Arms & Explosives

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CURRENT TOPICS.

The Naming of Belgian Proved Guns.—It is difficult to estimate the precise view of the Birmingham Gunmakers' Association concerning the marking with English names on Belgian proved guns. According to the chairman of that body, such a practice tends to mislead the purchaser into supposing that the gun is of English origin. From our own point of view, exactly the reverse would seem to be the case; for the Belgian proof-mark is the most unmistakable sign possible of Belgian origin, though, of course, a Belgian name as well would no doubt add to the information conveyed by the proof-mark. Exactly what the Birmingham Gunmakers' Association wants to do is extremely difficult to see. The Proof House has already ample powers to punish the offence of putting an English name on a Belgian-proved weapon, unless and until it has been reproved in this country. Surely this is a purely Proof House matter, in which the Proof House would act as prosecutor, and not the Association, which seems to speak as though it were the authority destined to administer the Proof Act. Furthermore, it would be advisable if the Birmingham Association would say how they think Belgian productions should be treated. The obvious way of avoiding the offence described is that which most of the members adopt who do a large trade in Belgian arms, viz., to avoid all signs of Belgian origin by having the guns English proved throughout. We have often had occasion to notice that in discussing the working of the Proof Act there is a tendency to treat it as a sort of Merchandise Marks Act. The Proof Act is intended for the protection of the public against unsafe fire-arms; and for better or for worse the Belgian test is recognised as guaranteeing an equal degree of security to that which is adopted in London and in Birmingham. The clause which makes the English naming of Belgian-proved guns tantamount to cancellation of the proof is a little out of character with the rest of the Act. It is, in fact, a sort of Merchandise Marks clause, but it carries with it an inviting right of way through which the proverbial coach and horses could be driven.

The Remedy.—If Birmingham gunmakers really wish to prevent Belgian-made guns masquerading as English, they should stop the stupid pretence that it is a Proof House question, and deal with it solely under the Merchandise Marks Act. In actual operation, this Act makes it necessary for all goods coming from abroad to bear the mark of origin, which generally takes the form in the case of Continental guns of the inscription "Made in Belgium." The Act of Parliament lays on the Custom House officials the obligation to insist on a true mark of origin in respect to all goods passing through their hands. This works perfectly in the case of finished manufactured articles, but it does not provide for departmental action in relation to goods which are mainly manufactured abroad but are finished in this country, the true mark of origin disappearing in the process. In the case of guns and actions that are consigned from Belgium to English buyers, it is accepted as sufficient mark of origin if the words "Made in Belgium" are daubed over the top rib by means of

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acid. The action and barrels are then duly proved in all respects the same as if they were of English origin. The manufacturer who stocks, finishes, and generally carries through the final processes, adds any English mark or name of origin he thinks fit, and both the Government and the Guardians of the Birmingham Proof House leave him unmolested.

Summary.—In other words, while the public might be excused for supposing from the published reports of the annual meeting that it has been decided to stop the marking of English names on Belgian guns, as a matter of fact that seems to be furthest from the true intentions of the Association's officials. If they wish to tackle that side of the case, they have only to arrange a friendly action in respect to any one of the thousands of Belgian guns that come over to England for the English proof, and are marked with English names, and the decision of the court would be that such guns are truly of Belgian origin, and that it is an offence under the Merchandise Marks Act to name them as though they were English, and they would confirm their decision by inflicting a fine. Then the Birmingham Association would be in possession of what is already common knowledge, viz., that obvious offences against the Act which are committed within the borders of the country can only be punished upon the complaint of an aggrieved party. If, therefore, the representatives of the Birmingham gun trade feel aggrieved (as they seem to be according to their published words) by a practice that has been going on since they were children, it can be eremptorily stopped by taking action against offenders, and then letting it be known that such prosecutions will be continued so long as defendants are forthcoming. Such prosecutions present no greater legal difficulties than those which the Gunmakers' Association of London instituted against another class of offender under the same Act. All that is wanted is a fairly sound definition of the dividing point between an English gun of which certain accessories have been made in Belgium, and a gun which has reached so advanced a stage of development before coming to this country as to be substantially Belgian. The case could be tested in relation to the ordinary rook rifle, or Francotte's falling block high-velocity express rifles. If the Birmingham trade want to deal with the grievance to which they have drawn attention, the way is very easy; but at present we must submit that there seems a disposition to talk a good deal about the protection of British trade, at the same time burking the real question at issue, viz., whether or not the Birmingham trade are prepared to enlighten the sporting public as to the exact extent to which many supposed English gun and rifle operations are dependent on Belgian assistance.

The Encyclopædia Britannica.—An article will be found on another page in which it may seem that we handle with somewhat of a mailed fist the contributions on shooting which grace the new volumes of the *Encyclopædia Britannica*. In so far that this publication is generally regarded as a prized national possession, recording the up-to-date condition of the manifold questions of art and science, we cannot but regret the inadequate fashion in which that which relates to shooting seems to have been carried out. It will be remembered that the subjects of guns, rifles, and pistols were similarly mistreated in the *Encyclopædia of Sport*. In fact, so great was the disappointment that an otherwise fine volume should show such a serious lapse in so important a branch of sport, that the publishers issued a circular to nearly every gunmaking concern in the country asking for particulars of their manufactures, in order that the defect could be remedied in some future publication. As is only too well known, nothing whatsoever came of that attempt to systematise the up-to-date developments in the practice and mechanics of shooting. Now another opportunity has been lost, this time by the publishers of a volume who undertake a far more serious mission than the mere cataloguing in a popular fashion of the representative sports of the country. Either there is something that makes shooting information impossible to procure, or else insufficient care has been taken to collect the material that lies to the hand of anyone willing to take the needful amount of trouble. Our own action, in condemning the shooting articles as a whole, has been taken after mature consideration. We think it desirable to place on record our repudiation of them, since we consider them unworthy of the developments they profess to deal with. If, therefore, in future ages the at present new volumes are quoted as an index of the state of affairs now existing, we must at least hope that someone will delve into some bin of back numbers and find a copy of this journal, where the merits of the articles are discussed from an independent standpoint.

The late Mr. E. W. Wilkinson.—We very much regret to record the exceedingly sudden death of Mr. E. W. Wilkinson, Co-Managing Director with Mr. Ellis of the firm of Charles Osborne & Co., Ld., of Birmingham. When this well-known concern was registered with limited liability, we entered with some detail into its history and development, the article appearing in our issue of October, 1899. At the time we gave such complete details that it is unnecessary at this juncture to say more than that under the new *régime* the firm of Osborne has increased its connections and developed its business, Mr. Wilkinson remaining, as heretofore, the man of grit and energy that settled things with a promptness and decisiveness that enabled him to get through a vast amount of work. As the portrait we then published showed, he had a determined expression, a trait that was reproduced most strongly in his character. Bluff and hearty in his manner, his welcome was always genuine; but he did not waste time in preliminaries, and consequently if there was any business to settle he liked to know without delay what was expected of him. In the Proof House he was a most valued member of the Guardians, his interest in the technical school and other modern developments being most keen and thorough. The news of his death did not come to his friends entirely as a surprise. The present writer was talking to the Master of the Birmingham Proof House on the Wednesday, and was told that Mr. Wilkinson had been ill with heart affection. To the surprise of both, a ring at the telephone showed that Mr. Wilkinson was out and about, and a spirited conversation ensued with reference to Proof House business. The following day he was again at business, and it passed in the usual manner. He apparently fell asleep after retiring to his room, but it turned out to be the last sleep of all. His age was 62, and he leaves a widow and two children, the son being in the business and thoroughly *au fait* with its manifold details.

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SINGLE-TRIGGER EXPERIMENTS

IT is a most remarkable thing that nearly all of us have accepted the rebound from the shoulder as the correct explanation of the involuntary pull that has to be taken into account when dealing with single-trigger mechanism. Notwithstanding all that has been written about recoil, and our knowledge that the maximum rate of recoil is about 12 feet per second, and its average distance when firing from the shoulder about three inches, we have always assumed when seeing a gun fire two barrels at once that the natural explanation was that the forward jump of the gun after recoil caused the trigger to strike the finger. It was, however, pointed out by a correspondent, who signed as "X" in the columns of the *County Gentleman*, that the time element and various other considerations hardly seemed to agree with the assumption that had hitherto obtained currency. Many of us were wearied with the columns and columns of verbiage which were introduced into the discussion of this simple question of fact. The need was obviously for a crucial experiment, and the shooting representative of our contemporary was able to arrange this with the valuable collaboration of Mr. R. W. S. Griffith.

All that was wanted was to measure the duration that ordinarily occurs from the commencement of recoil till the gun has reached the end of its course. Such a measurement would represent the minimum interval that must elapse between the firing of the two barrels, supposing that the currently accepted theory was the correct one, and, as a result of the tests that were conducted, this time was fixed midway between one and two-tenths of a second, which is a period that the senses can readily appreciate. As our contemporary pointed out, there is no appreciable interval of time between the discharge of the two barrels when the second goes off as a result of the involuntary pull. To clench the argument, the time interval between the firing of the two barrels with a defective single-trigger gun was next taken, the actual measurements being made by means of wires stretched across the two muzzles and connected with the chronograph. The time registered was ·02 of a second (one-fiftieth), which is just on the accepted margin that divides those intervals of sound that can be appreciated by the senses from those which cannot. In fact, it is just this interval of time between the fall of the hammer and the arrival of a charge of shot at the muzzle which is treated as marking the commencement of noticeable hangfires in testing the rate of ignition of various powders.

Accepting the very obvious inferences from our contemporary's intelligently conceived experiments, we can henceforward assume that the involuntary release, which precedes the involuntary pull, must be attributed to the first forward movement of recoil causing the gun to get clear of the finger the subsequent pull being accounted for by the tension on the finger causing it very quickly to catch up the retreating trigger, this occurring almost immediately after the hand has begun to partake of the backward movement of the gun. In fact, the whole explanation of the question seems to be that the gun, especially when loosely held, recoils independently of the shooter's hand for a certain distance, and that as soon as the hand is involved in the backward movement the unconsciously released tension of the finger is once more tightened.

Considerable credit is due to our contemporary, first for opening its columns to so abstruse a discussion, and secondly for evolving so convincing a settlement. To Mr. Griffith also is due the thanks of the shooting community, to whom he has acted in this, as in other matters, as guide, philosopher and friend. Finally, to that veteran single-trigger expert, Mr. Robertson, must be accorded a further vote of thanks, he being responsible for preparing the guns necessary for the tests.

THE FUTURE OF CHEAP SHOT GUNS.

A great many persons have remarked of late years upon the difficulty met with in Birmingham to rival the cheap models of shot guns which are put on the market by Belgian manufacturers, either from their own country, or in the guise of English weapons by the collaboration of some trusty agent who trades as a gunmaker, and applies his name to the goods that pass through his hands. Rock bottom prices for such work are soon reached, since they represent the maximum value that can be got from the garret workers who carry on their occupation under the degrading conditions of long hours and small pay. In this particular, the Belgian worker seems almost to thrive upon a rate of pay which the Birmingham operative would find wholly inadequate.

The difference between holding and losing a market in the cheaper grades of gun is mainly a question of a certain number of shillings in the price. The methods of manufacture observed in the two countries are much the same; consequently the variations in quality and effectiveness are too slight to be material. What the Belgian manages to impart in the way of extra finish is accounted for in the gun of Birmingham make by superior hardening and generally greater degree of soundness. So long, therefore, as the competition is mainly a question of price, things are likely to drag on for some time to come, and any alterations that may occur will be of a gradual development, the masters having mean while plenty of time to look around, and in some cases find fresh outlets for the activity that is crushed by the undue reduction of prices. If any really serious situation arises needing active and immediate measures by leaders in the trade, the promoting cause is not so likely to come from Belgium as from America.

In the United States they are a great shooting people, and a large amount of their sport is carried on at clay birds, which provide a far more vital test for a gun than ordinary game shooting. Thus, even if we may not admire the lines of the American shot gun, we must admit that a very large proportion of the American output in shot guns would satisfy a systematic test for velocity, pattern and general effectiveness from the shooting point of view. We cannot deny the ugliness of the average American weapon, and we can hardly admit, even after English models have been carefully imitated, that the result is by any means artistic. So that, while according to the British gunmaker a degree of individual skill far ahead of that possessed by his American confrère, we must remember that our own methods of manufacture and general trade organization do not give us full value for the skill that is available. For instance, we all know the vast importance of carefully chambering a gun. A small plant on the lines of a machine

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in use at the Webley factory would perfectly chamber the whole of the guns turned out in England, and yet we do not believe that more than a very small proportion of the total number of guns manufactured in this country are chambered in a manner above criticism. We are willing to admit that the standard of skill necessary to make a moderately ill-formed chamber with the old-fashioned and unsuitable appliances in general use, is far greater than to do one properly on the system adopted by such a firm as the one named, who have tackled the problem on ordinary engineering lines.

Granting the existence of other cases where everyday practice is inconsistent with recognised laws, we maintain that the skill available in the English gun trade is not organised and applied in the manner best calculated to give English guns the supremacy in quality that they might well acquire. What is done in the best guns might be carried out in a proportionate manner with all the other grades, and as a consequence there will be a tangible superiority in English weapons that would prove a splendid means for holding on to our share of a remunerative branch of industry. There is unfortunately a tendency to regard the working of a shot gun as more or less in the nature of a mystery, this allowing excuse for each man to build up and apply in his own way a large number of imaginary laws, which he presumes are based on practical experience. As a matter of fact, the information available to the gunmaker in a small way of business is hardly on a sound enough scientific basis to enable him to go into the radical principles of a gun's shooting, such research being more appropriately left to the laboratories of the powder and ammunition firms. The work of the gunmaker is largely mechanical, and he should endeavour to arrange that his weapons are mechanically perfect and do not infringe the laws of accurate construction.

It is in the application of the last-named system of working that the American manufacturer is likely to challenge the supremacy of the English gun. His labour is far too expensive to enable individual intelligence and ideas to be applied to every individual fire-arm. What he endeavours to do is to apply skilled individuality to the original model, and he puts into it all that his designing power and experience allow. He then has before him the model of a gun. Many an English mechanic could show that by such and such an alteration of the centres of the limbs and of the position of the bearing parts, efficiency and strength would be increased without adding to the cost, and yet these faults of ignorance are inherent in many types of American shot guns whose other good qualities find them a large market. The Stevens single-barrel weapon, for instance, has an enormous sale, and is far preferable to the so-called converted Chassepot of Belgian origin for the hedge popper and boy about a farm who wants a gun but cannot spend more than about thirty shillings on it. On the other hand, everyone will have noticed that the extractor of this gun only occupies about a quarter of an inch of the circumference of the rim, instead of the much larger distance that is known to be necessary. There are no apparent mechanical reasons why this should have been so arranged, and hence we must assume that this is an example of a case where an American model is open to an improvement which would enhance the quality and effectiveness without affecting price. The Winchester pump gun is an example of American enterprise in which an absolutely sound gun that will stand an immensity of knocking about is produced at a price that will allow it to be retailed at less than £5. The single-barrel greatly simplifies the problem of boring, and allows for a big margin of strength, while the repeating mechanism gets over the difficulty of having to reload after every shot. Finally, when we turn to the genuine American double-barrel guns we find a good rough soundness of construction that affords the desired combination of strength and good shooting.

Here in England we talk too much about the shooting of guns, and study it too little from the mechanical standpoint. Those high priests of gun boring, who are ready to tinker with every barrel that is placed in their hands, and the large class of self-styled cartridge loading experts who are prepared to work out a special load for each gun, or at any rate pretend to do so, are standing in the way of the only sound development that there is really room for. We refer to the need for building guns mechanically true to the recognised bore, and stopping when the barrels are mechanically true to the sizes that are commonly understood to be correct. The considerable differences between one gun and another from the point of view of their actual shooting is, at the present time, the greatest fault of English gunmaking. It would be so simple a matter for every retailer to keep by him a few plug gauges, and insist that all barrels delivered to him should lie within specified limits, that it really seems as though the omission must be due rather to want of knowledge than actual unwillingness to apply a necessary test.

Once the manufacturer felt the necessity for recognising the existence of certain standards governing the construction of his fire-arms, a change would soon follow. The bread-and-butter side of gunmaking is not nowadays recognised as a mystery, nor is it as much of an art as many would make out. It is a question of solid businesslike manufacturing, and the intelligent compliance with a number of fairly elementary rules—that is, elementary from the standpoint of the man who has spent his life in the overhauling of fire-arms. When, however, we find that guns turned out by firms of experience contain elementary points of error, it must be recognised that there is something wrong in the manner of working; but it is not easy to make sure of touching the weak spot. The difficulty, in our opinion, is that the large body of highly skilled workers in the trade are labouring under the disadvantage of putting too much of their individuality into a small number of weapons, so that the remainder suffer from the unskilled attentions of those less versed in the intricacies of the mechanism. Modern methods of manufacture increase the responsibilities of the highly skilled mechanicians who act as supervisors of their fellows, while the actual routine processes are conducted by a lower grade of workman, deriving his power to do sound work from the superior appliances designed and organised by his superiors, and from the existence of a thorough system of inspection.

It would be difficult, without going into every detail of a gun's construction, to say just where the errors of our present methods occur. We have selected the barrel as showing the greatest divergence, and as capable of the greatest improvement from the point of view of the shooting user, and we really believe that by laying down rules for their construction, and sticking to them, the general average would be improved. In the American guns which we have examined there is a far greater conformity than we have met with among English guns of equal price, and as the user is very quick to pick up these little points of difference, especially those which affect

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his success in the field, we must remember the good old rule that prevention is better than cure. It is for the English gun that we would like to see the reputation for uniformly good shooting and well-spread patterns. Strength, soundness and good appearance all go by the board if the shooting is bad, and we, therefore, urge upon the gun trade the need for meeting the more modern phase of competition, by attending more particularly than in the past to those points of quality in a gun which can be improved without enhancing cost. Technical education is a very fine remedy for many of our commercial maladies, but unfortunately the masters frequently look upon themselves as past cure. What we should like to see is an ever-increasing proportion of the master men in the business taking a personal interest and pride in keeping up with the technical aspects of their calling, and seeing that needful reforms are enforced by intelligent overseers.

INCIDENTAL JOTTINGS.

WE ARE A HAPPY FAMILY WE ARE

The year 1902 was no exception to its predecessors in the magnificence and munificence of the Royal Ordnance Foremen's Association banquet. Those outside the pale call it the general meeting of the Ordnance Factories, Unlimited, where they declare a handsome dividend in self-congratulation and mutual admiration. I should be the last to poke fun at this excellent institution, but the novel idea of the staff entertaining the "Directors" is amusing to us as shareholders. It is a refreshing contrast to the ordinary tendency of commercial practice, but then Government establishments are generally run on these lines! The logical conclusion which these Ordnance Factory Foremen have undoubtedly arrived at is, that they must load and prime their big guns to get a good "report"! The wisdom of their action is exemplified in the columns of the daily press, which show that this "muzzle-loading" achievement at the Holborn Restaurant produces a very big hit! No one will deny that the occasion does not merit their joyful thankfulness. Happy, happy "salt of the earth." Happy with a constant supply of work. Happy with an enormous grant of money to spend. Happiest in the knowledge that that enigmatical compilation of financial jugglery known as the "Ordnance Factories accounts" will never show where it goes to. A toast! a toast! and musical honours—

The Ordnance Foremen gave a dinner,
The contractors stopped at home;
The Ordnance products got praises,
The contractors they got none.
And the officer guests cried "we," "we," "we," "we,"
Until it was time to go home.

THE BIG "POT" AND THE "KETTLE."

But after the feast comes a reckoning. Was there a Judas there that night, stimulating with praise, whilst secretly conniving at their downfall? Heaven forbid! Better to look for him amongst those who stayed away than to conclude that the eulogy was only a veneer, brightly polished to dazzle the worthy hosts, compliments of shoddy material, value for money! Then comes the sequel that the Government are dissatisfied with their managers and foremen, and would have a committee to enquire and ascertain if they are worthy of their positions, or whether they are not sadly out of date by comparison with men of similar positions, such as are employed by contractors; and, finally, whether the staff should not be well primed and new blood infused. We all know these committees. We have heard our fathers speak of the barber-surgeons, who bled their patient for every ill. History repeats itself. It does not want a committee to find out that the disease is only a contagious one disseminated in the red-tape from Pall Mall.

DIAGNOSIS AND PRESCRIPTION.

Honestly, if we enquire whether the staff of the Ordnance Factories is the best, we cannot say it is, nor do we say it is the fault of the men in question. But one thing is clear, which is, that *under the circumstances* the staff is as good as it can be. What prospects have these foremen? What pay have these managers? What possible realisation of any ambitions is possible, when the military officers take all the "plums," and are content to take them at a salary far below the commercial value? Not that I infer that they are worth more, but the good posts would in the absence of the officers element go to responsible and fitting men, who have had their spell at the bench. More than half the time is taken up in educating these officers into the mysteries of engineering, which, not being a hereditary gift, and they not having received any training for such work, it is impossible for them to do it without string pullers, prompters, and other means of cramming them with the necessary knowledge. The period of their education is all lost time to the Department, as these officers, being "birds of passage," move away just as soon as they begin to know what to learn. This is no reflection on the officer himself; you might just as well expect him to be an expert dentist, ship pilot, or brewer, with the training he brings to the Ordnance Factories. Consequently, whilst the civil staff have to utilise their talents as schoolmasters and nurses, the work receives their second thoughts much to its detriment. Now, if they put a military officer as a junior to a competent man he would learn just as much, and the work would not suffer. But it must be a competent man, and the bait at present offered is hardly enough to catch him, whether from the Factories or from the ranks of the contractors.

TOMMY ATKINS, PROVIDENCE, AND THE MINISTER.

There is one very striking passage in De Wet's book, just published, which throws a very strong light upon the inefficient training of our soldiers as rifle shots. At Springhaansnek he had, with 8,000 of his men, to run the gauntlet between two forts situated from 1,000 to 1,200 yards apart. For a distance of over 3,000 yards (or paces, as he calls them) they were entirely visible from both forts, without any cover whatever. They raced these 3,000 yards "whilst a storm of bullets was poured in among them from both sides," and no single man was killed, only one injured!!! Perhaps De Wet was wrong in the distance, or it was dark, or the incident exaggerated; but if it is even partly founded on fact, it is apparent that the bag was an astonishingly small one! De Wet ascribes it to the irresistible protection of the Almighty

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So the Hythe instructors can breathe again. We can yet believe in the inborn sporting instinct as an English tradition. This reminds me of a delightful story in one of the newspapers recently of a would-be sporting evangelist who was out for his maiden shoot. The host found himself being prodded in the back by the muzzle of the reverend sportsman's loaded gun, and being asked in plaintive tones if he could show him "how to let these beastly things down" (the hammers!) History does not repeat the host's remarks, which possibly were—Here endeth the first lesson!

A BURNING MATTER.

Why have the insurance companies a holy terror of the very name "explosives," unless it is viewed through a half-guinea per cent. rate as a minimum? There is no excuse for their appalling ignorance on the subject, for theirs is a business which exists entirely upon statistics. In no trade are statistics so exhaustively published, the rules for prevention of accidents so rigidly enforced, the risk so broken up into small losses, as in the manufacture of explosives and allied productions. In addition, every accident which might result in a claim is reported upon, and if any serious damage to life or property occurs, a Blue Book is issued giving the minutest detail on all points, in fact such as would satisfy the most critical insurance company as to the origin and *bonâ fides* of the claim. The consequence is that sooner than agree to the prohibitive rates of the insurance companies, it pays the explosive companies better to put aside two shillings per cent. as a fire reserve fund, and in time it yields a handsome profit. This is all due to the exaggerated stories as to the dangers of explosives. But I am bound to admit that the extraordinary care and precautions exercised in explosive factories tender to engender, instead of allaying, the timidity of insurance surveyors, whose nerves are somewhat upset by the heavy premiums they dream of and do not get.

THE ROYAL MOTOR ARTILLERY.

Those who were tempted to the Salo d'Automobile Show in Paris must have been disappointed at the stagnation of ideas in motors for practical military purposes. There was one 15 h.-p. motor, with a machine gun fitted thereon, capable of firing 600 rounds per minute, and certainly this armour-plated scorcher, with its magazine and gunners, looked very business-like. But what about firing on a base of pneumatic tyres? It is certainly easy to introduce a trail or other means of taking up the shock of discharge other than on a puffy air tyre. Certainly there seems a great field for motor gun-carriages. And we heard rumours of something great coming from one of our big gunmakers and a well-known motor-car firm, which was to put Pom-Pom guns or field-guns on a far more useful carriage than the ones at present employed. When one sees the merry steam trollies gambolling about Whitehall with heavy cargoes of stone to build the new War Office with, it raises a wonder why so little has been done in the way of motor batteries of artillery. The difficulty is of course to secure the right kind of collaboration between the artillerist gunmaker and the automobilist. With such resources as our big gun firms command, there should be but little difficulty in acquiring the needful motor technique.

CYCLOPS.

THE CHARTERED INSTITUTE OF SECRETARIES.

THE past six months have contained two items of interest that relate to the social side of the company world. We refer to the lapse from greatness of the Article Club and the important accession of influence that the Institute of Secretaries has achieved. The first-named society showed that the business world is quite ready to unite under the banner of any organisation that will be representative of sound commercial institutions. But, unfortunately, the sources of enterprise in the body referred to were too much mixed up with the personal gain of a single individual, with the result that what appeared a splendid fabric was publicly discredited. As regards the Institute of Secretaries, we have been interested observers of its progress almost from its first inception. It has not been worked to gain the applause of the multitude, and yet it has achieved a position and an influence that speak well for the soundness of the policy with which it has been identified. A little consideration will convince any thoughtful person that an overwhelming proportion of the activity of the country is carried on in the form of associated enterprise. The growth of the company system has, notwithstanding a large number of unfortunate exceptions, placed the industrial organisation of Great Britain upon a sound footing of good management and well-ordered finance. In a similar manner the three rules for success—first to organise, second to organise, third to organise—have been carried out in a very literal spirit, as shown by the large number of trade protection and other societies calculated to advance the common policy of their constituents.

MR. L. G. DUFF-GRANT.

As is well known, the secretary is a very influential person, no matter how his rights of independent action are curtailed by statute. He is very frequently the one man who is conversant with all details, and his training and surroundings enable him to attain the ends he thinks best, even when he seems to be no more than a mere automaton. In reference to joint-stock companies, the secretary is even more. His position, strictly speaking, is not only that of a servant to the board of directors, but also the shareholders, and as such the person without whom progress is impossible. While we have no wish to glorify the secretary for the purposes of this article, we must at the some time admit that an institute which is formed of secretaries contains a greater proportion of truly practical business men, who are intimately in touch with the commercial pulse of the world, than could be met with in the membership of any other commercial body.

The founders of the Institute of Secretaries fully appreciated the importance of a secretary's functions when they set themselves to raise the calling to the status of a recognised profession. While conversant with the large amount of hard work that has been done, we must at the same time recognise that the occasion was ripe at the time of the Institute's

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initiation for more fully defining the responsibilities of the secretary as a means of increasing his aptitude and usefulness. Now that the Institute of Secretaries has been incorporated by Royal Charter, the members of the society are in a fair way to consider themselves "chartered secretaries," in just the same way that we hear of chartered accountants. The effect of such a change of nomenclature will no doubt be a desire on the part of all secretaries not yet members of the Society to join it, and add the magic word to their description. As time goes on, the Institute will be able to lay down a certain standard of action for the observance of its members, and by carefully regulating the admission of future candidates for election the business world will see the growth of a body truly representative of its best interests.

We referred in the first part of this article to our interest in the doings of this Society from its earliest days. That interest, we may explain, was stimulated by our personal friendship with Mr. L. G. Duff Grant, the Secretary of the then Smokeless Powder Company. We regarded him as in a measure the representative of the gun and explosives trades on the direction of this body; and as the Institute became more and more important, we were kept duly informed of the various stages of its progress. Now that the summit of the early ambitions has been achieved, and the members have celebrated the granting of their charter at a public banquet, we feel that no apology is needed for introducing the subject to our readers, particularly as the occasion for doing so affords an opportunity for referring to Mr. Duff Grant's connection with the Institute.

We remember him as its first Treasurer in the year 1892, a position which he held until 1895, when his journey to America necessitated his passing over the work to someone who could guarantee remaining on the spot. He, however, retained his position as a member of the Council of the Institute, and his constant and business-like attention to its needs have made him a very valuable member of its organisation right up to the present time. It is, however, as an expert in company matters that Mr. Grant's qualifications are most notable. Since 1877 he has been actively employed in business operations of one kind and another, his experience with companies dating from 1883. His record also includes an appointment which he held for some time in the share and loan departments of the Stock Exchange. Since 1888 he has been connected with the powder business, and in one form or another has had experience of almost every kind of company operation. Apart from the actual work he has carried through, he has consistently studied the subject as a science, and in consequence there must be very few who know the ins and outs of its manifold complications in a clearer manner than he does. This, in our opinion, is why his services have been so much appreciated on the Council of the Institute.

MR. ARTHUR H. KANE,
Last Year's President.

Personally, he is still in the prime of life, so that while his career has been to some extent overshadowed by complications that have ever marred the progress of the Company referred to, we are glad to say that his individuality has more than survived the ordeal. Gunmakers will ever be grateful to him for the hundreds of circulars he issued with a view to organising opinion in connection with the storage of nitro-compounds. The state in which he was able to hand the question over to the Gunmakers' Association enabled the latter body to carry through a much needed reform by means of suitable representations to the Home Office. Therefore, in referring to Mr. Grant, we cannot omit to remind our readers that the present facilities for the storage of nitro compounds in registered premises are largely due to the prompt steps he took at a well-chosen moment. As may be judged from his name, he is a Scotchman, Aberdeen University having turned him out ready for the world of business in which he so soon became actively employed.

MR. J. STEPHEN JEANS.
This Year's President.

It is not our wish, in speaking so fully of the one member of the Institute whom we have known so long, to suggest that he has had any kind of monopoly in doing the good work of which the results are so self-evident. In fact, an Institute of this kind is essentially the outcome of joint efforts, not, we should say, of the whole of its members so much as of the small number of them who act on the Council and in other official positions. We, therefore, think it appropriate in writing about the Institute of Secretaries to include in our personal references the last President of the Institution in its old form, and also the official who holds the position under the new terms. It was Mr. Arthur H. Kane, of the Reading Gas Works, whose presidential activity was most useful in carrying through the delicate negotiations that ultimately endowed the Society with its new charter, and it is Mr. J. Stephen Jeans who takes over the office as first President under the new *régime*. Mr. Stephen Jeans probably requires but little introduction to the business world. He has ever been connected with iron and steel. In fact, both as a society secretary and in his journalistic career, his contact with the subject has been continuous, and, therefore, he may be regarded as a typical president of a body which aims at improving the status of associated enterprise, by raising to the professional rank those who exercise the important functions of secretaryship.

THE WAR OFFICE AND THE PRIVATE INDIVIDUAL.—An interesting feature of the relations existing between the War Office and the general public is illustrated by a correspondence which has recently been made public. Lady Meux, of Theobald's Park, instructed her solicitor to apply to the War Office for compensation in respect to the frequent shattering of the windows of her mansion, which was due to the firing of big guns on the Government grounds at Waltham Abbey. In reply, the Secretary of State for War, through the Accountant-General, informs the applicants that "no liability can be accepted by this Department for damage said to have been caused by the firing of guns at Waltham Abbey, and that no compensation for such damage can therefore be made from Army Funds."

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THE "BRITANNICA" ON SHOOTING.

A LOST OPPORTUNITY.

THOSE who took the trouble to read the advertisements that heralded a new series of volumes to bring the *Enclyopædia Britannica* up to date, were led into the belief that a special effort had been made to live up to the programme so exultingly announced. We were among those who mildly hoped that in the section on shooting justice would be done to the remarkable developments that the past twenty years have seen in this direction, and also that due account would be taken of the relation of these changes to the life and work of the universe. The last of the new volumes of the *Encyclopædia*, which covers from Pribiloff Islands to Stowmarket, seems to contain the bulk of the shooting information with which we are to be favoured. There is no reason to grumble at the amount of space that has been devoted to the subject, but in the matter of quality there is a sad lapse from the standard observed in many of the other branches of science which have been rewritten so as to keep pace with modern developments. The only exception that we can allow occurs in connection with an article on "Propellants," the author of which is Major F. L. Nathan, R.A., superintendent at Waltham. He is really expert at his subject, and he has endeavoured to express in a manner understandable by the intelligent general reader the subject-matter indicated by the heading adopted. As might be expected, he has mainly devoted himself to Cordite, touching only briefly on the various sporting nitros.

It is not, however, to Major Nathan's article that we propose to devote any considerable attention, but rather to those which aim at dealing with the more popular aspects of shooting. These include an article on the "Rifle," by Sir H. Seton-Karr, M.P., another on "Shooting," by Mr. P. Stevens, and two more on "Small-arms," one by Major H. W. Barlow, R.A., and the other by Capt. J. T. Thompson, dealing with American productions. We propose to examine them *seriatim*.

THE SETON-KARR ARTICLE.

This opens with the refreshing information that a rifle is a musket with a grooved bore, which leaves the reader in doubt as to the definition of a musket. Then we are told what are the objects for imparting a spin to the bullet, among which the gyratory effects seem to be ignored. Bearing in mind the object of the present edition, which is to bring the reader up to date since the publication of the main edition, it would almost appear that a reference to Louis XIII., the naming of the sum that Mr. Greener received from the Government in the middle of last century for the expansive bullet he produced in 1835, and the exclusion of a quantity of equally ancient and rather overdone historical-matter, represent a sad waste of space that might have been effectively utilised in telling us of the doings that more properly belong to the age in which we live. In fact, the titled author might just as well have referred his reader to Greener's book and the *Text Book for Military Small Arms*, as have written up, in a not very illuminating fashion, a large amount of information about the past, which is rendered superfluous and out of place by the fact that the comprehensive method of treatment stops the moment he has finished with ancient curiosities.

We may, however, dismiss this part of the article by asking our readers to note the remarkable paraphrasing that exists between it and the *Text Book for Small Arms* as above. Considering that the current edition was published in 1894, we are not astonished at the lack of modern information displayed by the author. He, however, seems to be well acquainted with the various editions of the National Rifle Association's annual reports, and consequently we see a further course of rifle history covering the period of the Association's existence and records, together with a few excerpts from their definitions of rifles to be used in target competitions. A paragraph on modern American target rifles, containing obvious paraphrasing of Gould's book, which was published in 1892, shows at least where some of the information has been obtained. We cannot, however, harmonise the use of the word "modern" in the title of this paragraph with the information contained therein. With reference to a six-line paragraph on Continental match rifles, we are surprised to see the stupid misspelling of the word scear by which it becomes "skear." In sporting rifles we naturally do not get very far, since only a little over a column is given, and we start as usual in the middle of last century. A quotation from Mr. Walsh's trials brings us to the year 1883, and we are then told that the usual rifling in modern express arms is from five to seven shallow grooves; and then we get another silly misprint, by which the lands of the rifling are spoken of as "bands." Considering that modern express rifles are dealt with in a matter of four inches, it is not perhaps remarkable that the greatest achievement of English gunmakers during the past decade is entirely ignored, viz., the production of the modern high-velocity express rifle firing a nickel-covered bullet.

Patience fails us to deal adequately with the article as a whole. It is padded out with some seven columns of laboriously compiled historical matter that is not justified in a volume whose sole purpose is to bring things up to date. The three remaining columns that profess to deal with rifles of the present day are painfully inadequate, and give rise to the suspicion that the author's own independent information is very meagre in quantity, and hence his reliance on far too limited a selection of more or less out-of-date text books. How on earth the editor of the sporting section of the *Encyclopædia Britannica*, who had the experience that comes of having edited the Badminton Library, accepted such an article as this, when such a practised writer and authority as the Hon. T. F. Fremantle exists, and would no doubt have taken up the work as a labour of love, we absolutely fail to see.

MR. P. STEVEN'S ARTICLE.

In this article it was doubtless the intention of the editor that modern game shooting as carried on in Great Britain should be properly described and dealt with. Bearing in mind the great changes that have taken place in the shot gun and its ammunition since the publication of the previous edition of the *Encyclopædia Britannica*, it is unfortunate that the entire subject is here dismissed—we cannot say dealt with—in a matter of six inches. We are told that for all practical purposes a 12-bore gun, weighing about 6¾ lbs., with 30-inch barrels, is the most useful for sportsmen of average physical capacity. We are told nothing about systems of ejection, form and amount of choke, nor does it seem that firing results are considered worthy of particular attention. Possibly it is just as well that the author did not risk his reputation in this dangerous quarter, for the samples of

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knowledge which he displays do not make us enthusiastic. He is most eloquent in advising his reader to place himself in the hands of a firm of London gunmakers of repute, and pay a good price for a good article. He enlarges upon the care bestowed on the fit and finish of a high-class London gun; but so as not to be too precise, he qualifies his remarks by admitting that there are many excellent provincial gunmakers, and that price is not invariably a proof of excellence. Having read all this, the reader will be forgiven if he is somewhat astonished by the information that a really first-class London-made, fitted and proved gun should be obtainable for £40 or £45, and a pair for from ninety to one hundred guineas. The author does not explain why it is that two guns cost more than twice the price of one. However, he escapes criticism by explaining that these prices are susceptible of considerable modification or increase (*sic*).

We then learn that single-trigger guns, the latest fashion, are not specially desirable, a remark that ignores recognised facts, and yet contradicts them in a half-hearted manner. Had he explained that the chief bar to the general adoption of the single-trigger is the mechanical one of providing an effective mechanism that any gunmaker could fit at a low price, he would have been nearer the mark; for it is well-known that those sportsmen who have adopted a reliable system of single-trigger find it far in advance of the old arrangement. Possibly we were a little unjust at the commencement of this notice in suggesting that the author did not deal with firing results in the ordinary shot gun; for following the reference to single-triggers we find a warning against excessive choking, and a recommendation of 140 pellets for the right barrel and 160 for the left, the reader being apparently assumed to know that this figures relates to the number of pellets contained in a 30-inch circle when the firing is conducted at 40 yards with 1⅛ oz. of No. 6 shot. His reference to the loading of nitro powders is very much to the point, his idea being that 40 to 42 grains of nitro powder with 1 or 1¼ oz. of No. 5 or 6 shot is sufficient for general purposes. General purposes is rather a vague phrase, and it is possible that some readers would like to know whether 42 grains of nitro powder and 1¼ oz. of shot is a suitable charge. Some even might wish to know whether Imperial Schultze, or E.C. No. 3, for instance, could be treated as typical examples of nitro powders, and therefore be loaded with these charges.

The remainder of the article, covering about three columns, deals chiefly with the writer's views on general game shooting, and being about on a par with the class of article one ordinarily meets with in sporting journals, we will not trouble our readers with any detailed references thereto, as we must assume that their interest is mainly in the technical branches of shooting.

THE ARTICLES ON SMALL-ARMS.

These two articles seem to show a great absence of editorial regulation, much of the ground traversed being identical with what was covered under the heading of rifles. In fact, it would be very difficult to draw any distinction between the subject-matter of Sir Seton-Karr's article on the "Rifle" and those on Small-arms, except that the "Small-arms" is perhaps treated as a more comprehensive term. Such difference as exists, is simply what one would expect to find between two writers dealing with the same theme.

Major Barlow sets about his task in the manner of one having a definite end in view. He does not pad out six columns with introductory matter, but he goes straight into his subject and confines his attention to those developments of the past two or three decades which have directly influenced the existing types of rifle, and his summary on questions of interest is brief and to the point. Where we find fault with his work is that he very quickly plunges into an abstruse description of various military arms by the aid of not over brilliantly executed drawings. The following is a sample of his method of description, which, in our opinion, is more suited for patent specification than a five-page treatise on small arms:—"Movement backwards is prevented by the rib *p* being brought in front of the lug *q* on the body *b*, and a projection *r* being turned into the groove *s* in the interior of the bolt-way." The reader would have been far more illuminated in his mind had the author explained in simple language the leading features of our service rifle, which comprise (1) a badly locked bolt supported by lugs at its rear end instead of at the head, (2) a stock which for some unknown reason is made up in two pieces, and (3) an incoherent sort of magazine, which reduces the soldier to single loading when once his reserve of ten cartridges has been used up. It might not have been politic for the Secretary to the Chief Superintendent of the Royal Ordnance Factories, Woolwich, to have been too funny at the expense of our service rifle, which is praised far beyond its merits by the Commander-in-Chief, an example which the rest of the service seems obliged to follow. One or two well-made woodcuts would have been far preferable to the dozen drawings which show the rifle in its various positions, the absence in these drawings of proper shading making it very difficult to distinguish the true arrangement of the parts.

After dealing with the English service rifle, that of Austria-Hungary next receives attention. When, however, the author comes to the German rifle he shows himself to be rather out of the running. He deals with the model 1888 German rifle, and speaks of it as the German arm, when the 1898 model has now been out for some years, and is about as radically different from the previous rifle as any two arms serving the same purpose could possibly be. There is hardly any excuse for ignoring (unless a footnote on another page is taken into account) such a well-known rifle. Towards the close of the year 1900 two articles appeared in *The Field* which brought the rifle question up to date, and dealt with a number of points which have been missed by Major Barlow. As a matter of fact, we think that Major Barlow's real trouble is that the existing edition of the *Text Book for Military Small-Arms and Ammunition* is out of date. The last edition was published in 1894, and had the author of the present sketch but known it, a new edition is in the printer's hands, which calls to our mind the fact that the talented officer, by name Capt. Wallace, who has re-written the text book and brought it up to date, would have been a very suitable person to approach had the editors of the *Encyclopædia Britannica* but known of his existence and special fitness.

Table VI. from the *Text Book of Modern Small Arms* is reproduced, with one or two additions and slight modofications. A marginal note, for instance, refers to the new model German rifle, the ignoring of which in the illustrated description has already been noted. The fact that this table represents the old and seasoned error of stating the calibre of the 6½ m/m rifle as equal to ·2569 of an inch, shows that no particular originality has been exercised in revising the figures that were put together about ten years ago.

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The fact of allowing a separate author to write a United States sub-section of "Small-Arms" has introduced a number of striking anomalies, the United States rifles being thus treated quite separately from those covered in Major Barlow's essay. Then there is a description of the Springfield rifle, which really causes us to wonder why the Martini, its English contemporary, has been ignored by the other author. Then, again, we have a description of the Lee Straight-Pull rifle, which, by all who know anything about the subject, is recognised as an exploded arm, since the ammunition for which it was built was proved ballistically impossible, with the result that a lighter bullet took its place, and the military usefulness of the rifle disappeared. From the context we should judge that Capt. Thompson knew nothing of all this. The other rifles that are described are the Winchester, the Remington-Lee, and the Savage, none of which it seems to us are of sufficiently military importance to appear in an article apparently devoted to military models. Altogether we fail to see why the United States has received the favour of a special article. It was probably the most backward of the great nations to adopt and develop military rifles and ammunition of the modern kind; and it made bad mistakes long after Continental nations had arrived at something approaching finality. No one admires more than we do the precedence of the United States in the manufacture of cheap and sound hunting rifles, suitable for use in wild countries, and we should have welcomed a really expert article on this subject, such as Mr. A. C. Gould could have written.

Captain Thompson concludes his article with three columns on American pistols. He refers in detail to the American service model of the Colt revolver, but he has nothing to say about the productions of the Smith and Wesson Company, which means that his treatise on revolvers relates to that which is strictly military. He concludes, however, with a long description of the Colt Automatic pistol illustrated with a sectional drawing and a general view, the letterpress being of the ordinary patent specification type, the same, in fact, that he uses in dealing with several of the other arms he favours with his notice. We will conclude by expressing regret that the extraordinary methods of editing the shooting subjects in the *Encyclopædia Britannica* have permitted the inclusion of a detailed description of the American revolver, and have entirely ignored those of all other nations, including our own.

TARGETS AT BISLEY.—It is announced by the Council of the National Rifle Association that the following alterations are to be made in the targets at Bisley for the 1903 meeting. The dimensions of the 1st class target are to be reduced laterally, from 12 ft. by 6 ft. to 10 ft. by 6 ft., the other particulars, as to diameters of the various rings, remaining at the figures that have for so many years been the accepted standard. With regard to the 2nd class target, on the other hand, while the outside dimensions of the target are still retained at the existing figures, *i.e.*, at 6 ft. square, it has been found desirable to increase some of the measurements. The change consists in increasing the diameter of the inner from 30 ins. to 32 ins., and of the magpie from 40 ins. to 48 ins. It will be seen that these new figures are a partial reversion to those existing prior to the 1901 meeting, before which date the inner and magpie were respectively 36 ins. and 48 ins. in diameter.

NOTES.

THE CAVALRY EQUIPMENT.—It appears that, after all, the question of how the cavalry is to be armed is not yet definitely settled. During the progress of the Boer War, and since, there have not been wanting those who have stated in definite terms the final doom of the sword and shock tactics. But apparently this radical change of equipment, and the conversion of the dashing cavalry soldier into a mere mounted infantryman, is not so lightly entered into by the War Office. While the carbine may quite conceivably give way to the rifle, it is extremely problematical whether the "white arm" will be abandoned, either for practical or for sentimental reasons. For the present, the most that can be said on the subject is that the question of what shall for the future constitute the equipment of the cavalryman is being closely considered by the authorities in Pall Mall.

ON SMOKELESS POWDER.—The Laflin and Rand Powder Co., of New York, U.S.A., have forwarded us a copy of an artistic brochure dealing with their specialities in smokeless powders. The pamphlet is beautifully printed and illustrated with views of the company's extensive plant at Pompton Works, an establishment which has a normal daily output of 5,000 lbs. of powder, which at short notice can be increased to 12,000 lbs. per day. The operations are conducted in some 130 buildings scattered over 350 acres in the northern part of New Jersey, so completely enclosed by natural ranges of hills as to secure complete isolation from the adjoining country. Needless to say, the plant is throughout of an up-to-date character, and is thoroughly equipped with laboratories and testing appliances for the oversight of every stage of manufacture. The firm's leading speciality for shot guns is the "Infallible" smokeless powder, which is a dense powder of almost complete smokelessness, while for rifles there are the "Sporting Rifle," "Lightning," "Sharpshooter," and "W.-A. ·30 Calibre" smokeless powders, and for revolvers the "Bull's-eye" smokeless powder. A feature of novelty in this handbook consists of the reproduction of facsimiles in colours of the various tins containing these powders, and full-sized photographs of the powders themselves, showing the differing qualities of grain.

A NEW FRENCH RIFLE BULLET.—Either the French authorities are more hysterical over their mishaps, or they are more peculiarly unfortunate in respect to the loss of their War Office secrets than are other continental nations or ourselves. Some years ago a considerable stir was made over the alleged theft of a Lebel rifle, presumably in the German interest; and not two years since the new quick-firing field guns had to be jealously guarded lest an enquiring expert should approach within half a mile of them. Now, according to the *Patrie*, a new bullet of marvellous behaviour is the object of foreign intrigue, and the recent theft of some ammunition at Lyons is said to have been due to the desire of some rival Power to ascertain the construction of the new bullet, Mark D, which has recently been experimented with at Chalons. It is possible to sympathise with the felonious intentions of any foreign nation when we learn that this new bullet has a "perfectly flat" trajectory up to a range of half-a-

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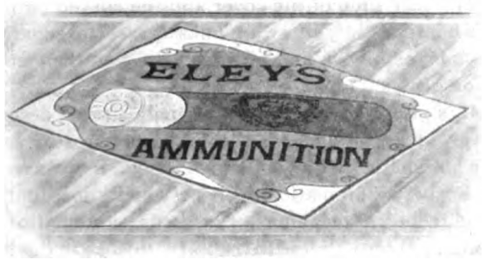
mile, and as a consequence will, on its adoption by the French army, considerably alter the conditions governing rifle-fire. Who would not break the whole Decalogue, to say nothing of one paltry commandment, for the possession of such a secret as that which is enclosed within the metal envelope of the D bullet? To be able to sweep half a mile of country in advance of a position without any adjustment of sights, and with the knowledge that there is no intermediate zone of safety in the enemy's advance, is a desideratum that can scarcely be affected by mere considerations of international morality.

A NOVEL ADVERTISEMENT.—Messrs. Eley Bros. have recently hit off a very smart idea in the advertising line. Realising that their goods are on sale at a large number of establishments where glass counter tops are used for the effective display of small ware, and knowing that some form of mat is desirable to prevent the glass from getting scratched by the placing thereon of hard articles, they have generously



provided the trade free, gratis and for nothing, with a smart looking mat, their only injunction being to put it in the most favourable position possible for enabling it to be seen. We asked our engraver to prepare a sketch of the mat, showing the manner of its use, and we show above the result of his handiwork.

NO SMOKE, NO FLASH, NO SOUND!—According to that trustworthy authority, the daily press, which in this case vouches for the accuracy of its information by adding an illustration, a French officer has recently brought out an appliance which does away entirely with smoke, flash and sound, as the results of firing a gun. So far as artillery is concerned, this end is achieved, apparently, by the attachment to a gun's muzzle of a long tube, the interior of which is divided up into compartments by means of cross divisions, each such division having a central aperture through which the projectile has free passage. The idea is that, as the projectile leaves the muzzle of the gun, the powder gases are admitted into the first compartment, thence, as the projectile travels further forward, into the second, and so on, these successive expansions gradually eliminating the flash and sound of the ignition before the powder gases finally emerge into the open air. As someone once remarked about something else, this arrangement will be splendid if it works out all right. We wonder, however, first, what the effect of the expanding powder gases will be on the extension tube and its cross divisions; second, what direction the projectile will take after running the gauntlet of all these cross divisions with the fiery untamed powder gases at its base; and third, whether the advantages to be derived from the invention will compensate for hauling about several feet of false muzzle on field guns, with an added weight of several hundred weight. As regards small-arms, to which we understand the system to be equally applicable, the answer to these conjectures may be given at once.

ROUND THE TRADE.

It seems that Major Denne, R.A., has been appointed Chief Inspector of Explosives for the Transvaal.

The directors of the E.C. Powder Co., Ld., have declared an interim dividend at the rate of 2s. per share.

Messrs. Buck send us for notice a neat dating stamp, which they are sending as a present to their customers.

The Navy and Army Illustrated of Nov. 29, 1902, contained a notice of the new factory at Acton of the Wilkinson Sword Co., Ld.

A deed has been registered in the case of John McLoughlin, trading as McLoughlin & Sons, gunmaker, of High Street, Cheltenham.

A newspaper cutting conveys to us the news that Messrs. Curtis's & Harvey have registered the word "Rippite" as a description for a certain brand of explosive.

It is announced that orders have recently been given by the U.S. Secretary for War for the construction and practical service trial of 5,000 rifles of the Springfield model as approved by the Ordnance Board.

Among the seasonable novelties we must not omit to mention our now well-tried friend, the monthly calendar, sent out by Messrs. Bennett, of fuse fame, the same being enclosed in a leather frame of true library solidity and neatness.

Our readers may be interested to learn that Mr. Dudley Wilson, who is not unknown as a sporting journalist, is shortly to appear on the boards as an actor and singer. He is, in fact, engaged for a tour with a new musical comedy.

A limited company has been registered under the style of Newnham, Ld., with a capital of £2,000 in £5 shares, to acquire the business of gunmaker and ammunition dealer, hitherto carried on as George Newnham, at 29, Commercial Road, Landport, Portsmouth.

Messrs. Kynoch, Ld., have given notice that they will apply to the Llantrissant and Llantwit Vardre Rural District Council for assent to the erection of a magazine for the storage of mixed explosives on Mwyndy Back Farm, Llantrissant, Glamorganshire, in accordance with the approval of the Home Office.

Messrs. Eley Bros. are among those who vie in adding a touch of colour to our office fittings. Some take the form of coloured notices to do various unpleasant things; but in Messrs. Eley's case the effect is a pleasant one, a richly bound leather tablet disclosing, when the cover is removed, a neat pad, upon which memoranda may be made.

The United States Cartridge Company have favoured us with a copy of a 122-page booklet on "Military Rifle Shooting," which they seem to have compiled with great care, much of the information being classified under the heading of the different States, in order to take due account of the variable customs that are peculiar to given localities.

Messrs. Curtis's and Harvey, Ld., have forwarded us copies of their useful little diary and pocket book for 1903, which is even neater and more compact than usual. It is bound in Royal blue leather, with gilt-edged leaves, measures 3¼ in. by 2¼ in. by $\frac{9}{16}$ in., contains two days to a page, and is fitted with a flap tablet to mark the place, and a pencil to make memoranda.

The Marlin Fire-arms Company and the Hazard Powder Company, both of the United States, have both sent us variations of the same design of calendar, that is, a neat card

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about six inches by three, representing a miniature edition of the larger American type wall calendars with which most of us are familiar. The colour-printing of sporting subjects is in each case excellent.

Some time ago the management of Messrs. Vickers, Sons & Maxim, Ld., invited the men employed at their Barrow Works to communicate any ideas they might have which would tend to more efficient methods of production. No fewer than ten suggestions made by the employees have recently been considered by an awards committee, and in six cases the suggestions were approved and accepted, and prizes were awarded ranging from £1 to £10.

A most curious and regrettable coincidence occurred in connection with the manufacture of Cordite. Shortly after midday on the 15th ult., at Waltham Abbey, and at the same time at Messrs. Curtis's & Harvey's factory at Cliffe, Kent, explosions occurred, the coincidence being rendered the more extraordinary by the fact that both explosions occurred in the mixing houses of the respective factories. In both instances there was loss of life.

The Abbey Improved Shot Company, Ld., sends us, in common with other newspapers, a letter for insertion to the effect that it is not they, but someone else, who has recently liquidated. Quite so, we all know that it is the Newcastle Chilled Shot Company, who, as a result of certain vicissitudes, have passed into the hands of Messrs. Walkers Parker. However, there is no harm in knowing that the first-named firm still flourishes.

AUTOMATIC PISTOLS AND THEIR AMMUNITION.

IN the accompanying table we place on record, for purposes of reference, some leading particulars of automatic pistols and their ammunition that can scarcely fail to be of interest. It will be noticed at once that the pistols chosen for the purpose present fairly wide variations in weight and ballistic results, though the preponderance is undoubtedly in favour of a calibre of 7·65 mm. (·301-in.) and a weight of bullet of about 85 grains. As regards the mechanism of the weapons, considerable diversity exists in the methods employed to bring about the automatic action of reloading and putting into a position for firing successive cartridges, it being premised that in all instances but one here given the force of recoil of the fired cartridge acts in a backward direction on a movable breech-block, which carries back the fired shell and ejects it, and on the return movement pushes a new cartridge from the magazine into the chamber of the weapon, at the same time that the hammer or firing pin is retained in the cocked position. The details of these successive operations differ according to the systems adopted by the inventors of the arms. For example, it is evident that the breech-block must be retained in contact with the back of the chamber for a sufficient period of time to ensure that the bullet has left the muzzle, and that the powder gases have obtained a free vent forward. One method of securing this end consists in giving the barrel itself a backward movement in recoil, and in so adjusting it in relation to the breech-block that the latter is not free to travel still further until the barrel itself has reached the extreme limit of its backward movement, by which time the bullet will be away from the muzzle. This system is adopted in the Borchardt and Luger pistols in conjunction with a toggle-joint, which bends upwards to allow of the backward travel of the breech-block, and the mechanism is so contrived that the toggle-joint is not able to come into operation until the barrel has reached the extreme limit of its recoil. As the whole combined movement is controlled by a powerful spring, which ensures the ultimate return of the parts to the firing position, it will be seen that ample provision exists for the purpose of keeping the breech closed until an appreciable interval has elapsed after the ignition of the powder.

The Mauser pistol is also fitted with a barrel capable of backward movement along the frame of the weapon to the extent of about $\frac{3}{16}$ ins., and until the end of that travel the breech-block is securely locked to the chamber. At that point, however, the breech-block is freed, and is allowed to recoil still further against the pressure of a spring, which on the completion of the recoil movement restores the block to its closed position. In the Colt pistol this same result is achieved by attaching the barrel to the frame by means of two swinging links, and by extending the breech-block forward in a sort of cover to the barrel. In the firing position barrel and cover are locked one to another by ribs and grooves, and it is not until the two have recoiled to the extent of $\frac{1}{8}$-in. that the effect of the rectilinear slide of the cover and the curved path of the barrel as controlled by its swing-links serves to separate the two. The breech-block and forward extension then continue the motion of recoil alone.

The Mars pistol, of which we gave an illustrated description about twelve months since, and which is noteworthy as being the only automatic pistol of British origin, if we except the Webley-Fosbery automatic revolver, which does not come within the technical meaning of the words "automatic pistol," is also operated by a sliding barrel. In this, as in the Mauser and the Colt, the breech-block is positively locked with the barrel until the two have recoiled together for some distance, in this case to the extreme limits of travel of either piece. It is not, in fact, until the two parts have actually begun their forward movement again, under the influence of a spiral spring, that the disjunction takes place, and the barrel moves forward to its normal position at once, while the breech-block pauses for so long as the trigger is still pressed, prior to bringing forward another cartridge into the chamber and closing the breech behind it.

In the earlier Mannlicher pistol, brought out some eight years ago, the effect of the recoil was to drive the barrel of the arm forward, the friction of the bullet producing this result, and this movement ejected the empty case, while the return journey of the barrel on the release of the trigger served to insert a fresh cartridge into the chamber. The breech-block was solid with the frame, and to suit the peculiar action of this weapon the magazine was below the barrel, and not, as in most cases, to the rear of the chamber and below the breech-block.

A further development of automatic mechanism was shown in the Mannlicher automatic carbine and carbine pistol, models 1901. In these, the barrel, receiver and breech-block all recoil about $\frac{5}{32}$-in., when the two latter parts are released and allowed to travel still further back for the purpose of reloading. This mechanism is applied to the carbine and to two designs of pistol, which differ only in the length of barrel and consequent variation in ballistics. All three models shoot the same ammunition. So far as the pistols are concerned, they are distinct from the arm next to be mentioned, in being fitted with a holster that is used as a stock, thus converting the hand weapon into a shoulder piece. These pistols are

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also considerably heavier than the later Mannlicher, and shoot more powerful cartridges.

The 1901-2 models of the Mannlicher, of which we gave full descriptions in our last October issue, and the modified Browning pistol manufactured by the Fabrique Nationale d'Armes de Guerre, of Liége, which was illustrated and described a month later, differ from the preceding types, not only in operation, but by reason of the extreme simplicity of their working parts. In both instances, the barrel is of the fixed type, being screwed into a suitable lug in the frame, and the automatic action is performed entirely by the backward movement of the breech-block. So far as the Mannlicher pistol is concerned, the travel of the breech-block is controlled primarily by the pressure of a powerful spiral spring, the inertia of which is supplemented by the pressure of the hammer upon the firing pin at the back of the breech-block, and by the retaining influence of a detent at the side of the block. In the case of the Browning modified pattern, the pressure of the spiral spring alone, in conjunction with the inertia of the breech-block with its forward extension, is sufficient to keep the breech closed during a period which allows of the passage of the bullet down the 4 inches of barrel. It must be remembered also that these two weapons shoot cartridges which relatively give far less recoil than those used in the pistols which are provided with definite locking contrivances between chamber and breech-block.

There are two other examples of automatic pistols which have rigid barrels, namely, the Maxim and the Bergmann. With regard to the former, we do not think that Sir Hiram Maxim has so far placed either of his two designs for arms of this class upon the market. A new model of the Bergmann is now extant, but we have no particulars definite enough to warrant it being included in the tabular list, beyond the facts that it is an 8-shot pistol, weighing 1 lb. 11 oz. empty, with a calibre of ·315-in., and a barrel 4 ins. long.

Turning to the table of ammunition, it will be seen that the cartridges designed for these various weapons show some widely varying capabilities of ballistics. The three patterns of the Mars pistol were designed to shoot very powerful cartridges, a fact on which we commented at length when reporting trials made with this system a twelvemonth ago. Tests of penetration made on that occasion showed that the three calibres of ·334, ·360 and ·450 were capable of piercing respectively 16½, 12 and 11 deal boards, each 1 in. in thickness. The velocities of the two former calibres especially are very remarkable for this class of arm, and produce corresponding results in muzzle energy, while the ·450 calibre, with its 1,250 f.-s. of velocity and 700 ft.-lbs. of muzzle energy, may be held up for comparison with the 700 f.-s. velocity and 287 ft.-lbs. of muzzle energy of the ·455 Service revolver, the ammunition for which is obviously far behind the requirements of present day conditions. The Colt automatic pistol, with its 105 grain bullet and 1,260 f.-s. velocity, is also a very powerful weapon, and the later ammunition, with an even heavier bullet of 128½ grains with slightly less velocity, should, in conjunction with a relatively large calibre, be eminently noteworthy for its shock-producing effects.

Of the 7·65 mm. arms, the Mannlicher carbine pistol (model 1901) and the Mauser show the most effective ammunition, judged purely by ballistics, but the high velocity, combined with the light weight of the bullet, somewhat unduly increases the range at the expense of man-stopping qualities. Mauser ammunition can, we believe, be used equally well in Borchardt and Luger pistols, but the latter has probably not sufficient length of barrel to ensure the efficient burning of 7¾ grains of powder. It will be seen that the ordinary Luger cartridge has a heavier bullet and lighter charge of powder, giving considerably reduced velocity. The 1894 Mannlicher possessed relatively low ballistics, which are surpassed by the later model, in spite of the considerable reduction in the

AUTOMATIC PISTOLS AND THEIR AMMUNITION.

	Weight of Pistol.	Length of Barrel.	Diameter of Bore.	Capacity of Magazine.	Length of Cartridge.	Weight of Cartridge.	Weight of Bullet.	Weight in Grains per Sq. Inch.	$\frac{W}{d^2}$	$\frac{d^2}{W}$	Weight of Powder.	Muzzle Velocity.	Muzzle Energy.
	lbs. ozs.	ins.	ins.	Cartridges.	ins.	grs.	grs.	grs.			grs.	ft.-secs.	ft.-lbs.
Borchardt	2 12	6	·301	8	1·378	163	85	938	·134	7·46	7	1,310	327
Mauser	2 7½	5½	·300	10	1·375	163	85	944	·135	7·41	7¾	1,400	369
Mannlicher, Model 1894.	2 2	7¼	·299	5	—	171½	112	1,244	·178	5·61	4	800	159
Do. „ 1901.	2 7	6	·301	5	1·378	160	85	942	·134	7·46	7	1,476	410
Do.	1 15	5½	·301	8	1·122	136½	85	938	·134	7·46	3⅜	985	184
Luger	1 15½	4 1/16	·301	7	1·180	157½	92	1,015	·145	6·89	5¼	1,140	265
Browning, 7·65 mm. ...	1 8	4	·301	7	·984	118¾	74	817	·117	8·54	3 1/10	886	127
Colt (Browning's Patent)	2 4	6	·350	7	1·267	178	105	857	·123	8·13	7¾	1,260	360
Do. do.	„	„	„	„	1·267	197½	128½	1,049	·150	6·67	6½		
Mars, 8½ mm.	—	8¾	·330	10	1·470	225	140½	1,290	·184	5·43	10	1,750	550
Do.	2 10	8¾	·354	10	—	272	160	1,277	·182	5·49	12	1,640	960
Do.	—	8¾	·440	10	1·400	362	220	1,136	·162	6·17	12½	1,250	760

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weight of the bullet. Both the Mannlicher (Model 1902) and the 7·65 mm. Browning are low in the scale of velocity and muzzle energy, and more especially the latter, which has only a 74-grain bullet. To admit this self-evident fact is not, however, to say that they are necessarily less effective from the point of view from which automatic pistols should be regarded. If we consider them as weapons to be used as pistols, and not as handy miniature rifles, and for employment at comparatively close quarters, it by no means follows that those weapons showing the least ballistic results would, under such conditions, necessarily prove the least serviceable. Any of the weapons and ammunition here reviewed is capable of killing at the utmost distance at which the user is likely to be able to make sure of hitting his mark, even if we allow for the use of detachable stocks in some cases, which convert the weapons into carbines.

DYNAMITE IN THE TRANSVAAL.

IT is now about fourteen months since we were able to give to our readers the details of what the then-styled Transvaal Dynamite Company was prepared to do in order to meet the new condition of affairs resulting from the downfall of the Boer Republic and the acquisition of the Rand as British territory. As is well known, the Dynamite Company as then constituted had enjoyed a monopoly in the manufacture and supply of explosives to the mines during the Kruger régime, and had as a consequence been able to maintain prices at whatever level may have seemed desirable. For some considerable time prior to the war, the ruling prices had stood at 97s. 6d. per case for blasting gelatine, and 75s. per case for gelignite, at which figures, it is needless to remark, the profits on manufacture were considerable. During the six months immediately prior to the outbreak of war, no doubt with that contingency fully in mind, the prices had gone up to 105s. and 85s. respectively. On the resumption of mining operations, under British rule, the rates were put back tentatively to the amounts formerly charged, namely, 97s. 6d. and 75s., during the particular period when military exigencies forbade the importation of any explosives destined for commercial purposes.

In October, 1901, the Transvaal Dynamite Company adopted a wise course in preparing to adapt itself to new conditions. As we announced at the time, the Company made offers to the Transvaal Administration to supply the Rand mines blasting gelatine at 67s. 6d. per case, and gelignite at 50s. per case, these prices being subject to delivery at the company's own factory at Modderfontein. So substantial a reduction in prices, meaning, on the basis of conditions existing before the war, something like £500,000 per annum saved to the mine owners in explosives, which is equivalent to about 9d. per ton reduction in cost of passing the ore through the mills, was in itself a sufficiently plain indication of the fact that the company was face to face with a possibility of outside competition. Some eleven months later, in September, 1902, the company was reorganised, and was registered as a British company with a capital of £1,100,000, under the style of the British South African Explosives Company, Ltd., and with this change of constitution a further advance has been made in the direction of meeting threatened competition. It seems to be realised that there is little likelihood of the local factory being granted any fiscal advantage over foreign importers, despite the recommendation of the Johannesburg Chamber of Mines that a coast duty of from 5s. to 7s. 6d. per case should be placed upon all imported explosives. This duty, as we pointed out at the time, would have given the two South African Explosives Companies a decided advantage over all outside manufacturers, and would have rendered attempts at competition well nigh hopeless. Acting on the assumption that this duty is extremely unlikely to come into force, the local company has acted wisely in meeting the situation by a bold stroke. It has, in fact, within the last few weeks indicated to the Transvaal Chamber of Mines that it is prepared to supply blasting gelatine at 55s. per case, and gelignite at 43s. per case, provided that an exclusive contract for a large quantity, and for a specified time, is entered into.

How far this drastic change of price is a direct reply to a recent move on the part of the De Beers Company may be conjectured. That company proposed that the seven leading groups of mines on the Rand should bind themselves for the term of seven years to purchase all their explosives from that Corporation at net manufacturing price, plus 6 per rent. on the capital cost of the factory and 6 per cent. profit. Roughly, these conditions would have made average prices of about 50s. for blasting gelatine and 38s. for gelignite, but, on the other hand, the Rand owners would have a natural disinclination to eliminate the advantages to be derived from competition. So far as this is concerned, however, the recent offer of the British South African Explosives Co., Ld., seems to be equally explicit in having for a condition the exclusive supply of explosives for a definite period.

Apart from the question of competition between the local factories at Modderfontein and Somerset West, it remains to ask how the most recent quotation of the Transvaal Company will affect the question of imported explosives. We understand that the price of dynamite f.o.b. at European and American ports, for large quantities, is somewhat in the region of 30s. per case. If to this is added a freightage of 6s. and a transit charge of 2s. 6d., the cost, including delivery on the spot, will work out to 38s. 6d. Taking these figures as being approximately correct, it will be seen that a coast duty of 5s. per case would just suffice to bring the total cost to about the same level as the latest quotation of the Transvaal Company for gelignite. It would seem, indeed, almost as though the local manufacturers, in fixing their price, had the imposition of some such restrictive duty in mind. In any event, the breaking down of the monopoly will at least benefit one class of the community. The mine owners, on the basis of the amended prices of 55s. and 43s. respectively for blasting gelatine and for gelignite, and on the consumption ratio existing prior to the war, stand to reduce their expenses as regards explosives alone by nearly a million sterling per annum, which should help to recoup some of the losses entailed by the protracted hostilities. This must make for increased prosperity for a large section of the community, and for the country at large, whatever effect it may have on the explosives industry. So far as the imposition of the coast duty is concerned, that is possibly one of the matters which will be taken into consideration by the Colonial Secretary during his stay in the newly-acquired colonies.

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PROPOSED NEW BYE-LAWS AFFECTING THE TRANSPORT OF EXPLOSIVES BY RAILWAY.

WE notice that the Secretary of the Railway Clearing House has issued an advertisement in the names of the British and Irish railway companies, setting forth that, in pursuance of the Explosives Act of 1875, and in accordance with the directions of the Board of Trade, formal notice is thereby given that the railway companies will apply to that authority for the amendment of certain of their bye-laws for regulating the loading, unloading, and conveyance of explosives. The advertisement is dated December 13th, and it is open to anyone interested in the matter to forward objections or suggestions with respect to the bye-laws to the Assistant Secretary, Railway Department of the Board of Trade, at the same time forwarding a copy to the Secretary of the Railway Clearing House.

The bye-laws which it is proposed to amend are respectively Nos. 6, 7, 8, 9, 11, 12, 14, 15, and 19, for the regulation of the loading, unloading, and conveyance of explosives by railway, and we give below the text of the proposed amendments, with comments on the changes effected in the existing bye-laws:—

6. Gunpowder and any Explosive authorised by the Secretary of State to be packed in metallic cases or cylinders as outer packages, if packed in metallic cases or cylinders which fulfil all the requirements of the Explosives Act, 1875, and are of a pattern approved by the Company, may be conveyed along with ordinary Goods Traffic in a carriage not containing any article or substance liable to cause or communicate fire or explosion.

It will be noticed at once that this amendment has a distinctly wider limitation than the existing bye-law, which deals only with "gunpowder or any explosive made with gunpowder." The clause does not, however, apply to nitrate of ammonium explosives.

7. No Explosive of the 5th (fulminate) Class, nor any Explosive of the 6th (ammunition) Class containing its own means of ignition, nor any Explosive of the 7th (firework) Class, shall be conveyed in the same carriage with any Explosive not of the class or division to which it belongs.

Here the effect is to impose further restrictions, since at present explosives of different classes or divisions may be conveyed in the same carriage, if properly separated.

8. There shall not be conveyed in the same carriage with any Explosive anything of the nature of Lucifer or other Matches, Acids or other Chemicals, Petroleum or other inflammable liquid, Calcium Carbide, Oily Goods, Charcoal, Lampblack, or any other article or substance of an inflammable nature, or liable to spontaneous ignition, or to cause or communicate fire or explosion.

In the existing bye-law the definition at the end of the paragraph is limited to "any substance likely to give off inflammable gases at a temperature below 100° Fahr."

9. On each side of every carriage containing any Explosive there shall be affixed in conspicuous characters, by means of a securely attached label or otherwise, the word "Explosive," or the name of the Explosive with the word "Explosive," except when containing Explosive packed in metallic cases or cylinders as provided for in the 6th of these Bye-laws; and every carriage containing Explosive shall be placed as far as practicable from the engine attached to the train.

This clause must, as the context shows, be read in conjunction with Bye-law 6, which reads into it a different meaning from that of the existing bye-laws.

11. Explosive contained in metallic cases or cylinders, if conveyed in open trucks, shall be sheeted, so as to effectually protect it against communication of fire.

It should be noted that the wording here proposed differs slightly from the original, but that the chief point to be noted is the insertion of the description "metallic" as regards cases or cylinders.

12. Explosive, unless contained in metallic cases or cylinders, shall be conveyed only in a Gunpowder Van.

In this bye-law we have practically a new feature, since under existing Bye-law 12 there are only regulations referring to the absence of iron or other metal in the carriage to be used, and suitable protection of the explosive from risk of communication of fire.

14. In loading or unloading any Explosive, the packages containing the same shall, as far as practicable, be passed from hand to hand, and not be rolled upon the ground, and in no case shall any such packages be rolled unless clean hides, cloths, or sheets have been previously laid down on the platform or ground over which the same are to be rolled. Packages containing Explosive shall not be thrown or dropped down, but shall be carefully deposited and stowed in such manner as to prevent any displacement of the packages during transit.

In this proposed amendment there is not much to note. The original "casks or packages" is here brought into a more general description as "packages" only, and the only other point to be noted is the more particular wording at the close of the paragraph relating to the stowage of the packages "in such manner as to prevent any displacement of the packages during transit."

15. No person while employed in loading, stowing in any carriage, or unloading any Explosive, shall wear boots or shoes with steel or iron nails, steel or iron heels, or metal tips of any kind, or have about his person any lucifer match, explosive, or means of striking a light; and all persons employed in the loading, stowing, or unloading of any Explosive shall, while such loading, stowing, or unloading are going on, abstain from smoking.

According to the existing bye-law, these restrictions were specified as applying to certain classes of explosive, whereas the new wording includes any explosive.

19. The company may refuse to receive, forward, carry, or allow to be brought or carried upon their Railway, any carriage or package which they suspect to be packed or sent, or to contain any article or thing packed or sent, in contravention of the said Act or of any of these Bye-laws, or not in accordance therewith; and in case any carriage or package which the Company suspect to be so packed or sent, or to contain any such article or thing as aforesaid, shall be upon any railway of the Company, the Company may open, or require such carriage or package to be opened, to ascertain the fact.

This is exactly the same wording as is contained in the existing bye-law, and it is repeated here amongst the amendments, apparently for no other reason than to show that this particular bye-law enforces such further restrictions as may be embodied in the clauses preceding, and which it is sought to amend in the manner already quoted.

Looking at the matter broadly, it cannot be said that these pro-

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posed amendments to the existing bye-laws are likely to prove of any serious detriment to the explosives industry. On the other hand, it is to be regretted that since alterations are suggested as desirable, they cannot take the direction of bringing into ine the conditions of the Explosives Act, 1875, and of the Board of Trade Bye-laws, as regards the vexed question of metallic cylinders. The anomalies introduced by the lack of agreement of these two authorities are particularly noticeable in the far from uncommon practice of forwarding explosives partly by rail and partly by sea, when the regulations which are in order, and indeed obligatory, during one phase of transit are entirely out of keeping with the conditions required in the other method of conveyance. We certainly consider that amendments of existing laws should bear in mind the discrepancies thus indicated. At the present time there is, we understand, some effort on the part of individual firms and corporations to secure concessions having this end in view, but apparently the explosives manufacturers and railway companies have not got sufficiently into line to be able to approach the two authorities with united weight of appeal. For example, an application has been made by three Scottish railway companies to the Clearing House for permission to send, in wood packages of a certain design, small quantities of Explosives of Class 3, Division 1; and on the other hand we learn that a firm of explosives manufacturers have recently been successful in having a wood and felt-lined metallic cylinder accepted severally by the Home Office and the Clearing House. It would seem desirable that the explosives manufacturers and the railway companies should work together with a view to taking concerted action, which might prove of inestimable benefit to both parties concerned, once they came to a proper understanding of their mutual requirements.

APPLICATIONS FOR PATENTS.

NOVEMBER 24—DECEMBER 20, 1902.

25,847. Loading Mechanism for Ordnance. W. E. Corrigale.
25,928. Recoil-Operated Small-Arms. H. F. Woodgate.
25,964. Rifle Shooting Apparatus. C. E Luard.
26,031. Sighting of Ordnance. A. Reichwald (Agent for *T. Ghenea*).
26,056. Shooting Instruction. E. F. Kelaart.
26,061.* Safety Device for Rifles. M. Weiss.
26,270.* Automatic Small-Arms. A. G. Bloxham (Agent for *F. R.. von Mannlicher*).
26,423. Chronograph. G. Hookham.
26,442.* Gun Sights. P. Junod (Date applied for in U.S.A., May 15, 1902).
26,463.* Aim Instructor. F. C. A. Ogilvy and H. C. J. Grant.
26,549 Sighting of Ordnance. Sir W. G Armstrong, Whitworth & Co., Ld, and C. H. Murray.
26,711. Barrel Boring. J. T. Cooper.
26,712. Barrel Boring. J. T. Cooper.
26,749. Smokeless Powder. F. E. W. Bowen and E. H. Harris.
26,770. Carrying of Rifle when Mounted. J. H. Patterson.
26,802. Blasting Explosive. H Dreany.
26,806. Range Finder. L W. Sterne.
26,923. Travelling Target Frame. C. H. Morgan.
26,950. Cartridge Cases. C. E. F. Gabel.
26,987 Single-Trigger Mechanism. J. Carter.
27,016.* Range Finder. C. A. Allison (Agent for *Sarah M. Kern.*)
27,059. Blasting Cartridge Cases. W. Hartig.
27,130. Automatic Small-Arms. H. F. Woodgate.
27,178. Rifle Sight Mounting. A. T. Dawson and G. T. Buckham.
27,246. Projectiles. A. Harper, J. McCormick and H. Kernaghan.
27,564 Range-Finder. F. N. Baker.
27,705. Fuses. H. Standbridge.
27,875. Range-Finder. C. E Liles and J. W. A. Rule.
27,948. Safety Rifle Range. T. B. Ralston and P. E. Hart.
28,038. Targets. T. Turner.
28,064. Ordnance Sighting. J. J. Hicks.
28,103.* Movable Targets. J. W. Parker.
28,172. Range Finder. Sir H Grubb.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

NOVEMBER 27—DECEMBER 18, 1902.

COMPILED BY H. TARRANT.

16,514 (1901). **Working of Turret Ordnance.** A. T. Dawson, London, and J. Horne, Barrow-in-Furness. A method of training and elevating turret guns, and of supplying ammunition thereto, through the medium of electro-hydraulic apparatus (electrically-driven hydraulic engines). The apparatus is located inside the revolving turret, and is entirely independent of external pumps or other machinery. Accepted November 15, 1902.

22,966 (1901). **Blasting Explosive.** A. J. Cocking, and Kynoch, Ld., Birmingham. In order to diminish the bulk of the explosive known as "Kynite," all but about 5 per cent. of the wood meal used in its composition is replaced by an equal weight of rice starch. The old composition of "Kynite" was —26 parts by weight nitroglycerin, 33 parts by weight nitrate barium, 40½ parts by weight wood meal (including moisture absorbed), with or without ½ part by weight carbonate or calcium. Accepted November 12, 1902.

24,118 (1901). **Shot Course Indicating.** R. Slazenger, London. In order to render visible the course that is taken by shot, the shot or bullet is coated with a paste which is capable of being ignited by the shock or friction caused by the explosion. The ignited paste becomes either incandescent or gives off a vapour, and enables the shooter to trace the path taken by the charge. Accepted November 12, 1902.

25,600 (1901). **Safety Device for Fuses.** A. T. Dawson and L. Silverman, London. The firing pin in a percussion fuse is surrounded by a cylindrical block. The pin is provided with a swelling of a diameter too large to pass through the block. When the gun is fired, the block is forced over the swelling, thereby permitting the point of the firing pin to protrude beyond the face of the block. On impact, the forward movement of pin and block explodes the charge. Accepted November 6, 1902.

25,815 (1901). **Rifle Carrier for Cycles.** J. B Brooks and J. Holt, Birmingham Rifle-carrying attachments for cycles, so designed as to be self-locking. The butt socket is fitted just above the bottom bracket, and is adapted, when the butt of the rifle is pressed fully into it, to grip the butt and hold it tightly. The barrel of the rifle is similarly automatically held by a clip on the handle bar. Accepted November 20, 1902.

25,873 (1901). **Machine Gun.** W. G. Gass, Bolton. A machine gun in which the parts are actuated by the gases of combustion. The parts are so designed as to be quickly withdrawn for examination or repair, or to enable rapid removal of any defective cartridge which stops the continuous working of the mechanism. A current of air is caused to play upon the barrel, the surface of which may be increased so as to enhance the cooling effect. Accepted November 20, 1902.

25,884 (1901). **Blasting Composition.** J. Wetter, London (Agent for *Westfalisch-Anhaltische Sprengstoff-Ag., Germany*). In order to render dynamite safe for use in fiery coal mines, without detracting from its disruptive power, the following modified composition is suggested:—40 parts nitroglycerin, 2 parts collodion cotton, 8 parts parafinum liquidum, 4 parts napthalene, 12 parts rye-flour, 2 parts wood-flour, 27 parts ammonium nitrate, and 5 parts potassium nitrate. The collodion cotton is used to gelatinise the composition. Accepted November 6, 1902.

26,371 (1901). **Breech Mechanism of Ordnance.** A. T. Dawson and L. Silverman, London. In the breech mechanism of ordnance in which there is a transversely moving breech

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block, those parts which have hitherto been carried by the block are attached to the body of the gun. A hollow block is employed, which co-operates with such parts during the opening and closing of the breech. Some of the parts of the mechanism project into the hollow in the block, and can move therein freely in performing their various operations. Accepted November 13, 1902.

26,382 (1901). **Breech Mechanism of Ordnance.** A. T Dawson and L. Silverman, London. A pivoted extractor is combined with the sliding breech block and its shaft and axle in quick-firing ordnance. As the block opens, this extractor is caused to engage with a projection or cam on the axle, so that the block cannot return until the extractor is liberated by the introduction of a fresh cartridge. Accepted November 13, 1902.

26,617 (1901). **Blasting Composition.** J. Wetter, London (Agent for *Westfalisch Anhaltische Sprengstoff-Ag., Germany*). A modification of the safety-dynamite described in Patent No. 25,884, 1901, consisting principally in the addition of one or more fatty acids rich in carbon. The composition consists of a mixture of nitroglycerin with one or more of the higher members of the fatty acid series, or with the resinous acids or members of the camphor group, together with the flour of cereals and of cellulose, and nitrates. Accepted November 6, 1902.

26,732 (1901). **Gun Mountings.** C. Holmström and A. Bremberg, Glasgow. In recoil mountings of field guns the recoil cylinder is provided with longitudinal guides for the reception of corresponding lugs or brackets on the gun. The traverse of the gun and its cradle in the trail is provided for by shifting the trail; and the brakes for the wheels are arranged to serve either as travelling or fixing brakes. Accepted November 20, 1902.

1,457 (1902). **Rifle Safety Device.** J. Otter, Switzerland. A ball or roller is so arranged in the mechanism of a military rifle that, when the rifle is held above a certain angle, the ball rolls beneath a catch, and prevents the pulling of the trigger. The safety is intended for application to rifles used by troops, and is adapted to prevent waste of ammunition caused through useless firing into the air. Accepted November 27, 1902.

1,753 (1902). **Sighting of Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). A method of adapting the front sight (in that class of ordnance in which the attachment bar is curved concentrically with the trunnions) to maintain its position while the gun is being elevated, consisting in allowing the sight carrier to rotate on the gun or cradle about the axis of the trunnions independently of the attachment. A stop prevents the sight rotating with the trunnion. Accepted November 6, 1902.

2,822 (1902). **Recoil Apparatus of Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). In ordnance of that class in which the gun alone recoils a compression device for the return spring is attached. The brake cylinder is provided with a movable abutment for the return spring, and with a tubular rear extension, the latter being so formed as to engage telescopic screw-threaded spindles, so arranged that they simultaneously connect brake cylinder and gun. Accepted November 13, 1902

6,103 (1902). **Envelopes for Ordnance Charges.** A. Reichwald, London (Agent for *Fried. Krupp Germany*). A method of controlling the ignitability and combustibilty of envelopes of ordnance charges (such as described in Patents Nos. 9,481, 1,899, and 7,969, 1900), consisting in making the fabric of which the cartridge bag is composed partly of smokeless powder threads and partly of threads of ordinary textile. Accepted November 27, 1902.

6,591 (1902). **Loading of Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). A method of reducing the labour of transferring the ammunition to the loading axis of such ordnance as is supplied by a hoist. It consists in making the loading tray form one side of a pivoted quadrilateral rocking on a horizontal axis, and having that side which is opposite the loading tray fixed and so mounted that the cord of the arc of the swing of the tray is nearly horizontal. Accepted November 13, 1902.

7,145 (1902). **Ordnance Recoil Brake.** K. Haussner, Germany. A friction brake designed to take up the recoil of the barrel by friction, and automatically to release itself after recoil in order not to stop the return of the gun, which return is effected by spring or air action stored up by the gun during recoil. Accepted November 27, 1902.

9,285 (1902). **Machine Gun.** A. J. Boult, London (Agent for the *Victor P. Deknight Gun Co., U.S.A.*). In this profusely illustrated specification the mechanism of a gas-actuated machine gun is described. Simplicity of construction, with its consequent advantages, is the aim of the inventors. Accepted November 13, 1902.

15,147 (1902). **Sighting of Ordnance.** W. L. Wise, London (Agent for *The Bethlehem Steel Co., U.S.A.*) A horizontal base range-finder having an adjustable member or members adapted to be set to a position corresponding to the range of the target. The finder is so connected with the training mechanism that in the act of bringing its adjustable member or members to position corresponding to the range, the gun is automatically sighted upon the target. Accepted November 20, 1902.

16,737 (1902). **Cleaning Rod and Gun Rest.** J. Wheeler, U.S.A. A rod divided into two parts of unequal length is clipped beneath the barrel. The two parts are hinged, and either section may be turned down to form a rest. The front section is pushed forward beyond the muzzle to form a bayonet, and the whole, when disconnected, forms a cleaning rod. Accepted November 27, 1902.

17,209 (1902). **Range Keeping Telescope.** T. Y. Baker, Mediterranean Squadron. A telescope for use with heavy guns, with which is combined mechanism for indicating alterations in range. Any variation of the distance between gun and object is automatically registered on a scale on the telescope, and the sighting is altered accordingly. Accepted November 27, 1902.

18,072 (1902) **Elevation of Ordnance.** G. Ehrhardt, Germany. A bearing device for the elevating screw apparatus in field guns The elevating apparatus is so mounted in the interior of the closed carriage trail that the axis of the crank actuating the screw-spindle constitutes at the same time the axis of rotation of the spindle oscillating in a vertical plane. Accepted November 6, 1902.

20,269* (1902). **Back Sight for Rifles.** M. E. Sutherland, Canada.

21,171* (1902). **Explosives.** A. Hough, U.S.A.

21,189 (1902). **Blasting Explosive.** H. Poetter, Germany. A blasting material designed to be safe against the action of atmospheric change and against coal dust. An example of its composition is as follows:—82·7 per cent. ammonium nitrate, 1 per cent. denitrobenzol, 11·5 per cent. turmeric, and 4·8 per cent. copper oxalate. These ingredients are mixed in grinding mills. Accepted November 6, 1902.

21,276 (1902). **Firing Mechanism of Ordnance.** V. C. Tasker, U.S.A. Firing mechanism for ordnance, in which one spring performs the three functions of firing, retracting the pin and striker, and returning the firing lever to its normal position. By means of this arrangement it is necessary only again to pull the landyard in case of a missfire. The system may be applied to small-arms. Accepted November 27, 1902.

22,435 (1902). **Projectiles.** R. L. York, Leeds. In order to increase the velocity, and thus the penetrating power of a projectile, the projectile is formed with a central air channel running from nose to base. This hole is closed whilst the projectile is in the gun by means of a base plate and a loose pin. When the projectile leaves the gun, the pin and base plate fall away, thus opening the channel to the air. Accepted November 27, 1902.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

A SMOKELESS EXPLOSIVE.

21,171 (1902). A Hough, U.S.A. In this specification the manufacture of nitro-starch is dealt with. The invention applies also to the nitration of any carbo-hydrate which may be dissolved in nitric acid without such decomposition therein as would prevent its nitration, and out of which it may be recovered by precipitation.

Nitro-starch is employed as the carbo-hydrate in the process of explosive manufacture described in this patent. The starch is carefully dried, is then pulverised, and is placed in about eight

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times its weight of concentrated nitric acid. The starch is permitted to dissolve, the length of time required for dissolving depending upon the temperature of the acid. When completely dissolved the solution is placed in a nitrator, or in a vessel constructed of iron or lead-lined wood, having the usual agitating appliances for agitating the solution during precipitation. The nitrator is provided also with a water jacket. Precipitation is caused by introducing in the condition of fumes anhydrous sulphuric acid (SO_3), and causing it to penetrate through the nitric acid solution of starch. These fumes are introduced to the solution in the following manner:—The nitrator is provided with a cap, from which leads a pipe passing to a fan or other device, capable of creating a vacuum. The fumes (SO_3) are admitted into the bottom of the nitrator, and are drawn through the solution by the reason of the partial vacuum created by the fan in the upper portion of the nitrator. The anhydrous sulphuric acid is thus brought into contact with the solution, and, combining with the water present, the nitro-compound is precipitated. The acid contained in the nitrator holds the nitro-starch in suspension, and the two may be taken from the nitrator in the form of a liquid. The solution is delivered on to a tray, the bottom of which is constructed of some filtering material such as asbestos fibre. The free acids are drawn from the nitro-starch through the medium of a vacuum created beneath the filtering surface. The nitro-starch is then taken from the filter, is washed and neutralised, and is taken to drying rooms to be dried to any degree desired.

The explosive produced by this system of nitrating starch forms a smokeless powder which it is claimed burns freely and evenly, and leaves no residuum. It is stated also that by analysis starch nitrated as described contains at least 16 per cent. of nitrogen.

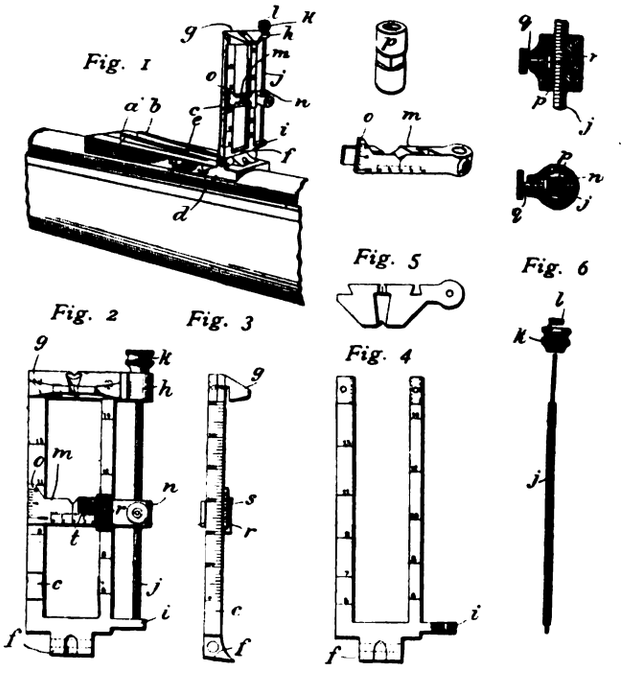
When graining or moulding this material a small percentage of nitro-benzol is mixed with it, in order to desensitise it to a point of safety in handling. The nitro-benzol afterwards evaporates and leaves the pure material. The explosive may be detonated, and when so exploded it is claimed to develop power about equal to that of nitroglycerin. The yield in nitration is about the same for starch when treated as described as for glycerin as at present nitrated. Nitro-starch, it is stated, will not freeze, and is cheaper and safer to manufacture than nitroglycerin. Accepted Nov. 6, 1902.

BACK SIGHT FOR RIFLES.

20,269 (1902). M. E. Sutherland, Canada. A back sight for rifles—intended more especially for arms of the military type—is described in this specification. Combined with the sight is a finely-graduated vernier, for use when fine range work is to be performed. This vernier may, by a single operation, be dispensed with, in order roughly to enable the sight bar to be quickly adjusted. A wind-gauging device is so fixed that it is slidably adjustable upon the bar itself. By means of this sight the inventor claims that all detachable sighting appurtenances may be dispensed with.

Referring to the drawings appended, the sight, it will be seen, is of ordinary shape, and is mounted in the usual manner upon the bed *a*. The bed is slightly inclined upwards towards the muzzle, and a scale is marked upon its sides. This scale is used for point-blank or short-range shooting when the leaf is in its horizontal position, and is kept in position by the parallel lugs *b*. These lugs have inclined surfaces, which co-operate with the sliding bar and the scale on the sides of the bed. The leaf *c* is pivoted at *d*, and when it is in its upright position it is held there by the leaf spring *e*, which presses against the sloping bottom *f* of the leaf. The bottom of the leaf is so sloped that when in the upright position (Fig. 1) it shall not be at right angles with the barrel, but shall be vertical when the muzzle is raised for long-range shooting. The upper ends of the arms of the leaf *c* are joined by a cap block *g*, which is secured to the arms of the leaf by means of dovetail joints and screws. The sidewardly projecting pivot lug *h* of the block *g* contains a pivot-hole, which is co-axial with a pivot-hole bored in the corresponding lug *i* projecting from the plate *c*. In these co-axial holes work the reduced ends of the tangent screw *j*. The screwed portion of the tangent screw exactly spans the distance between the two lugs *i* and *h*, and so endwise movement is prevented (Fig. 6). The screw is turned in its bearings by means of a milled head *k*, which is locked to the screw by the small nut *l*.

The sliding bar *m*, illustrated in perspective, is formed of one piece of metal, and is adapted to slide upon the arms of the leaf *c*. At its right-hand side this bar projects beyond the leaf *c*, and forms the lug *n*, which is bored to embrace the screw *j*. At the other side the bar is widened, as at *o*, in order to allow of a finely-divided vernier scale being marked thereon. The lug *n* of the bar is connected with the screw *j* by means of the small cylindrical nut *p*,



which is internally screw-threaded. This nut is formed of some non-rustable metal, to prevent its irregular working upon the screw *j*. The nut is adapted also to fit the hole bored in the lug *n*, and to be fixed therein by means of the enlarged foot of the set screw *q*, which is screwed against the squared waist of the nut. When so connected the turning of the milled head *k* turns the screw *j*, and enables the bar *m* to be finely set at any point along the leaf *c*. In this case the vernier scale on the bar is used in conjunction with the finely-divided scale cut upon the left-hand side of the bar (Fig. 3), in order to obtain a very fine adjustment. When the nut is disconnected from the lug *n*, the bar may be roughly adjusted upon the leaf to the ranges marked thereon.

In order to compensate windage or side-drift the wind gauge *r* is provided. This gauge takes the form of a thin blued steel plate, and it slides, by means of a dovetail connection, upon the face of the bar *m*. Upon the tongue *s* a vertical line *t* of inlaid platinum wire forms an unalterable white line against a dark background. The face of the bar *m* is graduated upon either side of its central sighting notch, and the gauge is set by sliding it along the bar until the line *t* coincides with the division representing the allowance necessary to compensate any side divergence of the projectile. Accepted November 20, 1902.

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Arms & Explosives

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CONTENTS.

CURRENT TOPICS.

A Musketry Anomaly.—The placing of the cart before the horse may not seen so very strange after all, now that the long suffering quadruped is no longer indispensable. Yet the saying will hold good for many years to come as an apt way of describing acts whose proper sequence is reversed. It would be impossible to find a better illustration of the principle than is afforded by the attitude of the war office towards musketry training. Our Commander-in-Chief, issues a patriotic circular in which the advantages of intelligent musketry instruction are urged upon all classes of officers, and they are actually told that promotion can be earned only by studying the theory and practice of musketry, with a view to transmitting the ideas so gotton to the less assimilative minds of the men in the ranks. The official handbook that outlines the needful scheme of education, has been out of print during the whole time that these rumblings of intended activity have been prevalent. A year ago we tried in vain to obtain a copy of the "Musketry Regulations," which is one of the permanent handbooks of the army, new additions being published as the old ones get out of print, thereby affording an opportunity for bringing the information up to date. The 1898 edition may not be the most recent, but as it lies before us it discloses a most useful collection of interesting facts concerning rifles in general and the service rifle in particular. Considering the activity in club rifle-shooting during the past year, and the extraordinary outburst of officially encouraged enthusiasm, it is really remarkable that for the entire period it has been impossible to purchase a copy of the handbook. Frequent applications have failed to extract any kind of information; and now after a year has gone by it is announced that a revised provisional edition has been approved, and will shortly be issued. It is only natural to allow that the drafting of manifestoes, which bulk largely in the public eye, requires but a slight exertion, and tends to keep things going during the periods of slackness to which the officials at head-quarters seem to be prone.

The N.R.A. Year.—The annual report of the National Rifle Associations discloses a very satisfactory state of finances, the accounts showing a surplus on the year just passed of no less than £2,339. The effect of this tribute of success will be to show that the Association has thoroughly got over the effects of those little proofs of lack of sympathy between the volunteer competitors and the members, which in the past few years have seemed likely to detract from its success as a popular institution. The alteration of shooting rules without adequate enquiry as to the probable effect on entries, and too marked a tendency to treat the competitor who is qualified to shoot in the grand aggregate as one whose wishes are best regulated by prescription, led to a protest. The council then took warning, and recognised that the higher branches of rifle shooting can only be well patronised so long as the charm of the work is allowed to remain intact. Object lessons were not wanting to show that quite small changes made a vast difference to the competitive interests of the shooting, and since this has become more fully recognised the complaints that count have reached the vanishing point. Target shooting can never absolutely reproduce the conditions of warfare, so that its educational value must always remain relative and indirect. The last war showed that snap shooting was the most important test of merit in a soldier, and this upon the top of a notion that nothing but sharp-shooting was likely to be of value. According to the new rule the best marksmen would be those who

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had graduated in the use of the shot gun, and really there is nothing absurd in the suggestion that a team of clay-bird shooters would do greater execution with the service rifle in the event of a surprise than a similar number of "Tommies" innocent of scatter gun experience. In fact, the best instruction of all would be for soldiers to practice trick shooting with gem air guns in the barrack yard, at the cost of about one penny per hundred shots. But joking apart, the chief value of target shooting is that it develops knowledge of the rifle and enthusiasm in its use among a noteworthy proportion of the population.

Anonymous Backbiting.—Journalism as a profession has many responsibilities and but few rewards. The stating of facts and the giving of an honest opinion are its highest achievements; and, as a class, journalists may lay claim to a high sense of honour in the exercise of their profession. But the fair name of journalism is smirched more by outsiders who habit themselves in sheep's clothing than by those whose livelihood is gained by the sale of their written work. These reflections are brought to our mind by reading a series of articles, dealing with the development of single-trigger guns, which recently appeared in a cheap sporting contemporary of ours. The writer adopted a pseudonym which, however, failed to hide from the world the virulent trend of his mind in one direction and its over great kindness in another. Now, in our oplnion, and that of every other decent-minded person, a series of articles which professes to deal with problems connected with a much disputed subject, should not be a highly eloborated puff of the one favoured mechanism which is picked out for special mention and a stab in the dark at all the others. Either the editor who allowed such material to pass into his paper failed to take the necessary trouble to find out what his contributor was supplying, or else he took a very strange view of the duties of his position. However that may be, we feel called upon to draw attention to the fact that these practices are afoot, so that all gunmakers who are interested in advancing the cause of fair play should hold themselves ready to repudiate such action as we have described. Editors must also beware lest they become the innocent means by which artificially manufactured opinion is disseminated among sportsmen. The correspondent who desires, under the cloak of anonymity, to favour one gunmaker at the expense of his rivals, should be treated with suspicion, and his effusions should be destroyed. Many a deep laid plot to secure free puffs has been stifled at its inception by this very simple remedy.

The Top Connection.—A writer in the *Sporting Goods Dealer*, U.S.A., delivers himself on the subject of the top connection in shot guns, and although his efforts are mainly directed to instruct his American readers, he discusses a problem of universal interest. He does not seem to be fettered by any very strong allegiance to our English firms. For instance, in referring to the Greener cross-bolt, he describes it as about the only decent thing this firm ever accomplished. This is a bit hard on Messrs. Greener, because their book contains references to a number of their other notable achievements, and at any rate represents them as ever at the forefront of progress. Reverting to the question of top connections, the numerous occasions on which the writer quoted, lays down what is the obviously sound way of scientifically closing a gun, bring to mind the knowledge that this question has never been finally settled. While the third grip is a recognised fastening for almost all sorts of guns, it must not be forgotten that the best London made gun has no top fastening whatsoever, the face of the barrels being entirely free from extension of any kind. Burst guns, a most useful source of information, show that while the top extension resists opening of the breech, it fails. as frequently turned out, to exercise any real service in resisting excessive breech pressures. In several types of American double gun the underneath fastening is entirely eliminated, and the rib extension affords the sole means of holding the barrels down. A gun may have twenty fastenings, and yet go off the face; so that the true effectiveness of a fastening must remain a question of the skill exercised in adjusting the engaging surfaces. More than this cannot be said in a few lines, but it should at least be sufficient to show the dangers of asserting too specifically what is the common sense of a subject when the writer's is the sole authority for the opinion so expressed.

Rifles at Bisley.—The chief interest for the gun trade that attaches to the report of the N.R.A. is the information it conveys as to the rifles used by competitors. During the past year or so interest in this connection has largely died down. The Martin-Smith competition can no longer claim to rank as a representative contest between different types of sporting rifles. The modern sporting rifle is no longer a suitable weapon for work on a range, and as the Martin-Smith conditions take account only of accuracy, and leave striking power entirely out of the calculation, the test as a practical one falls to the ground. The shooters who are making top scores at this range are soon known, so that the manufacturer desirous of securing an advertising record has only to lend a rifle and a supply of ammunition to one of these men to ensure getting a show. For instance, a certain type of rifle appears several times in a list of fifteen prize winners. This does not mean that so many shooters independently selected this rifle from among those comprising their armoury. It merely indicates that the one and only rifle of the kind used was for trade reasons lent successively to the competitors who did so well with it. In the various other competitions of this character, many of the shooters made use of borrowed rifles, or, at any rate, those which were specially urged upon their notice. Now, it is well known that ordinary factory ammunition is not sufficiently reliable for the very fine work that is needed for shooting in a two-inch bull at 100 yards. Hence the list of successes is mainly limited to those brands of material of which a specially-prepared lot is on the ground, and the particulars given must be associated with this very important qualification. In the revolver competitions only are the inducements about equal in the matter of the weapons open for selection, and in the records published it will be found that the three types rank on a very nearly equal footing as regards the extent of their patronage by the individual shooters.

The New Pattern Rifle.—The modified form of service rifle which represents the outcome of the labours of the small-arms committee, seems to be advancing; but as facilities for its inspection are not readily obtainable, it is probable that for some time to come most of the writers who express opinions thereon will do so exclusively from second-hand

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information. The generally accepted specification does not appear to rouse any great enthusiasm, and this feeling is likely to continue unless further information shows that the more radical effects of the old rifle's design have been removed. Admittedly, the points of difference between one military rifle and another, are not of a kind to turn the course of a war in favour of one side or the other, according to the species of their armament. This fact is not forgotten by the official apologists of our national arm. They have only to say what our own rifle will do, and ignore the added conveniences and strength of parts of other rifles, to make out a very good case in favour of the home arm. Apart from the military defects, or rather openings for improvement, of the Lee-Enfield there are the mechanical anomalies; and it is difficult to hope for very much reform in this direction, the membership of the committee being what it is. The fact that this body has held itself aloof from all outside opinion implies a justifiable dislike for interference. But it must remember that its responsibility becomes thereby increased, and that the risks of passing over errors unnoticed are increased. Germany, it will be remembered, repented of the 1888 model of compromise, and put things on quite a different basis some four years ago by the introduction of the '98 model. Let us avoid uninstructed comment, and wait until we see how things have gone in our own country. Present indications do not make us hopeful that the action has been simplified and strengthened, but possibly the changes dictated by military considerations will be of a compensating kind.

THE IMPORTANCE OF GAUGING GUN BARRELS.

ONLY a short time ago a very well-known gunmaker was heard to remark that he never dreamt of passing a gauge through any barrel that came to his place as second-hand. This, as a matter of fact, is by no means an uncommon experience, though it is certain that it represents a species of neglect that may sooner or later give rise to trouble and difficulty. Among the reasons that make it desirable to register the internal diameter of a gun barrel is that any subsequent tampering with its boring may be instantly detected. Admittedly, to register the weight would serve a much similar purpose, but when a barrel has become lighter there is no indication to show where the metal has been removed, whereas if the diameter of a barrel at various points along its length be duly recorded together with the other filed particulars of individual weapons, a very valuable check would be established by which claims for damage might be investigated, and in many cases answered. The existing inattention to the internal diameter of barrels has created all kinds of anomolies in dealing with guns, but none greater than the irresponsible fine boring and polishing out of the interior of worn or second-hand guns, in order to remove dents, rust marks or other blemishes. Bearing in mind the popular demand for light guns, and knowing that only three pounds weight is allowable for a pair of barrels belonging to a light, well-balanced sporting gun, it must never be forgotten that this limit can only be observed by making the walls of the barrel a minimum thickness from end to end.

There are few who realise what minimum thickness really amounts to. In a vague general way it is assumed that the most minute layer of barrel metal is sufficient to withstand the effects of the powder gases forward, and therefore, the precise amount of metal that is left is seldom carefully gauged. There is probably no book that is so misleading on this subject as Greener's "Gun and its Development," from which it would appear that barrel walls may be thinned down indefinitely, and yet fully retain their capacity to withstand the effects of shooting ordinary cartridges. The experience of the trade runs in the opposite direction to that quoted; for wherever a barrel is found to be unduly thin over any particular part of its length, a characteristic puckering of the surface is perceptible. In fact, the gun trade are at the present time very much concerned at the great prevalence of this complaint; and yet there seems to be no satisfactory theory to account for it. It is, however, obvious that something occurs during the ordinary wear and tear of a gun by which thin surfaces develop signs of strain, while barrel walls of substantial thickness remain unaffected.

A pair of barrels weighing 3 lbs. will carry such an amount of metal as will enable the walls to be of a thickness of not less than ·030 in. at any part, still leaving plenty of metal to thicken out at the breech end, so as to support the recognised graduations of pressure met with in nitro powders. In the same way the stated weight allows for substantial ribs as these things go, and also for a sufficiency of metal to enable the breech fastenings to be arranged without unduly reducing the clear thickness of the chamber walls. Similarly, there is plenty of margin for thickening the exterior of the barrels at the muzzle, so as to increase insensitiveness to shock at this place, and in the case of choke bores to provide support at the place where the constriction occurs. When, however, it is laid down that all these things can be amply provided for in a pair of 30 in. barrels weighing no more than 3 lbs., it must not be forgotten that there is practically no margin for errors. If the barrels be untruly bored, so that there is more metal on one side than the other, or if the internal diameter be excessive, the margin of strength allowed for by the contour of the outside is lost at once. Considering that it is by no means unusual to find barrels as large as ·740 of an inch, it is not surprising that so many go wrong, or at any rate, show themselves unduly sensitive to the rough treatment they receive in the course of everyday work. Supposing, for instance, that a barrel is over-bored by ·010 in., and that the interior is unconcentric with the exterior to the extent of another ·010 in., then the safe limit of ·030 in. minimum wall thickness, which may have been aimed at in theory, becomes ·010 in., which is hardly sufficient to resist a vigorous scrub out with a well-fitted cleaning rag.

Such elementary facts as those here quoted would hardly seem to require accentuation in the columns of a journal like this, and yet they are called for by the extraordinary state of neglect into which the examination of shot gun barrels has fallen. No gunmaker is competent to express a reliable opinion upon a gun unless he has first taken the precaution to gauge its interior surface and compare the dimensions so obtained with the diameters registered externally from breech to muzzle. The difference between these two should provide a fair idea of the thickness of the barrel walls from end to end, and experience should then enable one to determine whether there is the needful margin of strength at all places. At the present time there are probably very few in

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the gun trade except skilled barrel makers, who could state the correct thickness of metal throughout the length of a pair of gun barrels, and how those dimensions should be varied so as to produce proportionate variations in strength and weight. It cannot be denied that this information is as much part and parcel of the skilled knowledge that enables a maker to turn out a good gun as any other department of gunmaking or fitting. It is not enough to rely upon the barrel maker, because if this is done the whole principle of viewing and inspecting falls to the ground. There are admittedly a few makers of gun barrels whose reputation for good work is their most cherished asset; but the mere fact that such men command a high price disposes of the argument that inspection is unnecessary, because in the large majority of cases prices are sufficiently low to force a man to make efforts to avoid the loss that comes with condemned material. If, for instance, a barrel is too much reduced on the outside in the early processes, the conscienceless borer is tempted to leave it very small in diameter so as to ensure the requisite wall thickness. This is probably why so many 12-bore guns are finished with a diameter of ·720 in., which cannot be opened out to the proper diameter, especially after putting together, as the almost inevitable result would be to leave undue thinness at some place or other.

It is only by a gradual process of improvement that the present methods can be advanced. The cry of the Birmingham gunmaker is against the competition of the Continent. In these columns it has always been urged that it is better to compete in quality than in price; and as the barrel contains the most obvious faults of the modern day gun, the sooner that subject is taken up in an earnest spirit the better for all concerned. Six months ago there was a certain amount of excuse for gunmakers who had not been in the habit of making a proper inspection of the barrels that passed through their hands. In the past few weeks there has been a change in so far that the firm of Cogswell and Harrison have issued for sale a reproduction, with various important improvements, of the Allport barrel gauge. Now, for the sum of three guineas it is possible for any gunmaker to obtain an accurate gauge with which he can examine all the barrels that pass through his hands. With this gauging rod and an ordinary micrometer caliper, the diameters, internal and external, of every pair of barrels, can be determined in a very few seconds.

When the habit of using the gauge becomes well established, all barrels failing to conform with the standard measurements can be rejected, and after a very few experiences of this kind, the barrel-borer, or the wholesale supplier, will soon find that he too must pay enhanced attention to a side of his business hitherto the subject of neglect. While there is no intention to misrepresent small discrepancies as serious errors, it cannot be denied that the existing inattention to the dimensions of gun barrels is causing a good deal of annoyance to a large number of gunmakers. Weapons which are to all appearances sound when they leave the premises, seems to show an altogether undue sensitiveness to blows. Furthermore, while it is impossible to say whether it is the fault of the cartridge or not, the number of barrels that show signs of fatigue on account of the action of the cartridge, seem to increase yearly. In fact, while popular belief is misled into supposing that gun barrels are amply strong for the stresses that are set up forward, experience actually shows that this is their weak side, and that the proof test does not appear to establish predisposition to give way. Whether this is due to the development of the thinness after proof, or whether it is that a succession of service charges causes far greater distress that one proof charge, the central fact remains, viz., that sufficient attention does not seem to be paid to ensure in every gun the margin of strength that the allowable weight in the barrel can provide for in the presence of sound workmanship. At any rate, one way to insure a certain standard of workmanship is to submit all gun barrels to systematic gauging, a precaution whose efficacy is seldom put to the test.

NOTES.

A NEW SMOKELESS POWDER.—Messrs. Curtis's and Harvey are to be congratulated on their nitro powder "Diamond Smokeless." It is of the 33-grain class, this implying that the weight stated is the charge for the standard 12-bore cartridge, being the equivalent bulk for bulk for three drams of black powder. The report that appeared in *The Field* shows this powder to be quite up to the highest standard attained by this class of nitro, their special qualifications being low recoil, great smokelessness and conspicuous ability to show good results with small shot charges. Altogether these powders are ideally suited for modern conditions of shooting, and their ever-increasing popularity is proof positive that they are regarded in that light by sportsmen.

THE NEW EXPLOSIVES CO., LD.—This company is to be congratulated on a marvellous record of progress. It is not much more than eight years ago that a derelict and closed down works was taken in hand by a new directorate. As a result of their energy contract upon contract was obtained, and things gradually began to assume a promising aspect. There was no resting on the oars, so that no sooner was one fresh development well in hand than something else was undertaken. The cumulative effect of all these things is well displayed in the report and accounts for the year 1902. The profit for the year is £21,656, which, after deducting debenture interest and income tax, £2,417, leaves a net balance of £19,239. This added to the amount brought forward from 1901, £7,441, produces the sum of £26,680 for appropriation. The directors recommend that this be dealt with as follows:— 10 per cent. dividend £9,000; reserve for extensions to property, plant and buildings, £2,500; write off "property purchase account," £5,523; add to reserve fund, £3,000; carry forward £6,658. The board very much regret to announce the death of Mr. C. W. A. Goodfellow, who has acted as chairman of the company since the reconstruction. His successor as chairman is Mr. F. Machell Smith.

THE STORAGE OF MIXED EXPLOSIVES.—It seems that the Public Control Department of the London County Council are once more agitating on the subject of the amount of explosives permitted on registered premises. The Public Control Committee, in dealing with this subject, have lately reported that "it is again desirable to direct attention to the unnecessarily large quantities of explosives which the Act permits upon any premises which have been registered with the local authority. There is nothing, for instance, to prevent

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an oilman keeping in a shop as much as 50 lbs. of gunpowder, but an even larger quantity may be kept, as when it is stored in a fire-proof iron safe there may be 100 lbs., or, if in a brick-built magazine in the yard, 200 lbs. Although London has escaped serious accident, other towns have not been so fortunate, and in the last 25 years there have been some 150 accidents, of a more or less serious character, in connection with the use of rooms for filling cartridges, and with the storage of gunpowder and other explosive compounds." The Committee, thereupon, recommend that the Home Secretary be requested to promote a bill to amend the Explosives Act by reducing the amount of explosives that may be kept upon registered premises. It seems unfortunate that so important a subject should be handled in such a jumbled up way. The implied suggestion that oilmen keep large stores of powder, and are in the habit of loading cartridges, very unfairly, prejudices the subject. Laxity of this kind is unpardonable, considering that the County Council, as local authority, has access to the records showing what holders of certificates for registered premises use loading shops. At any rate, it is a remarkable fact that H.M. Inspectors of Explosives some years ago reconsidered the regulations applying to registered premises, and as a result of friendly representations from the Gunmakers' Association, various clauses were modified, and the allowable maximum storage of gunpowder was reduced from 100 to its present limit of 50 lbs. If the County Council would study the records of accidents that have happened they would find that, as a rule, they have been aggravated by storage in excess of the statutory limits, and by the omission of recognised precautions to ensure safety. At any rate it would seem that H.M. Inspectors are of opinion that it is not the Act, but its administration by the local authorities that is at fault. Another sign of the County Council's lack of knowledge in these matters is that they do not seem to be aware that the regulations can be altered by a simple Order in Council.

MESSRS. ELEY BROS.—The balance-sheet of this Company discloses a very satisfactory state of affairs, the net profit for the year ended Dec. 31st, 1902, amounting to £36,671. With the amount brought forward from the previous account, there is a disposable surplus of £53,436, of which £37,500 goes for the payment of a 15 per cent. dividend on the quarter million capital of the company. Various writings off absorb £3,421, leaving £12,515 for carrying forward. It seems that the increased demand for the company's manufactures has necessitated further outlays in machinery plant, and that the tool-making department has been thoroughly reorganised, and everything brought up to date. It is proposed that the sum so expended during the year shall be written off as depreciation. It is announced that, as the factory at Pancras Road has, for some years past, been totally inadequate to meet the demands upon it, the board decided, at the latter end of 1901, to erect a new and modern range of workshops and stores at the Company's loading factory at Angel Road, and to remove the work to that place. The necessary buildings and installation have been steadily proceeded with during the past year, and the principal shops are now ready for occupation. It is hoped that the work of removal will shortly be commenced and the transfer completed during the current year. To meet the outlay required for the purpose, the directors have created £50,000 of debentures, and have obtained a temporary loan of £40,000, depositing debentures as security. As the remainder of the report deals with the changes in the directorate that have occurred as a result of losses and retirement, it need not be further quoted beyond saying, in addition to what has already been announced in these columns, that Mr. Henry Eley has been forced to retire on account of ill-health, and that his place has been filled by Mr. Charles Cuthbert Eley, son of the late Mr. William T. Eley. Altogether, the report and accounts show that this well-known and old-established firm is developing its resources with all the vigour and energy of youth.

A DUPONT CALENDAR.—Probably there is no better example of the latest successes in colour printing than the roll-up calendars that American sporting goods makers issue year by year to their customers and clients. Each one seems

to try to eclipse the efforts of past years, or live up to previous successes. But whatever may be the promoting impulse, there can be no doubt as to the result. Messrs. Dupont, the well-known powder makers, of Wilmington, Delaware, U.S.A., wrote to us, upon reading our notice of Messrs. Curtis's and Harvey's picture of partridges, to ask what we thought of their own effort in the way of a sporting reproduction, at the same time enclosing a copy of the calendar in question. The accompanying reproduction of the picture at least shows that they have scored a notable success. The ordinary artist's idea of a sportsman holding a gun seems generally to suggest a terrible sense of disproportion between barrel and stock; also that the balancing centre of the gun has somehow got mis-

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placed, judging by the manner of its holding. In the present picture we have obviously a real gun, and better still, a real boy grasping it as a boy would, at the same time planting his feet in a manner suggestive of ambitious intentions against something. In leaving out the something, the artist has shown a wise discretion; because in attempting to show the game as well as the shooter, one too often gets the impression that the gun must shoot round corners to hit the object, and at other times that the shooter can be no sportsman to take aim from so short a distance. The pictures, for instance, that depicted the shooting experiences ot the German emperor on his recent visit to this country, frequently showed him to be firing at pheasants a gun's length away. While desirous of calling a halt for fear of becoming too discursive, we cannot do so without congratulating Messrs. Dupont on having produced a truly artistic conception without offending our sporting, mechanical, or anatomical sensibilities.

MAUSERS FOR MEXICO.—The Mexican Government has contracted with the Waffenfabrik Mauser for the delivery of 50,000 Mauser rifles for the rearmament of the Mexican infantry, and this is, we understand, only the first of a series. The rifles are of the M.98 pattern, exactly similar to those now in the hands of the German troops, of which an illustrated description appeared in our issue for May, 1901, and this model was chosen only after very exhaustive trials of the weapon alongside other competitors. It is interesting to note that the German Government have in this instance for the first time allowed an existing Service rifle to be furnished to any outside Government, and one might almost infer from this act of grace that a change is in contemplation. Herr Louis Schlegelmilch, chief of construction at the Imperial rifle factory at Spandau, is working on the production of an automatic rifle, which, according to all accounts, is well-nigh perfected for use as a practical military arm. We understand that a committee of German officers appointed to inquire into the matter has advised the retention of the present Service calibre of 7·9 m/m., after prolonged trials of rifles ranging as low as 6 m/m (·236 in.). As is well-known, this small calibre was tried in the U.S. Navy, and subsequently found to be impracticable for military requirements.

THE "LEE ENFIELD MODIFIED."—An air of mystery still surrounds the new rifle which is about to replace the existing Service arm, even though its adoption is virtually decided upon, and arrangements are already in progress for its manufacture. We believe that even those firms who will shortly be called upon to supplement the output of the Government factories in the supply of the new weapon are, as yet, not fully enlightened as to the changes of machinery that will be necessitated by the production of a new model, since, if our informant is to be credited, they have not yet had the opportunity to examine a sample of the modified rifle in its complete form, but have merely seen a few of the component parts. Under the circumstances, we give with all reserve such details as are forthcoming. The barrel of the new arm is to be shortened by five inches, and while its calibre and rifling are presumably to be of the existing pattern, a modification is to be tried by increasing the calibre for about ten inches at the muzzle end, the idea being to diminish the frictional resistance after the powder gases have exerted some considerable portion of their force. The whole of the barrel, with the exception of about one inch at the muzzle, and sufficient space for the excrescence of the back-sight bed, is to be enclosed with wood. The bayonet will be attached to a special nose-cap. The back-sight is to be of a new design, with a flap that is raised only for the longer ranges. Details as to the breech action and magazine are still wanting. It is to be hoped that a new and improved bolt action will be substituted for the faulty one now in use, and since it is stated that clip loading is to be adopted, one may also trust that a non-projecting magazine, even though it hold less than ten cartridges, may be fitted in place of the existing pattern. From the particulars so far to hand, no very great hopes can be entertained that the new rifle will be other than the "modified" Lee-Enfield, that its official name seems to imply, and it cannot be said that our confidence in the ultimate success of the weapon is increased by the absurd reticence that has been observed in respect to publication of its characteristics almost up to the day of its production in practical quantities.

NEW "EXPLOSIVES IN COAL MINES" ORDER.

In pursuance of Section 6 of the "Coal Mines Regulation Act," 1896, the Secretary of State for the Home Department has issued, under date December 20th, 1902, a new "Explosives in Coal Mines" Order, which revokes, as from January 1st, 1903, the "Explosives in Coal Mines" Order of October 1st, 1901, which we published in our issue of November of that year, and the subsequent Orders dated respectively December 17th, 1901, and March 24th, June 7th, July 26th, and October 10th, 1902.

The body of the new Order, so far as its first seven sections are concerned, reads exactly the same as in the Order hereby revoked, the full wording of which we gave at the time as already mentioned, but an eighth Section is added, which reads as follows:—"8. So much of the schedule as relates to the explosive named, Special Bulldog, shall be in force only until March 1, 1903, and after that date the Order and schedule shall have effect as if that explosive was omitted from the list of permitted explosives." The reason given for the insertion of this Section is that the makers of the explosive in question, Messrs. Curtis's & Harvey, Ld., have given notice that they have ceased to manufacture "Special Bulldog" in consequence of the inclusion in the permitted list of their new explosive, "Bobbinite"; and it is retained on the permitted list for two months only, in order to allow existing stocks to be used up.

At the date of the issue of the preceding Order of October 1st, 1901, the schedule of permitted explosives included a total of 22, all of which had passed the Special Test, as laid down by the Home Office Memorandum of October 18th, 1899. Succeeding Orders added nine explosives to the list, and the new Order, which now takes the place of the foregoing, brings the total up to 33 by the addition of "Bobbinite" and "Dragonite," the number being shortly to be reduced to 32 by the lapse of "Special Bulldog." The two new explosives are both the sole manufacture of Messrs. Curtis's & Harvey, Ld. As now brought up to date, the list of permitted explosives

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comprised in the schedule of the new Order, consists of the following:—

Albionite, Ammonite, Amvis, Aphosite, Arkite, Bellite No. 1, Bellite No. 3, Bobbinite, Britonite, Cambrite, Carbonite, Clydite, Dahmenite A, Dragonite, Electronite, Faversham Powder, Fracturite, Geloxite, Haylite No. 1, Kynite, Nobel Ardeer powder, Nobel carbonite, Normanite, Pit-ite, Roburite No. 3, Saxonite, Special Bulldog (this explosive is permitted only until March 1, 1903), Stowite, Thunderite, Victorite, Virite, Westfalite No. 1, and Westfalite No. 1.

THE "FIELD" TURNOVER TEST.

WE have reproduced from the columns of our contemporary, *The Field*, a drawing which shows in general principle the particulars of a test that has recently been established for determining the value of the resistance afforded by different kinds and degrees of turnover in sporting cartridges. An ordinary cartridge is cut in half by a sharp knife at a point just in advance of the interior lining. The wads and shot are then withdrawn from the back, and a small round hole is punched in the top wad. This permits the insertion of a

screwed pin having an eye at the other end, and a metal disc is screwed on to the pin from the back of the top wad, and so gives the screwed pin a hold on the wad. The back of the cartridge is then held in some suitable form of chuck, that shown in the illustration being only a temporary and not altogether convenient adaptation from an American concentric lathe chuck. The main principle is, however, effectively carried out in so far, that a well fitting plug is inserted in the open end of the tube, and so allows the jaws of the chuck to obtain the necessary grip on being screwed home. Of course a more convenient method of fastening the cartridge would be to make one or two slits in the cartridge tube and make the interior plug slightly cone shaped, a sleeve with a correspondingly cut cone serving to jam the cartridge tightly under screw pressure, one cone being forced into the other with the cartridge tube in between.

At any rate, granting that the cartridge is firmly held, the remainder of the test consists in attaching a spring balance to the screwed eye, and imparting a gradually increasing tension until the turnover gives way and allows the wad to escape. By this means the resistance of the turnover can be very accurately estimated, and in values that will give a strict relation showing the effectiveness of the turnover as a means of initially confining the powder gases and so causing them to do their full amount of work on the shot. The results so far published show that weak turnovers that are obviously deficient in strength give way at as little as 30 lbs. tension, while well-made turnovers on the other hand range from 50 to 60 lbs., according to their shape and the condition of the paper. Turnovers are occasionally met with which are so solidly jammed into position that their resistance runs up very nearly to 80 lbs. The general effect of the publication of these values seems to have been to call attention once more to a very well-known aspect of cartridge loading. There is an apparent tendency to endeavour to define limits of resistance that might be recognised as standards in cartridge turnovers, with the result that those methods that produce defective turnovers, either through over-weakness or undue solidity, would be gradually abolished. The first step in the direction of an improved shape of turnover seems to be to condemn the absolutely square turnover, and to adopt in its place one with a fairly square angle on the inner side, but nicely rounded on the external corner, thus toning down extreme rigidity, and yet allowing for a thoroughly sound and lasting form of closure.

When refinements of this kind are discussed, it is always a matter of some interest to enquire how far they can be said to have a practical application. Cartridge loaders do not want to be for ever cutting up ammunition and sticking it in a testing machine. On the other hand, it is possible that occasional tests might serve the useful purpose of showing whether the proper amount of resistance as a rule is reached. The experiments so far made seem to show that, while the eye is not an infallible index as to the quality of a turnover, at the same time it affords a good deal of information, especially when its observations are intepreted by the help of occasional experiments. Thus it might happen that a cartridge loader, who is generally satisfied with the class of work being done in his loading shops, might find upon experiment, that in some way or other the turnovers had become unsuitable in their resistance from some cause till then unnoticed. Once on the right track, a very little amount of enquiry would probably establish the existence of a bad chuck or one of the other prevalent causes of bad work. At any rate, among those loaders who retain their business against energetic competition, there is always a desire to leave no stone unturned to ensure efficiency, and if the turnover test be shown to be an effective instrument in regularising results, then it might be assured a permanent position among the gauges and other appliances that one meets with in all well organised loading shops. The system is not, however, likely to extend very far if each man is left to improvise his own testing machine. Consequently, its extension is likely to depend in a great measure upon whether someone versed in the designing of simple experimental appliances will be ready to take up the manufacture and sale of some inexpensive form of bench testing machine, such as could be acquired for a small cost by those inclined to go a step further in the direction of giving the thing a practical trial.

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INCIDENTAL JOTTINGS.

RECEIVED ON ACCOUNT.

Now we know all about the new rifle, will someone tell us about the ammunition? though, perhaps this, like the reward of good children, will come "by and by." But there is no harm in suggesting that ammunition might be wanted after all. We should, therefore, begin to think about it, so as not as in times of old, to have to use Mark II. ammunition with a new weapon, and have a regular hash-up before the pattern is altered to suit the new conditions. With a shorter barrel it is conceivable that the velocity will alter. With deeper grooves or the increasing twist of the rifling, mayhap the bullet envelope will require to be stouter, and if the envelope is thicker, possibly the weight of the bullet will be less, and peradventure longer to compensate. And then the modified cordite—unreelable, unwieldy,—how will it be loaded? Surely we shall be spared the ignomony of a "grain" powder, that antedeluvian form we have discarded years ago! We have an affection for cordite with its graceful, supple little strands, which we bolder men have used as pipe lights at Bisley for exhibition purposes. Its combustion in the rifle was never complete, and with a shorter barrel it would be even less so, so good-bye old friend 3¼ cordite. This fact must give the verdict against you.

A GENTLE BOAST.

After the usual splash of American exuberance at the mounting of the big gun at Sandy Hook, it must have been very disappointing when it "bust" at proof. After all the arguments as to the excellent and up-to-date automatic machine of our Teutonic cousins, the shelling of San Carlos in Venezuela does not convince anyone that the Germans are experts in fuze manufacture. Yet we are all sick to death of hearing these nations quoted to us as the lights of progress in manufacture, while their missionaries live in this country and work like niggers to convert us to their views, when they are apparently badly wanted at home. What we want are apostles of design who can introduce better patterns for us, and leave the manufacture alone. There is then every chance for a perfect article. The present service rifle is a tribute to the excellence of our own machine-tool makers. No nation in the world could have made a weapon like it, considering the vile outrage on mechanical principles which the design represented. Also look at the excellent cartridges, and consider the unmechanical beer-bottle neck, no form could be more difficult to make. Not only in small arms, but in the design of our war material all through, one can see the indiscision due to invention or editing other peoples inventions by committee. The actual results of manufacture are in spite of the greatest difficulties, above reproach, and far ahead of the accomplishments of any other nation.

THE O. C. "SITTING." WHAT WILL THEY WATCH?

The new field equipment for the army is a chance in a lifetime for original design. Just now everyone is smothered with ideas which have no coherence one with the other. Each unit is being exploited in the hope that the Ordnance Committee will be able to sort things out into some sort of uniformity. This generally ends in a complicated design that presents serious difficulties of manufacture that easily get out of order, and where everything depends upon the skill of the workman rather than the simplicity of mechanical form in which the idea finds expression. I do not think this argument is laboured. It is an undeniable fact that by taking a multiplicity of suggestions, some good and some bad, the result must be an average. If anything really good is wanted, it is generally to be found outside the Government factories, whence all inventions in war material generally emanate. Invention within the ordnance factories is regarded by the authorities as a disease. I am sorry to say that even if military men are of an inventive turn, they seem to lack the courage of their own convictions. But when they retire they suddenly get bitten with a terrible fit of commercial impulsiveness, and the Patent Agents help them spend their "retired" pay.

THE ARTS OF WAR APPLIED TO PEACE.

Major Denne, R.A., is greatly to be envied on account of his appointment as Inspector of Explosives for the Transvaal. There appears to be a good deal of heart-burning amongst many of the unsuccessful candidates, also of that respectable and Royal Regiment of Artillery, who aspired to receive this honour. They not unreasonably considered their recent training, and special work would render them eminently suitable as military inspectors. This would apply particularly in a new colony where a disciplinary administration might possibly be considered more in accordance with the requirements of an Explosives Act than an expert knowledge of the materials they would inspect. Major Denne will enter his duties free from the fads and peccadillos of a trained chemist, the prejudices and bigotry of a manufacturer, or the dangerous familiarity of a user for industrial purposes. Under these happy auspices I congratulate the gallant officer—as well as the explosives world in the Transvaal.

IS IT UNDER SUSPICION?

It was unfortunate that two accidents should have happened recently with "modified" Cordite, in the process of incorporation. Being a newish sort of thing, it gives the stuff a bad name, which it does not deserve. But it opens up a question whether the pugging machine used for Cordite in its old form is absolutely the right thing, or works at the right speed for "modified." I know it is generally the text of all those in responsibility to "blame the individual rather than the system." And if a machine is occasionally receptive to grit and dirt with such fatal results, it deserves to be put aside for something better, in just the same way that an excellent workman would be discharged if he was subject to unreliable moments, however infrequent. It is, however, by these mishaps that we gain experience, but it is very costly to the trade, when alarm seizes the explosive inspectors at Whitehall who may possibly view the matter as a fault of the material rather than a weak spot in the system of manufacture. It therefore behoves the community to give this matter the greatest attention, bearing in mind that "modified" Cordite is our half-way house to the "Pure cellulose" powder of the future. The only prospect of financial success in manufacture is to retain every hard-won privilege

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which has been gained for Cordite from the Home Office inspectors. The decrepit Act of '75 is sucked dry. There is not another "interpretation" left in it, and when we arrive at the cellulose powder we come into the ring of international competition, and will feel the cost of every restriction which does not equally bear upon our continental neighbours. "Modified" must, therefore, be very carefully "treated," or the "licensing authorities" will put it on the "black list" in accordance with the Act.

CYCLOPS.

FRENCH RESEARCHES ON EXPLOSIVES.

BY A CORRESPONDENT.

WITH the publication of Part II. of Volume XI. of the *Mémorials des Poudres et Salpêtres*, the scientific officials of the French Government Powder Factories, have added another volume to the record of their investigations on explosives. The series forms a veritable monument of careful research, and the present state of our knowledge on explosives and the theory with respect to the same, owes not a little to the scientists who have been associated with the French government explosive industry. The present issue is of a similar character to the more recent volumes, containing as it does technical articles and official publications. The technical or scientific matter consists of the following articles: The Delay in the ignition of Shotgun Powders; The Powders and Explosives of the Exhibition of 1900; The Calculation of Pressures in Ordnance; The Production of Nitro-napthalene. To each of these articles we will refer later.

The last two or three volumes of the *Mémorials* do not contain what one might term the epoch-making researches of the earlier issues. They are devoted rather to the working out of the detail and the application generally of the theories previously proved to be sound. This is easily understood when it is borne in mind that researches which give correct explanations close the door for further useful investigation. It is not to be understood that the field for research in explosives is exhausted, but rather that the more important branches have either been placed on a satisfactory theoretical basis or brought up to date as regards the requirements of the practical man. In most instances, however, it must be admitted that the present accepted explanations were first published in the volumes of the *Mémorials*.

That there is still need for investigation and mathematical analysis there can be little or no doubt. A case in point is supplied by the article on "The calculation of Pressures in Ordnance" by *M.* Vallier, on the subject matter of Interior Ballistics. Broadly speaking, his treatment consists in equating the possibilities of a charge of gunpowder, considered from a physical and chemical point of view, with the results given on firing the said charge. Abel and Noble proposed a method of calculation which, although, having nothing to recommend it, still finds its way into most modern English works on gunnery. They considered what would be the maximum energy that an ignited charge of gunpowder could give out in expanding from one density to a lower density, and they equated this to the energy actually given to a projectile submitted to such expansion. The projectile never acquires this maximum energy, but only 70% to 90% of the same, depending on the bore, bullet, &c. Such a method of calculation and stating of the case was not instructive as a piece of pure explanation, and as it failed to give any value to the factors which were known to affect the results, it offered no assistance to the manufacturer of gunpowders. Obviously the actual calculation of pressures and velocities can possess little or no merit if it does not give to every factor or variant its proper or proportionate value. A correct method should not only be instructive from the point of view of knowledge, but it should contain all the variable elements which go to form a gunpowder at their proper value, so that intelligent manufacturers of gunpowders might be able to appreciate the importance thereof and make their investigations accordingly.

The first volume of the *Mémorials*, issued in 1882, contains M. Sarrau's early analysis of the factors connected with the subject of interior ballistics. For the first time an attempt was made to present an intelligent statement of the case. Sarrau's general method is adopted to-day, with but slight alterations. It is a pity smokeless gunpowders are not treated from the very beginning by themselves. *M.M.* Sarrau and Vieille in their investigations on "The mode of Combustion of Gunpowders," showed wherein the present day smokeless rifle and artillery powders differ from black powder. The fact that gelatinized smokeless gunpowders burn in concentric layers should materially assist a separate treatment of the subject and lesson the present use of indefinite factors or constant multiples which differ for black powders of various sources of manufacture, and also for smokeless powders of different natures. The calculations of pressures and velocities can never be considered satisfactory until such factors as the above can be obtained from an *a priori* consideration of the explosive itself. In M. Vallier's article, which relates only to the curve of pressures from the point of maximum to muzzle, it will be seen that the same use is made of these indefinite factors as is usual. Thus he gives different arbitrary values to his terms for black and quick, medium and slow smokeless gunpowders. While these are necessary, interior ballastics must be recognized as affording an insufficient scientific explanation of the phenomena of combustion of powder when propelling a projectile.

The article on the production of nitro-napthalene is continued from Volume IX. The previous publication deals with the manufacture of di-and tri-nitro napthalene while the present article is confined to the production of the higher nitro-derivatives viz., tetra-nitro-napthalene. As the nitro-napthalenes have not yet become widely used explosive substances, these articles are more interesting to the chemical manufacturer than the explosive expert. The investigation of substances which are, or are likely to become of interest to the explosive trade generally, has always been proper subject matter of the *Mémorials*, and many instances could be quoted where the experiments published therein have afterwards been a useful source of information for the supply of a new demand. The present series of nitrating experiments recall to memory those made on cellubose by Vieille in 1884 and later by Bruley in 1895, all of which supply a number of useful facts to the manufacturer of nitro-cellulose.

A feature of these experiments on the production of nitro-napthalene is especially interesting, viz., the use the author *M.* Patart makes of the copper crusher gauge to assay the resulting nitro-derivative. When an investigator takes the pressures given on firing a known weight of explosive in a

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closed vessel as a test for the degree of nitration in preference to the ordinary methods of chemical analysis, it is a complete answer to those who question the accuracy of the crusher gauge. Where discredit does exist as to the reliability of taking pressure with Noble's copper crushers, the questionable results that give rise to these suspicions may be ascribed to a neglect of the precautions demonstrated to be necessary by *MM.* Sarrau and Vieille in their publications in the *Mémorials* of 1882 and 1892.

The articles on the ignition of Shotgun Powders is continued from Part I. of Volume XI. The ignition of the powder charge is considered from two points of view, first that of the delay which occurs between the impact on the cap and the emission of the flame, and secondly the time between the emission of the flame and the ignition of the powder charge. The experiments were made with French powders only, there were however a few tests with Eley's caps. The results show that the actual ignition of the primer does not differ appreciably. With the caps tested, the time does not vary beyond ·00013 sec. and ·00030 sec., evidently an amount which nee not be considered. The ignition of the powder is however quite different; for the caps varied materially in their effectiveness for a given powder. The tiine of ignition is determined, as is also usual in England, by measuring the interval between the striking of the primer and the exit of the shot from the muzzle. The ignition of the cap may be considered constant, and if the velocities given to the shot charge do not differ materially, it may be taken that the time in moving up the barrel is constant. Thus the difference in the interval measured corresponds to the delay in igniting the powder. The results obtained agree very well with those registered in England. Thus smokeless powders and a good cap gave intervals of from ·0035 sec. to ·0045 sec., and black powder intervals of about ·0025 sec. Several instances are figured where the cap showed delays which would imply distinct hang-fires. One series averaged 0·0532 sec.; yet nevertheless even with such a delay in ignition, the recorded velocity and pressure did not differ from those obtained with good primers. This is not new, and in England it is well understood that a cap which "hang-fires" does not necessarily give low ballistics. In fact, it is really a matter of suitability of cap to powder or powder to cap, which ever way it may be considered.

The greater part of the present issue of the *Mémorials* is devoted to a report on the powders and explosives of the Exhibition of 1900. The first chapter of the report deals with apparatus and machinery used in connection with the manufacture of explosives, and the second chapter with the explosives exhibited. The French government decided not to exhibit, and nearly every other government followed their example. This is unfortunate, as a complete record of the explosives, more especially the gunpowders now in use, would have been useful not only to those at present interested in explosives but it would have been a good record to leave for powder makers in the future.

It is impossible to do more than notice the more striking features of the report. *M.* Polain exhibited his well known pressure-barrel for shotgun work, and along with it a series of pressures he obtained with well known nitros in 1895—1896. The English press has previously shown the value it places on records which indicate that the pressure in a shotgun barrel rises as the shot moves up the barrel; and it appears that the committee who make the report are just as difficult to convince, in fact, they go so far as to state that, to find an explanation it would be necessary to know exactly the details of the results obtained by *M.* Polain as well as the method of reading the measurements. *M.* Polain, however, gives a table of pressures of later date 1898—1899, when the usual nitros had ceased to behave as hitherto, and the pressures given at the various points in the barrel were more in accord with what is generally understood.

"Normal" Rifle and Artillery Powders receive by far the longest notice; and if the report may be taken as fair, then it is difficult to understand why these powders have not been adopted by other countries as well as Sweden, Finland, Norway and Switzerland. From the results quoted, Normal Powder, which does not contain nitro-glycerin, has little or no erosive action. In Field Artillery, 800 rounds may be fired without injury to the efficiency of the piece, whereas with nitro-glycerin products 100 rounds are said to ruin a similar gun. In small arms, as many as 30,000 rounds have been fired from one rifle without injury to its accuracy; but 1,000 rounds are given as the life of the same rifle firing a nitro-glycerin compound. Immediately below these statements, as if to give a reason for them, it is stated that 100 rounds of Ballistite fired under certain conditions raise the temperature of the rifle 432° F., and under the same conditions 100 rounds of Normal, cause the temperature to rise only 252° F. It is also set forth that very large quantities of this powder have been stored in magazines for four years without deterioration in ballistics or the injury in anyway of the metal cartridge case.

The above and more to the same effect make it impossible to understand why one or other of the Greater Powers has failed to discover the merits of this product.

The shotgun powders are only briefly mentioned and with the exception of a table of results, which is given below, do not offer any feature worthy of notice.

The following table is interesting as an instance of French standards, as compared with English loading of the same powders. It will be noticed that the charges of powder and shot are higher than our standards, and that the velocities and pressures are rather lower.

Powder.	Shot Charge.	Powder Charge.	Velocity over 33 yards.	Pressures with 4·9 m/m. coppers
French J. No. 2	1¼ ozs.	58½ grains.	896 feet.	2·8 tons.
Cooppal No. 1	,,	46 ,,	886 ,,	2·2 ,,
,, No. 2	,,	37 ,,	886 ,,	2·2 ,,
Mullerite No. 1	,,	34½ ,,	886 ,,	2·2 ,,
Clermonite ..	,,	42 ,,	853 ,,	2·8 ,,
Ballistite ..	,,	29 ,,	886 ,,	2·8 ,,
Rifleite ..	,,	43 ,,	886 ,,	1·9 ,,
Normal ..	,,	34 ,,	869 ,,	3·5 ,,

It has been stated already that the present accepted theories and facts with regard to explosives have in most instances first been published in the *Mémorials*. Feelings of patriotism make us sorry this has to be admitted, and hopeful that it is a state of things likely to be altered before long as far as England is concerned. With the establishment of the Explosive committee and the employment by it of men conversant with the methods of science, it is reasonable to anticipate that the members of the explosives trade in the future will not have to rely on scientists of other nations for the interpretation of the facts of their experience.

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ROUND THE TRADE.

The Ballistite agency of the Nobel Company will shortly move to 29, College Hill Chambers, Cannon Street, E.C.

Mr. Gustaf Roos has announced by circular that as debenture holder he is taking over the Normal Powder and Ammunition Co., Ld.

Messrs. Nobel's Explosives Co., Ld., have applied to the Stirling County Council for permission to alter and enlarge their factory at Reddingmore.

There is a fire-arms factory at Fez, in Morocco, which was instituted about ten years ago by the late Italian Colonel Bregoli, aided by the present director, Colonel Ferrara.

The firm of Bentley & Playfair, of Summer Lane, Birmingham, has lately been formed into a limited liability concern, at a nominal capital, for purely family reasons.

Mr. Henry Andrews, of 31, New Road, Woolwich, S.E., has sent us a copy of the eighteenth edition of his well-known score register and handbook of shooting for the ·303 regulation rifle.

Subject to confirmation by the shareholders, it has been arranged that Nobel's Explosives Co., Ld., take a controlling interest in the business of Messrs. Joyce, the well-known ammunition makers.

In the list of companies winding-up voluntarily, as published in the *London Gazette*, is to be found the name of the South Wales Explosives Co., Ld., the liquidator for which is Mr. Henry Mosenthal.

Messrs. Eley and Kynoch have separately announced a 5s. per 1,000 rise in the gross price of ejector and grouse cases, to date from the 7th ult., Messrs. Joyce apparently continuing to sell on the old terms.

The Hazard Powder Company send us a circular letter stating that the New York branch office, which was opened on the occasions of moving their head offices to Wilmington, Del., will now be discontinued.

We learn that Mr. J. H. Thomas has recently been appointed Works Manager of the Normal Powder and Ammunition Co., Ld., at Hendon. Mr. Thomas had previously represented Normal Powder in the provinces for some considerable time.

The National Rifle Association announce the removal of their offices from Gloucester House, Charing Cross Road, London, to the Camp Offices at Bisley. The London Committee meetings will be held at a room provided by the Royal United Service Institution in Whitehall.

A circular just received from France tells of a projected industrial exposition at Rheims, and intending exhibitors are invited to sign a form saying that they "demand to expose the following products." We note that there is a section devoted to "guns of the chase."

A serious fire has wrecked the premises of Messrs. Robert Roper & Co., Ld., gunmakers and explosives dealers, at Sheffield. From the accounts received up to date, there seems to be no reason for supposing that the fire was in any way due to explosives on the premises.

The last arrival among the calendars sent to this office is one from Messrs. Kynoch, of the tear-off pattern. It suffers from the same fault as the one sent last year, viz., a tendency for the block of leaves to separate bodily from the card, though no doubt a rivet would set the thing right.

In the list of purveyors who hold warrants of appointment to the Royal Household, as published in the *London Gazette*, of January 2nd, we notice the names of Messrs. T. Clough & Son, Stephen Grant & Sons, Charles Lancaster, James Purdey & Sons, John Rigby & Co., Ld., and the Wilkinson Sword Co., Ld.

The announcement "that it has been decided that rifles owned by members of rifle clubs affiliated to the National Rifle Association, and used only on rifle ranges, will be temporarily exempt from gun licence duty pending legislative sanction for the amendment of the law" will be received with pleased surprise as a tardy recognition of a much needed reform.

The Scottish Shooting School announce their Fifth Annual International Championship Meeting, at clay birds, for the 19th and 20th inst., at their ground, near Glasgow. The programme announces four leading events each day, these including a British championship and a championship of Scotland.

We are able to contradict the report that Messrs. Vickers, Sons & Maxim, Ld., have decided to remove their Maxim gun works from Erith to Barrow-in-Furness. The Erith establishment covers about ten acres of ground, and employs from 1,500 to 2,000 hands, and is thoroughly equipped with modern machinery.

Among recent applications for trade-marks are the following;—A device and the words "The Martin" arms, ammunition, &c., with specified exceptions, by Martins, Birmingham, Ld., of the city named; "Castropite," for explosive substances by a German firm; "Colonite," for arms, &c., by Rhenish Dynamite Company.

The export value of military rifles manufactured and sold to other countries by the German arms factories during the last twelve years has amounted to the very substantial total of nearly £7,000,000. Apparently, these figures apply only to military arms, to the exclusion of sporting rifles and shotguns, automatic pistols, and other weapons.

Messrs. Jas. Lang & Son inform us that they have increased the area of the West London Shooting School at Perivale, near Ealing, to 100 acres, and that a rabbit warren has been established. Altogether, the firm are to be congratulated on recent developments, the shooting school having accounted for a consumption of 100,000 cartridges.

The directors of the Webley & Scott Arms Company report as a result of war purchases having slacked during the past year, their net profits have decreased nearly 25 per cent., as compared with the previous year, which restricts the Company to a 5 per cent. dividend without repeating the practice of the previous year when a large sum, £5,000, was carried to reserve.

Under Class 20, Messrs. Westley Richards & Co., Ltd., have registered for use on cartridges a device consisting of two figures, one in the act of shooting, the other standing by, with a label bearing the name of the firm, and other lettering. Under this class also, the Rheinische Dynamitfabrik have registered the word "Colonite" for all goods comprised in Class 20.

This year's *Grand Prix* competition at Monte Carlo fell to the lot of Capt. E. Pellier-Johnson, who has been well-known among clay-bird shooters for years. While more of a sportsman than a business man, he at one time represented "E.C." powder. The gun that received his auspicious patronage on this occasion was a "Cashmore," and the powder was "Cooppal No. 2."

Under Class 19, Messrs. Clabrough & Johnstone have registered, for sporting and military guns, rifles and revolvers, a device representing an Arab on a camel, with a desert in the background, the whole being enclosed within a circle. Under the same class the Rheinische Dynamitfabrik have registered the word "Colonite" for arms, ammunition, and stores, not included in Class 20.

Among the latest catalogues to hand is that of Messrs. Jos. Lang & Son, of 102, New Bond Street, W., the specialities treated ranging from best London pattern side-lock ejector guns at 65 guineas, to the firm's 25 guinea "New Century" single-trigger ejector, to say nothing of plainer quality keeper and other guns. The get-up of the catalogue is of the best, and the information is given in a concise and readable form.

One of the most remarkable proofs of the way in which Belgian gunmakers seek to secure the benefits of apparently British origin is shown by a list of trade-marks published in *L'Armurerie Liégeoise*. H. Pieper, of Liége, has, for instance, the following to his name:—"Eagle Gun Works, The Leader, Royal Gun Works, Bayard Arms Co., Premier Arms Co.,

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National Arms Co Henry Arms Co." Rougé's choice falls on the following terms:—"The Winner, Detective, Centennial, U.S.A., The Simplet, The Policeman, The Champion of the World."

COUNTRY GUNMAKERS AND THE CARTRIDGE TRADE.

IN years gone by cartridge loading in the provinces has formed the subject for much discursive comment. At a time when black power could be satisfactorily loaded by almost any shop apprentice the cartridge trade rested with anyone who cared to organise a loading shop and stock the necessary varieties of cartridge case, shot and wadding. With the advent of nitros the work of loading became a highly skilled operation, and gunmakers by their special knowledge were able to secure a large portion of the trade, and the profits involved were such as to constitute a very satisfactory portion of the year's income. In order to justify their position gunmakers were inclined to suggest the importance of special loading for special customers, at the same time maintaining that there was some intangible virtue in the output of their own particular loading. As a result the factory loaded cartridge became only second in the sportsman's esteem; and it was to the hand loaded cartridge that he looked when desiring the refinements that went to produce effectiveness.

Increasing competition among the wholesale houses, and the indisposition of gunmakers to stock the newer nitros at the time of their first introduction, led to the creation of an immense outside business in the supply of ready loaded cartridges. The traveller who failed to get a good reception from the local gunmaker turned his attention to the lesser dealers or the thriving emporiums, and got them to list in their catalogues some proprietary brand of ready loaded cartridges. By this and other means the gunmaker became less and less able to maintain anything like a monopoly of the business; and as many of his rivals could purchase cartridges in such quantities as to qualify for special printing on the tubes, they had all the advantages of a loading shop of their own. At any rate the accommodating cartridge maker would dispatch direct from his own factory to any address in the kingdom large and small quantities of cartridges loaded to any particular specification.

However gunmakers may regard the question they cannot possibly deny that the factory cartridge has proved its excellence in spite of all opposition. Admittedly there are lots of cartridges loaded on the factory system that are of the very worst; but the general average is good when the factory concerned takes an intelligent interest in the behaviour of its products. Certainly it is only by reproducing factory methods that the individual gunmaker who has a large district under his care can compete with the factory loaders who work from a distance. The pace is set by those gunmakers who either have very large loading shops themselves or who contract with the ammunition or powder makers for the loading of cases bearing their names on the tube or some other sign of individuality. Thus it happens that the sportsmen who form the special or occasional *clientèle* of the country gunmaker have three sources of supply open:—first the gunmaker in London; second, the local gunmaker; and third, the miscellaneous dealers whose name is legion.

In a great number of instances the local gunmaker has no advantage over his competitors beyond those which come of being personally popular and of a sympathetic temperament as regards sporting matters. There are few shooters who are not interested in an opinion that comes from one having a sound knowledge of the sport and its implements. Even if their own opinions are fixed they may like to have an extra view even on such simple matters as the most suitable size of shot to be used. Furthermore, if the gunmaker is expert at his business, and can give a sound opinion upon the shooting of a gun, an additional bond of sympathy is created. It is, in fact, by being known in the district as a good sort that the country gunmaker can establish a connection that will put him in the position of a privileged dealer, as distinguished from his less-informed competitors in the same town. But there is one mistake that he must never make. The cartridges he sells must be of perfect behaviour, and to ensure this end he must discourage all kinds of experimentation with powders and charges. There is no load that is equal to the one the powder maker recommends. It is the same way with wadding, for though the openings for variations may be greater, every system used must bear the test of not infringing recognised rules.

Whatever checks can be instituted by way of testing and gauging, and analysing the contents of a certain proportion of the cartridges issued in order to see that no mistakes have been made, should be carefully performed; and wherever possible, the fact that such care is taken should be made known to the customers, who are at all times ready to appreciate any little extra precautions and refinements that are brought to their notice. By consistently studying the market, examining various samples of wadding and otherwise taking every possible care to ensure the production of a sound cartridge in an economical manner, the loader should be well able to maintain his position. Unless, however, he is prepared to take nearly as much care in his own small way as the factory loader takes in dealing with his millions, he will find either that loading does not pay, or else that complaints arise, showing that the quality is defective. Since there are so many little openings for imperfection that will mar the performance of a cartridge, nothing but constant care and attention is likely to enable the requisite standard to be maintained. If, however, all these things are done, and particularly if the gunmaker is possessed of a shooting range and constantly tests the behaviour of his cartridges, he will make a small but well-earned and consistent profit. If, on the other hand, he takes a different view of his business and prefers to devote to guns and rifles the time he would otherwise bestow upon cartridges, then he must purchase factory loaded ammunition, and be no more than a mere retailer in this particular branch of his business. It is not certain that this would be a bad policy. It looks uncommonly as though the factory loaded cartridge is likely, as years go on, to improve in quality, while the hand loaded cartridge reached finality long ago, since the standard of accuracy that is possible with ordinary methods of loading, and the boy labour that it is necessary to employ, must be very low unless inspection is of the keenest.

It is, therefore, a question for every gunmaker to answer for himself as to the attitude to be adopted towards the cartridge trade. In a great many instances it is necessary to do a certain amount of loading for the execution of special orders, and this at any rate should be done with a care and

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accuracy that will deserve, and in most instances command a good price. In the mere retailing of cartridges the gunmaker cannot claim any kind of monopoly. All the talk about registration of gunmakers and other similar matters is unlikely to alter the fact that a cartridge, bearing the name of a recognised manufacturer of ammunition, is bound to be worth its price whether sold by a gunmaker or a tinsmith. Therefore the cartridge trade is mainly to be retained by the study of one's customers, and the avoidance of shoddy materials in cheap and plausibly recommended cartridges.

Where, on the other hand, facilities for distribution carry the trade before them, then the gunmaker must be prepared to stand down. He cannot organise delivery of goods and collecting of orders in the manner that comes so readily to the general stores; and he must, therefore, in such directions, see trade of the kind which was once his, go to a stranger. The gunmaking business, however, demands above all things, an all-round knowledge of the goods supplied; and this is the most abiding recommendation to monopoly that can be put forward. It is the argument that is most likely to tell with the customer, even though he may know that the right thing may be obtaind by chance at the general stores, and be quite as good as an equally suitable article purchased at the gunmaker's as a result of intelligent recommendation. It is, therefore, by having an intelligent conception of the customer's needs that the country gunmaker can maintain his cartridge business on a paying basis, whether he buys his ammunition ready loaded or whether he puts it together himself from components purchased through the usual channels.

MACHINE PROCESSES IN GUNMAKING.

THERE are probably few industries in which the adoption of machine processes is more difficult than in gunmaking. The intricacy of the parts, the variations that must constantly be observed, and last but not least the conservatism of traders and sportsmen, all combine to make it very difficult to secure economy and effectiveness by the use of specialised machine tools. One of the most important considerations is the large number of gunmakers who are established in business and who all have their own particular models, and yet whose aggregate turnover would only keep a limited number of factories in full working order. These difficulties are, however, only on the surface. The bulk of the guns in existence are made on thoroughly well established lines. There are only two kinds of action for double-barrelled guns, and the conditions that govern efficiency necessarily limit the scope for variability of outline. There must be a certain thickness of metal across the flats, and the depth of the action from the flat to the bottom plate or its equivalent may be considered as a more or less well established value. In fact actual variations from standard design may be accounted for more often than not by objectionable lapses from a high standard of design. To anyone who critically examines a large number of guns by different makers in all parts of the country, and, therefore, of variable grade as regards price, it will be fairly obvious that the absence of controlling dimensions for the trade as a whole is more an accident than the result of design.

Granting, as one must, the necessity for individuality in guns fetching a high price, the argument does not necessarily apply to the lower grades of gun. Therefore it is in that direction that one must look for the first movement towards finality of pattern. There is always a supply of shooters in need of a sound quality gun at a moderate price; and modern developments in manufacturing show that the only way in which such a want can be met would be by systematising the mechanical side of the weapon, so that the thinking part of the work would be accomplished once and for all, thus enabling the money laid out to be applied exclusively to manufacture. Even supposing that a gunmaker were desirous of buying such a weapon in a wholesale way, and were to give directions that individuality of a special kind should be imparted in the finishing processes, the cost would not be materially enhanced, while at the same time the customer would be assured of sound construction as regards essentials.

The adoption of machine methods is not a policy that can be urgently pressed without the danger of falling into the error of ignorant zeal. Frankly, every gunmaking works in the country makes an extensive use of machinery. They have the usual assortment of lathes, drilling, planing and slotting machines, and to a more limited extent the milling cutter and the capstan lathe receive their share of patronage. The moment that some special kind of holder is adopted for retaining the work in position while the drill or cutter is carrying out its function, the principle of machine duplication has come into practice. The extention of this recognition is entirely a question of the progressiveness of the shop and the possibility of economising time and labour by devising some special jig whereby a slow hand process may be quickly and equally well performed by a lower grade of mechanical intelligence. The one thing that limits the extension of machine processes is the ever-present consideration as to whether the number of times that a given operation needs to be performed will justify the expenditure necessary for increasing the existing facilities. The attitude of the employer or foreman mechanic should always favour the side of advance in preference to giving way to over-conservatism. The idea of saving time, or being able to turn skilled services into more remunerative channels, should always weigh strongly in the mind of the one organising and carrying on a manufacturing business.

The only way of keeping the mechanical outfit well up to date is to study the latest developments that are on foot. This can be done by encouraging the more intelligent foremen and managers to read up the most recent English and American practice. That brilliantly conducted journal *The American Machinist* should be studied with religious fervour, and the ideas and suggestions that it contains should be subjected to a prompt test. Then again, by familiarising oneself with the tools and implements of the various companies who are specialists in labour saving devices, one is able to keep well up to date in modern methods. Probably there is no mechanic's text book that contains more interesting reading than the catalogues of such firms as Buck and Hickman, Brown and Sharpe, Ludw. Loewe and Charles Churchill, to say nothing of our own home firms, such as Archdale, who are energetically adopting the best lines of American thought and design, meanwhile adding to them the advantages of English solidity. All these firms are very happy to keep the humblest mechanic supplied with the latest editions of the literature they publish, for they know that it is by educating the individual mechanic that the way will be prepared for the adoption of more refined

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appliances. The master in his turn finds that the new plant he introduces is better kept and better appreciated than if it were forced upon an unwilling staff, and he is thereby encouraged by the facility with which his increasing output is handled to go in for a gradual extension of those developments which upon examination seem to make for enhanced soundness.

Turning to the gun it will be found that as machine processes become more generally accepted, there is a need for greater standardisation of the leading dimensions. That this is required must be apparent to all, because many of the most obvious faults met with in guns supposed to be the product of good makers, may be traced to the absence of rules governing leading dimensions, It may be urged that individuality is lost the moment that rules are laid down for the guidance of everyday practice, but this argument falls to the ground when it is found that individual guns, the work of a single firm, vary from what is good to what is bad without any apparent explanation. In other words, the enormous amount of supervision that is necessary to ensure all-round excellence in an output whose quality is governed by the ability and care of individual workmen, cannot but fail at times (maybe more often than one cares to admit) and let through something that is really bad in a most elementary detail. There are a few highly trained critics of guns who can go all over a weapon, and examine it in relation with design and construction from one end to the other, and when such men are master gunmakers, they are able to ensure a high grade of quality for all that bears their name. But unfortuately there are those that have taken the science of their business less seriously, or who have been forced by circumstances to deal with things more particularly from the commercial standpoint. Then it is that faults slip through and the conscience becomes gradually accustomed to the explaining away of defects that are really too obvious to be denied. To such people the establishment of consistent dimensions and rules should be of great value, for their observance removes responsibility. At the same time, defects met with in actual practice are likely to be less frequently encountered. Therefore as a final argument in the discussion of machine processes in relation with guns, we would say, systematise the construction of the gun wherever it may be possible, and ensure the following out of the system by utilising the latest mechanical labour saving devices.

APPLICATIONS FOR PATENTS

DECEMBER 22ND, 1902—JANUARY 17TH, 1903.

28,207. Targets. J. O. B. Tandy and W. W. H. Warneford.
28,245. Explosives. C. E. Bichel.
28,250. Projectiles. H. Burrows.
28,258. Safety Explosives. C. J. Frank.
28,268. Rifle Sights. T. J. Britten, C. W. Abbott, and C. F. Kelly.
28,306. Case for Hygroscopic Blasting Powder. W. Hartig.
28,376. Projectiles. J. R. Hoyle and A. Anderson.
28,520 * Targets. A. F. Spooner (Agent for *P. Lange*).
28,524. Targets. C. J. McCran.
28,536.* Cartridge Boxes. L. Bernhuber.
28,606. Cartridge Carrier. H. S. Watkins.
28,647. Vernier. T. W. Vipond.
28,675. Ordnance. H. H. Grenfell.
28,698. Ordnance. C. D. Abel (Agent for *Rheinische Metallwaren Mf.*).
28,707.* Field Guns. E. K. Rothe.
28,708 * Projectile Time Fuses. C. Baker.
28,831. Small-arms. T. R. R. Ashton
28,940.* Automatic Small-arms. J. T. S. Schouboe.

1903.

103 Explosives. Alice M. R-C le Mesurier.
219. Magazines for Rifles. J. C. Bayliss and Taylor and Challen, Ld.
241. Drop-down Guns. J. Robertson.
411.* Ordnance. P. M. Justice (Agent for *The Bethlehem Steel Co.*).
456. Manufacture of Explosives. Kynoch, Ld., and T. J. Ashley.
457. Explosives. Kynoch, Ld., and A. T. Cocking.
494. Transportation of Ordnance. A. Reichwald (Agent for *Fried Krupp*).
599. Signalling Cartridges. F. Harvey.
601. Cartridge Adapter. H. Munckton and W. Williams.
745.* Aim Instructor. H. H. Cummings.
833. Quick-firing Guns. D. Batcock and O. O. Dale.
850. Quick-firing Guns. T. K. North.
859.* Fire-arms. B. F., F. L., and A. B. Penny.
860.* Bayonets. B. F., F. L., and A. B. Penny.
1,130. Small-arms. L. B. Taylor (Agent for *A. E. Lard*).
1,138. Automatic Guns. A. T. Dawson and L. Silverman.
1,149. Blank Ammunition. A. T. Dawson and L. Silverman.
1,220. Percussion Fuses. A Reichwald (Agent for *Fried Krupp*).

*These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

DECEMBER 24TH, 1902—JANUARY 15TH, 1903.

COMPILED BY H. TARRANT.

25,450 (1901). **Barrel Cleaner**. A. C. Drummond and T. W. Layman, U.S.A. A barrel cleaner, consisting of a simple helical spring. The spring is of angular section, being so shaped as to constitute cutting edges on its outside circumference. By the adjustment of a screw collar up or down the cleaning rod, the spring is correspondingly increased or diminished in diameter to fit barrels of various bores. Accepted Dec. 11, 1902.

26,069 (1901). **Sighting of Ordnance**. L. E. Andersson, Sweden. Automatic sighting device for guns, such as those used on war ships or for coast defence, consisting of such a combination of a range-finder that the movements communicated to the movable part of the angle-measuring instrument are transferred to the sight, so that the firing angle corresponding to the range, is automatically introduced while the range is being found Accepted Dec. 20, 1902.

26,228* (1901). **The Henry Single-Trigger Mechanism**. L. Henry, London.

62 (1902). **Breech Mechanism of Ordnance**. C. Holmström and A. E. Mascall, Glasgow Firing mechanism for ordnance, in which the firing pin is so arranged that if the breech block is not properly screwed home the pin lies eccentric to, or out of line with, the axis of the bore. Another feature of the mechanism consists in the provision of a loosely pivoted arm, through which the breech is kept locked, unless the gun is actually discharged. Then recoil jars the arm out of place. Accidents from hang fires are thus prevented. Accepted Dec. 24, 1902.

1,303 (1902). **Trigger Mechanism and Sights of Small-arms**. Capt. C. L. Graham, Turvey and A. Henry, Edinburgh. In the mechanism described the trigger is abolished in favour of a part which is pressed by the thumb in order to release the sear. Sights, claimed to improve the shooting of inexperienced shooters, are described, as also is a light rest, which is fixed beneath the muzzle end of the rifle when not in use. Accepted Dec. 24, 1902.

1,959 (1902). **Sights for Guns.** J. T. Peddie, Canada. A leaf sight for small-arms or ordnance, in which part of the base is rendered slidable, so that the sight may be bodily adjusted in a transverse direction, in order to counteract side divergence of the projectile brought about by wind or such causes. Accepted Dec. 18, 1902.

2,150 (1902). **Mannfacture of Projectiles**. F. C. Fairholme and J. E. Fletcher, Sheffield. A method of imparting increased toughness to projectiles, consisting in feeding the projectile when in the heated state, forward during the rolling process, in the direction of its nose, Thus the projectile is subjected to pressure tending to force its ends together. Accepted Dec. 18, 1902.

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3,144 (1902). **Detonator**. W. P. Thompson, London (Agent for *R. H. F. Rennick, India*). A detonator for use with such high explosives as dynamite, consisting of a small metal vessel, to which is attached a fuse tube. Inside the vessel is placed about 40 grains of Curtis's & Harvey's small grain gunpowder. Empty sparklets are quoted as in every way suitable to contain the gunpowder. Accepted Dec. 11, 1902.

3,535 (1902). **Range Finder**. Major B. F. S. Baden-Powell, London. A simple oblong box is provided with a reflector or prism, set at an angle of 45 degrees to, and on one side of, the central axis at one end of the box. At the other end are two peep holes, one of which is in line with the axis. By means of this instrument any range may be measured. Accepted Dec. 11, 1902.

6,821 (1902). **Recoil Brake for Ordnance**. A. Reichwald, London (Agent for *Fried Krupp, Germany*). A method of "breaking" the recoil and returning the barrel in ordnance of that class in which the barrel alone recoils Hydraulic brake apparatus is displaced by connecting the barrel to the movable abutment for the returning spring by means of metal strips, which pass through an elastic pressure bearing. Accepted Dec. 18, 1902.

11,325 (1902). **Manufacture of Explosives**. Dr. F. Schachtebeek, Germany. A method of increasing the stability and durability of safety explosives which contain hygroscopic substances such as ammonium nitrate, consisting in adding some such semi-solid substances as glue or dextrine, which have absorbed a large quantity of water. Glycerin is added to the explosive to prevent its water being given off to the air. An example of the composition of the explosive is as follows:—3 parts glue, 3 parts dextrin, 3 parts water, 3 parts glycerin, 31 parts of nitroglycerin gelatine, 23 parts of rye meal, and 34 parts of ammonium nitrate. Accepted Dec. 11, 1902.

16,728 (1902). **Range Finder.** J. P. Sörensen, Denmark. A range-finder, with a horizontal base, in which the measurement is effected by known methods through the medium of two pivoted straightedges. One straightedge always turns through the same angle as one of the telescopes through the medium of gearing. The other straightedge is caused electrically to take up a position parallel to the second telescope. Accepted Dec. 4, 1902.

19,625* (1902). **Repeating Pistol Mechanism**. W. J. Turnbull, and W. H. Bofinger, U.S.A.

19,955 (1902). **Torpedo Firing Apparatus** S. Lake, U.S.A. Pneumatic apparatus for discharging self-propelled torpedoes from submarine boats. The firing apparatus is controlled by a gunner in the conning tower, and the entrance of external water through the torpedo tubes is guarded against. Premature firing is prevented by means of locking apparatus, which cannot be released until a predetermined minimum pressure is created by the propelling medium. Accepted Dec. 24, 1902.

21,043 (1902). **Targets**. T. Scully, Waterford. A target consisting of a perspective pictorial reproduction of figures the size they would appear at various ranges. Combined with the target is a scale showing the distances the objects depicted should be, in order to be same size as the reproduction. Accepted Dec. 8, 1902.

21,620 (1902). **Automatic Small-arms**. H. H. Lake, London (Agent for *J. M. Browning, U.S.A.*). A number of modifications in the construction of the bolt-locking and ejecting devices of automatic small-arms are described in this patent. A locking bolt is added to the bolt mechanism, as are also an improved extractor and an injection-cam, which lifts the spent shell out of engagement with the extractor just prior to its ejection. Accepted Dec. 4, 1902.

22,365 (1902). **Torpedo Steering Apparatus.** J. Börresen, Norway. By means of this invention a torpedo is allowed to turn, when launched at an angle with the aiming line, until it approaches the aiming line. Then the gyroscope is set in action and the torpedo is, by its influence, brought into the aiming line, and can continue undisturbed in that direction—independent of the estimated distance, even in angle-shooting. Accepted Dec. 11, 1902.

22,641 (1902). **Shells for Ordnance.** C. D. Abel, London (Agent for *Rheinische Metallwaren Mf. Germany*). A method of predetermining the number of fragments which shall result from the bursting of a shell consisting in inserting a comparatively small bursting charge in the form of a long cylinder in the interior of an inner shell, which inner shell is grooved transversely and longitudinally. Accepted Dec. 18, 1902.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

THE HENRY SINGLE-TRIGGER MECHANISM.

26,228 (1901). L. Henry, London. In the system of single-trigger mechanism described in this patent, a transversely slidable spring-actuated bar is the medium through which the sears of a double-barrelled gun are lifted. An intermediate pull, which in actual firing is performed involuntarily, is necessary between the two sear-lifting pulls in order to place the parts in position ready for the firing of the second barrel.

In the drawings appended, the mechanism illustrated is capable only of discharging the two barrels in the left first and then right order. The trigger blade *a* is mounted in the ordinary way by

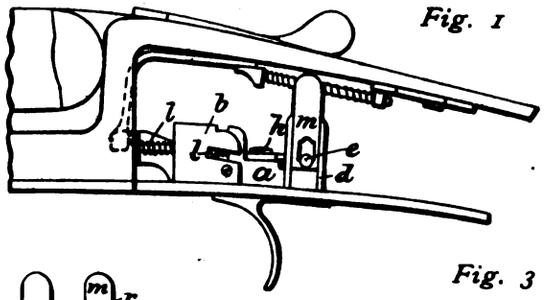

Fig. 1

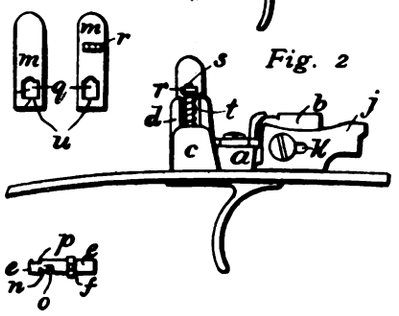

Fig. 2

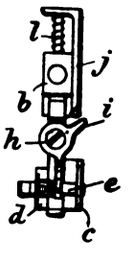

Fig. 3

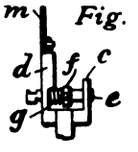

Fig. 4

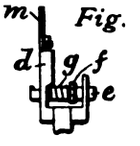

Fig. 5

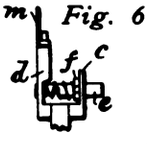

Fig. 6

pivoting at *b* in the box *c*. On the rear of the blade *a* are secured the side plates *c*, *d*, and in these plates is mounted the bar *e*, upon the approximate centre of which is a collar *f*. A spring *g* (Figs. 4, 5 and 6) tends always to drive the bar over towards the right-hand sear, as in Fig. 6. In order to turn the bar over to the left, a bell-crank lever is pivoted upon the top of the trigger-blade at *h*. One arm *i* of this lever is so operated upon by a spring-actuated slide *j* secured to the box *a* by means of the slot and pin-connection *k*, that its other arm is caused to turn and to force the bar *l* against the action of its spring *g* to the position shown in Fig. 4. The slide *j* is forced in the rearward direction, and is caused so to actuate the bell-crank lever by the action of the top lever in turning to open the gun for reloading. When the gun is again closed the spring *l*, which acts also as a trigger-spring, forces the slide *j* back to its normal position; and the bar *e* is secured in the position illustrated in Fig. 4 by means of the part *m*, which works in a slidable fashion in the plate *d*.

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The bar *e* is illustrated in detail and, as will be seen, it is provided with bents *n* and *o* on its under surface, and with the recess *p* upon its top. In the part *m*, shown also in detail, which slides vertically in the side-plate *d* is cut a hole or recess *q* through which the bar *e* projects. This part *m* has fixed on its inside surface the collar *r*, through which the rod *s* works. Around the rod is coiled the spring *t*, which tends always to keep the plate *m* in the position shown in Fig. 1.

When the gun is opened to reload, the slide *j* actuates the bell-crank lever and carries its arm to turn the bar *e* over to the left-hand position (Fig. 4). There the bar is held by the bottom surface *u* of the recess *q* cut in the plate *m*. The ledge *u* is forced up by the spring *t* into the bent *o*. When the trigger is pulled the end of the bar *e*, being beneath the left-hand sear, brings about the release of the left-hand hammer and so fires the corresponding barrel. The lifting of the trigger carries the slide *m* upwards, and its top comes into contact with the underside of the strap and is forced downwards against the action of spring *b*. Thus the bent *o* in the bar and the ledges *v* are disengaged, and the spring *g* is free to drive the bar *l* over towards the right. The recess *p* in the end of the bar is, however, engaged by a flange upon the left-hand sear, and when the trigger is partially dropped the ledge *u* engages the bent *n*. When the trigger is released sufficiently, the sear and recess *p* become disengaged and the ledge *u* further enters the bent *n* (Fig. 5). The involuntary pull again jerks the trigger upwards, causing the slide *p* to meet the strap again and to disengage the ledge *u* and the bent *n*. The spring is then allowed to drive the bar completely over to the right, the position it is caused to occupy being illustrated in Fig. 6. The second voluntary pull releases the right-hand sear and so discharges the right-hand barrel through the medium of the bar *e*.

In the specification is illustrated a little slide, which is adapted when actuated to depress the plate *m* and so to allow the right-hand barrel to be discharged first. Of course, the gun would have to be opened in order to take the parts back to the position ready to discharge the left. Accepted December 18, 1902.

MAGAZINE PISTOL MECHANISM.

19,625 (1902). W. J. Turnbull, and W. H. Bofinger, U.S.A. A magazine pistol, the mechanism of which is entirely operated by the pulling of a wheel-like trigger, is described in this specification. The cartridges are previously loaded in a series of separate chambers, which are joined together in the form of a belt, and which work over a star wheel within the magazine box, so as to come in rotation into correspondence with the barrel of the pistol. The design of the pistol is therefore that of a revolver, having an indefinitely extended series of chambers according to the length of belt that can be accommodated in the magazine box.

In the accompanying drawings, a sectional side elevation of the pistol is illustrated in Fig. 1. A vertical transverse section on the line 2—2, Fig. 1, is shown in Fig. 2. Fig. 3 is another side view of the pistol, showing the hammer-locking device.

The hollow stock *a* of the pistol is composed of a fixed wall *b*, forming part of the casing *c*, and of the rear wall *d*, which is connected by the hinge *e* with the top of the barrel *f*. The two walls are closed together by means of the spring latch *g*. The peculiarly shaped hammer *h* is pivoted within the hinged portion of the butt at *i*. The spring *j* tends always to drive the hammer *h* to the position illustrated in Fig. 1. The body of the hammer extends upward, and terminates in the part *k*, which carries the firing pin *l*. The extension *m* of the hammer is provided with a friction roller, which is adapted to roll over the convex surfaces of the teeth of the star wheel *n*. Situated above the trigger, or series of triggers *n*, is a cylinder *o*, in which are cut a number of spiral grooves, such as are illustrated. The cylinder is mounted upon trunnions *p* and *q*, and is capable of rotating thereon. Secured upon the end of the trunnion *q* is a star wheel *r*, which, with the rotation of the cylinder, caused by the working of the triggers through the spiral grooves *s*, turns the chain of cartridge chambers *t* working over it, and presents the cartridge chambers one by one to the rear of the barrel of the pistol.

When the parts are in the position illustrated in Fig. 1 and the trigger is pulled, the convex surface of one of the arms of the star-like trigger wheel, which rotates about the pivot *u*, is caused to engage the friction wheel upon the hammer. The hammer is by this means forced back against the pressure spring *j*. After a certain length of pull the trigger disengages itself from the hammer, and the hammer being forced forward again by the spring *j* is caused to discharge one of the cartridges, which, also with the

Fig. 3

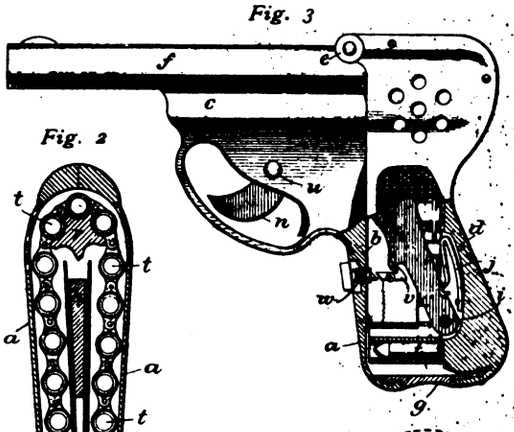


Fig. 2

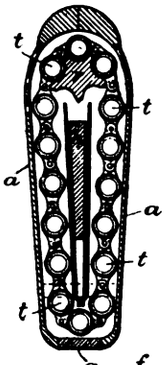
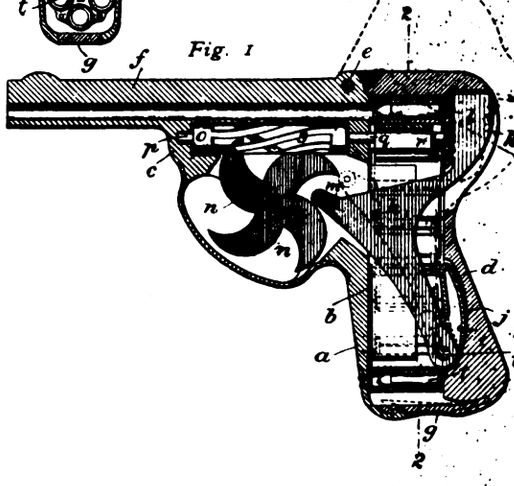


Fig. 1



pulling of the trigger, has automatically been brought into the proper position for firing in its chamber through the medium of the spiral slotted cylinder *o*. The spiral slotted cylinder is allowed only to rotate a certain distance, since one of the arms of the trigger wheel is always in engagement with one of the spiral slots, so that before one arm leaves the forward end of one slot, another arm enters the back of the next slot. Thus the travel of the cartridge belt *t* is regulated so as always to place one chamber opposite to the back of the barrel. When the belt is empty it may speedily be disengaged by lifting the back part of the frame upon its hinge and taking it away, when it may be reloaded, or a spare chain of loaded chambers may be substituted for it.

The catch *v* is disengaged from the hammer when the butt is grasped to fire the weapon, through the medium of the push piece *w*. Accepted Dec. 4, 1902.

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Arms & Explosives

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CONTENTS.

CURRENT TOPICS.

Air-Guns in Birmingham.—The extraordinary vogue of the air-gun has recently been illustrated by a curious dispute that has arisen in Birmingham. It seems that the publicans in that city have endeavoured to entertain their patrons by providing facilities for air-gun shooting, which they justifiably regard as a harmless amusement, having much the same characteristics as the games of bowls, quoits and skittles, which are available at many country inns. The town equivalent for these amusements is, of course, the game of billiards, which, unfortunately, represents a prohibitive expense to the working-man, or other person of small means. Since the Rifle Club movement first indicated the direction in which Britons could indulge in sport, and at the same time help their country, every possible encouragement has been given to all forms of shooting. In a thousand ways it has been shown that a man's instinctive keen-ness for marksmanship needs only the humblest start to make him ambitious to excel. We have always held the opinion that cheap ammunition is at the very root of the success of the rifle club movement, and since it is really remarkable what fine work can be done with an air gun, it must follow that their slugs at eightpence or even less per 1,000, represent the ideal conditions under which a person of small means can acquire his first insight into the mysteries of rifle marksmanship. When, therefore, it became the fashion to erect small air-gun galleries at a number of Birmingham public-houses, it would have seemed reasonable to suppose that such a wholesome form of amusement would have earned the approval of the authorities. Unfortunately, however, the chairman of the licensing magistrates at Birmingham seemed to be averse to the whole principle of these clubs, and he has used his influence to veto their continuance. Public sentiment in Birmingham has, however, risen to the occasion, and a petition has been extensively signed asking for his removal from the magisterial roll. Even if this much-desired consummation is not realised, it is to be hoped that the resistance which the above harsh repressive measures have called forth will effectually check this exhibition of official bumbledom. While capital has in some quarters been made of the fact that the magistrate in question is Mr. Arthur Chamberlain, chairman of the Kynoch Company, whose name has figured so much in the public press during the past few years, we, for our part, prefer to give him credit for acting in his public capacity with independence of judgment and honesty of purpose.

Clay Bird Shooting.—With the present month the season for clay bird shooting may be said to commence. One swallow does not make a summer, but nevertheless the fact that the Middlesex Gun Club opens its season during the first week in March provides clear evidence that the most appropriate time of year for indulging in this sport has begun. It is not, however, under the expensive conditions of club shooting that the very general consumption of the clay bird in this country is accounted for. The shooting schools have developed a far more popular form of obtaining practice with the shot gun. At these establishments, club meetings so to speak are always in progress, and the patron who has run down in a cab on a spare afternoon is in the happy position of laying down his own programme. A very small part of the proportional cost of the shooting covers the services of an expert, who with

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the experience inevitably gained in such a position, is able to offer the most valuable advice. Not only are the conditions of privacy suitable for the giving of instruction, but the opportunity for adjusting the shooting to the state of progress reached by the pupil, means that the lesson in hand can be thoroughly well inculcated before passing on to something else. The financial side of the question seems also to favour the shooting school method of imparting instruction by means of the clay bird. With a club the whole equipment has to be maintained in order for at most six hours use in a week, whereas with the shooting school a more limited amount of accommodation can be maintained in active operation during the entire range of what may be termed business hours. Another side of clay bird shooting that has shown the most unexpected developments is that which is connected with those bird flinging appliances which have shown themselves so admirably adapted for private practice, where anything in the nature of a permanent installation would seem to be prohibitive. Unfortunately they are by no means easy to use, so that a large part of their value is discounted by the number of birds they break and by the limited number of persons who can demonstate them at their best. Really it would seem as though there should be a great opening for an instrument midway between the ordinary trap and the hand-flinger. An apparatus working on these lines is advertised in an American contemporary, and the idea is sufficiently conveyed by asking the reader to imagine a sort of cross-bow, carrying the essential elements of a trap, namely the arm, a spring, and a catch. Such an arrangement can apparently be used by everyone. All that is necessary is for the operator, after setting the spring, to point the trap in any direction, and pull the trigger when he desires to release the bird. It is in the development of such simple contrivances as this that we look for a still further extension of the ubiquitous clay bird, rather than to an increase in the number of well-organised clubs. These have their function as a source of amusement for the shooter whose instincts turn to work of a competitive nature; but they hardly meet the needs of the large class of sportsmen, whose funds are limited and who spend their available funds on game shooting; the clay bird being regarded as a means of impromptu practice in season or out of season as the case may be.

The New Rifle.—It is a somewhat unfortunate circumstance that any change in our national armament should be preceded by a large amount of unofficial information, by which the public mind is prejudiced before the authenticated facts are available. It is possible that the authorities are to blame in the matter of the new rifle, but they had difficulties to contend with, no matter what course they adopted. If they take the public into their confidence during the process of developing a modified arm, they are liable to find that progress is blocked in various directions by inventors who suggest obvious improvements which the experts themselves would probably develop in due course, or else they lose the benefit of the large amount of useful criticism that would be placed at their disposal by those willing to afford valuable and gratuitous aid. However much one may sympathise with the difficulties of the small-arms committee, it is impossible to avoid the conclusion that progress has been most terribly slow. In fact, one is really entitled to the view that the rifle may be obsolete before it is issued; that is unless things go along more smartly now that the all-important decision has been given. Meanwhile, press comments are very interesting, and even Secretaries for War are apt to become unconsciously humorous. Newspaper reports have told us for months past that the new rifle is now ready for issue in trial quantities; the *Times* actually states that it has been issued to various selected battalions. Yet, as a matter of fact, we believe that there are not half a dozen of those rifles in existence, and that the machinery for turning them out cannot be ready for some months. Coming now to the enlightenment that is offered concerning this rifle by such a notable person as the Secretary of State for War, we are exceedingly interested to hear that the slight increase of recoil, due to shortening the barrel, is unimportant, and is more than compensated for by the reduction in weight. Of course, it is possible that the new rifle involves new principles of gunnery. At any rate, the inventors of the new rifle seem capable of doing what no one has ever accomplished with the shot-gun, viz., to compensate for increased recoil by reducing the weight of the weapon.

The New Musketry Regulations.—At last, after many delays the new Musketry Regulations have been issued, and they can certainly be pronounced a great improvement on all previous editions. All the old information has been carefully examined, and revised where the need for it was found to exist. The result is that the new book contains a vast body of information that should do a great deal to keep everyone who aims at understanding the conditions of military rifle shooting well up-to-date. It could hardly be denied that a large part of this book must of necessity be interesting to every class of person that is connected with rifle shooting, whether for practice, sport, or the more serious side that is connected with military training. It is a book that is so well-known by virtue of previous editions that there is no need to go into a detailed description of its contents. Suffice it therefore to say that the information concerning the various classes of target for practice in the more advanced forms of military rifle shooting at unknown distances and over unknown ground is very complete. In fact there could be no excuse for failure to instruct soldiers in every branch of their work when the way is made so easy by the simple and compact instructions that are put forward in the Musketry Regulations at the very reasonable price of ninepence per copy. Cheap though the volume is, the specimen before us at this moment is not creditable as an example of Government printing, the margins being so irregular that no private firm would care to issue such disgracefully slip-shod work.

Live Pigeon Shooting.—It is well-known that a good deal of betting goes on at most competitions in live pigeon shooting at the various clubs existing for the enjoyment of this particular branch of sport with the gun. That betting to some extent should occur, in this way, is not much to be wondered at. Englishmen will bet occasionally, despite all regulations to the contrary, whether their money is wagered on the running of a particular horse in an historic race, the skill of a shooter at the traps of a recognised gun club, or the progress of a pair of flies over a window-pane. It was somewhat of a surprise nevertheless to the world of shooting men, that sums amounting to thousands of pounds should be won or lost in an hour's shooting of blue rocks on the grounds of the well-known gun

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club at Monte Carlo. This information was gathered by those who read the report in the daily newspapers the other day of a case before Mr. Justice Channell in which Mr. R. S. Sevier, the well-known owner of racehorses was sued by a Paris bookmaker for £2,000, the amount of a cheque for bets made on the shooting of one of the competitors for the Grand Prix at Monte Carlo a year ago. Mr. Sevier declined to pay on the allegation that he had ascertained that the shooter he had backed had put no shot in his gun, and had purposely missed the pigeon in this way so as to favour the bookmaker betting on the escape of the bird. The case was ultimately decided in Mr. Sevier's favour by his pleading the Gambling Act on the advice of his solicitor, and not upon the question of whether or not an attempt had been made to swindle him out of his money. His explanation, however, stands, as made on oath, until disproved by evidence to the contrary; and it certainly casts a strange sidelight on the practices that are apparently allowed to prevail at Monte Carlo in what may be described as the most important series of competitions in live pigeon shooting in the world. The sport has survived many determined attacks by humanitarians and others in this country who have attemped in vain to show that the birds that are trapped are treated with cruelty. That has been clearly disproved as an argument for its abolition, but if it were to become recognised that practices such as we have mentioned in connection with Mr. Sevier's case were common on this side of the channel, the sport would stand in much greater danger of successful attack.

Our Lecture on Caps.—In another column an effort has been made to systematise contemporary knowledge concerning the relation of caps or primers to the ignition of the various nitro powders. Most of us think we know a lot about caps; and yet when an attempt is made to set that knowledge out in written form, it is found that a large number of vague suppositions have to be discarded, and that the things that we know in a definite way amount to very little compared with what we should like to know. It is not a very difficult matter to determine the suitability of a given cap for a given powder, because what we know about powders in general enables us to tell whether the cap under trial is acting efficiently and in accordance with the other known conditions of the test. With a supply of caps by us that have been found to do well in the past, there is no trouble in getting at the true state of things. On the other hand, the study of caps becomes very much more complex when the investigations take the form of finding out why things have gone wrong, as they are known to do at times, even when all reasonable precautions appear to have been taken to prevent falling into errors. If, therefore, in the course of the lectures that are now appearing we are able to apply some sort of systematic reasoning to the facts that are made known to us by our practical experience and by the experiments that have been devised by such authorities as Mr. Borland, then our time will not have been spent in vain. We cannot make original discoveries; we cannot advance the quality of cap making by our leading manufacturers, for that is their business and not ours. But we can show them that the subject is intelligently grasped by their customers, and that such quality of work as is known to be readily attainable will be required of them. The lecture may now be left to tell the rest of the tale in its own way.

THE WINGED BULLET.

THE gun trade were very much disturbed upon receiving the circular letter that Messrs. Webley & Scott sent to their customers on the 11th ult., which was to the effect that their trade-mark and the letters "W. & S." would, for the future, be impressed on the flats of all guns and rifles of their manufacture. The circular pointed out that this step was taken with a view to sharing to some extent the credit that must necessarily attach to the excellence of the work turned out for their trade customers, and wound up by stating that customers of the firm would be entitled to cancel their orders if they did not wish this mark of origin to appear on the goods of their selling. It is almost impossible at this stage to lay down with any certainty what is likely to be the precise effect of such a radical alteration in the business methods of the gun trade, which almost more than any other calling is dominated by traditions that have been observed since the last century was in its infancy. In taking a share of the credit the manufacturer also takes a share of the responsibility, and this is certainly a help and a protection to the retailer, who, in these days of reducing profits, frequently finds it irksome to bear the brunt of mistakes that are not due to his own neglect.

On the question of giving information to the sportsman as to the source of the goods that are supplied to him, the trade will be variously affected according to the individual status of its members. The London gunmaker, who by years of consistent effort has made a name that is itself a guarantee of the goods supplied, will not like sharing the benefits of his connection with the maker who has hitherto remained in the background. The smaller dealer, on the other hand, will find that advantages accrue from the association so created between himself and a firm of resource and reputation. In fact, the whole situation, however viewed, is one of give-and-take on both sides, because even if the London man has made his reputation for one class of goods it is not certain that he will find that his name will cover every class of weapon that he may offer for sale. His name on a gun or rifle as a proof that it has satisfied his own tests, and the mark of origin that implies sound British workmanship, should surely have the effect of a joint guarantee which, to the common-sense purchaser, has a double value.

The retailer is nearly always of a cautious turn of mind, and it is in the nature of things that he should look with jealousy on anything that might savour of a desire on the part of the supplier of his goods to cultivate direct relations with those who become the ultimate possessors. A wholesale firm can never do a retail business, and it always happens that those who are allowed to place an order on retail terms give far more trouble than the manufacturer can afford to extend to so insignificant an item in his total turn-over. If, therefore, the step taken by Messrs. Webley & Scott is regarded as indicative of a wish on their part to work in closer unity and partnership with their trade customers than ever before, it will be clear that the strength that comes with such unity will be devoted to meeting the insidious competition that takes advantage of the present secrecy in the gun trade to foist on the unwilling purchaser goods that are hatched abroad and placed in the tender care of a British foster-mother. The more light that is thrown on the meri-

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torious side of British-gunmaking, the better it will be for those who have a stake in its success. We cannot include among the latter those who are so short-sighted as to act in the capacity of foster-parents of continental work.

THE CALIBRE OF SHOT-GUNS.

WHEN the two Gunmakers' Associations set to work to standardise chamber sizes, they added to the particulars of each bore of cartridge the decimal size of the barrel to correspond. This was very simple in so far that one had only to turn to the Proof Rules to find out the values that were used. For instance, upon turning to Scale No. 4 relating to breech-loading arms, which will be found on page 17 of the current edition of the Rules of Proof, it will be seen that among the gauges enumerated is 12-bore, whose decimal equivalent is stated as ·729 in. Familiarity with the working of the Proof Act gives the further information that all barrels are considered as of true 12-bore if their internal diameter lies anywhere between ·729 and ·740. The principle of working to limits seems to have received very tardy recognition from gunmakers, bearing in mind the anomalous state of affairs that has arisen on account of the decimal value ·729 in acting in the double capacity of a minimum and absolute value at one and the same time. This figure, in other words, represents the only officially-accepted size for a 12-bore, and we find that cartridges, wads, and powders, are, as a rule, regulated with guns having this dimension of barrel. On the other hand, according to the Proof Rules, ·729 in. is the minimum size of a 12-bore, so that a gun which is delivered to the sportsman in agreement with this size is always marked in proof as of a different bore by virtue of its size at the time it undergoes the Proof test.

While the proof regulations are not very explicit upon the exact status of a gun as regards whether or not it is an improved weapon, it cannot be denied that the general intention of the Act very clearly indicates that guns ought to be regarded as improved which have been proved while below the range of values that are counted as 12-bore, the gun being subsequently polished out so that the proof mark no longer denotes the true bore. Now two things are fairly certain. The first is that the Proof Rules are never likely to be altered so as to make ·729 in. an official standard; and the second is that the Proof Houses have for years displayed a strong tendency to render it inconvenient to gunmakers to open out their guns after proof, so as to pass outside the limits of size within which the calibre of the gun fell at the time of its proof. Officially, all guns marked 13/1-bore are already regarded as improved if their barrel diameter shows them to be ·729 in. or over. If any one wishes to dispute this view he has only to send in for the nitro-proof a gun that complies with the conditions we have laid down, and he will find that the gun in question must receive a fresh definitive proof before it is eligible for the supplementary test. Upon reviewing the whole question there can be no doubt that the Proof Rules, which must be accepted as governing to a great extent the boring of guns, make it highly undesirable to continue to adopt ·729 in. as the official diameter of the 12-bore shot gun.

The question then arises whether there is any radical virtue in the value ·729 that makes the true 12-bore barrel necessarily of this size to the exclusion of every alternative gauge. Practical experience shows that no such absolute limit exists in regard to the behaviour of guns with ordinary good quality cartridges. We have known of shooters who have stated that they never experienced such patterns and penetration as they have obtained from guns which, to our knowledge, have been ten-thousandths of an inch above the normal size. In a similar manner we have known guns this same amount smaller than the nominal size, which have not displayed marked deficiencies or irregularities in the field. This cannot, however, be used as an argument to prove that guns may be made any size that chance or providence may decree, and that no very material loss of efficiency will be encountered. It is known that the nearer that guns can be worked to specified sizes for chamber, cone, and barrel, the more simple is it for the ammunition maker and powder maker to provide ammunition that will give a high average of result.

The out-of-date notion that a special cartridge must be worked out for each gun, in order to show it at its best, provides another proof that the boring of guns has hitherto been allowed to take so many forms that an ordinary cartridge could not be trusted to give a result satisfactory to the shooter. Certain methods of boring and regulating barrels perpetuated this same principle; because the gunmaker regulated and re-regulated his barrels until he obtained what seemed an ideal result with the particular cartridge he was in the habit of using for his tests. This to some extent kept in his own hands the sale of cartridges that were to be consumed in the guns made by him. In due course it created a tendency to try and impart special characteristics to each maker's guns and cartridges, so that the two should invariably be used together. The policy in question has undoubtedly an unsatisfactory aspect for the gun-maker in the long run; because weapons of his make cannot always be used with his own ammunition. Yet, nevertheless, their efficiency is judged in relation with the cartridges that the shooter may obtain from a variety of sources.

Assuming it has been proved that a gun-maker's interests are best served by turning out a weapon that will give the highest average results with average cartridges, the need arises for defining by the aid of some representative authority the standards to which he should work to attain the desired end. In accordance with the recent demand for standardisation, the chamber sizes have been most carefully specified. Unfortunately, too many gunmakers have shown a tendency to leave themselves an inadequate margin of toleration, the result being that they oftentimes fall below the recognised minimum sizes, which means that they have followed out in the chambers the same tendency to work on the small side which is displayed so strongly in the boring of the barrels. If, therefore, gunmakers were prepared to take a generous view of both the chamber and the barrel, it would be possible in the latter instance to lay down a decimal calibre which might be acceptable as a practical standard, and at the same time one that would not bring the trade into conflict with the Proof Act. It is widely recognised up and down the trade that a certain allowance for regulating and polishing the barrels is necessary after a gun has been proved, and most makers think three-thousandths of an inch an ample margin for this purpose. Allowing, therefore, that a gun is delivered

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for proof at about ·729 an inch, thus qualifying it for the 12-bore mark, its size subsequent to the finishing processes mentioned above would be about ·732 to ·733 in. If one or other of these values could be adopted as the standard diameter of a 12-bore barrel, it would represent an excellent average of the guns already in existence. At the same time, it would not render necessary any alteration of the chamber sizes that have been adopted. The 12-bore wad would still make a nice fit in a barrel so bored, though if the accepted size were placed at a materially higher value, the diameter of the wads would need to be increased along with the chambers, this because the thickness of the paper walls of the cartridge case must be taken as a fixed quantity.

Ammunition makers are at present under contract to observe the accepted chamber dimensions as a maximum for their cartridges, which means that cartridges must enter with a fair amount of ease a minimum chamber gauge. If in addition to this allowance the gunmaker were to endeavour to make his chambers average some two-thousandths greater than the present minimum sizes, the existing limits would be observed in practically every instance, and at the same time cartridges would pass freely into the gun and the wads would work well in a ·733 in. barrel. The only way to obtain a reliable indication of trade sentiment on the matters here ventilated would be to consult the members of the two Associations who have already worked in harmony together on other questions where joint interests were involved. At the present time we are faced by the curious circumstance that the two representative Associations of the trade have sent out a card of chamber sizes, to which is attached a list of barrel dimensions which it is more or less illegal to observe. That being so, it is about time that something should be done to set things in order, and lay down for all calibres from 5-bore to 32-bore the decimal diameters that the trade should endeavour to observe as an average of their every-day practice.

THE PAST SHOOTING SEASON.

WITH the beginning of March comes the end of what we may term the Coronation Shooting season; and it is natural that we should turn over in our minds the results that have been given during the last six or seven months, now that guns and rifles have been returned to their cases, and game of all kinds is protected until August once more comes round. From the standpoint of the manufacturer of guns or ammunition, season 1902-3 has not been a very good one looking to the average of the three or four preceding years. Grouse shooting opened in August fairly well, better than could have been expected from the unfavourable character of the previous spring and summer weather, which severely tried the nesting birds and after the tender young cheepers emerged from the shell, they stood the cold surprisingly well, though here and there, particularly in Perthshire, the centre of grouseland, there were wide districts where the stocks of birds on the Twelfth were much below the usual standard, and in one portion of that famous grouse county there could be no doubt of the presence of grouse disease in a rather decided form.

Nevertheless, even in Perthshire the bags made in the opening week of the Season did not, after all, compare so badly with those of the two previous successful years, and the Inverness-shire returns rose above the average of other counties in Scotland, the bags, though not record ones, being most satisfactory. We need not take up space with recording the figures of the best bags in any county, either in Scotland or England. None of them broke the records, and, as a rule, Inverness-shire, perhaps, excepted, the bags on the opening week were from twenty to twenty-five per cent. under the average. Inverness-shire shot very well all over, for once in a way beating Perthshire, while Aberdeenshire and Argyllshire were not much behind. Another feature of the grouse season that materially affected the amount of ammunition required during its progress was the earliness of the date at which the greater part of the shooting ended.

By the middle of September on many moors as many grouse had been shot as the ground would stand, looking to the necessity of leaving a breeding stock of birds on each moor. Shooters in such cases had perforce to put up their weapons and return south before they might otherwise have done, had birds been more plentiful after the first few weeks of shooting. It has been said that if the annual letting value per brace of grouse is a guinea, it worked out this year at from 25s. to a guinea and a-half, which means, of course, that there was less ammunition expended than usual. On the other hand, it was announced that the number of grouse-shooters on the heather last August was greater than it had ever been, due, no doubt, to the return of so many military men from South Africa. For season 1903-4 on the moors, we may add the prospects are believed to be exeeedingly good.

Mid-way between grouse and pheasant shooting comes that of the partridge. From a trade point of view partridge shooting equals in importance that of grouse and pheasants combined, and the condition of the partridge crop every year is, therefore, diligently studied by those who have to furnish partridge shooters with their requirements in sporting weapons and ammunition. Every holder of a game shooting licence may be safely put down as a shooter of the little brown birds in the fields, whereas we should say that the numbers of those who kill grouse or pheasants in any quantity, joined together do not at most exceed 25,000 shooters, if they really reach that figure. There are, therefore, more than twice as many sportsmen whose interests are confined to partridge shooting as there are men who also shoot pheasant or grouse. The importance to the trade, therefore, of a good partridge shooting season can scarcely be over-estimated. In a good season the partridge undoubtedly yields more shooting than all the other birds put together, more than half the game shooters in these islands being entirely dependent upon it for their autumn sport with the gun.

The partridge season just closed unfortunately was below the average, some writers describing it, we think erroneously, as the worst on record. But at best it could only be described as a "patchy" season, some districts being very well stocked with birds, while others were almost barren of good coveys. This was due, it was said, to the floods that were experienced during the critical week in June, when the young partridges were least able to resist the damaging results of the continuous and heavy rain. In a number of places heavy downpours destroyed a multitude of young birds, and but for the fact that these floods were somewhat partial in their visitations, the season would have been utterly ruined. As it was, it proved "patchy," though the barren patches in every county were

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smaller than the good parts that had been not so severely handled. Here and there, indeed, the bags made were good. quite up to the average of previous years, and in a few cases, on well preserved and extensive manors, somewhat beyond it. But, on the whole, the sport afforded was comparatively poor in most districts, the best bags being made on the notable estates, such as Holkham and Welbeck, where the total showed very little falling off from the best years. But such bright spots were undoubtedly the exception, because from the point of view of the manufacturer of shooting requisites, the season was disappointing, the consumption of cartridges, for instance, by partridge shooters, being estimated to have fallen off to about 20 or 30 per cent. below that of a good season.

Between the end of the grouse season and the beginning of sport in the coverts, there seems to have been a marked diminution in the sales of ammunition as compared with previous years. The sales only recovered their tone when the pheasants began to come into shootable condition. In the coverts sport was quite up to the usual standard, now invariably expected and confidently relied on by all concerned.

Year after year increased sums of money are spent on securing large stocks of pheasants in most of the well-known coverts, with the result that such an occurrence as a failure of the pheasant shooting season has been rendered almost an impossibility. So great has the skill of the rearers of pheasants become, that they are now able to make every year a certainty of good sport in the pheasant preserves. In truth, the number of pheasants reared and shot in this country has shown material increases year by year, every season seeing greater numbers of pheasants bagged. Each year thus makes larger demands upon those supplying the pheasant-shooter with his cartridges. Sport in the coverts this year continued right up to the very last available day in the season, the King and the Prince of Wales, both very devoted to the sport, taking part in shooting the Windsor and Sandringham preserves up to the last week in January.

Driving is now so universal on English shootings that cylinder guns have become the most popular for that branch of work. But, on the other hand, we learn that in Scotland driving is decreasing in popularity, there having been more grouse shot over dogs this year than has been previously recorded since driving elsewhere became fashionable. For such shooting on the moors, where every bird flushed is going away, guns with some choke at least in the left-barrel have always been found desirable. So long, therefore, as "dogging" lasts in grouse shooting, we are likely to have guns used that are more choked than the weapons found in the fields and coverts where all the birds are driven over the shooters. The keen shot, who is particular as to his battery of sporting weapons. requires a special gun with some choke in the second barrel for the moors, where he may often be called upon, especially after the first week's shooting, to bring down his birds at longish distances. But where driving is the fashion, the same set of guns that he employs in the coverts is quite applicable to driven grouse.

With a fairly good spring and favourable summer, there is every hope of a successful shooting season during the present year; for the stocks of game birds left on all kinds of shootings were numerous and healthy at the close of the past season, having come through the winter months as well as could possibly have been desired by the keenest game shots.

NOTES.

EXPLOSIVES IN WESTERN AUSTRALIA. — An amendment of the Explosives Act of 1895, for this Colony has been passed of date the 7th of October last, of which the following are the provisions. (1st) The Act may be cited as the Explosives Amendment Act 1902, and shall be read as one with the Explosives Act 1895 referred to as the principal Act. (2nd) The Governor is empowered from time to time to appoint and remove Sub-Inspectors of Explosives and may assign to them their Duties. (3rd) A Sub-Inspector of Explosives may in the performance of the duties assigned to him, exercise all the powers of an Inspector of Explosives under the principal Act. (4th) Any Inspector or Sub-Inspector may attend any inquest on the bodies of persons whose death may have been caused by the explosion of any explosive or by any accident in connection with any explosive, and shall be at liberty at any such inquest to examine any witness. (5th) Section twenty one of the principal Act is amended by striking out the words "as he may fix from time to time not exceeding those in the Schedule," and by inserting in lieu thereof the words "as are set forth in the Schedule." The Schedule referred to fixes the fees payable for Licenses quoted by the minister as follows:—Factory Licenses (1) Original License £10; (2) Amending License £5; (3) Annual Renewal of License £5; Magazine Licenses, (1) For any quantity up to 500lbs., £1 per annum; exceeding 500lbs. and up to 10,000lbs., £1 10s. per annum; (3) For quantity over 10,000lbs., £2 per annum; (4) Amending License 5s.: Store Licenses, (1) In Mode A 15s. per annum; (2) In Mode B. 10s. per annum; (3) For Sale of Fireworks only 5s. per annum; License to Import, (1) Original £2; (2) Renewal 5s. (6th) So much of the Schedule to the principal Act as prescribes the maximum fees for licenses granted by the Treasurer is repealed and the Schedule in this Act is substituted therefor. It may be added that a comprehensive scheme for the removal of the existing Magazine Depot, and the Establishment of a Reserve, more in accordance with modern ideas has been approved and is now being carried out. It is to Mr. E. A. Mann, as chief inspector that Western Australia owes the care and intelligence with which this important department of administration is carried on.

THE WEBLEY COMPANY.—The reports and accounts of the Webley and Scott Revolver and Arms Co., Ld., were approved by the shareholders at their meeting on the 3rd ult. Lord Ebury presided and went into various questions connected with the finance and management of the company. He pointed out that it would be some time before a better state of affairs could be laid before the shareholders, so much of the support which the company formerly received from customers abroad having been lost by changing conditions of industry. The diminution in the profit was mainly owing to the relaxation of deliveries to the Government consequent on the termination of the South African war; but, on the other hand, it was encouraging to note that the company's mark VI. service model revolver held its own, and the board felt sure that whenever the Government required more pistols, which usually happened during April, they would receive the customary order to supply them. The commercial branch of the revolver trade had also been very quiet since the conclusion of the war. In the

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other departments of the business they had had gratifying results. The money which for a number of years the company had been spending so freely out of revenue in experimenting on steel, so that the material of wh. ch the barrels were made should be brought to the highest pitch of perfection, was beginning to bear fruit. For several months in the gun and rifle department orders have been pouring in, and during the past year there had been a considerable increase in the turnover, although he must add that, to a great extent, they had been giving their guns away. The fact was that the conditions of the trade were changing. Labour, skilled to the point they required, had become very costly and rare, and had to be supplemented by labour-saving appliances, which had to be thought out, experimented on, and brought into operation at the expense of revenue. No doubt the difficulty would be mastered in time, but the directors believed that it would be the falsest of economy to try and meet it by any compromise in the matter of quality. He announced that Mr. Webley's term as managing director having come to a close he has undertaken to serve in the same capacity for a period at the will of the shareholders, and he has furthermore agreed to accept a materially reduced salary until the company's business has registered a marked improvement. His co-directors have adopted a policy equally to the benefit of the shareholders, with the result that an economy of rather over £1,000 per annum had been effected. The final announcement of the chairman was to the effect that with the approval of the shareholders, he proposed that their secretary Mr. Frank Murray, and their works manager Mr. W. J. Whiting should be enabled by the making of a suitable change on the wording of the articles of association to take seats on the company's board, thereby acquiring the power of serving more effectively in an administrative capacity than hitherto.

MESSRS. ELEY BROTHERS, LD.—The 29th annual general meeting of this company, was held recently at Cannon Street Hotel, Mr. T. R. Bayliss presiding. Mr. E. F. Quilter, as the oldest director present, having expressed the sense of the loss which the company had sustained during the year by the death of Mr. Charles Eley, its chairman, and of Mr. J. Irvine, superintendent of the works, and also of Mr. Henry Eley, who had retired on account of failing health, the chairman moved the adoption of the report. He stated that the past year had not been one of the best for the particular trade carried on by Eley Brothers, but that, nevertheless, the volume of trade done had been really very large. This pointed to still further efforts being made, and the new factory was being rapidly put together. That would mean concentration, increased output, and economy in manufacturing and other charges. Down to the present time the shareholders had never been asked for a single penny by way of increasing the capital. It might happen that with increased trade and a large modern factory, equal to any American one, they would require extra capital, and if so, the board would have no hesitation in asking the shareholders to supply it. At present, for the work done, the capital employed was one of the smallest extant; he knew of only one at all equal to it. It was hoped that the work of removal to the new premises would shortly be begun, and the transfer completed during the current year. Mr. Quilter seconded the motion, which was at once agreed to, together with the dividend recommended—20s. per share, free of income tax, making, with the interim dividend, 15 per cent., free of income tax, for the year. Subsequently, the chairman, without absolutely predicting, stated that the prospects for the coming year were rather bright. In former days, indeed, they had larger dividends, but the conditions of trade were very different now. Wages were different, materials, and, in fact, everything was higher, so that it was impossible to make the same profits relatively as formerly, but if the board continued to give them 10 per cent. dividend and 5 per cent. bonus they might rest fairly satisfied.

ARMAS AUTOMATICAS.—The amount that our fellow men get through is a constant subject of wonder to the more placid among us. In reading a book in the Spanish Language entitled as above, this feeling cannot but be uppermost in the mind. *Signor Juàn Gènova* is its author, and he evidently set to work with a great power for amassing facts and recording mechanical movements to fill a blank that has for some time past been a marked feature of the literature of fire-arms. Automatic guns, rifles and pistols cannot be adequately treated in combination with other matters. They are important enough to belong to a class by themselves. At any rate *Sig. Gènova* thought this, or he would not have given us the present volume. It comprises 371 pages of exceptionally well illustrated matter, while in addition there are no less than seven inset sheets showing the details of arms that could not be adequately illustrated within the compass of an ordinary page. The only regret that one feels in going through the volume is that it is not in English; because although technical terms are so much alike in almost all languages, one necessarily finds it a slow task to follow the clear reasoning of the author when frequent recourse to a dictionary is necessary. The author's disquisitions on the principles of working of different arms, and the manner in which the same identical difficulties have been met by the various inventors who have attacked the automatic problem, is most interesting to study now that all the particulars are systematically presented in a single volume. The illustrations and tabulated statistics are so clearly represented that the book should be useful to those who require the *data* without the reading matter.

THE NEW EXPLOSIVES CO., LD.—The proprietors of this company held their annual meeting on the 12th ult., and the very prosperous state of the company's affairs led to the most pleasant exchange of compliments and good wishes among those concerned. A bonus of £550 was voted to the directors in consideration of the successful results of their work, a sure sign that the shareholders appreciated the manner in which their interests have been looked after during the past and recent years. From the remarks made by the new chairman of the company, Mr. F. Machell Smith, it seems that present indications in the explosives business show a tendency towards greater competition, a state of affairs that implies the doing of a larger business at a less proportionate profit in order to maintain the same level of earnings. With such a strong tendency as this company displays in the direction not only of keeping up to date, but of creating the developments that make the pace, there can be little doubt that there are plenty of plans fully matured for putting into effect the fresh endeavours that will represent the coming year's effort to be among the first in the race. The company is well favoured in the personality of its active members. The directors are

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those who have worked for the company since the re-organization of methods ten years ago, while Mr. F. Martin Hale, though not a director, is very much in evidence as an active and painstaking general manager; he not only takes the purely business problems of the London office within his purview, but he has made himself thoroughly *au fait* with the manufacturing processes at Stowmarket, especially with reference to their relation to finance and economy of administration.

THE MINIATURE BISLEY.—The Rifle Meeting to be held at the Crystal Palace under the auspices of the Society of Working Men's Rifle Clubs with which is incorporated The British Rifle League, commences on the 23rd inst. The President of the Society is Field-Marshal Earl Roberts, K.G., and the Secretary Mr. H. Marks, 17, Victoria Street, S.W. According to the Rules and Regulations which have now been issued along with the Prize List, the meeting is open (1) to all members of properly organized Civilian and Rifle Clubs of any portion of His Majesty's Forces, whether affiliated to a Rifle Association or otherwise, (2) to any individual wishing to compete, (3) Members of School Rifle Clubs Cadet Corps, P.O. Corps of Messengers or Lads' and Boys' Brigades, (4) Teams of five to the number of three from each Regiment or Rifle Club. Entries must be made with the Secretary by the 9th of March. The use of orthoptics will not be allowed, nor artificial rests or slings. Position at 20 yards standing, and at fifty yards, any military position. The rifles used must be either service weapons with the Morris tube with short ammunition or miniature rifles, magazine or single shot of calibres not exceeding ·230, weight not over 8lbs., trigger pulls not less than 4lbs., but to be plain without undue projections and the retail cost of the weapon including sights must not exceed £3 10s., open sights only. At 20 yards the targets will be 6in. square, the bull $\frac{7}{8}$in. diameter, inner 2in., magpie 4in., outer, rest of target. There will be a carton in the middle of the bull which will count as 6. It may be added that in testing a trigger the rifle is to be slanted so that the tester may hang in a line diagonally across the small of the butt; and in the case of rifles fitted with a safety catch, the thumb-piece of the safety catch must be quite down and the catch must not be used in any way as a means of discharging the rifle. The Championship Competition is open to all comers at 1/- entrance fee, and will be fired in three stages, standing, kneeling and prone at 20 yards, 7 shots at 6in. target for first stage, standing and kneeling at 50 yards, 10 shots at 12in. target for second stage, and 20 shots at 50 yards prone at 8in. target for third stage, the 1st. prize being a £25 Cup, Gold Medal and 25 per cent. of the entrance fees, which are all divided proportionately among the remaining nineteen winners. There is a number of other interesting competitions, all well rewarded by good prizes.

THE COLT AUTOMATIC PISTOL.—The Colt Company have issued an improved model of their automatic pistol. The capacity of the magazine is eight shots, and the calibre is nominally ·38, but actually about ·350 in. bore. The length of barrel is 6 ins., length over all 9 ins., and the weight 37 ozs. The pistol is most effective in its operation, and it enjoys the remarkable distinction that it may be dismounted by a single hand movement, so throwing the barrel clear for cleansing from the breech.

LECTURES TO YOUNG GUNMAKERS.

XIX.—CAPS.

PROBABLY there never was such a scapegoat as the sporting cartridge cap. Whatever goes wrong with the shooting of a gun, or the behaviour of the powder, it is an unfailing rule to blame the cap, or at any rate cast such aspersions on its character as will make it appear remarkable that things ever go right with so unreliable a servant to perform a necessary office. No one can have much to do with the loading and testing of cartridges without finding instances of the most remarkable discomformity of result between individual samples taken from the same batch. It is impossible to suppose that the gun behaves differently, or that the wads and cartridge cases can have something so radically uneven in their characteristics as to account for what happens. However, to make assurance doubly sure, some very careful persons have been known to put aside every cartridge case and every wad that may show any discrepancy of fit. And yet there still remain occasional wild and unexplainably bad shots. One feels quite sure of the powder, because the manufacturer shows that it is blended and reblended until in each charge there are possibly specimens of the outcome of a whole season's batches. In the matter of weighing, shot-filling and turning over, well, practice makes perfect, and there is at least positive evidence that nothing can have occurred that will make one cartridge radically different from its fellow. Finally, when we allow for the central and accurate insertion of the felt wads, so as not to destroy their regularity of shape, and for a careful watching of the cartridges in their progress through the loading shop and on to the range to see that they are not dropped or otherwise thrown out of truth by rough handling, then what is there left but to blame the cap if any irregularity occurs in the shooting?

When the question is examined in a broader frame of mind, it is found that the case against the cap is not proven. Some caps are good, others are bad; but taking the medium nitro cap as we find it, we certainly cannot hold it responsible for a tithe of the sins that are laid at its door. Many of the libels on the humble cap would fall to the ground for want of proof if they were examined in a court of law, and in some instances the defendant would have to pay heavy damages for wrongful defamation of character. For instance, we are always hearing that the amount of composition in a cap is liable to vary within serious limits. Yet the moment it is shown that the system of filling makes such a contingency highly improbable, the attack takes the form of suggesting that cap composition is such dangerous stuff and so difficult to deal with, that it is highly unlikely that the ingredients will be represented in their due proportions in the minute quantities that go to make up the charge for a single cap. It is almost impossible to argue with the man who refuses to believe anything but what is bad about the cap. The ideal cap that will make a bad powder give good results, has admittedly still to be found, and if a powder has a tendency to irregularity, it takes a wonderful cap to correct the fault. There are many caps that suit one powder, and there are many powders that shoot all right with one kind of cap. But the caps that suit a range of different powders are nearly as scarce as the powders that do well with any kind of cap. In fact, there is one such powder, and for

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fear of seeming to hide the truth, its name must be stated. It is not one of the "ites." It is our old and long-tried friend black powder, which even now, after twenty years of supercession, is still the standard to which the nitros try to attain. They can never get there so far as regards regularity under all conditions; but they have other still more valuable characteristics that make us ever ready to bear with their changing moods and fancies, hoping some day to arrive at finality, and so produce a perfect cartridge by working to specification.

In attempting to deal with caps on a sound scientific basis, it is probable that the various points put forward will seem to be quite unoriginal, and to convey but little information beyond what the reader may rightly or wrongly think he already possessed. The subject can be divided under two general headings, viz. (1) The effects that caps produce on gunpowders, and (2) their examination by means of various forms of test to foretell their probable behaviour. The function of a cap is to ignite a charge of gunpowder in a manner that will enable the explosive to do its work in a proper manner. It consists of a small explosive charge enclosed in a metal capsule, the whole being mounted in such a way that it may be effectively ignited under the conditions provided for in the ordinary gun and cartridge. It is exceedingly difficult to explain in simple terms a comprehensive theory that will explain how a cap ignites an explosives charge, at the same time insuring that the explanation given shall accord with the views that are accepted by scientists as a correct explanation of what takes place. Similes are likely to carry the mind much further than is intended, so that one is inclined to hesitate before committing one's self to the fathering of a popular illustration. Reducing the behaviour of a cap to the simplest possible form, we may regard the powder charge as a system of parts in a state of unstable equilibrium requiring the application of energy to disturb it. An illustration of this idea may now be put forward. Let us imagine that there are a number of weights lying on a table and tied together by cords, in such a manner that if one or more of the weights be displaced or pushed off the table the rest of the weights are dragged off as well, the entire combination being involved on the downfall. If we regard the group of weights as an explosive charge, we may consider the initial displacement of one or more of the weights as equivalent to the process of ignition. To carry the analogy further, we may suppose that the time which is occupied in bringing the whole of the weights to the ground is proportional to the number that are simultaneously disturbed at the outset. This finishes the illustration, in so far that the effectiveness of an ignition of a charge of explosive is dependent upon the amount of the charge that comes under the direct influence of the original source of the impulse. To appreciate the energy of the explosive charge, it is sufficient to assume that this is controlled by the total value of the weights and the height of the table. This gives the analogy of their energy, viz., mass multiplied by height equals work done, or for the purpose of an explosion, the violence of the blow. The effectiveness of an explosion is determined by the time that elapses from the first ignition to the moment when the whole of the charge has been resolved into gas. That is to say, we have two well-defined limits to the rate of progress of the ignition. The slowest possible ignition would occur when the igniting energy was applied to only one weight, the movement thereof gradually extending to the rest of the system, and so bringing the entire mass to the ground in due course. The most rapid rate of ignition would occur under the opposite conditions, viz., when the whole of the weights are separately and independently pushed off the table by the initial or starting force.

Turning more directly to the actual conditions that occur in a cartridge, it is possible to appreciate the action of different caps in relation with the analogy above put forward. A cap of small igniting power would ignite a portion only of the explosive charge in a cartridge, the combustion of the powder thus ignited leading to the progressive ignition of the rest of the charge. It should be clear that a powder that is ignited in this manner would not be likely to give effective results except it had an altogether special capacity to propagate combustion throughout its mass. Black powder, which has already been mentioned in this connection, is about the only explosive that can be regarded as having this power of developing an effective explosion from the smallest beginnings. Nitro-powders, as a class, are much more obstinate to deal with, and they, therefore, require to be ignited by a cap whose influence shall be directly transmitted to a large number of the particles comprising the whole charge. This is why the cap question has attained such an important aspect with the growth of nitro powders. These latter require a cap that will inflame the necessary number of particles of a charge without committing the offence of creating too sudden a dissolution. More than this, they require a cap which shall work within very narrow limits of variation. That is to say, the cap must be capable of repeating with fair regularity the pre-determined kind of ignition. The powder on its side must not be too prone to variations of action with a cap whose consistency is well established.

In an explosive charge, whether it be for blasting or a primer for igniting the main charge of a shell, or an ordinary powder charge in a cartridge, the ignition is accomplished by raising the temperature of a part of the charge to a degree that represents the point at which inflammation is established. This is our initial displacement, the ignited part communicating the action to the adjacent parts by means of what we have represented as our cords of communication. This ignition may be effected either by the direct application of heat or by shock. The latter element of an explosion is very difficult for the beginner to appreciate. He imagines that the shock element of a cap's action must relate to some kind of vibratory wave action that is set up throughout the mass of the explosive, thereby setting the molecules into a state of agitation that promotes a tendency to disassociation, that is, combustion or explosion. As a matter of fact, this is not in the least what is meant. Possibly an illustration may be taken from the behaviour of a rifle bullet, whose temperature we wish to raise to the melting point. This we can do in two ways. First, by the application of heat in any convenient manner; second, by a blow. It would take an appreciable time to raise the temperature of a bullet to the melting point even by the application of a powerful blow-pipe flame. On the other hand, if we put the bullet into a rifle and fire it through the air, we impart to it a certain amount of energy, that energy being instantaneously converted to heat upon impact with an iron target. The heat is derived from the blow or shock, and represents simply a conversion of energy into heat. The impact of the cap gases upon the explosive provide the

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element of shock that has the function of aiding ignition by providing an additional source of intense heat.

The shock element of a cap must therefore be regarded as the transformation of its energy into heat in the explosive itself. The effectiveness of an ignition depends on the amount of explosive first ignited, as well as on the nature of the ignition, viz., how much temperature and how much shock. This is obvious upon a moment's consideration. Heat acts according to the temperature of the source, and also according to the nature of the explosive charge, that is, the readiness with which it takes up heat from an outside source. In any case, this process is slow as such things go, in the same way that the bullet could only be slowly raised in temperature by the application of a flame. Shock, on the other hand, is rapid, because the transformation into gas of the immediate layers of the explosive which absorb it is instantaneous. Furthermore, the volume of gas formed by this transformation acts as a similar igniter by shock to the adjacent layers, and so on from layer to layer until every grain of explosive is completely resolved into gas. Thus it happens that the complete ignition that results from shock is a process of great rapidity. It is seen at its maximum when detonation occurs, and there are various stages between detonation and the ignition that are met with in a slow-burning charge of explosive. The above explanation will enable a person not versed in the technicalities of the science of explosives to appreciate the difference between burning a charge of gun-cotton, and exploding it by means of a detonator. A train of gun-cotton may be burned in the open so that temperature is the sole means of passing the combustion from one layer to another. If, on the other hand, one end of the train is ignited by a detonator, the shock that is there applied passes progressively through the mass, the instantaneous ignition of one layer creating gas with sufficient rapidity to account for a blow to the next layer, and so on till the whole train has been exploded with a suddenness that could never be accounted for by the mere transference of temperature from the products of one layer to the next layer of explosive.

The function of the ordinary nitro cartridge cap is to afford the required combination of temperature and blow necessary to ignite an explosive charge with the requisite sharpness demanded by the sportsman. This must be accomplished without going too near to the objectionable extreme of a too sudden explosion, this taking the form of an excessive pressure, which is liable to injure the gun and spoil the shooting. The effectiveness of a given cap must always be considered in relation with the explosive charge upon which it is required to act. Similarly, the explosive charge must be in a great measure judged according to its standard of behaviour with caps that represent a fair commercial average of what they may be expected to attain to. It has already been shown that an ideal cap is the one which ignites all powders equally well. Conversely, that powder is best which is equally well ignited by all caps. The subject of caps cannot be dealt with in a single lecture, and the present instalment may be brought to a fitting close by referring to a well-known test which is applied to smokeless powders. The first test of a powder is with cartridges containing the Eley medium nitro cap. If all goes well, and the powder is pronounced to work satisfactorily when the conditions of ignition are favourable, then it is tested with cartridges containing caps that are known to give bad results in the way of hang-fires with powders having the slightest tendency to obstinate ignition. If the powder still gives results that would pass muster, even with a critical sportsman, then the ignitibility of the powder can be considered up to standard.

It is more satisfactory in powder-making to put forward a product that is fairly adaptable in the matter of its ignition, than to ask for an altogether artificial amount of humouring by the aid of a special cap. It is in this connection that the study of caps is of such great importance in dealing with powders and ammunition. To summarise this present lecture, it may be stated in brief that the elements of a cap are (1) temperature of flame, and (2) pressure at which this flame is given out, that is another way of saying, shock. In the next lecture attention will be devoted to the various headings under which the behaviour of caps can be studied with reference to the conditions of their actual behaviour in practice.

(To be continued.)

THE NEW PROOF RULES.

IT is now well-known in the trade that the joint work of the two Proof Houses has resulted in a satisfactory settlement of all outstanding questions connected with the drafting of a new set of rules, the necessity for which was recognised upwards of three years ago, when Mr. Thomas Turner was appointed to the Mastership of the Birmingham Proof House. At the time it was a very moot question whether the loss of Mr. Allport's scientific knowledge would not inflict an irreparable injury to Proof administration, and doubts were expressed even in our own columns whether the work could satisfactorily progress in the absence of one having the altogether exceptional powers of the late Proof Master. Experience, has however, since shown that Mr. Turner also has well-marked abilities of a kind that enable his services to the cause of sound proving to rank as high as, if not higher than, those of his immediate predecessors. He has a lawyer's grasp of an Act of Parliament, and as an administrator he has a great power of adapting hard and fast rules to the practical needs that have to be met. As a gunmaker whose speciality has always been barrel-making, he is well up to the niceties of this highly technical branch of work.

This record of his achievements does not, it will be seen, contain any references to the more highly scientific branches of gun and rifle testing. We refer especially to the taking of pressures in guns and rifles, and the adaptation of appropriate proof charges based on the knowledge so gained. Neither Mr. Turner, nor for that matter anyone in the regular employ of the London Proof House, can claim to possess knowledge on a par with what such men as Mr. R. W. S. Griffith and Mr. F. W. Jones have acquired as the result of consistent application through a life-time. It is here that the two Proof Houses are to be congratulated on their openness of mind. They have shown themselves to be entirely free from the old-world prejudice that no one can teach a gunmaker anything connected with his profession, and they have asked these two gentlemen to conduct on their behalf the tests necessary for providing the *data* upon which they can base their decision.

While therefore the experts have been hard at work measuring pressures upon the latest approved lines, and showing the most reliable means of applying the requisite surplus

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over the service pressure for the purpose of the proof-test, the joint committee of the two proof houses has been actively engaged in reorganising the code of rules and bringing the same up-to-date with modern requirements. In a very short time from now it may be anticipated that the new rules will be submitted to the Secretary of State for War, after which they will be published in the *London Gazette*, in order that they may be open to public criticism previously to their coming into force. Those gunmakers who for years have been agitating for a system of proof, based on scientific principles and giving the needful protection to the sportsman with a minimum of loss to the gun trade by the spoiling of good work, are at last in a position to anticipate the realization of a large part of their desires. With things on this satisfactory footing, the trade is committed in advance, almost for the first time in its existence, to accord a favourable and friendly reception to a performance whose first recommendation is that it represents an honest and painstaking effort to achieve a useful purpose.

ROUND THE TRADE.

Mr. August Reichwald, agent for Krupp's, and late of New Broad Street, has removed to Finsbury House, Finsbury Pavement, E.C.

The Auto-Electric Rifle and Target Co., Ld., is the name of a concern which has been registered to work auto-electric rifles and targets, whatever these may be.

Among the marriage announcements of last month is that of Mr. W. R. Quinan, General Manager of the De Beers Explosives Works in Cape Colony, to Miss Sarah Stamford, of Kimberley.

Reports from New York announce the death of Mr. R. J. Gatling, the well-known octogenarian gun inventor, his recent activities having been concerned with the development of farming implements.

Those who are interested in the development of universal rifle shooting should bear in mind that the "Miniature Bisley" Meeting is due to commence at the Crystal Palace on Monday, the 23rd inst.

Mr. Charles Lancaster's latest appointment is that of Purveyor to the Court of H.I.H. the Grand Duke Vladimir. He has also been nominated "Fournisseur Breveté de Monseigneur le Duc d'Orléans."

We have received from Mr. H. J. Poulter his new season's price-list for revolver and other targets and accessories for rifle shooting, and those who want copies should send for them to his printing works, at 545, Commercial Road, E.

The employés of Messrs. Westley Richards & Co. held their 91st Annual Dinner in Birmingham on the 7th ult., and from the accounts that have been sent out to the newspaper press, the assembled guests appear to have spent a thoroughly enjoyable evening.

Messrs. Joyce & Co. have sent us a letter in which they disclaim the terms of our announcement in regard to their relations with Messrs. Nobel, and we must express regret that our information was not sufficiently explicit to enable us to describe the position in a manner acceptable to the parties concerned.

Messrs. James Macbeth & Co., manufacturers of blasting apparatus, have sent us from New York an interesting little note-book containing hints on electric blasting, together with a number of sheets available for the making of memoranda. A special feature of the booklet is the celluloid cover, which bears tasteful illustrations back and front.

Mr. P. A. Stockbridge, for some years assistant to Mr. W. W. Watts, of the London Sporting Park, Hendon, on the termination of his engagement with the latter, has started as a coach and instructor in shooting on his own account, having secured a convenient ground for his shooting school in the Finchley district, where gun-fitting for the trade will be made a special feature.

The Directors of Messrs. Vickers, Sons & Maxim, Ld., have declared, subject to the sanction of the company in general meeting, a final dividend of 1s. 6d. per share (free of income tax) on the ordinary shares of the company for 1902, making with the interim dividend of 1s. paid in August last, 2s. 6d. per share, or 12½ per cent. for the year.

The Lord Mayor of Birmingham distributed the prizes to the successful students at the Technical Instruction Classes established in connection with the Birmingham gun trade on the 25th ult. Mr. J. W. Ward, the chairman of the Proof House, presiding. The Lord Mayor's speech contained the usual references to foreign competition, technical education being put forward as the appropriate remedy.

Messrs. Hunter & Warren, Ld., early last month resigned their agencies for Messrs. Joyce and for the E.C. Powder Company, in consequence of other arrangements they had pending. They have now completed an agreement with the Kynoch Company, by which they sell their ammunition, smokeless sporting powder and black sporting powder exclusively, as from the 28th ult. All these plans relate to Scotland only.

We learn that Mr. J. C. Scott recently resigned the appointment he has held with the Webley & Scott Revolver and Arms Co., Ld., since its formation; the reason being that he considered such a position inconsistent with a new *rôle* that he proposes shortly to adopt, viz., as adviser and consultant to his son, Mr. Frank Scott, who will shortly be starting in business as a gunmaker on his own account. Under the circumstances, the resignation was accepted, it being decided that it should date from the time of its acceptance.

The Directors' Report for Messrs. Walkers, Parker & Co., Ld., for the year 1902, states that the market for lead having been steady and the fluctuations moderate, has been favourable for the company's operations. The trade has been fair and deliveries of manufactured goods have shown a considerable increase over those of 1901. The net trading profits amount to £34,013, and after payment of debenture interest and other head office charges, there remains £13,030, from which the deficiency of £10,658 from 1901 has been deducted, leaving a balance of £2,371 to be carried forward.

The balance-sheet of the Cotton Powder Co., Ld., displays a very healthy state of affairs, viz., the power to pay full dividends on the first and second preference shares, and a dividend of 5 per cent. on the original value of the ordinary shares, and at the same time to leave a sufficient balance to transfer £5,006 to the general reserve fund, making it £25,173, and £1,000 to the contingency reserve fund, making that £6,000, leaving £5,006 to be carried forward. Major-General Stuart-Nicholson, C.B., the company's chairman and managing director, is to be congratulated on this fine achievement.

The death is announced of Mr. Charles Marcus Westfield, of gunpowder fame. He started with John Hall & Son in 1867, purchased the business of J. T. & S. Sharp in 1882, whose factory was at Chilworth, in Surrey. The firm was turned into the Chilworth Gunpowder Co., Ld., when the Germans wanted to acquire a factory for making the brown prismatic powder for heavy guns. He was joint managing director with Mr. E. Kraftmeier. It will be remembered that Messrs. Vickers-Maxim bought a big interest in this company at a time when it was thought that German guncotton powders would be recommended for adoption by the Explosives Committee.

Messrs. Eley Brothers are issuing, for the coming season's trade, an excellently put-together cheap cartridge case, which will be known by the distinctive appellation "Grand Prix." It is an unlined case, with a kind of extended base, giving the impression of a coned case. It loads well and shoots well; but, as with other unlined cases, carelessness and the application of undue pressure in the turning-over process are liable to crumple up the tube. Curiously enough the loading staff soon accustom themselves to dealing with unlined cases, though at first sight it might seem as though they would have difficulty in doing so. Automatic turn-over machines are seldom able to deal with the quality of case referred to.

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THE POSITION OF GUN-FITTING.

IT is now many years since the Try-Gun first introduced to the sporting mind a plausible way of accounting for bad shooting and a promising means of accomplishing an improvement. Since that time volumes of matter have been produced in which it has been proved to the satisfaction of most of the writers that an ill-fitting gun is an explanation for most of the unsuccessful shooting that exists, and that an alteration in the shape of the stock will influence the necessary change of shooting form. Although the idea is so persistently dinned into our ears there has always been a minority who have boldly asserted that a great deal of nonsense is written about gun-fitting, and that half the successes that are recorded may be directly attributed to the practice and coaching that are incidental to firing the shots involved in the process of gun-fitting.

In favour of this contention a large number of practical experiences could be quoted. We have, in the first place, the most extraordinary adaptability that is displayed by all persons who are in the habit of handling a large number of differently stocked guns. The ordinary gunmaker's shooting-man is a person who unofficially fires away a large number of cartridges in the course of a year; and he thereby acquires a remarkable level of skill. One does not hear much of these men in public competitions, the reason for which is not far to seek. Their practice is generally obtained in privacy, or in the presence of a small inner circle among whom they are heroes, and hence they lose the benefit of the large amount of mental and moral preparation for shooting contests which is gained by the patron of a club who is in the habit of shooting in public. However, it is so well-known that better scores are made in private than in public, that we need hardly labour the point that the average gun-fitting expert contradicts in his own person the very lesson he is always endeavouring to impress upon his customers or those of his employer. He can use almost any gun with the same degree of success. At any rate, there is a wide range of guns, any one of which seems to serve his purpose equally well.

That the above experience is not confined to gun-fitting experts is shown by the facility with which many sportsmen can change from one gun to another without a noticeable diminution of their skill. There are also hundreds of cases within the knowledge of every professional expert, in which a man has adapted himself in a very short time to a gun obviously different from anything he had used before, and which at the first handling seemed most uncomfortable. There are also many other instances in which a shooter has been fitted by the help of a try-gun, and finds the result most unsatisfactory, notwithstanding the skill and care with which the fitting operation has been conducted. The skilled gunmaker, whose testimonials prove his power to satisfy the needs of his customers, does not allow his stocking department to be ruled by the try-gun. He certainly conducts a fair amount of shooting and satisfies himself as to the peculiarities of the prospective purchaser of a gun, and he notes with care the particular try-gun adjustments with which the best shooting was done. He then takes a poet's licence in settling the final dimensions of the stock, and, where possible, he arranges for a careful test before the wood-work is brought to its final state, and, therefore, while it is still in a condition when modifications can be put through. Although this represents the practice of many firms, it must be admitted that in a large number of cases the gun is finished right off with no guidance beyond the original outing to the shooting ground.

The most important side of gun-fitting is certainly that which is conducted with the actual gun which is being prepared for the individual shooter; because many of the niceties of stock are those which hardly fall within the compass of the gun-fitter's first specification. In addition to this no try-gun is likely to handle in just the same way as the real weapon that will ultimately be delivered to the purchaser. Whatever there is, therefore, in the art of gun-fitting the try-gun can only be treated as a rough instrument with which the first general idea of a shooter's characteristics and peculiarities is obtained. In fact, at many of the larger gun-fitting grounds it would be almost better, than to have a try-gun, to build up a series of weapons representing a variety of leading types of stock, the try-gun to be used only when these fail to give satisfaction. By reducing gun-stocks to a definite number of leading types, some ninety per cent of the existing shooters could be fitted without complication or doubt as to the ultimate results. If a gun were found for a man on his arrival at the ground with which he proved himself able to do all that was needed, showing meanwhile a marked capacity to improve with practice, the gunmaker would be able to put through an identical weapon with far greater assurance of success than if the dimensions of the much too easily adjusted try-gun were followed.

It might seem unfriendly to the cause of skilful gunmaking to decry any innovation that seems to have served a beneficial purpose. But in trusting too much to one resource there is always the danger that other vital issues will be neglected. If, for instance, two guns were met with that seemed in all respects similar as regards shape and fit, and yet proved to be highly unequal in their shooting capabilities in the hands of a sportsman, it might well happen that a person too much committed to the pursuit of gun-fitting would waste his time in endeavouring to discover some hidden difference of shape or balance to account for the discrepancy of result. We have known many cases where the loss of birds which have been touched by the shot and have got away wounded has been attributed to some misfit in the gun whereby the game got the edge only of the pattern. Under such circumstances a remedy is generally sought either by recommending an altered stock or by endeavouring to get the shooter to hold further forward or otherwise correct his aim.

Considering that bad patterns probably account for more misses in the field than bad gun-fitting it seems unfortunate that the mind should be instinctively driven to look for an explanation of a given phenomenon in one direction, when there are probably half-a-dozen equally appropriate alternative explanations. In fact, pattern is vastly more important to the shooter than gun-fitting to the last sixteenth of an inch. He can adapt himself to the gun, but no prior calculation or experience can tell him how to hold on to his birds when one shot throws a pattern that is hollow in the centre, the next illustrating some other peculiarity of behaviour. To make a gun throw its charge so that the pellets are ranged round a definite centre, and to insure that the general average of distribution is maintained with fair average regularity from shot to shot is a side of gun-fitting that has not in our opinion received the attention that it would have done had a little less importance been attached to the particular kind of stock that is given to the individual sportsman.

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CORRESPONDENCE.

AMERICA'S BIG GUN.

TO THE EDITOR OF *Arms and Explosives.*

SIR,—In your February number, page 26, "Incidental Jottings," under heading "A gentle boast," it would appear that your informant must have been "pretty considerably mixed" when he wrote that jot, inasmuch as the big gun (a 16-inch B. L. rifle) did not "burst at proof," nor has it done so as yet. On the contrary, it is intact, and gave the expected results at the test, viz., a muzzle velocity of 2,300 feet per second, with a pressure of about 16¼ tons per square inch.

A 12-inch B. L. rifle did burst at the proving-ground in testing a type of shell that had already been condemned by the Ordnance authorities, and which it was expected would not function and would probably burst the gun, as it did. Proper precautions were taken before firing the shot, so that in the result no one was injured. This was one of those cases where an experiment was ordered to be carried out that was already foreseen by those who were familiar with the subject would, in all probability, prove to be useless.

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TRADE MARKS.

APPLICATIONS ADVERTISED. JAN. 28TH—FEB. 25TH, 1903

250,799. Swansea Safety Fuse Co., Ltd. Device consisting of a Goat standing upon a rock and enclosed within a circle of fuse, with the words "Three red threads running through centre of fuse" printed round the outside of the circle. December 18, 1902.

251,293. } H. S. Welcome, trading as Burroughs, Welcome & Co.,
251,294. } London. The word "Tabloid.', January 9th, 1903.

250,798. Swansea Safety Fuse Co., Ltd. Device, consisting of a framework of fuse and the words "Safety Fuse for Blasting:" Spitfire Brand: "Three blue threads through centre of fuse." December 18th, 1902.

250,577. Westfälisch Anhaltische Sprengstoff A.-G. mit Beschränkter Haftung, Germany. The word "Coronite." December 9th, 1902.

249,589. The Webley & Scott Revolver and Arms Co., Ltd., Birmingham. Device consisting of their winged bullet. October 27th, 1902.

TRADE MARKS REGISTERED. JAN. 15TH—FEB. 11TH, 1903.

248,648. The United Safety Fuse Co.
249,792. Curtis's & Harvey, Ltd
249,910-11. Curtis's & Harvey, Ltd.
246,172. Martin, Birmingham, Ltd.
250,311. Castroper Sechenhest, Sprengstoff, A.-G.

APPLICATIONS FOR PATENTS.

JANUARY 19TH—FEBRUARY 21ST, 1903.

1,323. Projectile Fuses. H. W. W. Barlow and W. Charlesworth.
1,392. Discharge of Projectiles. J. Salt and J. Brightmore.
1,436.* Projectile. J. G. Schrödel.
1,452. Range Finders. A. Barr and W. Stroud.
1,494. Animal-killing Pistol. L. Lenglez.
1,557.* Cartridges. C. Kurth.
1,567. Rifle Sights. C. E. Liles and J. W. A. Rule.
1,599. Small-arms and Ordnance. W. S. Simpson.
1,633.* Aim Indicator. A. Reymann.
1,639. Detonating Fog Signals. F. A. Ludlow.
1,678. Range Finder. A. H. Atteridge.
1,804. Targets. T. Turner.
1,850. Projectiles. F. E. Fairholme and J. E. Fletcher.
2,003. Orthoptics. H. Andrews.
2,131. Rifle Sights. T. Thorp.
2,333. Gun Mountings. W. Beardmore, G. A. Köhler and A. Bremberg.
2,457. Torpedo Steering. F. W. Dodd.
2,460. Sighting of Ordnance. H. H. Greenfell.
2,504.* Field Guns. C. D. Abel, (Agent for *Rheinische Metallwaren und Mf.)*
2,557. Reloading Miniature Cartridges. W. H. Trask.
2,567.* Magazine Guns. H. Lake, (Agent for *Winchester Repeating Arms Co.*)
2,570.* Filling of Rifle Magazines. H. H. Lake, (Agent for *Winchester Repeating Arms Co.*)
2,592.* Explosive Envelopes F. Timmel.
2,660.* Powder Envelopes F. Groepper.
2,786 Sighting of Guns.' Sir W. G. Armstrong, Whitworth & Co., Ltd., and A. A. Common.
2,838. Projectiles R Wood.
2,868. Ordnance. F. T. Fisher and F. W. C. Dean.
2,877.* Locking of Gun Pivots. G. Ehrhardt.
2,977.* Blasting Compound. A. Brock.
3,020. Nitro-glycerine. F. L. Nathan, J. M. Thompson and W. Rintoul.
3,045. Nitro-cellulose Compounds. H. Ensminger.
3,057. Range Finder. J. A. F. Field.
3,064. Ammunition Waggons. A. T. Dawson and G. T. Buckham.
3,326. Aim Indicator. J. N. Dempsey.
3,408. Targets. E. Holloway.
3,497.* Floating Batteries. A. P. Stokes.
3,520. Quick-firing Guns. W. Rowbotham.
3,559. Projectiles. A. T. Dawson and G. T. Buckham.
3,569. Projectile Fuses. G. C. Sturrock.
3,604.* Automatic Small-Arms. M. Mondragon.
3,624. Gun Mountings. A. T. Dawson and W. Burton.
3627. Targets. J. Jackson and C. J. Rouse.
3,652. Cartridge Adapter. C. F. Thompsen and C. W. Buckland.
3,680. Sporting Cartridges. G. Hookham and Kynoch, Ltd.
3,717.* Automatic Firearms. H. H. Lake, (Agent for *Winchester Repeating Arms Co.*)
3,967.* Cartridge. J. M. Edmunds.
4,061* Guns. J. A. Palmborg, (Date applied for in Sweden, March 3rd. 1902.)
4,085. Sights for Guns. E. H. D. Lloyd.
4,181. Ammunition Hoist. A. T. Dawson and J. Horne.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

JANUARY 22ND—FEBRUARY 19TH, 1903.

COMPILED BY H. TARRANT.

984* (1902). **Pressure Gauge.** J. E. Petavel, Manchester and Capt. J. Bruce-Kingsmill, R.A., Woolwich.

1,228 (1902). **Sighting Apparatus.** A. A. Common, Ealing. Sighting apparatus consisting of two Galilean telescopes placed side by side, one of which is provided with a collimator and a fiducial mark, the other being plain. Means are described for adjusting the balance of one telescope from the other to suit the width of the eyes of the user. Accepted Jan. 15, 1903.

1319 (1902). **Breech Mechanism for Ordnance.** A. T. Dawson, London, and J. Horne, Barrow-in-Furness. In order to avoid loss of time between the firing of successive rounds from heavy ordnance, hydraulic apparatus is provided so that the breech may be opened either automatically or at will when the gun has partly returned to the firing position and in all angles of elevation. Thus, as soon as the gun has come to rest, the breech will be fully open and the gun ready for loading. Accepted Jan. 1, 1903.

1,398 (1902). **Targets.** M. Mullineux, Manchester A carrier for targets, consisting of a framework, one portion of which forms part of a band of wire or cord operating around vertical pulleys. This carrier is supported by a leg upon the end of which is a pulley running upon the part of the cord running around under the pulleys. The target may by means of this arrangement be wound quickly from the firing point to the butt. Accepted Jan. 1, 1903.

2,256 (1902). **Howitzer Elevating Gear.** Sir W. G. Armstrong, Whitworth & Co., Ltd., Sir A. Noble and R. T. Brankston, Newcastle on-Tyne. In order to bring a howitzer from high

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angles of elevation to the horizontal for loading and *vice versa*, the ordinary elevating screw is connected with the elevating arm by means of a link When elevated the link and the screw are in line, but when horizontal the link and screw form an angle one with the other. Accepted Jan. 8, 1903.

2,629 (1902). **Manufacture of Cartridges.** E. Jones, (of Kynoch Ltd.) Birmingham A machine for effecting the accurate insertion of percussion caps in cartridge cases. The caps are placed within a feed hopper from which they are set in the bases of the cartridges at a uniform distance above or below the heads. The cartridges are held in a rotating carrier. Accepted Jan. 1, 1903.

2,852 (1902). **Sighting Device for Guns.** A. A. Common, Ealing. In the sighting of guns a Galilean telescope is used. In the field of view of the telescope is produced an image of a fiducial mark which can be seen upon the image formed by the telescope. The optical axis of the telescope and the mark, form an aiming line which can be adjusted to any required angle of inclination to the axis of the bore. Accepted Jan. 15, 1903.

2,899 (1902). **Lock Mechanism of Small-Arms.** W. Baker, Birmingham. In the lock and ejector mechanism described, spiral springs displace the flat springs ordinarily used. The spiral spring is so disposed upon the lock plate that it acts upon sear and hammer and tends always to force the hammer forward and the sear nose into bent. The same principle is applied to the ejecting device. Accepted Jan. 8, 1903.

3,047 (1902). **Field Gun Carriages.** A. T. Dawson and G. T. Buckham, London. Modifications in field gun carriages chiefly intended for howitzers are described in this patent. These modifications apply to the elevating gear which is made to operate more rapidly than heretofore; to the carriage wheel brakes which are adapted to be used either when travelling or firing; to the traversing hand spike which is packed more closely; to the axle, the arrangement of which is such that the gun is nearer the ground; and to the spade which is carried by the forward part of the trail. Accepted Jan. 8, 1903.

3,334 (1902). **Safety Blasting Explosive.** J. Wetter, London (Agent for *Westfälisch-Anhaltische Sprengstoff A.-G.*) A safety explosive, the composition of which the following is an example. Nitro-glycerin 40 per cent; Nitro-cellulose 1 per cent; Ammonium Saltpetre 27 per cent; Potash Saltpetre 4 per cent; Fatty Acid Salt 12½ per cent; Liquid Hydrocarbon 3½ per cent; Rye Flour 10 per cent; and Wood Flour 2 per cent. The proportions of these ingredients are varied according to the nature of the work the resultant explosive is required to perform. Accepted Jan. 8, 1903.

3,359 (1902). **Miniature Ammunition.** Maj. J. Richards, Kingstone Hill. A process is described in this patent by which the spent cases of service cartridges are cut down for the purposes of forming miniature ammunition. The diameter of the shortened body is reduced to enable its mouth to take a bullet of the same diameter as the service bullet. The base of the cartridge remains the same. A short tube is fitted into the chamber of the rifle to take so-formed miniature cartridge. Accepted Jan. 22, 1903.

3,391 (1902). **Fuses for Blasting.** W. F. Bennett, Cambourne. In the manufacture of safety fuses for blasting a waterproofed wrapper is applied between the core and the external binding of threads of cotton. The wrapper is not wound upon the core in a helical or spiral fashion, but is so applied that its overlapping edges lie parallel with the longitudinal axis of the core. Accepted Jan. 1, 1903.

3,564 (1902). **Bullets.** Col. C. A. MacLeod, Brecon. A bullet, so constructed, that rotary motion is imparted to it when discharged from a smooth-bore weapon. The bullet takes the form of a cylinder at the hinder part of which is a closely-fitting wad-shaped disc. On the periphery of this disc are oblique channels through which the air passes and so revolves the projectile about its long axis. Accepted Jan. 8, 1903.

3,616 (1902). **Howitzer Sighting.** A. T. Dawson, and G. T. Buckham, London. Sighting apparatus for howitzers in which the fore sights are adjustably mounted upon a long deflection scale consisting of a slotted bar carried by the cradle. A goniometric sight, so constructed that it may be employed in a horizontal or vertical plane, is also described. Accepted Jan. 29, 1903.

3,621 (1902). **Gun Mountings.** A. T. Dawson, and G. T. Buckham, London. Improvement in the construction of pivot mountings for quick-firing ordnance, chiefly consisting in devices for protecting the pivot against disturbance from shocks; for permitting ready access to the pivot bearings; and for facilitating the housing of the gun and cradle. Accepted Jan. 29, 1903.

4,176 (1902). **Machine Guns.** A. W. Schwarzlose, Germany. Modifications are described to the lock mechanism of the toggle link lock type of machine gun described in Spec. No. 13394, 1901. The alterations relate to the sear, the trigger, the striker and bolt, all of which are under the influence of one spring. The toggle links and mountings are such that the lock may be taken to pieces without the aid of any tools. Accepted Jan. 29, 1903.

4,178 (1902). **Cartridge Wad.** L. A. Le Couvrer, Paris. A between-powder-and-shot-wad for cartridges consisting of two superposed discs one of which is made of plastic material having lubricating qualities, and the other of a more or less elastic material. One or other of the discs is provided with perforations into which the plastic material may be partly compressed by the initial shock of explosion. This wad it is claimed, reduces initial shock, so obviating swelling of the case and crushing of the shot. Accepted Jan. 8, 1903.

4,657 (1902). **Sighting Apparatus.** A. A. Common, Ealing. A method of mounting the telescope in optical sighting apparatus for naval and military guns so that after the apparatus has been moved by hand from the normal position for each sighting operation, an automatic return is effected upon release. Accepted Jan. 8, 1903.

4,914 (1902). **Rifle Sights.** Capt. W. B. Wallace, Enfield Lock. A detachable backsight and foresight for rifles for use at night. The foresight consists of a rectangular plate of white metal which is so attached to the barrel that it slopes away from the breech end of the rifle at an angle of 45 degrees with the axis of the barrel. The back sight consists of two white plates between which the foresight is seen when aiming. These plates also slope away from the breech. Accepted Jan. 29, 1903.

5,205 (1902). **Percussion Primer.** C. Holmström, and G. A. Köhler, Glasgow. A percussion primer made in two parts which, when screwed together, grip between them a flanged portion of the detonating cap. This flange arrangement is adapted to serve as a watertight packing between the body and the magazine of the primer. Accepted Jan. 15, 1903.

6,211 (1902). **Gas Checks for Cartridges.** R. W. Scott, U. S. A. In order to prevent escape of gas beyond a projectile before it is securely seated in the rifling, the cartridge case is so formed that upon combustion the neck is expanded and all forward vent sealed. Accepted Jan. 1, 1903.

6,847 (1902). **Cartridge Belts.** W. Lindsey, London. A cartridge carrier having three rows of pockets all woven in one with the backing. This belt is a modified form of the belt described in Patent No. 5,393, 1880, and is designed to increase the carrying capacity. Accepted Jan. 29, 1903.

7,735 (1902). **Projectile Fuse Caps.** A. Reichwald, London. (Agent for *Fried. Krupp, Germany*). In order to enable the cap protecting the fuse of a projectile readily to be removed a "ripping wire" is attached to and forms part of the cap. When it is desired to separate the cap from the fuse the wire is pulled and the cap is ripped from edge to point. Accepted Jan. 1, 1903.

7,986 (1902) **Percussion Fuse.** A. Reichwald, London. (Agent for *Fried. Krupp, Germany*). An improved form of the fuse patented in Specification No. 12,172, 1901. The fuse is arranged to explode either upon impart or after penetration, and the improvement consists in the provision of a cock which is placed in the passage directly connecting the ignition chamber of the fuse with the burstir g charge. The cock enables the passage to be opened or closed. Accepted Jan. 1, 1903.

8,464 (1902). **Loading of Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). A new method and apparatus for transferring ammunition from the waggon behind the gun to the axis of the gun. The ammunition is first transferred to a loading tray. The tray is then turned into a vertical position after which it is again turned about a point at a higher level in the loading position. Accepted Jan. 15, 1903.

8,465 (1902). **Training Gear for Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*) A method of

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decreasing the amount of time occupied in bringing such a gun as a howitzer to the loading position and *vice versa*, consisting in inserting a clutch in the elevating mechanism, which when disengaged allows the gun barrel to be elevated or depressed independently of the operating mechanism of the elevating gear. Accepted Jan. 29, 1903.

9,866 (1902). **Recoil Brakes.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). A modification of the recoil brake for ordnance with a long barrel recoil as described in patent No. 16,048, 1901. The effective length of the return spring is increased and the weight of the brake reduced by building up the spring of a number of directly abutting sections. Accepted Jan. 19, 1903.

11,162 (1902). **Recoil Brakes.** A. Reichwald, London. (Agent for *Fried. Krupp, Germany*). In relation to ordnance of the type in which the gun barrel alone recoils, a recoil brake is described in which the connection of the piston rod with the cradle or barrel enables the brake quickly to be taken to pieces or put together, and which protects the piston rod from bending strains. Accepted Jan. 29, 1903

12,098 (1902). **Range Finder.** C. A. Trotter, New Zealand. A range and altitude finding device adapted to operate as a rifle attachment. Through the medium of a pivoted lever weighted at one end, the range of any object is discovered and the necessary elevation is at the same time automatically indicated. Accepted Jan. 1, 1903.

12,249 (1902). **Training of Ordnance.** A. Reichwald, London (Agent for *Fried Krupp, Germany*). In the rapid transference of high angle shooting guns to the horizontal or *vice versa*, a clutch has been suggested which permits the gun to be elevated independently of the training mechanism of the elevating gear. The clutch has to be disconnected by a sleeve in the case of a gun fitted with toothed sector elevating gear. The invention described in this patent renders it possible to dispense with the disconnecting sleeve and to disconnect the clutch by means of the gun barrel itself. Accepted Jan. 29, 1903.

16,329 (1902). **Automatic Rifle Mechanism.** T. Bergmann, Germany. In the breech mechanism of automatic shoulder-arms the breech block is provided with a fixed striker. By means of a sear the block is arrested in its backward position after every discharge. The hammerless fire-arm so constructed is similar in action to a pistol having a hammer. Accepted Jan. 1, 1903.

21,019 (1902). **Torpedoes.** L. Wilson, U.S.A. By means of wireless electricity, torpedoes are propelled and steered, and their explosive contents are ignited at the correct moment by an operator in the distance. Accepted Jan. 15, 1903.

21,288 (1902). **Manufacture of Projectiles.** M Weiss, Hungary. A method of manufacturing projectiles with closed or perforated points from tubes. The point is strengthened by stamping when either in a cold or heated condition. This method, it is claimed, makes for cheapness since tubes may be made in large quantities and cut off to suitable lengths. Accepted Jan. 29, 1903.

22,110 (1902). **Ignition of Fuses.** J. von der Bosch, Germany. A device for igniting the fuses in mines, which works quite independently of external influences and is therefore safe for use in fiery mines. Accepted Jan. 8, 1903.

22,554 (1902). **Air Guns.** W. R. Benjamin, U.S.A. An air gun constructed with a view to simplifying the parts; making the limbs more durable, and so facilitating taking to pieces in order that the operator might effect his own repairs. Accepted Jan. 29, 1903.

22,645 (1902). **Safety Explosives.** Dr. F. Schachtebeck, Germany. A method for increasing the stability of the explosive with hygroscopic mixtures described in patent No. 11,325, 1902, mainly consisting in adding to the explosive during the manufacture, an aqueous gelatine or glue or dextrin. Accepted Jan. 8, 1903.

23,097 (1902). **Sword Fastening.** H. W. Aulhorn, Germany. In order to avoid the liability of the gun barrel to bend when the bayonet is used, as it is liable to do with the prevailing system of attachment, a tube is arranged around the end of the wood near the barrel muzzle. To this tube the bayonet is attached. A thrust or blow causes, by this arrangement, a movement only of the upper stock and does not affect the barrel at all. Accepted Jan. 1, 1903.

26,061 (1902). **Firing of Blank Ammunition.** M. Weiss, Hungary. A device for preventing the firing of live ammunition when only blanks are intended to be used, consisting of a projection in the breech of the rifle which must fit into a groove formed on the base of the cartridge. The projection may be put out of operation. Accepted Jan. 15, 1903.

26,270* (1902). **Mannlicher Automatic Rifle.** A. G. Bloxam, London. (Agent for *F. R. von Mannlicher, Austria*).

26,442 (1902). **Rifle Sight.** P. Junod, U.S.A. A gun sight so designed that it may be turned about a mounting in order to present different surfaces to the eye of the shooter to suit different lights. Accepted Jan. 29, 1903.

* These specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

PRESSURE GAUGE.

984 (1902). J E. Petavel, Manchester, and Capt. J. Bruce-Kingsmill, R A., Woolwich. A gauge for recording or indicating the pressure set up by an explosive during combustion is described in this patent. The gauge is adapted more particularly for use with ordnance. The movement of the piston in the gauge is communicated to a lever carrying a mirror. A spot of reflected light is thus moved, the magnitude of its movement being recorded through some such medium as photography.

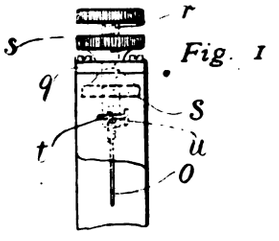

Fig. 1

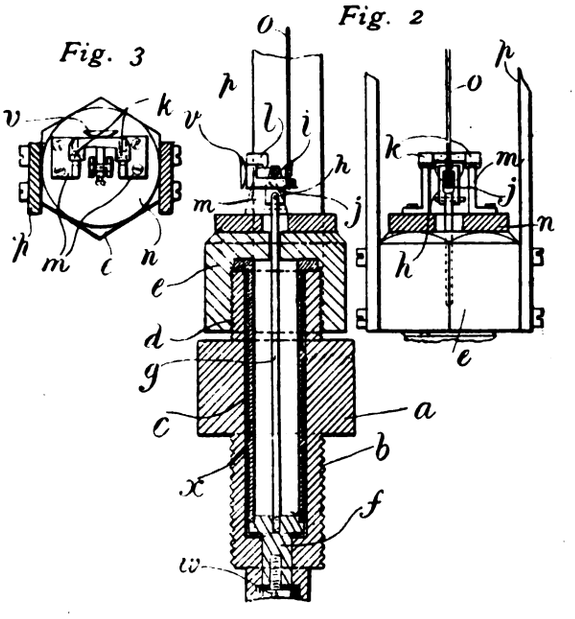

Fig. 2

Fig. 3

Referring to the accompanying drawings, it will be seen from Fig. 2 that the device is built upon a hollow plug *a*, which is screw-threaded at *b* in order that it may be fixed into the wall of the chamber in which the explosive is to be tested. The end of the plug is curved to correspond with the curvature of the interior of the chamber. Within the plug *a* is mounted a tube *c* composed of some resilient material. The upper end of this tube *c* terminates

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with the flange *d*, which flange is held between the end of the plug *a* and the interior of the cap *e*, which is screwed upon the top end of the plug *a*, as is illustrated. To the lower end of the tube *c* is attached, by means of a screw-thread, the piston *f*. The piston is exposed to the force of the explosion produced within the pressure chamber.

Into the top of the piston is screwed a rod *g*, which extends upwardly beyond the cap *e*. Pivoted to the top of the rod is a stirrup *h*. The cross-bar of the stirrup carries the downwardly-extending knife edge *i*, which rests upon one end of the horizontal lever *j*. The free end of the lever *j* is carried upwards, and is branched so that arms *k*, each carrying a knife-edge *l* are formed. The knife-edges *l* rest upon supports *m* carried upon a base *n* rigidly secured to the cap *e*. To the other end of the lever *j* is secured a tie *o*, composed of wire under tension. Vertical supports *p* are mounted upon either side of the wire *o*. These supports are connected at their upper ends by a cross-piece *q*, which is drilled to receive the adjusting screw *r*. This screw *r* is provided with the lock-nut *s*. The end of the screw *r* is slotted at *t*, and is provided with the screw *u* to which the free end of the wire *o* is secured.

When pressure is created within the chamber by an explosive, the piston *f* is forced slightly upwards, so that the resilient tube *c* is compressed. The rod *g*, the lever *j*, and the tie *o*, being all under tension, this movement is immediately imparted to the lever *j*, which is caused to rock upon its knife-edges *l*. This rocking movement is communicated to the minor *v*, and the movement of a spot of reflected light thereon is recorded in any known way.

A copper-washer, held in a recess at the bottom of the plug by the screw *w*, and a ring screwed into the recess, prevent any escape of gas between the piston and the plug. The tube *d* is ribbed at *x* in order that it may be supported at points intermediate in its length without interfering with its elasticity. The tube is made of such material and of such dimensions that it is not strained beyond its elastic limit by the stress put upon it. Accepted January 8, 1903.

MANNLICHER AUTOMATIC RIFLE.

26,270 (1902). A. G. Bloxam, London (Agent for *F. R. von Mannlicher, Austria*). A modified construction of the Mannlicher automatic rifle is described in this specification. The parts dealt with are the bolt-locking appliance; the striker-locking part; the trigger safety, and the fore-end fastener.

The fact that the breech-bolt had, in the former mechanism, to effect its own unlocking was, says the patentee, prejudicial to the secure and reliable action of the breech closing and locking mechanism. Therefore, the unlocking of the bolt is performed in a positive manner during the backward motion of the barrel, without any co-operation of the bolt. After unlocking, the momentum acquired during the primary movement of the breech-bolt and barrel, carries the breech-bolt backwards to its fullest extent against the action of its return spring. In the closed position of the parts, shown in Fig. 1, the nose of the bolt *a*, pivoted at *b*, is caused to engage the rear of the breech-bolt *c* and so lock the bolt in its forward position, as is illustrated. Upon discharge the recoil drives the barrel and breech (and, of course, the locking-bolt), in a rearward direction against the influence of the spring *d*. During this rearward movement the studs *e* (Fig. 3) on the sides of the bolt *a* are brought into contact with the bevelled ends *f* of the fixed guiding-rib *g*. The bolt is thus depressed and, sliding down over the upper side of the bridge-piece *h*, unlocks the bolt. The bolt continues its rearward movement after the barrel has been brought to rest by the breech-facing. The bolt *a* is held down by the breech-bolt *c* during the opening of the breech, and the bearing of the bolt *a* against the bridge-piece *h* locks the barrel in its rearward position. After the momentum of the breech-bolt is spent, the spring *i* impels the bolt forward again, and, after passing from the top of, and so releasing, the bolt *a*, the spring *d* is freed by the piece *h*, and is allowed to carry the re-united breech-bolt and barrel (reloaded) forward to their proper positions. The forward movement of the breech and barrel cause the inclined surface of the locking-bolt to be dragged over the bridge-piece *h*, and thus the bolt is raised to its locking position. By the construction illustrated, it will be understood that the rearward pressure of the breech-bolt is transmitted directly through the pivot *b*—the concentric point of abutment of the bolt.

The device *j* is provided to prevent the firing-pin *k* striking the cap of the cartridge before the breech is completely closed and locked. The cross-bolt *j* is provided with a tappet *l* adapted to

Fig. 1

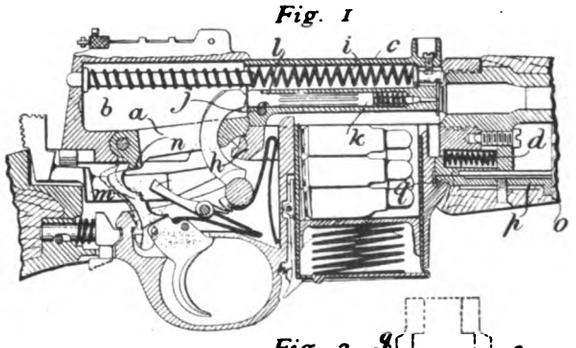


Fig. 2

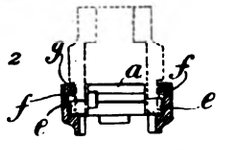
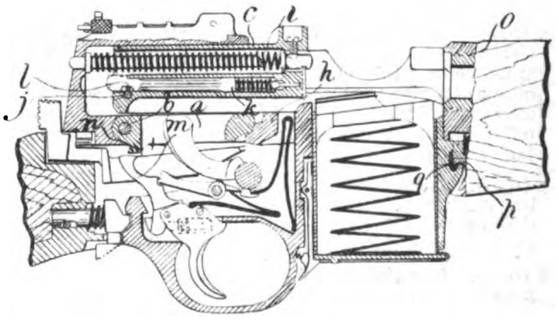


Fig. 3



engage a notch in the firing-pin. The tappet also engages a lever (not illustrated), which lever, when the breech is open, causes the tappet to impinge against the back of the slot and so to hold the firing-pin against any forward movement. When the breech is securely closed, the lever falls into a slot and so releases the tappet.

In order that the hammer may not be released when the breech is not closed, the detent lever *m* is provided with an upward extension. When the breech is open, as in Fig. 2, the top of this extension faces the surface *n* of the breech-bolt locking-part *a*. If the trigger were to be pulled, these two surfaces would be brought into contact before the hammer-releasing sear were disengaged by the lever *m*. When the breech is closed the surfaces are clear of one another, as in Fig 1. In consequence of the backward rotation of the lever *m*, the distance through which the trigger is raised is diminished, and the sear notch in the lever *m* is allowed to engage smoothly with the sear when the hammer is recocked during the opening movement of the breech.

In order that the forepart *o* of stock shall allow of the longitudinal movement of the barrel therein, it is fitted to an iron plate *p*, which plate carries upon its rear end a nose *q*. The nose engages a hook upon the casing, and this engagement secures the stock *o* against movement. Accepted January 22, 1903.

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CONTENTS.

CURRENT TOPICS.

The Birmingham Air-Gun Dispute.—The Birmingham citizens, whose feelings have been outraged by the recent attempt at magisterial interference with their rights, could not possibly ask for a more complete acknowledgment of the justice of their attitude than was afforded at the meeting of magistrates, which was held in the Town Hall. The Lord Mayor presided, and a very strong resolution, which was personally directed at Mr. Arthur Chamberlain, was supported by various influential magistrates, who included among their number, Mr. E. Parkes, M.P., Sir James Smith, Mr. Jesse Collins, Mr. F. W. Lowe, M.P., and Mr. Powell Williams, M.P. After having thoroughly explained their position, and having heard the heated arguments that were put forward by those who had illegally endeavoured to make the licensing laws a means of enforcing improper regulations upon those responsible for the conduct of licensed premises, the warlike resolution that was first of all put forward was withdrawn in favour of one which did not cast reflections upon the good intentions and impartiality of the erring justices. The effect of the amended resolution was none the less clear from the point of view of the public, in that it most emphatically condemned the action of the licensing magistrates, in attempting to suppress air-gun clubs on principle, by the affirmation that their resolutions should not be acted upon. The public are thus quite free to form air-gun clubs at every public-house where the idea is favourably received, and the licensing justices are reduced to their proper function, viz., the refusal of licences only in those instances where proofs of specific misconduct or other improper behaviour are given. We hold no brief for the licensed victuallers' industry, and the question has only incidentally been raised in our columns by the attempt that has been made by would-be temperance reformers to treat air-gun shooting as a species of misconduct. To the unprejudiced observer it would seem that this form of recreation is in no way harmful, and indeed possesses merits that recommend it for an equal share of the benevolent good wishes that are accorded to the other species of amusement that are obtained at what is well described as the poor man's club.

The Gunmakers' Association.—This body has brought to a close another year of its existence, and while its career has at times appeared to suggest a certain measure of stagnation, the general average of its accomplishments is one that should appeal to all who have the best interests of the trade at heart. It has certainly accomplished a useful purpose in making evident the power that the trade has shown to work in harmonious unisance for the joint benefit of its members. It is, of course, a matter for regret that it has not received a greater measure of support from country gunmakers. The opinion seems rife among many of these that it is useless to join the Association unless they can attend its meetings. Certainly it is an advantage to all representative bodies that the outlying members should keep in touch with head-quarters as much as possible. On the other hand, a great part of the strength of an association is derived from the representative character of its membership, thereby enabling its executive body to perform its functions in reference to a large constituency. The financial side of the question must also be taken into account. The sum of money that counts for so little to the individual, represents part of a considerable aggregate fund, by which an up-to-date organisation is main-

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tained, and the needful expenses of administration are provided. In hoping, therefore, that the Gunmakers' Association will in the coming year receive a greater addition to its membership than ever before, we are only expressing in another form a desire to see its influence and powers of usefulness materially enhanced. The question of joining the Association is one that each gunmaker who is not already a member must settle for himself, though existing members in a number of instances might do a great deal in bringing the merits of the Association to the particular notice of their friends in the trade. Whatever line of conduct is adopted by the Association, one thing, at least, is certain, viz., that it is conceived in the interests of the trade as a whole, so far as the executive committee can estimate the directions in which these interests lie. These words are likely to reach the eye of more than one by whom they should be taken openly to heart, and we trust, therefore, that the appeal will not be made entirely in vain.

The Testing of Caps.—Those of our readers who are brought in contact with the trials and difficulties that must of necessity beset the path of all loaders of cartridges, should devote more than a mere passing glance to this month's lecture on "Caps." It is all very well to be vaguely conscious of the fact that certain people have devoted a considerable amount of attention to this abstruse subject, but it is better still for each person to endeavour to grasp for himself, so far as his facilities for study and research will allow, how the matter stands. It is by no means a complex subject in its more obvious aspects. All that is required is to take the points of a cap's functions and behaviour, and to observe where the differences lie, meanwhile acquiring a suitable appreciation of the bearing of the different methods of test with the practical behaviour of the cap when in a cartridge. Our reason for urging upon gunmakers the need for consistently studying the theory of caps is, that whenever they encounter an unexpected result in the course of their experiments at the target, they are too inclined to treat the whole question as beyond their control, the responsibility for the trouble encountered being frequently laid at the door of the cap, while ignoring other equally reasonable explanations of the trouble that arises. The cap is only one among a dozen of the possible explanations of bad and irregular shooting in a gun. So that the true cause of any difficulties experienced is only too likely to remain unsolved if the cap is condemned without a fair inquiry into the other facts of the case. If our readers will fairly set themselves the task of studying paragraph by paragraph what we have already said, and what we still have to say on the subject of caps, we can assure them of two things in advance; first, that they shall not be unduly worried with needless technicality; and second, that the information available will be of undoubted use to them in connection with cartridge loading and the regulating of their guns to give a specific result.

The Indian Arms Regulations.—The recent announcement that the Indian Government has decided to withdraw from officers the special facilities that were granted to them, in respect to the importation into that dependency of rifles of military bore, may at first sight appear to imply additional interference with the carrying on of legitimate trade. It must, however, be remembered that notwithstanding the inconveniences that have arisen as the direct result of Indian Arms legislation, the outcome has not been of a kind that can be regarded as without its favourable aspects from a purely trade point of view. Gunmakers were not slow to adapt themselves to the conditions that were engendered by the original prohibition of military calibres. It at once set them to work to devise satisfactory sporting weapons firing ammunition of a totally different character, the Cordite express rifle being the arm that has been substituted for the military type of sporting weapon, that ten years ago seriously threatened the existence of the express arm. There is more profit to gunmakers in the sale of a weapon exclusively manufactured for sporting purposes, than in one which represents a cheap go-between the service arm and the sporting rifle. Not only have the gun trade thus indirectly benefited by the restrictions that were originally enforced, but the sportsman has the satisfaction that comes with the possession of a weapon better suited to the game he is in the habit of pursuing. The flat trajectory of the military-bore weapon gave him marked advantages by comparison with the best that the old express cartridge could claim to accomplish. Nowadays, he has the double satisfaction that comes with the possession of a weapon that has all the accuracy of the military cartridge coupled with an increase even in the stopping power of the large-bore express. The gunmaker has thus good reason for regarding in a philosophical frame of mind the restrictive tendencies of the Indian Government.

Gunmakers as Armourers.—It has been frequently pointed out of late that the War Office are desirous of encouraging a superior class of men to act as armourers to the large number of Volunteer units that are stationed around the different cities and townships of the kingdom. The qualifications for such a position include the capacity to see that the large amount of valuable Government property that is entrusted to the care of Volunteers, shall be maintained in a proper state of preservation and repair. The only class of man who is really competent for work of this kind, is the skilled gunmaker, who, by long years of experience, has learned exactly what treatment a rifle requires, and how best to impress upon others the need for punctual attendance after use. The remarkable amount of bad treatment that the Volunteer rifle receives, is a matter that appeals as a personal grievance to the true lover of fire-arms. In the writer's own experience a weapon which jammed at the range was found to contain the fouling that had remained in it since the blank firing of the Easter manœuvres, and a close acquaintance with Volunteers and their ways with fire-arms, would no doubt lead to the discovery of a number of incidents on all-fours with the one quoted. A strict supervision over all arms in the hands of each particular unit, would no doubt save a great deal of the loss that undoubtedly occurs at the present time, to say nothing of the all-round improvement in the shooting that would arise if the weapons in use were maintained in a better state of preservation. Gunmakers, by the fact that they are to be found in almost every part of the country, would no doubt be willing to take over the responsibilities of the position of armourer, if the War Office could see its way to offer some slight inducement by way of an allowance for assistance in the more routine aspects of the work. Gunmakers, on their side, would no doubt be happy to help their country in this fashion, especially if in so doing they could see the

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chance of developing a certain amount of increased custom by virtue of the introductions that would result.

Pistols Legislation.—The perennial Pistols Bill has come once more into prominence by the issue of a very simple series of clauses which are put forward in the name of Mr. Helme, who is supported by Mr. M. W. Ridley, Mr. Herbert Gladstone, and Mr. Stuart-Wortley. The full text of the Bill is given in another column, and it will be seen that it embodies almost the very points which gunmakers were prepared to accept in place of those which were put forward in the Bill that was so strongly opposed some seven years ago. The two chief clauses involve two sets of conditions that cannot possibly be considered as unreasonable. According to the Gun Licence Act, a person who carries a fire-arm must be in possession of a 10s. licence, and although pistols are often purchased for the legitimate purpose of house protection, such use not involving the technical condition of carrying, there can be no great harm in laying down that the purchaser of a pistol shall be the possessor of a gun licence. The *onus* is thrown on the vendor, of seeing that the purchaser shall be duly licenced to carry fire-arms, though it is not made quite clear whether this restriction applies to private barter in addition to purchase through the ordinary trade channels. The only other condition laid down is, that the vendor shall keep a proper register of the names and addresses of all persons who purchase pistols. Provided the word "retailer" refers exclusively to trade vendors of pistols, the Bill can be accepted as a thoroughly practical measure, which is unlikely to interfere with legitimate trade, and which will, at the same time, provide the police with a most useful means of tracing the ownership of pistols that form the subject of inquiry. The Bill would certainly be more useful if among the particulars to be entered in the registry were included the serial number and maker's name, which are already marked on the bulk of the weapons sold. Also, that all dealers in pistols should register their names with the local authority, in the manner that is already so well carried out in connection with the storage of explosives.

THE MINIATURE BISLEY.

Gunmakers who have been disappointed with the commercial developments of the rifle club movement may well take heart from what has transpired at the recent meeting of members of workmen's rifle clubs at the Crystal Palace. When the National Rifle Association was appointed the regulating body of the rifle club movement, it was so dominated by its contact with the War Office that it propagated the fallacy that the only way to learn military rifle shooting was with the Service rifle. This would be true enough in the case of a soldier being put through his drills, but it cannot apply to those who take up rifle shooting as a sport, starting as novices and gradually working their way into the front rank.

There is so much to learn in the proper handling of fire-arms, that a much modester beginning is desirable if only on economical grounds. The amount of taxpayers' capital that is invested in Service rifles, that seldom or never fire a shot, except by the aid of the Morris tube, is so great that it seems a pity that the use of some simpler form of arm was not encouraged at the first outset. The novice has so much to learn that could be imparted better by the use of miniature rifles than by that inaccurate combination, the Morris tube in the Service weapon, that it is really unfortunate that the Service traditions were so strongly impressed upon the clubs.

For fear it should seem that we were unjustly criticising the Morris tube, we can assert, without fear of contradiction, that so unsatisfactory has been its shooting at the recent Crystal Palace meeting, by comparison with the cheap American and Belgian rim-fire rifles, that it has been agreed upon as absolutely necessary for future meetings, to insist on its isolation in separate competitions. If any argument were needed to prove conclusively the undesirability of continuing the use of the Service rifle for purely gallery shooting, that argument would be found in the circumstance here recounted.

It is a well-known fact that the Morris tube may be inserted on one occasion so as to give very fair average results, while on another it may fail to make anything approaching a diagram. This is partly because the Morris tube cannot be relied upon to take the same adjustment in the rifle each time it is fitted. The Morris tube cartridge is, however, also to blame, because being badly designed from the start, it will not shoot well even in rifles specially bored and chambered for it. Considering that it is a central-fire cartridge, it certainly should be able to outclass rim-fire ammunition for accuracy at short ranges, but it fails in this crucial test.

Considering the vital necessity for adjusting rifles for gallery shooting to throw the group of shots exactly on the bull's-eye, it must follow that the rough-and-ready sighting of the Service rifle is not adapted for such work, especially in view of the regulations that condemn any alteration of the sighting, that bears the proper relation to the trajectory of Service ammunition. Since working men's clubs must necessarily consider questions of cost, it must follow that they have been obliged to strike out a line for themselves wherever the official view seemed antagonistic to the efficiency of the club, considered as a club and not as an educational ground for budding recruits.

The effect of this aspect of club shooting was splendidly illustrated during the nine-days' meeting that was held at the Crystal Palace. Riflemen, as keen as mustard, had journeyed from all parts of the country to take part in these seemingly trivial competitions. An examination of the targets that littered the ground in all directions, showed that, enthusiastic though they might be, very few of them had mastered the rudiments of rifle shooting, notwithstanding their evident desire to rank as marksmen. Very few held their rifles in the manner that is conducive to steady holding, and nearly all of them seemed to pull the trigger the moment they were on the bull, instead of holding on to it for some time in order to ensure perfect steadiness of aim at the moment of firing. They were, however, working on the right lines, for each shooter seemed to possess his own rifle and be fully conversant with the need of taking care of it.

An examination of the arms in use showed that two representative types practically dominated the assembly. Francotte's Cadet pattern of Martini, and the Winchester magazine repeater were to be seen on every side, with here and there a few Stevens' "Ideals," whose heaviness of barrel seemed to mark them out as specially suited for the work in hand.

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It is a somewhat curious circumstance that magazine weapons have been allowed to come into such general use for gallery work of this description, the National Rifle Association having expressly barred their use for miniature clubs. In favour of the magazine system is the fact that the rim-fire cartridge is lubricated from the outside, thus making them sticky and unpleasant to use for single loading. Against magazine actions is the danger of accidents, due to cartridges being nadvertently left in the magazine when the rifle is supposed to be empty. One had only to spend an evening at the Crystal Palace to see as many rifles pointing at one as there are fatalities in a year, because the person morally responsible "did not know it was loaded."

Although we believe that the N. R. A. are inclined to remove this restriction, leaving clubs to make their own regulations, we think that to do so would be a mistake. At miniature ranges there is always a table handy on which the shooter may place the number of cartridges required for the shooting immediately in hand, the fact of having them immediately in front of him reminding him of how the shooting is progressing. When it is a question of seeing that his rifle is unloaded, he can ascertain the fact by reference to one cartridge only, whereas he may forget to take the same precaution with regard to the hidden supply in the magazine. Moreover, when the "cease-fire" signal is given, all rifles should be unloaded, a rule that it is inconvenient to observe with a fully-charged magazine.

It is possible, however, that a little more experience with these rifles will show whether or not the magazine system is to be regarded as safe. At the real Bisley it is regarded as misconduct to use the magazine except when specially permitted. For our part, we much prefer the single-fire system for competitions where accuracy is a *sine qua non*. The weight of the rifle is better disposed, and there are fewer complications in the lock mechanism, which, at any rate, tends to make the action of the striker more effective. Magazines, as applied to rim-fire ammunition, necessarily belong to a cheap class of rifle, and they cannot, therefore, be adjusted so as to ensure perfection of working. At any rate, whether they can or not, the fact remains that competitors were at times to be seen at the firing-mark struggling with obstinate rifles that refused to operate.

Another inconvenient aspect of the magazine system consists in the fact that with rim-fire ammunition it is frequently impossible to extract a cartridge without leaving the bullet in the barrel, the unfired case that is extracted possibly allowing a fresh cartridge to be loaded behind the bullet that is already jammed in the chamber. If, therefore, our own manufacturers contemplate the issue of a 22-calibre club rifle, we think they would be well advised to pin their faith to a single-shot type of weapon, notwithstanding all that may be urged in favour of the more complicated system of mechanism.

Altogether, the Miniature Meeting at the Crystal Palace can be pronounced a decided success. It has shown that there are thousands of keen riflemen who are willing to practice consistently under the restricted conditions of a covered range. It has also shown that many of the items of a shooting education can be effectively studied within the compass of our large towns. The meeting has further demonstrated the great need that exists for a well-equipped permanent gallery range, at which rifle clubs could hold meetings, and where there would be facilities for individual practice.

If local authorities were prepared to enter into the scheme, they might consider the desirability of allotting sights in the parks that so plentifully besprinkle many of our large cities. Such enterprise would be almost certain to find its reward by encouraging the formation of a large number of clubs which would pay a sum for the facilities that would be granted. It would be necessary, in the first place, to demonstrate the practicability of the scheme by means of private enterprise. If the Crystal Palace directorate were willing to take a lesson from the success of the meeting that now draws to a close, we believe that there would be no difficulty about finding a liberal guarantee of support for the permanent range that it could establish on a suitable site in the Palace grounds.

There are at the present time several rifle clubs in London who are in vain searching for a site that they might adopt as a permanent head-quarters. Considering that half-a-dozen clubs could find ample accommodation in a well-equipped pavilion, it seems a pity that a practical scheme has not already been devised. With six clubs shooting every evening, to say nothing of practice during the day, it would seem as though the suggestion had only to be put forward to be approved on grounds of sound policy. With these words we will leave the subject of miniature club shooting, trusting that the Society of Working Men's Rifle Clubs will see its way to urge some such development, as is above outlined, as a result of the altogether satisfactory amount of encouragement which its maiden effort has not only deserved, but actually received.

SOME EXPERIMENTS ON EROSION.

WHENEVER that great scientist, M. Vieille, has anything to tell us on the subject of his researches, he never does things by halves. The latest issue of the *Mémorial des Poudres et Salpêtres* contains an account of some of his most recent researches, the subject chosen being the very important one of erosion. The task he set out to accomplish was to repeat, and at the same time amplify the experiments which had hitherto been conducted with a view to determining the rules that underlie the phenomenon of erosion. The two accompanying illustrations refer to photographs which have been made of the inside of large guns which have been subjected to the destructive influences of firing, and our readers will no doubt agree that the effects of erosion are most characteristically marked. We all know that the explosive propellants that contain nitroglycerin, erode the barrels in which they are fired, to a much more serious extent than is the case with the alternative types that consist of gelatinised nitro-cotton. Notwithstanding this marked disadvantage of nitroglycerin powders, their ballistics are so remarkable as almost to outweigh their unfortunate tendency to destroy the barrels in which they are fired. An attempt has been made to reduce the erosive effects of an explosive, by choosing a metal of reduced susceptibility, but so far little more has been accomplished than to show that erosion is at its lowest when the metal consists of pure iron.

A direct trial of finished guns is objectionable for several reasons, one of the most serious considerations being the prohibitive cost involved. Besides this, the quantities of explosive so required make it impossible to deal with the small

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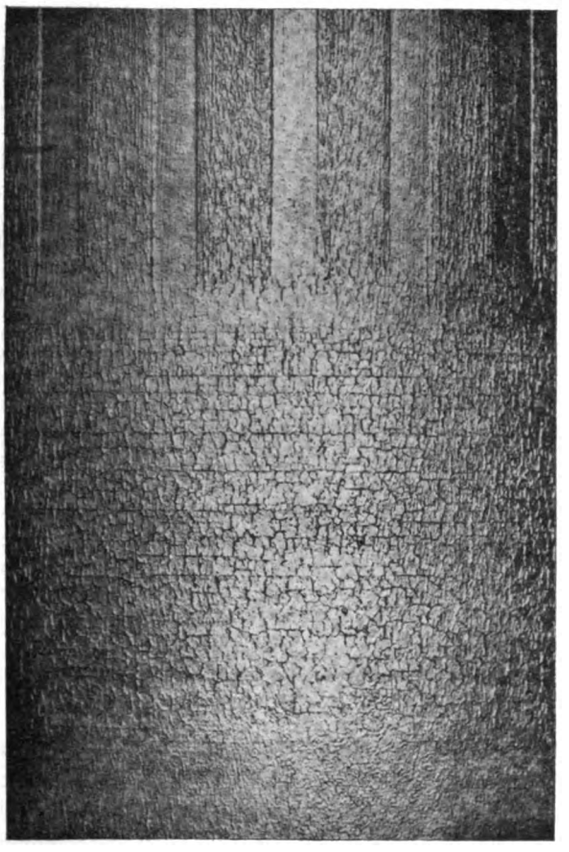
specimens that can be prepared in the laboratory for the special end in view. The fact that the erosive effects are almost exclusively concentrated at the point of the bore where the chamber leads into the rifling, suggests that the erosion is due to the rush of gases at a high pressure, and consequently high velocity as well, between the bore and the shot, at a time previous to the establishment of a perfect gas check. The peculiar formation of the lines of erosion is shown most clearly on the accompanying photographs, the gases cutting deep channels in their passage from the



EROSION IN A 274 MM. GUN AFTER FIRING 300 SHOTS.

chamber to the front of the shot, the cumulative effects of erosion being due to the repeated passage of a jet of high temperature. The gas passes freely through the very small orifices that are thus formed, the start being obtained by the passage of the products of combustion through the spaces that are left on account of the absence of a perfect union between the projectile and the rifled bore of the barrel.

M. Vieille accordingly came to the conclusion that the conditions of erosion could be experimentally reproduced on a system that had already been tried, viz., by burning small charges of an explosive in a closed chamber, having an orifice or vent-hole formed in a small metal test piece. The precise form that he gave to his apparatus was, however, more complete than this. It consisted of a T-shaped piece of metal very much the same in general form as a gaspipe union. The explosion chamber lay at the junction of these three branches. One of the latter was appropriated as a pressure-taking plug, designed to record the gas-pressure attained in the chamber. For this purpose he used the ordinary system of pressure piston with a gas check made of a copper cap having a suitable diameter. The piston of the pressure-plug was one square centimetre in area, which is equivalent to ·155 of a square inch. The piece of metal which was to record the erosive effects of the explosive charge consisted of small cylinders about ¾ inch long, and pierced axially with a one millimetre hole (·039 inch). The length of the hole was about one-and-a-half inches, so that every opportunity was afforded for the gases to wear away the inside surface of this hole by an action analagous to what takes place in the gun. This test piece was of course firmly screwed home so as to form a gas-tight union with the explosion chamber, leaving the orifice as the sole means of exit. The third arm of the T-piece was, as might be anticipated, reserved for the ignition of the charge, this being effected by electrically heating a small strand of iron wire.

The explosive charges employed were 3, 5 and 10 grammes respectively, which correspond in English measure to 46, 77, and 154 grains. It was found, in making use of the apparatus, that the jet of hot gases from a 10 millimetre (·394 in.) hole had travelled no less than 11 feet, producing highly objectionable results by way of breaking windows and doing other damage. Even with the smaller holes it was found to be desirable to lessen the disturbance due to firing the shot by placing the entire apparatus inside a metal shell, provision being made for the gradual escape of the gases therefrom. Before each experiment, the metal test-pieces, which weighed just over four ounces, were accurately weighed in a chemical balance with a view to determining the amount of subsequent loss by erosion. The following table gives particulars of some of the results that were obtained in comparing the erosive effects of a sample of gelatinised guncotton with those produced by an explosive containing 50 per cent. of nitro-glycerin :—

Nature of Explosive.	Diameter of Vent-hole. 4 mm. (·157 in.)		Diameter of Vent-hole. 2 mm. (·079 in.)		Diameter of Vent-hole. 1 mm (·039 in.)	
	Loss by Erosion.	Pressure	Loss by Erosion.	Pressure	Loss by Erosion.	Pressure.
	cub. mm.	tons per sq. in.	cub. mm.	tons per sq. in.	cub. mm.	tons per sq. in.
Gelitinized Gun-cotton ..	·2	7·9	6·9	13·0	20·3	15·2
	·5	6·4	8·5	8·5	22·7	15·0
					24·7	14·1
					25·5	14·3
Composition with 50 % Nitro-glycerin ..	12·7	6·9	58·6	13·9	84·5	15·9
	12·3	8·1	58·2	13·3	83·2	15·0
					90·2	16·2
					85·9	15·0

These results are worthy of very careful consideration, in so far that they show the relative cubical amount of metal removed by the shots fired. The relation between the three series of results, with the size of venthole as the variable factor, is most interesting. The fact that the smallest holes lead to the greatest amount of erosion is not entirely due, as might at first be supposed, to the consequent reduction of pressure, since it will be seen from the pressure measurements that the tension of the gas was well maintained under the conditions of some of the experiments. In fact the lesson

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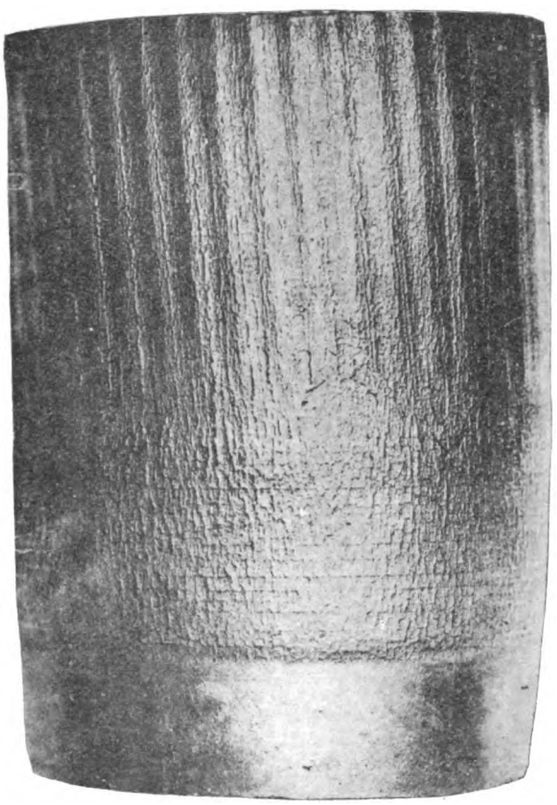
they teach, as a whole, seems to show that variations of pressure do not affect the amount of erosion, provided the level of pressure reached is not less than about 12·7 tons per square inch.

Having established the practicability of this form of test, first as a means of comparing the behaviour of different kinds of powder, and second for testing the relative susceptibility of different metals, M. Vielle at once set to work and tested an immense variety of metals and explosives and their relative effects the one upon the other. While we must refer our readers to the original text of the article for the comprehensive data that is published, we can summarise his conclusions under the following headings:—



EROSION IN A 138 MM. GUN AFTER FIRING 1,145 SHOTS.

1. There is no relation between the mechanical properties of the iron and steel proofs of metals, that is, their hardness and behaviour under tension, and the tendency to erosion.
2. Metals seem to be susceptible to erosion in relation to their temperature of fusion.
3. Alloys of iron containing small proportions of chromium, manganese, nickel and tungsten in the presence of from ·4 to 1 per cent. of carbon, have no effect in preventing erosion.
4. Large proportions of nickel in the alloy greatly increased the susceptibility to erosion.
5. Of the metals outside the iron group that were tested, the law expressed in Rule I. holds good, platinum being least affected, though in this respect it is very little superior to pure iron, which among the iron group seems to be least of all affected by erosion. Aluminium is the only exception to the rule, in that it erodes to an extent double that of zinc.

THE COUNTRY GUNMAKER.

IN many a country town the centre of sporting intelligence in the district is the establishment of the gunmaker. The owner of that establishment as a rule is a man of some education and refinement, accustomed to meet gentlemen as well as keepers, and to learn their views while transacting their business. He hears sporting topics discussed from every point of view, and in course of years he would be singularly devoid of smartness if he did not have well-informed opinions on most subjects that come up for discussion when sportsmen meet. We have spent a pleasant hour or two on various occasions during our visits to the country in the gun shops that generally occupy the most central positions in the main streets, where the prospects of sport, the capabilities of various shootings, the bags made on them, the skill of certain shooters, the qualities of the guns they use, and other gossip, served to make the time pass quickly away to all those interested in shooting, on which the gunmaker himself was invariably the leading authority. Probably he had served his apprenticeship in London or Birmingham, with a good firm of gunmakers, and his technical knowledge there, and since acquired, enables him to speak with authority and weight on all questions of gun manufacture and performance of guns and gunners in the field. His knowledge of guns and ammunition, in fact, is an educating force in the particular district in which his tent happens to be pitched; he is able to guide and form sporting opinion there, as to what is best and worst in shooting, while from meeting all sorts and conditions of shooters daily, weekly and monthly, and hearing reports from them as to the doings of themselves and others, he is well posted up as to the bag-making capacities of every shooting for miles around in time.

Almost by force of circumstances he becomes a sort of repository of sporting information, always available to those who come in contact with him in business. Shooting tenants may come and go, keepers may change their situations, but he remains constant to his post, an observer of all the changes, an onlooker with sharp eyes directed to note the ups and downs of sporting experience in his immediate neighbourhood. Often he is himself somewhat of a sportsman, with sport in his blood that finds many opportunities of showing its existence. He may get a day's partridge shooting here, and a day's rabbiting there, and when game is scarce can always count on the shooting of wood pigeons, while every rookery, in the season, is at his disposal. In such occasional diversions from the routine of everyday business, he has the peculiar satisfaction of feeling that to some extent he is combining pleasure with some measure of business. Now he is trying a new gun or rook rifle, now experimenting with a smokeless powder or a new system of loading, and now he is bringing out a young dog that he hopes may turn out a valuable aid to the shooter and become worth a good many guineas in the market. He may delight in the sport itself, but his delight is all the keener when he feels that he is gaining experience that may be exceedingly useful to him in his business, wherein he takes great pride.

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In these respects his position as a country gunmaker has advantages that are more difficult of attainment to his fellow gunmaker in London, whose expenses are heavy, and whose opportunities of sport are few. True, the profits the former makes may be comparatively small when placed beside those made by gunmakers in the metropolis, but on the other hand, as we have said, the outlay he is compelled to make to earn his income is correspondingly small, and the income, when made, goes very much farther in the purchasing of comfort, and even of enjoyment and recreation of the most healthful and energising kind.

The life of a country gunmaker, then, who is really interested in his business, and is also partial to sport in a moderate way, is therefore in many respects a very pleasant and enviable one. If he makes a smaller income than his brother gunmakers in London or Birmingham, he makes it go further than they could, and he has enjoyments from time to time, such as they can seldom obtain, especially if he takes delight in sport, or at any rate in sport with the gun for its own sake.

Nor is he precluded from adding to his income by making additional profits from other branches of sport, such as fishing, football, cricket, tennis and golf. In many cases the country gunmaker is a dealer, not only in guns and ammunition, but also in fishing tackle, and the many requirements of the cricketer, footballer, tennis player and golfer. It is not within our province to deal with these branches of the business of a gunmaker in the country, but it is necessary to state that they exist, and not infrequently add very considerably to the income of makers who are popular with sportsmen of all descriptions, and are not confined to the business attendant upon shooting alone.

But while depicting the lot in life of such gunmakers in colours as bright as possible, in showing that they have many advantages denied to their brother gunmakers obliged to do business in the larger cities and towns, who have not the same chances of fresh air and exercise, or of exciting sport and recreation, we must not, on the other hand, forget the troubles that beset country gunmakers, which they have to fight hard against to maintain their positions and earn their incomes. It cannot be denied that the trend of events in the world of sport has of late years pressed very hard against the gunmaker who happens to be located in a country town, and is therefore in a comparatively small way of business. One of his chief sources of income for generations, for instance, has been the supply of suitable ammunition to local sportsmen, which he has loaded according to instructions on his own premises. In the days of black powder, some twenty years ago, the loading of sporting cartridges was comparatively speaking, a very easy operation, requiring no very great amount of skill on the part of the loader. When there were only one or two nitro-compounds in the market, some ten years later, loading even then was not such a very arduous and delicate task. But now that black powder has been almost entirely dispensed with and many varieties of nitros have taken its place, varying, as each of them does, in many particulars, the loading of them has become much more difficult, demanding the services of a skilful and experienced loader, if satisfaction is to be given to the users of them in the field.

Unless the gunmaker therefore loads his cartridges himself, and has studied very closely the manner recommended in loading by the manufacturers of each powder he is unlikely to produce thoroughly satisfactory ammunition unless he employs a skilled workman, who has made himself master of the art of loading. Such men are not easily found when wanted, and to secure their services employment has to be given them all the year round, thus considerably increasing the cost of their engagements. As an alternative, the country gunmaker has to load all the cartridges he sells to his customers, which means a considerable tax upon his time, which might possibly be more profitably employed. But he cannot entrust the duty, as he once might have done, to one of his apprentices, and so occupy the latter's time with profit and satisfaction as in days of old, when there was no such variety of explosive demanded by his clients. Every year tends to make the loading of sporting ammunition more difficult and therefore less profitable to the country gunmaker, who finds himself also strongly competed with, by the ironmonger next door to him, who buys his cartridges ready loaded, and is willing to sell them at a very small percentage over prime cost.

The competition is becoming keen between the gunmaker and the ironmonger in the sale of loaded cases. The former can come out on the top of that competition, only by the greater study he devotes to all the improvements made in ammunition, and by closely watching every development in the manufacture of explosives and also their behaviour, when used in shooting. Other things being equal, a shooter would always prefer to order his ammunition from a gunmaker, so long as he believes that that gunmaker is fully abreast with the latest information in sporting ballistics and has devoted intelligent attention to the behaviour of each propellant made so as to give his customers the benefit of such skill as he has thus acquired—skill which could not be expected in his ironmonger opponent. When the latter, however, buys his cartridges loaded by the manufacturers of the powders themselves in the most approved manner, in the proportions found most effective in shooting, it becomes a harder struggle than before for the gunmaker to maintain his footing. He has all the more need, therefore, in these days to become thoroughly master of all the intricacies of loading with various powders and their results in velocity, pattern and penetration when loaded, so that he may impress his customers with the conviction that their interests are best safeguarded by coming to him for all their requirements in the shape of ammunition.

The gunmaker has to fight for his trade against the insidious attacks of his opponent the ironmonger, not only in the matter of ammunition, but also in that of guns. The latter can sell a ready-made gun over his counter as easily as the former, and can cut his profits down to a fine point. But he is quite unacquainted with the art of gun-fitting so as to suit his customers accurately with a gun-stock, and he also lacks the skill necessary to keep that gun, when sold, in repair. A keeper prefers to have a gun that fits his shoulder to a nicety, quite as much as does his employer, and if he has faith in a gunmaker's fitting powers and skill, he would rather deal with him in preference to doing business with a dealer who has no such special knowledge. It is here that the skill of the gunmaker tells in the long run, and helps him to build up and maintain a trade in guns. The more he studies his customers' requirements the greater his success in overcoming opposition, and the larger his income in the end. It is more than ever necessary therefore for the country gunmaker to keep himself thoroughly posted up in everything connected with his profession. What would serve his purpose a quarter of a century ago will not suffice now to keep his business pros-

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perous and profitable. He has to read, mark and learn every week of his life, or he will assuredly fall behind in the race, which is to the strong, and not to the weak and neglectful of the most up-to-date information obtainable in the sporting world.

The weak point of too many country gunmakers, we think, is in their disinclination to profit by the experiments and investigations of experts in their own lines of business, as reported from time to time in the press. The knowledge even of a decade ago is no longer sufficient to enable them to breast the current and swim to the haven of success. Every year teaches its own lessons, which are added to the sum of knowledge in manufacture, and those who will not read and learn such lessons have to take a back position in these days, as fallen behind in the race of life. It is by closely following every new development and profiting by the research and inquiry of others in every branch of ballistics, as well as in manufacture, that the country gunmaker can succeed in maintaining the position he and his predecessors have so long and so well occupied; and those who keep well posted up in everything that concerns the business they are engaged in are those who are certain to retain the confidence of their clients and continue to profit by the business done with them, in increasing, instead of diminishing volumes.

ROUND THE TRADE.

Mr. H. J. Hussey, accompanied by his assistant. Mr. W. J. Capel, has gone to the United States on a business trip.

Messrs. Reilly have removed to 295, Oxford Street, pending the rebuilding of their premises at 277, in the same thoroughfare.

The Shooting Editor of *Land and Water* gives it as his opinion that the sportsman ought to know how to strip his gun himself.

A new model of the Bergmann Automatic Pistol, on a reduced and cheaper scale, has just been brought to the notice of buyers in this country.

Luck's Explosives, Ld., have gone into liquidation, their chief product being a 33-grain nitro, known as Henrite, which has achieved some popularity among pigeon shooters.

The Gun Club has recently issued its list of fixtures for the spring season. From a perusal of the card there seems to be a complete absence of trophies donated by the powder makers.

At the bankruptcy proceedings of the Safety Explosives, Ld., the total deficiency was returned at £70,413. Various particulars were given in the course of the proceedings as to the formation of the company and the allotment of the shares.

In replying to a question in the House, it was stated that cartridge pouches and bandoliers with which the troops were equipped in South Africa were unsuitable, and were the means of supplying the enemy with quantities of ammunition.

The Savage Arms Company, of Utica, U.S.A., will shortly introduce a new 22-calibre repeater with box magazine. It will be of hammerless construction, and will weigh 5 lbs. 6 oz., and will be known as the Little Savage.

The Remington Arms Company are making a good deal just now of a single-shot target rifle, having a very pronounced form of pistol stock, and built very much on the lines of the Tranter rook rifle.

In the course of his speech as President of the Chamber of Mines at Johannesburg, Sir Percy Fitzpatrick stated that while he thought the dynamite monoply was a thing of the past, a genuine local factory, employing British workpeople, Dutch or English, would be liberally supported.

A notice is published concerning the raising of £270 debentures of the Harris Rifle Magazine Co., Ld., this being a further instalment of the £2,000 charged on the present and future assets of the Company's undertaking. This makes a total of £1,150 so raised.

We very much regret to hear of the death of Mr. A. Marlet, a director of Messrs. J. and C. Hall, Ld., the well-known manufacturers of gunpowder machinery. He took a great pride in the development of the business with which he had been connected for some sixteen years, the great development of which had coincided with his association therewith.

The report of the Roburite Explosives Co., Ld., discloses a net profit of £8,246, which with the carry forward makes a total of £9,585 available for dealing with. Of this amount £825 is set aside for the reserve fund, making it £3,696. A 5 per cent. interim dividend absorbed £2,470, and the directors have recommended the appropriation of a further £4,939 for the same shares, thus paying off 18 months' arrears of this dividend in one year. The balance carried forward is £1,351. The directors refer feelingly to the double loss they have sustained in the past year by the death of their chairman, Sir John Stokes, K.C.B., and Major-General W. H. Wardell, who, by the way, is well known for his handbook on guncotton. Mr. H. A. Krohn, their tried and trusted secretary, has been elected on the board, Mr. J. H. Brown having taken over the secretarial duties.

NOTES.

ELECTRICITY IN MINES.—The evidence before the Home Office Committee on electricity in mines, was reported in *The Colliery Guardian* of the 13th ult. Mr. Frank Brain said that he was there to represent the colliery owners of the Forest of Dean. His experience of electricity commenced in 1882 with a small underground pump at the Trafalgar Collieries, which had always been regarded as the first application of electricity as a motive power in mines. In 1886 a larger pumping plant was installed. They had had no trouble or accident with either of these plants. All the collieries in the Forest of Dean were worked with naked lights, gas being entirely absent. The Colliery Owners' Association of the district, wished him to point out that should the committee deem it desirable to introduce any new rules with reference to the use of electricity in mines, they ventured to hope a clear definition would be made between gaseous and non-gaseous mines. Continuing, Mr. Brain said that he had had a close and large experience in the manufacture of electric high and low-tension fuses. Both had their good points, but he preferred the former at the coal face, because it was not such a delicate article to handle. The high-tension fuse being a chemical fuse, there was no liability to fracture the platinum wire as in the low-tension fuse. The voltage of the high-tension system was higher, that of the low-tension system being 10, but he had worked the former at 30, and it was generally considered that nothing less than 50 volts in a battery would enable it to give a spark of such intensity as to fire gas. Shot-firing by electricity was more economical, and, in gaseous mines, was the safest system with which he was acquainted. He had tried all kinds of batteries for shot-firing, and preferred the magneto battery because it was safer and more practical. The cell battery was much cheaper at first cost and more portable, but his experience had been that it was very unsatisfactory as to its wearing quality, and there was also the difficulty of dealing with the chemical components. One of the dangers attendant upon the use of cell batteries was the possibility of the bare ends of a fuse wire, accidentally coming into contact with a terminal. He thought

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it would be an additional precaution to seal hermetically magneto batteries where used in gaseous mines. In fiery mines he was in favour of shot-firing by deputy, but was adverse to it in non-fiery mines, owing to the loss of time to the workman. He would make it a matter for the colliery manager's judgment. Witness put in tables showing the comparative cost of firing 1,000 shots by means of fuse and igniters, and by high and low-tension electric detonators. The cost per shot worked out at 2·17d., 1·29d., and 1·48d. respectively. This was merely reckoning cost of material. Turning to the use of electric coal-cutters, witness said he knew of mines in which he would not consider them to be safe. If the terminals were all properly enclosed, this restricted class of mine would be a very limited one—more restricted than the mines where only "permitted explosives" would be used. The dangerous mines he had in mind were those subject to large blowers of gas intermittently, and that constantly more or less. In regard to cables, he preferred unarmoured cables for continuous current. An unarmoured cable could be better watched and examined.

INDOOR RIFLE SHOOTING IN THE UNITED STATES.—*Shooting and Fishing*, of March 12th, contains a very interesting report of the Annual Indoor Rifle Tournament, which is promoted by the Zettler Rifle Club. The targets used for the championship competition have bulls two inches in diameter, with a half-inch centre that counts 25 marks, and the rest of it is divided by rings one-quarter of an inch apart. Although the fact is not definitely stated, we assume that the distance at which shooting is carried on is 25 yards, a distance that makes a great call on the rifleman's skill, bearing in mind the high average of scoring that is necessary to qualify for the top places. It will be noticed that the American plan is to shoot at bull's eyes that average about twice the size of those that are ordinarily adopted on this side, and to separate the scores by the use of no less than four subdivisions of the black disc. The match was won by Mr. L. P. Ittel, who made the altogether remarkable total of 2,457 marks out of a possible 2,500. The number of shots fired consists of a round hundred, these being distributed over 20 targets. Our contemporary publishes a facsimile reproduction of the targets made, and they represent a truly remarkable exhibition of skill and nerve combined. Not a single shot in the series failed to hit the two-inch bull, and since only 43 marks were lost in the entire contest, the average represents 57 centrals and 43 on the one-inch ring. Of course, the score was not made up in this way, for there was of necessity a far greater preponderance of centre shots to cover the occasional stray shots that went in the more distant inches. Dr. W. G. Hudson, of New York, came in second, two marks behind the winner, while H. M. Pope, of Stephens-Pope barrel fame, was third, with five marks less than the winning score. The finish of the match for the winner was a fine exhibition of nerve power. Dr. Hudson's score was already accomplished, and to win the match at a certain stage Mr. Ittel could only afford to drop seven marks. Eight would have meant a tie, nine defeat. He only dropped seven marks, and was thus acclaimed winner. This is the second year he has won this championship. He evidently believes in doing things by instalments, for on the previous occasion he tied with the winner, but was counted out, his opponent having made the highest ten-shot score. As showing the steady increase in the development of arms of precision for this class of work, and ammunition as well for that matter, our contemporary quotes as follows, the winning scores of the previous five years:—1897, 2,421; 1898, 2,424; 1899, 2,425; 1900, 2,429; 1901, 2,451; 1902, 2,458. A series of eleven perfect scores made at this tournament with Peters' 22-calibre short cartridges, were shot with the following rifles:—five with Stevens-Pope rifles, two with Stevens rifles, one each with the following: Ballard-Zettler, Ballard Winchester, Ballard-Stevens, Ballard-Zischang.

THE PERFECTED HYPOSCOPE.—A camera obscura attached to a rifle would be a rough-and-ready description of this implement. It seems to have become the fashion to say nice things about it, the N.R.A. report containing some remarks in praise of its principle, and now we have the Bisley correspondent of *The Times* writing about it in the issue of March 10. He says: "it may be added that it has been inspected and cordially approved by the Small-Arms Committee, and that the answer to the question whether it shall be adopted for partial, if not universal use in the British Army, is delayed mainly because it is not yet decided, by authorities higher than the Small-Arms Committee, what effect it would be likely to exercise upon the *morale* of the men supplied with it." In other words, the whole article seems to be couched in an excessively friendly spirit, and apparently without their consent, the committal of the Small-Arms Committee seems hardly fair on that body. Either its members must be held guilty of bad judgment, or they have not cordially approved the hyposcope as a military contrivance. One or the other is true, and we state the fact somewhat boldly, as a corrective for the unjustified comments on the hyposcope that have appeared of late. We are in no way prejudiced against it. It was submitted at the last Bisley Meeting for trial and report by whoever cared to examine it. All our views about the hyposcope are, therefore, derived from the hyposcope. We saw a hurdle reared on end, covered with thatch. It was some six feet high. The top of it served as a rest for a rifle. Being impossible to bring the butt of the rifle down to the shoulder, it was supported in the palm of the left hand, the arm being placed round the head in a peculiar manner. This brought an eye-piece into proper position, so that by peeping through a sort of telescope extending downwards from about the centre of the rifle it was possible to see over the hurdle and along the sights. When once the attractiveness of the idea of firing at the enemy when one is completely concealed has been got over, the question arises, what are the disadvantages at which this truly meagre advantage is to be gained? Meagre, we call it, because a soldier must consider the success of the attack before the immunity of his own body. One cannot be for ever hunting about for brick walls, for even when found, it might be necessary also to secure a box to stand on. Even with the ready-made rest that was provided at Bisley, the power of steady shooting was so far destroyed by the natural swaying of the body, that it was more difficult to keep on the target with the hyposcope than it is on the bull when shooting under normal conditions. It is true that some people might make a fair score after a number of trials, but the fact that not a single possible was made in a fortnight, with unlimited entries and the ordinary target, suggests that something is wrong. At any rate, we take the liberty of differing *in toto* from the views our contemporary has published. We say that in our opinion, and this we consider more valuable than

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that of an occasional contributor, that the instrument is unwieldy, far too complicated for military conditions, and does not offer advantages in any way proportionate to its many objectionable features.

THE PARABELLUM PISTOL.—Our contemporary *Engineering* gives a description of the Parabellum Automatic Pistol, a name that has been chosen for the weapon manufactured by the Waffenfabrik Mauser, and which it seems has been adopted by the Swiss Government. Our contemporary appears to have derived most of its information concerning the relative stopping power of automatic pistol bullets, and those of revolvers from a source that can hardly claim to be an independent one. It is not, for instance, true that "experience has shown that the stopping power of this small bullet is greater than that of the larger bullets of the ordinary revolver." The small bullet in question weighs 93 grains, its calibre being ·300-bore. Particulars are given of comparative experiments with the Smith and Wesson ·44 cal. Russian pistol. As, however, expanding bullets seem to have been used in the automatic pistol, the experiment can hardly be considered as of practical value so long as this method of increasing the stopping power of bullets is barred among the nations. This, however, does not detract from the value of the general description of the pistol, its lines following out the general tendency that is displayed in modern editions of these arms, viz., to simplify the general construction, reduce the total weight, and make the exterior neater in outline. To read the description that our contemporary gives, one might be led to assume that the Parabellum is a new pistol, though it is, in reality, that known as the Luger, the Luger being descended from the Borchardt.

WAR OFFICE ORDERS.—At the sitting of the War Commission, Sir Andrew Noble, chairman of the Armstrong Company, stated that he considered that the stock of guns and ammunition in this country was deficient at the beginning of the war. He thought that there should be a reserved fund always available for preparations at the direction of the Government in the event of dangerous contingencies. Sir Andrew made a statement as to the powers of production of his company and the rate, if in full swing, at which ammunition could be turned out, and stated his views as to the most suitable ammunition to be used with heavy and light field guns. Lieutenant Dawson, R.N., director and superintendent of artillery in Messrs. Vickers, Sons & Maxim, also gave evidence. He supplied details of army material supplied by his company to the War Office during the war. They would have been in a better position to supply if they had had longer time to prepare in. If their machinery was kept going in peace time it would be much easier rapidly to increase output on the occasion of war. The capital expenditure of his company on new machinery, &c., during the last five years amounted to £2,241,450. Much of their machinery and workshops were now lying idle, and they had to discharge many workmen in consequence of the cessation of orders. He represented that a larger proportion of normal work should be given by Government to manufacturing firms, on the understanding that such firms should place their facilities exclusively at the command of the Government in time of war and emergency. In this case orders would not in future have to be placed in foreign countries. Lieutenant Dawson also laid stress upon the importance of quick-firing guns.

THE PISTOLS BILL, 1903.

TO REGULATE THE SALE AND USE OF PISTOLS OR OTHER FIRE-ARMS.

THE following is the text of the above Bill:—

Be it enacted by the King's most Excellent Majesty, by, and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1.—This Act may be cited as the Pistols Act, 1903.

2.—DEFINITION OF TERMS.—In this Act the term "pistol" means a fire-arm of any description from which any shot, bullet, or other missile can be discharged, and of which the length of barrel does not exceed nine inches.

The term "gun or game licence" means a licence to use or carry a gun granted under the Gun Licences Act, 1870, or a licence or certificate to kill game granted under the laws of excise in that behalf.

3.—SALE OR HIRE OF PISTOLS.—It shall be unlawful to sell by retail, or let on hire, a pistol to any person, unless at the time of sale or hire such person either produces a gun or game licence then in force, or gives reasonable proof that he is a person entitled to use or carry a gun without a gun or game licence by virtue of section seven of the Gun Licence Act, 1870.

Every person who sells by retail or lets on hire a pistol, shall, before delivery, make, or cause to be made, an entry in a book to be kept for that purpose the date of such sale or hire, the name and address of the purchaser or hirer, and the office from which the gun or game licence was issued, or the circumstances exempting such purchaser or hirer from having such licence.

Such book must be produced for inspection on the request of any officer of police, or any officer of Inland Revenue.

If any person—

(*a*) Contravenes any of the foregoing provisions of this section; or

(*b*) On the sale, purchase, or hire of a pistol knowingly makes, or causes to be made, any false entry or statements as to any matter which he is required by this section to make, he shall be liable to a penalty not exceeding *five pounds*.

4.—PERSONS UNDER SIXTEEN YEARS.—Any person who being under the age of sixteen years, and not being exempt by virtue of section seven of the Gun Licence Act, 1870, from incurring a penalty for using or carrying a gun without a gun or game licence, buys, hires, uses, or carries a pistol, shall be liable to a penalty not exceeding *forty shillings*, and any person who knowingly sells or delivers a pistol to any person under such age, and not being so exempt, shall be liable to a penalty not exceeding *five pounds*.

The court may make such order as to the forfeiture or disposal of any pistol found in the posession of a person being under the age of sixteen years, and liable to a penalty under this Act, as to the Court may seem fit.

5.—PROCEEDINGS IN COURT OF SUMMARY JURISDICTION.—Any offence against this Act may be prosecuted, and any fine in respect thereof may be recovered, and summary order under this Act may be made in manner provided by the Summary Jurisdiction Acts.

6.—LEGAL PROCEEDINGS IN SCOTLAND.—For the purposes of the application of this Act to Scotland, any offence against this Act may be prosecuted, and any fine in respect thereof may be recovered, and any summary order under this Act may be made in manner provided by the Summary Jurisdiction (Scotland) Acts.

7.—PISTOLS AS CURIOSITIES OR ORNAMENTS.—The provisions of this Act shall not apply where an antique pistol is sold as a curiosity or ornament.

8.—EXTENT OF ACT.—This Act shall not apply to Ireland.

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LECTURES TO YOUNG GUNMAKERS.

XX.—CAPS.

IN the previous lecture attention was devoted to the theory of caps in relation to their effect upon the ignition of the powder, and it was shown that the two chief elements in the behaviour of caps were comprised in the temperature of their flame and the rate of evolution of their gases of combustion, which is another way of saying shock. On the present occasion it is intended to say a few words concerning the tests which determine the qualifications of the various kinds of cap.

The experiments that are commonly adopted comprise tests for:—

(1) Sensitiveness.
(2) Time from the application of the blow to the evolution of gas.
(3) Delay in igniting gunpowders.
(4) The results by way of pressure and velocity produced upon the powders ignited.

As regards the first of these tests, it is commonly agreed that a cap must be sufficiently sensitive to be ignited by a blow easily provided for in a lock mechanism. The consensus of opinion fixes this sensitiveness as equal to the blow produced by a 2-oz. weight falling 12 inches. It must not, however, be so sensitive as to be liable to ignition by the knocking about incidental to the treatment the cartridge receives in the loading-shop and in the field. The actual test for sensitiveness is carried out by a machine of very simple construction. It consists generally of a vertical rod mounted on a solid base. A cartridge-chamber is fitted to the base of the pedestal, and the weight is suspended from the rod, the cap of the cartridge case intended for testing, being exactly in the line of the falling weight. A striker of light construction and approved form is so fitted as to lie within reach of the cap. The 2-oz. weight is magnetically suspended from the rod, the height of the magnet being made adjustable to any required distance of fall. When the cartridge case has been inserted in the chamber, and the striker adjusted, an electric current is passed through the electro-magnet. The weight is then suspended, and as soon as it is still the electric circuit is broken, and the weight falls on the striker, igniting the cap, or otherwise, according to the result of the experiment. From the description given it will be clear that from several points of view this apparatus is more a convenient shop-tool than an exact instrument.

When a gunsmith regulates the strikers of a gun, he arranges matters so that the cap shall receive such a blow as will produce what experience has shown to be a suitable indentation of the cap. The amount that a striker projects from the face of the breech is also the subject of adjustment, and, as in other things, there are openings for variation. Now, the strikers of some guns project further than others in the direction of the cap, the exact value being regulated by the amount of play between the cartridge and the gun-chamber, as well as by the actual distance the striker projects beyond the face of the breech. With some guns this distance is rendered very short by the action of a positive stop, which thus absorbs the surplus strength of the hammers. With others, there is a sufficient projection of the striker to ensure its forward movement until the resistance offered by the cap brings it to rest. Then, again, strikers are not always of the same weight, and granting the existence of a stop on the hammer, it will be clear that with an equal blow from the hammer the value of the impact of the striker on the cap will be in relation to the weight of the striker.

To summarise the whole question, there are various ways of producing one and the same degree of indentation on a cap, varying from a push to a blow, and the action of the cap must be affected by differences of this kind.

The above considerations as to the manner in which a cap is fired in a gun will show a curious absence of relation between what happens in the cap testing machine and what happens in the gun. The 2-oz. weight falling 12 inches, must hit the striker at a very small velocity, the speed at which the blow is transmitted to the cap being still further reduced according to the weight of the striker that is set in motion. With a gun lock, on the other hand, the speed must, by comparison, be enormous, to judge by the height to which a coin can be thrown into the air by merely resting it on the face of the breech and letting off the hammer from the full cock.

The difference between the two blows would seem to imply that no gun should ever fail to do justice to a cap that fulfils the requirements of the test above-described; and yet we know that guns which seem to give a much stronger blow than any 2-oz. weight could deliver after falling 12 inches, give defective ignition, and that to ensure satisfactory shooting they must comply with a much stricter specification than is implied by an energy of blow equal to one-eighth of a foot-pound.

To investigate wherein the difference lies, it would probably be necessary to conduct a variety of experiments. For instance a much heavier weight could be used in the testing machine, and the travel of the striker could be limited by the action of a stop. By that means the indentations would be alike throughout, and the height of fall of the weight would vary but one factor, viz., the velocity of the blow. Such a test would not, however, take into account the resistance of the copper dome that contains the cap composition. An unduly hard or thick cap would pass the test without calling attention to the fault that existed, and the cap would, in consequence, fail in all guns but those having exceptionally powerful locks.

The test of a small weight falling on a striker without a stop must, therefore, be accepted as an invaluable combination, in so far that it tests the true sensitiveness of a cap, that is the sensitiveness of the priming composition and of the copper dome. It does not, however, bring us any nearer to the solution of the more difficult problem of determining a practical relation between the strength of a gun-lock and the actual value of impact that is necessary to ignite the cap.

While the time from the application of the blow to the emission of flame by the cap has been put down as one of the four factors for consideration, the point has, in reality, only been raised to show that it is of negligible importance as things go. In the course of some experiments that were recently conducted in France, a series of readings was taken to determine this very point, and it was proved conclusively that when hang-fires occur they need not be attributed to any delay on the part of the cap composition to respond to the blow of the striker. The experiments referred to showed that all caps are ignited and emit their flame in from ·0001 to

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·0003 of a second, an amount that is negligible in relation to the total delay that occurs from the fall of the hammer to the production of the full pressure of the powder gases within the cartridge.

We are, therefore, reduced to look for an explanation of hang-fires to the time that is occupied from the emission of the cap flash to the moment when the combustion of the powder-charge is well under way. When undue delay occurs, it is due to a want of harmony between the cap and the powder, and where the fault really lies, can only be determined by the behaviour of similar caps with other powders, and the same powder with other caps. As has already been stated, almost all priming compositions ignite black powder with equal facility. This is not so with smokeless powders. Not only the nature of the cap composition, but also the amount of composition contained in each cap has an important influence. Moreover, the various sporting powders are not ignited with equal facility, and, therefore, special caps exist for special powders. An all-round cap should not hang-fire when used in igniting any standard powder, nor even when such powders have absorbed an excess of moisture, provided, of course, this excess keeps within the limits incidental to storage in our island.

Fortunately for the efficiency of cap manufacture, there is no test that is easier to conduct in an ordinary ammunition or powder laboratory than to take the time occupied by the cap and powder in performing their joint office. All who have followed the scientific side of sporting literature will be familiar with the existence of the chronograph. This instrument provides for the taking of very short intervals of time, that is of periods shorter than a second with a degree of accuracy to the five or ten-thousandth of that amount. When, for instance, it is stated that the velocity of one cartridge was 1,042 feet per second over 20 yards, and of another 1,084 feet, it means that the charge of the first cartridge occupied ·0576 of a second in travelling from the muzzle to a point 20 yards down the range, and that in the case of the second the time was ·0554 second.

Subtraction shows that the difference of 42 feet in the velocity was accounted for by a difference in the time of flight over the measured range of ·0022 of a second. An instrument that needs the greatest care and attention to provide accurate readings when such minute periods have to be distinguished from one another, would obviously not require any elaborate precautions to ensure accuracy of result when dealing with time measurements of ignition, the gap between a good ignition and a bad one being so great. It is thus clear that practically any sort of chronograph, no matter how old-fashioned, is good enough to take cap times, even though it might be far behind the modern Holden instrument, that does such faithful service in the the testing of rifle and shot-gun velocities. The Smith chronograph is also well capable of dealing with this class of time measurement, the existence of several measuring contacts enabling the same instrument that takes the velocity of the cartridge also to record that of the time of ignition of the powder charge.

As already stated, the time-measurement involved is a very simple one. For mechanical reasons, it is usually taken from the fall of the hammer to the arrival of the shot at the muzzle. The time measurement so obtained includes four factors; first, the delay from the breaking of the contact till the cap is struck; second, the delay that occurs from the impact of the striker on the cap to the emission among the powder of the cap flash; third, the time occupied by the powder in getting well alight, which is the true period of ignition; and, finally, the time taken by the shot in arriving at the muzzle.

It can be shown that even though the total measurement includes the above four factors, the third will overpower the others by reason of the fact that it is the only one subject to material variations. Taking them seriatim, it is merely a question of mechanical arrangement to make sure that the electrical contact is not broken until the hammer is just on the point of touching the striker, its velocity then being so great that the odd sixteenth or so of an inch of remaining travel could not account for a material proportion of the time represented by the total reading; and whatever time is so occupied is constant for all experiments. The delay in the time taken by the cap to establish the flash has already been shown to be immaterial. As regards the length of time taken by the shot from its first movement till the arrival at the muzzle, pressure curves and other sources of exact information enable us to lay down its approximate value with a fair amount of certainty. It may be taken at ·0025 of a second on the average; a little arithmetic will show that this value corresponds roughly with an average velocity of the shot of 933 feet per second for the time it is in the barrel and in a state of motion. Variations in the muzzle velocity of the shot must necessarily be accompanied by variations in the time taken by the shot to travel along the barrel. It has already been shown how small is the time difference involved when a 20 yards range is under consideration. When dealing with the 28-inch travel of the shot in a 30-inch barrel, the difference becomes insignificant.

While, therefore, it may seem odd to measure four things in order to get at the variability of one, the step can be justified on grounds of expediency; first, because it would be highly inconvenient to fix electrical wires at any intermediate spot between hammer and muzzle, and second, because of the four things measured, there is only one factor liable to variation. Another argument in favour of the so-called trigger-to-muzzle test is that to the sportsman it represents the material amount of the delay that occurs from the pulling of the trigger to the arrival of the pellets at the target, a delay that must be estimated with exactness in shooting at flying objects.

Now, of the time occupied from the fall of the hammer to the arrival of the shot at the muzzle, nearly the whole amount is accounted for by the travel of the shot up the barrel when the ignition is good. We have before us a few results taken with black powder, and they run out as follow:—82 grs. T. S. No. 4 and 1⅛ oz. of shot, times ·0033, ·0030, ·0034, average ·0032 of a second; 88 grs. of above powder and 1¼ oz. shot, times ·0034, ·0032, ·0034, average ·0033 of a second. This time is so near to what is above calculated for the time taken by the shot to travel to the muzzle, that it means either of two things, first that with good ignition the time occupied in igniting the powder is as insignificant as that taken in establishing the flash, or else that the average velocity of the shot while travelling up to the muzzle has been underestimated. This seems very unlikely, because while we know that the greater part of the velocity is attained during the first four inches of travel, we should have to assume an average velocity very nearly equal to the muzzle velocity of 1,200 ft.-secs. in order to get anything near the irreducible

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limit of ·0020 of a second. Hence only one alternative is left, viz., to assume that powder can be ignited in less than ·0007 of a second when the conditions are favourable.

If the reader of this lecture will bear in mind the fact that ·0025 of a second is very nearly the minimum time that the shot can take in its passage from the cartridge to the muzzle he will be able the more readily to appreciate the figures that will follow. These are the results of five shots with a smokeless powder which is characterised by rapid ignition almost wherever met with:—·0033, ·0032, ·0033, ·0036, ·0037; average ·0034 second, very regular and quick. Here are some results with cartridges containing the same powder which were complained of as liable to hang fire:—·0047, ·0040, ·0053, ·0053, ·0057; average ·0053 second, regular enough, but not so quick as the powder is usually found to be. They were, however, just about what is obtained from ordinary powders of the present day, as the following results with a typical powder go to show:—·0040, ·0049, ·0051, ·0044, ·0046, average ·0046. Such results as this could be reproduced indefinitely, but they would merely represent variations on numbers between ·0035 and ·0050.

Turning now to some less satisfactory results, here is what happened with a powder that went off with an unpleasant jar and yet did not give very definitely perceptible hang-fires:—·0154, ·0053, ·0054, ·0066 second. No average need be stated, it being clear that hang-fires were about. Here are some more results with the same powder and another loading:—·0161, ·0078, ·0114, ·0108 second. Bad again. The same powder in cases with a strong German cap did all right, showing it was not suited to a particular English nitro cap. Here is another interesting series:—·0108, ·0112, 0098, ·0217 second. Their history is very simple. The user did not like them, and as a result of the complaints that were made, samples were tested, and the above readings were obtained. The gunmaker concerned stated that he had several times received complaints to the effect that his cartridges went off like squibs, and he was glad at last to be put on the track of its cause. The verdict was of course bad caps, since the powder in question did reasonably well with other caps. Here are three shots of a batch that occasionally went off with peculiar indications of delay that the practised sportsman can detect:—·0099, ·0086, ·0060 second, none of these could well fall within the range of time that the human understanding can ordinarily appreciate, but they are bad enough to suggest that a very few more rounds would bring in a really bad record of ·0150 or thereabouts, which verges on the appreciable hang-fire.

A curious fact may now be stated about hang-fire cartridges in concluding the present lecture. It is that however long the delay in ignition may last there is no *prima facie* reason why the cartridge should behave badly in other respects. We do not deny that caps have a great effect on the ballistics of a powder, but we do say that the defect known as a hang-fire may exist free from all other complications, the powder once it is alight passing down the barrel just as if would have done had there been the correct rapid action throughout. As a final word we would say that the time of ignition of cap and powder is so important a question that it ought to receive more attention from practical men than it has hitherto done. Of the influence of caps on pressure and velocity and other matters we shall have more to say in the next lecture.

To be continued.

CORRESPONDENCE.

MODIFIED CORDITE.

TO THE EDITOR OF *Arms and Explosives.*

SIR,—I regret to learn from "Jottings," in your February edition, that the "modified cordite" is liable to be condemned before it has even had an opportunity to exist. It would seem to be only a matter of fair-play to give it at least a trial before putting it out of the way for good and all. Is it not barely possible that it might possess some merits which would at least warrant a careful investigation in order to determine whether or not it has any value?

It is, of course, very nice to have a smokeless powder made into pretty little strands with which one can amuse one's friends and acquaintances by its use as pipe lighters; an ordinary wax match gives equally good results for the purpose, but is not so entertaining. It is difficult, however, to discover in what respect this pastime affects the function of a powder, which has always been supposed to depend upon its ballistic value; and any information as to the relation between a pipe-lighter and a smokeless powder would doubtless prove of interest to your numerous readers.

Why a symmetrical grain should be "antideluvian" is also a problem not yet solved, and why the return to a granular form should be ignominious, is another question that deserves an explanation which would also be interesting.

With the exception of the cube or sphere, the cylinder (or cord) is one of the least desirable forms for a powder grain, and is used only in England. A decreasing burning surface cannot produce the best results in fire-arms. It is to be admitted, of course, that Cordite has given very good results, but these results were dependent not upon the form of grain but upon the composition. In the United States, Smokeless Powder for small arms, containing nitroglycerin, has long been used with most satisfactory results. It is granulated in symmetrical form, which permits of easy loading by machine, and renders possible the greatest accuracy in the weight of the powder charge, thereby ensuring uniform velocities and pressures.

U.S., Feb. 28, 1903. A.

SUCCESS IN GUNMAKING.—It frequently happens that the success of a gunmaking business is judged by the amount that the orders in hand are ahead of the possibilities of production. The firms who are reputed to be the most prosperous, find themselves chronically unable to guarantee prompt delivery. It is very much to be doubted whether this is as healthy a sign as it seems to be on the face of it. It implies a certain degree of inability to extend production with the elasticity that is desirable in order to take advantage of the flowing tide. A certain number of orders must necessarily be diverted by those who are unable to wait so long before obtaining the object of their desires. When enquiring more closely into the conditions that bring about this state of deadlock, it is frequently found that the trouble is due to an inadequate supply of the class of highly-skilled labour that is involved in turning out a good gun. The Birmingham section of the trade has experienced this difficulty in an acute form, due to the constant migration of their best workmen to other centres, where the pay is, perhaps, greater and the conditions of life more acceptable. A remedy has been sought by encouraging a larger proportion of young mento take up the study of gunmaking in a serious spirit, and thegood results of this action will no doubt have a proportional effect in the future conditions of the business. Another remedy which can advantageously be developed meanwhile, is

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to systematise the work of gunmaking, so that many of the processes which are now conducted with the aid of specialised labour, will, in future, be accomplished by a mere routine procedure that depends on the services of a less highly-trained class of mechanic. The principle involved cannot, as a rule, be applied with success on a large scale; but by taking advantage of every opportunity that presents itself, in the course of daily work, it is more than likely that substantial relief can be secured in the long run.

TRADE MARKS.

APPLICATIONS ADVERTISED. MARCH 4—25, 1903.

251,748. Eley Bros., Ld., London. The word "Lab." Jan. 26, 1903.

250,307. Eleanora Thomas, trading as A. Chamberlain, Salisbury. A picture of Stonehenge, underneath which are the words:—"The Stonehenge" Smokeless, specially loaded by A. Chamberlain, gunmaker, Salisbury. Nov. 28, 1902.

252,090. W. Brunton & Co., Cambrian Fuse Works, Wrexham. A picture representing a hound chasing a hare. The device is to be applied to safety, electric, and other fuses for blasting. Feb. 10, 1903.

TRADE MARKS REGISTERED. FEB. 19—MAR. 18, 1903.

251,293-4. H. S. Wellcome. Trading as Burroughs, Wellcome & Co.

250,798-9. The Swansea Safety Fuse Co., Ld.

249,589-90. The Webley & Scott Revolver and Arms Co. Ld.

APPLICATIONS FOR PATENTS.

FEBRUARY 23—MARCH 21, 1903.

4,238. Sighting of Ordnance. A. T. Dawson and J. Horne.
4,258. Binocular Range-Finders. G. Forbes.
4,474.* Automatic Fire-arms. H. W. Holland and T. Woodward.
4,539. Automatic Pistols. T. K. North.
4,542. Targets. G. Nicholls-Pratt.
4,559. Shield for Quick-Firing Guns. J. A. Wilson.
4,595. Self-Marking Targets. J. P. Allen.
4,632. Sighting of Quick-Firing Guns. A. A. Common.
4,717.* Targets. W. and W. J. Thackray.
4,735.* Safety Fuses. W. Norris.
4,843. Single-Trigger Mechanism. H. W. Holland and T. Woodward.
4,884.* Loader for Sporting Guns. G. A. D. Goslett.
4,950.* Carbine Hooks. S. Adler.
4,957. Gun Sights. F. von Alemann.
4,967. Sporting Guns. G. Fükert.
5,091. Disappearing Targets. J. Chadwick.
5,122. Sporting Cartridge Cases. J. Mansell. T. Norris, and B. Turley.
5,151. Field Guns. O. Stocklé.
5,164.* Fire-Arms. J. A. R. Elliott.
5,180.* Repeating Pistols. C. P. Clement.
5,205 Breech Mechanism of Ordnance. Sir W. G. Armstrong, Whitworth & Co., Ld., and A. G. Hadcock.
5,475. Range-Finder. L. L. H. Osborn, H. O. Tarbolton, and J. Hayes.
5,501. Gunnery. L. K. Scott.
5,669 Quick-Firing Guns. A. T. Dawson and L. Silverman.
5,679. Automatic Guns. A. T. Dawson and L. Silverman.
5,746. Single-Trigger Mechanism. J. Ross.
5,790. Automatic Guns. Sir W. G. Armstrong, Whitworth & Co., Ld., and A. G. Hadcock.
5,791. Explosives. C. E. Bechel.
5,858. Automatic Guns. J. Werd and J. Lewis.
5,971. Sighting from Cover. W. Youlten.
6,081.* Time Fuse. E. Rubin. (Date applied for in Switzerland, July 16, 1902).
6,096.* Gas-Check for Ordnance. J. Y. Johnson (Agent for *The Ordnance Improvement Co., U.S.A.*)
6,097.* Firing Mechanism of Ordnance. J. Y. Johnson (Agent for *The Ordnance Improvement Co., U.S.A.*)
6,141. A Rifled Bullet. W. H. Banghan.
6,144. Targets. W. J. Atkinson.
6,148. Gun Carriages. A. Reichwald (Agent for *Fried. Krupp.*)
6,298.* Gun Carriages. G. Ehrhardt.
6,409. A Guncotton Steam Centrifugal. J. Selwig.
6,511.* Torpedoes. M. Fischhaber.
6,536. Boring Bars for Blasting. J. Welton.
6,538. Gun Sights. K. Fritsch.
6,551.* Cleaning and Oiling of Small-Arms. C. O. Thiele.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

FEBRUARY 26—MARCH 19, 1903.

COMPILED BY H. TARRANT.

24,482* (1901). **The Guinard Single-Trigger Mechanism.** A. and G. Guinard, France.

24,934 (1901). **Cartridge Packets.** Sir C. H. A. F. L. Ross, Balnagowan Castle. A packet for containing tapering cartridges, convenient for quick opening and for the speedy transfer of the cartridges therefrom to the rifle magazine. One side of the box is ripped off, but a barrier which remains after this side is torn away serves to hold back one end of the file of cartridges so that they may be delivered in proper lapping relation into the magazine. Accepted February 6, 1903.

25,994 (1901). **Explosives Manufacture.** R. Robertson and W. Rintoul, Waltham Abbey. A process for recovering acetone existing as vapour in admixture with the air, consisting in bringing the mixture into intimate contact with a solution of a bisulphite such as bisulphite of sodium or potassium. The bisulphite is directly distilled in order to separate the recovered acetone therefrom. Accepted February 19, 1903.

80 (1902). **Machine-Gun Feed Apparatus.** A. W. Schwarzlose, Germany. Apparatus for continuously feeding cartridges to a machine-gun with which metallic cartridge frames are used, consisting in so arranging the cartridge frames that when one is emptied another is caused automatically to take its place. The firing of the gun is by this arrangement not interrupted as heretofore. Accepted January 31, 1903.

3,822 (1902). **Machine-Gun Feed Apparatus.** T. K. North, London. By means of a stationary cylinder, around which is arranged a deep helical blade of slow pitch, cartridges held by their bases upon the interior of a rotating drum working outside the stationary cylinder are gradually caused to travel through the channel formed by the helical blade to a discharge-opening near the breech end of the gun. Accepted February 12, 1903.

4,284 (1902). **Artillery Practice.** J. F. Fogerty, Bournemouth, and E. F. Hallett, London. Apparatus for practising gunners in a drill-hall, consisting of a lantern adapted to throw the image of a target upon a screen and to register the course of the target's movement thereupon. Accepted February 5, 1903.

5,218 (1902). **Sighting Devices.** Sir H. Grubb, Dublin, A. T. Dawson and G. T. Buckham, London. Improvements in the application to ordnance of various kinds of sighting devices of the type described in Patents Nos. 12,108 and 22,127, both of 1900. Sighting devices and mounting especially adapted for use with service rifle are also described, these sights being adapted for use also as night sights. Accepted February 26, 1903.

6,745 (1902). **Recoil-Operated Fire-Arms.** C. R. S. J. Hallé and Marguerite E. Ribbenthorp, Hampton Wick. In order to enable the full power of the recoiling barrel in recoil-operated fire-arms to be utilised, the speed of flight of the breech-bolt in relation to that of the barrel is regulated by "lazy tongs" mechanism. Accepted February 12, 1903.

7,497 (1902). **Automatic Rifle.** H. Stamm, Switzerland. An automatic rifle with stationary barrel and breech-housing, in

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which the gases of combustion are taken from the barrel to act upon a piston directly connected with the breech mechanism. This piston performs the opening and ejecting operations, and compresses the return spring. Accepted February 19, 1903.

7,610 (1902). **Ordnance Breech Mechanism.** C. Holmström and A. E. Mascall, Glasgow. In guns provided with breech mechanism of the type described in Specification No. 62, 1902, there is combined with an eccentrically-arranged breech chamber and block, a cocking and firing-lever which during the recoil of the gun is recocked after being released to fire the gun by the pulling of the trigger-rod. The lever prevents the turning of the breech-block in case of a hang-fire. Accepted February 19, 1903.

9,481 (1902). **Smokeless Powder Grains.** Hudson Maxim, U.S.A. A powder grain or charge adapted to be consumed in the gun by the maximum accelerating combustion. A charge consisting of such grains is claimed to allow of the maximum amount of powder being loaded into the powder-chamber, excessive pressure being absent. A method of manufacturing such powder charges is described. Accepted February 26, 1903.

11,741 (1902). **Cartridge-Loading Machine.** T., and W. H. Nichol, Canada. A cartridge-loading machine, to the circular shell-carrying table of which special mechanism feeds the shells. The driving mechanism of the shell-carrier and of the charge and wad-feeders is of such a nature that concerted action may accurately be timed. The machine is capable of adjustment in order that cartridges of different calibres may be loaded. Accepted February 26, 1903.

12,658 (1902). **Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). In ordnance of the class in which the barrel recoils alone, the slide upon which the guide-claws of the barrel work is protected from dust by felt strips which are arranged upon the gun-barrel or the cradle. Accepted February 26, 1903.

13,348 (1902). **Detonating Agent.** F. M. Hale, London, and G. W. Bell, Ipswich. A detonating agent for high explosives obtained by treating a solution of picric acid with lead carbonate, the latter being used to neutralise the acid. The solution is filtered, aud the precipitate of lead picrate remaining is discovered not to be sensitive to accidental or premature detonation from shocks. Accepted February 19, 1903.

16,881 (1902). **Rifle Range.** G. W. Edwards, Putney. A removable rifle range is formed by combining a number of metal roof-plates in such a way that their edges may be affixed to the crown of any convenient wall. Vertical supports hold the plates up. An iron-cased house upon wheels serves as a target, and a set of lay figures, operated from inside the house are revolved around the target. Accepted February 5, 1903.

20,406 (1902). **Light Artillery Mountings.** The Hotchkiss Ordnance Co., Ld., London (Agent for *L. V. Benét, France*). Field mounts for machine and other light guns, so constructed that the gun may either be fired upon wheels or may be taken from the wheels, and after being carried over ground impassable to wheels, be fired from the rest of the mounting. The mount is divided into two parts, the upper part in the form of a complete tripod, which may be detached from the lower vehicular part. Accepted February 25, 1903.

21,788 (1902). **Semi-Automatic Small-Arm.** H. H. Lake, London (Agent for *The Winchester Rep. Arms Co., U.S.A.*) Semi-automatic rifle mechanism, which recoil cocks besides ejecting the spent cartridge, but does not reload. The mechanism is caught in its backward position in spite of continued pressure upon the trigger. The rifle is loaded manually, and when the thumb-lever just behind the breech-block is pressed, the block is released—flies forward, discharges the cartridge, and again recoils to its rearward position. Accepted February 5, 1903.

23,739 (1902). **Cartridge Ejector for Revolvers.** M. Dozin, Belgium. A more or less automatic cartridge ejector for revolvers. A spring-actuated rod is released when the revolver is broken down. This rod is forced against the rear of the rod carrying the star-shaped extractor, and thus the spent cartridges are forcibly thrown out of the cylinder. With the closing of the revolver, the parts are caused to assume their initial positions. Accepted February 26, 1903.

24,812 (1902). **Detonating Composition.** J. Fuhrer, Austria. A detonating composition, which is heated by a slow-burning ignition agent, such as black gunpowder, consisting of 45·5 parts nitrate of potash, 30 parts of bicarbonate of potash, 16 parts of sulphur, and 8·5 parts of aluminium. This composition is claimed to have the same detonating effects when ignited as stated, as the fulminates, chlorates, or picrates. Accepted February 26, 1903.

25,842 (1902). **Transport of Gun-Carriage Wheels.** Capt. H. R. Newburgh-Stewart, London. Slings for carrying wheels of gun-carriages upon transport pack-saddles, each consisting of a length of chain or rope connected at its ends with the saddle, and with a plug of wood which is inserted in the hub of the wheel. Accepted February 19, 1903.

26,463 (1902). **Aim Instructing.** F. C. A. Ogilvy, and H. C. J. Grant. (This Specification is a Secret Document).

28,103 (1902) **Operation of Moving Targets.** J. W. Porter, Australia. A traveller continuously running to and fro upon a horizontal pair of rails, carrying a rotatable target, which target is adapted to turn, at irregular intervals, through an angle of 90 degrees, in order to be either "edge on" or "face on." A moving and disappearing target is so produced. Accepted February 12, 1903.

28,698 (1902). **Recoil Apparatus for Ordnance.** C. D. Abel, London (Agent for *Rhinische Metallwaren und Mf. Germany*). A construction of the brake-piston and valve in recoil apparatus, by means of which regulation is effected automatically, the gun being taken forward into the firing position after recoil in a quiet manner without concussion, no matter what may be the degree of elevation. Accepted February 5, 1903.

28,707 (1902). **Field Gun Mountings.** E. K. Rothe, Germany. A carriage for field guns so designed as to be light whilst yet well protected. The entire brake-gear is protected against foreign bodies and shell-splinters by protective armour, which is secured to the upper carrier and is detachable. The carrier and armour are separated by a clear space from the brake cylinder. Accepted February 26, 1903.

28,940* (1902). **Automatic Pistol Mechanism.** Lt. J. T. S. Schouboe, Denmark.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

AUTOMATIC PISTOL MECHANISM.

28,490 (1902). J. T. S. Schouboe, Denmark. In this patent a system of automatic pistol mechanism is described. The barrel is fixed and the sliding-breech parts are so arranged in relation with the lock-cover that they are not at any time exposed. The pistol may be taken to pieces without the aid of tools.

In the drawings appended, a section of the pistol is illustrated in Fig. 1, and the position of the parts after recoil in Fig. 2. The fixed barrel and lock-seat *a* are connected with the butt and frame *b* of the weapon in a known manner. The magazine *c* is of an ordinary type. The trigger when pulled pushes back the rod *d*, which disconnects the sear from the bent in the hammer *e*. The released hammer is thrown round upon its pivot by the mainspring and is caused to strike the percussion-pin *f*, which is held in place by the hook *g*. The hook is held in engagement with the striker by the recoil-spring *h*. The recoil following the discharge throws the breech-piece *i*, which forms part of the U-shaped cover *j*, together with the cover, back to the position illustrated in Fig. 2. During its travel the ejector *k* drags the discharged cartridge from the barrel and throws it away through an aperture in side of the casing *j*. The hammer *e* is cocked by the breech-piece during its backward travel. The parts are forced forward again by the spring *h*, and a cartridge from the magazine is introduced into the chamber in the well-known manner.

The recoil-spring *h* works at its rear-end upon the rod *l*, which forms part of the piece *m*, called the closing-stud. Upon this stud

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is arranged a projection *n*, around which the hook *o* upon the frame *b* closes. A foot upon the bottom of this stud bears against the top of the rear-end of the lock-seat *a*, and so keeps barrel and lock-seat in place. The sides of the stud are provided with guides corresponding with grooves on the interior of the cover *j*, upon which guides the cover slides during its backward and forward travel. When it is desired to take the pistol to pieces, the projection *n* and the hook *o* are disengaged by pressing the stud *m* forwards and upwards in the manner illustrated in Fig. 3. The rear-end of the

Fig. 1

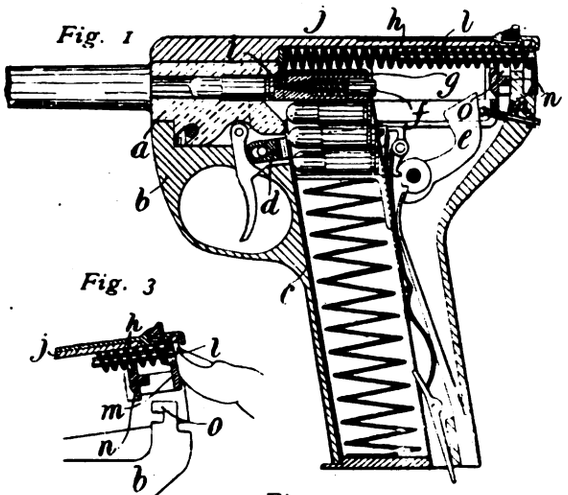
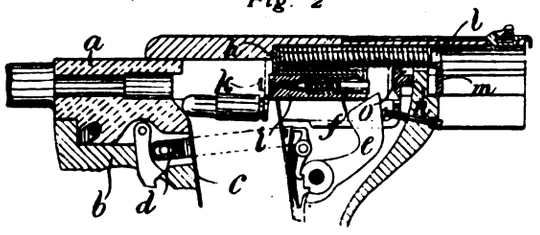


Fig. 3

Fig. 2



lock-seat is thus freed, and by downward pressure upon the barrel, barrel and lock-seat, together with the cover and breech-piece, may be disconnected from the rest of the pistol. These parts are separated after disconnection with the frame and magazine. In order to cock and load the pistol for the first discharge, the cover is carried rearwards as far as it will go by hand, and is then released. Accepted February 12, 1903.

THE GUINARD SINGLE-TRIGGER MECHANISM.

24,482 (1901). A. and G. Guinard, France. In the system of single-trigger mechanism described in this specification, the sear-tails are so arranged as to be capable of a lateral motion. Thus either sear, through the medium either of spring influence on the one hand, or the "selective" mechanism on the other, may be presented to position immediately over the blade of the single trigger. The method of preventing double discharge, due to the involuntary pull, is not explained.

On examination of the accompanying drawings it will be seen that the sear-tails *a* and *b* are pivoted to the sear-noses *c* and *d* at *e* and *f* in such a manner that the tails are capable of a slightly lateral movement. The sideway movement of the tails is controlled by the spring-rods *g* and *h* (working within the rear of the sear-noses), which bear respectively upon the fingers *i* and *j*. The spring-rod *g* is intentionally made stronger than the spring-rod *h*, in order that the sears shall occupy the position in which the right-hand sear-tail is situated over the trigger-blade when in the normal state of rest (Fig. 2). When the trigger is raised to discharge the first barrel, the right-hand sear *a* is lifted and the corresponding barrel is fired. The fallen right-hand tumbler holds the right-hand sear-tail in a raised position and the spring-rod *h* is thus freed and is enabled to force the left-hand tail *b* in a lateral direction to the position illustrated in Fig. 3. A second deliberate pull raises this left-hand tail, and so brings about the discharge of the left-hand barrel. When the gun is opened to reload, the depression of the barrels causes the sears to resume their initial positions, the end of the horizontal part *k* of the tail *a* sliding over the inclined surface on the end of the corresponding portion *l* of the tail *b*.

The "selective" mechanism consists of the rod *m*, upon the end of which is the controlling-lever *n* capped by the milled thumb-piece *o*. Upon the rod *m*, which passes through the lock just above the projections *h* and *l* of the sear-tails, is arranged the tenon *p*. When the lever *n* is in the position shown in Fig. 1, that is, covering the word "left" upon the plate *q*, the tenon is rendered inoperative; but when the rod *m* is partly rotated so that the word "right" is covered, the tenon is caused to engage the part *r* of the sear-tail *a*,

Fig. 1

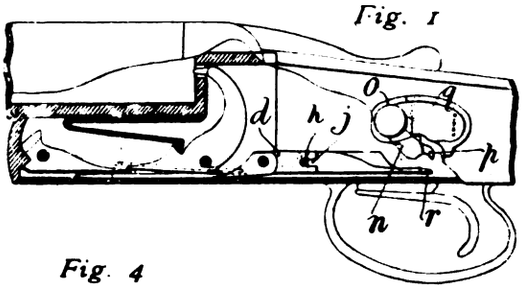


Fig. 4

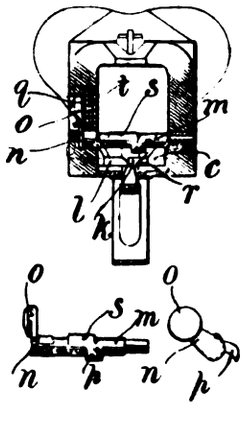


Fig. 2

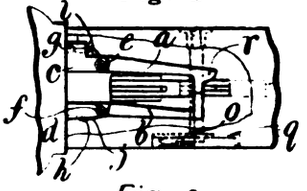
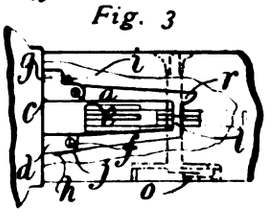


Fig. 3



and to force that tail against the pressure of its spring-rod to the right. The left-hand sear is thus caused to take up its operative position, and when it is raised to discharge the left-hand barrel the tenon is also lifted out of engagement with the part *r* of the right-hand sear. The left-hand sear is maintained in its raised position after discharge, and the right-hand sear is then forced back to its initial position over the trigger-blade. A modified form of "selective" mechanism is described in the specification.

Upon the rod *m* is arranged also a cam *s*. When the lever *n* is caused to assume a position central between "left" and "right," this cam is turned into contact with the tops of the sear-tails, and any upward movement of the trigger is so prevented. In this way the gun is "safed" The rod *m* is retained in either of its three positions by the spring-bolt *t* arranged behind the plate *q*. This bolt engages one of three plain faces cut upon the rod *m*, so holding it lightly against accidental rotation. Accepted February 2, 1903.

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CONTENTS.

CURRENT TOPICS.

The Rook Season.—The only trade that is at present at all active is that due to the proximity of the rook shooting season. The large number of accurate small rifles which have been put on the market and sold to those who are ambitious to excel as miniature marksmen, has had its due effect in limiting the sales of the typically English pattern of rook rifle. Time, and time alone, will show whether the inherent good qualities of the rook rifle will enable them to stand against the competition of their distinctly clumsy rivals. On the other hand, the rook rifle is not characterised by the same amount of accuracy that is associated with the more modern forms of improved weapons shooting cordite smokeless powder of the revolver type. The increased accuracy noticeable under these conditions was most remarkable, and the fact that cordite gives practically no trouble as regards undue tendency to promote corrosion when used with lead bullets, means that the difficulties at first feared when this ammunition was used, have since been shown to be groundless. We have a ·297/250 rook rifle, which has fired some two thousand rounds in the course of the last two years, which includes no less than 800 rounds of cordite ammunition. Needless to say the barrels have received every possible attention, though, of course, this is no more than every good rifle should have. At the present time the barrels are every bit as clean as they were on the day when they left the rifle maker's bench. The mirror-like polish of the lands and grooves is continuous from end to end, and this surely should be a testimonial as to the suitability of cordite for this class of rifle. The ammunition manufacturers cannot legislate for the man who obstinately refuses to treat his rifle with more care than his shot gun. The efficiency of a rifle is ruined if once rust is allowed to form, and however regularly it may be cleaned thereafter, the process is at all times more tedious and less satisfactory. The rook shooting prospects are not at the present time very well defined. There is a general feeling that the nests suffered during the severe spell of frost which recently surprised those who believed that winter had gone; but even so, rooks are hardy birds, and it is to be hoped that there will be plenty of shooting to maintain activity of trade on the one hand, and to provide plenty of sport for those votaries of the rifle who have far too few opportunities in this country of using them in a satisfactory way, that is, otherwise than at the target.

The New Service Rifle.—The fact that the War Office have entrusted a specimen of one of the very few samples of the new improved modified Lee-Enfield, that are in existence, to the Gunmakers' Association, for examination and report, must be recognised as the highest compliment which has hitherto been paid to that young but persevering body. It is not, of course, to be supposed that any radical changes are likely to be brought about as a result of the careful examination and test that it will no doubt receive. On that body are, however, the cream of gunmaking experts in this country. Their experience with the numberless types of weapon that are in existence must add considerable value to their collective opinion. Whatever may be the results of their inspection, the fact remains that they will have the benefit of knowing what is coming along, and the information so obtained will no doubt

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aid them in giving wise council to those who purchase them when they are available on a commercial scale. A number of well-known gunmakers are intimately connected with the sport of rifle shooting, and those naturally judge the rifle from the point of view it will present to volunteers and others who aim at precedence at the range. Among those the sighting and system of trigger release are matters of great moment. To others who bear in mind the stabilty of rifles as judged by the proof test, the breech closure will present features needing careful study. To a third class the system of loading will appear the most vital consideration. At any rate they will all be allowed their say, and it is to be hoped that the outcome will at least show that in framing their report they have succeeded in framing a comprehensive and well-informed document.

Quasi-Scientific Sport.—In reading some of the quasi-scientific disquisitions on shooting subjects that are put forward for popular consumption, one sometimes wonders how such things ever come to be written. Most sporting papers that aspire to earn a position in the regard of those who have money to spend on advertisements, think it the correct thing to sacrifice editorial regulation for a while, and allow the shooting column to contain a series of more or less abstruse views on some highly unimportant matter. Provided there is sufficient about foot-pounds and involuntary pulls, the editor feels that he is doing his duty to his paper. While his soul may yearn for the excitement of imagining adventures with lions, he feels that the promptings from within must be put aside, and the columns be turned over to the man who would settle sizes of shot by foot-pounds impact on something or other, having an area whose $d^2 \times$ is stated with portentious gravity. It certainly does not often happen that one gets very much further towards settling the relative merits of size 5½ of shot against No. 7, that our neighbour uses with such deadly effect on geese, mallard, snipe, or whatever it is that some previous scribe has killed with his favourite 20-bore and an overcharge of small shot. Even if it proves impossible to unravel some of the sentences, there is at least a feeling of having done one's best to look at the subject from the proper standpoint. One stands by in respectful admiration while witnessing the mathematic gymnastics of those men who seek to tell us what shot to use, or the number of pounds of momentum that are lost when the recoil takes place against the shoulder, as distinguished from free suspension. There are always so many interesting questions for ever cropping up in shooting, that it seems a pity to misuse simple arithmetic when the values handled have no practical application. Still, by giving a figure for everything and working out a formula, one at least has the satisfaction of realizing that the unknown quantity is x, but even so, x has many other aliases.

Gun Trade Developments.—Unless progress goes on we go back. This at any rate is true in a relative sense of the gun-making industry of Great Britain. In America they are making wonderful strides in the turning out of cheap machine-made weapons, while on the Continent the rapidly improving character of the work turned out in Liége is well known to all who are judges of workmanship and finish. We in Great Britain are also advancing apace, but we are faced with the ever-present need for progressing at the same pace as our rivals, in order to maintain the supremacy of British workmanship in the matter of guns and rifles. The question that arises, is in what direction fresh efforts can be made in order to improve on everything that has hitherto been done. In the very best class of work the question answers itself. The skill and enterprise of our makers of best guns, is ever on the move to devise some new means of adding to the comfort of the shooter, or of pleasing his fastidious eye, which has been accustomed by years of study of the best models, to look for harmony and graceful proportions as well as mere efficiency. It is, however, to the cheaper qualities of guns that we must now look for some important development. In fact, we must recognise that the day has gone by when the intermediate qualities of weapons may be excused their faultiness of appearance or touch, because they have cost less than sixty guineas. They must be more than merely sound guns. They must be regulated to a nicety, and as this costs money manufacturers must be ever on the alert to find a way of obtaining the best results by more direct means than have hitherto been deemed possible.

The Gauging of Shot Barrels.—Slowly, but surely, the idea is gaining ground that the good work of the Gunmakers' Associations in framing standard chamber sizes, will not be complete until the remainder of the internal measurements of the barrel are specified, with the same exactness and conformity to the conditions implied by the construction of the cartridge. With ammunition of specified type, certain of the barrel dimensions follow as a matter of course. The diameter of the barrel is a point that requires specific treatment. Wads must be of a certain size to comply with the conditions necessary for a well-loaded cartridge, and if wads are to have a fixed value as regards calibre, the barrel must be appropriately adjusted thereto between limits that allow of very small variation if the best possible results are to be obtained. The only way to ensure this in practice is to define the limits of sound manufacture, and to state explicitly the average value that should be aimed at in every-day work. A well-known authority on barrel-boring recently informed us that once the size was specified there would be little difficulty in adhering to it in practice, because the sensitiveness with which a well-shaped lead cap will take off the last thousandth of an inch will ensure satisfactory compliance with the requirements that are laid down by a standard set of gauges. So long as barrels continue to be turned out with less regard to dimensions than the exigences of manufacturing within a certain required limit, it must be admitted that the best possible is not done for the money. This being so, we must all admit that we shall not be giving British products a fair show until every gun turned out is as good as we can make it for the price.

The business and editorial offices of *Shooting and Fishing* has been removed from 293, Broadway, to American Tract Society Building, 150, Nassau Street, New York.

The fifty-shot pistol record, on the Standard American target at 50 yards, has been raised from 476 to 480 points. The new record was made by Thomas Anderton at the range of the Massachusetts Rifle Association, Walnut Hill, on April 4.

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THE GUNMAKERS' ASSOCIATION ANNUAL MEETING.

THE Annual Meeting of this Association was held at Effingham House on Wednesday, the 22nd ult., and there was a very small attendance, presumably in view of the fact that the members were saving themselves for the annual dinner some hours later. Mr. H. A. A. Thorn, chairman for the year just passed, presided, and there were also present Messrs. Blanch, Gale, H. Greener and Woulfe.

MINUTES.—The minutes of the last Annual General Meeting were duly read and confirmed.

MESSAGES OF REGRET FOR NON-ATTENDANCE.—The following wrote expressing their inability to be present:—Messrs. H. E. Akrill, J. Anderson, C. I. Annan, J. G. Benbow, E. Chamberlain, W. Garden, D. Gray, E. C. Green, E. Harrison, G. G. Higham, G. Hinton, J. Hobson, H. Hodgson, S. R. Jeffery, J. M. Kerr, W. R. Leeson, C. F. Liversidge, S. H. Mackie, J. MacNaughton, C. MacPherson, C. H. Maleham, F. R. Martin, J. E. Martin, W. H. Monk, T. C. A. Mortimer, J. T. Musgrave, A. H. O'Keefe, J. V. Pape, J. Patstone, Capt. Playfair, W. L. Powell, A. and J. Purdey, W. Richards, E. J. and J. Rigby, C. Playfair Robb, C. Rosson, P. Small, H. Tilney, J. Tisdall, T. H. Turner, J. B. Warrilow, T. W. Webley and E. Wilson.

Being informed that Mr. John Rigby's absence was on account of the very recent loss of his wife, the members present asked the Secretary to write to him stating their great sympathy for him in his bereavement, and their hope that he will bear up under the severe blow.

ANNUAL REPORT AND BALANCE SHEET.—The annual report for the past year, which had been circulated among the members, was taken as read, the full text being as follows:—

The Report and Balance Sheet of the Gunmakers' Association for the year ended March 31, 1903, is submitted herewith. It will be seen that there is a surplus on the year's working of £19 12s. 10d., which, with the balance of £78 0s. 9d. brought forward from the previous account, makes a surplus of £97 13s. 7d. to be carried forward. The amount is represented by cash at the bank and in the Secretary's hands of £94 10s. 7d., and debtors £3 3s.

The Secretaryship.—Mr. G. F. Bird, having submitted his resignation to the Executive, in consequence of fresh arrangements in his other work which would make it difficult to give to the work of the Association the time that its proper performance demands, the Executive felt themselves constrained to accept the same, meanwhile thanking him for the services he had rendered to the Association during his period of office. Mr. Max Baker was then asked whether it would be possible to take over the duties of the position which he relinquished two years ago, and having received an affirmative answer, the Executive appointed him last February to take Mr. Bird's place.

The Proof House Regulations.—The Executive are in a position to announce to their members that the Joint Committee of the Proof Houses have practically completed the draft new rules for regulating the conditions of proof, and they have accordingly invited the two proof authorities to give them an opportunity to inspect the same, in the hope that should their request be granted, they might be able, where it may seem desirable, to submit suggestions of a kind calculated to enhance the value of the protection afforded by the proof test.

Storage of Mixed Explosives on Registered Premises.—During the course of the year just passed, the Executive have had under their serious consideration the Annual Report of the Public Control Department of the London County Council, in which the conditions that regulate the storage on registered premises of mixed explosives, and the filling of cartridges, were considered as a danger to the public. The observations put forward did not appear to take a reasonable view of the case. For instance, due note was not taken of the special precautions that are enforced on registered premises, nor was account taken of the immunity from accident that is so marked a feature of the records that deal with the subject. Where accidents have happened they have been attributable to the presence of black powder and to serious breaches of the regulations, and it has been officially stated by H.M. Inspector of Explosives, that even where registered premises are on the whole indifferently kept, the premises of gunmakers stand out in marked contrast to all the rest. Notwithstanding this, the London County Council held up as a source of danger the facilities enjoyed by occupiers of registered premises, and appealed to the Home Office to promote a Bill in amendment of the Explosives Act, materially reducing the amount of storage now allowed. The Executive are exceedingly pleased that the Home Office was able to take the favourable view of the present system of storage, which is outlined in the following abstract from the report of the County Council proceedings, as published in *The Times* of March 18, 1903:—"Storage of Explosives. The Public Control Committee reported that a letter had been addressed to the Home Secretary requesting him to promote a Bill to amend the Explosives Act by reducing the amount of explosive that may be kept upon registered premises. The reply from the Home Office was to the effect that the number of accidents which might be prevented by legislation such as was recommended, was not sufficient to warrant action being taken, in view of the grave inconvenience to the trade that would result."

The Card of Storage Instructions.—Finding evidences of a well-maintained demand for the Card of Storage Instructions, which the Association first issued in the year 1897, it was decided that a fresh and improved edition should be published, the first, running into some hundreds of copies, having been entirely exhausted. The first card was sent out gratis at the expense of the Association, the idea being to afford to all gunmakers who were occupiers of registered premises, a bird's-eye view of the sections of the Act by which they are governed. These cards, which were at once in evidence in all parts of the country, had the anticipated effect, and the object of their circulation was achieved. The new cards have been issued at the price of one shilling each, to cover the expenses incidental to their issue.

Chamber Sizes for Shot Guns.—During the past year the Association has issued a series of sizes specifying the chamber dimensions for the various bores of shot guns. Since the issue of the card containing these sizes, representations have been received which suggest that in one or two directions, minor alterations might with advantage be made, and under these circumstances the Executive have the matter under careful consideration.

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Effect of Prosecutions.—The prosecution of those committing offences under the Merchandise Marks Act, by the marking of guns in a fictitious manner calculated to deceive the purchaser, seems to have brought about an almost total cessation of such fraudulent practices. Several cases that have been reported to the Association have been most carefully enquired into, and it has been found upon enquiry that the guns complained of had been marked before the Association took active steps in this connection. Where it has been shown that the offence was committed by persons innocent of intent to defraud, the Association has not prosecuted, contenting itself with receiving satisfactory assurances that the markings should be at once removed, and that the persons involved would take care not to offend in the future. The Executive, however, regret to say that they have received evidences of the fraudulent marking of guns in the colonial markets with fictitious names, and other false indications of a London origin, and they are making enquiries to find out what measures can be instituted to put a stop to such practices.

ELECTION OF OFFICERS.—The following were elected to act during the coming year:—

Executive.—Messrs. Charles Ingram Annan, Herbert J. Blanch, Charles Boswell, A. H. Gale, H. W. Gibbs, C. E. Greener, E. Harrison, H. W. Holland, J. T. Musgrave, J. V. Pape, W. L. Powell, John Rigby, John Robertson, H. A. A. Thorn and T. W. Webley. *Solicitor*, Mr. Reginald T. Woulfe. *Hon. Treasurer*, Mr. H. W. Holland. *Hon. Auditor*, Mr. Herbert White. *Secretary*, Mr. Max Baker. The re-election of Messrs. R. T. Woulfe, H. W. Holland and H. White, to the positions they had previously occupied, were accompanied by the most cordial thanks for the services they had rendered to the Association during the past and previous years of the Association's existence.

ALTERATION OF RULES.—The following alteration to the rules were submitted with a view to their formal adoption at a later period, and were duly approved:—To add to Rule 5 the words, "The Solicitor shall be *ex-officio* a member of the Executive." To strike out from Rule 17 the word "December" and insert the word "March" in its place.

THE NEW SERVICE RIFLE.—The members were informed that the War Office had acceded to the request of the Association, and had delivered for the inspection of the members, and for subsequent report, one of the few samples available of the new Service rifle on the model which has recently been approved. It was arranged that a special general meeting should be called to consider the same, the members to be made clearly to understand that the Executive has given on their behalf an undertaking that the matter shall be treated as strictly confidential, and that no publication, directly or indirectly, shall be made as a result of the facilities so afforded for a detailed inspection.

GENERAL DISCUSSION.—The members present then proceeded to consider the position of the Association as a whole, with a view to deciding upon the general line of action to pursue in order to continue to carry out the policy of the Association, which, in general terms, is, of course, the promotion of the trade's welfare. A letter on this subject from Mr. E. C. Green, of Cheltenham, was read, and it was decided that the suggestions therein contained should be carefully considered by the Executive, though some of them were obviously of a kind that could hardly lie within the scope of a body constituted as the Gunmakers' Association is.

THE GUN TRADE AND THE PRESS.

EFFORTS have been made of late to show that some of the organs of the sporting world have been touching too intimately on questions of a purely trade character. Such a matter is hardly suitable for discussion in the journals actually involved in the controversy; but, on the other hand, the whole question can be reviewed in these columns in a manner that will at least state the opposing views, even if no very definite conclusions can be offered. The development of gun and ammunition-making is so intimately connected with newspaper experiments and reports, that an altogether exceptional set of conditions is encountered. In most matters the press has been willing to register from the office table the engineering and other developments that comprise the progress that has made the last few decades remarkable in the annals of scientific advance. In matters connected with sporting gunnery totally different conditions have prevailed.

If the press has not taken the lead, it has at least been responsible for such a large amount of experimentation of an accurate and exhaustive nature as to supply many useful *data* to those who have been the actual introducers of commercial developments. Some five-and-twenty years ago there was probably no trading-house that was possessed of the apparatus and facilities of experiment that was controlled by the sporting press. Where practical knowledge was wanting, the large number of careful workers in the gun line who had made a special study of the more abstract branches of their business were only too happy to come forward and offer for the public use the valuable conclusions which they had arrived at by the unconscious accumulation of ideas gained in their daily work. By this means information, instead of being lost, was made available for the world at large, and, as a result, the general average of knowledge was advanced, and new comers were able to commence where their predecessors left off.

Since the advent of nitro-powders, conditions have changed. For the proper working out of these products an amount of research was necessary that had hitherto been superfluous when dealing with such a simple material as black powder. Moreover, the class of men who were engaged in the manufacture of nitro-powders had mostly received a sound scientific training, so that it became an enjoyable recreation, in between seasons to investigate the many interesting problems that lay around, invitingly awaiting a solution. As soon as these men had mastered the essentially chemical part of their work, they found that the mechanical and physical problems of gunnery required to be studied in order to guide their chemical researches. In the end a quite exceptional kind of expert was evolved. In many respects he knew a lot more about guns, than gunmakers themselves could claim to be acquainted with. On the other hand, he cultivated the closest relations with the best authorities on pure gunmaking, because he found that, however far he might get, something was lacking which only the gunmaker could supply. Thus there has been a constant interchange of courtesies between these two important sections of the gun industry. All gunmakers, however, have not the time or inclination to set apart the first place in their minds for dealing with abstract matters.

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Many of them find that the special needs of their customers, and the commercial requirements of their business, call for their first attention.

Here, again, the members of the press were able to insinuate their useful presence. They were neither gunmakers nor powder-makers; but most of them had acquired, by natural training, the power of assimilating ready-made notions from those who possessed the knowledge, but were wanting in the capacity, or lacked the inclination, to put the same into words. Some were better at this work than others. It is not everyone who can take part upon an equal footing in a conversation with one who is essentially practical in his views, but at the same time has not systematised his knowledge on an entirely logical basis. Then, again, the press man is faced by many temptations to make false steps. His all too partial knowledge is liable to lead him astray. Then, again, he may find himself so well able to talk on scientific questions that he falls into the error of supposing himself to be a scientist of the first water, and not merely a go-between that receives facts from diverse sources, turns them over in his mind a few times, and then transcribes them in article form for general consumption. While we may be painting an ideal picture of the quiet unobtrusive men who represent the press, it is at least our privilege, while occupying the chair, so to speak, to deal with a type of imaginary being who combines all the virtues and has none of the defects that we meet with in human nature.

At any rate, there is no reason why the members of the press should not take the favourable view of their calling. They may exercise to the full their power of acquiring, free from the abstruseness of the specialist, a fair general idea of any given subject, and they can then retail the information so gained in a manner that may prove of true service to the gunmaker, and of more than passing interest to the sportsman. The experts of the powder companies have proved a veritable magic fountain for the class of information that is most in demand, and the fact that one comes seldom away empty after partaking of these stimulating waters is, at least, a proof that the powder laboratory is doing good and useful work, much of which would be wasted without a medium for disseminating its more useful overflow. The ammunition makers have not hitherto done much in this line; but even they are awakening to a realisation of the value of research of one kind and another.

Granting the impossibility of each gunmaker acquiring at first hand abstract knowledge of those questions that only indirectly affect his business, the press must be recognised as serving a useful double purpose. It publishes from time to time much useful material that can be applied by the progressive gunmaker to the development of his wares, and it prepares the mind of the sportsman for their acceptance and appreciation. Nothing is easier than to stand still and let the more progressive of our competitors abroad, improve on our methods and beat us in the markets of the world. As an alternative it must seem desirable in many ways that, once an advance has been registered, all interested should be made acquainted with its inmost details, the consumer being meanwhile educated into a state of appreciation whereby he, too, is rendered willing to discard the old for the new.

There is, however, another side to the picture. It is a well-known aspect of the human mind to resent bustle, and to ask that it may be left alone so that life shall flow in less tempestuous paths. It is not pleasant to find that one must be for ever on the alert, ready, and even eager to cast aside the old methods and inquire into new ways of doing things, seeking to discredit the old by showing wherein lie its defects and how they can be changed for something better. As a class, sportsmen are born faddists, and they are for ever anxious to remedy by mechanical means the physical defects that are always too prone to develop at an early age in these days of arduous work and restless activity. Then, again, nothing is so easy as to acquire some plausible idea from the reading of an article, the natural bent so imparted to the mind unduly prejudicing the judgment and thereby causing a feeling that something is wrong and that a remedy must be found. Those of us who endeavour to look at all things from an unprejudiced standpoint, are conscious that some of our most successful days with the gun have been associated with the use of a weapon or ammunition, which, according to theory, ought to have caused a series of disappointments. On the other hand, things have gone worse when all the scientific conditions seemed to be most favourable to success. If we call this the psychology of shooting, we can pass on to the question under consideration. It is that the sportsman as a class is a crochety individual, and that if he gets an idea into his head that something is wrong, the gunmaker has a bad time of it.

In the same way that the reading of patent medicine advertisements and popular writings on medical matters are apt to induce imaginary disorders, so there is evidence that the reading of technical articles on shooting goes to produce dissatisfaction that is at once reported to the gunmaker. While the medical profession make the best part of their living from the class whose disorders are more due to the imagination than to anything really wrong with the vital organs, gunmakers frequently take the view that the less their customers know about their ammunition and guns, the better it is for their peace of mind and prosperity. It would, of course, be out of place to libel the fitness of those gentlemen who act as salesmen in the respective gun establishments, by suggesting that they invariably fail to do business with the dissatisfied sportsmen who are not quite sure that something is wrong, but at the same time feel that a visit to the specialist would be so much wasted time unless they had a bottle of something to take away. Turning from the jocular frame of mind into which we have unconsciously fallen, we can but say that it is very difficult to define just how much the sportsman should know; but it is by no means certain that the best interests of the trade at large would be served if the recent attempts to subject the press to a general muzzling order were carried into effect.

Many of us are constituted like certain members of the animal and vegetable kingdom, and thrive under the conditions that seem least favourable for development. Opposition in human affairs generally takes the form of criticism, and the more one is criticised the greater is the inducement to cast aside the attitude of contemplating one's virtues, and thereby endeavour to find out wherein improvement can be registered by taking up some fresh train of thought and work. A gunmaker will, as a rule, put far more effective striving into an enterprise that promises to inspire the jealousy of his rivals than into something that will only benefit himself, and it is fair and unprejudiced criticism that indicates the lines upon which he should work in order to register an improvement on the faults

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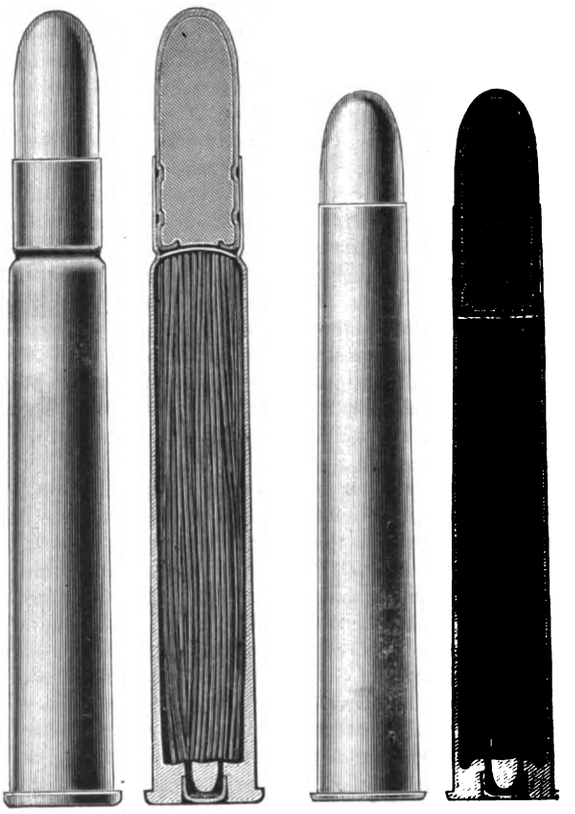
that self-esteem tells him are so apparent in the doings of a rival. A desire to be first in the race is but the nature of a healthy, well-developed mind. To prevent others from going faster than one's own natural gait, is a sign of the repressive mood that suggests a certain consciousness of inability to stay the course at high pressure. A free press is one of our most prized national possessions. This freedom is not absolute, because a paper or a writer that is out of sympathy with its readers, soon has no readers to be out of sympathy with. The truth of this view could be shown by numberless examples from every man's experience, It is, therefore, sufficient to say that the factors which naturally and automatically regulate newspaper policy are sufficient to maintain a safe course, and that attempts to place artificial restrictions in the way of progress in a given line, are not likely to have more effect than may be due to the genuine merits of such arguments as may be put forward in furtherance of the policy of repression.

ELEY'S NEW EXPRESS CARTRIDGE.

GUNMAKERS have been greatly interested in the recent announcement of a new express cartridge, calculated to give extremely low pressures when firing a heavy charge of cordite and the usual ·450-bore 480-grain nickel-covered bullet. The origin of this cartridge is of considerable interest, in so far that it is closely connected with a somewhat acrimonious discussion which took place in the columns of our contemporary, *The Field*, last year. It will no doubt be remembered by most of our readers that our contemporary received a ·450/·400 rifle, which had given way in firing, and from the investigations that were made, reasons were given for supposing that, although the advertised pressures of the cartridges in question, amounted to some 16 tons per square inch, these pressures were liable to run as high as 22 tons when fired at high temperatures such as are met with in various parts of India. Although the rifle had been duly proved, and the assertion was freely made that the proof test gave a chamber pressure of 28 tons, there was no absolute evidence that the test gave this margin of safety, the conditions of proof firing not being published in a manner that made it possible to conduct independent experiments for settling the point.

This, however, was not so much the subject of controversy as the conclusions which were drawn by our contemporary from the facts made clear in the experiments that were conducted. The general tendency of its remarks was that the influence of temperature on the behaviour of cartridges had not been sufficiently studied with reference to the limits of strength that could be imparted to a rifle such as would satisfy the sportsman's desire for a weapon of convenient weight. This view was hotly contested by various interested parties, who contradicted the values stated by our contemporary, and asserted that the pressures experienced were not such as to cause uneasiness in the minds of gunmakers.

A number of irrelevant issues were raised in the course of the controversy, efforts being made to show that the pressures had not been properly arrived at, notwithstanding the fact that the experiments were repeated in a manner that proved the groundless nature of the objections put forward. One gunmaker went so far as to challenge the results that had been published, and offered a rifle for destruction for the purpose of showing the true ultimate strength of weapons he turned out. Although this offer was accepted, an announcement subsequently appeared to the effect that the arrangements had fallen through, on account of inability to arrange terms acceptable to the parties interested. In upholding the view that the range of pressures experienced were unnecessary for obtaining the high ballistics demanded by sportsmen, our contemporary stated that the density of loading,



THE NEW NO. 2 NITRO. ·450-BORE. THE OLD STRAIGHT TAPER CARTRIDGE, ·450-BORE CARTRIDGE.

that is the space available in the cartridge for a given powder charge, was so small as necessarily to lead to high chamber pressures.

The gunmaker who took up the cudgels on behalf of the express cartridges, whose external dimensions were based on those of the original black powder ammunition, has publicly claimed to be the originator of the new cartridge, which entirely carries out the principle of a low density of loading, thus keeping the pressure at a more reasonable level. Although we believe that there is evidence to the contrary effect, in so far that Messrs. Eley express their readiness to prove that they had already commenced on the work of designing a new cartridge before hearing from the claimant to first honours, the assertion made at least goes to show that those who most hostilely criticised the warning issued by our contemporary, have now entirely changed their front, and are condemning the cartridges they previously praised, applying to them the term "makeshift," because they represent an adaptation of an unsuitable case to a purpose for which it was not designed in the first instance.

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In introducing the new cartridge to the notice of our contemporary, Messrs. Eley Bros. stated that it is the general opinion of their more prominent customers for rifle cartridges, that the view which was so hotly contested last year was eminently sound. In view of the widely-felt need for a low pressure cartridge, they have been successful in producing one that satisfies the conditions laid down. The task they set themselves to accomplish was to design a new cartridge case providing an ample space for the accommodation of the powder charge necessary to produce the velocity which has come to be regarded as standard. That is to say the 480-grain bullet, with a calibre of ·450 in., should leave the muzzle of the rifle at a velocity of 2,100 feet per second. The ordinary ·450 taper cartridge complies with this condition, the amount of cordite necessary for the propulsion of the bullet being 70 grains by weight. In order to insert this heavy powder charge into the old black powder case, it was necessary to pack it very tightly, so that the 70 grains of cordite occupied a space capable of receiving 100 grains of water. This is known as a loading density of 70, which means that the weight of the cordite is to the weight of water that will fill the same space as 70 is to 100.

In the new cartridge, on the other hand, the amount of space available for the powder charge is very much greater, so that the density of loading works out at from 54 to 56 per cent. It stands to reason that the same powder charge cannot produce the same velocity on the same bullet when acting in a larger chamber. Hence in the new cartridge the cordite charge has been increased from 70 grains to 80 grains. This still leaves the range of pressures very low, the breech pressure being 12·87 tons, with a muzzle velocity of 2,077 feet per second. The record was obtained when the cartridges were shot at a normal temperature. When the temperature of the cartridges was increased by means of a hot water oven, to 100 deg. F., the pressure reached 14·25 tons, the muzzle velocity going up to 2,168 feet. With cartridges at a temperature of 140 deg. F., which is frequently met with in tropical countries, the highest pressure amounted to 16·43 tons, the average for five shots being 15·93, the velocities registering 2,236 feet per second. It will thus be seen that the new cartridge has fully justified the claims made on its behalf by the makers. It now remains to find out whether the cartridge is equally satisfactory as regards tests for accuracy. There is, however, no reason to suppose that there will be any difficulty in this respect, so that in welcoming this development we can do so with the full assurance that it represents a very important advance on what has gone before, meanwhile affording gunmakers a very satisfactory margin of safety.

Although controversy has been very keen on the precise amount of pressure that will destroy a rifle barrel, there seems to be no disagreement concerning the disadvantageous effects of unduly high pressures in producing minor inconveniences, such as the blowing back of caps and other mishaps that promote difficulty of extraction. One point should not be lost sight of, and that is the grooving of the cartridge case at the bottle neck, so limiting the entry of the bullet to the predetermined distance, thus avoiding any undue reduction of the powder chamber and the consequent increase of pressure that arises therefrom. Our illustrations show the new No. 2 nitro cartridge, and also the one which it is intended to replace, the greatly enlarged powder chamber being a most clearly marked feature of its design.

NOTES.

SOME TESTING SPECIALITIES.—Messrs. Cogswell & Harrison, Ld., have forwarded to this office a leaflet comprising particulars of the various specialities they are able to supply for use by the trade. The items enumerated include that most useful appliance the "C. & H." pattern of the Allport barrel gauge, for the testing of shot-gun bores. It was favourably noticed in the *Field* of Jan. 31, last, and its cost is £3 3s., a sum which all gunmakers should find it worth their while to invest if they are not already provided with one of the original gauging rods as made by the late Mr. S. B. Allport. The above firm have also been favourably known as makers of crusher gun apparatus, their system being in daily use at most of the powder factories and other establishments having testing stations. Another new item is a single-barrel shot gun, with the well-known "Certus" action for taking patterns, the idea being to use interchangeable barrels at a cost of £2 each in place of endeavouring to maintain a battery of shot guns for demonstrating the various grades of boring and calibres of guns.

THE SCHULTZE GUNPOWDER CO., LD.—The report and balance-sheet of this Company has recently been issued. The profit earned during the past year amounts to £9,060, which, added to £4,312 brought forward, less £1,826 for preference dividend paid since the year opened, leaves £11,546 available for distribution. Of this £7,307 is appropriated for preference dividend, and £1,000 is written off the £3,437 expenses of the debenture stock, leaving £3,239 to be carried forward. The directors report that the sales during the year under review were satisfactory, and that the cost of production has shown a further decrease. They further announce that the prospects of the Smokeless Powder and Ammunition Company have not improved since the last report, and that after careful consideration the works have been shut down and the staff paid off. Inasmuch as this business has been virtually abandoned, the directors consider that the capital of Schultze Company should be written down from the present valuation, which is based on the cost of the Smokeless assets, to a figure representing its true value.

MESSRS. HOLLAND & HOLLAND, LD.—The report and accounts of this firm provide the usual satisfactory reading for the shareholders. The gross profits on the year ended Dec. 31, 1902, amount to £19,583, the office and other working expenses leaving £13,753 of this amount available for appropriation. Dividends on investments produce a further £760, which, with the amount brought forward from the previous year, makes a total of £14,878. This is appropriated as follows:—£3,284 for dividend on £70,000 of preference shares; £8,257 for 10 per cent. dividend and 1 per cent. bonus, less income-tax, on the ordinary capital of £80,000; £2,000 transferred to the reserve, making it £10,000; £860 for income-tax; and finally £477 to carry forward. The balance-sheet, apart from the ordinary particulars as to capital and other liabilities on the one side, and debtors, stock, cash in hand, leases and other assets on the other side,

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contains a very cheering list of investments to the total value of £22,219, which is certainly a very agreeable guarantee of the success of the Company's undertaking, bearing in mind the very substantial nature of the tangible assets.

THE EXPLOSION AT ARDEER.—Capt. M. B. Lloyd, H.M. Inspector of Explosives, has issued his report on the accident which occured at Ardeer on October 7, last, when one man was killed. It seems that the explosion occurred at one of the final nitroglycerin washing houses, but its originating cause seems to be so remote as to allow for little more than a mere review of general possibilities. This is not to say that any want of care has been shown in investigating all reasonable openings for finding a clue to the explosion that suddenly occurred. On the contrary, in fact, the report is marked by that judicial and scientific analysis of all relevant facts which has become a feature of this branch of Home Office work. Manufacturers in foreign countries frequently write to us to obtain for them copies of the special reports upon accidents in the hope that the knowledge they will be able to glean therefrom will assist them in raising the standard of safety in their own establishments. In the present instance the only possible explanation for the accident seems to lie in the possibility that the pipes through which the compressed air is carried to agitate the mixture in the washing tank must have been set in a state of vibration, thereby causing a thin film of nitroglycerin to receive a blow sufficient to cause an ignition.

EXTENSIONS TO WOOLWICH ARSENAL.—The War Office have completed negotiations for the purchase of 92 acres of land in Plumstead Marshes for the purpose of extending the Royal Arsenal at Woolwich. The land has a frontage of 2,000 feet, extending to Griffin Manorway and 870 feet to Church Manorway. It will join a good portion of river frontage which the War Department has already acquired for powder magazines and stores for the deposit of small-arm ammunition. The land about to be purchased is below high-water mark. The southern outfall main sewer runs through it, and there will be no difficulty with regard to the drainage. A large portion of the land will be utilised for the erection of buildings, on which a sum of some £200,000 will be expended. The new works include the removal from the Royal Laboratory of the danger buildings (in which the recent explosion occurred) to a more isolated position in Plumstead Marshes; new buildings to cost £20,000 required by the Explosives Committee; new shops for range-finding; and the extension of the torpedo factory. Pending the erection of the buildings, the land is being utilised for grazing purposes for military horses, bought in Canada, Spain, &c., for service in South Africa.

AN ENTERPRISING CLUB.—The following prospectus concerning the Middlesex Gun Club, displays in so many respects the enterprise and wise management of its directorate, that we give it in full;—This club was founded in 1895 for the purpose of encouraging the shooting of inanimate (clay) birds. The Club is managed entirely by a committee elected by the members who have made arrangements with Messrs. Westley Richards & Co., Ld., for the use of their enclosed ground adjoining Welsh Harp Station, Midland Railway, and seven minutes from Hendon Station. The ground, which covers five acres, is fully equipped with a club-house, 60 ft. tower, targets, trench, traps, &c. The subscription to the Club is one guinea per annum. and the entrance fee one guinea. Club Shooting Meetings are held every Saturday from March to October (Saturdays before bank-holidays excepted). The usual entrance fee for the Club Sweepstakes and Competitions is 2s. 6d., which includes the cost of the birds used. Many of the cups and prizes are, however, given free by the Club and no entrance fee charged. Members not wishing to enter for the Sweepstakes, which are always optional, may shoot for practice on paying for the birds they use at the rate of ten for 1s. Cartridges are supplied on the Club grounds at the rate of 1d. each, but members may, if they prefer, bring their own, which, however, must not contain more than 1⅛ oz. shot. Guns belonging to members can be cleaned and stored at the Club grounds free of all charge, and are covered by insurance against fire and burglary. Strangers may be introduced by members to shoot on any Club shooting day. Candidates for membership must be proposed by one member and seconded by another, and their election is entirely in the hands of the the committee, who require the application for membership set out below to be filled in.—(Signed) A. H. GALE, *Hon. Sec.*, 178, New Bond Street, London, W.

THE GUNMAKERS' COMPANY.

ALL matters connected with the two Proof Houses necessarily occupy a prominent position at a time when the gun trade is awaiting the new rules of proof which will shortly be issued. For years we have been working under an anomalous set of conditions, such that, whatever may be our loyalty to the Proof Houses who test our guns, we are left with certain vague suspicions that things are not always quite what they might be, and that the protection of the proof test does not go so far as the sportsman might desire, from the point of view of safeguarding his person. Gunmakers, on the other hand, have not been without their fears in another direction, since from time to time they have experienced rejections at proof which have hardly appealed to them as showing that the test itself was a consistent one, and at the same time avoiding unnecessary injury to weapons of sound construction.

No matter how old we may grow we shall never forget the epidemic of ring-bulges in express rifles that occurred some eight or nine years ago, by which many hundreds of pounds worth of damage was done to rifles, whose soundness was never in dispute. M. Vieille showed many years ago that there was a tendency in a long column of powder for wave pressures to be set up, whereby ring bulges were produced in the neighbourhood of the projectile. Notwithstanding this, the Proof House continued to test express rifles with a column of powder extending several inches up the rifled part of the bore, and to reject those weapons whose interior surface was ruined by nasty little ring bulges of various degrees of depth. In consequence of this and other evidences of much-needed reform, the gun trade, and in particular its representative association in London, adopted an attitude of hostile criticism, which took the form of repeated protests to the London Gunmakers' Company. Almost needless to say the constitution of this Guild was objected to as affording too

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little opportunity for forcing its executive body to deal with grievances whose existence could not be denied. True to its traditions, the London Gunmakers' Company maintained an attitude of dignified reserve; but, on the other hand, it promised to enquire most carefully into the grievances that had been brought forward. It is possible now that years have gone by, and the feelings of resentment that were roused have died down, to review the progress that has been registered in the interval. It is, however, only fair in connection with the question of ring bulges in proof, to say that the true explanation was not forthcoming till the matter was referred to the proof-house experts. Others who had gone into the question had strayed into fallacious reasoning.

Originally, only two gunmaking firms were represented on the Court of the London Company, these being first, the premier house in the trade, Messrs. Purdey, and in addition a much less-known arms manufacturing company, trading both under the name of Barnett and as the London Small Arms Company, the latter name being adopted by them in connection with their military work, and for other contracts for government and other rifles. This firm has hardly been identified in the ordinary way with the gunmaking interest, such as appeals to the sporting world of Great Britain and the Colonies. Hence it was almost to Messrs. Purdey alone that the representations of the trade could be reckoned to go home.

Since those days, however, a great change has come about. The vacancies on the Court that have since occurred have been filled by men whose knowledge of, and touch with, gun and rifle-making could not be questioned. Mr. H. W. Holland, who is in our opinion the most able man in the entire gun trade, was elected a member of the Court. Subsequently two other vacancies have occurred; and of these, one was allocated to Mr. R. W. S. Griffith, whose scientific attainments and general commonsense attitude must have represented a great accession of strength to the *personnel* of the Court. Mr. C. O. Purdey is another of the newer members of the Court, and although he is not very well known in connection with his adopted business, he, at least, possesses the most useful qualification that he is a gunmaker and well versed in the routine of the important establishment which is carried on under the family name. Thus we see that the tendency of the Gunmakers' Company has been to meet the criticisms of the trade by appointing to the vacant positions on the Court those who can approach the problems brought forward with a full sense of responsibility and a knowledge of the questions they are called upon to decide. This may or may not be a case of cause and effect, but whatever may have been the influence at work, the fact remains that the result has been thoroughly satisfactory.

It is, perhaps, now appropriate to examine how far the altered personality of the Court has gone in the direction of bringing the operations of the Proof House into greater sympathy with the trade upon which its decisions have so important a bearing. As is well known to our readers, the past two or more years have been a time of great activity and ceaseless experimentation. It was recognised that the methods of proof had not kept pace with our ever-increasing knowledge of ballistics; whereby methods of proof that involved fallacies continued to receive the recognition that arises from daily use. The nitro proof for shot-guns is an excellent instance of the kind of thing we have in mind. It was mistakenly supposed some ten years ago, that if one wanted a powder to give a good stress at the breech, and maintain its pressure well forward, the proper thing to do was to have a powder consisting partly of large grains and partly of small ones. The small grains, by their rapid combustion, were supposed to give a high breech pressure, while the larger ones, according to the same line of reasoning, could afford the progressive evolution of gas essential for testing the barrel forward. It is now well-known that this pretty theory fails in the one essential of agreement with existing facts. Such a powder must burn in accordance with the average size of the two extremes of grain, and the tendency of the small grains to gravitate to the bottom of the receptacle containing the powder, necessarily means that the grains would tend to become classified, and so produce irregularity of results, according to the state of separation the powder had attained. Much greater fallacies could be quoted in connection with the testing of many of the more modern forms of weapon of which the last few years have seen the rise, and hence the urgent need for re-organising the proof methods on a proper scientific basis was recognised as proved up to the hilt. Whether or not the Proof House of London was stimulated into action by the criticisms of the gun trade, the fact remains that it approved the very sound principle of going for expert advice where it knew it could get it; and the result has been that the new proof regulations now in their final, or nearly final, stage have been drawn up with an amount of knowledge and appreciation of the latest scientific developments that could not have been improved upon had a Royal Commission been asked to undertake the work. Whatever may be said in a critical spirit concerning the London Proof House, it seems to be generally understood that its work is carried on under conditions of harmony and mutual good understanding, such as one cannot always guarantee in bodies of a different constitution, whose individual parts are brought together by popular election.

This article is in no way put forward as an *apologia* for the London Proof House. This body is perfectly well able to take care of itself; but, on the other hand, it has its constituents, and it must surely appreciate such recognition as one can honestly put forward of the exceptional efforts it has made of late years to bring its methods into harmony with modern conditions. Among gunmakers it does not seem to be as widely known as it might be, that a change, slow, but sure, is coming along. If one were asked to name instances in proof of such an assertion, it might be difficult to quote specific examples. On the other hand, among those who are in touch with the tread of thought in matters that concern the welfare of the gun trade, the impression is gaining ground that the Gunmakers' Company is more open than ever before to receive suggestions, and that it is throwing off to an appreciable extent the cloak of reserve with which it has hitherto shrouded its doings. No doubt, as time goes on, evidences of this favourable frame of mind will become more and more plentiful, and that without in any way detracting from the authority that must of necessity be vested in a body having such important functions to fulfil. It must not, of course, be supposed that such a line of development is the result of striking an average between the conflicting views of two sections. It merely implies that the urgent need of gun and

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rifle makers to maintain the closest touch with the ever-changing requirements of their business has been recognised, this recognition being the more readily granted as the technical representation on the Court of the Company becomes greater and greater.

While the spirit of the proof regulations is inspired as much by a desire to protect the sportsman as to assist the gunmaker in keeping the design of his weapons within the bounds of sound construction and fitness for the functions in view, it must never be supposed that a wholly technical Court is to be desired. Gunmaker members of that body are desirable, and the responsibilities of their position are such that they are bound to act in a public-spirited manner, even where the result may be to increase the costs of carrying on their business. Even so, however, it is an advantage that the Court should contain a due leavening of lay members, and for this reason it should be well understood that there will always be a fair proportion of members who regard guns and rifles rather from the point of view of representatives of the British public than as manufacturers. Nevertheless, the younger generation of gunmakers would be well advised in seeking admission to the Livery of the Company, since the connection cannot be a disadvantage, and at the same time t carries with it the chance of promotion to the Court should they be known as men of culture and masters of their vocation.

Having said so much about the Gunmakers' Company, which is framed in a spirit so different from that in which the same subject was discussed in these columns some eight years ago, it may not be out of place to suggest that the good work that has been proceeding, will not be finished when the new rules are passed. There is one direction in which the experience of those who are in the habit of submitting guns for proof seems to suggest that there is scope for improvement. According to all accounts the actual operations of proof are not conducted with the care and skill that the value of the property so handled would seem to necessitate. The constant supervision of one well versed in all that appertains to the making and testing of guns seems to be desirable, and if existing office-holders, having vested interests of a conflicting kind, stand in the way, they should be placed on the retired list. In fact, until the daily work of the London Proof House is placed in the skilled hands of one who is more than a mere workman, it would seem as though there still remained too serious an opening for improvement to justify a wholly favourable attitude to things as they now stand.

GUNMAKERS AT DINNER.

THE annual dinner of the Gunmakers' Association, which took place on the 22nd ult., may well be pronounced the most successful hitherto held. Not only was there a much larger proportion of gunmakers than on any previous occasion, but the friends and other guests who assembled to do honour to the Association and its retiring chairman, were exceptionally representative of the large body of persons who are allied one way and another with the industry of gunmaking. The position of honour was accorded to Mr. Wm. Senior, the editor of *The Field*, whose sympathy with the work of the Gunmakers' Association was thereby expressed, his presence being much appreciated by the members present. He was supported by Mr. J. E. Harting, shooting editor, and Mr. C. J. Butcher, assistant editor. Other members of the press who were present as guests of the Association were Mr. E. G. Mackenzie, of *The County Gentleman*, and Mr. E. H. Stone, of the *Sporting Goods Review*.

Another agreeable feature of this gathering was the fact that Mr. W. H. Hughes, chairman of the Birmingham and Provincial Gunmakers' Association, and Mr. J. C. Scott, a member of its Executive, were present. This was considered a valuable proof of the thoroughly friendly relations that exist between the two bodies; and in the course of the evening a hope was expressed that some day it would be possible to form a joint committee of the two Associations for dealing with questions of mutual interest. Other visitors included Mr. R. W. S. Griffith, of the Schultze Company, and Mr. J. C. Irvine, of Messrs. Eley Bros., Messrs. Charles Whitehead and F. W. Jones were also present on behalf of this firm, as also was Mr. Melville Smith, on behalf of the King's Norton Metal Company, Mr. F. C. Borer, of Schultze, Mr. H. W. Newton, of Curtis's and Harvey, Mr. W. R. Hillsdon, of the Kynoch Company, and a representative of Messrs. Joyce completing the list of allied representatives. The gunmakers present, in addition to those already enumerated, were Messrs. H. J. Blanch, A. H. Gale, H. W. Gibbs, H. W. Holland, the brothers Robertson, A. F. Embleton (Boss & Co.), Frank Murray, Beesley, Chas. Hobday and Mr. W. J. Whiting, of Messrs. Webley, Mr. W. Corrie (Evans & Co.), F. Beesley, Robert Gray, the brothers Harrison, H. Greener, W. R. Oliver, J. M. Kerr (London Armoury Co., Ld.), G. A. Cartwright, H. W. Monnickendam (of Chas. Lancaster). Other guests included Mr. H. G. A. Thorn, Mr. Edgar Barnes, Mr. Frank Garwood, Mr. Angiers. Apart from the guests of the members were Mr. R. T. Woulfe, solicitor to the Association, and Mr. Max Baker, secretary.

The dinner was well served, and the menu executed in a manner that seemed to please the assembled company, at the same time reflecting credit on the Trocadero Restaurant. During and after the dinner a number of band selections were rendered, the idea being to afford entertainment without placing restraints upon conversation, such as are necessary when vocal music is the order of the day. Mr. Edgar Barnes, one of the guests at the dinner, helped to make things go merrily by singing several favourite melodies in a tenor voice of great sweetness and expression.

According to previous arrangement, the speeches were kept within circumscribed limits, the toast of the evening, "Success to the Gunmakers' Association," being the only one which covered a good deal of ground. The chairman referred to most of the subjects that have been uppermost during the past few years; but this did not prevent him from doing full justice to the occasion by welcoming those who had devoted an evening to the mild festivity of a gunmakers' dinner. The other speakers included Mr. W. H. Hughes, who proposed the health of the chairman, and Mr. J. C. Irvine, who said some very nice things about the press in proposing their health. Mr. J. E. Harting responded, and in so doing pointed out that while he hoped the press would never adopt a dictatorial attitude on gunmaking matters, he at the same time trusted that their efforts to indicate the lines of sound theory would meet with due appreciation.

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ROUND THE TRADE.

We hear that Mr. Roper, the ever-courteous engineer to Messrs. Eley Bros., Ld., has taken to himself a wife.

The affairs of Mr. J. H. Barber, gunmaker, of 9, Court Street, Faversham, are in bankruptcy.

A fire occurred on Saturday, April 25th, at the paper and wadding mills of Messrs. Baldwin, of Birmingham.

The death of Mr. James Webber, retired gunsmith, of Barnstaple, in his 101st year, occurred on April 21st.

We understand that Mr. P. Bozard has severed his connection with Messrs. Moore and Grey, and Mr. Cameron, for many years in the firm's employment, is now in charge of the Craven Street establishment.

This month's instalment of our "Lectures on Caps" has been held over, due to pressure on our space by the many other subjects of interest which have come up for treatment in consequence of the recent meeting of the Gunmakers' Association.

The Marlin Firearms Co., of New Haven, Connecticut, U.S.A., have called our attention to their new Grade B repeating shotgun, which has just been brought out. It is not as elaborate in style as the Grade C or D, but very much nicer in finish than Grade A. The Company hopes that it will be appreciated by those who want something especially nice at a moderate price.

The newspapers continue to record particulars of cases where the energy and enterprise of rifle clubs, have been constantly balked by the difficulties that landowners and others have placed in the way of acquiring suitable range accommodation. A letter in *The Times* of the 11th ult. gives particulars of a very bad case, where, as it happened, the local authorities have been the cause of very serious delays, when the landowner had done all that was possible by way of presenting a site.

In consequence of the Annual Meeting being a little later this year than usual, the directors of the National Explosives Co., Ld., desire to intimate that subject to the accounts being approved by the auditors, they propose to recommend, at the General Meeting, to be held towards the end of this month, a dividend of 8 per cent. on the Preference Shares, 10 per cent. on the Ordinary Shares, and £3 15s. 10d. per share on the Deferred Shares (inclusive of the interim dividend already paid).

The National Sportsmen's Exhibition which has recently been held at Norwich, seems to have been well represented by various exhibitors of sporting accessories. The Normal Powder Co., who seem to have turned gunmakers, had a large exhibit of sporting guns, Mr. Cashmore, of Birmingham, being also represented on the spot, his exhibit including the gun which recently won the Grand Prix at Monte Carlo in the hands of Captain Pellier-Johnson, who, by the way, has been a resident in Norfolk for some years past.

It is reported from Birmingham, that employment is at the present time very slack at Small Heath and Sparkbrook, in consequence of the stoppage of manufacture of the present pattern Lee-Enfield; the tool-making departments being very busy getting the fixtures and plant ready for the manufacture of the "improved" Lee-Enfield, it being hoped that in a very short time the special appliances will be ready for work on the new model. The B. S. A. Company are doing their best to keep their staff together during this period of transition.

The Waffenfabrik Mauser A.-G. have written us a letter in reference to our note last month on the subject of the Parabellum pistol, pointing out that the pistol in question is not manufactured by the company we stated, but by the Deutsche Waffen-und-Munitionsfabriken, of Berlin, the former company being the manufacturers only of Mauser arms on their own Mauser systems, their representatives for this country being Messrs. John Rigby & Co., for sporting rifles, and Messrs. Westley Richards & Co. for the Mauser self-loading pistol.

The report of the Hotchkiss Ordnance Co., for 1902 shows a net profit of £7,474 which, with the amount carried forward makes £12,321 available for appropriation. Of this amount £5,745 is absorbed for interest upon debentures and debenture stocks, £1,500 for service of the sinking fund, £1,324 reserved for income tax, leaving £3,752 for carrying forward. In order to cover the fluctuations in orders for ordnance, the Directors are of opinion that some outside manufacture should be undertaken, and they therefore, propose to construct automobiles for which further capital will be required.

Teams drawn from the rival establishment of Messrs. Boss and Co., and Woodward engaged in a football match at Pinner on Saturday, April 25th, and the result was a win for the Woodwardites by 1 to 0. The players and friends were entertained to dinner at the Ship Inn with Mr. John Robertson in the chair. The pleasure of the evening was at its latter end somewhat marred by an accident through one of the party present falling into what nearly proved a veritable death trap. By a deed of heroism, the danger was averted, and everyone is now able to congratulate themselves that no untoward results have followed.

It has been decided that the International Competition for the Palma Trophy will be held at Bisley on Saturday, July 11th, preceding the ordinary Bisley Meeting. The difficulty was to decide whether to precede or succeed this fixture, the fear being expressed on the one hand that the men would have to shoot without sufficient practice, and on the other that they would run the risk of being stale. The former has been considered the lesser evil, and Major Freemantle, Captain of the British team, points out that it will be necessary for those selected to shoot or to act as reserve men to practice at Bisley during the week commencing July 6th.

In our last issue we omitted to state that we had received from the Home Office the official report of Major Cooper-Key, H.M. Inspector of Explosives, on the circumstances attending an explosion of partly mixed cordite paste which occurred at the factory of Messrs. Curtis's & Harvey at Cliffe on December 15th, 1902. In view of the complete destruction that occurred very little evidence of an exact nature was forthcoming, but briefly stated, it is Major Cooper-Key's opinion that the accident under report may be attributed either to the fall of one brass-lined box on another or to a collision between two of these boxes, but that how such fall or collision took place it is impossible to determine.

H. M. Inspectors of Explosives have been very prompt in issuing their report of an accident which occurred in the Drying House of the E. C. Powder Co., on the 3rd of March. Captain Thomson who signs the report, states it as his opinion that the accident was due to the metal frame of the drying rack being struck by a zinc dustpan, which the workman was improperly using for the purpose, the same being supplied solely for clearing rubbish from the floor. Captain Thomson condemns in the strongest terms the mendacity of one of the workmen involved, who sought to conceal his breaking of the rules by the giving of an inaccurate account of the proceedings. The Chief Inspector concludes by thanking Mr. Borland for giving every possible assistance in carrying out the enquiry. We, for our own part, are able to say that the two workmen who were burnt by the flames are making a good recovery. In accordance with what might be expected from E.C. Powder the accident was a question of fire and not one of explosion.

We have received a copy of the full programme for the *Concours Internationaux de Tir aux Pigeons* which will take place at Florence on the five days ending the 21st instant. The prizes amount to the substantial total of 27,500 francs which work out at £1,100 in English money, while in addition there are eight Gold Medals. The chief event, which unfortunately for the sentiment of English competitors is down for the shooting of the first round on Sunday, is to be known as the Grand Prix d' Italie, and the conditions are four pigeons at 26 metres on Sunday, and eight pigeons at 27 metres on the Monday. The entrance fee is 200 francs, or approximately £8, the Prize List running into 20,000 francs. The Grand Championship Competition, open to all Nations,

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is another event, which, however, is based on a modester scale as regards entrance fee and prize money. The management of the meeting seems to be in good hands, and altogether there is reason for supposing that this Italian meeting stands a good chance of representing the start of an interesting series of annual Competitions.

MODERN CARTRIDGE LOADING.

THE conditions of the cartridge business are ever undergoing a change in the commercial aspects. The tendency is always towards cheapness, sportsmen being, as a rule, so ill-advised as to patronise those brands in which the last half-penny of cost has been trimmed down. Profits have necessarily followed the same way, so that there is no longer the prospect of regarding the trade in cartridges as the substantial stand-by that it was ten years ago, all the while that we know that complaints of the same kind as are rife to-day were then urged with even greater persistency than they are now. The explanation must lie in one or other of two directions; the first, that things have been getting steadily worse; the second, that production has in some way been cheapened to meet the turn that the market has taken, and that it is merely the ever-present straining for even lower prices than at present reign, which is causing the repeated complaints which one hears on all sides. Even the apostles of cheap cartridges are heard to complain that business never really flows except when bargains are being offered at knock-out prices.

Sportsmen, as a class, rule the position. Each one among them considers himself a competent judge of ammunition. Even those who most persistently miss their birds, or find it necessary to make undue use of the second barrel, are always ready to quote some lucky fluke as a proof of their sagacity in saving the difference between cheap and dear cartridges. It is very difficult to convince an intelligent man, let alone one who has his conclusions cut-and-dried before commencing an argument, that the sportsman is a very bad judge of a cartridge. The expert who knows his chronograph, and who can read the hidden meaning of the patterns shown on the plate, is the only man who can say what cartridge is likely to give the best average results in the field. He knows that a patchy pattern is conducive to occasional fluky successes at inordinate ranges, and he is equally well-informed concerning the velocity that will afford the most judicious combination of evenly-distributed pellets and reliable penetration. The sportsman who endeavours to imitate the expert, makes the mistake of trusting too implicitly to pattern; and even if he ends by working out a charge that would not let a sparrow go unscathed at 30 yards, he probably departs in so doing from the average to which a good all-round cartridge should conform.

Being face to face with personal as well as financial and administrative problems, the cartridge-loading gunmaker is at his wits' end for a clear line of policy to adopt, whereby he can, in his own individual way, work towards the goal that offers the surest prospects of ultimate success. Too many believe that the only possible course to adopt is to fall into line with the craze for cheapness, and endeavour, by increasing sales, to compensate for the percentage reduction of profits. Such a policy is all very well when carried out by the greedy minority; but when the majority of dealers adopt it they end by helping one another to do a lot of hard work for a mere pittance. Another class of cartridge vendor endeavours to find a remedy for the perplexing situation that faces him, by cultivating a name for specialised skill in cartridge loading. This is a praiseworthy view to adopt; but, unfortunately, much of its virtue is lost through endeavouring to impart peculiar characteristics to his own particular brand of loading. The successful cartridge must always represent a judicious compromise between extremes, so that the moment one characteristic is unduly developed, the others suffer in proportion, so that the result is a lowering of the general average that distinguishes the well-behaved cartridge. When, therefore, a cartridge loader decides to counteract the tendency towards cheaper cartridges by paying special attention to quality, he is faced by the difficulty of knowing just what specification to follow in order to earn the extra price he hopes his customers will be willing to pay.

At this stage he calls theory to his aid. The intelligence with which he has studied the causes of past successes and failures, to say nothing of the views he has acquired from a perusal of the writings of the various authorities, self-styled and otherwise, who interpret the lessons of the laboratory; in fact, the results of a life-time's experience are brought to bear on the issue that must be faced. In the end, his course of action is duly defined, and he sets to work. To those who have still an open mind on the subject, and it surely bristles with an imposing array of technicalities, the few remarks we may have to make may be of interest. We cannot, however, deal with cartridge loading until we have reviewed the indirect influences that arise from the present position of the powder trade. Years ago it was a question which was the best powder. To-day it is much more pertinent to enquire which is the best-made powder. That is to say, the chemical constitution of smokeless powders is now established on so firm a basis that the leading nitros are all assembled from recognised proportions of well-known ingredients. The few instances where the elements of composition are not understood, may be dismissed, their bad qualities being demonstrated by their want of patronage by consumers. Granting, therefore, that every powder-maker, who knows his business, is able to control, in whatever manner he thinks fit, the behaviour of his product, we must recognise that the idea aimed at is one that represents the highest attainable average of good qualities, and the smallest manifestations of such necessary evils as blow-black, high-pressure, unpleasant recoil, and so forth.

We have already given credit to the maker of a successful powder of knowing his business. In so doing we must give him credit for also knowing the most suitable means of giving to the cartridge the most suitable combination of good qualities, and of reducing the necessary evils to a minimum. It is impossible to give to every maker an equal share of credit for achieving the same results with every batch he turns out; but this involves a matter of degree and not of principle. According to the skill with which a powder is turned out, so every batch approaches, more or less closely, the ideal aimed at, and that ideal is most closely approached by loading to instructions, rather than by departing from them according to the fancy of the individual. The only circumstances in which it is permissible to depart from standard methods of loading, occur when the loader is so well equipped with testing instruments that he can find out for

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himself the characteristics of each delivery of powder, and suit the load to the results desired. Otherwise, he will be best advised if he works on the recognised lines. For the protection of his customers' interests, he should make occasional tests of pressure, and, at the same time, take patterns in a gun with whose behaviour he is familiar.

Now that it has been shown that the progressive cartridge loader should, above all things, avoid usurping the functions of the powder-maker, it is time to review the departments of loading, where he may exercise to the full his desire to turn out good shooting ammunition. It stands to reason that the first requirement is the accurate measuring of the powder charges. We all know that any ordinary well-constructed powder-filling apparatus will repeat the load for which it is set to the fraction of a grain, say one-fifth variation on either side of the mean. Constant care and supervision are necessary to ensure the keeping of this mean at the standard value, and to apply a prompt remedy the moment that careful inspection has demonstrated the existence of irregularities. Were this simple advice more often followed than at present, instances of serious variations from cartridge to cartridge would be less frequent, and the factory-loaded case would not have attained the vogue it has to-day.

As this article is not put forward as a treatise on cartridge loading, it will be unnecessary to do more than refer in general terms to the other points that require attention if a well-loaded cartridge is to be produced. The card wadding must be true to gauge, and of the thickness recommended by the cartridge loader. Variations from ordinary loads of shot must be accompanied by a suitable adjustment of the wadding to be used. On the selection of felt wads alone a chapter might be written. They must, above all things, be made of a quality of wool that combines the necessary elements of firmness and capacity to expand upon being subjected to pressure. The grease must not exceed its due proportion of the total weight, and there must be a regularity of thickness such as will ensure, in every cartridge, the requisite true placing of the card over the powder. The actual distance of entry of the over-felt wad must be governed by the value of shot charge to be inserted, and the wads between it and the powder must have the combined thickness that leaves to the explosive the space that is required for its proper combustion. The accurate measuring of the shot, the square seating of the top wad, and the allowance of just the right amount of case for a good turnover must all be studied in turn, not once and for all, to cover an entire season's output, but from day to day, and from week to week, to make sure that faults shall not be passed undetected. Finally, to impart the correct shape and firmness to the turnover is itself a study that will absorb many hours of patient study and experimentation, to say nothing of the supervision of the loading staff, whereby each, according to the work he has to do, shall reproduce in his own work the ideals laid down by the supervisor of all these things.

In fact, modern cartridge loading is more a laboratory process than many people believe, and it is those who ignore quality, and compete only in cheapness, who fail to see how each trader, in working towards perfection by individual effort, can stem the tide that is flowing too fast towards disappearing profits and a hopeless set of conditions for the country retailer. The man who spends from ten shillings to a pound a head on the game brought to bag, must surely be open to conviction that the cheapest cartridges are the dearest in the end. The argument of quality versus inefficiency must surely prevail if those who load cartridges bearing their own name will only make sure, to the best of their ability, that quality is the mark aimed at, and that faddism shall be relegated to a back seat so long as there are more important things to attend to.

TRADE MARKS.

APPLICATIONS ADVERTISED. APRIL 1—23, 1903.

252,058. Nobels Explosives Co., Ld. Glasgow. The word "ANCHORITE." To apply to explosive substances not including safety fuses. Feb. 9, 1903.

252,233. Rheinisch-Westfälische Sprengstoff A.-G., Germany. A device representing an "ACORN" enclosed within a circle. To apply to explosive substances. February 13, 1903.

252,322. Nobels Explosives Co., Ld., Glasgow. The words "ANCHOR POWDER." February 17, 1903.

252,372-3. Kynoch, Ld., Birmingham. The word "BONAX" to apply to explosive substances and arms, ammunition and shot. February 18, 1903.

252,€79-80. Kynoch, Ld., Birmingham. The word "HALEX" to apply both to explosive substances and arms, &c. February 28, 1903.

252,829. Hall Bros. & Co, Liverpool. A device representing three crossed paddles, around the top of which, over a semi-circle, are the words "THREE PADDLES BRAND." To apply to explosive substances. March 6, 1903.

TRADE MARK REGISTERED. MAR. 19—APRIL 15, 1903.

251,748. Eley Bros., Ld., London.

APPLICATIONS FOR PATENTS.

MARCH 23—APRIL 18, 1903.

6,689. Fuse Igniter. A. Engl.
6,700.* Projectiles. N. Dansler.
6,743.* Sights for Small-Arms. H. S. S. Watkin and J. J. Speed.
6,744.* Rifles. H. S. S. Watkins and J. J. Speed.
7,014.* Trigger Mechanism. K. Völler.
7,046. Single-Trigger Mechanism. H. A. A. Thorn.
7,058. Nitro-Cellulose. G. J. Atkins.
7,188. Automatic Fire-Arms. O. Imray (Agent tor *Colt's Patent Fire-Arms Mfg. Co.*)
7,213.* Range Finders. A. J. Boult (Agent for *The Warner and Swasey Co.*)
7,269, Explosives F. L. Nathan, J. M. and W. T. Thompson.
7,282. Small-Arm Sights. J. F. W. Leach and C. A. Brentnall.
7,338. Range Finder. W. L. Wyllie.
7,573. Impact Cushion for Guns. G. Peart.
7,688.* Range Finders. G. Nicholson.
7,695.* Glazing of Gunpowder. A. J. du Pont.
7,712.* Glazing of Gunpowder. A J. du Pont.
7,858. Priming of Cartridges. R. Collet.
7,923. Cartridge Pouches. E. P. and H. W. Lawrence, and J. Row.
7,931.* Cartridge Carriers. A. J Boult (Agent for *A. Mills.*)
7,980.* Electric Targets. G. A. Peters.
8,057.* Projectile Fuses. H. Dahlke.
8,107. Rifle. H. Hallows.
8,139.* Single-Trigger Mechanism. F. Beesley.
8,155 * Loading of Ordnance. C. P. E. Schneider.
8,156.* Firing Mechanism of Ordnance. C. P. E. Schneider.
8,159. Automatic Signal Gun. J. Poultier.
8,278, Nitro-Cellulose. J. M. and W. T. Thompson.
8,301. Semi-Automatic Fire-Arms. T. R. R. Ashton.
8,303. Loading of Magazine Arms. T. R. R. Ashton.
8,326. Blasting. P. A. MacMahon and J. M. Macdonald.
8,330. Miniature Rifle Shooting. F. Flatman.

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8,333. Targets. R. A. Rogers.
2,977A. Shells for Signalling. A. Brock. (Date claimed February 7, 1903).
8,576.* Loading of Ordnance. C. P. E. Schneider.
8,640. Single-Trigger Mechanism. D. M. Fraser.
8,674. Loader for Sporting Guns. W. J. Seton.
8,843. Submerged Torpedo Tubes. Sir W. G. Armstrong, Whitworth & Co., Ld., and E. L. D. Boyle.
8,848.* Blasting Fuse Igniter. H. H. Lake (Agent for *Société Française des Munitions de Chasse, de Tir, et de Guerre.*)

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

MARCH 26—APRIL 23, 1903.

COMPILED BY H. TARRANT.

24,814 (1901). **Sighting from Cover.** W. Youlten, London. An instrument more especially designed for sighting ordnance from cover. It consists of a tube or series of telescopic tubes, at either end of which is a prism. The object aimed at is by this means reflected down to the eye of the concealed gunner. Accepted March 5, 1903.

2,165 (1902). **Sighting and Range-Finding Apparatus.** G Russo and C. Laurenti, Italy. An optical instrument, so constructed that the panorama, in which lies the object aimed at, is reflected downwards through a tube to an eye-piece fixed at right angles to the tube. By means of a network of lines traced upon a piece of ground glass within the tube, the instrument may be used also as a range-finder. Accepted February 27, 1903.

4,532* (1902). **Ashton Rifle Mechanism.** T. R. R. Ashton, London.

6,034 (1902). **Optical Sight.** Lieut.-Col. H. C. Dunlop, R.A., London. Optical sights for guns consisting of the combination of a curved tangent scale graduated in ranges, and used instead of a foresight, with an optical appliance, such as a telescope or binoculars. The latter appliance is arranged so that the target and the tangent scale may be focussed at the same time with one eye. The apparent size of the tangent scale may be altered by means of adjustable lenses in order to counteract falling off in velocity due to wear. Accepted March 12, 1903.

7,764 (1902). **Disappearing Targets.** T. Goucher, Tasmania. A simple form of disappearing target constructed in such a manner that marking may quickly be performed. Two targets are mounted upon two beams, which are rigidly secured at right angles one to the other. A diagonal brace fixed in the angle formed by these beams is so pivoted to an upright that the targets are swung through an angle of 90 degrees in order to expose one and conceal the other. Accepted March 5, 1903.

7,894 (1902). **Lathe for Grooving Projectiles.** A. J. Astbury, Birmingham. By means of an eccentric which is caused to actuate a rod secured to the saddle of a lathe, the tool carried by the saddle is caused to slide to and fro in a direction parallel to the axis of the projectile held in the lathe. By this arrangement the spiral-waved projections upon the bottom of the groove, which are turned in the projectile to receive the copper band, are cut without stopping the lathe after performing the previous operation. Accepted March 5, 1903.

7,951 (1902). **Field Gun Mounting.** C. Holmström and A. Bremberg, Glasgow. A carriage for field guns, in which the most important features are:—the traversing gear, consisting of a cross-head pivoted on the trail which carries the trunnion bearings, and is adapted to slide transversely on the axle bracket by turning about the pivot on the trail; the elevating gear which is connected to, and moves laterally with the traversing gear; and a shield for protecting the gunner which is caught up underneath the trail when travelling. Accepted March 19, 1903.

9,213 (1902). **Breech Adapters.** The Wilkinson Sword Co., Ld., and H. W. Latham, London. This patent covers the employment within a breech-adapter of a copper, or non-corrosive metal-covered steel plug shaped to receive the impact of the head of the striker, and perforated to allow of the passage of the striker tip. The head is screwed in the tube end which guides the striker. Accepted March 19, 1903.

9,410 (1902). **Magazine Mechanism.** H. W. Holland, London, and W. Mansfield, Child's Hill. The cartridge-lifting platform is coupled to the forward end of lever-arm, which arm extends backwards and turns upon a fulcrum pin at the rear of the magazine. The other arm of the lever extends downwardly and projects through a slot in the trigger guard. By means of this arrangement the platform may be held at the bottom of the magazine to allow the cartridges to be dropped in. A sear spring is also described. Accepted March 19, 1903.

9,480 (1902). **Smokeless Powder Grains.** Hudson Maxim, U.S.A. In order to obtain better ballistic results, a smokeless powder charge composed of grains of rod-like form, each provided with longitudinal and lateral perforations, is arranged around a core of quick burning powder. By means of this form of charge, it is claimed, wave action and irregularity of combustion are obviated. Accepted March 12, 1903.

9,927 (1902). **Magazine Mechanism.** J. H. Topham and A. W. Brewtnall, Manchester. By means of a thin band of metal, which is arranged to slide over the cartridge-platform-raising spring, an outside handle when depressed, takes the platform to the bottom of the magazine, the loading of which is thus facilitated. Accepted March 12, 1903.

9,971 (1902). **Rifle-Carrying Arrangement.** Lieut.-Col. G. S. McD. Elliott, R.E., Dover. By means of a band of webbing, which passes over the left shoulder, and to which is secured a running noose, the rifle may be tightly carried upon the back when riding and may be easily unslung. The noose holds the barrel whilst a strap, hooked to the noose, holds the small of the stock. Accepted March 19, 1903.

10,332 (1902). **Bullets.** Sir W. G. Armstrong, Whitworth & Co., Ld., and A. G. Hadcock, Newcastle-on-Tyne. A bullet in which the core is formed of a mixture of lead and tin. This core is pressed into an envelope of metal, such as copro-nickel. Near the base of the envelope is a projecting ring, which is adapted to engage the rifling. Copper driving-rings may be pressed into the casing to perform the same function. Accepted April 2, 1903.

10,528 (1902). **Shot Firing.** C. Cook, New Brinsley. In this patent, portable galvanic batteries are described, which are constructed in such a manner as especially to adapt them to the specialised function of shot-firing. Accepted March 12, 1903.

11,088 (1902). **Cattle Slaughterer.** E. Finke, Germany. A cattle-slaughtering fire-arm, which is shaped in a fashion similar to a pistol. The projectile consists of a hollow bolt, which, without becoming entirely disconnected from the pistol, enters the brain of the beast and allows the gases of combustion to rush through it and so to stupify and immediately kill the animal. Accepted March 12, 1903.

13,337 (1902). **Recoil Apparatus of Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). In order to close the cradle at the end next the breech to protect the barrel-returning springs from dust, packing is so fixed to the cradle that it surrounds that part of the recoil brake which recoils and returns with the barrel. The intermediate space between the recoiling part and the cradle is thereby closed at least when in the firing position. Accepted April 2, 1903.

19,518 (1902). **Disappearing Targets.** J. W. Porter, Australia. Moving and disappearing targets, in which a traveller running upon rails is provided with a rotatable vertical target carrying spindle. The spindle has a tappit wheel provided with four radial equidistant projections, which are adapted to strike against pins projecting from the rails. By means of this arrangement the travelling target is, at intervals, turned through an angle of 90 degrees, so that it is alternately "edge on" and "face on." Accepted March 5, 1903.

23,419 (1902). **Rifle Sights.** R. B. Ransford, Upper Norwood (Agent for *The Peddie Sight Co., Ld., Canada.*) Improvements upon the sight described in Patent No. 1,952, 1902. The cross-bar is provided with a locking device in order that it may be secured in any position. The main adjusting-screw

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is also protected, and a graduated finger extends along one side of the graduated frame. Accepted March 19, 1903.

25,518 (1902). **Recoil-Operated Small-Arms.** P. Mauser, Germany. In a very bulky specification an automatic rifle is described, in which the barrel and breech are not unlocked after discharge until the breech has completed its backward travel. It is claimed that by this arrangement the force evolved by the gases of combustion is most economically utilised, because they have time to expend their energy upon the projectile. The ejection of cartridge cases also takes place quietly. Accepted March 5, 1903.

28,536 (1902). **Cartridge Boxes.** L. Bernhuber, Austria. A cartridge-carrier so constructed that, although very light, is stiffly built and damp resisting. The sides, mounted on a special base, consist of sticks of fabric-covered cane. A covering of skin or raw hide is pressed on to the fabric, so forming a stiff and waterproof wall. Accepted March 19, 1903.

411 (1903). **Extracting Mechanism of Ordnance.** P. M. Justice, London (Agent for *The Bethlehem Steel Co., U.S.A.*) A shell-extracting lever, which during the opening of the breech is rocked slightly upon its rolling fulcrum. The shell is thus started from the base with great leverage, and the continued movement of the breech during opening completes the extraction. A spring returns the extractor. Accepted March 5, 1903.

745 (1903). **Aim-Instructor and Recorder.** H. H. Cummings, U.S.A. Apparatus, by means of which, without actually shooting, a marksman may aim at a target and know exactly the part of the target he would hit. This knowledge is imparted through the medium of a pointer, which follows the movement of the rifle, and indicates upon a miniature reproduction of the target in which direction the weapon is directed. Accepted March 5, 1903.

859.* (1903). **Magazine Rifle Mechanism.** B. F., Fidelia L., and A. B. Perry, U.S.A.

860 (1903). **Bayonets.** B F, Fidelia L, and A. B. Perry, U.S.A. A bayonet which is provided with hand-guards arranged to be folded when the weapon is used as a bayonet, and to be extended when used as a short sword or as a dagger. Accepted March 5, 1903.

1,557 (1903). **Shot Cartridges.** C. Kurth, Germany. A shot-cartridge in which an air space is arranged in the shot chamber to allow of better combustion. The powder is enclosed in a cardboard tube, the openings in which are covered with netting. Accepted April 2, 1903.

2,567 (1903). **Magazine Guns.** H. H. Lake, London (Agent for *The Winchester Repeating Arms Co., U.S.A.*) A modification of the magazine in tubular magazine guns of the type described in Patent No. 17,167, 1901. The modification provides for a more reliable and convenient means for loading the magazine with cartridges. Accepted March 26, 1903.

2,570 (1903). **Magazine Loaders.** H. H. Lake, London (Agent for *The Winchester Repeating Arms Co., U.S.A.*) A two-tube charger for loading tubular magazines of guns, consisting of two correspondingly-shaped tubes connected together side by side. A spring, situated upon the outside of the tubes, is sprung out of the way in order to allow the cartridges in the tubes to enter the magazine. Accepted March 26, 1903.

2,592 (1903). **Waterproof Covering for Explosives.** F. Timmel, Austria. A waterproofing agent into which the explosive may either be dipped, or may be charged into as an envelope, consisting of a solution of celluloid in 5 to 90 per cent. of its weight in acetone, to which is added 5 to 15 per cent. by weight of a separately-prepared solution of linseed or castor oil in double the quantity by weight of acetone. Accepted April 2, 1903.

2,877 (1903) **Gun-Pivot Locking Device.** G. Ehrhardt, Germany. A device for locking the pivot to the axle of a gun, consisting of a closed ring with oppositely-arranged sections of different widths. In order to lock the pivot the ring is given a turn through 90 degrees, so that its narrow portion is brought in engagement with grooves cut upon the pivot. The ring cannot fall away during driving because the pivot has first to be taken out of its bearing in order to remove the ring. Accepted April 2, 1903.

* These specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

ASHTON RIFLE MECHANISM.

4,532 (1902). T. R. R Ashton, London. A shortened rifle is described in this specification. The rifle is of the straight-pull bolt type, and the shortening is produced by shifting the bolt and breech body rearwards, so that they are situated over the butt. The stock is hollowed out to receive the firing-pin operating mechanism; and the barrel remains of ordinary length. The specially-constructed bolt-mechanism adapted to this form of rifle, is of the straight-pull type described in Lee's Patent No. 18,866, 1895, and is alone dealt with in this specification.

The general disposition of the mechanism will clearly be understood from the drawings. The bolt *a* is provided with the locking-face *b*, which abuts on the surface *c* when the bolt is home. The bolt is operated through the medium of the handle *d* and the

Fig. 1

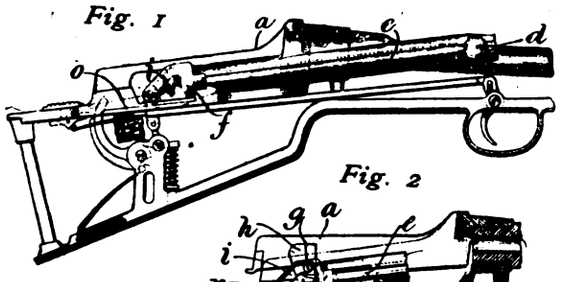


Fig. 2

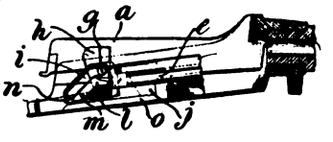


Fig. 3

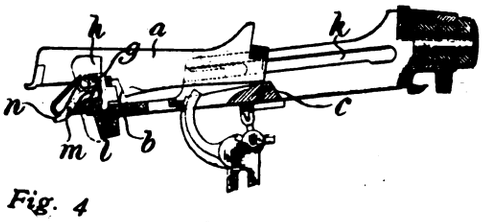
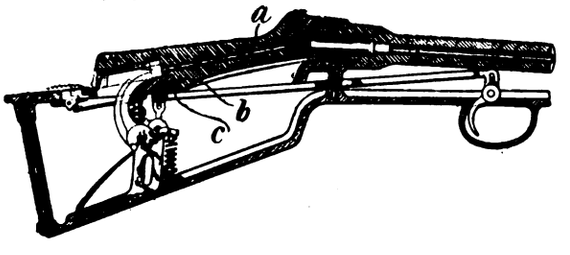


Fig. 4



reciprocating slide *e*, which are situated partly in front of the breech, because they could not conveniently be manipulated if placed in the usual position. At the rear end of the rod or slide *e* is a triangular-plate *f*, which is recessed upon its inner side in the inclined manner illustrated, to allow of the reception of the stud *g* outstanding from a lug *h* attached to the bolt. Fig. 1 illustrates the bolt in its locked position. If the handle is grasped and is pulled in a rearward direction, the movement is communicated to the plate *f* by the rod *l*. The consequent backward movement of the plate *f* causes the stud *g* to slide up to the lower edge of the inclined recess or slot *i*. The lug *h* to which the stud, it will be remembered, is attached, is thus lifted out of the recess provided for it in the breech body. The lifting of the lug brings about a raising of the rear end of the bolt *a*, which assumes the position illustrated in Fig. 2. The locking surfaces *b* and *c* are then disengaged, and further backward movement of the slide, bringing the stud *g*

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and the end of the slot *i* into contact, causes the bolt to be taken along the slot *k* to its extreme rearward position, as represented in Fig. 3.

During the rearward movement of the bolt, the pawl *l*, which also works in a recess on the inside of the plate *f*, has been forced around on its pivot *m* by its spring, to the position illustrated in Fig. 3. This movement occurs when the end *n* of the pawl leaves the engagement of the top of the cheek *o*, as it is seen just about to do in Fig. 2. When, therefore, the bolt handle is pressed forward to close the breech, the stud *g* is brought into contact with the head of the pawl and the stud, together with the lug *h*, and thus the bolt, is moved forward along the slot *k*. When the position, as represented by Fig. 2, is again reached, the pawl-end *n* strikes the cheek *o* and is lifted. The upper arm of the pawl is thus forced down and the stud *g* slides down the slot *i*, causing the rear end of the bolt to descend, the lug *h* to enter its recess *j*, and the surface *b* to lie against the abutment *c*. The lifting and depression, and the withdrawal and forward movements of the bolt are in this manner performed by a single rectilinear motion of the slide. The trigger and striking mechanism, and the safety bolt and trigger-locking device, which are illustrated, form the subject of another patent specification, so need not be described in detail. Accepted March 21, 1903.

MAGAZINE RIFLE MECHANISM.

859 (1903). B. F., F. L., and A. B. Perry, U.S.A. In the rifle described in this specification, the magazine is capable of carrying an unusually large number of cartridges, which are automatically transferred therefrom to the breech end of the barrel by a series of chambers, or clamping jaws, which revolve in a circular space in the breech.

Referring to the drawings, the complete mechanism is illustrated in Fig. 1. Figs. 2 and 3 are transverse vertical sections taken in different planes across the breech (Fig. 1), whilst Fig. 4 illustrates the trigger and sear. Extending transversely through the centre of the circular casing *a* is an axle *b*, which takes a bearing at its ends in the sides of the casing *a*. This axle is turned in its bearing by means of a fly-head *c* (Fig. 2). Immediately inside the casing *a* is mounted upon the axle a ratchet-wheel. A pawl *d* is attached to the casing to prevent the wheel, and thus the axle, turning in two directions. Upon the axle is also arranged a drum, to which the inner end of a flat-coiled sort of clock-spring *e* is secured. The outer end of this spring is attached to one arm of the circular-armed cartridge carrying-part *f*, which is adapted to revolve upon the axle *b*. The cartridge-carrier is held against forward movement by the catch *g*, which catch is held up to its work by a spring, as is illustrated. It will be understood that when the axle is turned by means of the head *c*, the spring *e* is wound up, the pawl *d* preventing movement of the axle in the opposite direction and the catch *g* of the cartridge carrier in a forward manner.

The cartridge-holders or clamping-jaws *h* are pivotally attached to a rim running between the cartridge shell-pans *i* (Fig. 2). These jaws, which conform with the cylindrical contour of the cartridge to be held therein, are caused to clamp a cartridge and hold it tightly by the spring *j*, the ends of which bear against the inner extremities of the inclined shanks *k*. The front ends of the jaws *h* are formed with bevels (as illustrated in detail) in order that they may contact with, and pass over, the correspondingly bevelled sides of the barrel end. When the jaws are so forced apart the spent cartridge is released, drops into the pan *t* behind the jaws, and so falls away through the opening in the side of the casing *a* (Fig. 3).

The trigger arrangement is illustrated in Fig. 4. When the trigger *l* is pulled, the sear *m*, to which the striker *n* is attached, is forced backwards against the pressure of the spring *o* until the top of the trigger slips beneath the bottom of the sear. The spring *o* then impels the striker forward against the cap of the cartridge. When the trigger is released its spring *p* forces it back, the pivoted bottom portion of the sear *m* swinging upwards to allow it to resume its normal position. Should it be desirous to discharge the whole loading of cartridges without manually operating the trigger, the arm *q* is lifted and fixed in an elevated position, so that its upstanding projection *r* is engaged by the pins projecting from the wheel *s*. The wheel *s* (Fig. 2) turns with the cartridge-carrier *f*, and this turning movement forces the arm *q* backwards out of the path of the wheel-projections. The arm *q* in its turn forces back the trigger and so operates the striker. This automatic action goes on, so long as the catch *g* is pressed downwards out of the road of the projections *t* upon the cartridge-holders, until the magazine is exhausted or the spring *e* is run down.

The cartridge-holders *h* are loaded as they pass the magazine by the springs *u*, which are strong enough to overpower the jaw-closing

Fig. 1

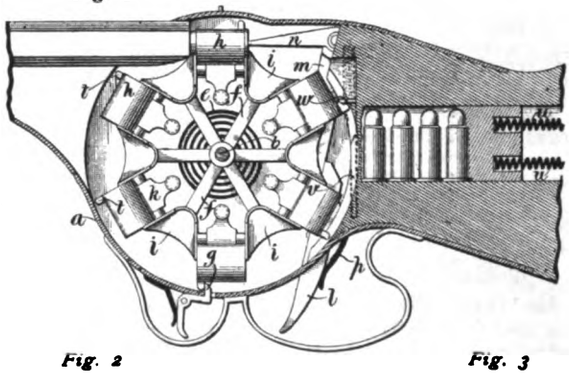


Fig. 2

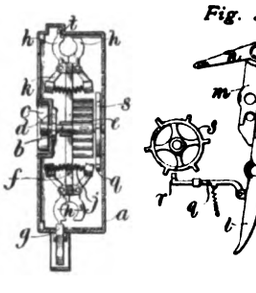


Fig. 4

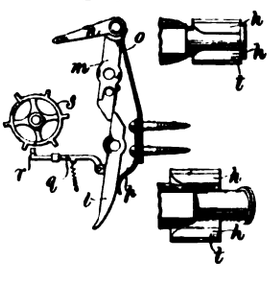
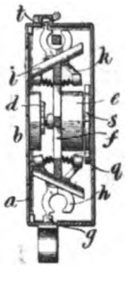


Fig. 3



springs *j*, and thus to force a cartridge into a holder. The slide *v* (shown in dotted lines in Fig. 1), which shuts off communication between the magazine and the casing, is raised automatically by the moving projections *t*, one of which engages the flange *w* upon the slide and lifts it against the pressure of its spring. The slide is lifted to such an extent as to present an opening, exactly corresponding with the shape of a cartridge to the magazine entrance. A cartridge is forced through by the springs *u* into a holder, and the projection *t* by this time having passed the flange *w*, the slide-spring forces the slide down and prevents the entrance of any more cartridges. The magazine is shaped in a similar manner to a cartridge as is the cartridge-follower. This arrangement ensures the delivery of the cartridges to the holders in one position. The magazine is loaded from the side, a removable plate being fitted to the side of the stock for this purpose Accepted March 19, 1903.

MM. G. & J. Roth have applied for leave to amend their Patent No. 16,277, 1900, relating to explosives, in order more correctly to define the invention.

Messrs. G. Brown and J. J. Hicks apply also for leave to amend their Patent No. 14,820, 1902, relating to Range Finders, by striking out the last named as an applicant for the Patent.

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Arms & Explosives

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CONTENTS.

CURRENT TOPICS.

Cordite Contracts.—From the reports of the various companies interested in the manufacture of Cordite, it would seem as though the pinch of scarcity of orders has already become felt. At the commencement of the war it was known that the actual reserve of small-arm ammunition was perilously inadequate, and the manufacturers were, in consequence, kept hard at it to make up arrears, to replace the rounds fired and wasted during the war, and to provide the necessary number of rounds at the various depôts to cover all possible contingencies however the war might develop. Following upon this period of great activity, the present stagnation must be all the more noticeable, and although there is every likelihood that the amount consumed in the training of soldiers will be considerable, it is likely to be some time before the reserves are brought down to a normal condition and the trade resumes a condition of ordinary activity. It is to be hoped, of course, that the competition for the few orders that are likely to be available, will not unduly reduce the prices and so spoil the business; but even so, a tendency in this direction is only the natural result of a desire on the part of each manufacturer to keep his works in a sufficient state of activity to cover establishment expenses.

The Pistols Bill.—The fact that the Gunmakers' Association has given careful consideration to the Pistols Bill, which is now before the House of Commons, merits more than passing attention from the rank and file of the trade who do not concern themselves with public work in connection with their business. Popular sentiment is much disturbed on account of the large number of shooting affrays and tragedies that occur in the course of a year, and it follows almost as a matter of course that, sooner or later, restrictive measures governing the sale of these weapons will be put into force. How far the most carefully framed enactment can be successful, is hardly a material point in view of the public feeling that something, at any rate, must be placed on the Statute Book in order to deal with the improper use of pocket firearms. The Bill now before the House is certainly based on a simpler and more reasonable foundation than any of its predecessors; and if it passes into law, it will, at least, help to calm those who hold that the evils complained of can be dealt with by legislation. At any rate, the Gunmakers' Association has accepted the principle that some form of legislation is bound to come into force, and it has accordingly issued the memorandum which is reproduced in another column, calling attention to two points upon which the present Bill needs amendment if injury to legitimate trade is to be prevented. In order that the conclusions arrived at shall be suitably brought before those in authority, the gunmakers to whom they have been issued have been asked to forward the same to their members, urging upon them the need for supporting the very reasonable amendments proposed.

The Rook Shooting Season.—From reports that have come to hand there seems to be no special reason for treating this year's rook shooting as in any sense a red letter occasion. From being at one time an excuse for the country side to turn out and enjoy the sweets of sport with the gun and rifle, to say nothing of the satisfaction incidental to the thinning down of a voracious feeder on other people's land, the rook shooting season has a good deal deteriorated, partly on account of the adoption of more stringent methods of destruction, and partly because this form of shooting seems for some unaccountable reason to have gone down a good deal in favour. Possibly modern methods of bringing ordinary game to the gun have

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made people less inclined to watch for their opportunities than in the past. There is no more fickle pursuit than the endeavour to hit off the psychological moment at which to deal with a colony of rooks. Stormy weather may keep them in the nest until they are very nearly fully fledged, so that the owner of the sporting rights finds that his patient waiting for a suitable opportunity to shoot the birds has led to their gaining sufficient activity on the wing to get clear away from the danger threatening them. It is in the power of country gunmakers to follow the plan adopted some years ago by a well-known representative of the fraternity. He visited every well-known rookery in his county, and offered terms for the shooting at a rate which tempted many owners to let their rights. In due course, the tenants who had been kept well advised as to the progress of the young birds put in an appearance, and the results were as a rule so satisfactory as to make it possible year after year further to extend the connection so established. At the present time there are probably very few districts in England where an active canvass has been conducted for the purpose of finding out what rookeries are available for letting. If this were done there would be a good chance of bringing men from the towns who would pay good prices, provided there was some satisfactory assurance of sport, and probably none would be keener than the more recent recruits to the rifle shooting movement, who have seldom or never fired a shot at a more lively object than a card target. Possibly the hint here given may be worth following by those whose business is carried on in neighbourhoods well favoured with rookeries.

Dr. Common's Sights.—At the last Conversazione of the Royal Society, Dr. Common, whose name has been so frequently associated of late with scientific developments in optical sighting, was responsible for an exhibit of great interest to all shooting men. Those of us who have endeavoured to teach inexperienced persons the proper means of aligning a shot-gun, have always felt the need for some sighting device which would appeal to them in the same direct and obvious manner as an ordinary set of rifle sights. The need for rapid alignment has made any system of backsight impossible in the case of the shot gun. Consequently the sole method of obtaining the necessary direction and elevation is by means of the top rib. Just how high the eye should be above the rib, and how much of the object to be struck should be covered by the muzzle, is at all times very difficult to explain to the learner. Shooters who have not acquired the power of properly handling a gun are at the same time so slow in bringing the barrels into line with the eye, that the time available for actual aiming is very much restricted. Hence a slow and fumbling raising of the gun to the shoulder is, as a rule, followed by a hasty and ill-directed shot. The sight introduced by Dr. Common has the appearance of a very small telescope some three inches long, which is fitted at the back end of the rib. The sole object visible in looking through the telescope is a black dot in the centre of a piece of round glass. By an ingenious optical arrangement this spot, when viewed from the approximate position which the eye must take up in the act of rapid alignment, at all times projects a beam of light strictly parallel with the line of the rib. The left eye sees the object to be fired at and the right eye the spot, so that by bringing the two into juxtaposition, the line of aim is correctly provided for, while for crossing birds the necessary allowance can be made with a precision not possible with a plain rib. An invention of this sort seems likely to fulfil a number of very useful functions in connection with the large number of shooters who fail to make good shooting, for various reasons connected with the action of the eyes, or want of skill in bringing the gun to a proper state of alignment time after time. By another ingenious application of the same principle an electrically-produced dot of red light is utilised for alignment at night or during dusk, the precision of aim being vastly greater than is possible with ordinary night sights, whatever may be their size or power of collecting such light as may be available. Gunmakers will be well advised in looking out for further developments of this most promising contrivance. Since the above lines were written news has reached us of the sudden death of the genial doctor.

Rifle Clubs.—From a correspondence which appeared in *The Times* about the middle of last month, it would seem that only lately has it been discovered how useful a preparation for military rifle shooting is systematic practice at restricted ranges such as are popular in village rifle clubs. In the course of the correspondence referred to, it has been pointed out that the greatly minimised recoil of the ·303 rifle has lessened, in a marked degree, the difference between gallery shooting and firing with full-power ammunition. For our own part, we believe that the shooter who could make good practice with a miniature rifle would be equally successful in dealing with elephant rifles, provided he could only control the tendency to anticipate recoil by a preliminary jump at the moment of pulling the trigger. It is, however, the absence of any serious recoil in the case of the service cartridge that gets rid of nearly the whole of the tendency on the part of the shooter to flinch at the moment of firing. Hence the man who has learnt to take the correct amount of foresight, to hold his rifle with steadiness up to the moment of firing, and to work the trigger with a slow and steady movement, has acquired knowledge that will enable him to show a successful record the very first time he is called upon to fire, say, at 500 yards. It takes but a very short time to get a fair general idea of the allowances necessary for wind and varying strength and direction. It must, of course, not be inferred from this that the ordinary volunteer who fires his twenty or so shots per annum is very strong on wind judgment, and that the miniature expert has a serious opponent to encounter. It frequently happens that the sergeant in charge of the class-firing determines the wind deviation by firing a few trial shots, after which he tells the shooter who is there to receive instruction, just at what point on or off the target to align his sights. This is done shot by shot, and the allowances vary according to the fluctuations of the wind. The resulting score is credited to the shooter often without his having the slightest idea as to how or why the results for which he takes the credit have come about. When we put against a man such as this a keen member of a miniature rifle club it is really not surprising that he should make what would pass for good scores. However, the more the matter is ventilated, and the greater the number of shooters there are who acquire the art of satisfactorily aligning a rifle, the higher will be the grade of shooting knowledge among the members of our national forces, and hence the greater will be the benefit they derive from the firing of their far too limited allowance of shots.

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AN INTER-COLONIAL AGREEMENT.

While politics are barred as a subject for discussion in these columns, the self-denying ordinance cannot apply to the consideration from a commercial point of view of political proposals that have attained the rank of a national question. While Mr. Joseph Chamberlain did not actually discover the Colonies of Great Britain, he has brought a sense of their full importance to the minds of many who had previously more or less ignored their great potentialities. After a matter of ten or so years of close study of the question he has come to the conclusion that our free trade policy is in need of amendment. He sees, as we all see for that matter, that it is a very unequal bargain to throw our country open as a free market for our rivals, and to find our own opportunities of trade circumscribed by hostile tariffs. While he has not definitely outlined the policy to which he would give effect, it is fairly certain that its essential principles provide for an import duty in Great Britain on foodstuffs coming from foreign countries, with free imports from the colonies, and on the part of the colonies free import of British manufactured goods, and a duty on those of our foreign rivals.

Some of the most notable economic experts of the day have pronounced emphatically against the Colonial Secretary's policy as one which will involve the whole country in disaster. Others, on the other hand, see its benefits. While it is not given to us to pose as experts on the larger questions involved, we can at least take a general survey of the probable effects on the gun industry. The United States and Belgium are our most serious rivals in the manufacture of firearms, but we prefer to regard the method of the former country as most destructive to our trade in the long run, though Belgian methods are improving as they become more American. Their own country is a kind of preserve, rivals being warned from acts of trespass by hostile tariffs. Their splendid mechanical ingenuity enables them to make goods in large quantities at prices half or quarter what they would cost with a reduced output. By charging a high price in their own home market and a low one abroad they are able to strike off a highly remunerative average price which it is impossible for their rivals to secure who have only free markets to trade in. It is for this reason more than for any other that we see a constant loss of the trade in firearms, which, under equal conditions of competition, we could retain. If, therefore, our colonies would consent to be to us what the prairies and settlements of the United States are to the manufacturing districts, we should ourselves enjoy the benefits of selling for two prices, and developing our trade by the help of the increased average price secured. In return, we should be asked to pay more for our food and give our workmen a higher scale of pay. The first would represent but little to the master and salaried official in the presence of larger profits and turnover, while the latter could be met by an extension of machine methods of construction, which would be possible were we able to deal with a larger turnover of standard patterns. Altogether, the scheme seems to be one that entirely hits off the needs of the gun trade. More than this we cannot say at present, for the final decision rests with the working man. We must, however, at least be thankful that the most urgent problem of the day has such a fine advocate, and that it will be raised in a manner securing for it the most careful thought and consideration.

An incidental side-issue of the proposal that has been put forward cannot be dismissed without mention in connection with a trade which is indirectly so much interested in all that appertains to the prosperity of our country districts. With a tax on foreign corn, the British farmer will have a fresh inducement to cultivate cereals, with the result that land which has not been under the plough for half a century or more will revert from the semi-neglect that characterises pastureland. The higher the cultivation the better the head of game is a well-known maxim, and if partridges and hares are likely to find a more congenial habitat, and country residents will have not only more sport, but more money to indulge in it, the home trade in guns is likely to register a great access of strength. In fact, the more we regard Mr. Chamberlain's proposal from the gun point of view the better we like it.

TELESCOPIC SIGHTS.

IT is a matter of constant wonder to those who interest themselves in the more scientific developments of firearms that the telescopic sight has never made any very great headway in the affections of the sportsman. The few scientific amateurs who have given it a fair trial have benefited by its greatly increased accuracy, as compared with the shooting obtained from ordinary methods of sighting. It is not, therefore, on account of lack of efficiency that the telescopic sight has so far failed to make the advances that have from time to time been confidently predicted on the grounds of its many obvious merits. The question of price is certainly a very important factor, for a good telescope frequently costs very nearly as much as the rifle to which it is fixed. While this might not seem of very great moment to the large and wealthy class of sportsmen who want the best that money can buy, it must be remembered that the more expensive rifles are, as a rule, too powerful for the effective working of a telescope, the vibration due to discharge being of such a character as to jar the special mountings requisite for the secure holding of the lenses. In fact, even when all possible precautions have been taken, the adjustment of the lenses is at times disturbed by the jarring effects that arise from constant firing.

Several makers have been successful in devising thoroughly effective mountings for telescopes adapted for use with light sporting rifles. The problem of mounting is in such cases greatly simplified by the recognition now accorded to the system of adjusting for elevation by raising the crosshairs within the telescope itself. The benefits due to this power of adjustment, apart from the mounting, would be still greater if further provision were made for the lateral adjustment of the crosswires, thus enabling the mountings to partake of the permanent character that is possible so long as the finer adjustments can be independently made. It is almost impossible so to fix a telescope that it will never require a certain amount of re-adjustment in the course of the life of the rifle. With different shooters the throw of the bullet right or left is subject to some slight modification, and in so far that most of the regulation of the sights by a gunmaker is carried on by firing from a rest, it is not certain that

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the shooter will get exactly the results he wants when firing in the manner that is customary in the pursuit of game. What, therefore, is wanted to popularise telescopes for sporting rifles of medium power is a simple method of adjustment, within the telescope itself, both for lateral and vertical deviation. After that, some system of mounting, of a more or less universal character, might with advantage be devised. Even then the English sportsman will be very slow to benefit from the advantages thus placed within his reach. It must be remembered that the noteworthy advantages of the Lyman sight have even to this day failed to gain the appreciation they most emphatically deserve.

The open sight, with its V or other form of notch, is still the recognised form of backsight, notwithstanding its very serious drawback that it can only be adjusted by a skilled mechanic with the aid of a file, after which it requires to be blued before it can be permanently fitted to the rifle. The expense that is involved in correctly adjusting rifles to shoot true to specified ranges is such that many rifles are sent out that have never been shot to test the graduations marked on the back sight or sights. The sportsman who is desirous of making the final adjustments for himself finds considerable difficulties in the case of the open sight. Even if he decides to fit the Lyman system of backsight, with its screw adjustment that gives absolute elevation for all ranges, he is faced with the difficulty of getting the proper threads cut on the strap of the action, to which the sight must be fitted. In American rifles it is the rule rather than the exception to fit all rifles with properly tapped screw-holes for the fitting of Lyman sights, these being occupied by dummy pegs which are removed as a preliminary to fitting the more expensive sights.

This instance of the want of recognition by the English manufacturer of the advances that are certainly appreciated by a large proportion of shooters, only goes to prove that the trade in English rifles is hardly pushed in the manner it deserves. As a weapon of precision the English rifle stands very high, while the ammunition which is made for it is both regular and consistent in its action. Even so, however, the shooter who wants something more advanced than the plain open backsight is almost forced to patronise foreign rifles and ammunition in order to satisfy his wishes. With the telescopic sight very much the same set of conditions applies. The mounting is at present so little systematised that it is almost necessary to design a special mounting every time that a telescope is fitted. This should not be necessary, since thoroughly effective telescope blocks can be fitted to the barrel by means of the ordinary dovetail notches, the attachment of the telescope being provided for by some simple form of catch whereby it may be instantly removed or put back into the right place every time. Those, therefore, who desire to see the benefits of the telescope brought within the reach of buyers of rifles for which a high degree of accuracy is required at short ranges, would do well to see whether a standard instrument cannot be obtained with a system of mounting requiring but little more mechanical thought and ingenuity in its adjustment than is involved in filing the slots for an ordinary leaf sight. It is hardly possible for gunmakers to enter experimentally into the optical portion of the telescope. The question of magnification and field of view is by this time well understood. There is no reason why opticians should not be able to do all that is necessary in this direction, provided they receive a suitable lead by way of instruction as to what the gunmaker really requires, in adapting the telescope for fine work over sporting distances. There must be many who would pay a good price for a very accurate ·22-bore rifle, whose deadliness of aim, due to the use of a telescope, would counteract in a measure the small striking power of the ammunition. Gunmakers should be ready to satisfy this demand for a highly accurate telescopically-fitted rifle for the smallest sizes of ammunition, and they should find that their efforts are appreciated in a manner that carries with it its own reward.

METRIC MEASURES.

A RECENT perusal of the handbook sent out by the Decimal Association raises the question of decimal weights, measures and coinage; but it is by no means certain that to raise it is to see clearly thereon. It is generally recognised that the exchange of merchandise is much hampered by the following of different plans in different countries; but even so, every year that we stick to the old plan renders it more difficult to take on the new, and it is a question whether we are not already too far advanced to make a change. Modern advances in machine methods have led to the accumulation of expensive gauges and standards, based on the English inch, and Great Britain, its Colonies and Dependencies, together with the United States, are faithful thereto.

An opinion we have always held, but which may be ascribed to prejudice or the effects of constant use, is that something about one inch in length is the most useful unit that could be selected. Its decimal fractions, in tenths, hundredths and thousandths gives us a most useful range of sub-divisions for all classes of mechanical work. Multiples of one inch enable us to express in the same unit in convenient figures, lengths up to eight or so feet. The metre, on the other hand, is not so adaptable for every-day work. For extended distances it is quite as useful as the English yard, but when we come to small sizes we find that another and very inconvenient unit is adopted, the millimetre seeming to be either too large or too small for mechanical operations. Surely, when it is necessary to designate the calibre of a rifle as 7½ mm., the decimal system is not seen at its best, whereas all fine measurements lie as a rule within the inch, and three places of decimals give a tangible idea of the size meant with the requisite fineness of measurement.

For chemical research we value the centimetre-gramme-second units at their full value; but for mechanics we think the English inch has its points. If the Decimal Association could see its way to frame a decimal table, based on the inch, we believe the units would be splendidly adapted to all sorts of conditions. The ten-inch unit might take the place of the foot, if it were really considered necessary; but the hundred inch unit would be the chosen means of measuring extended distances, for which the inch was too small, and would not clash in the manner that feet and yards do by their small ratio of distinction. Probably no units between 100 and 100,000 inches would come into general use, but the latter measure, equivalent to about 1½ miles, would probably serve as well as any other unit for dealing with great distances.

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There is no particular virtue about the kilometre, and yet it serves all ordinary purposes. It is five-eighths of a mile in length, which at least shows that to adopt the metric system would involve a change of about half-a-mile in the unit for measuring long distances. Why, therefore, not stick to the inch, and make the large unit of measure half-a-mile longer instead of half-a-mile shorter than our existing standard?

The virtue of an Association is that it should be practical. If, therefore, the Decimal Association would recognise the vast amount of difficulty that must exist in securing recognition for the metre as a basis for decimal measures, and would take account of the fact that two-thirds of the work is already done by micrometers and other instruments in decimalizing the inch, there are many persons who would accord a large measure of support to this reasonable measure of reform who now stand by, thinking the Association a body of mere visionary workers for an ideal, impossible of attainment. With three units in general use, the inch, the hundred-inch, and the hundred-thousand-inch, nine-tenths of the benefits of the metric system would be assured. If the pound weight were decimalized in a similar way, we should have a very useful range of measures, the ten-thousandth part of a pound being a very suitable unit to take the place of the grain which now runs 7,000 to the pound. The hundred pound unit would take the place of the hundred-weight, and the ton weight would be 1,000 pounds, or half the present value. At any rate, in many industries the ton already represents 2,000 pounds.

We frankly admit that the relation between a certain cubic measure of water and the unit of weight might not exist. Even so, its application is chiefly for the laboratory, and for this specialized work there is no reason why the true metric system should not remain. It might seem heresy to say so, but we really think that for practical purposes the relation of the specific gravity of water to the units of weight and measure, is for all purposes outside the laboratory, of about the same practical application as the relation between the metre and the circumference of the earth.

NATIONAL RIFLE ASSOCIATION.

At the spring general meeting of the National Rifle Association, held on the 29th ult., the chair was occupied by Major-General Lord Cheylesmore, who is the successor of Sir Henry Fletcher, now known as Sir H. Aubrey-Fletcher. The distant, reserved attitude of the late chairman, together with his want of touch with the prominent members of the rifle-shooting world, implies less regret at his loss than was the case with Lord Waldegrave, than whom no more genial chairman ever existed. In his opening remarks, Lord Cheylesmore expressed regret at the absence of their president, the Duke of Cambridge, and of the late Chairman.

The meeting of the Association, he said, would open on Saturday, July 11 next, when the Palma International Trophy, which was won last year in Canada by the British team would be competed for. It would close on Saturday, July 25, with the distribution of the prizes. At present about six teams had entered, including contingents from France and America. In connexion with this match, an individual competition, which should prove to be of great interest, had been introduced. It was called the "Cheylesmore"; the distance was 1,000 yards, and it was open to any pattern of rifle used in the Palma match. An opportunity would, therefore, be given to our first-class shots to test foreign rifles, and compare them with those of this country.

Two new competitions had been arranged for in view of the remarks made by the Commander-in-Chief as to the utility of rapid and accurate firing. One was for the Universities of Oxford and Cambridge, and the other was for public schools. Sir H. Aubrey-Fletcher had given a prize, value £20, for the retired Volunteer who made the highest score in the King's Prize competition. The majority of their old prize donors had most liberally contributed to the prize list. The Stock Exchange had, by the generosity of Colonel Inglis, Mr. Daniel Marks, and Mr. A. D. Blyth, been placed on its present footing for five years. Colonel Inglis had given £500, or £100 a year for five years; Mr. Marks had contributed £25 a year for five years; and Mr. Blyth had offered £10 a year for five years. Captain John Barlow and himself had each subscribed £50 to the Cheylesmore competition. Captain Barlow had also given £250, to which the National Rifle Association had added £150, for prizes open to all members of his Majesty's Forces now serving, and to those retired members who took part in the late war in South Africa.

A challenge bowl had been presented by Colonel Watts to be competed for by teams of eight from each cadet Volunteer battalion, and Major Edge had given £50, increased from £35, to the "Edge" prize. Range prizes amounting to £40 would be given by the Association for prizes at each range of the first stage of the King's Prize competition, while Messrs. Elkington had presented bronze busts of the King and the Prince and Princess of Wales, value £15 each, one to be given with each of the three series of prizes. In connexion with the Alexandra competition, a bronze bust of the Queen, value £15, would be given by the Association to the winner of the first prizes.

Some other additions and alterations had been made to the prize list. The conditions of the "Duke of Westminster" competition had been revised; and the time limit in the "Mackinnon" competition was now 80 minutes at each distance, with three targets allotted to each team. The "St. George's," second stage, was now 15 shots at 900 yards, instead of ten shots at 800, as last year. The cyclists' competitions had been discontinued. Special prizes had again been set apart for members of rifle clubs affiliated to the Association. The regulations as to sights had been amplified, and provision was made for the use by foreign competitors of foreign military rifles and ammunition.

As to targets, in the first class the size had been reduced from 12ft. to 10ft., and in the second the inner had been increased from 30in. to 32in., and the magpie from 40in. to 48in. One sighting shot was now compulsory, and the number of shots in all unlimited competitions, which was increased last year from seven to eight in consequence of the abolition of the sighting shot, had been put back to seven. The rule as to trigger testing had been altered, and competitors might now appeal to the Bisley Committee. No shot would be marked as a ricochet which did not give evidence of having struck the ground by the throwing of sand or dirt against the target or into the trench.

From the general tone of the meeting there seemed to be on all sides every reason to anticipate a thoroughly satisfactory gathering at Bisley.

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WEBLEY'S FALLING-BLOCK RIFLE ACTION.

AMONG the latest developments of the English gun trade the new Webley falling-block rifle must certainly occupy a very prominent position. Those who remember the time when a Government Committee were at work selecting a new army rifle to take the place of the Snyder, the falling-block action and the Martini ran a very close race for the premier position. While the Martini has since been found unsuitable for standing the heavy work incidental to firing modern high-power ammunition, the falling-block action has been shown to be specially suitable for this very function. It is for this reason no doubt that the falling-block action is almost universally accepted as an ideal closure for single-shot hunting rifles of high power. Plenty of force can be applied to the lever for the purpose of lowering the block after firing, so that sticking cartridges are not likely to give much trouble.

It rested, however, with Messrs. Webley to introduce certain modifications of the system which are calculated to accentuate the special merits which characterise it. The falling-block actions that have recently attained so great a vogue for the firing of Cordite express cartridges have almost exclusively emanated in the rough machine stage from Belgium, and it was in the hope that the London and provincial trade would appreciate an article that was English throughout, that Messrs. Webley entered into active competition for the sale of this well established piece of rifle mechanism, their idea being to show a marked improvement in quality, especially in the direction of greater strength and ease of manipulation. How far they have succeeded may be judged by the most casual examination of one of their new rifles. Bold in outline and well machined in all their details, they afford every indication of first-class quality. Not only have they the superficial benefits of a good-looking exterior, but a careful examination of the items of the action will show that definite advances have been registered in several important directions.

Chief among these is the receding falling-block, the face of the block being cut at such an angle that as the block descends it recedes slightly from the base of the cartridge. In effect this provides a thoroughly efficient clearance, ensuring the easy opening of the breech even when an extra high pressure has forced the base of the cartridge well back into contact with the face of the block. Other minor, but still important, details of design are involved in the means of adjusting the relative position of the block with the centre of the chamber, so as to suit the various diameters of cartridges that are used in a given size of action. Among the items of manufacturing perfection, there is probably none that has received more attention than the chambering and boring of the barrels to ensure thoroughly satisfactory shooting results. From the selection of a steel specially suited to the conditions that have to be met, to the final shooting at the range, the barrels are the subject of constant supervision, with the result that diagrams are produced with these weapons, which for closeness, and especially regularity of elevation, it would be exceedingly difficult to beat, even with rifles specially constructed for target accuracy over measured distances, irrespective of smashing power on the part of the bullet.

While advances in manufacture are, as a rule, slow and imperceptible at the time of their initiation, there is little doubt even now that, in the particular instance under consideration, Messrs. Webley have earned a title to congratulation for having achieved a really definite success, and one that should be most favourably regarded by all who have the best interests of the gun trade at heart. In fact, the new falling-block rifle is a weapon that all gunmakers should endeavour to encourage by giving it as great a share of their support as the exigencies of their business will allow.

THE PISTOLS BILL.

THE Gunmakers' Association has recently paid careful attention to the wording of the Pistols Bill, 1903, for the purpose of considering its bearing on the trade in these weapons if passsd into law. The following memorandum thereon has, in consequence, been extensively circulated among gunmakers, the covering letter containing a request that each recipient shall send the same to the Member for his district, asking his aid to forward the proposed amendments :—

The above Bill, as amended by the Standing Committee on Law, &c., would, if passed into law, seriously injure legitimate trade for reasons that may be set forth as follows :—

(1) That a very large proportion of the legitimate trade in pistols is with persons leaving for abroad.

(2) That such persons could not reasonably be expected to purchase a gun licence.

(3) That this trade will be entirely lost unless an amendment to Clause 3, be made exempting from the necessity of holding a gun licence purchasers of pistols who sign a form to the effect that they are about to proceed abroad.

(4) That the demand for actual production of licences will greatly injure legitimate trade, because licence holders rarely have them in their possession, and more often than not, mislay them very soon after they are taken out. Moreover, it has hitherto proved quite sufficient, in testing the claim of a person to be duly licensed, to take his name and address with a view to verifying the same in the register kept by the proper authority.

(5) That a signed declaration that the person is a licence holder should be sufficient, in view of the penalty for giving false information, at the time of purchase.

These points of objection could be met without interfering with the purpose of the Bill if Clause 3, which now reads as follows :—

> "(3) It shall be unlawful to sell by retail or let on hire a pistol to any person, unless at the time of sale or hire such person either produces a gun or game licence then in force, or gives reasonable proof, that he is a person entitled to use or carry a gun without a gun or game licence by virtue of Section 7 of the Gun Licence Act, 1870."

were amended in the manner indicated by the alterations shown in italics to read as follows :—

> "(3) It shall be unlawful to sell by retail or let on hire a pistol to any person, unless at the time of sale or hire such person either produces a gun or game licence then in force, *signs a statement that he is the holder of one*, gives reasonable proof that he is a person entitled to use or carry a gun without a gun or game licence by virtue of Section 7 of the Gun Licence Act, 1870, *or is about to proceed abroad, and signs a statement to that effect.*"

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PROOF HOUSE RETURNS.

THE report of the Guardians of the Birmingham Proof House, was submitted at the yearly meeting of the Birmingham Gun Trade on the 5th ult. The financial statement shows a profit for the year ended Dec. 31st 1902, of £839. Of the total income of £5,712 no less a sum than £4,292 was received for proofs, the other items of revenue being as follows:—Rent receivable £94; Interest on Investments £437; Sale of old cartridge cases, &c., £124; Receipts from shooting ranges £765. On the expenditure side of the accounts the following headings will sufficiently indicate the extent of the various transactions:—

	£
Ammunition Stores and Coal	914
Salaries and wages, &c.	2,540
Tools and implements	28
Repairs	355
Gas and water	34
Superannuation Fund and pensions	65
Rates and Taxes...	140
Law, office expenses, subscriptions and incidentals	299
Elected Guardians' fees	151
Up-keep of shooting ranges	156
Technical institution classes	191
Balance being surplus	839
Total ...	£5,712

As an example of economical and efficient administration, the Birmingham Proof House would be certainly entitled to rank very high. Where good men are wanted they know how to get them and pay a fair price. On the other hand there is no waste or show, so that leakage on account of unimportant non-essentials is not to be met with in any of the items of expenditure. The fact that every member of the Guardians is a gunmaker and a trained man of business ensures working for practical ideals. The small fees for which the Birmingham Proof House conducts its tests afford further evidence of its economical methods.

The records of tests carried out during the year show that there were 94,039 provisional proofs, as compared with 92,909 in 1901, and 282,749 definitive proofs, as compared with some 20,000 less in the previous year. To show the fluctuations in a comprehensive fashion we have compiled the following particulars for the past and three preceeding years.

	1899	1900	1901	1902
Provisional Proofs	**63,251**	**69,177**	**92,909**	**94,039**
Definitive Proofs				
Muzzle Loaders ..	34,824	23,115	13,192	15,799
African Barrels	139,642	124,155	77,220	83,640
Breech-Loading Arms ..	64,438	80,124	87,777	87,485
Rifle Barrels (nitro proved)	178	980	609	1,571
Express Rifle Barrels ..	325	277	361	537
Military Barrels ..	11,443	5,706	8,094	4,635
Chambers of Revolvers	53,222	78,423	62,343	68,674
Single Breech-Loading Fistols	215	440	283	275
Muzzle-Loading Pistols	650	513	772	648
Sundries	223	757	882	588
Supplementary Proofs				
Nitro Proof..	6,851	6,435	10,474	18,424
Proved with Nitros ..	251	166	354	473
Total Definitive Proofs	**312,262**	**321,091**	**262,361**	**282,749**

To carry the figures further back would entail a certain amount of complication, as the methods of recording the various proofs during Mr. Turner's tenure of office, have been altered somewhat in the direction of making information of all kinds more readily accessible. Working from the figures here available it will be seen that the total of provisional proofs registers a rise of about 1000, which may be considered satisfactory in view of the increase of the previous year being more than maintained. The first two items of the definitive proofs necessarily refer to a very cheap class of weapon, the facilities for disposing of which are controlled, to a great extent, by the political conditions existing in the less civilized countries. In speaking thus of muzzle loaders it must not, however, be forgotten that this somewhat obsolete method of construction is still much in favour in the backwoods and other inaccessible places where the inhabitants, however civilized, find tins of gunpowder and loose shot easier to replenish than cartridges. The total proofs of breech-loading arms must, for various reasons, be accepted as the truest idea of prosperity or otherwise in the Birmingham district. The following figures may, therefore, be treated as having a cheering aspect. Proofs of breech-loading arms in 1899, 64,438; in 1900, 80,124; in 1901, 87,777; in 1902, 87,485. These at least suggest the unfairness of the popular newspaper headings commonly used when dealing with proof matters which suggest that the trade in guns is a dying industry. It is a good thing to endeavour to wake things up by stimulating our manufacturers to further efforts, but to be for ever preaching the heresy of early dissolution is by no means a friendly action.

The trade in nitro-proved rifle barrels shows most welcome signs of health, express rifle barrels displaying a similar but less marked tendency, possibly because a large amount of Birmingham's work in this line goes to London for the final test of strength. Military barrels show a decline which suggests that contracts from the few purchasers that remain for this class of goods, have been few and far between. The demand for revolvers seems to have been active, but not up to the level reached during the early stages of the late war. Turning now to supplementary nitro proofs, it will be seen that a large excess is shown, but how much of this excess is due to increased trade, and how much to the growing recognition of a useful test it is impossible to say. At any rate, the following records for the optional nitro proof are well worthy of special attention:—In 1899, 6,825; in 1900, 6,435; in 1901, 10,474; in 1902, 18,424. The proof, with special nitros, is so little patronized that the anticipated cancellation of this test in the new rules of proof would appear to be fully justified.

A supplement to the Proof House report contains a record of the work done by the Technical Instruction Committee. The number of pupils receiving instruction was, at the date of the report, 24; and the classes comprise stocking, action filing and barrel filing. For our own part we should like to see an additional class for instruction at the ranges in the sighting and regulating of rifles, a branch of work in which there is a great opening for better informed manipulation than at present exists. Although the Committee are evidently doing their best, it is unfortunate that they cannot secure the collaboration of the official representatives of the gunworkers, whose attitude is, at the present time, to stand by and pour sand into the wheels. They desire representation on the

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Board of Guardians, and there is really no reason why they should not have, say a couple of special delegates thereon, provided it could be well understood in advance that their policy would be to further the interests of the trade, and not to socialize the Proof House. Anything would be better than the present state of misunderstanding, but necessarily there must be some sort of guarantee that an extension of favours would not be abused.

INANIMATE BIRD SHOOTING ASSOCIATION.

This Association has issued its yearly statement, which will be submitted to the tenth annual general meeting to be held at Effingham House on Thursday, the 4th inst., at 3 o'clock in the afternoon. It will no doubt be remembered that the Association three years ago adopted the policy of utilising the funds placed at its disposal for promoting contests at the grounds of its affiliated clubs. The full text is as follows :—

The Report and Balance Sheet of the Inanimate Bird Shooting Association for the year ending December 31, 1902, is herewith submitted. It will be seen that there is a favourable balance on the year's working of £11 10s. 3d., which, with the sum of £43 15s. 1d. brought forward from the 1901 account, leaves a cash balance of £55 5s. 4d. to be carried forward. This surplus is represented by cash in the bank and in the Secretary's hands. The committee are of opinion that the members of the Association have reason to be highly satisfied with the results of the year's working. Expenses of an unproductive nature have been maintained at a very low level, with the result that the amount of money distributed for the furtherance of club and other contests has represented a considerable proportion of the total income.

In view of the special efforts made in all directions to celebrate the Coronation year, the Association increased its grant to the Middlesex Gun Club for the holding of the Championship Meeting. The result was highly successful in so far that a large number of competitors visited the meeting, and in various ways showed their appreciation of the arrangements that had been made for affording them plenty of sport of a varied character. While the club made a profit, it was not so much as was hoped by the promoters, the explanation being that the prizes offered for competition were on an exceptionally liberal scale. With the facilities which the above club undoubtedly possess for the holding of meetings of this kind, they should have shown a larger profit as compensation for the immense amount of trouble they had taken to render the meeting a success.

In this connection, the special efforts of Mr. Gale, the Hon. Secretary, merit particular notice, the best thanks of the Association being due to him for the whole-hearted manner in which he threw himself into the arduous labours of his self-allotted task. It is hoped that by modifying the conditions of those events which received less support than was anticipated, the club will in the coming meeting be able to show a balance sheet that will fully compensate for the altogether exceptional efforts that are being put forth to ensure a valuable prize list and an attractive programme. The success of these meetings has at all times been greatly augmented by the very valuable prizes that have been awarded by the proprietors of the various sporting newspapers that interest themselves in shooting, and the committee desire to express their thanks for the disinterested help they have at all times been ready to accord.

Among the other competitions that have been supported by the Association during the past year may specially be mentioned the Dublin tournament which was well attended by all classes of Irish shooters. Another contest, to which the Association gave a prize, was in connection with a meeting held in Birmingham for the benefit of the widow of Mr. E. C. Tye. The late Mr. Tye had during recent years identified himself very closely with the prosperity of everything connected with shooting in the Midlands.

Those members of the Association who remember the struggles and difficulties of its early years are no doubt familiar with the reasons which led to the disuse of the word "clay" as a term descriptive of inanimate birds, an injunction having been granted by which this trade description was forbidden in respect to all birds made of a different material. The term has, however, still remained, and it continues to be largely used in the sporting press, and in fact wherever the subject of inanimate bird shooting is discussed. Bearing this fact in mind the Association recently communicated with Mr. Charles Lancaster, the person who is solely interested in the manufacture and sale of the true clay bird, and they asked him whether, in the interests of the sport, he would be prepared to withdraw opposition to the re-adoption of this trade description. The committee are very happy to report that they have received a letter from Mr. Charles Lancaster, from which the following extract is taken :—

> "Under the Merchandise Marks Act no one is entitled to "designate their targets as clay birds unless they are made "of clay. I, being the only one selling targets so "constructed, took proceedings to protect my rights, and "the judgment with which you are acquainted was given. "This, however, would not prevent anyone else taking "similar proceedings if the name was misapplied, but I think "I may assume, as there is no one else interested in the "matter, that if I do not do so, others will not. It gives me "great pleasure to accede to the wishes of your members "by saying that, so far as I am concerned, I shall not "object to the use of the term 'clay,' and I do this to "promote the general interests of the trade, and particularly "to assist your Association, many of the members of which "are personally known to me."

The committee were naturally exceedingly pleased to receive this welcome assurance of Mr. Lancaster's goodwill, and they trust that henceforward the word "clay" may be generally used to the exclusion of the more cumbersome term "inanimate." The opinion of the members at the annual general meeting will be asked concerning the desirability or otherwise of altering the name of the Association in accordance with this view.

The business to be settled at the annual general meeting will include the consideration of this report and balance sheet, with a view to passing the same, if approved; the receiving of suggestions for the modification of the rules; the election of officers; and, finally, the fixing of the amount of the subscription for the coming year. The committee trust, in reference to the last-named item of the agenda, that the members will see their way so far to approve the present methods of working as to place at their disposal the same funds as before.

(Signed) J. C. IRVINE (Chairman); F. C. BORER; W. R. HILLSDON; H. W. NEWTON; P. NEWTON; MAX BAKER (Secretary).

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THE MODERN EXPRESS RIFLE.

THE eclipse of the express rifle which followed on the introduction of the ·303 military type promised at the time to deprive the English gun trade of a very important branch of business. It is well known that sportsmen will pay almost any price for a rifle which handles nicely, and which can be sighted so as to produce a very high degree of accuracy when shooting within sporting distances. Nevertheless, it seemed for a period of several years as though the military weapon with the magazine system of loading would overpower the predilection in favour of the particular type of rifle in which the gun trade has always excelled. Many practical hunters were prepared to affirm that the bolt could be operated with sufficient rapidity to ensure a satisfactory second shot, or even a third where such might be necessary. Others of a more cautious turn of mind felt certain that the double-barrel system was the only safe and efficient means of giving to the shooter the benefit of a second barrel, directed with precision and certainty, immediately after the result of the first had been noted. This view so far prevailed that gunmakers at once set to work to endeavour to construct double-barrel rifles capable of firing the ·303 cartridge. The crossing of the shots presented many difficulties at the first outset, the extra range of the ·303 cartridge making it almost essential, in order to satisfy the sportsman, that the parallel flight should be sufficiently maintained to give reliable shooting on a given mark up to a distance of at least 300 yards.

At one time it seemed as though this could not be accomplished. In addition it was found extremely difficult to mount the barrels with sufficient solidity to resist the disturbance due to firing such powerful cartridges. In due course the problem was solved in the same way that gunmakers have been able to overcome many other difficulties which for a time seemed insuperable. The use of solid lumps, the selection of a very tenacious brand of steel, and the perfect fitting of the action with plenty of interlocking surfaces, enabled the peculiar conditions to be met with an amount of success that is obvious to anyone who gives the new rifles a trial.

As soon as the ·303 cartridge had proved its adaptability to the double-barrel system of construction, it began to be recognised in every direction that however ingenious might be the arrangements for causing a small-bore bullet to expand upon impact, the certainty of its encountering sufficient resistance to promote mushrooming could not be guaranteed. One by one the larger bores of express rifles were adapted to the general system of cartridge construction that characterised ·303 ammunition, and it became evident in due course that what was lacking in the ·303 was a feature of the larger bullets of liberal dimensions. Special cartridges were worked out for rifles of ·360 and ·370 calibre, and sportsmen were not long in appreciating the advantages of a flat trajectory in combination with a bullet of the weight and striking power that resulted from this larger diameter of bore. Single rifles, as well as those of double-barrel construction, were developed side by side. The single barrel being cheaper was popular for thin-skinned game not of a dangerous character, while the double-barrel proved useful for tiger and other game where self-protection necessitated a reserve shot. With deer, also, the double-barrel proved a great advantage, because any lack of effectiveness with the first shot could be corrected with the one following immediately after, a condition that could hardly be held to apply to the magazine action, no matter how rapidly and skilfully the bolt might be worked.

Progress was not long delayed in passing to other bores. The ·450/·400 cartridge in the Cordite and nickel-covered bullet form very rapidly gained popularity, while ·450's, ·500's, and even ·577 high-power cartridges followed in due course, the merits of each being appreciated according to the class of game to be dealt with. Whatever may be the rights or wrongs of the controversy concerning the permissible range of pressures in these rifles, the fact remains that their characteristic advantages are present even when the charge of Cordite is reduced so as to fall within the limits of pressure called for by the most cautious. That a low pressure is a great advantage, other things being equal, goes without saying, because even when the barrel and action are sufficiently strong to afford adequate resistance there is always a certain amount of liability to mishap in connection with the cartridge.

The necessary combination of ductility and hardness can only be carried a certain distance when dealing with a metal like brass. Hence with excessive pressures there is always a certain tendency for the caps to become unseated, the base of the cartridge being unduly expanded by the pressure set up. When the brass is made extra hard to counteract the blowing back of the caps, it is liable to become unduly fragile, especially in the presence of unexpected impurities or other manufacturing defects which deprive it in some measure of its capacity to expand without fracture to the size of the chamber. No matter what may be the pressure, the destructive effect of the gases which so escape round the chamber, or into the action, is such as to ruin a rifle in a very few rounds. The heated gases of Cordite striking a steel surface with an enormous velocity, cut deep grooves and channels into the metal in a manner that would hardly be credited if the evidence available were not conclusive. The slightest channel that may be cut out of the chamber is bound to interfere very seriously with the extraction of the cartridges that are subsequently fired. At the pressures experienced the brass is sufficiently plastic to be firmly moulded into any such cavities, and to effect extraction it is necessary to shear off the brass that has become lodged in these channels, or at any rate to deform the cartridge by dragging at the metal which has been forced into these channels.

When, therefore, Messrs. Eley Bros. led the way towards further developments by introducing a new cartridge giving such ample chamber space for the powder as would allow for a material reduction of the pressures, they opened the way for an advance which is likely to have the most far-reaching results. With pressures kept well down to the 13-ton limit, the strain put upon the brass is so much reduced that all the minor inconveniences of using high-power cartridges may be regarded as got rid of. Information that daily comes to hand goes to show that, not only on theoretical grounds, but in view of the practical experience of sportsmen, especially in the very hot regions of the upper Nile, the time had come some while back when it was necessary to place a definite check upon the permissible amount of pressure that could be allowed for high-power Cordite cartridges. So long as Cordite remains a standard explosive of general good behaviour, it is hardly likely that a slower-burning and therefore low-pressure

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composition can be put forward with the chances of success that apply to the alternative remedy of a specially constructed cartridge having a larger powder-chamber space.

The great amount of work that has been done by the two Proof Houses in testing the pressures experienced in the new express rifles, and in fixing the proportionate excess strength that is necessary to ensure the safety of the shooter has all gone to show that gunmakers had got within reach of the limit of strength of their actions and barrels. This is to say that with a high service pressure, and a proof stress representing the recognised percentage increase thereon, the rifles receiving a sufficient proof would be likely to suffer such a proportion of casualties as would unduly increase the cost of production. Conversely, with a moderate service pressure and a proportionately lower proof stress the margin is sufficiently ample to ensure the bulk of the rifles submitted for proof passing the tests with flying colours.

So long as this works out as satisfactorily in practice as it does in theory, the coming development of the express rifle can be gauged to a nicety. An entirely new range of cartridges, based on the new No. 2 Nitro which has been worked out for the ·450 bore bullet, will give in every calibre the same proportionate advantages. It may, of course, take some time before the whole of the requisite mechanical experiments are complete. Not only will it be necessary to design the cartridge in the first place so as to allow a low density of loading, but a large number of firing experiments must be made to establish the most suitable conditions of loading. What with the manufacture of special tools necessary for drawing out the brass cartridge cases, and the working out of the appropriate chamber dimensions for the rifles that are to be used for firing them, each cartridge will require several months before it is ready for submitting for the verdict of the sporting world.

As soon as the gunmaker is in the position fully to realise the important advantages of the new order of things, he will be able to set to work to endeavour to make use of the extra margin which will be placed at his disposal. Questions of recoil necessarily exert a great influence upon the limits of weight within which these rifles may be constructed, but even so it is possible that the facilities for a redistribution of the weight will enable him to work for greater accuracy and handiness of balance in the future. A characteristic feature of nearly all Cordite cartridges is that the pressures are sustained a long distance up the barrel, so that the thinning of the tubes in advance of the chamber must only be done with a full knowledge of the conditions. With a lower range of pressures it is possible that there may be a little reduction in the tension of the gases forward, but this is a question that can only be satisfactorily settled by experiment, notwithstanding the large amount of information that can be obtained by theoretical reasoning.

Taking all things into account it cannot be denied that the design of these rifles has been, to a great extent, dominated by the urgent need for labouring towards great strength and solidity of action. As this requirement becomes less urgent various little modifications of design can be introduced, all of which will tend to make the Cordite rifle of to-morrow an even more satisfactory weapon than that which has already commanded such a large share of patronage. The double and single-barrel systems are likely to exist side by side for many years to come, and in each of them there are various openings for further development, which at least ensures a field for active experimental work with resulting improvements of a kind calculated to maintain an active demand for a long time to come.

THE MONTH'S FINANCE.

NOBEL-DYNAMITE TRUST CO., LD.

The net profit made by this Company for the twelve months ending 30th April last, amounts to £189,631, which with £3,218 brought forward, makes an available total profit of £192,849. Of this amount, £15,104, is absorbed for dividend on the half-million of preference capital, and of the remainder, £171,405 is utilised in payment of a 7½ per cent. dividend, free of income tax, on the Company's ordinary capital of £2,285,400. At the ordinary general meeting of the Company, held at Winchester House on the 26th ult., Col. J. L. du Plat Taylor presided.

In moving the adoption of the report he explained that he had not anticipated when he last addressed the shareholders that the board would the following year have to recommend the payment of a lower dividend than that of the previous year. The Company's business in 1902 could not be described as having been altogether unsatisfactory, for the profits derived from the blasting trade had been fairly maintained, notwithstanding the competition which had arisen in certain markets. The Continental powder companies, with whom they were closely linked, had been able to show improved results, and a number of the undertakings in which their subsidiary companies were interested had paid better dividends, but a few had paid less. In the case of others, recently established to take up fresh industries, the delays incident to new undertakings had prevented them so far from contributing to this Company's income. The falling off in revenue was attributable mainly to the reduced demand for Cordite, and to the lower prices obtained for it, and it was not too much to say that had the demand for this powder—both for military and naval purposes—been maintained, the dividend would have been at least equal to what it was a year ago.

No income had been derived from the large amounts invested in the Transvaal Dynamite Company. That Company had not paid a dividend for four years, the profit made in the first nine months of 1899 having been practically absorbed by losses incurred during the war. At the present time the Transvaal Dynamite Company was in course of liquidation, and the works had been taken over by an English undertaking—the British South African Explosives Company, with a capital of £1,100,000, of which £29,604 was to be issued for cash. This Trust had undertaken, on behalf of their subsidiary companies and the companies linked with them, to subscribe for these shares. To forecast the new Company's prospects at this early stage of its existence was well nigh impossible. They must certainly expect very keen competition from all quarters, including the De Beers Consolidated Mines which had erected explosive works in Cape Colony.

Although the revenue of the Trust showed a diminution, their subsidiary companies working on a large scale continued to maintain their factories in an efficient condition entirely out of revenue. Substantial amounts were written off for depreciation year by year, and some of the works had been

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written down to a sum which represented little more than the value of the land on which they stood. He was able to say that, at a moderate valuation, the assets of the subsidiary companies fully covered the amount at which their shares figured in the capital outlay account of the Trust, although these assets had originally to be acquired at a considerable premium. No one could foreshadow, with any degree of accuracy, the probable results of the current year. It was, for instance, impossible to gauge the requirements of the various Governments for smokeless powder, or to estimate the proportion of the aggregate orders which might fall to the company's share. He feared, however, that at present there was little prospect of better prices being obtained, on account of the larger number of rival factories engaged in this special manufacture, and the lessened quantities now required.

All those factories also produced blasting explosives, and they were endeavouring to counterbalance the loss of business in powder by shipping large quantities of explosives to various markets. This naturally led to keen competiton, and the cutting of prices. On the other hand, the mining industries of the world were steadily increasing, and new fields of enterprise were being continually opened up. For the development of these undertakings high explosives were absolutely necessary, and the reputation of the goods made by their subsidiary companies was such that they could look forward with confidence to continuing to obtain a satisfactory share of the trade. The additional capital placed at the disposal of the board by the authorisation of the issue of preference shares was being gradually turned to profitable use. It was, as yet, too early to expect any revenue therefrom, but there was every reason to believe that favourable returns would be forthcoming in the future.

THE NATIONAL EXPLOSIVES CO., LD.

The profits of the Company for the year ending December 31st, 1902, amount to £26,258, which with the balance of £1,507 brought forward from the previous year, makes a total of £27,765 available for distribution. Large extensions have been made at the factory during the year, and others are still in progress. The sum expended on capital account for the year amounts to £35,026, and the property account now stands at £161,026. The previous year's figures may be quoted for comparison. They showed a profit of £40,771, and expenditure on capital account of £6,752. Returning to the year under review the directors recommend that £21,601 should be distributed amongst the preference, ordinary and deferred shares in accordance with the terms laid down in the articles of association. This distribution is £3,273 less than that of the previous year. With £2,500 transferred to reserve account, and £3,663 to be carried forward the available funds are duly disposed of, the preference shareholders getting eight per cent., and the holders of the thousand £1 deferred shares £3 15s. 10d. per share.

Mr. Athol Thorne presided at the annual meeting, which was not held till the 26th ult., on account of the absence of the general manager in South Africa. He pointed out that the available profits of the year showed a considerable decrease compared with those of the year before—a period, however, which was in many respects exceptional; the profits of the year ended December 31st last were not much below the average results for the past seven years. The trade was adversely affected owing to a considerable decrease in the Government contracts given out for Cordite, to a more severe competition for these contracts among the manufacturers, and consequently a reduction in the price obtained for the explosives. During the past year the directors had increased the capital of the Company by the issue of £150,000 4½ per cent. first mortgage debenture stock, part of an authorised issue of £200,000, and every effort would be made to make the new capital productive as soon as possible; but the general conditions of trade were complicated by the present state of affairs in South Africa. As regarded Cordite, it was impossible to make any forecast, but with regard to the Transvaal it was merely a question of time when the mines would not only be taking a quantity of explosives equal to that consumed before the war, but in all probability they would be needing much larger quantities than in the past. Nothing yet appeared to have been definitely decided about the duty on dynamite imported into South Africa, and the matter was still apparently under consideration.

THE KING'S NORTON METAL CO., LD.

The report of this Company for the year ending March 31, 1903, states that the profit has been £28,592, making, with the balance of £440 brought forward, £29,032, of which the directors have appropriated £5,000 to depreciation. They now recommend dividends at the rates of 7 per cent. per annum on the preference, and of 10 per cent. per annum on the ordinary share capital, and, in addition, a bonus of 2s. per share on the ordinary shares. This will leave £4,432 to be carried forward. Such, short and sweet, are the terms in which the directors of this Company make known to their shareholders that they are a matter of £28,000 or so richer than a year ago.

THE "E. C." POWDER CO., LD.

Presiding at the twentieth general meeting of this Company at Winchester House, Mr. H. Doughty Browne stated that they had again had a prosperous year. At the last meeting the board were able to announce a great improvement in the business, and it was then thought prudent not to divide the whole of the profits but to keep back a considerable sum to strengthen the position of the Company. The directors considered that if they had a large reserve they were not likely to meet with so much competition. During the past year they had increased their sales. The board had taken advantage of their prosperity to be drastic in the way of repairs and improvements, and a sum of money had been charged against revenue which a company not so prosperous would be justified in debiting to capital. Nevertheless, they had not entirely neglected the claim of the proprietors to receive something more in the shape of dividend. Since he became connected with the Company the amount set down for patents had fallen from £38,000 to £4,000, and on the other side of the account there was a reserve of £6,000. If tomorrow the Company were to be liquidated and nothing was credited for the works and the machinery, there would be a return to the shareholders of about 18s. in the pound. The works and machinery, however, stood in the accounts at over £16,000, and they were more worth the money now than they ever were in the history of the Company. Mr. W. A. Bradford seconded the motion, which was adopted. A resolution was also passed declaring a dividend of 4s. per share, and a bonus of 1s. per share, free of income-tax, making, with the interim dividend of 2s. per share paid on January 1st last, a total of 7s. per share for the year ended March 31, 1903.

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LECTURES TO YOUNG GUNMAKERS.

XXI.—CAPS.

An effort has been made in the two previous lectures to explain some of the functions of a cap, and how much may be expected from this small but yet important item of the cartridge. As an answer to those who blame the cap for everything that goes wrong we have pointed out that a cap cannot make a bad powder do well. On the other hand a well devised cap composition can do a lot to help a powder to show off its best points. For instance, a cap must not only ignite an explosive charge quickly, but it must do its work in such a manner that the initial pressures are not too high or the velocities too low. Moreover, a cap giving standard results with a powder in a normal condition as regards moisture must not cause too great a rise in pressure when the powder has from any cause suffered a loss of moisture. Nor must it on the other hand show too great a drop in velocity on account of such a gain of moisture as may be considered incidental to the normal behaviour of our climate.

All these questions must be judged by degree only. In fact, it needs years of training in the testing of various combinations of powder and cartridge before it is possible to judge how far the variations met with in practice can be ascribed to a particular one out of the many possible causes of abnormal behaviour. The variations of behaviour that we have dealt with are as a rule more often due to changes in the powder than in the cap. In fact, a cap can only prove its claims to good quality by showing over a prolonged series of experiments a good average of results, notwithstanding the variable conditions under which it may be asked to do its work. With inferior caps the expert can detect a tendency to give undue violence where the powder provides the necessary opportunity, or else it may accentuate slowness, weakness or irregularity, according to its own nature and that of the powders it is called upon to ignite.

While the testing of caps involves the same procedure as the testing of powders, cartridge cases, varieties of shot charge and differences of wadding, to the person specially desirous of examining the behaviour of the igniting agent, special observation of the tests for pressure and velocity is necessary. Pressure and velocity are here specially mentioned to the exclusion of the test for time of ignition, because the latter has already received special attention as a test relating mainly to the function of the cap, while pressure and velocity are more closely related to the propulsive action of the cartridge. As in all other experimental work where various factors are involved it is necessary as far as possible to ensure that details are alike from experiment to experiment except the one variant whose relative action must be studied.

For instance, we have before us at this moment the results of experiments with very nearly a hundred different varieties of cap composition. The proportions of the various ingredients were altered a little at a time until the series was complete. The tests dealt mainly with the firing results obtained from carefully selected samples of powder. A given number of caps were made up according to a pre-determined specification, and samples of them were then used in cartridges loaded with every possible care, so as to exclude all accidental causes of variation. At times the results may have appeared to contradict one another, but on further thought and experimentation, the general tendency of given combinations became known, and bit by bit light was thrown on the capacity of a given cap composition to adapt itself to a variety of influences tending to produce bad shooting.

One of the first things that became clear was that a certain characteristic group of the series of compositions that was examined showed a tendency to irregular shooting with certain classes of powder. These irregular results could not be attributed to differences between cap and cap. Rather they seemed to suggest that certain caps would work excellently when the powder was of a kind that would harmonise with their particular mode of action. But when the powder was not quite at its best, the cap failed to effect a satisfactory ignition, in fact it was a case of extremes meeting. A cap of insufficient strength, and a powder refractory as regards capacity to ignite might give three good shots out of five, the other two would be erring on the side of weakness. There is no intention to put this forward as a new discovery. Instances could be quoted on all sides where a deficiency in any direction shows itself rather by occasional fluctuations than by consistent weakness. With deficient motive power on an engine the want of reserve strength is frequently only shown at intervals. Reverting to cartridge experiments it may happen that a perfect series of results is obtained with a powder giving pressure that is abnormally low. There is, however, the ever-present likelihood that the moment any cause arises that tends still further to diminish the rate of combustion the results fall below the average in a way that could not occur if a reasonable level of pressure had been maintained under normal conditions of loading.

With caps as with powders it is necessary to provide a sufficient reserve power to ensure reliable ignition when the conditions are no longer favourable. The experiments to which we have already referred, showed in the clearest manner possible that the most favourable conditions for a cap are provided when the composition is of a kind that will produce a large but cool flame. By this means there is a large reserve of heat in the cap flash, by which the most obstinate powder is humoured into good behaviour, while with a dry or over-violent powder the absence of intense cap action obviates the risks of initiating a rapid explosion having the power of self propagation once it is started. There is always this danger when reliance is placed upon the igniting power of a small but intense body of flame. If by any chance the characteristic of a large and cool flame is carried too far, there is a danger that the cap will lack the sharpness of action, necessary to produce the requisite level of efficiency in the initiation of the explosive. All, therefore, that the cap can be expected to do is to produce a flame that with incertain limits will adapt itself to variations in the powder. The maker of the powder then finds his allotted task in producing an explosive whose variability of action will not pass beyond the limits to which the cap can adapt itself. From this it will be clear that when a complaint arises on account of the defective action of a given batch of cartridges, the powder maker may take the line of blaming the cap for not adapting itself to the variations to which the powder is subject under commercial conditions of storage and loading, while the cap maker blames the powder because its variations of performance are beyond anything that a cap can be expected to deal with.

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It might reasonably be asked why in discussing the subject of caps in a technical manner it is only possible to state the crudest general truths, whereas facts seem few and far between. The answer is that in matters of such complexity it is almost impossible to bring any series of experiments to a really conclusive finish. The evidence available is of a purely circumstantial nature, and the deductions drawn are gradually built up as experience is accumulated. If a series of cartridges is returned by the user for obvious deficiency of action, they are at once tested, and the results are found to be bad. Extracted powder reloaded into cases with different caps behaves well. On the other hand some of the powder may work badly when loaded into cases containing caps known to be a trifle weak. Another specimem of the same powder may give satisfactory results with the weak caps. The inference is that the powder has in some way absorbed an undue proportion of moisture, and that when in that condition some caps will ignite it properly, while others will not The powder is then exposed in a dry room for a couple of days, and the amount of moisture it loses is duly noted. Further trials show that it has regained its good qualities, and that weak caps will now ignite it in a quite satisfactory manner. Even then it is not possible to assert positively whether the blame rests with the powder or the cap, or should in fairness be divided between the two.

Then it is that experience comes along to aid the experimentalist. Other similiar experiences may have told him that there had been more trouble of the same kind with the particular cap or powder than with others of different characteristics. By examining the characteristics of the cap and the powder, he finds out the particular conditions that tend to create want of sympathy in a powder for caps, or want of adaptability in the cap to allowable variations in the powder. To examine the caps to determine whether they err in the manner indicated, and to see whether in the powder some cause of inferiority is manifest are but samples of the work that is always proceeding in the laboratory of a firm who intend by scientific means to turn out the best all-round product that existing developments allow for. It is not practical politics to blame the cartridge loader for irregular charging or unequal turnovers, nor even to object too strongly to the presence in the cartridge of inferior wadding, so long as one's general experience shows that these things are bound to occur to a greater or less extent. By suiting the product, as far as possible, to the conditions under which it will be used, and by endeavouring at all times to insure on the part of the loader as intelligent manipulation as can be obtained with the class of labour available is the most that the manufacturer can aspire to do. Fresh developments towards perfection can then only be attained as the general average of manipulation is improved in response to the constant pressure that competition exerts by way of asking for an advance upon what may have been previously accepted without criticism.

Even if this lecture on caps fails to give values where these seem desirable, it should at least educate the young gunmaker by showing him how to cultivate an attitude of reserve towards subjects of great scientific abstruseness. One cannot settle things by passing judgments which are only the impressions of one's but partially-informed common sense, and as knowledge increases it becomes more and more difficult to arrive at absolutely final conclusions.

ROUND THE TRADE.

An automatic Mannlicher rifle has recently been introduced in the United States.

The black powder plant of the California Powder Company will shortly be removed from Santa Cruz to Pinole, in Contra Costa County.

The Kynoch Directors recommend a dividend for the year ended April 8, at the rate of ten per cent. on the ordinary shares, tax free.

The J. Stevens Arms and Tool Co., of Chicopee Falls, Mass., U.S.A., are moving from No. 80 to No. 98, Chambers Street, New York City.

Messrs. Curtis's & Harvey have suffered the loss of a very old and much respected servant by the death of Mr. Bishop, one of their travelling staff.

Charles F. D. Smith and his brother, Arthur Smith, have taken over the gun business hitherto carried on by their father at 25A, Weaman Street, Birmingham.

A female travelling representative is now pushing the goods of the Laflin & Rand Powder Company, and it is claimed that she is the only one of her kind in that line of work.

Mr. G. Russell, till lately with Messrs. Cogswell & Harrison, Ld., at their Strand branch, has recently taken a position with Messrs. Holland & Holland, Ld., at their Bond Street premises.

Capt. Chas. Playfair, who has hitherto been engaged as an active partner in the firm of J. Braddell & Son, of Belfast, is now duly installed as managing director of Messrs. Bentley & Playfair, Ld., of Birmingham, in place of Mr. T. C. Bentley, retired.

The London ammunition agency of Nobel's Explosives Co., Ld., have forwarded for our information a copy of this season's lists of cartridges and powder. "Empire," as might be expected, occupies a prominent place by the side of its older confrère "Ballistite."

The current year's catalogue of the Winchester Repeating Arms Co., Ld., of New Haven, Conn., U.S.A., bearing date March, 1903, has recently come into our hands, and we understand that copies of it are obtainable from the Agents, at Laurence Pountney Hill, London.

Mr. Martin Deifenderfer broke 94 targets out of 100 thrown, so winning the Grand American Handicap. His handicap was 16 yards rise, Crosby and Gilbert being scratch at 23 yards. Only seven competitors out of 170 odd entries stood closer in than the winner.

The usual kind of formal notice has been issued concerning Luck's Explosives, Ld., which relates to an issue on the 7th, of a number of £20 debentures, to secure £2,000 charged as a floating security on all the Company's assets. Of the same series, £500 was issued on the 20th April last.

According to *Shooting and Fishing* of the 21st ult., it was not at that time a certainty that sufficent funds would be subscribed to send the American team over to contest in the Palma Trophy match, the amount subscribed at that date being about one-quarter of the necessary sum.

The lease of the Nobel factory at Pembrey, in South Wales, having terminated, the South Wales Explosives Co., Ld., has been liquidated, and the £25,000, at which the shares of that Company stood in the books of the Nobel Trust, has been deducted from the capital outlay account.

Mr. Chas. S. Axtell, who has travelled for so many years on behalf of Smith & Wesson revolvers, and who was seen to such advantage in the revolver competitions at Bisley three years ago, has resigned his position, and is devoting the whole of his time to a publishing firm in which he is interested.

Messrs. Charles Osborne & Co., Ld., have issued a revised price list of Smith & Wesson revolvers, for which they are the "only authorised sole agents" in Great Britain. The prices show an increase over those previously in force on account of increased cost of materials and labour. They came into force as from the 1st ult.

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The London Armoury Company are to be congratulated upon the get-up of their price list of Winchester rifles and shot guns, as recently issued. The various models on sale are concisely described, gross prices being stated in black type and the net wholesale prices in bold red figuring. The reader is clearly enjoined that the firm are wholesale only.

A circular letter has recently been sent out by the Secretary of Messrs. J. & W. Tolley, Ld., stating for the information of gunmakers and others that the Company, being about to retire from business, are prepared to receive offers for the good-will of the business hitherto carried on by them (including the right to use the name of J. & W. Tolley), either alone or together with the stock and the lease of the premises No. 59, New Bond Street, or either of them. Further particulars can be obtained on personal application.

Messrs. Walkers Parker have been successful in obtaining against the Abbey Improved Chilled Shot Co., Ld., an interim injunction restraining them from issuing a circular concerning the recent liquidation of the Newcastle Chilled Shot Co., Ld. The portions of the notice objected to contained suggestions to the effect that the old company, whose assets and good-will had been purchased by the plaintiffs, had gone out of business. By arrangement the circular was withdrawn, so that further litigation has been stopped.

Messrs. Isaac Hollis & Sons, of Lench Street, Birmingham, and 9, New Broad Street, London, have sent us a copy of the latest edition of their catalogue. It shows the usual assortment of typical models of shot guns, but we should have liked to see something more as to their performance than the bare statement that the greatest attention is paid to the boring, &c., of the barrels, and perfection in pattern and penetration is guaranteed. As this is equally applied to the dearest and the cheapest, the information is not satisfying. It is a striking aspect of the single trigger question, that Messrs Hollis are prepared to fit the Baker system for £6 13s. 4d. extra, and another for £9 6s. 8d. extra. Even assuming a discount, the extra cost has a remarkably high ratio to the prices for which the firm will supply an entire gun. Apart from these criticisms, which may apply with equal force to other wholesale catalogues, we can commend this as a handsome production.

TRADE MARKS.

APPLICATIONS ADVERTISED. APRIL 23—MAY 27, 1903

252,604. The Roburite Explosives Co., Ld, London. A picture representing a negro's head enclosed within a circle around the top of which are the words "NEGRO POWDER." Feb. 26, 1903.

253,142. Martin Pulvermann, London. The word "PULVITE," to apply to arms and ammunition. Mar. 17, 1903.

TRADE MARKS REGISTERED. APRIL 23—MAY. 28, 1903.

250,090. W. Brunton & Co.
250,307. E Thomas (trading as A. Chamberlain).
252,058. } Nobels' Explosives Co., Ld.
252,322. }
252,233. The Rheinisch-Westfälische Sprengstoff Ag.
252,829. Holt Bros. & Co.

APPLICATIONS FOR PATENTS.

APRIL 20—MAY 23, 1903.

8,898. Explosives. J. Wetter (Agent for *Westfälisch Anhaltische Sprengstoff-Ag.*)
8,937. Range Finder. P. R. J. Willis (Agent for *A. Kennedy*).
8,959. Projectiles. J. A. Main.
9,035. Targets D. Gilmore.
9,058. Projectiles for Ordnance. T. S. Forbes.
9,091. Blasting Explosive. R. Engelmann.
9,293. Brush Adapter. R Wake.
9 394.* Gas-Operated Guns. M. F. Smith.
9,424.* Shell-Fuse. G. M. Hathaway.
10,656. Cartridges. R. H. Housman.
10,761. Projectiles for Ordnance. T. S. Forbes.
10,780. Ordnance. A. Reichwald (Agent for *Fried. Krupp.*)
10,781. Brakes for Ordnance. A. Reichwald (Agent for *Fried. Krupp*).
10,789. Explosive. A. Fischer.
10,794. Field Gun Carriage. A. T. Dawson and G. T. Buckham.
10,836. Explosive. A. Brock.
10,916. Quick-Firing Ordnance. A. T. Dawson and G. T. Buckham.
10,948. Sight Protector. F. Flatman.
11,090. Electric Gun. R. H. E. Phillipant and A. G. Jardot.
11,092. Telescopic Sights. W. Youlten.
11,106. Unloading Cartridges. J. Hildesheim.
11,184.* Range Finder. P. M. Justice (Agent for *The Bethlehem Steel Co.*)
11,187. Ordnance Sighting. A. Reichwald (Agent for *Fried. Krupp*).
11,191. Rifle Rack. H. Weddel and A. E. Hobson.
11,244. Ordnance. T. K. Barclay, J. B. and S. W. Dalzell.
11,428.* Single-Trigger Mechanism. O. H. Peak.
11,440. Explosives. W. J. Orsman.
11,466. Cartridge Belt Filling Machine. J. Ramsay and T. E. Riddle.
11,478. Guns. E. Cuthbert-Keeson.
11,819. Quick-Firing Ordnance. A. T. Dawson and G. T. Buckham.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

APRIL 30—MAY 21, 1903.

COMPILED BY H. TARRANT.

8,177 (1902). **Moving Targets.** G. Risley, London. A moving target designed to travel in a direction and at a speed unknown to the shooter, in order to afford better practice than heretofore. The target is mounted upon an electrically-propelled truck, which runs upon a number of circuitous railways taking different directions and presenting abrupt turns. Accepted April 8, 1903.

8,763 (1902). **Gun Turrets.** S. G. B. Cook, London (Agent for *C. H. Howland-Sherman, U.S.A.*) In connection with main battery turrets, a number of improvements are set out, which, briefly, are designed to provide a turret with more universal and mathematically correct deflecting properties; to provide better ventilation for allowing the powder fumes to escape; and to arrange that shocks from the turret shall be distributed simultaneously over the deck and keel structures of the hull. Accepted April 15, 1903.

9,043 (1902). **Manufacture of Explosives.** R. Escales, Bavaria. In order to obtain a high disruptive force, elements, the oxides of which are reduced only with difficulty, such as barium and the rare earth metals, especially cerium and its analogous metals, are added to explosive materials already used. This addition brings about the development of very great heat and consequently a great disruptive power. Accepted April 18, 1903.

9,052* (1902). **The Langley Single-Trigger Mechanism.** J. J. Langley, Luton.

9,416 (1902). **Explosives Manufacture.** Dr. L. Edeleanu, and G. A. Fitili, Roumania. A process for the production of nitro-products from petroleum by means of nitro-sulphuric acid. Petroleum-fractions of the specific gravity of 0·87 and higher are treated with a mixture of concentrated or fuming sulphuric and nitric acid, and upon treatment with water the desired nitro-products separate as a precipitate. By mixing with oxidising agents the explosive is formed. Accepted April 16, 1903.

9,903.* (1902). **Rifle Mechanism.** L. O. Thayer and D. P. Butler, Canada.

10,330 (1902). **Vent-Sealing Tubes for Ordnance.** A. T. Dawson and L. Silverman, London. A device for preventing the accidental discharge of a gun or fuse by reason of shock due to the carelessness of the gunners, consisting of a thin

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metal disc or washer. The disc is so arranged that the head of the firing-pin must be forced through it before the point can strike the detonator. The blow from the hammer of the firing mechanism is sufficiently powerful, but any inadvertent blow would not be forcible enough to move the firing-pin. The device may be applied in different forms either to a combined percussion and electrical vent-sealing tube or primer, or to tubes provided with either method of firing. Accepted April 16, 1903.

10,555 (1902). **Rifle Back Sights.** H. Greener, Birmingham. A wind-gauge sight for rifles, to which lateral movement is imparted by means of a horizontal screw which is free to turn in two bosses left on the base of the sight. The sight hinges upon this screw, the centre portion only of which is threaded. A lug extending from the bottom of the leaf is drilled and tapped to receive the centre of the screw, and by turning the screw in the bosses the leaf is moved either to one side or to the other. Accepted April 16, 1903.

12,180 (1902). **Rifle Back Sight.** A. H. Silver and A. Butterworth, India. In order mechanically to adjust the bar upon a leaf back sight, a vertical screw is attached thereto, the turning of which raises or lowers the bar. A series of notches is cut upon one side of the leaf in order that the sight may be adjusted by the sense of touch. Accepted April 16, 1903.

12,228 (1902). **Gun Rest.** C. Dixon and W. Lightwood, Birmingham. A gun or rifle rest, consisting of a pair of hinged plates adapted, when not in use, to be closed up and fixed to the belt or otherwise worn by the shooter. Accepted April 23, 1903.

12,728 (1902). **Rifle Ranges.** J. MacNaughton, Edinburgh. A safety rifle range, the walls of which consist of wooden casings of annular construction to receive such material as sand. The range is tubular, and a diagonally-arranged baffle plate is located near its mouth. An endless conveyer, working between the shooting platform and the butt, is adapted to carry a series of targets to the butt. Accepted April 23, 1903.

13,073 (1902). **Rifle Mechanism.** J. B. Thorneycroft, Mauchline. A development of the rifle mechanism described in Patent No. 14,622, 1901. The principal modification is that connected with the magazine, the platform of which is held down for charging at the bottom of the box by a lever, which is turned over by hand, but which does not need to be continually kept over by hand pressure. When the magazine is loaded the lever is turned back and the cartridge-lifting platform is freed. Accepted April 23, 1903.

13,431 (1902). **Range-Finding Practice.** S. W. Edmunds, Sunderland. A device for teaching position-finding and gun-laying, consisting of a table about which a target is caused to travel through the medium of a centrally-arranged spindle, to which is connected a radial arm. The various positions of the target are observed from a point, and gun-laying to accord with the different ranges is so taught Accepted April 9, 1903.

13,864 (1902). **Explosive Projectiles.** C. G. Atha, U.S.A. An explosive projectile provided with an external jacket, which serves radially to support the shell body upon impact, but which becomes detached as the shell penetrates the object it strikes. By this arrangement the shell is not broken up upon impact, but penetrates the object and is exploded within the structure. Accepted April 30, 1903.

14,585 (1902). **Blasting Compositions.** J. Wetter, London (Agent for *The Westfälisch-Anhaltische Sprengstoff A.G., Germany*). To the blasting composition described in Patents Nos. 25,884, and 26,617, 1901, is added a quantity of oxalic acid or oxalite, preferably ammonium oxalate. This substance, it has been discovered, has a powerful cooling effect upon the gases of combustion. An example of the modified powder is as follows:—Nitroglycerin, 39 parts; paraffinum liquidum, 4 parts; ammonium nitrate, 25·5 parts: potash saltpetre, 5 parts; ammonium oxalate, 2·5 parts; aluminium stearate, 10 parts; and rye flour, 14 parts. Accepted April 30, 1903.

17,080 (1902). **Brakes for Ordnance.** G. H. Ehrhardt, Germany. A friction brake for guns with recoiling barrels, in which the cheeks lying in contact with the brake-rod with an initial pressure, are so suspended to pivoted levers, that when the recoil occurs, they become, in consequence of the frictional contact, more and more firmly pressed against the brake rod. Accepted April 30, 1903.

1,633 (1903). **Aim in Shooting.** A. Reymann, Austria. A device by means of which an observer standing by the side of a shooter may ascertain exactly in what direction the gun is aimed. It consists of a spectacle frame, in front of the right eye of which is fixed a piece of smoked glass in such a manner as to be at an angle of 45 degs. to the line of aim when the shooter is in a proper aiming position. The shooter can see through the glass while the observer standing on the right sees the reflected image of the gun, and, of course, the direction in which it is aimed. Accepted April 23, 1903.

2,504 (1903). **Field Gun Mountings.** C. D. Abel, London (Agent for *Rheinische Metalwaaren und Mf., Germany*). In connection with field guns having a recoiling barrel, a tubular cradle consisting of a single piece having a closed cross section, is provided with external ribs for guiding the barrel by means of slides attached thereto. By this arrangement a sufficient distance is provided between the recoil mechanism and the cradle walls to obviate the disabling of the recoil-brake should the walls be buckled by a projectile. Accepted April 9, 1903.

4,735 (1903). **Safety Fuse.** W. Norres, Germany. A safety fuse for fiery mines, which will work only in combination with the quick match fuse, and which cannot be tested without a quick match. The danger of igniting fire-damp either by carelessness or wilfulness is by this means removed. Accepted April 16, 1903.

6,511 (1903). **Torpedo Steering.** M. Fischaber, U.S.A. A torpedo of the Whitehead type is fitted with tubes through which compressed air is discharged after the torpedo reaches the water either from one side or the other of its stern. By this means any course, whether curved or straight, may be traversed by the torpedo. Accepted April 30, 1903.

6,700 (1903). **Armour-Piercing Projectiles.** L. Densler, U.S.A. An armour-piercing projectile, the outside of which is surrounded by a casing. This casing is designed radially to support the projectile on impact, but after striking is separated therefrom. The fuse is discharged by a striker which is actuated by a wire retained by the released casing. Accepted April 30, 1903.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

THE LANGLEY SINGLE-TRIGGER MECHANISM.

9,052 (1902) J. J. Langley, Luton. The single-trigger mechanism described in this specification is of the three-pull type, a switching portion of the trigger-blade turning on a pivot between the two sears, being the medium through which the solitary trigger discharges two barrels.

In the drawings appended, the mechanism is illustrated in elevation and plan in Figs. 1 and 2 respectively. The trigger *a* is pivoted in the ordinary way in the box *b*. The trigger carries the part *c*, pivoted at *d*, called the switching blade. At its free end, as will be seen upon close examination of the drawings, the blade is provided with two teeth *e* and *f*. These teeth are adapted to be engaged by the pawl *g*, which is pivoted to the trigger plate, and is always pressed towards the teeth by the spring *h*. The rear end *i* of the trigger-blade is so shaped that when the trigger is pulled it presses against the breast of the pawl *g* and turns its back upon its pivot against its spring, so disengaging it from the teeth upon the blade *c*. Mounted by the side of the pawl upon the trigger-plate is a hook-like part *j* called the interceptor, which, as will be seen from Fig. 2, is not vertical, but bends over towards the right-hand sear. The under surface *k* of this hook is inclined, as is clearly illustrated in the detailed front view of the pawl and interceptor.

When the gun is opened the turning of the top lever forces back the bolt *l* and causes it, by virtue of its hook-like engagement with the projection *m*, to throw the switching-blade round on its pivot until its end is situated beneath the right-hand sear. During this turning or switching movement, the teeth *l* and *f* slide over the

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inclined surface of the pawl *g*, but when the blade *c* reaches its right-hand position (dotted lines Fig. 2), the pawl is forced forward by the spring *h*, and by engaging the tooth *e*, the spring-operated rod *l* is prevented from pulling it over towards the left. At the discharge of the first barrel the trigger is raised to such an extent

Fig. 1

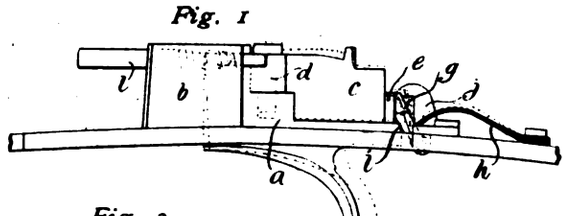


Fig. 3

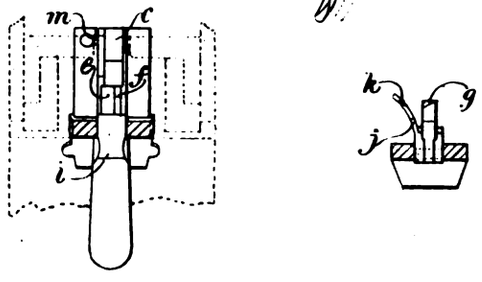
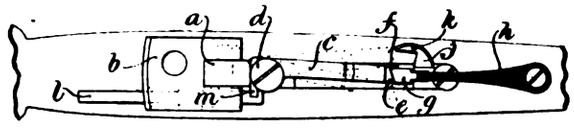


Fig. 2



that the tooth *e* on the blade *c* is disengaged from the pawl *g*, and the second tooth *f* is jammed tightly up on to the inclined surface *k* of the intercepting hook *j*. The involuntary pull instantaneously following the first discharge has the effect only of jamming the tooth more tightly on to this surface *k*. When the trigger is released the spring rod *l* pulls the switching blade towards the left, but it is stopped in its passage midway, as is shown in full lines in Fig. 2, by the pawl *q*, which engages the tooth *f*. Another pull releases the blade from this engagement, and the rod *l* is then free to pull the blade to its position beneath the left-hand sear. The third deliberate pull discharges the left-hand barrel. A modified form of this system of mechanism is illustrated in this patent. Accepted April 18, 1903.

RIFLE MECHANISM.

9,903 (1902). L. O. Thayer and T. B. Butler, Canada. In the system of triggerless rifle mechanism described in this patent, a specially-constructed spring, one arm of which is slightly longer than the other, not only throws the hammer over when the sear is released, but also opens the breech, when the catch holding the under lever is released.

The general arrangement of the various parts will be understood upon examination of the drawings appended. The breech-block *a* is pivoted at *b* to the side-plate *c*. Within this breech-block are arranged the firing pin *d* and its spring *e*, as is clearly illustrated in the detailed drawing. The hammer *f* is pivoted at *g* and is held in its cocked position, as in Fig. 1, against the pressure of the leg *h* of the spring *i* by the sear nose *t*, which is held up into the bent by the sear spring *j*. The second leg *k* of the spring *i* (which spring is pivoted to the side-plate *c*) is slightly shorter than the leg *h*, having, therefore, a stiffer and quicker action than this more pliable leg. The leg *k* bears against the cross-bar *l* connecting the pivotally swung parallel bars *m*, depending from the projections *n* of the lever *o*. The lever *o* is held in its closed position by the spring-operated catch *p*. When the locking-slide *q* is disengaged from this catch, and the catch is pressed, the leg *k* of the spring *i*, bearing downwards upon the cross-bar *l*, turns the lever round upon its pivot *g* to the position illustrated in Fig. 2. During this turning movement, if the hammer be uncocked, its notch *r* is engaged by the lever at *s*, and it is turned back until it is caught and held by the sear-nose *t*. The projections *m* are carried during this movement through the arc-shaped space *u* in the underside of the breech-block, until they contact with the projection *v*. This engagement, during the continued downward movement of the lever *o*, causes the breech-block to turn downwards on its pivot until it reaches the position shown in Fig. 2. The block in its downward progress carries the slide *w* with it through the medium of the engagement of the projection *x* thereon with the recess *y* in the block.

The parts are, in this position, ready for the insertion of a fresh cartridge within the chamber. This accomplished, the lever *o* is pressed upwards until it is held by the catch *p*. During this closing movement the projection *h* moves through the curved space *u* in the block engage the projection *v*, so forcing it back to position, as in Fig. 1.

In order to discharge the cartridge, the safety-slide *z* is first carried backwards from beneath the crank-lever *1*. This lever is then pressed downwards and its point *2* is thus caused to operate the sear and so to take its nose *t* out of engagement with the bent in the hammer. The hammer is forced by the spring *i* round upon its pivot until it impinges against the striker *d* and explodes the cartridge. When the spring-catch *p* is released, the lever is forced downwards, as has been described, the breech-block also being turned on its pivot. Upon reaching almost the limit of its movement, the nose of the breech-block strikes the arm *3* of the ejector *4*, so causing the other arm *5* to engage the rim of the discharged cartridge and to throw it out of the opening in the breech

Fig. 1

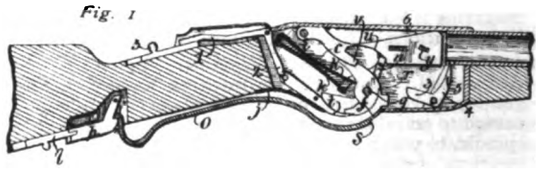
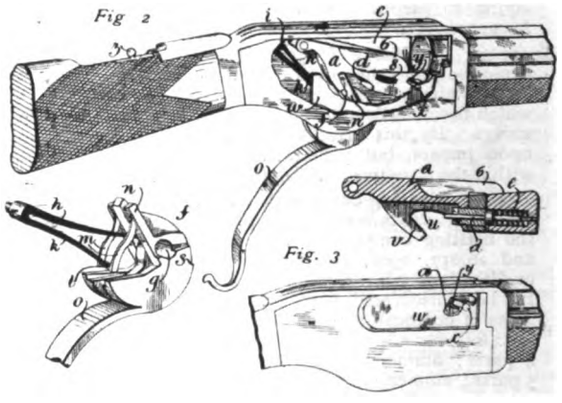


Fig. 2



formed by the vacation of the slide *w*. The shape of the recess *6* in the breech-block guides the cartridge out of the breech. The slide *w* is guided in its upward and downward movement by a flange which engages a slot in the side-plate *7*. The spring *8* forces the slide *w* against the plate *7*, and the breech-block against the plate *c*. Accepted April 29, 1903.

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Arms & Explosives

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CONTENTS.

CURRENT TOPICS.

Trade Prospects.—Just at the present time, those who are interested in the results of the coming season's shooting are suffering many anxious moments. Epidemic disease seems to be rife among pheasants, some of the largest preservers having lost thousands of birds in quite a short space of time. Whatever the changes and chances of naturally bred birds, it always seems to happen that the care and forethought that are exercised in the rearing of pheasants ensure a satisfactory head of birds even when the weather conditions are least favourable. This year promises to be an exception to the general rule. Epidemic disease of a peculiarly virulent type has manifested itself almost all over the country, and it is almost impossible to stay the course of its ravages. Partridges and grouse have not a clean bill of health; they, too, have suffered greatly from the inclement season. The fine weather that followed the downpour in the critical part of June may do much to improve the health of the birds that remain. Insect life is most vigorous in such seasons, but even so the birds that have died represent a net loss from the bags that would have been experienced under ordinary circumstances. The worst season for twenty years is a common prophesy. Let us hope that things will not prove so black as they are at present painted. We have already suffered from a succession of bad seasons. To cap these with one still worse would, indeed, be a misfortune.

Stagnation in Small Arms.—A period of transition in a military arm necessarily brings in its train a period of slackness for those engaged in the productive departments of manufacture. At the present time tool makers are very busy preparing the fixtures and other special implements that are necessary before a rifle can be turned out in quantities. It is likely still to be some time before the manufacturers of Government arms can once more fill their shops with work of a profitable nature. The making of tools represents so much capital outlay, and the machines must stand idle until such time as they are fully equipped so as to be ready once more to deal with the turning out of the many small and intricate parts that go to make up a rifle. Following a period of stagnation of this character, it is fairly certain that the new arms will be wanted in considerable quantities as soon as the source of supply is once more established in full working order. We do not yet know whether it is intended entirely to re-arm the troops with the new rifle, but the fact that the waste of ordinary service must be made good, and that the requirements of the Government have probably been kept down to as low a level as possible in view of the long-expected new arm, make it likely that the producing power of the available factories will in due course be strained to the utmost for some years to come.

Proof as a Sign of Origin.—One of the matters that most seriously agitates the mind of the English gunmaker at this moment is the relation of the marking of guns in London and Birmingham and the relation of these marks to the Merchandise Marks regulations. The English proof mark is so highly esteemed among purchasers of guns and rifles all over the world as to lead one to suppose that it implies English origin in the mind of the purchaser. The large number of Belgian guns that come to this country for the purpose of receiving the English proof shows that we in England are maintaining an organization, the improper use of which must do us a great deal of harm, how much it is impossible to say, but we at least know that there would not be the same sum on English proving if foreign arms so tested were at the same time indelibly stamped with the word "foreign." A proposal on this basis is at present under consideration, and it is to be hoped that something may be done to stop it. In evidence of the obvious intent to mislead the purchaser of English guns, we have only to refer to the extraordinary number of

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English aliases which are adopted by Belgian gunmakers under the guise of trade marks for characterising their guns. When to this is added the recent decision of the Belgian proof houses to stamp the particulars of proof in the English language, we can see how barefaced the fraud has become. That a Belgian proved gun should be marked "nitro proved" is not in accordance with ordinary traditions of fair play. We believe that steps will shortly be taken to get the Customs authorities to insist that Belgian guns so marked shall be refused entry into this country unless they bear, in addition an indelible mark of foreign origin. There are certain clauses in the Proof Act which might be interpreted so as to make such guns unproved, and it is at least to be hoped that a test case will be fought thereon; but even if it succeeds, the harm that will still continue in the Colonial markets cannot be stopped by such action. As regards the framing of suitable proof rules to deal with a part of the trouble that has arisen, Mr. Chamberlain has written that before the Government can take action it will be necessary to show that the trade desire the proposed alteration in the rules.

Pistols Legislation—The Pistols Bill has passed its third reading in the House of Commons, and the suggestions which have been made thereon by the Gunmakers' Association have not been accepted. To buy a pistol a man must still produce his gun licence, no matter what the inconvenience such a course may entail. No latitude whatsoever has been allowed in this matter, and even in the case of men well known to the vendor as regular licence holders there is no option but to produce it so that the particulars endorsed on it may be entered in the book kept for the purpose. Notwithstanding the penalties for a false declaration, the promoters of the Bill regard the signing of a statement by the purchaser that he is a license holder as a loophole that would be taken advantage of by the very persons whom it is hoped will be prevented from purchasing these weapons. In the case of those going abroad some slight extra latitude is allowed. They may purchase a pistol without the licence qualification if they produce a statement that they are about to proceed abroad for a period of not less than six months, signed by them and by a police officer of the district within which they reside, of rank not lower than that of inspector, or by them and by a justice of the peace. While this may be taken for what it is worth, the fact remains that it will stop a large amount of legitimate trade, the would be buyer postponing his purchase till he gets into a less restrictive country. A careful reading of the Bill suggests that there are no penalties for the person who obtains a pistol by making false declarations, the penalties being reserved for the vendor who inadvertently fails to comply with the provisions laid down. If the responsibilities were more equally divided between the purchaser and the vendor the Bill might be made more useful and less destructive of legitimate trade.

The I.B.S.A. Championship.—Favoured with a spell of beautiful weather, the championship meeting of the Inanimate Bird Shooting Association, which will henceforward be known as the Clay Bird Shooting Association, was a great success. The prizes offered for competition were well selected, and were excellent value for the entries demanded. The number of shooters who came to the ground exceeded the records of recent years. In fact, we have to go back to the times when this sport was stimulated by artificial means to find a parallel for the records of the present season. The clubs that are now in existence are organised and carried along on their merits alone, and the shooters who support the movement by their membership do so purely for the sport, and not in consequence of ulterior motives. This country is so well stocked with game, and the facilities for travel are so complete that clay bird shooting must of a necessity take a second place as the handmaiden of the more exciting pastime. The view that there are large numbers of shooters who are tied to the towns, and are willing to put in a part of their leisure at the clays, so as to make their limited visits to field and covert more effective, must be dismissed. Such men are more disposed to take their course of lessons more seriously, and acquire by private coaching the tuition that nervousness prevents them from obtaining in a more public fashion. Club shooting at the clays is essentially a sport for heavily choked guns, and unless club shooting were carried on by means of crossing birds thrown from towers on either side of the present form of trench it is difficult to see how the sport could be made to appeal to a man with a game gun only. Meanwhile, the club system of shooting has its votaries, and among them they do much to advertise the virtues of the clay bird and so help to stimulate the consumption that now runs into some millions per annum in Great Britain alone.

Ammunition Rejects.—One of the Birmingham papers recently contained references to the price of service ammunition as supplied to rifle clubs and other target shooting organisations. From a perusal of the same it would appear that the whole question turns upon price. When the volunteer buys his packet of ten cartridges for a shilling on the range he is paying at the rate of £5 per thousand. The organisation to which he belongs can, however, buy reject material for prices running as low as £3 17s. 6d. per thousand. This reject material consists of the overflow from Government contractors who find that a certain proportion of what they manufacture contains defects of various kinds which would disqualify its acceptance under the strict specification by which such goods are governed. Naturally, some of these defects are not such as to destroy the shooting efficiency of a cartridge. On the other hand, it is held that efficiency would soon deteriorate if the severity of the test were slackened. A few years ago a certain firm delivered some millions of this material under a contract in which they agreed that the cartridges should be of the highest quality. The consignment was refused, and an arbitration case followed. Samples of the rejected material were passed round the court, and they were of a kind to condemn the principle of accepting such goods as comparable with the best. The difficulty that arises is to know where to draw the line, and this we take it, is the problem that was discussed in Birmingham. The buyer must ultimately decide the question for himself, viz., whether he will have the cheap and nasty or pay a fair price for the best. A letter from the King's Norton Metal Company puts the gist of the question in a nutshell. They point out the supervision exercised must be faulty where large quantities of this inferior stuff are turned out, and that the manufacturer will succeed best in the long run who cuts his losses over the wasters, and endeavours to ensure a very high average of quality in the material turned out. Good quality cartridges will fetch a fair price, and the manufacturer should look to earn these rather than strike an average between the rate obtainable for Government acceptances and the rejects that give a bad name to the firm whose identifying mark they bear.

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THE WOOLWICH EXPLOSION.

ONE of the terrible chances of the explosives industry is the fact that one never knows what is going to happen. It is possible to run a factory year after year without any mishaps, beyond what one would expect in ordinary industrial operations. Then without warning, a building "goes up," and nothing can be done beyond attending to the injured and counting the dead. The very able reports which emanate in due course from the Home Office show that the precautions taken have, as a rule, covered all ordinary possibilities of mischance. Consequently there is nothing to do except weigh the evidence for and against certain more or less remote possibilities. The recent calamity at Woolwich was of a particularly severe type. The buildings seem to have been very closely aggregated together, no doubt, largely because lyddite is regarded as an almost inert substance in the absence of a detonator and a priming charge of dry gunootton. Notwithstanding this, the contents of a number of shells went off without warning, others in the immediate neighbourhood remaining stable, so far as the explosive within them was concerned, in spite of the severe shock they received.

The War Office department has naturally come in for a large share of censure, because the conditions of isolation which are enforced upon private factories do not appear to be observed at Woolwich. The consequence is that when an explosion does occur, the amount of material and the number of workers involved, come as a shock to the private manufacturers, who are in the habit of working under the Home Office regulations. The inadequacy of the Woolwich site for many of the dangerous operations that are there conducted seems to be generally recognised, and it is likely that in the near future, steps will have to be taken for removing this section of the work to a less circumscribed area. Meanwhile, one cannot help but sympathise very keenly with the highly-placed officials at Woolwich, who, at the inquest and in the press, have been subjected to criticisms that seem to take the line of laying at their door a large part of the responsibility for what has happened. As a general rule, these men must take things as they find them, and they cannot by the mere act of a personal decision introduce far-reaching and expensive reforms.

The private manufacturer knows that he will not get his licence unless everything is in accordance with the provisions of the Explosives Act, and it really looks as though things will never be placed upon a proper footing until the Government factories are controlled on questions of explosive manufacture by the splendid organisation which was built up by the late Sir Vivian Majendie, at the Home Office, and which is carried on with such conspicious ability by his successor, Captain Thomson, and his three co-inspectors. The Home Office rules are primarily intended for the protection of the worker in explosives factories, and if certain precautions are considered necessary in one factory they should be equally applicable to those belonging to the Government, who above all others should set a good example. If it were possible to arrange for the authoritative supervision by H.M. Inspectors of Explosives of the Government factories, in connection with all operations that are concerned with the manufacture and handling of explosives, the public would be more easy in mind. When explosions do occur, the responsibility would be properly apportioned. That would mean that the inspectors would be responsible for laying down the conditions of working, and the superintendents and other officials would be made to answer only for discipline and attention to the rules. The military rank of the inspectors would get rid of most of the objections to civilian interference, and, granting the justice of the precautions which the private manufacturers are forced to observe, the taxpayer, upon whom the cost of of re-organisation would ultimately fall, could not very well grumble at a measure of reform, having for object the provision of conditions of security for Government employees, equal to those which are now the natural right of workers for private firms. It would not be sufficient for the War Office to appoint their own officer. The system has been tried and has failed. What is wanted is the sturdy independence of an independently appointed official, who would not have to look to the War Office for promotion, and who would give his decisions on all fours with those he is in the habit of enforcing every day in the case of private firms.

THE BISLEY PROGRAMME.

ANOTHER year has passed, and we are once more on the eve of a Bisley meeting. Trade interest in this gathering is of a fluctuating order. The rifle powder-maker no longer endeavours to attract attention by the erection of handsome exhibition marquees, and to push his goods with the help of an experienced commercial gentleman of the travelling order. Cordite has come to stay, and its rivals hide their diminished heads, satisfied that capital is not wisely spent in cultivating relations with the hundred or two gentlemen who are exponents of the match rifle. The caterer for volunteer requirements occupies his accustomed position in the bazaar lines, and he displays the usual assortment of cleaning rods, verniers and sight-painting preparations, to say nothing of a host of cleaners and preservatives for the bore of the rifle. The revolver interest is still well represented by the three firms who seem to hold a monopoly of this market, but even so the N.R.A. have arrived at the conclusion that the competitive aspects of this weapon are deserving of but slight attention. Target revolver shooting has been killed by the few specialists who rank as much above the ordinary regimental expert as the representatives of the King's hundred are to the crack shot of an ordinary volunteer detachment. There are not enough competitors to keep the revolver ranges busy with a limited number of entries. Hence it is a race among a comparatively small assembly of shots to register possibles within a sufficiently small margin of entries to make the resulting prize a profit-showing dividend. Seeing this, the N.R.A. have reduced the number of revolver competitions, and are developing as a new side line the miniature shooting at short ranges that has sprung up as part of the rifle club movement.

A few gunmakers have interested themselves in the new departure. There would be more business in it if the rulers of the rifle club movement were less bent on the use of the Service rifle. If the arguments we have constantly urged are as sound as we believe them to be, the time must come when it will be regarded as waste of money to set a man to shoot with a Service rifle, fitted or not with a Morris tube as the case may be, before he has acquired those rudiments of

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the art of shooting, which are better acquired with miniature arms shooting miniature ammunition. The accuracy of adjustment obtainable with the last named inexpensive equipment is such as to provide more actual teaching than can be acquired with an expenditure of double the number of rounds fired with the Service weapon. When the rifleman has really learnt the exact amount of accuracy that can be expected from a miniature rifle, he is in a position to use the Service rifle, and reproduce with it results proportionate to the added difficulties that are encountered in shooting heavier charges at longer ranges.

However, that there is a demand for accurate rifles suitable for miniature ranges, is shown by the energy that is displayed by a few firms in pushing rifles of individual make for this class of work. It, however, seems to us that the firms interested have been guilty of a mistake in policy in associating their rifles with one particular kind of ammunition. The Greener ·310 cartridge has fully justified its claims to be considered a standard article of commerce. But to ignore such cartridges as Kynoch's ·300, the ·297/·250 rook, the ·25 Stevens, and above all others, the ·22 rim, seems to lose the benefit of many hundreds of sales to those whose requirements are not actually covered by the very powerful and rather expensive ·310 cartridge. The various kinds of ·22 ammunition are conjointly by far the most popular of ultra-miniature cartridges. Their accuracy from 30 or 80 yards is so remarkable as to put all higher priced material at a disadvantage, and yet the opinion seems to be current that among all the keen shooters of this bore of cartridge there is not a proportion who would spend a pound or two extra to get a rifle to shoot it, having the characteristics that enable English weapons to hold a high position in an open market. Those who are in touch with sporting opinion ought to know more of the estimation in which the ·22 rifle is held. We know one of the most celebrated of game shooters who claims to have shot every kind of horned beast that the world contains, whose chief amusement when at home is derived from pottering about with a ·22 rifle, his quarry being anything from a sparrow on a rick to a rabbit at the covert side. He has other rifles and is well provided for financially, but English country surroundings are not suitable for the firing of heavier ammunition than that of the calibre named.

Bearing this in mind, the altogether exceptional efforts made at Bisley to push the sale of rifles, which are so far only identified in the public mind with one particular sort of specialized ammunition, will seem to be in a measure a partial misdirection of useful energy. Once a rifle becomes well-known its sale should be extended by its adaptation to well-known forms of ammunition. The general construction stands true for all, the only differences of treatment being involved in boring, chambering and fitting suitably shaped extractors for a selection of standard cartrioges. At the miniature ranges at Bisley the Greener and Sherwood competitions will doubtless hold front rank. The Martin-Smith will suffer from the disabilities of old age. The shots are only seven, and the 3-inch bull is obsolete. Considering that equally good shooting is made in the Greener rifle competition, under the more difficult conditions of a lighter cartridge and a series of ten shots, the ease with which possibles are made at the central 2-inch carton is such as to limit the number of entries. The N.R.A. definition of a sporting rifle takes no account of flatness of trajectory, so admitting rifles whose ammunition is quite unsuitable for sporting purposes. It would be difficult to say offhand exactly how the conditions of this event should be revised. Certainly bullets of unduly curved trajectory might be intercepted at the mid-range and so be disqualified, but whatever may be the remedy the fact remains that the Martin-Smith competition is no longer the test of marksmanship it used to be, nor do its conditions take sufficient account of modern developments to encourage sporting game-rifle shots to try their skill as they used to do in the olden days. The best sporting rifle makers of the day ignore the competition altogether which is at least a proof that they do not recognise it as a test of their productions.

The match rifle and other contests with Service patterns of rifles are not of very great interest, except to those gunmakers who specially concern themselves with catering for volunteer shots, who desire something better than an ordinary rack rifle. The Palma Match provides the only special feature of the meeting in regard to ordinary rifle shooting. Representatives of six countries will meet to shoot with their respective Service arms, no restrictions being placed on the ammunition used. The Palma trophy was won from the Canadians last year, the United States team making a fine bid for the recovery of the trophy. This year's contest is of special interest, in view of the enhanced keenness among the six teams of competitors, three from the Continent, one from Canada, and one from the United States, making up the list of those desirous of taking the trophy from the home team, who are its present holders. As showing the public importance of the contest, it has been announced that the King will attend at the Camp on the succeeding Monday to present the cup to the winning team. The competition will be shot at Bisley on Saturday, the 11th inst., and it is likely that the attendance will outclass that even of the King's Prize day. Shooting will commence at 11 a.m. at the 800 yards range, and the contest will be continued at 2 p.m. at 900 yards, the final round taking place at 1,000 yards as soon as the firing at the shorter distance is completed. The chief conditions are as follow:—Eight members to each team; fifteen shots at 800, 900 and 1,000 yards range respectively, last year's 12 ft. by 6 ft. target to be tried, triggers to be tried with a 4½ lb. trigger tester before the match.

THE LOW WOOD EXPLOSION.—Major Cooper-Key is responsible for the Home Office report on the circumstances attending the explosion, which occurred in a press house of the factory of the Low Wood Gunpowder Company, near Ulverston, Lancs., on the 12th March last. The factory is the property of Messrs. W. H. Wakefield & Co. After reviewing in detail all the circumstances bearing on the explosion, which resulted in two deaths, the Major reports that it must be regarded as an accident pure and simple, and that it may be attributed to the presence in the powder under pressure of a foreign substance.

TREATISE ON AMMUNITION.—A seventh edition of the official handbook, "Treatise on Ammunition," has lately been issued, and the preface bears date April 18, 1902. It takes the place of the sixth (1897) edition, which was corrected up to January of that year. The book is, of course, invaluable to all who have to do with service ammunition of one kind and another. To the student of ballistics it is again of great value, because in it he will find a clear exposition of the theory of the subject as applied to Cordite and other well-known explosives. The price of the book is six shillings, and it can be obtained through the usual official publishers.

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HOW TO PUSH A CARTRIDGE BUSINESS.

The condition of the cartridge business is regarded as well nigh hopeless by many retailers who at one time looked upon it as a valuable source of profitable turnover. The large wholesale houses are loading ammunition in the components of which they are specially interested in one way or another, and the loader who has no special facilities for the purchase of components finds a difficulty in making ends meet. The reason why the cartridge and powder makers are able to compete so effectively is, that they make one or other of the components on the same site as that which accommodates the loading shops. The retailer on the other hand must buy all his materials. That is to say, his cases, wads, powder and shot must all be separately purchased and delivered at prices that take due account of packing, office charges, bad debts and personal supervision by various officials and superintendents.

The cartridge maker who has a loading department can send the materials he manufactures in a steady stream from one shop to another, and the components he buys are delivered in large quantities and at the favourable prices that so result. When the loaded cartridges reach the store in a finished condition they are held ready for dispatch at a moment's notice to the private customer from whom the retailer has received an order, so that the actual vendor never sees the goods that are delivered in his name to his customer. So prevalent and convenient is this system of working that a well-known advertising dealer in the provinces announces in his catalogue that for the convenience of his customers, he keeps loading premises in Birmingham and London, this fiction serving to account for the dispatch of goods from the factories established in these two centres.

The powder maker again is very favourably situated for loading cartridges. He is not obliged to standardize the nitros he loads in his own shops. A little humouring of the charge will save the expenses of regulating a batch to the absolute standard that is called for in deliveries sent out for loading by the trade to the ordinary charges. Then again, the price of the powder so dealt with is that of the absolute manufacturing cost, free of nearly all establishment and transit charges. From this it will be seen that the wholesale manufacturers can load and deliver cartridges at prices that must run very close to those of the retailer who buys his materials at the ordinary trade prices, and puts them together on his own premises. The latter sees the uninstructed general dealer taking orders for the delivery of cartridges at any centre, at prices that leave the competing gunmaker little or no margin to cover the time and labour he expends in working according to his ordinary methods.

There is, however, a good deal in personal connection, and the problem to be considered is how far it can be extended in profitable directions. If the gunmaker sells the same kind of cartridge that the rival dealer places before his customers the two are on an equal footing, and price must mainly regulate the resulting turnover. It is of no use to tell one's customers that one's own loading is superior if there is nothing to support the statements so made. The first thing to do is to prevent the handling of cartridges from running on lines similar to those adopted by the chemist who sells Cockle's Pills.

The gunmaker ranks as an expert, and to give full effect to his advantage in this respect he must impart individuality to the goods he sells. If he aims at doing this by the use of special waddings and special loads he will suffer in the long run, because every change from standard conditions is likely to be a change in the wrong direction. Let him therefore, first of all, faithfully follow the specific conditions laid down by the makers of powders, which will still leave him every opportunity for the exercise of wise care and discretion in personally studying by the aid of the most approved loading and measuring appliances the means by which a perfect cartridge may be filled and put together.

The individuality that he should exercise lies in the selection of a nicely designed marking and colouration of the cartridges into which he inserts the various fillings worked out by himself or specified by his customers. To make his connection as personal as possible, he should avoid in the marking of the cases all reference to the powder used. The size *and charge* of shot should be printed on the top wad, accompanied by some such words as "Turner's nitro loading." If the cartridges really make a reputation for clean and sweet shooting the reputation will then rest not with the powder, the shot, or the make of the cartridge—any one of which may be marred by unskilful loading—but with the gunmaker whose name is well displayed on the tube, and who can show those interested that his loading is performed with care and judgment, both as regards the inspection of materials and the supervision of processes. By avoiding too great a range of grades and patterns he will know how best to do the most for each quality, according to the price charged. It is inadvisable to qualify each grade by the use of fancy words, since without backing these by expensive advertising they merely result in confusing the buyer without imparting individuality to the goods sold.

If the gunmaker is of an experimental turn of mind his leisure will be usefully employed in checking every item of the loading done on his premises by frequent and periodic examination of the contents of the cartridges in process of filling. If he is of a mechanical turn of mind he can do a great deal by special mechanical adjustments and calibration of his loading implements to ensure correctness of work by his less skilled employees, and where special loading is required he can apply a great deal of intelligence to the drawing up of a specification that will enable the unusual but yet permissible conditions that may be asked for to fit in with the general requirements of a well loaded cartridge.

If he is a sportsman and a good shot he can soon cultivate in himself the power to detect bad behaviour on the part of a cartridge, wherever it may be, say in excessive recoil, patchiness or irregularity of pattern, slowness of ignition or deficiency of penetrative power. Unless he is prepared to go into the matter very thoroughly he should not attempt too much in the way of mechanical tests of pressure and penetration. But if his inclinations lie that way and he is disposed to spend time and money in bringing himself up-to-date in the latest approved methods he will have yet another way open for serving the best interests of his customers. In a word, to push a cartridge business it is necessary to sell only cartridges that bear the external marking of the gunmaker's individuality, and then to make sure by working on recognised lines that the individuality so created shall be associated with sound practice proved to be such by successful results.

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HOW TO BUY A GUN.

ADVICE BY BRYDEN AND TOZER.

IT seems that the firm of George Newnes has started a "How to Buy" series, and that the first volume showed the public with pocket-money how to buy cameras and photographic sundries, while the second deals with guns and rifles. The plan adopted by the joint authors of the present work, Mr. H. A. Bryden and Mr. Basil Tozer, is fairly obvious. They visited a certain number of gunmaking establishments, asked questions, took away catalogues, and borrowed blocks for illustration. The list of firms so favoured is given in the preface as follows:—Messrs. Armstrong, Bland, Cogswell & Harrison, Wm. Ford, George Gibbs, W. W. Greener, Holland & Holland, Jeffery, Lincoln Jeffries, Charles Lancaster, Moore & Grey, Reilly, Rigby, Tolley and Westley Richards.

The book leads off with a patriotic reference to the Boer war and its rifle-shooting lessons. Following that we have a chapter on the various kinds of rifle. Military arms are dismissed in a very few words, but the sporting patterns of the same receive a good deal of attention, though recent experience shows that the larger sporting calibres are more suitable for all-round work. These from high power express rifles are deservedly noticed in great detail. We think, however, that Mr. Bryden, who is responsible for this part of the book, would have done better had he dealt with the series of cartridges and bullets as a whole in reference to their particular characteristics before passing on to the rifles of individual makers. Had he done so he would not, for instance, have stated the striking force of the ·400 bore 400-grain bullet on pages 18 and 29, as 4,000 ft. lbs., the powder charge in one instance being 55 grains, and in the other 60 grains. Then, again, he does not say at what range these striking energies are taken and we all know that they fall off as the range increases. He states the striking energy of the ·450-bore 480-grain bullet at 4,500 ft. lbs. for a muzzle velocity of 2,050 feet per second, whereas this is rather more than the muzzle energy, the actual figure for which is 4,475 ft. lbs. According to the figures in the Kynoch catalogue, this bullet has a striking energy at 100 yards of 4,222 ft. lbs., when the muzzle velocity is up to the full nominal figure of 2,200 ft. per second. This seems to suggest that the author has been too ready to adopt ready-made figures rather than go to the trouble to work out and tabulate his own results. The statistics are again a little faulty when they illustrate the conical ball for a ball and shot gun, giving the wrong weights. The solid is described as the "express," with a weight of 720 grains, and the hollow-pointed bullet is marked solid with a weight of 780 grains.

Things like the above may seem to be trifles, but they do not suggest to the reader in search of information that the mass of material available has been properly digested. In fact, it is not certain that the reader is carried much further than the catalogue itself, upon which the information is based would carry him. We cannot find any attempt to differentiate between the various makers quoted, who to say the least are not on the same footing, either as makers or expert sighters and regulators of rifles. In fact, the final advice to the buyer of a rifle to place himself unreservedly in the hands of one of the best rifle makers, or to seek the advice and guidance of a friend who knows, disposes in a measure of the purpose for which the book was written.

On the purchase of shot guns so much has already been said in other volumes, that it is difficult for any author to import individuality into what he writes. Our own view as to the line that such advice should take would be to show what are the prevalent faults in guns to be avoided, how to detect them, and how to judge price against quality. To speak sincerely on all these points must entail the adoption of a very independent attitude, and we cannot see much evidence of this in a book that says nice things of nearly everybody. The text is, therefore, limited to general truths which the reader must apply for himself. In passing, we would like to mention what seems to us to be a curious little error that occurs on page 62. Do we read the author aright when he says that in a pair of guns the word "pair" is understood by the leading men in the trade to mean that "every limb and every pin is to fit exactly the duplicate gun?" Personally, we should not like to interchange the barrels, let alone the parts of a pair of game guns.

We cannot very well occupy more space with a book that can only rank among the many amateur contributions to gun writing that cover the shelves of the shooting enthusiast. They all have their good points, and this is no exception, but it can never rank as more than a casual three-months' work by an occasional writer. This notice may, therefore, be concluded with a humorous point that we came across in reading the book. In discussing powders, the author is very discreet when he says, "I am biassed in favour of one particular sort of powder, it is not my intention to start a controversy, and possibly bring a nest of nitro manufacturers about my ears by publicly proclaiming its merits." And there all reference to powders ceases. His preference is, however, delicately—possibly inadvertently as well—suggested in the index, which runs, "Air-guns, 108; amberite, 127." As this powder is not mentioned in the passage we have quoted from the page in question, nor in any other part of it, we must assume that the careful reader will have no difficulty in identifying the author's perfect nitro. The price of the book is 1s. 6d. net.

ELEY'S VERSUS GERMAN CLAY PIGEONS.—From the testing department of our contemporary, *Das Schiesswesen*, comes the following report which was duly published in that journal's columns, and of which we publish a translation:—"We have compared three kinds of 'clay pigeon', of German manufacture, with samples of the American pitch variety (Eley's targets). Their weight is of great importance, the American samples weighed just under 3¼ oz., while the three German kinds ran about 2½ oz., 3 oz. and 3¾ oz. respectively. The velocity of the light pigeon is much too high at the start, and it is, therefore, very difficult to hit. The velocity of flight of these artificial pigeons should be about that of a partridge, and the weight of the English bird enables it to comply with this condition. The light targets are too elastic, and at the same time they are not sufficiently brittle, the heavier sorts containing a large amount of sand, and being too hard. The chief fault of all the German birds lies in the material itself. We have subjected the three German birds and the Eley targets to a temperature of just over 100° F. for ten minutes, with the result that we could bend them to any shape, whereas the American targets retained their shape. It is a great mistake on the part of the German manufacturers to put an article on the market before it is perfect, the German targets being at present of inferior quality, and not fit to compare with the Eley targets."

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MILITARY RIFLE SHOOTING IN AMERICA.

THE visit to these shores of a United States team to take part in the contest for the Palma Trophy at Bisley on the 11th inst., naturally creates interest in the position of that country as a centre of rifle shooting. Most of us know how far the Americans have reached in the development of rifle shooting at the shorter gallery and sporting ranges. But on the matter of military rifle shooting we hear very little of their doings, and the impression is general that they are only just alive to its importance. Notwithstanding this, we are in the habit of looking on the Americans as a nation of rifle shots.

This is what Dr. W. G. Hudson, undoubtedly one of the finest shots they have on the other side of the water, has to say on the subject:—"One of the most unfortunate ideas that has ever prevailed is that so often heard expressed in the words 'The Americans are a nation of riflemen.' Indeed, the saying is a relic of the day when it was literally true—the early days of our history, when to be a good rifle shot was necessary as an important aid in replenishing food supply, and as a means of preventing premature baldness through the efforts of the then ubiquitous Indian. But times have changed, and while the possibilities of the rifle have been developed to a degree never dreamed of in those days, familiarity and skill with the weapon as a national accomplishment have dwindled, until now the saying sounds more like a sarcasm than an aphorism. True, there are groups of men here and there even more skilful than our ancestors; but as skill with the rifle is now not generally recognised as an immediate necessity, there is little incentive to acquire and maintain it except as a sport and in connection with military duties."

The aptness of the quotation may strike many of our readers as remarkable; but the explanation of its source will show how it is that we have been favoured with interesting material at a seasonable opportunity. The Laflin and Rand Powder Company have just sent us a copy of a work published by them, which is entitled "Modern Rifle Shooting from the American Standpoint." The author is the Dr. Hudson already referred to, and the subject of his discourse is exclusively on matters appertaining to military and match rifle shooting. The book is written with the style and delicacy of touch of a cultured thinker, while the practical quality of its information is what one would expect of an exponent of shooting of the calibre of the author. Admittedly it cannot compare with a *tour de force* such as Major Freemantle's "Book of the Rifle," nor similarly does it quite reproduce the carefully-recorded observations published by such an authority at the ranges as Mr. Tippins. On the other hand, Dr. Hudson expresses his indebtedness to both these writers for many of the ideas that have been welded into his own experiences.

He has, therefore, taken up the pen with a view to dealing with the American aspects of a form of sport at which we on this side have admittedly had the longer acquaintance, and he writes upon it with the assurance that comes from having excelled at all branches of the more typically American forms of rifle shooting, he having been among the most prominent advocates of more extensive patronage of the essentially military branches of sport with the rifle.

On the subject of Schuetzen rifle shooting, what he has to say is most interesting, his general view being that, in spite of the apparently artificial character of this kind of shooting, its educational value cannot be gainsaid, besides which it has the advantage of affording facilities for practice at a very cheap cost in ammunition. In fact, it is easy to see that Dr. Hudson sees in military shooting the need for expenditure of so much money on high-priced ammunition as to make it inadvisable to start circumventing the complexities of wind allowance until the art of holding and pull-off has been mastered under more economical conditions. But it is, as he says, in long-range shooting, undoubtedly, that the rifleman finds the highest development of the sport. It is, therefore gratifying to note that of late years the military and match rifle have approached very near to each other.

Very little has so far been published concerning the American Krag rifle and the particulars published in Dr. Hudson's book will be all the more interesting on that account. The chapter on the sights of the Krag rifle will be found among the most interesting in the book. As is well-known to those who have examined specimens of this rifle, the sights are the best adapted for target shooting among practically all military types of fire-arms. The Doctor speaks sympathetically of the British shooter, who must reverse the bar, and paint white lines to allow for windage. He puts the argument colloquially by saying "let us thank the good Lord that we have an effective wind gauge on our rifles." The information he has to give upon this rifle will shortly require to be re-written when the new Springfield weapon is issued to the troops.

The general design of the Krag backsight is very similar to that applied to the latest patterns of the Mauser and Mannlicher rifles of continental make, the wind adjustment on the American rifle being provided for by the lateral adjustment of the bar carrying the notch. In referring to various forms of match sights, the Doctor deals with nothing that will be unfamiliar to those in touch with English practice. He speaks also of the optical sights, which consist of a small concave eyepiece in the aperture of the back sight, and another glass of large diameter at the muzzle, these serving to define the target while using the ordinary sights. He says that this represents a new principle so far as he is aware. We could quote as an anticipation, Dr. Common's sight on the same principle as used at last year's Bisley meeting. If this does not ante-date the King Optical Company of New York, who have just brought out the sight referred to by Dr. Hudson, we could quote English Letters Patent of thirty years ago which disclose the principle of adopting the galilean telescope system of lenses to rifle sighting.

The history of the development of the modern American ·300-bore bullet is most instructive. This is how Dr. Hudson relates a very interesting incident:—"Until the Summer of 1902 we were unable to procure good bullets, and, in fact, were not even certain until then that the chief source of our trouble was in the bullets. At that time, with an important international match (Palma) on hand, and none of our ammunition giving really satisfactory results at the long ranges, I wrote an appealing letter to Mr. W. M. Thomas, the ballistic expert of the Union Metallic Cartridge Company, telling him of our troubles, and how we had experimented

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with everything else, but that it took a cartridge factory to conduct experiments in the production of metal-jacketed bullets. Mr. Thomas agreed to help, and the result of his efforts was the production of the first really satisfactory bullet of this character we had had." Mr. Thomas's attention was called to the fact that all the rifles the team had to shoot with, measured ·308 in. to the bottom of the grooves, while all the bullets were smaller in diameter than the standard. He, therefore, made the new bullets ·3085 in. in diameter. The shape was altered and various other changes were made, of which particulars are not given, but to use the Doctor's own words, "the new bullet marked a new era in our long-range shooting, for the misses became infrequent even at the longest ranges, and the scores suddenly jumped up to a standard that had never before been reached except with match rifles."

Turning to the N.R.A. Annual Report, this is what Major Freemantle says about these same bullets:—"In view of the very high scores made in practice by the Americans, scores which the (English) Service rifle and ammunition seem incapable of equalling, and in view also of the small vertical deviation noticed during the match on the American targets as compared with those of the other teams, it may be presumed that the team from the United States held a decided advantage as regards their rifle and ammunition." It might be replied that the British team won the match. It did; and this is how Dr. Hudson, a member of the team, explains it, and Major Freemantle's account of the incident and the scores made shows it to be true:—"We profited by the good weather conditions of the morning and gained a lead of 22 points over the English team at 800 yards. But in the afternoon, when the 900 yards' stage was about one-third completed, very bad weather conditions arose, with rapid changes of light caused by clouds scudding by; the wind came in fierce gusts, veered continually from one point to another, and small but strong eddy currents formed on the range. Under these conditions, with nearly every flag pointing in a different direction, the only reliable way to estimate the wind was by observing the mirage through a telescope trained on the target. This the English team had found in their three weeks' practice to be the only reliable way of gauging the wind on that range, while we were almost totally unfamiliar with that method, and had not even brought a suitable telescope with us. The result was that the Englishmen overcame our lead and gained 12 points on us. At 1,000 yards the conditions had settled a little, and we just held our own; but were unable to overcome the 12 points lead."

This really summarises the condition of American long-range target shooting. We in England have reduced the shooting to a science, but we take the rifles on trust; that is if our own rifle is beaten, we take over the Mannlicher. In the United States they are of a more experimental turn of mind, and Dr. Hudson reckoned that where there was an error, its source could be traced. They found the right bullet at once. We, in the person of the English captain, are still complaining about the ·303 service bullet. Armourer-Sergeant J. E. Martin, proprietor of the well-known Glasgow gun business of that name, was armourer to the team, and his time was mainly spent in scrubbing the nickel out of the barrels that had accumulated after each shoot. We believe the English team used extra power ammunition, thereby accentuating the "nickeling" tendency.

We have not stood quite still over here. We are at least on the way to the discovery that an extra good quality of nickel jacket will foul the barrel even in the presence of unusually high velocities, less, than that on the ordinary service bullet. We have more information than we are at liberty to publish; but when the time comes we shall be able to see whether there is not after all, more in the bullet than our philosophy has hitherto dreamed of. In the last match we were handicapped by bad shooting rifles, but managed to pull up the loss by better judgment of the fortunately tricky conditions of wind and light that came to our rescue.

Since then the Americans have no doubt learnt to place more reliance on the telescope than on the flags. We on our side are likely to be better equipped with ammunition than on the former occasion. In the Palma match, the American outers and misses showed a tendency to shoot right and left of the bull, which is a question of the man behind the gun, while the British misses were mainly due to elevation, which is a question of the rifle. This, then, is a summary of American rifle shooting, judged by reference to the English standard. The question shortly to be settled is, on what side does the balance of advantage now lie.

MINIATURE RIFLE SHOOTING.

A BOOK BY L. R. TIPPINS.

IN this handy little brochure on rifles and rifle shooting, we admire the matter as much as we regret the narrow-minded prejudices of the author. On the one hand, we find the ably recorded thoughts and observations of one who has studied rifles with the love of an enthusiast, and who lays bare their inmost secrets of construction and adjustment. On the other hand, we find much the same kind of narrow prejudice against gunmakers that a well-known lady author displays towards journalists and others of that ilk.

Notwithstanding our want of sympathy with the attitude adopted by the author of this book towards the trade by which he at least endeavours to make a little pin money, we pride ourselves on the possession of sufficient freedom from prejudice to do justice to its many good qualities. As we have already stated, he deals as one who knows with most of the small rifles which are at present before the public. His advice is sound, and his views are worthy of attention, even by those who have made a life study of match shooting.

Necessarily one cannot agree with everything he advances. For instance, he deals with the Sharpshooter and Sherwood rifles, which are of very similar characteristics throughout. In speaking of the first-named rifle, he describes it as possessing the conveniences and inconveniences incidental to a take-down barrel, while as regards the other, he says it has a good take-down arrangement. The implied slur on the Sharpshooter rifle seems hardly fair, in view of the altogether exceptional soundness of the Fletcher system of fastening upon which it is based. After some three or four years experience of the rifle, we have yet to learn what are its inconveniences. We speak, of course, of the more recent model; for the first that was issued had a bayonet fastening without any proper means of taking up the free play.

The price of the book is 2s. net. The publishers are Messrs. Sampson Low, and it is well turned out in about the same compass as the official *Musketry Regulations* and other kindred hand-books.

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ROUND THE TRADE.

Mr. E. J. Churchill gave expert evidence in the notorious Moat Farm murder case.

The Aetna Powder Co., of Chicago, have moved their head-quarters to 143, Dearborn Street, in the same city.

Mr.W. M. Thomas, the distinguished ballistic expert of the Union Metallic Cartridge Co., will shortly visit these shores.

The annual outing of Eley's employees takes place on the 25th inst., North Weald being the place chosen for the festive gathering.

Guittard & Lacroin is the name of a new firm of wholesale gun dealers, whose business premises are situated at 22, Rue van Lint, Brussels.

On Tuesday, the 14th inst., an auction sale is announced of the engineers' machine tools of the Gardner Gun Co.'s works, 49-51, Curtain Road, E.C.

The estate of the late Mr. Westfield, of the Chilworth Gunpowder Company has been valued at £23,735, including £14,911 in net personalty.

Mr. J. G. Ewing, of the Laflin and Rand Powder Co., U.S.A., has accompanied the American team who have come over to compete in the Palma Trophy contest at Bisley.

The Welsh Harp Station, which has for so long been the destination of pigeon and clay-bird shooters, has been closed; and, in future, a ten-minute's walk from Hendon Station will be the lot of those who journey to this part of Middlesex.

The National Explosives Co., Ld., call our attention to an unfortunate omission in our last month's notice of their report and accounts. We forgot to mention the ten per cent. distribution of dividend on their ordinary shares.

The annual report of the Field Sports Protection and Encouragement Association shows that this society continues to wage war against the egg stealer and the fraudulent dealer in game. The income is a mere trifle of £137 per annum, but the invested funds and cash in hand amount to £1,067.

The Hallé Automatic Firearms Synd., Ld., is the name of a company that has been registered, with a capital of £16,000, to acquire on the terms of an agreement with Mr. C. R. S. J. Hallé and Mr. M. E. Ribbentrop an arms-manufacturing business. General S. J. Nicholson is given as one of the directors.

In reporting that the building and equipment of their new factory at Angel Road is now complete, Messrs. Eley Bros., Ld., in a circular dated the 19th ult., invited subscriptions for £50,000 4½ per cent. debentures. The applications received from shareholders alone amounted to considerably over £80,000.

Capt. Charles Playfair writes to tell us that he acts in conjunction with, and not as successor to, Mr. Bentley, as regards the managing directorship of the firm of Bentley & Playfair. Ld. Mr. Bentley himself told us it was his intention to retire, so that we are pleased to have this intimation that his plans have been altered.

Mr. W. Cullen, chief of the Transvaal Dynamite Factory, fills in his spare time with a little journalism and a good deal of sport. As chairman of the local gymkhana and sports, he judged the pony race and acted as general starter. As journalist, he discourses on social life in Modderfontein in a paper called *The Modderfontein Gazette*, the aims of which are stated to be "to irritate, to ventilate, and to abuse."

We have received from Messrs. Braddell, of Belfast, a copy of their Register of Irish Shootings and Fishings. The volume runs into 100 or more pages and contains a variety of useful information concerning the sporting possibilities of the country, and the prices at which specified estates can be hired. The map of Ireland which accompanies the book is one of the best we remember having seen.

W. H. Wakefield & Co., Ld., is the name of a newly-registered company with £75,000 capital, which has been formed to take over, as a going concern, the gunpowder factories at Gatebeck, Westmoreland, and Low Wood, Lancashire, which have hitherto been carried on by Messrs. W. H. Wakefield & Co., as a private concern. The board of directors includes the late partners, and there will be no initial public issue.

Messrs. W. Ottway & Co., Orion Works, Uxbridge Road, Ealing, write to us that they have fixed the price of the late Dr. Common's day sight for shot guns at £2 12s. 6d., and the luminous night sight at £3 10s., which includes mounting on the gun. The night sights are successfully illuminated with radium in place of the troublesome electric lamp. In a very few days they will be in a position to send out a hand-book on these sights.

The Kynoch Company is responsible for the issue of a little leaflet, entitled: "Something about Sporting Cartridges. "Opex" and "Bonax" are not the names of new medical cures. They are words which Messrs. Kynoch are associating with sporting cartridges which they are putting forward for the coming season's consumption. Messrs. Westley Richards are advertising the "Bonax" retail at 7s. per 100, cash with order.

Some public accounts connected with the Uganda Railways show a curious discrepancy in the prices paid for Martini ammunition. One lot obtained from a wine merchant in India worked out at 145 rupees per 1,000, and another lot obtained through the British Government cost £1 4s. 9d. per 1,000, showing a loss on the basis of the second price of £1,264. When Mr. Tippins writes another book he might point out that the wine merchant is not only as dishonest as the gunmaker, only more so.

The report of the Rhodesia Chamber of Mines for the year ended March 31st ult., contains the following passage:—"The price of explosives was increased by Nobel's agents soon after the termination of the war by 2s. 6d. per case. Upon representations made by the Chamber, this was reduced to 1s. 6d., at which the charge stands to-day. Your Committee hope to secure from the new De Beers factory a supply sufficient for the requirements of Rhodesia at reduced charges on those being paid to-day."

Mr. A. H. Gale has been successful in his candidature for the representation of the North Kilburn Ward of the Willesden Urban Council. One would think that the responsible manager of Messrs. Westley Richards' London premises, and the Hon. Sec. of the Middlesex Gun Club, would hardly find time to engage in municipal politics, but the more busy a man is, and the more thorough his methods, the more leisure he seems to find for the things that idle men are too occupied to take up.

According to *Shooting and Fishing*, the American team for the Palma trophy "have been equipped with U.S. magazine rifles into which special Stevens-Pope barrels, manufactured by the J. Stevens Arms and Tool Co., Chicopee Falls, Mass., had been fitted. These rifles, it is understood, have an 8-inch twist. An additional rifle, as issued by the Government, was taken along by each man." We may mention that the twist of rifling in the English service rifle amounts to one complete turn in ten inches.

About six months ago the representative of the local authority walked into the business premises of Mr. W. Wallas, of Wigton, placed under seizure some cartridges which he had on the shop counter, and in due course a summons was issued for contravention of the Explosives Act. Since then we have been wondering what new offence has been created which we were hitherto unaware of. The magistrates have not added to our enlightenment, for at the adjourned hearing of the summons the Chairman of the Bench remarked that they had had enough of this case, and, therefore, dismissed it. We presume that Mr. Wallas left the Court without a stain upon his character.

We have received from Messrs. Charles Osborne & Co., Ld., a catalogue of what they term their standard guns and rifles, which is to say, a carefully graded selection of arms of a kind for which there is a regular demand and which they can supply from stock. The booklet, which is effectively

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illustrated, should be found very useful by trade buyers who cannot grasp the technicalities of ordinary gun catalogues with their hundred or more grades of goods, but who want to get the best available for a given price. Messrs. Osborne must take the credit for the bright idea of issuing, as a supplement, a number of duplicate proofs of the illustrations of the different guns, the same being pierced for tearing off by the retailer and sending to customers who make enquiries by letter.

Monsieur Jules Gastinne-Renette, the celebrated Paris gunmaker, has forwarded in response to our application a copy of his report on the sporting guns and rifles and accessories which were exhibited at the Paris Exposition in 1900. The report will be found of interest among those who make a point of filing historical records of this character. The author's treatment consists in writing about each group of exhibits as a whole, and of specifying the individual firms and for what they are celebrated. In writing about nitro and sporting powders, he credits Schultze with being the father of its class. Considering that it still occupies the front position by sheer good quality, it is unfortunate that the author did not have more to say as to why it was denied the highest award and was classed inferior to powders that, to say the least, are not superior. The report appears to be published under the auspices of the *Ministère du Commerce*, and was printed at the *Imprimerie Nationale*.

DR. DUPRÉ'S CHEMICAL WORK.

We give herewith the full text of Dr. Dupré's report on the special chemical work done by him last year for the Explosives Department of the Home Office. Our full notice of the Home Inspectors' Annual Report will appear in our next issue. Dr. Dupré writes:—

In consequence of an explosion of nitro-glycerine at Ardeer, some experiments were made on the sensitiveness of nitro-glycerine to direct percussion, or to a glancing blow. Nitro-glycerine can, of course, be readily exploded on iron or steel by an iron implement, but with some difficulty only with a brass one, or on brass with an iron implement, and, contrary to what might have been anticipated, it is more difficult to explode a thin film than a layer of moderate thickness, such for example, as that formed by a small drop. I found it quite impossible to explode nitro-glycerine on sheet lead of one inch thickness, placed on stone, by iron or steel implements, either by a direct or glancing blow.

The only other experiment made in connection with an accident was an investigation into the character of chlorate stars containing aluminium. It was found in the first place that a mixture consisting only of barium chlorate and aluminium, when moistened and kept at ordinary temperatures, showed only a slight tendency to chemical action, noticeable by the production of chlorides, but no rise in temperature could be observed. When kept at a temperature of 100° to 120° F. chemical action, however, became marked, and a considerable rise in temperature was observed. As, however, the temperature of ignition of such a mixture is very high, about a dull red heat, or above that at which barium chlorate loses its oxygen, there is practically no danger of such a mixture igniting spontaneously, especially if divided into small quantities as in stars. If the mixture is slowly heated, all the barium chlorate can be decomposed without ignition taking place. The addition of shellac and gum, however, considerably modifies the result. The mixture has now an igniting point somewhat below that of gunpowder, and below that at which barium chlorate loses its oxygen. In consequence of this, and in spite of the fact that the presence of shellac and gum greatly reduces the rate of chemical action, the mixture may, under conditions favourable to the retention of heat, ignite spontaneously, especially when kept in a place the temperature of which is 100° F. and upwards.

The conclusion arrived at was, that if the addition of shellac and gum, or other combustible matter could be avoided, or if the aluminium could be coated with a waterproof material, and the drying conducted at temperatures below 100° F., practically no danger would be incurred during the drying, after which all danger of spontaneous action would be at an end.

Another investigation of considerable interest conducted during the year, had for its object the influence exerted by small quantities of potassium perchlorate present in the saltpetre used in the manufacture of ordinary gunpowder. For years past the far greater part of the saltpetre used is prepared from Chili saltpetre, and nearly always contains potassium perchlorate, the complete elimination of which cannot be accomplished without considerably raising the price of the refined saltpetre. The question of how far the presence of perchlorate injuriously affects the character of the gunpowder is thus one of considerable practical importance.

Having first worked out an improved method for the estimation of perchlorate, I proceeded to the examination of six samples of gunpowder, containing various proportions of perchlorate, kindly prepared for me by a manufacturer. The perchlorate in the saltpetre of these sample (in each case specially estimated by the new process) varied from 0·048 per cent. to 1·21 per cent. These samples were directly compared with another gunpowder, absolutely free from perchlorate, in regard to the following particulars:—Chemical stability; temperature of ignition; sensitiveness to direct percussion *(a)* by a falling weight, *(b)* by firing at the powder contained in a 1-lb. canister with an Enfield, Martini-Henry, and a ·303 rifle, using service ammunition; sensitiveness to glancing blows on wood and stone by means of implements of iron, wood, and hide. In the case of the stone, the temperature of the stone was gradually raised until the gunpowder placed on it took fire.

With the exception of a slight depression in the temperature of ignition, amounting to 5·6° C. in the case of the powder with 1·21 per cent. of perchlorate (the igniting point of the pure powder was 327° C.), no difference whatever could be discovered between the gunpowder absolutely free from perchlorate and those containing it. I did not go beyond 1·21 per cent. of perchlorate in the first place, because I could not obtain in the market refined saltpetre containing more than that percentage of perchlorate, and it would have been manifestly unfair to add the perchlorate separately to the powder; and, in the second place, because there is apparently no difficulty for the manufacturer of gunpowder to obtain saltpetre with a proportion of perchlorate within the above limits, so that I did not consider it necessary to go further.

This investiation has left no doubt whatever in my mind that the presence of small proportions of perchlorate in the saltpetre does not in any way injuriously affect the powder, and that it is certainly not necessary to limit the permissible proportion of perchlorate to below those experimented with, or, say, to below 1 per cent.

I have continued to devote considerable time to the working

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out of improved methods of analysis, which, especially as regards permitted explosives, becomes more and more complicated, while, at the same time, the importance of having a reliable check on the composition of such explosives increases. A variety of substances are added, chiefly, no doubt, with a view of enabling the explosive to pass to Woolwich tests, but sometimes also I cannot help thinking, in the hope of obtaining a patentable article, or, at any rate, one to which, with some show of reason, a special name can be applied.

THE NEW "FIELD" LOADING.

Those who have studied the varied styles of wadding that are used in the loading of sporting cartridges must have been amazed at the extraordinary variety displayed without possible justification. The function of the series of wads used in a shot cartridge is so simple that it is really a marvel that things have not before this settled down into something like a well understood system. The office of the greased felt wad is to expand laterally and so obtain a grip first on the walls of the cartridge tube, and later on the walls of the barrel. By its length it is enabled to bridge over the space represented by the cone of the chamber. The card wads on either side serve in the first place to make the piston function of the felt wad more effective, and in the second to isolate it from the powder on the one side and the shot on the other. The grease in the felt has a detrimental effect on the powder, while the direct contact of the shot with the felt would open the way for the dangerous conditions that arise when the layer of pellets next to the felt are driven into the same, the combination acting as a ball with extended range with the likelihood that it may overtake the rest of the shot charge and scatter it so as to spoil the pattern. All, therefore, that is wanted is a couple of carefully gauged cards on either side of the felt, precisely similar to one another and having the ordinary medium thickness of $\frac{1}{12}$th of an inch. The over-shot wad may be exactly the same, but for the sake of patterns it is generally considered desirable to make it rather thinner, so that its thickness may be anything from $\frac{1}{16}$th to $\frac{1}{20}$th of an inch. Feltine, cloth, or hair wads seem to have no special claims to serious consideration for ordinary standard loading, while the notion that it is necessary to apply a greaseproof dressing on the wad next the powder can only be excused on the ground that it has been taken from previous generations without really considering whether its use offers any advantage.

These facts are patent to all, and our contemporary has lately published the following specification of loading:—

1. A plain white card $\frac{1}{12}$th of an inch in thickness and ·738 of an inch in diameter.
2. A greased wool felt wad of best quality felt and of medium hardness, having a thickness of $\frac{3}{8}$in. for 1$\frac{1}{8}$oz. charges, $\frac{7}{16}$th in. for 1$\frac{1}{4}$oz. charges, and $\frac{1}{2}$in. for 1 oz. charges, the diameter to be such as will enable it to take a firm bearing upon the walls of the cartridge tube.
3. A $\frac{1}{12}$th in. card as above.
4. A plain card wad of any suitable colour $\frac{1}{16}$th in. in thickness and ·738 in. in diameter.
5. The system of loading to be as follows: The powder charge to be inserted in the case, and the first card wad to be lightly seated, so as just to touch its surface. After that the felt wad should be inserted, and following it the second card wad. The wad-seating plunger should then be brought down upon the over-felt wad, driving the series of wads home to a distance that is proportioned to the amount of shot charge that will follow. Generally speaking, from the mouth of the case to the face of the second card wad should measure about 1·05 in. full for 1$\frac{1}{8}$oz. of shot, 1 in. for 1$\frac{1}{4}$oz. of shot, and ·95 full for 1 oz. shot, these distances being subject to slight modification according to the size and specific gravity of the shot. The top wad should be brought squarely and firmly down upon the shot charge; and, if the wads have been skilfully seated, the amount of case remaining for turnover should be ·275 in., the compression during the process of turning over being sufficient to give a turnover of ·3 in. of the cartridge tube when the contents of the cartridge are firmly held in place.

In justification of the new system of wadding various arguments are put forward, which are worthy of attention by cartridge loaders in so far that they seem to point the way towards a means of securing improved results at a less cost, a consideration that should have weight in these days of low prices accompanied by a demand for improved results. We append the following extracts as being particularly relevant to the subject under discussion:—

"The internal diameter of the average paper cartridge tube is ·735 in., and a well-fitting card wad which will make a nice, tight cartridge, at the same time not unduly bulging the exterior of the tube, should measure on the average ·738 in. with a rejecting maximum diameter of ·740 and a minimum of ·736. By the time a wad of this diameter has passed down the full length of the tube, any wad of a smaller size would necessarily be unduly loose. Hence the first condition of modern cartridge loading is that the whole of the card wads should measure as nearly as possible ·738 in. in diameter.

"Objections to the "Field" card, so-called, are, first, that it involves the loss of time incidental to placing it a given way up in the cartridge case; and, second, that it involves the use of two different kinds of wads where cards of identical character will serve the needful purpose. We have loaded every kind of powder that has been submitted to our notice with this system of card wadding, and we have found that it suits them all. If, therefore, the powder makers can regulate their nitros for this system of wadding, the conditions under which the cartridge loader works will be greatly simplified, and he can thus devote the bulk of his attention to ensuring the absolute measurement of his loads and the proper regulation of the compression upon the powder.

"As regards felt wadding this must necessarily depend to some extent upon the price of the cartridges to be loaded; but a standard system need only take account of the best materials, leaving those who deal in the cheaper brands to imitate as closely as possible the conditions laid down for the best qualities. The two extremes of commercial felt wadding are either too hard or too soft for doing justice to ordinary powders. Our choice has, therefore, fallen upon a best wool felt of springy texture, neither too hard nor too soft, and greased in the ordinary way.

"With a recognised system of loading capable of establishing itself in the regard of the sportsman, the tendency to patronise inferior combinations would be reduced; and there would be less and less of the undesirable form of economy by which a man may spend thousands a year upon his sport and handicap his success in the pursuit of game by using unsuitable combinations of loading, whose chief recommendation seems to be that they save a few shillings on the cost of a day's shooting. We have not put forward an expensive system of wadding, but merely one that represents the most economical form whereby a high standard of efficiency can be secured."

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THE PISTOLS BILL.

AS AMENDED AT THE THIRD READING.

THE following is the latest form of the Pistols Bill:

Be it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. This Act may be cited as the Pistols Act, 1903.

2. In this Act the term "pistol" means a firearm or other weapon of any description from which any shot, bullet, or other missile can be discharged, and of which the length of barrel, not including any revolving detachable or magazine breech, does not exceed nine inches.

The term "gun or game licence" means a licence to use or carry a gun granted under the Gun Licence Act, 1870, or a licence or certificate to kill game granted under the Laws of Excise in that behalf.

The term "antique pistol" shall not include any pistol with which ammunition is sold, or which there is reasonable ground for believing is capable of being effectually used.

3. It shall be unlawful to sell by retail, or by auction, or let on hire a pistol to any person, unless at the time of sale or hire such person either produces a gun or game licence then in force, or gives reasonable proof that he is a person entitled to use or carry a gun without a gun or game licence by virtue of section seven of the Gun Licence Act, 1870, or is about to proceed abroad for a period of not less than six months, and produces a statement to that effect, signed by himself and by a police officer of the district within which he resides, of rank not lower than that of inspector, or by himself and by a justice of the peace.

Every person who sells by retail or lets on hire a pistol shall before delivery, make, or cause to be made, an entry in a book to be kept for that purpose, specifying the description of the pistol, whether single barrel, magazine, revolver, pin, rim, or centre fire, sold or let on hire, the date of such sale or hire, the name and address of the purchaser or hirer, and the office from which the gun or game licence produced by the purchaser was issued, the date of such licence, or the circumstances exempting such purchaser or hirer from having such licence. Such book must be produced for inspection on the request of any officer of police, or any officer of Inland Revenue.

If any person—(*a*) Contravenes any of the foregoing provisions of this section; or—(*b*) On the sale, purchase, or hire of a pistol knowingly makes, or causes to be made, any false entry or statements as to any matter which he is required by this section to make, he shall be liable to a penalty not exceeding five pounds.

4. Any person who being under the age of eighteen years, and not being exempt by virtue of section seven of the Gun Licence Act, 1870, from incurring a penalty for using or carrying a gun without a gun or game licence, buys, hires, uses, or carries a pistol, shall be liable to a penalty not exceeding forty shillings, and any person who knowingly sells or delivers a pistol to any person under such age, and not being so exempt, shall be liable to a penalty not exceeding five pounds.

The court may make such order as to the forfeiture or disposal of any pistol found in the possession of a person being under the age of sixteen years, and liable to a penalty under this Act, as to the court may seem fit.

5. Any person who shall knowingly sell a pistol to any person who is intoxicated or is not of sound mind shall be liable to a penalty of twenty-five pounds, or to be imprisoned with or without hard labour for a period not exceeding three months.

6. Any offence against this Act may be prosecuted, and any fine in respect thereof may be recovered, and any summary order under this Act may be made in manner provided by the Summary Jurisdiction Acts.

7. For the purposes of the application of this Act to Scotland any offence against this Act may be prosecuted, and any fine in respect thereof may be recovered, and any summary order under this Act may be made in manner provided by the Summary Jurisdiction (Scotland) Acts.

8. The provisions of this Act shall not apply where an antique pistol is sold as a curiosity or ornament.

9. This Act shall not apply to Ireland.

THE KYNOCH BALANCE SHEET.

THE report and accounts of this Company for the year ended April 8 last have lately been issued. The net profit shown amounts to £100,023, to which is added the sum of £61,650 brought forward from the previous accounts. There is thus a surplus available for distribution of £161,673. Including interim dividends already paid this sum is appropriated as follows:—Directors' fees, £5,000; five per cent. on £495,370 of preference capital and ten per cent. on £375,000 of ordinary shares, both free of income tax; amount transferred to reserve fund, £40,973; the balance then remaining, viz., £53,660 to be carried forward to the next account. The balance sheet shows the following liabilities:—Capital issued, £870,370; Creditors, £140,072; Advance on Mortgage, £12,124; Reserve fund, £109,027; Pension fund, £14,833; Bad debts, etc., £9,091; Profits in hand, £149,517. The assets balancing the same are as follow: Property and plant, £899,041; Stock of material and finished work, £231,235; Debtors, £161,015; Cash and Investments, £13,743.

The report contains the following passage:—"The military ammunition trade has been very slack during the year under review. It has been necessary to discharge a very large number of work-people, and great difficulty has been found in providing profitable employment for those who remain. The Company's ammunition department was established, and practically exists, only to supply the British Government's requirements, but these are of phenominal irregularity, though huge sums are spent in increasing the plant and buildings of the royal factories. Your directors particularly regret the fact of this irregularity on their work-people; sudden fluctuations between excessive overtime and absolute cessation of work cause great misery in the homes, and tend to foster bad and improvident habits. It is the desire of your directors to train and gather together a body of skilled work-people, who should rely on the Kynoch Company for satisfactory and regular employment during the years of their working life, as well as considerate treatment in sickness and old age, and many provisions have been made by the board with that end in view; but such improved conditions as these

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are impossible in a trade that requires entire shops to be filled and emptied at frequent and irregular intervals."

It may be mentioned in passing that the report under notice covers the year ending April 8 last, the previous balance sheet dealing with the year ended March 31, 1902, the first eight days of April last year being thus apparently unaccounted for.

TRADE MARKS.

REGISTERED. MAY 27—JUNE 17, 1903.

246,232. Westley Richards, & Co., Ld.
252,604. The Roburite Explosives Co., Ld.
253,142. M. Pulvermann & Co.

No applications were advertised in the journals, June 2–25, 1903.

APPLICATIONS FOR PATENTS.

MAY 25—JUNE 20, 1903.

11,889. Small-Arm Safety Mechanism. T. B. Kinder.
11,899. Portable Target. L. G. Meyer and E. Thomas.
11,933.* Trigger Mechanism. S. Turndiza.
11,950 Torpedoes A. Elgar.
11,972.* Repeating Rifle. R. C. Stevenson.
11,985. Single-Trigger Mechanism. E. H. Stone.
12,030.* Sights. A. R. von Chylinski.
12,113.* Ordnance. L. J. M. R. von Markhof.
12,273. Illuminating Gun Sights. A. A. Common.
12,279. Hollow Projectiles. C. Cammell & Co., Ltd., F. C. Fairholme, and J. E. Fletcher.
12,280. Shrapnel Shell. C. Cammell & Co., Ltd., F. C. Fairholme, and J. E. Fletcher.
12,281. Projectiles. C. Cammell & Co., Ltd., F. C. Fairholme, and J. E. Fletcher.
12,398.* Magazines of Small-Arms. P. Mauser.
12,432 Explosive Cover. C. Simmons.
12,456. Working of Targets. G. Hoffman.
12,531. Targets. P. O'Carroll and J. C. Bunce.
12,572. Range Finder. L. W. Sterne.
12,676. Small-Arm Lock Mechanism. G. T. Richardson.
12,875.* Projectile Fuses. H. P. Merriam.
12,907. Trigger Guards. T. B. Kinder.
12,978. Sectional Targets. J. A. Dickie.
12,992. Range Finder. J. A. Gray.
13,061. Fuse Head for Electric Blasting. F. Render.
13,071. Lyddite Shell. P. J. Penney.
13,137.* Ordnance. V. C. Tasker.
13,457.* Smokeless Powder. P. M. Justice (Agent for *International Smokeless Powder and Chemical Co*).
13,470. Ordnance. A. T. Dawson and G. T. Buckham.
13,531. Explosives, J. Wetter (Agent for *Westfälisch-Anhaltische Springstoff Ag.*)
13,548. Telescopic Sights. L. B. Taylor.
13,659. Cartridges. E. Jones.
13,660. Cartridges. E. Jones.
13,670. Ordnance. A. T. Dawson and G. T. Buckham.
13,671 Ammunition Hoists. A. T. Dawson and G. T. Buckham.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

MAY 28—JUNE 19, 1903.

COMPILED BY H. TARRANT.

9,446 (1902). **Telescope and Attachment for Rifles.** J. Wildsmith, Sheffield. A telescope for use in connection with both the ordinary top and side rifle sights. The attachment of the telescope is such as to enable it to be applied to existing rifles. When not in use it is folded over into a recess provided for it in the stock. It may be detached and used as an ordinary telescope or for tele-photo purposes. Accepted May 23, 1903.

9,979 (1902). **Finishing Gun Stocks.** W. Boggis, Enfield Lock, and J. W. Hodgson, Ponder's End. A machine designed to smooth and polish gun stocks after they have been shaped roughly in a lathe in the ordinary way. Specially shaped smoothing tools operate upon the stock, the tools being under the control of a copy or templet over the surface of which a tracer secured to the frame of the tool is arranged to travel. Accepted April 30, 1903.

11,503 (1902). **Fuse Igniter.** W. Muir, Edmonton, and C. R. E. Bell, Bromley. The bright red allotropic form of phosphorus is used as a substitute for yellow phosphorus in fuse-igniting material. The following is an example of such a mechanically-ignited composition:—Bright red phosphorus, 3 parts by weight; chlorate of potash, 3 parts by weight; zinc or iron in powder, 6 parts by weight; glass or sand, 6 parts by weight; glue or gum, 2 parts by weight. Accepted May 14, 1903.

12,317 (1902). **Quick-Firing Ordnance.** The Hotchkiss Co., Ld., London (Agents for *L. V. Benét and H. A. Mercié, France*). By applying the mechanism set out in this patent to guns of the Hotchkiss type (described in Patent No. 5,435, 1881), or to various other similar types, they are so converted as to render them either automatic or semi-automatic, or capable of being fired "single-shot" by hand. The mechanism may be dismounted or assembled without the aid of tools, and may be thrown into or out of action at will. The semi-automatic gear referred to is that described in Patent No. 22,270, 1899. Accepted May 14, 1903.

13,111.* (1902). **Blasting Explosive "Enormite."** J. M. Az, Holland.

13,756.* (1902). **The Holland Single-Trigger Mechanism.** H. W. Holland, and T. Woodward, London.

14,298 (1902). **Gun Carriages.** A. T. Dawson and G. T. Buckham, London. A number of modifications in field gun carriages, consisting in providing adjustable shields which in action protect the gunners, but when travelling are used as seats. The elevating and training gears are combined, although independent of each other, and are arranged more conveniently in relation with the carriage. The firing and travelling brakes are so designed as to allow of the application of brake pressure to the wheels from either the front or the rear of the carriage. Accepted May 28, 1903.

14,681 (1902). **Cartridge Cases.** A. Barrallon, France. A cheap and light cartridge case for small-arms and small-calibre ordnance, consisting of a hollow shell composed of a mixture of celluloid and an earthy substance. These cases may be utilised two or three times, after which they may be melted up and remoulded. Accepted May 14, 1903.

15,307.* (1902). **The Green Single-Trigger Mechanism.** E. C. Green, Cheltenham.

15,712 (1902). **Air-Gun Mechanism.** F. S. Cox, Birmingham. In air guns of that type in which air charges are driven into the barrel through the medium of a reciprocating plunger, the mechanism is so arranged that the construction is simplified, tending at the same time to render the action of the weapon more efficient and powerful, and to improve its appearance. Accepted May 7, 1903.

16,570 (1902). **Fog-Signalling Detonators.** H. F. Clayton, Huddersfield. A method of avoiding the accidental omission of percussion caps from fog-signalling detonators, consisting in arranging that the size of the detonator-holding nipples are of different sizes. In manufacture, therefore, the signal passes through two hands for the purpose of being capped. Accepted May 21, 1903.

17,578 (1902). **Bandolier.** E. H. B. Laing and G. W. Clarke, London. A combined bandolier and waist-belt adapted to carry both cartridges and a rifle. It consists of a waist-belt, to the front of which the bandolier is attached, and to the back a band which meets the bandolier at the shoulder. A rifle is carried securely by means of appliances upon the back belt, whilst the bandolier is used for the ordinary cartridge-carrying purpose. Accepted May 7, 1903.

20,115 (1902). **Ordnance Sights.** A. Reichwald, London (Agent *Fried. Krupp, Germany*). In attachments for ship and coast guns, slide bars are employed for making the necessary corrections in the traverse due to the movement of the target and to drift. Hitherto separate screws have been used for the adjustment of backsight slide, as well as for the

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backsight slide together with the second slide. By means of the present invention both the adjustment of the backsight alone as well as the adjustment in common with the second slide may be made through one adjusting screw. Accepted May 28, 1903

20,430 (1902). **Revolver Mechanism.** The Webley and Scott Revolver and Arms Co., Ltd., and W. J. Whiting, Birmingham. In single and double action revolver mechanisms, when the hammer is held in bent at full cock, the trigger takes up a position at the back of the guard. More especially in consideration of target shooting, the disturbance in the finger position caused by such alteration of the trigger location is obviated by so modifying the trigger mechanism that when the hammer is cocked by hand (as distinguished from cocking by the trigger) the trigger remains in its usual position in the centre of the guard. The double action remains as before. Accepted May 28, 1903.

20,723 (1902). **Aiming Instruction.** J. W. D. Johnston, Birchington. An instrument consisting of a tube upon which is fixed a set of ordinary rifle sights. By means of levers, screws and joints regulated by thumb-screws, the tube may be turned about so that the method of aligning sights upon an object may be practically demonstrated. Accepted May 21, 1903.

2,977 (1903). **Explosive Compound.** A. Brock, Sutton. An explosive compound, to be called "Brockite," which is specially applicable for use in signal rockets and shells, but may be used also for blasting. The explosive consists of a chlorate, preferably chlorate of baryta, and aluminium powder. The proportions in which these are mixed is varied within considerable limits, according to the purpose for which the compound is intended. This mixture can be exploded without a detonator. Accepted May 14, 1903.

2,977A (1903). **Shell for Signalling.** A. Brock, Sutton. A shell designed to be thrown from a mortar for marine and other signalling purposes. The shell contains a charge of the explosive described in the immediately foregoing patent, and is exploded by means of a quick match. Accepted May 14, 1903.

2,977B (1903). **Signalling Rockets.** A. Brock, Sutton. A rocket for signalling, in the front part of which is arranged a "hea-ling" composition to govern its flight. In the rear of the rocket is placed a charge of the explosive, referred to in the above patent, No. 2,977. The shell is designed to be ignited by a Bickford fuse. Accepted May 14, 1903.

3,604 (1903). **Repeating Rifle.** M. Mondragon, France. A rifle which is adapted to be worked either automatically or by hand. An outside lever, which always works in a straight line, but imparts a rotary motion to the breech bolt, is the medium through which the breech is opened should the valve, shutting off the supply of gases of combustion which automatically work the mechanism, be closed. Accepted May 21, 1903.

3,967 (1903). **Cartridges.** J. M. Edmunds, U.S.A. A cartridge for rifles in which the bullet is rigidly attached to, or is part of, that part of the case which forms the powder chamber. The cap is inserted in the base which separates from the combined casing and projectile upon firing. Accepted May 7, 1903.

4,717 (1903). **Moving Targets.** W. & W. L. Thackray, York. A travelling target, which upon being hit is adapted to disappear and to be automatically returned to an upright position. The target is fixed upon a weighted carriage which slides freely upon a fixed horizontal bar. Movement is imparted to the carriage by means of an endless band. The target is caused also to rotate. Accepted May 7, 1903.

5,151 (1903). **Field Guns.** O. Stocklé, Belgium. In order to allow the trail and limber of field quick-firing guns to be detached when the gun is in motion, the hook upon the trail is so pivoted that by means of a lever it may be swung into or out of engagement with the eye upon the limber. Accepted May 28, 1903.

5,164* (1903). **Single-Trigger Mechanism.** J. A. R Elliott, U.S.A.

6,298 (1903). **Gun Carriages.** G. Ehrhardt, Germany. A carriage for guns with tube recoil, in which the gun is guided by means of the bars to which the armour is attached. These bars embrace and slide upon correspondingly parallel bar arranged upon the tube containing the recoil brake. Accepted May 21, 1903.

6,744 (1903). **Rifle Mechanism.** H. S. S. Watkin, and J. J. Speed, Enfield Lock. Instead of the eliptical-shaped barrel and stock fore-end binder ordinarily used on rifles, an approximately circular ring is used This ring is provided with two flats which grip the barrel when the screw, situated under the centre of the fore-end, is tightened. This method is claimed to have the advantage of not preventing longitudinal expansion of the barrel. A cocking piece safety and a locking part which prevents rotation of the bolt are also described. Accepted May 7, 1903.

7,014 (1903). **Trigger Mechanism for Ordnance.** K. Völler, Germany. Trigger mechanism for ordnance which is so arranged as to be easily removable, without the aid of tools, independently of the bolt or firing pin. The return action of the trigger after pulling replaces the sear nose in the notch in the firing pin, so that the trigger may be recocked without opening the breech in case of mis-fire. Accepted May 28, 1903.

7,712 (1903). **Glazing Powder Grains.** A. I. du Pont, U.S.A. A method of shortening the time occupied during the glazing process, consisting in substituting a metal drum for the wooden one ordinarily used. This drum is steam jacketed, the moisture in the grains being by this means brought to the surface quickly. The watery vapour developed within the drum is cooled when the grains have been brought to the glazing point by stopping the supply of steam in the jacket. The vapour condenses and collects any dust, thus leaving the powder grains clean The glazing is then proceeded with. Accepted May 21, 1903.

7,965 (1903). **Glazing Powder Grains.** A. I. du Pont, U.S.A. In the above patent, No. 7,712, is described a method of decreasing the duration of the operation of glazing powder grains. The present patent refers to apparatus which it is preferred to use in practising the method. Accepted May 21, 1903.

7,931 (1903). **Cartridge Carriers** A. J. Boult, London. (Agent for *A. Mills, U.S.A.*). A belt, the fabric of which is woven in one with pockets adapted to contain cartridges, either loose or in clips. A pocket designed to contain a first-aid package forms part of the belt. Accepted May 14, 1903.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

THE ELLIOTT SINGLE-TRIGGER MECHANISM.

5,164 (1903). J. A. R. Elliott, U.S.A. A system of single-trigger mechanism is described in this specification. A sleeve is so arranged as to be capable of a partial rotation around a fixed post. This sleeve carries two lugs, one of which operates one of the sears when the trigger is pulled for firing. The position of these lugs in relation with the sears is regulated by an exterior thumbpiece, which must be operated after the first discharge in order to turn the parts over for the firing of the second barrel. The involuntary pull is rendered inoperative since the second sear cannot be lifted until by manual manipulation of the outside thumbpiece the sleeve is rotated in order to place the second lug beneath the second sear. When the parts are centrally disposed, both barrels would be discharged were the trigger to be pulled.

The parts are illustrated in various positions in the annexed drawings. Referring to Figs. 1 and 3, it will be noticed that a frame is supported upon the trigger plate consisting of the fixed part *a*, the rear plate *b*, and the top plate *c*. The principal limbs of the mechanism are contained within this frame. The post *d* is a standing fixture upon the trigger plate, and around this post the sleeve *e* works. The sleeve is capable of vertical and rotatable movements upon the post, and its base rests upon the top of the trigger blade. Upon its upper surface the sear-lifting lugs *f* and *g* are arranged. At its lower end the lugs *h* are provided, and these are designed to be engaged one at a time by one of the two stop springs *i* and *j*. The

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arrangement of these springs in relation with the rocking parts *k* and *l* is such that one is held down out of the way of the sleeve, whilst the other lines up with the lugs *h*. The rotation of the sleeve upon the post is regulated by these springs. The sleeve is rotated to alter the positions of the lugs *f* and *g* through the medium of the flexible ball-ended arm *m*. This arm is attached to a block *n*, movable transversely in a channel cut in the post *a*. A pin *o* extends from the block *n* into a hole in the top plate *c*. The top plate is so mounted that by turning the shifting bolt *p* by

Fig. 1

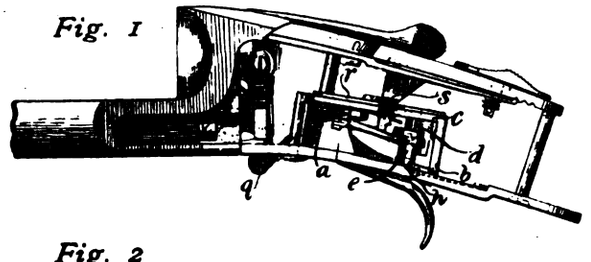


Fig. 2

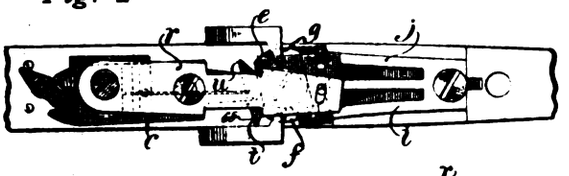
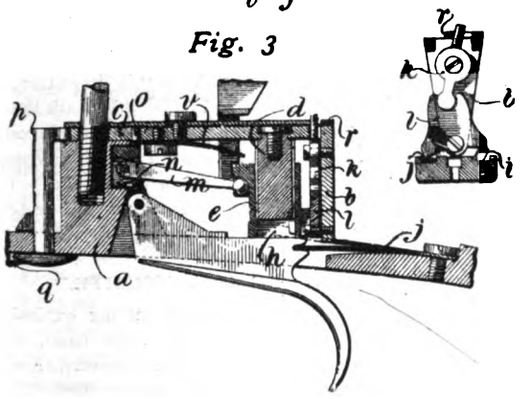


Fig. 3



means of the thumbpiece *q* it is swung upon the post *d*, its forward end being carried towards either lock. When the plate is so swung, the block *n* is carried with it, and thus the arm *m* is caused to turn the sleeve *s* about the post *d*. Attached to the plate *c* is another plate *r*. During the swinging movement of the plate *c*, the plate *r* is caused to rock the lever *k*, and so to release one of the springs *i* and *j*, and to depress the other. The sleeve is released during this movement, and is free to be rotated by the arm *m*.

When the gun is broken down for the purpose of reloading, the safety slide is pushed back in the usual manner, and one of the legs *s* is carried into locking engagement with one of the arms *t* and *u*. Any upward movement of the trigger is thus prevented, until the slide is pushed forward again for firing. The sleeve is lifted when the trigger is pulled, and the right-hand barrel is discharged through the engagement of the lug *g* with the right-hand sear tail (Fig 2). The upward movement of the sleeve is checked by the spring *v*. When it is desired to discharge the second barrel, the thumbpiece *q* is operated to turn the plate *c* over. The sleeve is rotated during the traversing movement of the plate through the block *n* and its arm *m*. The rocking levers *k* and *l* are actuated at the same time, and the spring *i* is depressed, so allowing of the rotation. The lug *f* is, in this manner, placed beneath the left-hand sear tail, and upon further pressure the trigger discharges the second cartridge. Accepted May 21, 1903.

THE HOLLAND SINGLE-TRIGGER MECHANISM.

13,735 (1902). H. W. Holland, and T. Woodward, London. In the system of single-trigger mechanism described in this specification, the involuntary raising of the trigger caused by the recoiling of the gun is prevented by a lever, the end of which swings over the top of the trigger blade immediately after the first discharge. The lateral position of this lever in relation with the locks, regulates the order in which the two barrels shall be discharged.

From the drawings appended, it will be seen that the lever *a* is pivoted just beneath the strap at *b*, and is so arranged that when it is swung forwards from the position illustrated in Fig. 1, its lower ends just clear the top *c* of the trigger blade. The lever is retained in its backward position by lugs *d* upon the hammers, one of which engages one of the lugs *e* upon the lever, according to the lateral position of the lever *a* upon the pin *b*. This lateral position is governed by a thumb-piece *f*, the sideways movement of which carries the lever *a* either to one side of the action or to the other. When the hammer which holds the lever back has fallen, the spring *g* drives the lever forward on its pivot *b*.

When the parts are in the position illustrated in Fig. 2 the lever *a* is so placed that its ends (Fig. 3), which embrace a part *h* pivoted upon the top of the trigger blade, are caused to hold the tail of this part beneath the right-hand sear *i*. When the trigger is pulled the end of the lever *a* enters a notch *j* in the top of the blade,

Fig. 1

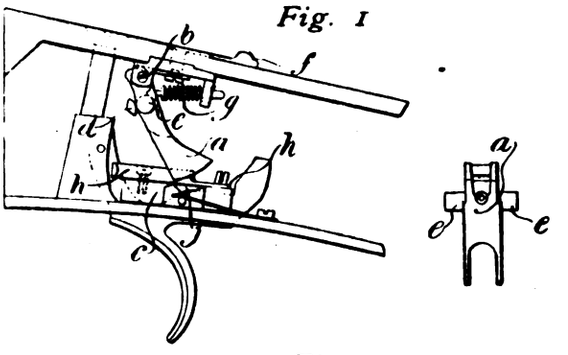


Fig. 2

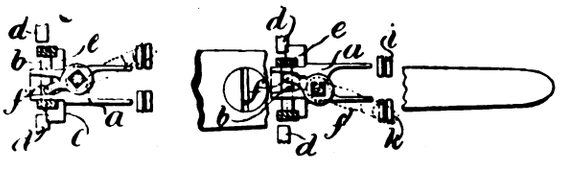


Fig. 3

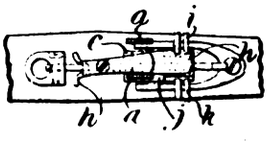
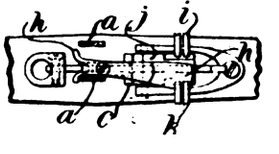


Fig. 4



and so allows the trigger to be raised sufficiently to release the hammer and discharge the right-hand barrel. The falling of the hammer releases the lever *a* which is forced forward by the spring *g*. As the lever end passes over the top of the blade *c*, the involuntary pulling of the trigger is occurring and any upward movement of the blade is smothered. One of the lever ends, at the finish of the forward travel of the lever, engages with the forward end of the part *h* and turns this part over on its pivot to the second sear *k* (Fig 4). A second deliberate raising of the trigger lifts the sear *k*, and discharges the left-hand barrel, when the

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gun is recocked, the lever, in swinging back to its original position leaves the butt of the part *h* beneath the right-hand slot again. Should the thumb-piece *f* be utilized to turn the lever *a* over to the left-hand position before the discharge of either barrel, the left-hand barrel is the first to be fired; and the same cycle of operations as described above, but working in the opposite direction, safeguard against the involuntary pull and place the parts for the second discharge. Accepted, May 14, 1903.

THE GREEN SINGLE-TRIGGER MECHANISM.

15,307 (1902). E. C. Green, Cheltenham. The mechanism described in this patent is adapted, through the medium of one trigger, to discharge three triangularly-arranged barrels successively.

Referring to the drawings appended, Fig. 1 represents a side view of the three-barrelled gun, with the left-hand lock plate and attached parts removed. Figs. 2, 3, and 4 are views of the

Fig. 1

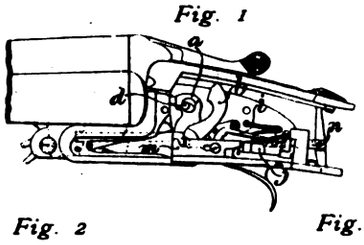


Fig. 2

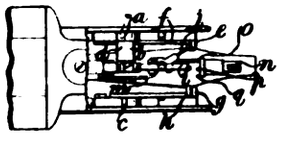


Fig. 3

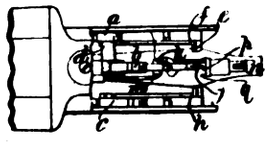


Fig. 4

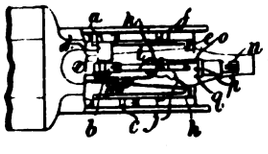
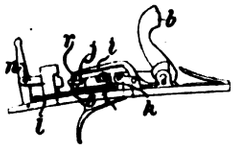


Fig. 5



mechanism in the varied positions taken up during the firing of the three barrels; and the remaining illustrations are views of parts of he mechanism.

The three barrels are discharged by means of the three tumblers, *a*, *b*, and *c*. The hammers *a* and *c* are cocked in the ordinary way during the breaking down of the gun by the usual cocking dogs. The centre hammer *b* is connected with, and is cocked by, the right-hand hammer *a*, the lateral pin *d* communicating the motion of the one to the other. The locks are provided as usual with the hammer-releasing and intercepting sears *e f* and *g h*. The centre hammer *b* is controlled by the sear *i*, the arrangement of which is illustrated in Fig. 5. The "swinging bar" *j* (see detailed drawings) is pivoted to the top of the trigger blade, and its swinging movement from right to left is caused, through the medium of the bell crank lever *k*, by the spring *l*. The bar *j* is forced back from left to right against the pressure of the spring *l* by the rod *m*. This rod *m* is actuated through the locking bolt by the top lever during the opening of the gun in the well-known manner, being taken from the position illustrated in Fig. 4 to that shown in Fig. 2. In the latter position the bar *j* is held by a hook upon the tail of the safety sear *f*. The safety slide is of ordinary construction, and is automatically pushed back to "safe" during the turning of the top lever. Attached to the leg of the safety slide is the limb *n*, which is adapted to engage the tail-end of the trigger blade, and so to prevent any upward movement were the trigger to be pressed. The face of the limb *n* is provided with the series of projections, *o*, *p*, and *q*. These projections intercept the swinging bar *j* during its movements from right to left, and prevent the involuntary pull after each discharge from lifting the next sear.

Assuming the parts to be in the position illustrated in Fig. 2, the pulling of the trigger lifts the right-hand sear, beneath which the bar *j* is held. The right-hand barrel is thus discharged, and the partial relaxation of the grip upon the trigger just before the involuntary pull, releases the bar from the embrace of the hooked sear tail *f*, and allows the spring *l* to turn it over in the direction of the left-hand lock; the projection *o*, however, being in the path of its traverse, intercepts its movement until the involuntary pull once again lifts the trigger, and thus allows the tail of the bar to travel over the top of the projection. The bar is again brought to rest by the tail of the sear *i*, midway in its lateral movement, and with the release of the trigger the bar drops into the position beneath the projection *r* on the tail of the sear *k*, whilst the tail of the bar *j* is brought into contact with the projection *p* as is shown in Fig 3. When the trigger is pulled again, the sear *k* becomes disengaged from the hammer *b*, and the centre or top barrel is discharged. The lifting of the bar disengages its tail from the projection *p*, and when the trigger pressure is slightly relaxed immediately after discharge the bar slips beneath the hook *s* on the sear tail *i*, but is brought to rest again by the projection *q*. The involuntary pull instantaneously following lifts the bar above this projection, and allows it to resume its travel to its final position beneath the left-hand sear tails *g* and *h* (Fig 4) A third deliberate pull upon the trigger brings about the discharge of the third barrel. When the gun is broken down to reload, the bar *j* is pushed back to its position beneath the right-hand sear (Fig. 2), and the trigger is locked as has been explained. Accepted May 14, 1903.

BLASTING EXPLOSIVE "ENORMITE."

13,111 (1902). J. M. Az, Holland. A mining explosive is described in this patent. It has a nitrate mixture basis, and its composition is such, it is claimed, as to render it powerful in action in proportion to weight, and safe under severe conditions.

The explosive consists of a mixture of a large proportion of nitrate of ammonia, with a small quantity of pure anthracene, and a still smaller quantity of sulphide of barium. These substances are mixed in any suitable manner, the finished composition being called "Enormite." The quantity of each ingredient lies within the following proportions:—Not more than 93 parts and not less than 91 parts of nitrate of ammonia ($NH_4 NO_3$), not more than seven parts and not less than five parts of anthracene ($C_{14} H_{10}$), and not more than one part and not less than one part of sulphide of barium (BaS). In accordance with one specified mixture, the exact amounts of each substance employed are:—91·826 parts of pure nitrate of ammonia, 6·174 parts of pure anthracene, and two parts of pure sulphide of barium. The explosive, which can be exploded with any ordinary detonator, is claimed to excel any other nitrate mixture in power, proportionate with weight, and in security, and to possess a valuable property in not producing dangerous after-damp when exploded. Accepted May 14, 1903.

PATENT AMENDMENTS.

15,453 (1901). The Auto Electric Rifle and Target Co., Ltd., seek to amend Patent numbered as above and granted to J. L. McCullough and H. Connett, desiring to make the claims therein, which they are advised are too wide, more clear and precise.

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CONTENTS.

CURRENT TOPICS.

Miniature Rifles at Bisley.—This year's Bisley records differ but little from those of previous occasions in regard to the miniature rifle competition. The first prize was secured with a Stevens ·25 rifle, firing rim ammunition, this falling within the limits of price laid down for the special competition set aside for inexpensive arms and ammunition. It is unfortunate that, with so many fine rifles available, none of our manufacturers seem disposed to lay themselves out for rifling and chambering specimens of their arms for the different cartridges that are popular amongst miniature shooters. The limit of price for ammunition in this contest, viz, 5s. per hundred retail, would allow for the admission of several well-known English cartridges, and it is, therefore, to be regretted that a greater effort has not been made to give representative English goods at least a show. Nothing is done abroad that we could not equal in this country at least for the purposes of a special competition of this character. We must, therefore, hope that some firm will put the same energy into the development of miniature rifles that Messrs. Webley have shown in dealing with a rather more expensive type of sporting and club weapon. The modern miniature rifle is so simple in construction that the limit of price, viz., £3 10s., should allow plenty of margin for doing all that is required in the interests of the junior marksmen of the country.

The Future of the ·303 Cartridge.—Those who have taken note of the wonderful success of the special ·303 cartridges made for the Palma match will naturally wish to know whether it would be possible to adopt the same standard of construction for the ordinary service cartridge. The pressures given by the new combination of charge and bullet are reckoned to work out at 18 tons, which represents an advance of about two tons over the ordinary service standard. The above pressure would probably rise to 20 or 21 tons in a hot climate, but we fear that this is a prohibitive limit in the case of the ordinary service rifle. If a proper system of bolt fastening were adopted such a pressure would give no trouble whatsoever, but with a bolt that is so inadequately locked as is that of the ·303 service rifle, it must regretfully be admitted that the stresses set up would pass the limit of safety for service conditions. The Mauser, Mannlicher, or in fact any other service arm, would be fully capable of withstanding the range of pressure experienced, and it is, therefore, a pity that there appears to have been no effort on the part of the Small Arms Committee to reconstruct the bolt of the service rifle on sufficiently sound mechanical principles.

The Pistols Bill.—There was a species of fright in gunmaking circles when it became evident that, notwithstanding the pressure of parliamentary business, the Pistols Bill had passed its third reading in the House of Commons, and was romping through the Upper Chamber. There appeared to be no possibility of stopping its course, or of securing reasonable alterations of the very drastic and unnecessary clauses which had been incorporated into it. At the eleventh hour, the Birmingham Gunmakers' Association awoke to the seriousness of the situation, and by the help of the altogether exceptional political influence of the Midland metropolis a moment's breathing space was obtained. The credit for what was done rests primarily with the Birmingham Gunmakers' Association, and Mr. Joseph Rowlands, the law clerk of the Proof House Guardians. By the last named gentleman's personal endeavours, Mr. Powell Williams's interest was secured, and as a result Lord James of Hereford was approached and certain amendments were urgently pressed upon those in charge of the Bill. These were accepted at the

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third reading in the House of Lords, and they allow greatly increased facilities to purchasers of pistols without in any way detracting from the objects aimed at by the promoters of the Bill. Parliamentary procedure necessitates the referring back of the Bill to the House of Commons for the approval of the amendments incorporated, which for the moment leaves it in doubt whether Parliamentary time will be allotted for the purpose of its further consideration. At the present time, therefore, all that can be said is that the Bill is more satisfactory in its clauses than any previous measure hitherto submitted, and that if it does pass as now amended the gun trade will have to thank the Birmingham Association for the very effective aid it has been in a position to render.

Uniformity in Loading.—Messrs. Eley Bros. have taken a most important step in connection with *The Field* system of loading, of which particulars were published in our last issue. Fully realising the great advantage of a settled plan of loading in place of the large variety of systems that have hitherto been current they are about to solicit the co-operation of the powder makers. They are of opinion that, in view of the increasing demand for cartridges giving the very best results, it is necessary to call for the closest conformity with the recognised standards of all components used in cartridge manufacture. As a means to this end they are willing to supply to powder makers most carefully standardised cases and wadding which they propose should be used on the system laid down in *The Field* method of loading. These materials they propose employing for their own proof tests of all powder supplied, and they recommend that the manufacturers of the same should use the identical materials, and as far as possible observe the same methods of test. Bearing in mind the very large purchases that Messrs. Eley are in a position to make, it is more than likely that the powder makers will decide to adopt the Eley materials for standardising the remainder of their product. As a direct consequence of this policy, *The Field* method of loading is likely to be the system recommended by the powder makers for adoption by all their customers, thus simplifying the conditions of loading and enabling the powder companies to regulate their nitros with a more definite knowledge than ever before existed of the conditions under which they will be used. Such a change requires time before the full benefits can be experienced, but even so, no matter how slow the progress may be, it is in the right direction, and as its favourable results become manifest it will gather strength and so gradually become universal, its chances of development being increased by the fact that the new method of loading is simpler and less expensive than most of the systems that have hitherto been adopted in commercial practice.

Clay Bird Shooting.—This year's clay bird shooting season is now drawing to a close, and it is a somewhat remarkable fact that with less trade encouragement than the movement has ever before received, the sport is showing a vitality and energy that exceed all previous records. Two large and highly successful meetings have been held in London during the season, and at both of these the aid granted by the Clay Bird Shooting Association was eclipsed by the extensive donations of prizes which were made by supporters of the clubs who were unconcerned with trade influences. Experience seems to have defined the most favourable conditions under which gatherings of this kind should be organized in order to attract plenty of support from the shooters, and the result has been that shooting has proceeded continuously during the whole time that the meetings have been running. In Scotland and Ireland renewed interest has also been shown in the sport, shooters having at last come to the thoroughly sound conclusion that not only is their skill with the gun greatly enhanced by the facility that is gained with club practice, but that the club shooting itself is of an enjoyable character and conducive to the health and enjoyment of its participants. Shooting schools again are progressing in a manner never before experienced, several of our best managed establishments of this character having as many engagements as can be crowded into each day. Whether at tower birds or at those thrown from the ground the experience of practical shooters is the same, viz., that the skill acquired in handling the gun and in making the complicated allowances for objects moving at various angles and distances is most useful as promoting efficiency when dealing with fur and feathered game.

Gun Fitting.—The extending popularity of the clay bird has brought into being an entirely new class of gun expert. We refer to the man who is more an exponent of shooting than an actual expert in the manufacture and testing of guns. Men of this character have a wonderfully quick eye for shooting form, and they are able to detect in those who come to them for advice and aid various little peculiarities that may be remedied by one or other of two obvious means, the one being the special adjustment of the gun, the other the teaching of the shooter how to remedy his faults once their existence has been made apparent. When gun fitting is thus intelligently carried out, those entrusted with the work are able to acquire an altogether exceptional experience through dealing with a large number of individual types of sportsmen. They know to a nicety just how much the peculiarities of the shooter can be humoured by special gun construction, at the same time differentiating clearly those faults which must be remedied by the shooter himself. Till quite recently, gun fitting has been regarded more or less as a fad, and the haphazard methods in which the stock and other measurements have been arrived at, have lent probability to the view. Now, however, that gun fitting is advancing on a more exact basis by the aid of a specialist class that has grown up with the demand, the proportion of successes is daily increasing, so that among the best sporting opinion of the present day, gun fitting is regarded as absolutely essential in order to get the best value out of one's sport. This is ensured by a correctly fitting gun that will adapt itself to the peculiarities of form and style of the shooter for whom it is intended.

The Stevens Arms and Tool Co. have forwarded for our information their new telescope catalogue which gives full particulars of the various goods of this kind that they have on sale. It seems that they have acquired the telescope business of the Cataract Tool and Optical Co., of Buffalo, New York, having also taken over the services of Mr. F. L. Smith, ex-manager and expert of that business. Those acquainted with Cataract telescopes must appreciate their nice construction and good optical qualities. The new catalogue is interesting, both for its optical information and the particulars it gives of various forms of carefully worked-out mountings.

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THE PALMA MATCH.

ON the 11th ult. the competition for the Palma Trophy took place. The United States team won with a score of 1570, the British coming second with 1555, the colonial and other competing teams following. The six best scores made for each of the above teams of eight exactly tied. The two worst scores for the British team were 15 points worse than the two lowest that were made for the Americans. We thus lost the match. According to all accounts the result incontestibly proves the inferiority of the British service rifle, and the superiority of the United States arm. We think exactly the reverse, since we believe the Lee-Enfield never received such a testimonial in its whole previous existence. By the rules of the match the teams were to use the service arm of their country. In point of fact, the winners did nothing of the kind, and their diversity of action was allowed to pass without the protest that would have resulted in only one way, viz., by the disqualification, before the match, of the rifles used, or, after the match, of the team making the winning score. That is to say, the members of the winning team used barrels that differed materially from those of the service pattern arm. As an admission of this fact they brought with them reserve arms that were of standard make, but they were not called upon to use them. It is impossible to say what advantage, if any, was gained by the altered character of the barrels that were used in the match. The chief advantage which rested with the United States team lay in the circumstance that the rifles used were fitted with aperture back sights in addition to which they had means of applying lateral adjustment for wind allowance.

Such a difference between the arms of the competing teams constitutes a handicap allowance that may be variously estimated at from five to ten per cent., which may be compared with the winning margin of one per cent. There is talk of sending a British team to the United States next year to compete yet again for the Palma Trophy, but it is to be hoped that wiser counsels will prevail. One does not need to cross the Atlantic to discover that the fixed military sights of British pattern are not in the running with a set of sights that possess much of the delicacy and refinement that are associated with what are in this country known as match rifles. Either the British competitors must be allowed the same advantages in sighting as their rivals, or they should not shoot. As to the status of the peep sight on the arms used by the American team, the available information is not very clear. For instance, *Shooting and Fishing*, of July 23, 1903, contains the following paragraph:—"The Chief of Ordnance, U.S. Army has decided that soldiers in battle will not use a peep sight, consequently he does not favour a rear peep sight on the new U.S. Springfield rifle. * * * The shorter barrel and the open rear sight on the new rifle make fine shooting at long range more difficult than with the peep sight." In other words, a test of accuracy between rifles cannot be a fair one unless they are sighted alike, and consequently when this condition is not present, the deductions made must be false, unless the result is suitably qualified by a statement of the advantages favouring one side or the other. So long as there are serious differences in the extent to which nations are willing to adapt military arms to the specialized conditions of match shooting, the regulations attached to the Palma Trophy are not fair ones. As the United States team have themselves departed from the conditions laid down for the match, they should sanction a further amendment, viz., the allowing of any sights that the competitors care to use. We cannot, however, allow that the partial reconstruction of the weapon in the manner adopted by the American team is in accordance with the spirit of the rules, or the sportsmanlike traditions that should be brought to bear in carrying out the contests.

If, therefore, future competitions for this trophy are to be carried on in a spirit of friendly rivalry between the two nations most chiefly concerned, the rules laid down must be fair in themselves, and at the same time equally adhered to by the contesting parties. The trophy affords such a splendid opportunity for the interchange of friendship and hospitality between the sportsmen of the two nations that it seems a pity that on either side there should be a tendency to go further than the regulations allow when strictly interpreted. The splendid marksmanship displayed by the members of the American team gives promise of a brilliant future for match rifle shooting in the United States. It has fallen somewhat into abeyance, but there is no doubt that the victory they have gained in the recent well contested match will set things on a more satisfactory footing than ever before. We on our side have much to learn. Almost at the last moment we were able to produce a cartridge satisfactory in all respects for long range shooting, a direction in which the ·303 cartridge has hitherto proved a rank failure. Let us, therefore, work to perfect our implements in the hope that future international contests, whether for the Palma, or some other trophy, will show us in a favourable light both as regards rifles and marksmanship. The most important lesson that the British public has learnt from this competition is that the English service ammunition must be replaced with different loading to secure a maximum of target efficiency from the rifle. What follows from this is that the rifle should be capable of dealing with a higher power ammunition than the service brand, and it is just here that we fail, because the margin of safety is insufficient in the breech closure, bearing in mind the rise of pressure due to tropical temperatures.

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THE NEW SERVICE RIFLE.

A good deal of ill-informed comment has lately been going the rounds of the papers concerning the new service rifle. It is unfortunate in some respects that the public have not been enlightened in a more official manner concerning the attributes of the new arm. A large amount of information has, however, got into the general press, and this is not surprising, considering that specimens of the new arm have been freely handed about and their inspection allowed in a more or less confidential way. The actual form of the new sight is no longer a secret, since we find that Mr. Joseph Speed, of the Enfield Factory, has taken out a patent covering its essential features. The specification of this sight is duly outlined in our present issue.

The generally acknowledged fact that the radical defects of the old system of bolt have been retained, inspires a feeling of regret in the minds of all those who hoped that something better would be adopted by the Small Arms Committee, as they had every opportunity of bringing this part of our national arm up-to-date. In the same way it is much to be regretted that the divided stock has been retained in place of adopting a piece of wood continuous from one end of the arm to the other. It is, however, on account of the reduction of the weight of the rifle by one pound and the shortening of the barrel from 30 inches full, to 25 inches full that most of the hostile comment has been aroused. Furthermore, the dimensions of the bore are such that the well-known operation of lapping out a parallel barrel by means of a lead plug can no longer be applied. Curiously enough, the reduced weight and length of barrel have been condemned in the most sweeping manner on account of the supposed increase of recoil resulting. How these scribes get at their figures it is difficult to understand, considering that the total recoil of a ·303 rifle of the old pattern is but a little more than half that of the ordinary shot gun, and that the sole increase of recoil that can exist must be such as is due to the reduced weight of the arm and the efflux of the products of combustion at a slightly higher muzzle pressure than before. These changes are not likely to add more than 10 per cent. at the outside to the recoil at present experienced, and considering that the total amount must in any case be so ridiculously small, it is a pity that so inappropriate a weapon of attack has been chosen for discounting the merits of the new rifle. The shortened distance between the fore and rear sights has also been treated as a subject for severe comment, notwithstanding the fact that the distance adopted in the new rifle is one frequently met with in many arms where absolute precision is even more important than in a military rifle.

We are far from wishing to act as unofficial apologists for the new service rifle, supposing of course that the pattern lately adopted will be finally accepted for issue to the troops. It is exceedingly difficult to make suggestions that would not involve objectionable features in one direction or another; but, however we may look upon the question of selecting a new rifle, one thing at least is clear, viz., that the responsible committee should be well informed, both in the technicalities of rifle science, and in the *minutiæ* of mechanical workshop practice. Unfortunately, the personality of the Committee is remarkable for an entire absence of these most useful qualifications.

EXPLOSIVES LITIGATION.

Davies *v.* Curtis's and Harvey, Ld.

This appeal from the previous judgment of Mr. Justice Walton was heard by Lords Justices Vaughan Williams and Stirling on the 20th ult. The plaintiff, Mr. Leyshon Davies, of Glasgow, claimed by this action to recover damages from Curtis's and Harvey, Ld., for breach of an agreement, dated January 13, 1899. The plaintiff was manager for the defendants at their factory at Kames, and his case was that he had invented a safety powder, named "Argus," which was manufactured by the defendants under an agreement to pay royalty on profits derived therefrom. His arguments went to show that the defendants ceased to sell the powder invented by the plaintiff under the name of "Argus" powder, but sold large quantities of the same powder under the name of "Bull Dog" powder; and he now sought to recover the lost royalties, together with damages for breach of contract. The special importance of the plaintiff's invention lay in the fact that "Argus" powder was an explosive permitted under the Coal Mines Regulation Act, to be used in fiery mines.

In answer to the plaintiff's claim, the defendants said that the "Bull Dog" powder was not manufactured under the letters patent for the invention referred to in the agreement of January 13, 1899, and they denied it was the result of an improvement in or addition to such invention.

Lord Justice Vaughan Williams, after stating the facts at length, and reading the agreement and the specification of the plaintiff and Mr. C. W. Curtis, said the evidence fully proved the identity of the "Bull Dog" powder and the "Argus" powder, with the exception that, under the invention disclosed in the complete specification filed by the plaintiff and Mr. C. W. Curtis, lignite was designated as the source of carbon. His Lordship had very little doubt that, although the plaintiff believed in the advantage of lignite—which was the special feature of his specification—by reason of its being cheaper than ordinary charcoal, he was disposed to exaggerate the importance of lignite as conducing to safety, because it was possible to obtain protection under a provisional specification based on a combination including definite proportions of lignite of a certain quality and saltpetre. It would be practically impossible to protect a powder based merely on exclusion of sulphur and certain proportions of saltpetre and ordinary charcoal. Having regard to the evidence, his Lordship could not say that the conclusion of Mr. Justice Walton was wrong, although this case should not be regarded as a "patent case," but as a case of the construction of an agreement with a schedule describing the invention, the subject of the agreement; and although he could not doubt that for a long time Messrs. Curtis and Harvey did regard the discovery of the new blasting powder as the discovery of a sulphurless powder constituted with saltpetre and charcoal, and regarded lignite as a cheap source of carbon, yet before and at the time of the agreement they and their successors, the limited company, under pressure from the plaintiff came to regard lignite as the essence of the discovery. This view equally disposed of the plaintiff's claim in respect to the improvements or additions, and, although the case was a very hard one on the plaintiff, this appeal must be dismissed with costs. Lord Justice Romer and Lord Justice Stirling delivered judgments to the same effect.

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MR. H. MELVILLE SMITH.

At a time when the Palma contest is still fresh in our minds it may not seem inappropriate to say a few words about one of the members of the British team who neither shot in the match nor acted in any other official capacity. Mr. H. Melville Smith is already well known to a large number of our readers. The extent of his information on all that appertains to the manufacture and performances of military small-arms ammunition is remarkable. He knows Woolwich more accurately than many of the guides who show its wonders to visitors, and he is *persona grata* to the chiefs of departments who find that he is generally in possession of the latest information that is going.

It is, however, as superintendent of the cartridge factory of the King's Norton Metal Company that his abilities have their fullest scope. He designed the factory on the basis of a life-time's practical experience, both as an engineer and as a cartridge expert; and as a result the Abbey Wood Works are absolutely unique as a factory, embodying every possible modern improvement. Here it was that the Palma cartridge, for so we prefer to term it, had its being. The time for the recent match was drawing on apace, and the members of our team were not satisfied with the ·303 service cartridge. What was wanted was something of greater power that would retain a constant elevation at long ranges. The ·303 had long ago been discarded by our most famous match rifle shots in favour of the Mannlicher; and in the present instance they were forced to use the service arm while knowing full well the serious limitations of its cartridge for the purpose in view. Mr. Melville Smith saw his chance, and as the result of a conversation on the subject with one of the members of the team, at the last Gunmakers' Association dinner, he set to work to produce a high power ·303 cartridge. It is difficult to see exactly what discovery he has made, and yet, judging by results he has revolutionized Bisley sentiment towards the ·303.

It is no longer an impossible weapon for long-range competitions. It is as accurate as the best, and many who have ignored it in the past have decided to use it in the future. Just at present it is not easy to foreshadow the consequences of this change of attitude. The rifle which serves the volunteer for the ordinary routine of range-firing may be converted into a match rifle by the fitting of appropriate sights, and he will then be equipped to enlarge his experience without changing his weapon by shooting at the longer ranges where the most delicate methods of sighting are permissible. Then again the slur which has always rested on our service arm will be removed by the knowledge that with a more powerful cartridge it can produce the best results at long distances. At any rate the fact remains that in the Palma match, when the new cartridge was used, out of 360 shots not a single one missed the target; a unique record which was simultaneously achieved by the American team, who used a grade of ammunition which was looked upon as altogether remarkable by the English team who had to shoot against it last year. It is the production by Mr. Melville Smith on behalf of the King's Norton Metal Company of this new cartridge which affords us the opportunity to mention in our columns some one who has been known to us for years, and with whom we have been in the closest touch and sympathy throughout.

He served his time as an engineer in the works of Messrs. Greenwood & Batley, of Leeds, thus acquiring a good all-round training that was of great assistance in his subsequent career. Coming later on to the London office of the same firm he enlarged his knowledge in other directions, gaining an insight into the machinery used in the manufacture of powders, small-arms and ammunition in government and other factories. Messrs. Greenwood & Batley were the concessionaires of the "Rubin" patents, so that he has followed the whole history of the ·303 cartridge from the time of its incepton to the present date. The early difficulties of its manufacture were brought to his notice on account of the many applications by manufacturing firms who came to Messrs. Greenwood & Batley for advice and machinery. His first connection with the King's Norton Metal Company was when his name appeared as one of the signatories at the time of its incorporation, after which he was jointly employed by the two firms. At the time of the late war, Mr. Smith was entrusted with the erection of the Abbey Wood Works, and he made it his ambition to reproduce in that department the same vigorous and effective striving after good workmanship, that is characteristic of the large factory at headquarters, which has grown up under the nurturing care of Mr. Bayliss, who has already been introduced to our readers. That he has succeeded in his ambition will be apparent to anyone who sees the factory in its present completed state, hard at work on government orders, and employing a large staff of skilful workers. It is now one of the biggest, if not the biggest factory of its kind in the Kingdom, the Woolwich cartridge department excepted. Under such circumstances it is not surprising that Mr. Melville Smith finds his time well occupied in attending to the one concern, he being now permanently retained by the King's Norton Metal Company. We wish him many years of prosperous work under the congenial direction of such chiefs as Mr. Arthur Greenwood, chairman of the Company, and Messrs. T. K. and T. A. Bayliss, father and son, joint managing directors.

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THE HEAT TEST.

MR. ALBERT P. SY contributed a very interesting article to the *Journal of the American Chemical Society*, which appeared in their June number. In reviving the subject of his discourse, he points out that stability tests, sometimes also called "heat tests" are applied to explosives to determine their stability and keeping qualities. During the process of manufacture these tests are made to determine if the product has been sufficiently purified, that is freed from substances that might cause it to decompose spontaneously. He then proceeds to discuss the various forms of test for nitrocellulose powders which have this end in view. and we cull extracts from his descriptions and comments.

The Abel Test.—A specified weight of the sample to be tested is placed in a test tube in which is suspended a test paper of potassium-iodide-starch, moistened to one half its length with a 50 per cent. glycerine solution. The tube is then immersed in a bath kept at 65·5° C., plus or minus one degree for nitrocellulose, and at 100° C. for nitrocellulose powders. The test is ended by the appearance of a brown or blue line on the test paper. For a good nitrocellulose, this discolouration must not take place in less than 40 minutes, and for a nitrocellulose powder is not less than 10 minutes. Powders containing nitroglycerine should stand this test for 20 minutes at 65·5°. The author assembles under seven headings the weak points of this test as applied to finished products. Most of the objections are based on the fact that this test does not afford sufficient information upon the points where information is desirable, and on the fact that the result is likely to be affected by irrevelant factors. His chief condemnation of it is, however, based on the well known fact that the behaviour of a powder under test can be affected in a manner to mask the true condition of the explosive.

The Zinc-Iodide-Starch Test.—This is a modification of the test just described, zinc iodide being used instead of potassium iodide. The alternative substance is more sensitive, but as greater sensitiveness is in no way an improvement, the author dismisses this test as no more reliable than the original.

The Guttmann Test.—This test was described by Mr. Oscar Guttmann in a lecture he delivered before the Society of Chemical Industry in the year 1897. He recommended the use of a test paper moistened with a solution of diphenylamine in sulphuric acid. He claimed for his test the following advantages:—(1) Not as sensitive as the Abel test; (2) test papers more easily prepared; (3) masking substances do not interfere. The temperature used is 70° C., and nitrous fumes turn the colourless paper to a greenish yellow, and, finally, blue. This test does not appear to have commended itself to practical workers in explosives, masking substances having been discovered, and its results are affected in various other ways.

The Hess Test.—Nitrocellulose is heated to 70° C. in a tube, and by means of a current of air, the volatile products of decomposition are carried into a dilute potassium-iodide-starch solution. The tests include four colourimetric readings, and the time required for explosion of the sample. The test shows the beginning, and roughly, and for a short time also, how decomposition proceeds. It is, however, condemned as too sensitive, since it may show decomposition which does not in reality indicate instability of the explosive, and also because its results may be affected by extraneous conditions.

The Hoitsema Test.—The explosive is heated for fifteen minutes at a constant temperature, and then, by means of a current of carbon dioxide, the products of decomposition are passed through glasswool, moistened with Guttmann's diphenylamine solution. This operation is repeated, lowering the temperature 10° each time, until a temperature is found at which no products of decomposition are found which give a colour reaction with the test solution; this being the point at which decomposition ceases. This test is condemned for undue sensitiveness and other reasons.

The Explosion Test.—A small sample of the explosive is placed in a strong test-tube, which is then tightly corked and placed in a paraffin bath at 100° C. The bath is stirred and heated, so that the temperature increases 5° per minute. The temperature is noted at which the sample explodes. The author is of opinion that this test is reliable when the explosive is either very good or very bad, but the results vary with changes in the method of manipulation.

The Thomas Test.—A sample is heated in a glass-stoppered tube in an oil bath for eight hours daily. The temperatures considered suitable for this test are stated to be too low to produce a decisive decomposition, which may be observed by the appearance of brown fumes. Varying amounts of moisture and solvents in the powder will give different pressures in the closed tube, and consequently different results, since pressure affects decomposition.

The 135° C. Test.—Two and one-half grammes of the explosive, and a blue litmus paper are placed in a strong test-tube. The latter is tightly corked, and placed in a bath at 135° C. Three observations are made, (1) reddening of the litmus papor; (2) brown fumes; and (3) explosion of the sample. In this test, it is sometimes difficult to decide when the litmus paper is red, and when there is the apppearance of brown fumes, besides which the results obtained are frequently of a contradictory nature.

The Vielle Test.—Ten grammes of the explosive are placed in a strong glass tube, a piece of litmus paper is placed above the sample, and the tube closed air-tight; the tube then being heated in an air-bath at 110° C., until the litmus paper is completely reddened. This operation is repeated daily until the time required to redden the paper is one hour or less. The total time is taken as a measure of the stability of the powder. The results given by this test are reliable only when the explosive is very good or very bad.

The Will Test.—Nitrocellulose is decomposed at 135° C., and by means of a current of carbon dioxide the products of decomposition are carried into a reduction tube containing a heated spiral of copper gauze. This reduces the nitrogen compounds to nitrogen gas, which is measured over sodium hydroxide. The nitrogen is measured at regular intervals, and the rate of evolution is taken as an index of the decomposition. A nitrocellulose which by this test gives equal quantities of nitrogen in equal intervals of time is considered by Will to be in the "limit state of purification," and, therefore, as stable as possible. The author appears to think well of this test.

The Author's Test.—Having adopted so pessimistic an attitude towards the existing methods of test, one may be pardoned for surprise at hearing that the author has a test of his own to submit to public judgment. We propose describ- this in our next issue.

(To be continued.)

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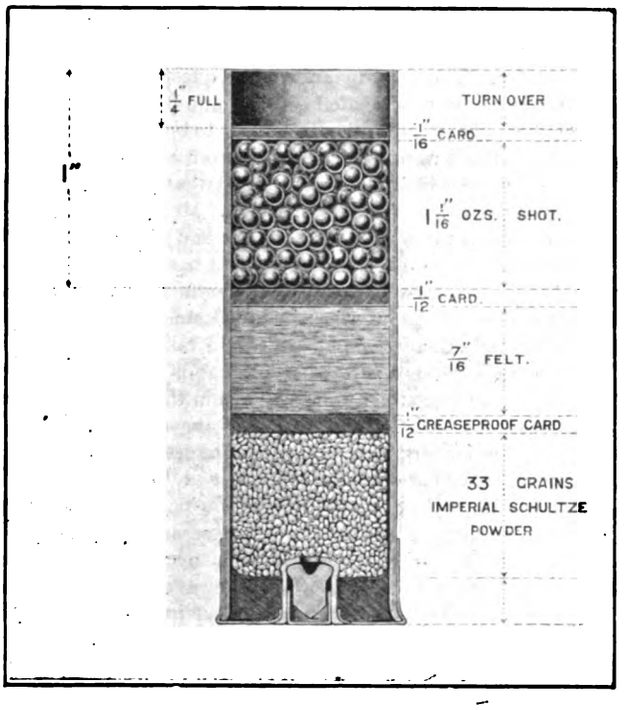
A USEFUL LOADING CHART.

It is the ambition of all powder makers that the nitro powders they issue to their customers shall be loaded on the lines that they themselves have found to be best. This ambition is not always satisfied. The exigences of competition are apt to enforce the use of inferior materials. The striving of the individual loader after peculiarities of style to characterise his output must be allowed for; and, finally, there are those differences that arise through a want of proper appreciation of the conditions that must be observed if a satisfactory cartridge is to be the outcome. We believe that we were about the first to initiate the graphical system of giving instructions for cartridge loading by the aid of a



sectionized drawing, showing the contents of a cartridge in their proper relation, with the addition of such marginal instructions as are necessary for their proper interpretation.

At any rate, we adopted this plan some time ago in dealing with the loading of Schultze powder, and the Company concerned has recently carried the idea a step further by showing the same kind of diagram as applied to Imperial Schultze. The loading recommended is as nearly as possible that laid down as the new "Field" system, which has already been officially recognized by Messrs. Eley Bros., and recommended by them for adoption by the various powder companies. The only noticeable divergence in the chart here reproduced is that the card over the powder is described as "greaseproof," whereas by the "Field" method an ordinary plain card is recommended. As the difference is only one of colouring matter the distinction cannot be urged as an important one.

By following out the information here given in an illustrated form good loading will be attained, and the powder will be working under the most favourable conditions.

SPORTING RIFLES AT BISLEY.

NOTWITHSTANDING the somewhat slack and unpopular state of the sporting rifle ranges at Bisley, a good deal of interest is always taken in the results there obtained. Of late years it has been usual to include in the survey of sporting rifles the various miniature arms which have supplemented the attractions of what may well be termed the sporting ranges. These include the running deer range, and also what is still known as the Martin-Smith range. Strictly speaking, the shooting done at the running deer should be of great interest to sportsmen; but as a matter of fact this is not the case, no doubt because sporting patterns of rifle seem to offer no practical advantages over the military type of weapon. If, for instance, it were possible to establish a competition for double-barrel rifles, to be used on two running deer crossing the range, one behind the other, with a specified interval between them, added interest might accrue.

The Martin-Smith range has for many years past been characterised by the absence of a representative show of English rifles, this having been caused by the fact that the prizes were unduly small, and the competition has not, for some reason, been regarded by our leading makers as a test of quality in a sporting rifle, notwithstanding the fact that accuracy over and above what was possible years ago, is so important a requirement in modern weapons. We feel inclined to echo the suggestion that Mr. John Rigby put forward in *The Field* some years ago to the effect that gunmakers should utilise the Martin-Smith competition to make in public the diagrams which they are so fond of publishing as having been made privately. There are many sportsmen who excel at this work, and who, therefore, need but a little encouragement to spend time and money in endeavouring to show the competing weapons at their very best.

That there is a growing tendency for English makers to regard the 100 yards range at Bisley with greater keenness than ever before we are very pleased to note. For instance, it has just been proved to the world that four shooters were able, without any great effort to themselves, to put up a "possible" apiece in the Martin-Smith competition, with Webley falling-block rifles. That is to say, each of them was able in competition to place seven successive shots in a two-inch circle at 100 yards, the firing being conducted at a three-inch bull. We have not the full figures before us, but we believe that Messrs. Webley have been successful in the recent meeting in winning with their rifles something like eleven out of thirteen prizes put up for competition. The Webley falling-block rifle thus receives a most valuable testimonial, as also does Cordite ammunition with nickel-base bullets as made by Messrs. Kynoch.

Messrs. Greener have in a similar way decorated themselves with a very healthy crop of laurels. In the Greener competition there were many shooters who made the most extraordinary runs of accurate firing, this, be it remembered, with a rifle costing about £3 10s., and ammunition at 5s. per hundred retail price. The winner of their competition, for instance, entered twenty times, firing in all 200 shots. Of these 133 were scored on the two-inch central carton, 65 missed the carton, but hit some portion of the four-inch bull, and two only out of the entire series failed to strike the bull, and were recorded as inners.

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THE MARKING OF FOREIGN GUNS.

During the past month or two a good deal of discussion has been proceeding with reference to the marking of foreign guns that enter this country. The points at issue relate to a number of trade practices which are to some extent involved in the procedure of the two Proof Houses and the Customs Authority.

The gunworkers of Birmingham have for a considerable time past felt themselves aggrieved by the fact that Belgian components and finished work are sent over to this country to receive the English proof mark, from which they appear to derive an additional value in the markets to which they are subsequently sent. In a similar manner a number of our own firms are in the habit of importing Belgian materials and guns which are finished in this country and are marked in all respects similarly to English goods of the same pattern. The gunworkers of Birmingham have lately taken up this question as prejudicing their interests as producers. Justifiably they seem to consider it a grievance that an organisation run under the authority of an Act of Parliament should be utilised for giving the makers of foreign materials an unfair advantage. In other words English gunmaking is in high repute in all parts of the world, and to a considerable extent the presence of an English proof mark on a weapon is regarded as evidence that it has been manufactured in this country, and it is prized accordingly. The deception that is practised on the ultimate purchaser of the gun is rendered possible by the fact that English proof marks in no way distinguish between foreign and English weapons which are submitted for test.

What the gunmakers of Birmingham demand is that such weapons shall be indelibly marked with their country of origin at the time of proof. This would of course destroy the misleading impression that is now produced by the English proof mark when applied to foreign arms not bearing their true mark of origin. The inducement to have Belgian guns proved in England would then largely cease. At any rate, the makers of them would probably no longer find it worth while to pay the carriage on weapons to this country for the purpose of proof if they were returned indelibly marked according to their country of origin. Foreign proof marks are mostly recognised as representing a test on all fours with that which is applied in this country, and consequently foreign makers would probably be satisfied to submit their guns for proof in their proper country of origin, and only those guns would come to England for proof which are destined to go to those countries where the English proof marks are regarded as affording better evidence of stability in an arm than those which are impressed as a result of the tests made in foreign establishments.

It is difficult to state off-hand what would be the precise result of carrying out the proposals here outlined. Presumably Belgian guns which at present go to foreign markets with a complete assortment of English names and proof marks will be forced to disclose their true origin. We cannot, for instance, interfere with the Belgian gunmaking establishments who apply the following trade marks to weapons of their manufacture:—Eagle Gun Works, The Leader, Royal Gun Works, Bayard Arms Co., Premier Arms Co., National Arms Co., The Winner, The Detective, Centennial U.S.A., The Simplet, The Policeman, The Champion of the World. Every one of these words is a trade mark registered in Belgium, and their object is obviously to impart an appearance of British origin to weapons which doubtless only come to England to receive the English proof. In fact from reviewing the available facts it is evident that a system of misrepresentation by Belgian manufacturers has been built up, largely as a result of the facilities which have been accorded by our Proof Houses for adding the final mark of English origin to guns named or rather misnamed as above.

The Belgian Proof House has carried the process still further in so far that while the actual armorial devices stamped on the weapons remain the same, the authorities are in the habit of applying such verbal particulars as "1⅛ oz. Max." to the weapons which they prove. This practice has been brought to the notice of the Board of Trade, and there is little doubt that it is contrary to the spirit of the Merchandise Marks Act. There is, in addition, a question as to whether these marks can be accepted as a genuine Belgian proof, such as qualifies the weapons, bearing them to be circulated in this country without re-proof. This, however, is a technical legal question upon which it is understood that opinions by the highest authorities have been obtained. Meanwhile, the whole subject is being thoroughly threshed out, and there is little doubt that things will be placed upon a sound basis. The Board of Trade has been memorialised by the gunworkers, and a clear case has been made out, whereby the Customs Authorities will be instructed exactly what measures to take with regard to the weapons passing through their hands. As to the Proof Houses, it is understood to be well within their power without interfering with existing reciprocity arrangements to apply a mark of foreign origin to all arms submitted by them which do not already bear suitable statement of their origin. The exact wording to be adopted, and the power to apply such wording as may be approved, must necessarily be dealt with by the Secretary of State for War, in accordance with the provisions of the Proof Act. This, however, is not a matter where there is likely to be any difficulty, once the trade are agreed as to the policy that it is desirable to adopt.

At the present time, a good deal undoubtedly goes on which can hardly be considered as fair trading. No one is more willing than ourselves to grant the obvious fact that the quality of Belgian guns s yearly improving, but no matter how much they improve, there is no reason why they should rank as English weapons. Such patronage as Belgian goods may merit by virtue of cheapness and sound construction, they should receive under their true colour and not under the guise of being English in origin. Many retailers in this country, who would object to trade in Belgian guns so marked, are not so sensitive when the goods can be presented to the English purchaser without any sign whatsoever of their Continental origin. All that the gunworkers of Birmingham ask for, and we are with them in their demands, is that the purchaser shall be at liberty to decide for himself whether he will buy an English or a Belgian gun, in exactly the same way that he may decide upon the relative suitability for his purpose of an American or English rifle. What is not fair is that he should wish for an English gun, and yet be misled into purchasing a Belgian arm as a result of the system of misrepresentation that is rendered possible by the existing anomalies of Customs House and Proof House procedure.

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ROUND THE TRADE.

It has been decided to wind up the Fitzgerald Machine Gun and Carriage Syndicate.

We understand that Mr. Hancock, formerly of Holborn, is now manager of the guns, etc. department at Harrod's Stores.

The effects of Messrs. Tolley were recently sold by auction at the firm's premises in Bond Street, the chief buyers at the sale being those who customarily frequent functions of this kind.

The statement of the affairs of Mr. Thomas Parkinson, gunmaker, of Ulverston, Lancashire, shows assets for £440, and unsecured liability of £860, these being of the usual trade character.

An automatic shot gun is at last on the market, Mr. J. M. Browning being the inventor. This at present applies to the United States only, but specimens of it will doubtless shortly reach this country before long.

A notice has recently been published concerning the issue of £6,000 debentures, being part of a total issue of £7,000, which is secured on the assets, present and future, of the firm of Bentley and Playfair, Limited.

The powder used by the winning team in the recent Palma match was Laflin and Rand's W. A. Brand, and the bullet was the Thomas, the name of which is derived from the gentleman known as "U.M.C." Thomas.

Among the visitors from America in London at the present time is Mr. Justus von Lengerke, of the well-known New York house, von Lengerke and Detmold, who are reputed to be the largest retail gun dealers in the United States.

County Gunmakers, Ld. is the name of a Company formed with a capital of £10,000 for the purpose of adopting an agreement with Messrs. T. C. Bentley and C. Playfair for the purpose of carrying on the business of J. Braddell and Son, of Belfast.

The propulsion of light machinery, such as turnover lathes for cartridges, can frequently be effectively carried out by water power. Mr. Percy Pitman has sent us his new price lists of "Pelton" water wheel motors of the kind that he supplied for the factory of the Smokeless Powder Co., Ld., and which seem to have given every satisfaction.

Messrs. W. Ottway & Co., of Orion Works, Ealing, W., have sent us a neat little eight-page pamphlet describing Dr. Common's patent collimating gun sights for day and night. Gunmakers would do well to send for copies of the same for distribution to those of their customers who are interested in this most ingenious and useful invention.

Messrs. Walkers Parker & Co., Ld., have forwarded for our information a copy of a circular dated the 1st ult., in which is reproduced the text of the final order made by Mr. Justice Bryne in reference to the statements made by the Abbey Improved Chilled Shot Co. concerning Messrs. Walkers Parkers' recently acquired chilled shot factory in Newcastle.

A leaflet from Spirit Lake, Iowa, has recently come into our hands. It gives particulars of Mr. Fred. Gilbert's system of puller for inanimate bird traps, whereby one rope operates the three traps at the one position. The details given are, however, so meagre as to render it impossible to state an opinion as to the effectiveness of the system one way or the other.

Messrs. Joyce & Kynoch were represented at the recent ironmongery exhibition at the Royal Agricultural Hall, each of them displaying effective exhibits of their best known products in the cartridge line, Messrs. Kynoch supplementing their display with an assortment of nails, and Messrs. Joyce showed a number of samples of shot guns, such as they now hold ready for delivery to customers in the ironmongery trade.

Messrs. Rigby have recently brought forward a most interesting series of rifles constructed on the Mauser principle of bolt, but adapted for firing ·303 service pattern ammunition. Those who have been privileged to examine samples of these weapons cannot fail to regret that with such models of excellence in existence the service rifle of our country should represent such a mixed confusion of unmechanical absurdities.

Mr. J. C. Irvine has recently applied for admission to the Livery of the Gunmakers' Company; and his election will no doubt be unanimously approved, as it is in the enrolment of such members as himself that the London Proof House has demonstrated its desire to associate with it the leading specialists in the various technical matters with which they have to deal in settling the many complicated questions of proof and procedure.

Gunmakers are at times at a loss to know where to purchase telescopes for rifle target and stalking work at the most favourable wholesale rates. A catalogue describing the output of Messrs. James Parkes & Son, of Vesey Street, St. Mary's, Birmingham, seems to hit off the exact need. We have examined several samples of their telescopes, and find that even for so low a price as 15s. a thoroughly effective glass can be obtained, capable of locating bullet holes at 100 yards.

Several leading west end firms were recently alarmed at hearing that a burglary had occurred on the premises of a gun action hardener, who had a large quantity of best work in process of treatment. While the loot was useless to the thieves, a corresponding number of best guns due for delivery for the coming season's shooting were practically put out of existence. Fortunately the missing materials were traced and recovered, but as a quantity of intricate lock-work had become mixed, it took a considerable time to effect its proper re-classification.

The Middlesex Gun Club affords a standing example of sound administration in the conduct of its clay bird shooting meetings. The past year's balance sheet shows a surplus of £80, which brings the surplus of assets over liabilities to the substantial sum of £307, most of which is represented by solid cash and investments. At the recent Championship Meeting, the Club was able to distribute £446 in prizes among the shooters for £321 received in entries. This was rendered possible by the large number of free prizes and donations placed in the hands of the management.

One of those most marvellous handbooks concerning the mechanism of automatic pistols has just reached this office. It relates to the Parabellum pistol which, generally speaking, is the same as the Luger automatic pistol which has already formed the subject of numerous press notices. The extent of the information it contains and the extraordinary variety of the illustrations makes the pamphlet a really valuable handbook which should be in the hands of all who are interested in such mattets. Messrs. Osborne favoured us with the copy we possess, sending at the same time a sample of the pistol as described in the text of the pamphlet.

The 1903 Eley ammunition catalogue has just reached our hands. It arrives in good time for giving to dealers and other traders full particulars of the many specialities turned out by this firm. The introductory notice states that great care has been exercised, as in the past, in the regulating of Eley medium nitro cap, and that by its aid only can the best results be obtained with the following powders which are standardised therewith:—Schultz, E.C., Amberite, Cannonite, Ballistite, Empire and Diamond Smokeless. Three pages of the catalogue are devoted to Major Gaudet's system of minature targets and ammunition, of which Eley Bros. are in a position to supply particulars.

Being a degenerate nation our leading sportsmen seldom consider their equipment complete unless provided with a collapsible stool, which will serve alternately as a walking stick and a prop to support their tired bodies while waiting for the arrival of the next lot of birds. The Mills aluminium telescope stool seems to be one of the neatest of these popular contrivances, and copies of the leaflet similar to the one they have forwarded us should be worthy of attention by those gunmakers who make a point of keeping their stock of sporting sundries well up-to-date. The sole manufacturers of these stools are Messrs. William Mills & Co., of Atlas Works, Bonner's Field, Sunderland.

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THE ANNUAL REPORT ON EXPLOSIVES.

THE annual report of H.M. Inspectors of Explosives has recently been issued, and it displays on the part of this department of the Home Office the same solicitude for public safety, coupled with that consideration for the commercial interests of the Companies affected, which have in combination done so much to enhance the benefits derived from the Act of 1875. It seems that while the termination of the South African war has diminished the manufacture of explosives for war purposes, the loss has been counterbalanced by an increase in the demand for explosives destined for more useful purposes.

The inspectional visits to the various factories and magazines throughout the kingdom have shown that there is no falling off in their condition and management. The occasions when it is necessary to take legal proceedings in connection with serious irregularities are increasingly rare, and in general the occupiers of factories and magazines have shown perfect readiness to remedy such defects as have been pointed out to them in the course of the inspections that have been made. The Inspectors repeat their annual regrets that registered premises are well looked after only in some districts, and for the first time they indicate a remedy that may have some day to be applied, when they state as the result of their experience that they are of opinion that in the case of so highly technical an Act decentralization is undesirable. This can only mean that they are in favour of local inspectors to be controlled from Whitehall, and not by the local authorities. The accidents by fire or explosion in the manufacture of explosives during the year under review, while showing 13 deaths, as against an average of 6·5 for the decade, do not appear excessive, and will compare favourably with the death rate in other dangerous trades. Other portions of the main report deal with particulars of seizures, proceedings and other legal processes connected with the routine work of the office. A case of unlawful entry of a building registered for the keeping of gunpowder was reported to the Inspectors. Some malicious persons gained access to the store of powder and fired some 200 lbs. of it. H.M. Inspectors must be held responsible for unconscious humour in view of their remark that the malicious persons in question were not caught either by the resulting explosion or by the police.

The amount of foreign blasting explosives containing nitroglycerin imported in 1902, as compared with 1901 is given as follows:—

EXPLOSIVE.	1902. lbs.	1901. lbs.
Blasting Gelatine	207,350	126,200
Carbonite	356,300	384,000
Dynamite	40,310	28,250
Gelatine Dynamite or Gelignite	1,184,500	887,500
Metagnite Gelatine (J. R. Watson & Co.)	49,500	48,000
Various	1,317	—
Total	1,839,277	1,473,950

Sundry importers of Blasting Explosives were as follows:—

	BLASTING GELATINE.	GELIGNITE.
Alliance Explosives Co., Ld.	81,000	264,000
E. Barnes & Co.	—	15,000
A. J. Brown & Co.	2,000	104,500
do., Nahnsen's Gelignite	—	215,000
J. A. Eadie & Sons	2,550	10,000
T. Jones & Co.	2,000	4,000
W. Marden & Co.	115,000	467,500
F. Richter & Co.	—	34,500
J. Russell	800	50,000
J. R. Watson & Co.... ...	—	10,000
S. J. Williams & Son, Ld. ...	4,000	10,000

Messrs. J. R. Watson & Co. imported during the year 6,004 lbs. of Cooppal powder; Mr. P. B. Crowe, 143 lbs. of Dahmenite A; Messrs. Helcké Bros., 14,400 lbs. of fulminate of mercury; various consignees, 698,221 lbs. of manufactured fireworks; the Normal Powder and Ammunition Co., Ld., 11,100 lbs. of Normal Powder; the Carbonite Syndicate, Ld., 12,000 lbs. of Thunderite; and Messrs. Bentner & Co., 3,250 lbs. of Walsrode Powder.

The following stand as importers of detonators:—

Alliance Explosives Co., Ld	375,000
A. J. Brown & Co.	980,000
W. Marden & Co. (in addition to 20 cases)	605,000
C. G. Mueller	3,873,000
Nobel's Explosives Co., Ld.	15,000
F. Richter & Co.	1,126,000
J. R. Watson & Co.	6,178,000
Total	13,152,000 and 20 cases.

While these figures are somewhat below those for the previous year, they represent, with a single exception, an advance upon the following preceding records:—1900. 8,732,500; 1899, 13,836,300; 1898, 10,089,600; 1897, 10,509,100.

H.M. Inspectors are evidently well employed during the year. A summary of work done during the period under review comprises 244 visits to factories, 471 to magazines, 106 to stores, 326 to registered premises, attendance at 8 inquests and 16 enquiries, to say nothing of 91 calls on local authorities and 111 miscellaneous journeyings. To effect this, they have among them visited 74 counties in the United Kingdom out of a total of 117.

Capt. A. P. H. Desborough continues to act as officer in charge of the testing station at Woolwich. In his separate report he states reasons for a conclusion he has arrived at, viz., that if shot firers in mines were better instructed as to the best charge of explosive to be used in the different bore holes to accomplish the work required, the conditions of safety would be enhanced. He points out that the energy released by the explosion of a cartridge if not utilized in doing work, will largely exist in the form of heat energy, and when charges are used over and above what is wanted for the work in hand, this heat energy must be a great source of danger in mines if gas is present. He remarks that he has frequently fired in the gas gallery unstemmed charges from 30 to 50 grammes in weight of most of the explosives on the permitted list, and has never failed in obtaining a violent gas explosion. With a slow burning explosive there may be the additional risk of particles of the explosive itself being projected in the act of combustion. It is true that the gas mixture used at the testing station is far more sensitive than a mixture of pit gas and air,

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but on the other hand the cooling effect of the steel liner of the cannon is greater than is obtained in a shot hole. It has been suggested that if the diameters of cartridges were standardized it would be of assistance to the user in determining the weight of charge to be used, as with a constant diameter the weight would be proportioned to the length, and Capt. Desborough is of opinion that this suggestion is worthy of the attention of manufacturers. As to the standards which should be adopted, he thinks that possibly diameters of 20, 30 and 40 millimeters (·78, 1·18 and 1·57 ins. respectively) would answer all reasonable requirements; but, as he says, this is a matter which would necessitate the careful consideration of both manufacturers and users.

The list of permitted explosives, as given in the report, comprises the following:—Albionite, Ammonite, Amvis, Aphosite, Arkite, Bellite No. 1, Bellite No. 3, Bobbinite, Britonite, Cambrite, Carbonite, Clydite, Dahmenite A, Dragonite, Electronite, Fracturite, Geloxite, Haylite, Kynite, Nobel Ardeer Powder, Nobel Carbonite, Normanite, Pit-ite, Roburite No. 3, Saxonite, Special Bulldog, Stow-ite, Thunderite, Victorite, Virite, Westfalite No. 1 and Westfalite No. 2. These are a truly marvellous assortment of "ites," which should leave the mine owner plenty of range of choice.

TRADE MARKS.

APPLICATIONS ADVERTISED. JULY 1—JULY 22, 1903.

253,384. Westley Richards & Co., Ld. The words "FAUNA KING." To apply to arms. March 26, 1903.

255,054. } Kynoch Ltd. The word "OPEX" to apply to arms,
255,055. } ammunition, projectiles and explosives. June 5, 1903.

There were no registrations between June 18, and July 15, 1903.

APPLICATIONS FOR PATENTS.

JUNE 22—JULY 18, 1903.

13,874. Armour-Piercing Projectiles. E. M. Johnson.
13,976. Ordnance Brakes. A. Reichwald (Agent for *Frcd. Krupp.*)
14,026.* Sights for Small-Arms. O. Imray (Agent for *Colts' Patent Firearms Manufacturing Co*).
14,119. Sporting Cartridges. G. Hookham & Kynoch Ld.
14,344. Moving Targets. W. Loosemore.
14,364. Automatic Firing of Ordnance. L. Obry.
14,671. Electrical Shot-Firing. R. C. W. Wood and G. Clifton.
14,672. Projectiles. H. Platz.
14,684. Sights W. E. Corrigall.
14,750. Rifle Supports. P. T. Stanley.
14,825. Explosives H. H. Lake (Agent for *Dynamite A.-G. vormals A. Nobel & Co.*)
14,827. Explosives. J. Y. Johnson (Agent for *Société Anonyme des Poudres et Dynamites.*)
15,061. Projectiles. H. W. W. Barlow and J. M. Ledingham.
15,092. Breech Blocks of Ordnance. C. P. Gilman and R. Lewis
15,110. Sighting Devices. A. König.
15,123. Field Gun Carriages. A. Vickers and G. T. Buckham.
15,183.* Trigger for Small-Arms. J. T. Mitscherling and C. J. A. Just.
15,306. Ordnance Breech Mechanism. J. B. Moore.
15,505. Torpedoes. J. Stumpf.
15,521.* Telemeters. H. E. Purey-Cust.
15,604. Small-Arm Sights. W. R. Webb.
15,733. Gun Carrying. C. M. Western.
15,749.* Projectile for Drill. P. A. Guye.
15,781. Machine Guns. T. K. North.
15,860 Cartridge Feed Mechanism. H. T. Ashton.
15,861. Machine Guns. H. T. Ashton.
15,894. Small-Arm Foresight. T. Breen.
15,945. Wad Punch. W. Evans, L. Wallet, and S. Feast.
15,949.* Recoiling Guns. C. P. E. Schneider.
15,963.* Target Traps. C. G. Marks (Agent for *The Chamberlain Cartridge and Target Co.*)

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

JUNE 25—JULY 23, 1903.

COMPILED BY HENRY TARRANT.

5,817 (1902). **Gun Carriages.** A. T. Dawson and G. T. Buckham, London. Means whereby the equipment of light gun carriages and limbers for machine guns may be easily taken to pieces, in order to form loads for transport by man or beast over difficult country. Accepted June 8, 1903.

7,013 (1902). **Rifle Mechanism.** J. H. Topham, Manchester. In the breech mechanism of the Lee, or other bolt rifle, a slider with a helical slot is provided, so that the bolt may be operated by a straight pull and push movement. Accepted June 22, 1903.

12,804 (1902). **Gun Barrel Truing.** The Birmingham Small-Arms Co., Ld., A. H. M. Driver and G. Norman, Small Heath. A method of testing the straightness of the bore of a barrel, consisting in rotatably mounting the barrel and casting circular shadows upon the interior of its walls, by causing light to pass through a stationary screen, mounted at the muzzle, which is partly transparent and partly opaque. Accepted June 4, 1903.

12,805 (1902). **Barrel-Boring Machinery.** The Birmingham Small-Arms Co., Ld., A. H. M. Driver and G. Norman. A machine for fine boring and finishing barrels in which the boring bar is stationary, whilst the revolving barrel is drawn over the fine-boring bit by means of a carriage. Accepted June 4, 1903.

13,415 (1902). **Miniature Rifle Range.** G. E. Goddard, Pewsey. An oval tube fixed upon an iron protected plank through which miniature rifles may be shot up to 50 yards. The target is operated from the firing point Accepted June 13, 1903.

13,845 (1902). **Detonators.** F. Hess, Austria. An improvement upon the detonator described in Patent No. 3,238, 1902, consisting in producing a powerful, uniform and sudden initial detonating impulse by enclosing the detonant tightly in a capsule. Accepted June 18, 1903.

14,840 (1902). **Range-Finder.** G. Brown, Plumstead. A range-finder in which the movement of an adjustment brings about the coincidence of the reflexed and direct images of the object. The movement of the mirror causes the index to indicate the range. Accepted June 25, 1903.

15,676 (1902). **Sighting of Heavy Ordnance.** A. T. Dawson, London, and J. M. Horne, Barrow-in-Furness. In order to protect the sighting apparatus of barbette or turret guns the sight is carried by an arm, situated apart from the gun carriage, and adapted by suitable mechanism to receive movement in accordance with elevation or depression. Accepted June 18, 1903.

15,962 (1902). **Trunnion Bearing for Ordnance.** A. T. Dawson and G. T. Buckham, London. In ordnance in which the gun is removed in a rearward direction out of its bearings, the bearing blocks are locked to the mounting by means of sliding bolts actuated by a toggle-joint. Accepted June 11, 1903.

15,975 (1902). **Ordnance Breech Mechanism.** A. T. Dawson and G. T. Buckham, London. Ordnance breech mechanism of the type described in Patents Nos 19,026, 1895, and 22,606, 1898, so altered, that the swinging out of the breech and the turning movement of unlocking are practically continuous. Accepted June 11, 1903.

16,658 (1902). **Bulleting Machine.** G. J. Smith, India. A machine in which the bullets are passed from the dies by a plunger into the solid drawn cases contained in sockets in a carrier. Accepted July 2, 1903.

17,036 (1902). **Bullet Screens.** Col. W A. Wetherall, Rugely. A bullet-catching device for safety ranges, consisting of a frame, within which are arranged a series of inclined steel plates. These plates deflect the bullets downwards into a coiled catcher at the bottom of the device. Accepted June 11, 1903.

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17,270 (1902). **Bandoliers.** G. W. Smart, Birmingham. A bandolier consisting of a harness fitting over the shoulders and around the waist. The belt is adapted to carry cartridges, haversack, waterbottle, and bayonet frog. Accepted June 11, 1903.

17,321 (1902). **Telescopic Sights.** A. A. Common, Ealing. Apparatus for measuring small angles, consisting of a telescope and a prism. The prism is movably mounted in line with the telescope, and the deviation between the normal position of the axes of the two is registered by a scale. Accepted July 2, 1203.

17,610 (1902). **Ammunition Hoists.** Sir W. G. Armstrong, Whitworth & Co., Ld., and E. W. Lloyd, Newcastle-on-Tyne. An ammunition hoist consisting of an endless chain upon which are arranged carriers, coupled thereto by means of two arms. When a carrier reaches the top of the hoist the leading one of the two arms tilts the carrier and discharges its load Accepted June 17, 1903.

17,804 (1902). **Projectiles** W. E. Hayner, U.S.A. A projectile which is combined with an unconfined compressed charge of smokeless powder. A "firing head" or base covers the bottom of the column of powder and carries fulminate for detonating the charge. Accepted June 25, 1903.

17,864 (1902). **Sight Protector.** A. Blaikley, London. A back-sight protector, designed to be slipped over the leaf when in the raised position, so that when the sight is folded the protector is locked in position. Accepted June 18, 1903.

17,877 (1902). **Automatic Small-Arms.** J. T. S. Schouboe, Denmark A recoil-operated rifle, in which the barrel and breech recoil together within the breech casing. The hinged breech block is carried around upon its pivot during the backward movement, so freeing the bore and allowing of extraction and reloading Accepted July 2, 1903.

18,354 (1902). **Rifle Sight.** J. J. Mason, Manor Park. The sliding bar of an ordinary leaf sight is provided with a mechanically traversed block which carries a line or bar, contrasting in color with that of the moving block. Accepted June 25, 1903.

18,492 (1902). **Trunnion Bearings.** Sir W. G. Armstrong, Whitworth and Co., Ld., and R. T. Brankston, Newcastle-on-Tyne. A trunnion block consisting of a square piece fitting into a recess in the cradle. The block is bored to receive the spring beam and anti-friction gear, and the gun may thus be removed from the mounting without disturbing these parts. Accepted June 25, 1903.

18,840 (1902). **Recoil Apparatus of Ordnance.** A. T. Dawson and G. T. Buckham, London. A method of regulating the flow of liquid in hydraulic recoil absorbing buffers, consisting in providing the ram with liquid passages which are controlled by a valve located in the ram and kept on its seat by the action of gravity alone. Accepted June 18, 1903.

19,017 (1902). **Projectile Fuse.** Sir H. S. Maxim, London. Means for enabling a comparatively large quantity of fulminate of mercury to be used safely in delayed action fuses, consisting of an arrangement whereby the main charge cannot be detonated unless the fuse is in the forward position it is caused to occupy upon impact. Accepted June 25, 1903.

19,297 (1902). **Air Gun Pellet.** A. Cox, Birmingham. An air gun pellet the outside surface of which is cut away so that there shall not be so much surface in contact with the bore. The base of the pellet is hollowed. Accepted June 18, 1903.

19,600 (1902). **Miners' Shot Box.** T. Straker, Leamside. A shot box for miners with which is combined an oil receptacle. The oil is used for lubricating drilling machines and for refilling "Scotch" lamps. Accepted July 2, 1903.

20,467 (1902). **Safety Fuse.** Maj. H. W. W. Barlow, R.A., Blackheath. A method of preventing communication between the cap chamber and the main charge until a valve is shifted upon the discharge of the shell from a gun. Accidental detonation is by this means rendered harmless. Accepted June 18, 1903.

20,752* (1902). **Magazine Charging Clip.** A. J. Boult, London, (Agent for *A. Mills, U.S.A.*)

20,817† (1902). **Field Gun Carriages.** F. T. Fisher and F. W. C. Dean.

20,818† (1902). **Field Gun Carriages.** F. T. Fisher and F. W. C. Dean.

20,819† (1902). **Brakes for Gun Carriages.** F. T. Fisher and F. W. C. Dean.

20.820† (1902). **Spades for Gun Carriages.** F. T. Fisher and F. W. C. Dean.

20,821† (1902). **Field Gun Carriages.** F. T. Fisher and F. W. C. Dean.

20,822† (1902). **Traversing of Field Gun Carriages.** F. T Fisher and F. W. C. Dean.

20 823† (1902). **Field Gun Carriages.** F. T. Fisher and F. W. C. Dean.

21,699 (1902). **Barrel Carriers for Ordnance.** A. Reichwald, London (Agent for *Fried Krupp, Germany*). Apparatus designed to enable the part of a gun carrying a vertical trunnion to be directly inserted in the carrier in its nominal position from above. The necessity for making the fork of the carrier wider than is required is obviated. Accepted June 11, 1903.

22,905 (1902). **Pressure Brakes for Ordnance.** A. Reichwald, London (Agent for *Fried Krupp, Germany*). In fluid pressure brakes in which the liquid passes from one side of the piston to the other a means for controlling the return motion of the gun consisting in the application of a flap-valve to the brake piston. Accepted June 18, 1903.

23,521 (1902). **Transportation of Ordnance.** A. Reichwald, London (Agent for *Fried Krupp, Germany*). A method of dispensing with special means of transporting heavy wheeled guns of the type in which the barrel alone recoils, consisting in distributing the weight of the gun as evenly as possible upon the wheels of its own carriage and limber. Accepted July 2, 1903.

24,324 (1902). **Sighting Instructor.** J. M. Campion, Bedford (Agent for *Maj. F. H. J. Birch, R.A., India*). By means of a clinometer, such as is used in teaching the correct laying of ordnance, the aiming of a rifle by a novice may be compared with its position when sighted upon the same object by an expert Accepted June 18, 1903.

3,717 (1903). **Automatic Small Arms.** H. H. Lake, London (Agent for *The Winchester Rep. Arms Co., U.S.A.*) Automatic recoil-operated mechanism for rifles designed with particular regard to safety, durability, and to the reduction of the number of parts. Accepted July 2, 1903.

5,180 (1903). **Automatic Pistol.** C. P. Clément, Belgium. A recoil-operated pistol of the reciprocating bolt type the novel feature of which is the fewness of the parts. Accepted June 18, 1903.

6,081 (1903). **Time Fuse.** E. Rubin, Switzerland. A cap adapted to be coupled with and to turn the timing ring of a shell. The method of attaching and detaching are described. Accepted June 25, 1903.

6,069 (1903). **Gas Checks for Ordnance.** J. Y. Johnson, London (Agent for *The Ordnance Improvement Co., U.S.A.*) A gas-check pad for ordnance consisting of a core composed of a pressed mass of asbestos, grease, glycerine and starch which is enclosed within a metal network envelope. Accepted June 4, 1903.

6,097 (1903). **Firing Mechanism for Ordnance.** J. Y. Johnson, London (Agent for *The Ordnance Improvement Co., U.S.A.*) Firing mechanism for ordnance in which the lanyard strap is not subject to the recoiling movement of the gun, and which can be operated only when the gun is within safety limits. The firing pin is laterally shifted away from the primer except when the breech block is securely closed. Accepted June 4, 1903.

6,743* (1903). **Back-Sight for Rifles.** H. S. S. Watkin and J. J. Speed.

7,213, (1903). **Range Finder.** A. J. Boult, London (Agent for *The Warner and Swasey Co., U.S.A.*) Modifications in the construction of depression range finders, consisting principally in obtaining accuracy by freeing the parts from complication, and in rendering the instrument adaptable for use at any known elevation above the horizontal plane in which the distances are to be measured. Accepted June 11, 1903.

7,282 (1903). **Small-Arm Sights.** J. F. W. Leach and C. A. Bruntnall, Middlesbrough. The provision upon the bar of a leaf sight of a transversely sliding sight notch. The notch may be adjusted laterally for the purpose of counteracting wind. Accepted June 18, 1903.

7,980 (1903). **Electrically Operated Targets.** G. A. Peters, U.S.A. A self-registering target, the various sections of which when struck complete a circuit of electricity, and communicate to the shooter through the medium of a dummy at the firing point the part of the target struck. Accepted July 2, 1903.

8,057 (1903). **Projectile Fuses.** H. Dahkle, Germany. A fuse for shell in which the explosive primer is fixed, while the body transmitting the action of the primer to the bursting charge is movable. The transmission of the detonation of

† These Patents are Secret Documents.

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the bursting charge igniter is, it is claimed, ensured, and the danger of self ignition of the primer is reduced. Accepted June 18, 1903.

8,139* (1903). **Single Trigger Mechanism**. F. Beesley, London.

8,156 (1903). **Firing Mechanism of Ordnance**. C. P. E. Schneider, France. Firing mechanism for ordnance in which the firing pin is eccentrically disposed relatively to the breech screw which is itself eccentrically disposed to the axis of the gun. The two eccentricities are such that the nose of the striker can only coincide with the detonator when the breech is completely closed. Accepted June 18, 1903.

8,838 (1903). **Safety Fuse Igniter**. H. H. Lake, London (Agent to *Société Française des munitions de Chasse de Tir et de Guerre, France*). A safety fuse igniter for use in firing mines, consisting of two tubes of cardboard, the outer tube carrying the priming lodged in a plug of compressed paper, and the inner tube carrying the friction member and the fuse. Accepted June 11, 1903.

9,315 (1903). **Ordnance Recoil Springs**. G. Ehrhardt, Germany. A device for securing and removing the recoil springs in ordnance consisting of a spring compressing screw the length of which is proportioned to suit the desired preliminary compression of the spring. Accepted July 2, 1903.

9,424 (1903). **Shell Fuses**. G. M. Hathaway, U.S.A. A simple form of percussion fuse in which a hammer arranged within a chamber shaped to the hammer is caused upon impact to detonate the cap. A flange upon the base of the hammer prevents premature explosions. Accepted June 4, 1903.

9,644 (1903). **Air Guns**. H. Greener, Birmingham. An improved pull off for air guns consisting in the combination of a tumbler and trigger, the tumbler having two horns engaging at the back of and a slot in the piston. Accepted July 2, 1903.

10,168 (1903). **Magnifying Sights**. J. T. Brayton and E. L. Harpham, U.S.A. A magnifying sight for small arms in which two divided lenses are used each terminating at or near the line of vision in aiming. One lens magnifies the target and the other the foresight. Accepted June 11, 1903.

11,184 (1903). **Range Finder**. P. M. Justice, London (Agent for *The Bethlehem Steel Co., U.S.A.*) Range finding in connection with movable targets, performed by means of two instruments whereby not only is the range discovered, but also the difference in range resulting between time of firing and contact. Accepted July 2, 1903.

12,030 (1903). **Small-Arm Sights**. A. R. Von Chylinski, Hungary. A method of increasing accuracy of aim consisting in arranging lateral walls at both sides of the foresights, the edges of these walls must coincide with corresponding edges upon the back sight Accepted July 2, 1903.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

THE BEESLEY SINGLE-TRIGGER MECHANISM.

8,139 (1903). F. Beesley, London. In Patent No. 26,749, 1898, a system of single-trigger mechanism was described. This mechanism has been so modified as to allow of regulation of the order in which the two barrels shall be fired. The modified "selective" mechanism is dealt with in the present specification.

Upon examination of the drawings it will be noticed that the oscillating cam or quadrant *a* is pivoted to the breech block, so that it is capable of movement in a vertical plane, partly within the breech block, which is cut away to allow of such movement. The quadrant is turned back from the position illustrated in Fig. 3 to that in Fig. 1, either by the cocking dog *b* or by the sliding rod *c* in the well-known manner during the breaking down of the gun. The cocking dog *b* is used only when no "selective" mechanism is existent, since it is necessary that the cocking dog should be released by whichever lock it controls, in order that the quadrant shall be freed to set the parts for the second discharge. Thus, if the right-hand cocking dog is used to turn back the quadrant, the right-hand barrel must be fired first. If the left-hand dog is utilised for this purpose then the left-hand barrel must be the first to be fired.

When the "selective" mechanism described in this patent is combined with the ordinary parts, the sliding rod *c* is caused, during the breaking-down process, to push the quadrant back against the pressure of the spring *d*. The projection *e* upon the arm *f* extending from the trigger blade *g* holds the cam in its cocked position, as is illustrated. When the gun is closed the sliding rod *c* is released, so that no matter which sear is lifted first the quadrant is free to be rotated forward by its spring. The effect of the projection *e* upon the quadrant *a* during the firing of the two barrels, is the same as in the mechanism described in the former patent quoted.

The switching arm *h* (Figs. 2 and 5) is the medium through which the sears are raised in predetermined order. This arm is pivoted to the top of the blade *g*, and is lifted when the trigger is pulled. Its normal position is beneath the right-hand sear, where

Fig. 1

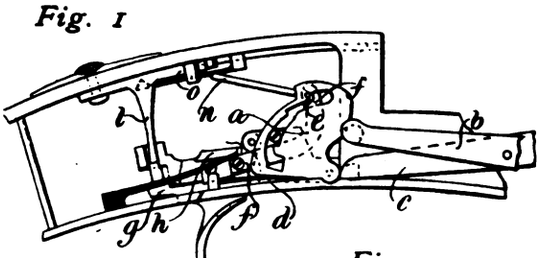


Fig. 2

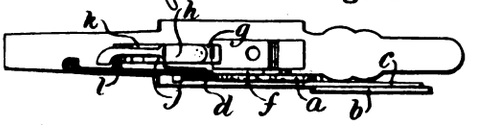


Fig. 3

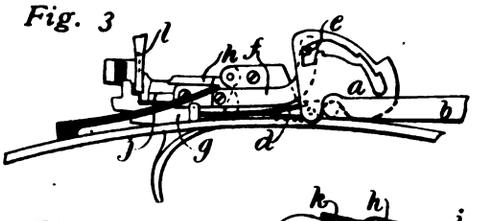
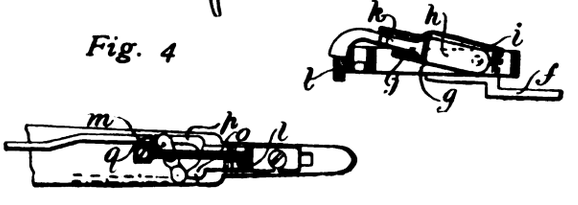


Fig. 4



it is retained by a light spring *i*. The step *j* contacts with the right-hand sear, and when the trigger is pressed takes the sear nose out of bent. The step *k* upon the other side of the arm follows up, and is caused in a similar fashion to discharge the left-hand barrel when the trigger is again deliberately pulled.

Should it be desired first to discharge the left-hand barrel, the safety is pulled slightly to the rear instead of being pushed forward in the ordinary way. This movement unlocks the trigger, and the dependent post *l*, which engages the trigger blade and holds it against upward movement is caused to engage the tail of the arm *h*, and to turn the arm over to a position beneath the left-hand lock. The first pull when the parts are so placed discharges the left-hand barrel. The slot in which the safety bolt works is elongated to allow of the increased backward movement. By means of the lever *m* (Fig. 4) the safety is either pulled forward or pushed backwards into the locking position as in Fig. 1 during the opening of the gun.

Supposing the right-hand barrel to have been fired first, the safety, which has been pushed forward, is forced rearwards by the

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quadrant *a* through the thrust rod *n*. The rod *n* presses the lever *m* against the part *o* of the yoke *p*, so shifting the safety back. Should the left-hand barrel have been discharged first, then the other arm of the lever *m* engages the projection *q* and draws the yoke and thus the safety bolt forward to the safety position. Accepted June 18, 1903.

BACK-SIGHT FOR RIFLES.

6,743 (1903). H. S. S. Watkin and J. J. Speed, Enfield Lock. A back-sight for rifles, the sighting notch of which is regulated in height by the position of a crossbar, upon the edges of two parallel curved plates forming the top of the sight bed. The sight may be accurately adjusted to positions corresponding with different

Fig. 1

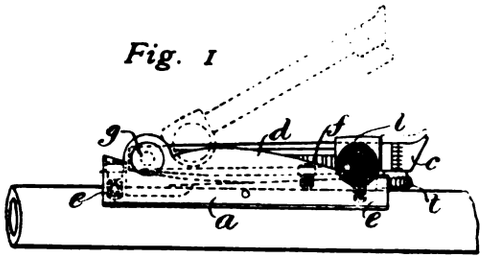
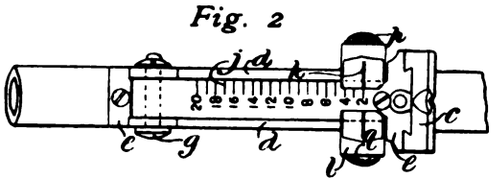
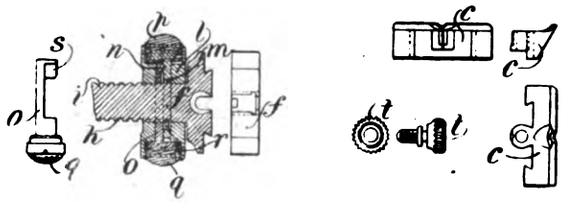


Fig. 2





ranges, whilst for intermediate ranges, or for other vertical adjustments, the sight bar is set by a fine-threaded screw.

The sight is illustrated in the accompanying drawings, from which it will be seen to consist of the bed *a*, the leaf *f*, and the sight *c*. The bed *a* is composed of the two parallel curved bars *d*, which are connected at each end by the saddles *e*. The leaf body *f* is pivoted to the bed at *g*. At the rear end of the leaf *f* the right bar *c* is adjustably attached. The edges of leaf are notched at intervals along their length the notches *h* on one edge corresponding, say, to 200, 300, 400 yards and so on, whilst the notches *i* upon the other edge, intermediately cut in relation to the notches *h*, correspond to 250, 350, 450, etc., yards. The lines *j*, upon the surface of the leaf *f*, indicate the positions of these notches. The index line *k*, upon the slide *l*, serves as a guide to the correct adjustment of the slide with the notches. The under part of the slide *i* is provided with a transverse slot *m*, in which the sliding pieces *n* and *o* work. These sliding pieces are connected with the buttons *p*, *q*. When the buttons are pressed inwardly, the spring-pushed pins *r*, *s*, are held clear of the notches with which one or the other engages, and the slide may be moved along the leaf until the index *k* is brought into alignment with the figure on the leaf corresponding with the range it is desired to adjust the sight to.

In order to set the sight for ranges between those corresponding with the notches on the leaf, the sight bar *c* may be vertically adjusted in relation with the leaf. When the milled head *t* is turned, the sight bar is caused to move either upwards or downwards upon the leaf head, a scale and vernier on the edges of the leaf and bar indicating their relative positions. Accepted June 4, 1903.

MAGAZINE CHARGING CLIP.

20,752 (1902). A. J. Boult, London (Agent for *A. Mills, U.S.A.*). A permanent clip for guiding cartridges into the magazine of a rifle is described in this specification. The clip works upon a hinge, somewhat after the fashion of a leaf sight, so that when it is turned up into a position at right angles with the barrel, cartridges may be slipped into it and guided down into the magazine; and when not in use may be turned down out of the way, and be held by a spring fastening.

The clip is illustrated in its closed position in Fig. 1 of the appended drawings. As will be seen it is arranged to lie flush with the top of the casing *a*, to which it is hinged, so as not to interrupt the line of sight. The fastening *b* is, for this reason, also located to one side of the longitudinal axis of the rifle. The side opening in the breech casing, through which the spent cartridges are ejected, is also left unobstructed.

The guide clip is formed of the clip proper *c* and the holder *d*. The holder is hinged at *e*, and is provided with the guide grooves *f*.

Fig. 1

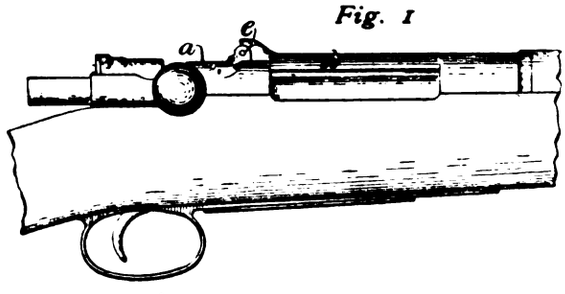
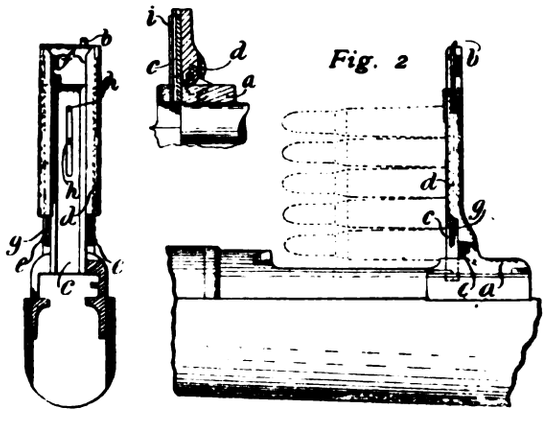


Fig. 2



The clip *c* is provided with flanges *g*, adapted to receive the guide grooves *f*. By this arrangement, the clip is retained within the holder, and is permitted to slide up and down thereupon. The sliding motion is limited by the pins *h*, as will be readily understood.

When the guide is in its vertical position, the clip *c* is pushed down, so that its lower end enters the space in which the breech bolt slides. The cartridges are then inserted into the clip, the flanges *i* receiving their flanged heads, and are pushed down into the magazine. When the magazine is loaded, the clip *c* is pushed up until its end is above the level of the casing, and the clip holder *d* is turned down to its original position as in Fig. 1. Accepted June 4, 1903.

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CONTENTS.

CURRENT TOPICS.

The Reform of Cartridge Loading.—An article which appears in another part of this issue goes to show that the principles and practice of cartridge loading are undergoing a steady development. It is impossible to show a very large amount of progress for any one year, and yet when we go back over a term of years we find that the aggregate result is considerable. Nowadays one point is very clear. It is that those cartridge loaders who are working within the recognised limits of loading which have been laid down on a sound practical and theoretical foundation are enormously increasing their business. On the other hand freak loaders are less and less in favour, so much in fact that the unpopularity of the schism of which they are the high priests, is irresistibly forced to their notice. The continued prosperity of the English cartridge trade is involved in the maintenance of a high quality of work. During the past ten years we have seen the trade attacked by the wealthiest of foreign firms, and yet when their entire efforts are considered, it is found that they have failed to make any substantial headway against the solid achievements of the firms which are guided by the sound workers whose names are household words among us. Competition is always active, and, therefore, it behoves us to make the pace in cartridge work, as in other things, where we are determined to retain for ourselves the profitable market that is represented by the home and colonial demand.

Our Lecture on Cap Testing.—With the present issue we bring to a close our latest series of lectures which has dealt with caps. While we may have found ourselves unable to give any radically new information upon this important subject, we think we can at least claim to have made certain general laws clearer in the minds of our readers than they were before we took up the task of systematically treating the subject as a whole. It has been made clear that caps are not such sinners as they are commonly represented, and also that a kind of partnership exists between the cap and the powder whereby the two must be judged in relation with one another, so that if the combination is good or bad, the praise or blame must, for a start, be equally divided. This is the first step in the proper understanding of caps. The next is to ascertain which of the two is most to blame. If the cap does well with most powders and badly with a small minority then its good character is established. If, on the other hand, another make of cap is found to produce a constant error of greater or less magnitude with a variety of powders, then the cap is to blame. The detailed working out of these arguments through our series of four lectures will, no doubt, do a great deal to show the careful student exactly how far he is entitled to go in passing judgment upon caps and powders in relation with one another, and if we have accomplished this purpose, we can, at least, claim to have raised the general average of knowledge on a very difficult technical question.

Capital versus Labour.—A somewhat difficult problem will shortly come up for solution in Birmingham. We all know that the gunworkers of Birmingham wrecked the new Proof Act which was introduced by the Guardians some years ago for the purpose of giving effect to certain necessary reforms. Because the gunworkers' claim for representation on the Board of the Guardians was not agreed to, they opposed the Bill and turned the Parliamentary expenses into so much wasted capital. Since then, some of them have obtained places on the Birmingham City Council, and in that capacity they have insisted by reason of a right granted by the Proof Act to sit on the Board of Guardians. While we have every sympathy with the working man's desire to raise his status by legitimate means, we are conservative enough to object to the principle of running a business on the lines of socialism, when its prosperity demands the guidance of the master mind working his own capital or that of the shareholders. Nevertheless, the amelioration of the working man's lot must be mainly pushed forward by his

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own political efforts, his capacity to improve his position being strictly proportioned to the influence he can wield. The ideal of the extremists among the men would work out as unsatisfactorily in practice as if the master on his side had his own way entirely, and the happy compromise that results from a policy derived from the two opposing camps may be expected to produce in a gradual manner the reforms which the workmen would like to secure by a single coup, and which the masters will only sanction so long as it can be shown that the prosperity of the business is not thereby threatened.

The Marking of Foreign Barrels.—Having secured representation on the Board of Guardiars by indirect means the gunworker delegates are anxious to introduce modifications of proof procedure that will benefit them as a class. They asked for the indelible marking of foreign guns proved in Birmingham in a manner that would distinguish them from home-made goods. The master gunmakers throughout the country fully appreciate the benefit of such reform, and all were agreed as to the advisability of accepting this most desirable proposal. Then it happened that the gunworkers tried to go further than the masters considered desirable. They wished that all foreign made barrels, even when imported in the form of rough tubes, should be stamped in a similar manner. This would have been acceptable enough if the Birmingham barrel makers were in a position to satisfy the home demand, but they are not. It is a notorious fact that English barrels of the cheaper qualities, while dearer than a similar grade of work produced in Belgium, are defective and unsatisfactory. No doubt in time this could be remedied, but to impress a foreign marking on every weapon that is constructed from a 25s. pair of Belgian tubes would be to strike a blow from which the gun trade would never recover, and the workmen would be involved in the disaster that would follow. The masters are, therefore, disinclined to give way on this point, while on the other hand the workmen have it within their right to carry their arguments to the War Office when the new Proof Rules are submitted for approval. No one is more anxious than ourselves to see the necessary components of a gun made entirely in our own country, and the splendid developments that have arisen in this direction from the efforts of such a firm as Webley's, show us what a lot can be done by persistent effort. If, therefore, the reform which is now proposed for immediate adoption could be accepted and passed so as to come into action in a couple of years time we should be among the first to welcome the principle. Just at present we think that the distinctive marking of arms made abroad is quite as large an instalment as can be immediately dealt with. If the principle of marking the barrels is accepted for future adoption then the art of barrel making will gradually revive and tube works will be established whereby Sheffield forgings can be worked down into a marketable form at an economical price.

The Shooting Season.—So far as it has gone, the present shooting season, from a business point of view, has not been a bad one. The grouse may not be such an important game-bird to gun and ammunition manufacturers supplying the requirements of grouse shooters, as is the partridge, but, nevertheless, a bad grouse season, through failure of the supply of birds on the heather, makes an appreciable difference to the manufacturer of shooting requisites. We are glad, therefore, to find from a careful perusal of the grouse-shooting reports, that though far short of the almost record grouse season of 1901, the opening weeks in Scotland, the North of England and Wales have been very nearly equal in reported results to those of last year, which was a good deal above the average of the last ten seasons in grouse-land. It is thought, therefore, that grouse-shooting this year is rather over than under the average of the last decade, the season's shooting beginning fairly well, not only from the shooter's, but also from the gunmaker's point of view. From what we can gather, the weapons and ammunition used by grouse-shooters this year have been recognised by them as of the highest quality, giving thorough satisfaction all round. If the partridge season, now upon us, should only equal that of the grouse, there would be no great ground of complaint on the part of those who supply the requirements of the shooter. It is to be feared, however, from all information supplied at the time of writing, that at least in all the southern counties of England, the partridge crop is almost certain to prove a failure. Though exceptions may here and there be found in the south of England and good bags be made on occasion, the partridge season cannot but be disappointing to those gun and ammunition manufacturers whose businesses are situated in southerly provincial parts. In other English centres again, partridges are reported as numerous and strong, and likely to yield sport quite up to the average, the only drawback to such sport during early September being the lateness of the harvest. Ungathered crops prevent the shooter enjoying the best of sport, however plentiful the coveys, until weeks after the opening day. But the sport comes later, if the birds are there, and the usual amount of powder is burned in making the late bags. Though partridge shooting may be a doubtful quantity over at least half the country, it is unlikely to be the dire failure that was once anticipated, and that is all that can be said in its favour, until driving, when the harvest is reaped, really demonstrates the classification that the season deserves. We seldom find grouse, partridge, or pheasant shooting all equally good in any year. In the present, we know that the grouse returns are fairly favourable, that those from the pheasant coverts when they come, cannot be up to the usual high standard due to artificial rearing, on account of epidemic disease, but if the homely partridge only yields anything like moderate sport, we need not be apprehensive of a very bad shooting season being the record when results are summed up a few months hence. Let us hope at least for the best; that the consumption of ammunition may be found up to a fair average at the end of the shooting season of 1903.

Edward G. Herbert Ld., of Cornbrook Park Works, Manchester, have sent us some particulars of a hack saw machine, worked by its own attached motor, this being in their opinion an interesting novelty, in that it affords an example of the extending principle of letting every machine have its own source of power.

For the convenience of those of our readers who desire to have by them for reference, official copies of the Pistols Act and Gun Licence Act, 1870, we will forward one copy of each, post-free, for sixpence, payable in advance. While this represents a gross profit of 400 per cent., the turnover is not likely to do more than pay for the trouble involved, and it will certainly be a saving of trouble in the case of those who would otherwise have to make their purchases individually. Certainly, every dealer should have a copy of the two Acts in his possession to answer the arguments and assertions of possibly over-zealous members of the police force.

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PISTOLS RESTRICTIONS.

For better or for worse the gun trade must henceforward accept the provisions of the Pistols Act which is reproduced in full on the next page, as a permanent institution in their business. Coroners, magistrates, and jurymen have all added a large weight of opinion in favour of some kind of enactment to deal with the pistol nuisance which has been so marked a feature of the past ten years' records of assaults, accidents and outrages. Year by year private members of the House of Commons have endeavoured to secure the passage of more or less restrictive legislation on the subject. The chances of the annual ballot brought Mr. Helme's 1903 bill into a front position, and public opinion was so strongly in favour of its passage that it was allowed to go through without material opposition being encountered. Widespread as were the efforts made to secure reasonable amendments of the unnecessarily restrictive clauses, the bill continued to go forward without material alteration. At the very last moment the Birmingham Gunmakers' Association were instrumental in securing the adoption of a modified wording whereby exceptional treatment was granted in favour of pistols purchased for house protection. Persons going abroad have not been treated in an equally indulgent spirit. Hence they are called upon to produce a certificate, attested by a Justice of the Peace, or by an inspector of police, to the effect that they are proceeding abroad for a period of not less than six months. Youths under sixteen years of age are entirely debarred from the purchase of pistols, unless they are exempted by the fact of being volunteers etc. from the necessity to hold a gun licence for carrying arms in the performance of their duty. This liberty is evidently allowed in order to permit those who are undergoing training in the care and handling of arms to obtain pistols which will presumably be intended for the practise of marksmanship.

Sellers of pistols must at once make themselves familiar with the new regulations which they are now forced to observe. First of all they must satisfy themselves in a thoroughly clear manner exactly who are entitled to purchase pistols, and the conditions that must be observed in order that the sale shall be conducted in a legitimate manner. The ordinary purchaser is naturally the man who presents his gun licence at the time of buying a pistol. The gunmaker need have no hesitation in supplying such persons with whatever they may require, except of course they know them to be of unsound mind or intoxicated. The requirements of the Act will be fully complied with by entering in the register book kept for the purpose, the description of the pistol, whether single barrel, magazine, revolver, pin, rim or centre fire, and its serial number, which, though not called for under the Act, the vendor will probably find it to his own interest to insert. He must also enter the name and address of the purchaser, the issuing office of the licence and its date. In the case of persons who are exempted from the necessity to produce a icence certain other conditions must be observed. Section 7 of the Gun Licence Act specifies the persons who are entitled to use or carry a gun without a gun or game licence. While the Section in question specially limits such carrying of weapons to the carrying which goes on in the performance of duty or when engaged in target practice, the reading of the Pistols Act seems to allow any person in the naval, military, or volunteer service, or in the constabulary or other police force to buy a pistol without the need for possessing a licence, whether or not his duties require the use of such an arm. Section 7 opens the way for a rather absurd reading of the Pistols Act, since a person need not have a licence for carrying a gun belonging to a person holding a licence by order of such licenced person. By the strict interpretation of this clause a person might purchase a pistol if he carries at the instruction of the owner a gun belonging to a holder of a gun or game licence. This means for instance that if a sportsman employed a messenger to carry his gun to the station the messenger could purchase a pistol in the course of the journey and claim exemption from the requirement to produce a licence. Again, the occupier of a piece of land, provided he uses or carries a gun for the purpose of scaring birds or killing vermin on such land, should be allowed to purchase as many pistols as he likes without producing a licence. In the same way any man employed as a game scarer or vermin killer could purchase a pistol, since in that particular capacity he is exempted from holding a licence. Then again any person carrying a gun in the ordinary course of his trade or business as a common carrier might claim the privilege which thus arises from his occupation. This, of course, is a *reductio ad absurdum* of the Pistols Act, but its goes to show the loose way in which the provisions have been drafted.

Taking the spirit of the Pistols Act as it stands, the pistol retailer's chief trouble will be to define in practice exactly what amounts to the giving of reasonable proof by a purchaser that, being a householder, he proposes to use a pistol only in his own house or the curtilage thereof. It would seem that the retailer should satisfy himself as to the identity of his customer and the correctness of the address given, the fact of his intending to use the pistol for house protection only being sufficiently covered by a signed declaration to that effect. By the proper identification of the name and address of the purchaser, the responsibility will then be thrown upon him for any false declaration that he may make. The police would then have in the registration of his name and address something to go upon which would not exist if the retailer were satisfied with a man's bare statement that he was such and such a person and resided as a householder at such and such an address. In the case of persons going abroad very little difficulty would arise, because the onus would rest with the magistrate or the police officer who endorses the man's statement that he is about to proceed abroad. The difficulty that would arise in such cases would be to get the would-be purchaser to take the trouble to get the necessary authorisation. Altogether the provisions of the Act are not as restrictive as in many of the enactments that have previously been proposed, and we think that the conscientious retailer who deals with a good class of customer will not have much cause for worry. The suppliers of trashy weapons to boys will undoubtedly suffer, but we have not much patience with them as a class, as it is by their greed and want of scruple that the present Act has become a recognised necessity.

M. Jules Polain has published some fresh results with his pressure gun in which the muzzle readings are much higher than further back. He has yet to show us that the readings his instrument gives are pressures. Our own opinion is that all is not pressure that squeezes the crusher.

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THE PISTOLS ACT.

The following is the full text of the Pistols Act, which having become law is now binding on all whom it may concern:—

CHAPTER 18.

An Act to regulate the sale and use of Pistols or other Firearms. [11th August 1903.]

Be it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. This Act may be cited as the Pistols Act, 1903.

2. In this Act the term "pistol" means a firearm or other weapon of any description from which any shot, bullet, or other missile can be discharged, and of which the length of barrel, not including any revolving detachable or magazine breach, does not exceed nine inches.

The term "gun or game licence" means a licence to use or carry a gun granted under the Gun Licence Act, 1870, or a licence or certificate to kill game granted under the laws excise in that behalf.

The term "antique pistol" shall not include any pistol with which ammunition is sold, or which there is reasonable ground for believing is capable of being effectually used.

3. It shall be unlawful to sell by retail, or by auction, or let on hire a pistol to any person, unless at the time of sale or hire such person either produces a gun or game licence then in force, or gives reasonable proof that he is a person entitled to use or carry a gun without a gun or game licence by virtue of section seven of the Gun Licence Act, 1870, or that being a householder, he purposes to use such pistol only in his own house or the curtilage thereof, or that he is about to proceed abroad for a period of not less than six months, and produces a statement to that effect, signed by himself and by a police officer of the district within which he resides, of rank not lower than that of inspector, or by himself and by a justice of the peace.

Every person who sells by retail or lets on hire a pistol shall, before delivery, make or cause to be made, an entry in a book to be kept for that purpose, specifying the description of the pistol, whether single barrel, magazine, revolver, pin, rim, or centre fire, sold or let on hire, the date of such sale or hire, the name and address of the purchaser or hirer, and the office from which the gun or game licence produced by the purchaser was issued, the date of such licence, or the circumstances exempting such purchaser or hirer from having such licence. Such book must be produced for inspection on the request of any officer of police, or any officer of Inland Revenue.

If any person—

(*a*) Contravenes any of the foregoing provisions of this section; or

(*b*) On the sale, purchase, or hire of a pistol knowingly makes, or causes to be made, any false entry or statement as to any matter concerning which he is required by this section to make an entry or statement,

he shall be liable to a penalty not exceeding five pounds.

4. Any person who being under the age of eighteen years, and not being exempt by virtue of section seven of the Gun Licence Act, 1870, from incurring a penalty for using or carrying a gun without a gun or game licence, buys, hires, uses, or carries a pistol, shall be liable to a penalty not exceeding forty shillings, and any person who knowingly sells or delivers a pistol to any person under such age, and not being so exempt, shall be liable to a penalty not exceeding five pounds.

The court may make such order as to the forfeiture or disposal of any pistol found in the possession of a person being under the age of eighteen years, and liable to a penalty under this Act, as to the court may seem fit.

5. Any person who shall knowingly sell a pistol to any person who is intoxicated or is not of sound mind shall be liable to a penalty not exceeding twenty-five pounds, or to be imprisoned with or without hard labour for a period not exceeding three months.

6. Any offence against this Act may be prosecuted, and any fine in respect thereof may be recovered, and any summary order under this Act may be made, in manner provided by the Summary Jurisdiction Acts.

7. For the purposes of the application of this Act to Scotland any offence against this Act may be prosecuted, and any fine in respect thereof may be recovered, and any summary order under this Act may be made, in manner provided by the Summary Jurisdiction (Scotland) Acts.

8. The provisions of this Act shall not apply where an antique pistol is sold as a curiosity or ornament.

9. This Act shall not apply to Ireland.

THE GUN LICENCE ACT.

The following is the full text of section seven of the Gun Licence Act, 1870, above referred to:—

7. Every person who shall use or carry a gun elsewhere than in a dwelling-house or the curtilage thereof without having in force a licence duly granted to him under this Act shall forfeit the sum of ten pounds.

Provided always, that the said penalty shall not be incurred by the following persons; namely,

(1.) By any person in the naval, military, or volunteer service of Her Majesty, or in the constabulary or other police force, using or carrying any gun in the performance of his duty, or when engaged in target practice.

(2.) By any person having in force a licence or certificate to kill game granted to him under the laws of excise in that behalf.

(3.) By any person carrying a gun belonging to a person having in force a licence or certificate to kill game or a licence under this Act, and by order of such licensed or certificated person and for the use of such licensed or certificated person only, if the person carrying the gun shall upon the request of any officer of inland revenue or constabulary, or any constable, owner or occupier of the land on which such gun shall be used or carried, give his true name and address, and also the true name and address of his employer.

(4.) By the occupier of any lands using or carrying a gun for the purpose only of scaring birds or of killing vermin on such lands, or by any person using or carrying a gun for the purpose only of scaring birds or of killing vermin on any lands by order of the occupier thereof, who shall have in force a licence or certificate to kill game or a licence under this Act.

(5.) By any gunsmith, or his servant carrying a gun in the ordinary course of the trade of a gunsmith, or using a gun by way of testing or regulating its strength or quality in a place specially set apart for the purpose.

(6.) By any person carrying a gun in the ordinary course of his trade or business as a common carrier.

In any information for the recovery of the penalty imposed by this section, it shall be sufficient to allege that the defendant used or carried a gun without having a licence in force under this Act, and it shall lie upon the defendant to prove that he is a person not incurring the penalty by virtue of the proviso contained in this section.

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MR. A. B. HOLLIS.

THERE are few gunmakers who merit the regard of their *confrères* in the trade in a higher degree than Mr. Alfred B. Hollis, for he represents the colonising instincts of our race as applied to gunmaking. When quite a young man the instinctive desire to travel overcame all other considerations, with the result that he made frequent journeys abroad with a most laudable double motive. This was to combine the development of business, at the same time seeing as much as possible of the various foreign countries that had always been of special interest to him.

In the course of his early career he covered Egypt, Turkey and Southern Russia. In addition to this, he many times crossed the North American Continent, from Montreal to New Orleans and from New York to California. All these journeys were made in connection with his business as a gunmaker. But even so his love of travel at one time took him to the Holy Land: from Jaffa he went to Jerusalem, and from the Valley of the Jordan to the Dead Sea, from whence he proceeded to Damascus. Among his lesser journeys he included a number of visits to the Continent. He was present at the siege of Paris, and was on the spot during the revolution. That his career at this time was not without incident may be shown by the fact that he frequently made use of the passport he possessed entitling him to cross the lines. As a memento of one of the most anxious periods of his life he preserves a letter which was intercepted during the time of the Paris siege. Although an innocent enough document in itself, he was, on the strength of it, tried for his life, and was for weeks anticipating a summons to go out and be shot. The fact that things ended more pleasantly, is shown by the inditing of this sketch of his career up to date.

In the course of his travels, and for that matter during his residence in England, he had frequently heard the most glowing accounts of India as a country that afforded every scope to the pushing man of business. He applied to the Commissioner of Police in Bombay for a licence to trade in firearms. This was refused in view of the very strong tendency to place obstacles in the way of trade of this sort. Mr. Hollis then determined to appeal to Lord Dufferin, the then Viceroy and Governor-General of India, who was the only person who could give the much desired authority to start in that business. Mr. Hollis then set to work to obtain signatures to a petition which first of all vouched for his respectability; second, which bore suitable tribute to the splendid services he had rendered to the Birmingham gun trade in selling their wares in outlying countries, and finally, which recommended him as an altogether suitable recipient for the favour asked. This petition was signed by the leading Birmingham gunmakers and by the Mayor of that town, also by such men as the Right Hon. Joseph Chamberlain, the late Lord Randolph Churchill and Sir Richard Temple, and although the number of licences was restricted by Government, it was then granted. Since then licenses to deal in firearms in Bombay Presidency have been further restricted, and there are now only three such in Bombay. Their value is greatly enhanced, as the rules of the Indian Arms Act are now more rigidly enforced than in the past.

This has not prevented the firm of Hollis from prospering apace. They had many difficulties and disappointments to contend with at the start. But they have surmounted all obstacles, and the firm is at the present moment one of the largest distributors of every kind of high-class and up-to-date weapon. In the interests of English and native sportsmen in India, they stock every kind of express ammunition. Their gun and rifle catalogue, which is one of the most complete of its kind issued, contains an assortment of goods suited to every class of customer. An edition running into thousands is issued yearly and distributed throughout the whole of India, Burmah, Assam, Baluchistan and other outlying kingships and states. The customers of the firm include the leading English residents, whether of the military, civil service, or commercial persuasion. The Duke of Connaught has expressed his satisfaction with the goods supplied to him, while H.H. the Nizam of Hyderabad and other notables, are regular buyers from the Bombay house, Great tact and judgment are necessary in dealing with the varied class of the firm's patrons, but they all seem to agree that they are well served, both as regards quality and value offered for the money asked.

Mr. Hollis's business in sporting cartridges is very extensive, and special qualities of the same are largely used for the shooting of clay birds at the numerous officers' clubs that abound. Apart from the trade done with British firms, Mr. Hollis carries on a large business in American firearms. He is in best of touch with the consumer, and a wide range of goods is necessary to satisfy the requirements of his customers. His American goods are imported from the west coast *via* the Pacific, whence they are transported by Japanese ships to their port of destination. In the repair line the firm have to deal with a variety of operations, and they have to study cost, in so far that the Indian sportsman is indisposed to pay th prices that are freely asked and obtained in England. To get over this difficulty Mr. Hollis has trained an efficient staff of

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native workers, who are able, under his supervision, to re-stock a best gun, to tighten up the joint of an action that has come off the face, file a new lock altogether if necessary, in fact, to carry out the sundry repair jobs that the more practical among our provincial gunmakers are in the habit of undertaking.

Of Mr. Hollis personally it is necessary to say but little, in view of the light that is thrown on his character by this all too modest account of his very active business career. He is a gunmaker bred and born. His grandfather and grandfather's brother were the original Richard and William Hollis, who were established as gunmakers in Birmingham in the year 1776. The partners of the parent firm separated in due course, each for the purpose of carrying on business with his son. William, grandfather of the present Mr. Hollis, traded in partnership with his son as W. and E. Hollis, this firm being established in the year 1796. Business was carried on at Bath Street, and Whittall Street, Birmingham, and the firm were in a position to describe themselves as makers to the Honorable Board of Ordnance and contractors to sundry continental Governments. In due course William Hollis died, and the firm became E. Hollis and Son, Mr. A. B. Hollis thus for the first time joining the family business. Mr. A. B. Hollis, although concentrating his activities in the work incidental to his travelling operations, still kept the firm alive, and about sixteen years ago opened the present firm in Bombay. He is at this moment the only surviving member of the Hollis gun-making family. The firm of I. Hollis and Sons is still carried on in Birmingham, but no member of the Hollis family is associated with it. The present Mr. Hollis, as we prefer to call him, has a family, which includes one son, who has been trained as a gunmaker, so that the continuity of the name is not, for the present, at any rate, in fear of extinction.

THE REGENTS SHOOTING SCHOOL.

In visiting the new Regents Shooting Ground, our expectations of something good were pleasantly fulfilled. The site it occupies is one of the most favourable for the purpose in view that could possibly be imagined. The main field where the shooting is done carries a high tower on its crest, and it slopes away towards the east, the eye finding pleasant relief in a splendidly grown wood that thoroughly fulfils one's idea of what a pheasant covert should be. Well-grown hedges, undulating grass land, together with a nicely diversified background, all combine to make the spot an ideal one for the instruction and coaching of shooters, be they young or old.

The greatest asset of the new ground consists in the fact that it has Mr. P. A. Stockbridge for principal. As an exponent of pure shooting skill, he would be hard to beat, no matter how wide the net might be cast to find another like him. He can kill birds thrown from the high tower, shooting from the hip with as much assurance as most of us can bring to play in dealing with them in the ordinary manner. Whether the gun be upside down, held sideways, or even shot through the arch formed by the legs, no position seems to find him at a loss in the power to smash his birds. At the shots that represent game shooting conditions he is equally at home. His judgment of the allowance necessary for the highest bird that can be thrown, and his power of dealing with the fastest flying of low birds go to show that he has marvellous powers in connection with the sport in which he acts as guide, philosopher and friend to those who are less skilful than himself.

That he is a specialist in the more technical branches of gunfitting goes without saying, in that the experience he gained while employed at the London Sporting Park has become a purely personal asset. In the course of his work he has supervised the shooting of many of the best and a lot of the worst shots that the country contains. He has observed their peculiarities. He has found out why the good men are successful, and, for that matter, wherein they can add some fresh accomplishment to increase their already well-

MR. P. A. STOCKBRIDGE.

applied experience. More than this, he has learnt to associate want of success among those who have failed to get beyond mediocrity with the presence of tricks of style and faults of manipulation that are open to correction if only those concerned will set their minds to the task.

Through dealing with all sorts and conditions of shooter, and being familiar with the recognised methods of arranging shooting school apparatus, Mr. Stockbridge has been able to fit up the new ground in the manner best calculated to serve the requirements involved. The ground lies near the Finchley Road, just over two miles beyond the Finchley Road Station of the Baker Street line. The new ground should certainly deserve the patronage of those gunmakers who do not run an establishment of this kind in connection with their own business. Messrs. Boss & Co. have placed the whole of their work in Mr. Stockbridge's hands, and this should of itself afford evidence of the soundness of the methods upon which this school and gunfitting ground is worked. Mr. Stockbridge does not sell guns, and, consequently, he is in a position to act disinterestedly on behalf of all shooters who patronise the singularly complete installation over which he presides.

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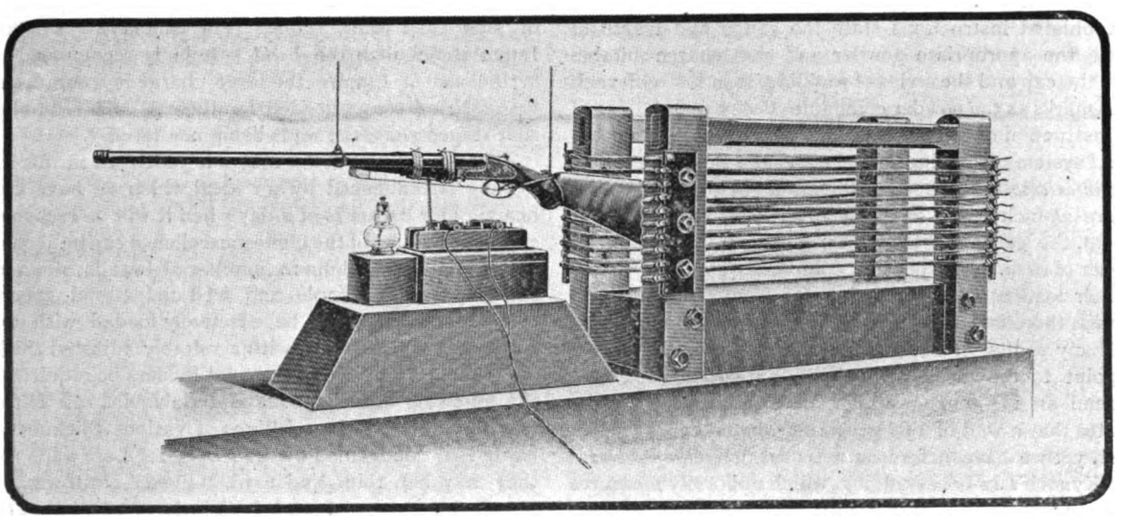
THE NEW "FIELD" RECOIL GAUGE.

To test the recoil of an ordinary 12-bore cartridge is a simple and necessary operation that is daily carried out in proof work. All that is required is that the proof gun shall be so mounted that a register of its backward movement is available. The readings so obtained are calibrated in such a way that the values recorded show the foot-pounds recoil that the cartridges tested would give if fired from a gun weighing 7-lbs. and imparting a similar velocity to the charge of shot. Such recoil measurements are a cartridge test pure and simple. To take the recoil of any rifle or shot gun is, however, a more intricate problem, and yet true recoil is the recoil that follows from firing a given cartridge in a given gun or rifle.



To make a satisfactory test of recoil it is necessary to provide a suitable means for measuring the movement of the actual weapon under consideration. Those recoil gauges that involve the strapping of the gun on a carriage or table present several difficulties, which are due to the fact that the resulting recoil is that of the gun plus the dead weight to which it is attached with a varying amount of rigidity. Even if it be assumed that the whole recoiling mass acts as a self-contained body having no relative movement within itself, that is between the gun and its mounting. the difficulties of obtaining absolute readings are very great.

For the above reasons it has been apparent for some years past that the system of measuring recoil by judging the movement of a carriage or trolley that offers a given resistance to backward travel must be discarded in favour of a more absolute method. The obvious plan is to suspend the weapon to be fired by means of strings, so that the weapon flies back in the manner of a pendulum. For the testing of sporting cartridges in a permanent proof gun it is sufficient to make the gun very heavy, say 50 lbs. in weight, and to measure the recoil by the amount the gun is raised in its backward swing, this recoil being translated by means of a scale into the foot-pounds recoil of a 7-lb. gun. When, however, it is necessary to take the recoil of an ordinary weapon the only possible plan is to suspend the gun or rifle, and to measure the velocity of its recoil over a suitable number of inches, and to convert the reading so obtained into foot-pounds of recoil by means of the well-known energy formula. The process of conversion is very simple. The ascertained velocity is multiplied, first by itself and then by the weight of the gun in pounds. This product is then divided by 64·4, and the answer represents foot-pounds energy of recoil. The value of the recoil that would be obtained with a heavier or lighter weapon can then be determined by a further calculation.

That our knowledge of recoil is likely to be increased in the near future, may be assumed from the fact that our contemporary, *The Field*, has lately described for the benefit of its readers the permanent piece of apparatus which is here illustrated. It will be seen from the drawing that the principles above described have been embodied in a very simple form. The gun or rifle to be tested is suspended by cords. The trigger is operated by an elastic band. This acts when the forward pull on the trigger set up by a piece of twine is relieved by the act of burning. The actual recoil gauge consists of two electrical contacts that are separated by a distance of 7·2-ins., which is exactly the hundredth part of twenty yards. The chronograph which is attached to these contacts is read with the scale for taking velocities over 20 yards, so that a record of 1,465 feet per second, reading from the ordinary scale becomes 14·65 feet per second of recoil when the velocity of the gun is the thing to be measured. Put in simpler language, the gun travels over 7·2 ins. in about the same time that a shot travels over 20 yards, so that the period of the recoil over this distance falls well within the range of measurement of an ordinary chronograph. There is practically nothing more to explain about this gauge. Its readings are absolute, and therefore require no theoretical justification. For instance, by its aid the fact was established that Messrs. Holland's new smokeless Paradox cartridges gave 23 per cent. less recoil than when black powder was used the effect on the bullet being the same in both cases.

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CARTRIDGE LOADING INSTRUCTIONS.

We have received from our contemporary, the *Sporting Goods Review*, a copy of their sixth annual card of loading instructions for sporting nitro compounds. The list of powders whose loading is specified is as follows:—Amberite, Coarse Grain Cannonite, Ruby, Ballistite, Cooppal No. 1, Cooppal No. 2, Smokeless Diamond, E.C. No. 3, Henrite, Empire Powder, Imperial Schultze, Kynoch Powder, Mullerite (leaflet), Normal, Schultze, Walsrode, and Universal Walsrode. The bores of cartridge for which loads are given run from 8-bore to 28-bore, though it is only in some instances that the whole range of loads is laid down.

The tabulated instructions state the gauge and length of each case, the appropriate powder and shot charge suitable for each, the cap and the series of wadding, together with such special remarks as the powder companies desire to put forward for the instruction of the loader. We are glad to see that the new *Field* system of loading is recognised to the extent of its printing *in extenso* at the head of the card. While the loading of 12-bore 2½-inch cases has only been dealt with as a first instalment, the general principle is, of course, applicable to other sizes of case. The powder companies continue to lay down their loading instructions in a far from complete manner, though there is a distinct tendency apparent to come into line on many points. As an instance of this disconformity we might point to the fact that Nobel's Explosives Co., Ld., recommend an 11¾-gauge wad for all 12-bore cases. The card states that a wad of this gauge may be taken as ·738 in diameter, yet we have before us a recent delivery of several kinds of Kynoch's 12-bore wadding, which uniformly measures from ·738 to ·740 of an inch in diameter. We know, further, that the Nobel wadding is of this same size, which leads us to suggest that when the same thing is meant the same words should be used to describe it. A larger wad than that commercially supplied for 12-bore cartridges should not be used, and it is a pity that it should by inference be recommended.

In the same way the thickness of card wads is dealt with in three distinct ways. The words "thick" and "thin" are used with the most casual reference to actual sizes. There is only one way to make a satisfactory measure of the thickness of a card wad, viz., to build up a pile one inch high, squeezing them firmly together between finger and thumb, and then count the number running to the inch. Eight to the inch will indicate a thick card, twelve a medium card, while sixteen, twenty, and so on are promiscuously termed thin cards. The one-twelfth card is generally sold as a "thick" card so that these adjectives are not related to specific sizes. Again, we notice that the Kynoch Company recommend a $\frac{1}{32}$ inch card for the over-felt wad, but they use a $\frac{1}{40}$-in wad.

Turning to other points we think that perhaps the most serious departure from recognised custom is that of the Nobel Company, who lay down that a soft felt wad should be used with their two powders, Ballistite and Empire. It would be a very simple course for them to regulate their powders for use with felts of medium firmness, such as are in universal currency throughout the trade. To use a medium or hard wad where a powder is regulated for a soft wad is to create a tendency to low velocities if the loader uses the wad to which he is accustomed. Alterations in the texture of felt wadding have such a great influence on the behaviour of a nitro as to make it desirable in the interests of all powder makers that a standard firmness of wadding should be made universal throughout the trade.

In the same way we think that the loader should receive definite instructions as to the manner of dealing with varied charges of shot. In the *Field* system the following combinations are recommended, the charge of powder remaining unaltered:—1⅛-oz. shot, ⅜-in. felt; 1$\frac{1}{16}$-oz. shot, $\frac{7}{16}$-in. felt, 1-oz. shot, ½-in. felt; nothing really could be simpler, yet the E.C. Company specify for 1-oz. charges of shot, the same wadding, and three extra grains of powder, and they say nothing at all about the intermediate load, though most practical experimentalists uniformly find that they get better results with 1$\frac{1}{16}$-oz. of shot than with 1⅛-oz. For Smokeless Diamond and Imperial Schultze the *Field* system is recommended, while in the use of Empire, the large charge is ignored, 32 and 36 grains being recommended for the 1$\frac{1}{16}$ and 1-oz. charges of shot respectively, the wads being unaltered.

There can be no doubt that our judgment in this matter of loading is influenced by an ideal which we have closely at heart. Our dream is of a day when it will be recognised that cartridge loading of the highest excellence can be accomplished with the aid of a minimum number of brands of wadding, all agreeing with a simple and well-understood specification. If a 12-bore case can be effectively loaded with two $\frac{1}{16}$-in. cards and a $\frac{1}{16}$th card, with a suitably adjusted thickness of felt wadding, why, we ask, should loaders be required to stock the following miscellaneous materials, viz., soft felt wadding for the Nobel powders, feltines of various thickness, "Field cards" (as condemned by the *Field*), 11¾-bore wads (whatever they may be), thin $\frac{1}{32}$nd card, "Field" cloth wads, and the so-called greaseproof wads? We have no wish to close the door to improvements. All we say is that miscellaneous waddings having no special justification should be abolished, thus simplifying the problem of ways and means for the cartridge loader, and enabling him to do the fullest justice to the variety of powders which he is called upon to load.

That our ideal is proving its claims to solid usefulness we have much reliable evidence. The Schultze Company have abolished the thin card over the felt, and the thick over-shot wad, and have thrown their enormous influence into the scale in favour of the *Field* system of wadding. The E.C. Company only differ in point of words, except that they recommend an addition to powder instead of to wadding for the lighter charge of shot. The Curtis's and Harvey powders all run on the line recommended by the *Field*, though they point out for the benefit of those having "Field" cards in stock that these satisfy the conditions of the one-twelfth card. These powders represent an enormous proportion of the total output, and the fact of their compliance with the working average of existing methods as laid down by the *Field* at least affords a useful example that might with advantage be followed by Messrs. Nobel and Kynoch, who are now the sole important exceptions to a meritorious general rule. One of the most useful factors in the reforms advocated is, undoubtedly, the card which lies before us. It gives the *data*, as supplied by each powder maker with precision and great clearness of arrangement, and this year's edition will no doubt before long be found prominently posted in all well-regulated loading establishments.

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ROUND THE TRADE.

Mr. C. R. Borland, Chemist to the American E.C. Works, is in this country.

Mr. A. B. Hollis, of Bombay, returned to India on the 13th ult., by the P. and O. boat, *Arabia*.

Mr. Sydney C. Harrison has lately been appointed Secretary of Messrs. Cogswell and Harrison, Ld.

The affairs of Mr. James Franklin Rogers, gunsmith, of Woodbridge, have been placed in bankruptcy.

Mr. Gaskell, President of the Laflin and Rand Powder Co., of New York, recently paid a business visit to London.

The local journal contains an account of the recent marriage of Mr. A. E. Cole, the gunmaker of Devizes.

Ammonal Explosives Ld. is the name of a Company that has been formed to work a new explosive of the safety class.

A first and final dividend of 12s. 6d. in the pound is declared in respect to the winding up of the affairs of Mr. J. H. Barber, of Faversham.

The Morris Tube Company have sent us a laudatory notice of the shooting obtained with the Morris Tube at the recent Bisley meeting.

We understand that Mr. Geo. Levy, of St. Dunstan's House, Idol Lane, E.C., has transferred his agency for the Soc. Française cartridges to Mr. E. Hope Pearse, of the same address.

Mr. G. Bayliss, who advertises himself as many years London manager and expert gunfitter to the late firm of J. and W. Tolley, Ld., has started on his own account at 14, Avery Row, New Bond Street.

It is reported that Hillsdon & Son, of Main Road, Rondebosch, and Cape Town, have been granted a licence by the Colonial office to stock, sell and import all kinds of fire-arms and ammunition.

Our telephone number has just been altered from 3,416 Gerrard to 6,325 on the same exchange. This should be noted by all who have reason to ring up the Gunmakers' Association or the Clay Bird Shooting Association.

The public proceedings in connection with the winding up of The Safety Explosives Ld. (Fumelessite) have disclosed a very unsatisfactory state of affairs as regards the allotment of fully paid shares to those interested in the promotion.

Von Lengerke and Detmold, of New York, have accepted an agency for the Gilbert pulling mechanism for clay bird traps. It seems that the arrangement pulls off the traps in ordinary rotation and not according to the instructions given to the puller.

Following the principle of the Workmen's Compensation Act a sum of some £3,679 has been expended by the Secretary of State for War in satisfying the claims of those dependent on the fourteen victims of the recent Lyddite Explosion at Woolwich.

The recent death in Glasgow of Mr. R. M. McDougall is reported. He was agent in Scotland for Baldwin's wads, and formerly represented Messrs. Joyce. He was greatly respected by the large circle of business friends and acquaintances with whom he came into contact.

Mr. T. R. R. Ashton, whose name has a familiar sound, is hailed as the inventor of another rifle. It is a 100-shot a minute rifle, and according to the *Midland Express* and the *Morning Leader*, a number of models are being made for submission to the War Office.

Shooting and Fishing, in its latest number to hand, eloquently advocates an American proof house. The manufacturers say it is unnecessary, and yet we have heard of the returning of whole consignments because of the entire destruction of sample models submitted to proof in Birmingham.

The barring from the British market by the Colt Company of the pocket model of the Browning automatic pistol for the past few years is at last explained by the issue from the Colt works in America of a pocket model having a 4-in. barrel, a length over all of 7-in., and a total weight of 23-oz.

We greatly regret that it is our sad office to place on record the death, on the 4th ult., of Mr. Henry Wilkinson Latham, a director of the Wilkinson Sword Co., Ld. He occupied the important position of works' manager and mechanical expert to this Company, and his brilliant attainments have accounted for the high esteem in which their manufactures have always been held.

The *London Gazette*, of the 7th ult., contains a supplement to the following effect, viz., that by the Exportation of Arms Act, the exportation of arms, ammunition, etc., may be prohibited to countries where they may be made use of against His Majesty's subjects or forces, and whereas such a prohibition was issued in 1900 in respect to China, the same is now withdrawn as no longer necessary.

The firm of Mason Bros., of Sydney, recently fought a test case, demanding a refund of the duty paid in respect to shot contained in loaded cartridges. They won their case in the first instance and also on appeal, it being the opinion of the judges that the intention of the legislation was to exempt cartridges as cartridges. The decision will affect a large number of importers who were fighting the case jointly with the firm of Mason Bros.

The London Armoury Company inform us that they have a model of the new Winchester automatic repeating rifle of ·22 calibre for showing to their customers, but that they will not be able to sell them until the proof test has been settled. The cartridge to be employed therein is specially made for the purpose. These rifles should, at least, be a great boon to those who are exponents of the art of trick shooting. They will also command a market wherever rapid fire and silent reloading is an essential.

The Vickers-Maxim Company has received so many letters from individual shareholders asking the reason for the great fall in the price of shares, and it appears that such wild and totally unfounded rumours have been started, that the directors have thought it desirable to state to the shareholders generally that nothing in the company's affairs warrants the shrinkage in price which has taken place. The financial position of the Company is very strong, its special manufactures still retain their prominence, and, in the opinion of the directors, there is no reason why, with a revival of trade, the profits should not rise again to the level of the years previous to 1902.

An interesting light is thrown on the advantages of gun dealing, by reading of the fabulous profits made by a Woolwich gunsmith who claims £2,684 compensation for being turned out of his premises. His profits on some articles range for 200 to 800 per cent. "It was probable that he would experience great difficulty in getting new premises, owing to the storage of explosives for which he held the London County Council licence, the regulations being now very stringent." We don't quite see this as the granting of a registration certificate is as by right and the local authority has no option in the matter. It seems that the business is managed by an assistant with a salary of 8s. per week.

"There is the gun, I have experimented on scientific principles for years to produce the best machine gun, and have carefully avoided the mistakes which have rendered the other guns practically inoffensive." Such is the modest way in which a new gun inventor opens the ball of conversation with the *Echo* representative. He has discovered the successful application of a cooling agent, and to demonstrate this he fired several rounds of blank cartridge through the gun, and "the breech being open one could easily test the truth of his statement." The barrel was quite cool. This remarkable result is vouched for by the *Echo* man. The great pity is that owing to the supineness of our war department the Russians look like getting hold of the idea. It may be that this affords an explanation for the recent market fluctuations of Vickers-Maxim shares.

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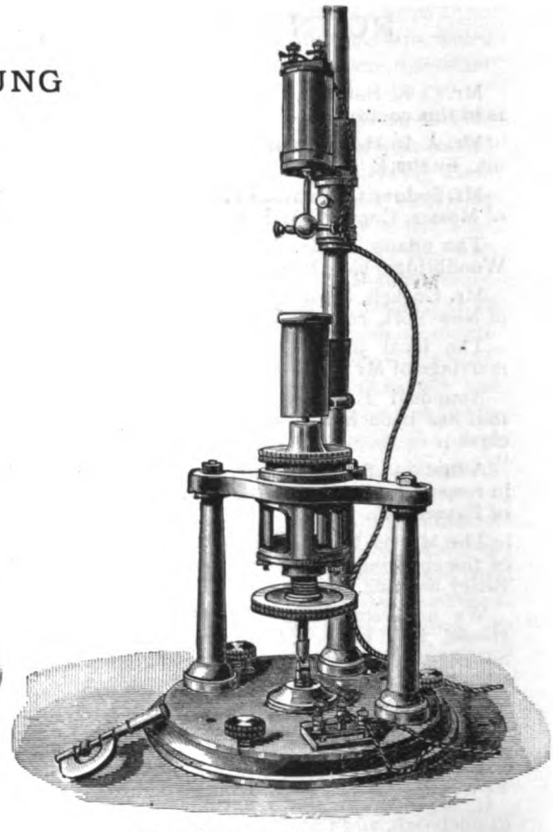
LECTURES TO YOUNG GUNMAKERS.

XXII.—CAP TESTING.

THE BORLAND SYSTEM OF THERMOPILE TEST.



THE BORLAND CAP TESTER.

In previous lectures we have shown what are the various elements which are essential in good caps. To determine these elements and foretell their existence methods have from time to time been proposed, and these we intend to review and point out how far they have been successful. On the subject of cap testing Mr. W. D. Borland has accomplished more and published more than any other person.

The usual methods of cap testing include the following:—

(1) Sensitiveness, as judged by the blow of the falling weight.

(2) Flash on paper, determined by firing a cap at one end of a tube, and allowing the ejected matter to impress its mark on paper.

(3) Cap pressure to determine the force of the gases liberated upon the explosion of a cap.

(4) Time of ignition as determined by the Borland cap tester.

(5) Heat of flash as shown by thermopile readings.

(6) Photographs of cap flashes.

(7) Chemical method consisting of weighing cap charges and analysing cap compositions.

The earliest forms of test determined sections (1) and (2) as above. The test for sensitiveness has already been explained in full. **The flash test is sufficiently indicated by the brief description above given. To this day it is a much-used check on factory operations, and by its aid a good deal of information of a general kind is obtained.**

The Borland cap tester was a great advance on anything that had hitherto been devised. This machine, which is shown in the above illustration determines values for (1), (3) and (4). The pressure of the cap is obtained by firing it in a closed chamber containing a piston carrying a cutting edge which is forced into a lead disc, the depth of the cut indicating the pressure of the cap gases. The amount of oil on the piston has a marked action on the result, so that in taking pressure the piston should be cleaned at every shot and wiped dry. The Borland method of taking the time of ignition provides for the operation of electric contacts by the burning of a strand of guncotton by the flash of the cap. By means of a chronograph a time record is taken which measures the interval from the blow on the striker to the operation of the electric contact. It is possible that better results would be obtained by fixing the second contact so that the circuit would be broken at the first movement of the piston. While the testing of cap ignitions satisfies a number of useful requirements, the alternative test of the action of a complete cartridge is more useful in many ways. Certainly the time taken from the fall of the hammer to the arrival of the shot at the muzzle is a tangible value, which gives more information to the ammunition maker and sportsman than the time of the cap alone. As in other matters of an experimental kind, **tests of an allied character serve special purposes, and they are not invariably interchangeable. In some instances they may be used alternatively, in others a particular method gives the required information in a better and more convenient way. The time test of caps will deal with a cap independently**

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of the gun. On the other hand when the necessary connections exist on a proof barrel capable of firing cartridges primed with the caps under notice, then it happens that very complete information can be gained not only as to the cap, but as to its igniting effect on the particular powder used in combination with it. Since details have been given of the cap to muzzle tests no more need now be said thereon.

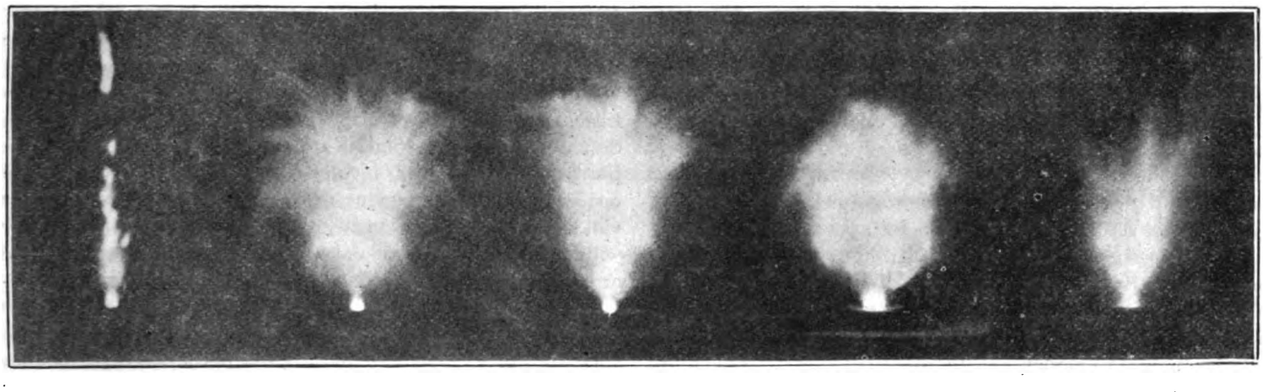
The thermopile cap test is probably the most technical of any that afford really useful information. A thermopile couple is an arrangement of metals that generate electrical current when heated. The cap flash is directed on the thermopile, and a minute amount of current is produced. It is so small in quantity that the most delicate galvanometer would not show a readable deflection. The difficulty is, however, overcome by using a small mirror in place of a needle, and reflecting a spot of light from its surface on to a carefully marked scale. The beam of light so projected acts as a long needle without weight. The current would be inadequate to deal with a needle having any magnitude of radius, hence the beam of light takes its place. The method of taking this test is illustrated at the head of this article. Although the actual amount of the current generated by the cap is so small it is strictly proportionate to the heating effect of the flash. It cannot be regarded as a test of temperature, because the amount of cap composition is a factor, and weak caps of large size therefore give the greatest deflections. On the other hand as a comparative test between cap and cap of the same batch it gives a most useful idea of their regularity and conformity with the recognised standard.

Even by the aid of a thermopile it is most difficult to estimate the total heating effect of a given cap. The duration is so short that the heat is dissipated before it can be directed on to the thermopile. Mr. Borland has, however, gone wonderfully near an exact determination of the total heating effect of a cap. In a series of special tests made by him the flash of the cap was directed into a closed box containing a known weight of air. This was heated by the explosion, and it was directed in a jet on to the thermopile. The amount of heat so registered showed a wonderfully close agreement with the value obtained by a chemical calculation of the heat that should be liberated by the decomposition of the known ingredients of the mixture. So much for thermopile tests, we will now deal with cap photographs.

Mr. Borland first made known his method of photographically registering the cap flame in a lecture delivered before the Gunmakers Association. He ignited the caps to be tested in a light-proof box, and the image was thrown on a reduced scale upon a photographic plate of great sensitiveness. So small was the projected image that five such flashes could be registered upon a single plate. By this means a true comparison was established whereby the results could not be affected by differences of photographic treatment. That is to say the character of the flash might be affected by the altered character of different plates, and by slight variations in the development of the negative. However, by skilful photography and by taking on the same plate the flashes which it is intended to compare, a large amount of valuable information is rendered available.

For the purposes of this lecture Mr. Borland has kindly taken two series of comparative results with the latest issues of representative modern caps. In our first illustration a most comprehensive set of flames is reproduced. The illustration is taken from an enlargement of the original photo, the present size being half that of the true cap flame. We are not at liberty to publish names, since to do so would be to introduce controversial questions of trade rivalry that would be outside the scope of this lecture. Starting from the left the first flash illustrates a thoroughly bad cap. Instead of an instant complete gasification of the cap mixture, a solid lump of the material was projected from the flash-hole of the cartridge, leaving on the plate the impression of a shooting star. Associated with results of this kind is bad behaviour of the cap in the cartridge, involving slow and irregular ignition amounting to hang-fires with irregular action of the powder as regards pressure and velocity.

The remaining pictures show other caps, English, Continental and American, and all but one conform to the character of flash which is associated with a well-behaved cartridge. From all the types of cap which were originally examined by Mr. Borland, those which conformed to this style of photo were especially picked out for commendation. In igniting they give off a large body of cool flame, with plenty of solid particles to afford a sustaining effect to the igniting power of the flash. The body of flame liberated is sufficient to fill the whole of the powder chamber several times over with the right kind of moderately high temperature gas to set into instantaneous combustion every grain and particle of powder. At the same time the flame is nowhere so intense in its action as to initiate an unduly violent explosion of the powder, such as would involve an excessive rate of burning and consequently an unduly high pressure. In other words there is an instant and all-pervading evolution of flame such



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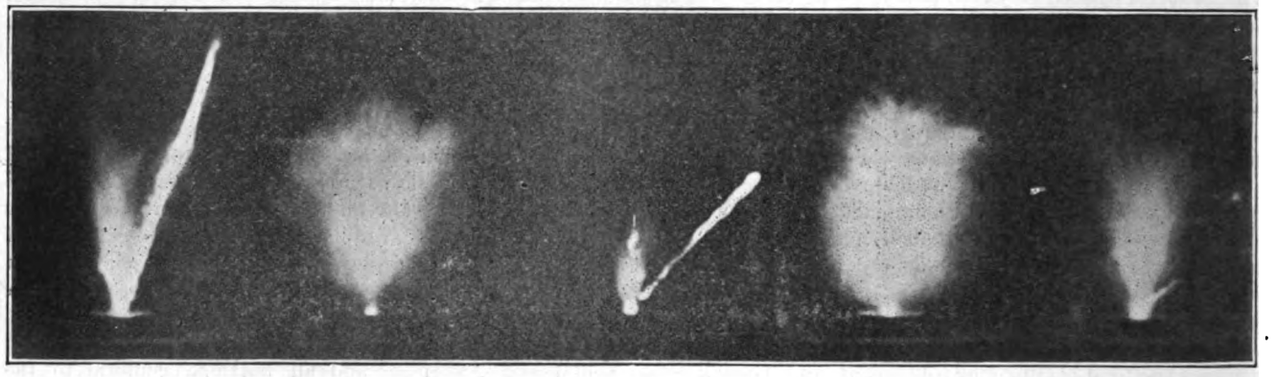
as will put the whole charge of powder into practically instantaneous combustion without entailing a greater subsequent rate of burning than is desirable.

The second series of photographs contains several very interesting examples. The end flash on the left and the next but one to it reproduce the same bad features that characterise the flash adversely criticised on the previous page, and that this form of flame proves consistent badness may be shown by the fact that all these pictures are obtained from the same make of cap. Their action in the gun is nearly always bad, and with certain powders that are difficult to ignite the bad behaviour above indicated is intensified. The good flash between the two bad ones was obtained from another cap of consistently good behaviour. The two on the right are interesting in view of the fact that they both relate



to caps used for priming American cases. The one on the right was taken from a batch of cartridges that were behaving badly, that adjoining it being from another delivery that gave every satisfaction.

The photographic method of test is thus shown to provide a very useful means of examining the characteristics of caps for conformity with types that are proved to behave in a given way. It would be impossible to say on the strength of the information gleaned from cap photographs that a given character of flame indicates a cap with the requisite properties for effecting the satisfactory ignition of a sporting or military cartridge. The suitability of a cap for its intended functions must be examined with reference to those functions. The powder it ignites must act satisfactorily as regards prompt ignition, moderate pressures and high velocities. Furthermore, these properties must not be unduly influenced by variations in the explosive between certain limits.

What those limits are, has already been explained in a general way, the summary of which is that a cap cannot be held to be without fault if it fails to accommodate itself to reasonable alterations in the explosive or method of loading. The powder again must not depend too much upon the cap for the correction of faults inherent within itself.

The precise conditions will be clearer if we quote Mr. Borland's own practice in the matter. For his powder, E.C. No. 3, an average pressure of 3·25 tons, with standard conditions of cartridge and gun, is aimed at, no individual shot in the series materially to exceed 3·5 tons. The powder will do its work effectively in the presence of a softness of cartridge and ample size of chamber, such as will bring the pressure down to about 2·5 tons. To prevent an undue rise of pressure when the opposite conditions exist, he produces the powder with a hardness of grain that makes it extremely difficult for it to burn more rapidly than the pre-determined rate. He then asks that the medium cap shall ignite his powder satisfactorily within these limits, and his cap tests are designed for the purpose of examining the conformity of the various deliveries with the standard sample which he has approved as the result of long experience, and to which he has regulated his powder. If trouble is at any time encountered, he at once examines the caps to see if they satisfy the requirements which his experience of the various testing appliances has enabled him to establish. A fault in the cap mixture, if present, is at once detected, and his subsequent course of action is outlined.

It should not be supposed from this little account of Mr. Borland's laboratory experience that he is constantly at war with the cap makers. He issues a powder that is liable to be used in combination with all kinds of caps. The primers which give little or no trouble are those which are regularly turned out to a good reliable specification. Those with which difficulties are likely to arise are such as lie, so to speak, on the borderland of the objectionable extremes. A cap whose ordinary behaviour suggests a tendency towards undue violence, slowness, insensitiveness, weakness or irregularity will give trouble the moment a slight accident of manufacture or treatment in the cartridge emphasises an already objectionable characteristic. The average struck by a good cap, the same as a good powder, leaves ample margin for diverse variations of a reasonable nature, but if the average inclines too much in any one direction, trouble commences when the line of demarcation is passed. If a rifle is truly sighted to strike the centre of the bull, there is an equal opening for error in every direction without incurring the penalty that comes with missing. If the sights diverge towards any point, a moderate error in the same direction will result in a miss. So it is with caps, and it is such apparatus as Mr Borland's that helps us to define the true centre of the target of perfection we are aiming at. Chemical analysis and the weighing of cap charges tell us a great deal about their inmost characteristics, but results under this heading come within the forbidden ground of trade secrets. Hence we are not in a position to go into that side of the question. So far, therefore, as we are concerned, the discussion on caps is closed.

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THE HEAT TEST.

(Concluded.)

The new test proposed by Mr. Albert P. Sy consists in subjecting a given weight of explosive to a comparatively high temperature and observing the loss in weight from time to time.

In the article published in the *Journal of the American Chemical Society*, tabulated results and curves are set forth showing the relation between temperature and rate of decomposition for several nitro-celluloses and gunpowders. The powders experimented with were of the pure nitro-cellulose type. The experiments were made at temperatures varying from 80° C. to 135° C., and finally 115° C. was selected as the best temperature for showing up the bad features of an unstable sample of powder. At this temperature, after loss of moisture and solvent, the volatilization of the products of decomposition proceeds slowly, but with an increasing rate until a condition is reached which corresponds to the breaking down point of the powder, which may be likened to the elastic limit of metals, thus the new test, it is said, promises to give us *The Elastic Limit of Powder Resistance to Heat*, and this is the new measure proposed.

Mr. Sy says:—"The test adopted, pending further develop-
"ments, is as follows:—From one to four pieces of the
"powder to be tested are weighed on a watch-glass, and
"heated for eight hours per day, in the 115° C. oven; the
"sample is allowed to cool in a desiccator and weighed, the
"loss in weight is calculated to percentage. This is repeated
"from day to day until completion of test (six days or less).
"During the first day's heating, a good powder loses approxi-
"mately its moisture and volatile matters; after this the
"daily loss is less than one per cent., but gradually increases
"until a maximum is reached, after which it slowly decreases.
"The daily loss of a good powder does not exceed one per
"cent. before the sixth day, often not before the tenth day.
"The maximum daily loss is usually not reached before the
"eighth day. A bad powder usually loses more than its
"moisture and volatile matters on the first day; the daily
"loss is more than one per cent. before the sixth day, and
"the maximum daily loss occurs before the eighth day."

For this test it is claimed that:—

(1) The powder is tested in its natural condition.
(2) It shows all products of decomposition.
(3) It shows the decomposition of nitro-compounds other than nitro-cellulose, which are often present in finished powders.
(4) It shows the effect on stability of small quantities of substances added for marking stability or any other purpose.
(5) It shows quantitatively the progress of the decomposition
(6) The test itself as well as the apparatus is simple, and not subject to variations like the old tests.

The above is very briefly the test proposed by Mr. Sy. It can hardly be admitted new as it is doubtful if there exists a laboratory in connection with the manufacture of explosives wherein experiments of the kind suggested have not been made. Moreover, Abel in his researches in 1867 gave quite a number of figures showing the loss, due to decomposition, on submitting guncotton to temperatures in the neighbourhood of 100° C. The only novelty that can be allowed is the proposal to make use of the total loss as an index of the purity of an explosive compound as distinguished from the loss of nitrogen as determined by the Will test.

In discussing the merits or the probable adoption of any new test, one has to bear in mind the conditions which have arisen during late years, throwing discredit on existing tests. The Abel heat test is still used, almost exclusively, by manufacturers of guncotton and nitroglycerine, and rightly so, because these compounds when having passed the test satisfactorily have behaved well in storage. Moreover, up to a limit, as the operations of purification are prolonged so are the readings of the test. The objections to this test did not arise until it was attempted to prove all gunpowders under the same conditions as regards temperature and amount of explosive. It was the anomalies which then arose by the adoption of hard and fast rules which have called forth so many new proposals during the last five or six years. Unfortunately, the new tests are no better, because, equally with the Abel test, they give results for the components of a powder which do not bear a correct relation with the finished product.

A stability test as applied to a gunpowder should show whether the explosive bases have been properly purified and also whether there is any objectionable inter-action between the components of the powder. If it were possible to devise such a test, which would be applicable to all gunpowders, a real advance would be made. As a matter of fact, any new test short of this would not better our present state of affairs, because there is no difficulty in drafting a specification of the Abel test applicable to pure nitro-cellulose powders or any other powder of determined composition.

Mr. Sy has so far restricted his experiments to guncotton and nitro-cellulose powders. Obviously, his test could not be used for gunpowders containing any material amounts of ingredients, volatile at 115° C., as these would give erroneous readings, the volatile ingredients being mistaken for products of decomposition. Consequently, his test is not applicable to powders containing nitro-glycerine or any of the nitro-hydrocarbons, such as dinitrobenzene. This is a serious fault, and practically restricts its application to guncotton and powders made wholly of it.

A suitable stability test should indicate the likely changes which will take place in a gunpowder at climatic temperatures. Therefore a proper test should not be of too high a temperature for the reason that a test at a comparatively high temperature assumes that all powders have the same increase in their rate of decomposition as the temperature rises, an assumption by no means obvious. A test which requires days for its completion is not likely to replace one finished in an hour.

All new methods of investigation are useful in the hands of the expert, and no doubt Mr. Sy's present results and those he promises for the future will assist investigators in explosives, but his test as at present proposed does not appear likely to replace those now in use.

The *Sporting Goods Review*, U.S., is responsible for the statement that the Browning automatic shot gun is being manufactured by the *Fabrique Nationale*, of Belgium, for the American market. This is not the first we have heard of the greater cheapness of European manufactures if the machine methods be good.

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REPRODUCED FROM THE LATEST KYNOCH SHOW CARD

TRADE MARKS.

APPICATION ADVERTISED. JULY 29-AUGUST 26, 1903.

255,680. The Carbonite Syndicate, Ltd. The word "Championite." To apply to explosive substances. July 1, 1903.

TRADE MARK REGISTERED. JULY 16-AUGUST 19, 1903.

247,610. Clabrough & Johnstone.

APPLICATIONS FOR PATENTS.

JULY 20—AUGUST 22, 1903.

16,090. Disappearing Targets. C. E. Marks.
16,182. Explosives. A. F. Hargreaves.
16,217. Projectiles. F. C. Fairholme, J. E. Fletcher, and W. B. Hamilton.
16,310. Air Guns. L. Jeffries.
16,372. Ordnance. Sir W. G. Armstrong, Whitworth & Co., Ltd., and R. T. Brankston
16,373. Ammunition Hoists. Sir W. G. Armstrong, Whitworth & Co., Ltd., and R. T. Brankston.
16,384. Laying Ordnance. M Darmansien, and A. Dalzon.
16,455.* Gun Carriages. E. Bousfield (Agent for *P. Nordenfelt & E. Ternström.*)
16,463. Portable Targets. F. S. Cox.
16,464. Barrel Bands for Small-Arms. The Birmingham Small-Arms Co, Ltd, and C. Proctor.
16,504.* Small-Arms. G. Harrison (Agent for *J. P. White & B. D. Haines*)
16,507.* Rifles. R. M. Basilone.
16,517. Explosives. R. B. Ransford (Agent for *M. S. Talbot.*)
16,586. Sights for Guns. B. B. Hill.
16,652. Wind-Gauge Sights. A. Blaikley.
16,799. Torpedo Steering Mechanism. J. Whitehead.
16,814. Ejecting Mechanism of Small-Arms. W. Baker.
16,913.* Sights for Guns. A. J. Boult (Agent for *F. A. Schanz*)
16,963.* Loading of Ordnance. C. P. E. Schneider.
16,964.* Shrapnel. B. W. Dunn.
16,991.* Safety for Small-Arms. J. Tambour.
17,191.* Ordnance. M Mondragon.
17,193. Gun Wads. S. T. Batley (Agents for *A. C. Whitney.*)
17,272. Firing of Blasting Cartridge. T. Grainger.
17,333. Automatic Fire-Arms. J. J. Reifgraber.
17,377. Double and Multiple-Barrel Fire-Arms. L. Reblé.
17,414. Pressing Guncotton Blocks. G. W. Bell.
17,415. Formation of Blocks of Guncotton. G W. Bell.
17,509. Sighting of Ordnance. A Vickers, and G. T. Buckham.
17,515. Purification of Nitrocellulose. G. W. Bell.
17,625 Luminous Sights. E. Preda
17,654. Sporting Gun Ammunition Carriers. W. J. Seton.
17,759 Automatic Small-Arms. E. H. Clive, and J. A. Timmis.
17,778.* Spring Recoil Guns. G. Ehrhardt.
17,828. Small-Arms Cartridges. J. K. Ewart.
17,890. Guncotton Blocks G. W. Bell.
17,961. Presses for Guncotton G. W. Bell.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

JULY 30—AUGUST 20, 1903.

COMPILED BY HENRY TARRANT.

15,525 (1902). **Aiming Instruction.** J. Cohen, London. A tubular box, at one end of which is arranged a detachable target, and at the other end an aperture. Within the box are arranged a number of sights, all or any of which may be aligned with the target at will for the purpose of teaching the correct method of sighting. Accepted July 9, 1903.

15,686 (1902). **Electrical Targets.** J. A. Dickie, Leith. A target consisting of a number of variously-shaped sections, each resiliently mounted on a rod adapted to operate a contact. The contact closes an electric circuit when the target is hit, and indicates at the firing point the exact part of the target struck. A spring returns the section to its normal position. Accepted July 14, 1903.

16,673 (1902). **Sighting Device.** G. D. MacDougald, Dundee. A device applicable to the sighting of small-arms or ordnance in which the ordinary foresight is replaced by reflecting substance. The reflector throws back into the eye of the shooter, through the medium of another mirror, a white or black line arranged upon a ground reverse in color. The line-carrying part is secured to the barrel just below the rear sight. Accepted July 23, 1903.

16,930 (1902). **Breech Mechanism of Ordnance.** M. Darmancier and A. Blizon, France. A system of ordnance breech block mechanism, in which a toothed segment carried by the bracket is adapted to communicate the first part of the movement of the opening lever to the block in order to turn it and to disengage it from the breech. The last part of the lever's movement carries the block out of the breech. Accepted July 30, 1903.

17,045 (1902). **Small-arm Sights.** E. H. D. Lloyd, London. A sighting device for small-arms, in which the front sight consists of a bead-topped folding piece of metal and the rear sight of two parallel thin flat bars carrying at their upper ends two knobs. The front sight bead is viewed through the two back-sight knobs. The sights are designed especially for snap shooting. Accepted July 30, 1903.

18,273 (1902). **Telemeters.** A. Barr, Glasgow, and W. Stroud, Leeds. Improvements in single observer rangefinders of the same general type as those described in patents Nos 9,520, 1888; 13,507, 1893; and 3,172, 1901. The essential feature of the modifications consists in the use of a separating prism at the focal plane in combination with a single objective. Accepted July 16, 1903.

19,303 (1902). **Pneumatic Gun.** J. Picken, Fort William. A pneumatic small-arm, in which, in addition to the air cylinder arranged at the back of the barrel, another is attached to the underside of the barrel. The parts are duplicated, so that when the arm is broken down both cylinder plungers are forced back, and when the trigger is pulled both are released. Accepted July 16, 1903.

19,359 (1902). **Ordnance Sighting.** A. A. Common, Ealing. A method of sighting turret, or such like ordnance, where protection is required for the gunlayer and for the sighting apparatus. A telescope of the type described in patent No. 6,429, 1899, is mounted on a parallel bar frame, pivoted at the centre of its length so as to be capable of vertical and horizontal movements. Accepted July 30, 1903.

19,729 (1902). **Small-arm Mechanism.** L. T. Hamal, Belgium. Cocking mechanism for hammerless guns or pistols, consisting of a lever arranged beneath the trigger guard. When the lever is pressed downwards, the barrels are freed, and continued downward movement cocks the hammers. The parts are few in number. Accepted July 9, 1903.

20,799 (1902). **Targets.** J. B. Ralston, Glasgow. Simple apparatus for operating targets of the type in which while one is in the firing position the other is depressed out of view. The targets are arranged to counterbalance, their ends running through the medium of rollers, upon guide rails fixed to the target supporting standards. Accepted July 30, 1903.

20,840 (1902). **Signalling Apparatus for Ranges.** P. H. Lempiere, I. of W. Apparatus designed for the purpose of

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registering the value of a hit upon the target and its exact position. By means of a clock face situated near the target, the marker indicates the position of the hit; and through the medium of another device, consisting of a series of coloured discs attached to the apparatus, the value of the hit is signalled. Accepted July 23, 1903.

21,711 (1902). **Cartridge Filling Apparatus.** N. Ceipek, Austria. In centrifugal machines for filling cases with a certain amount of powder, a device actuated by centrifugal force is so arranged as to enable predetermined quantities of powder to be delivered to measuring chambers, and from thence to the cartridges. Filling takes place without interruption. Accepted July 30, 1903.

22,184 (1902). **Ordnance.** P. K. Lewes and K. St. G. Kirke. Electrical signalling and controlling apparatus, chiefly designed for artillery purposes. This specification is a Secret Document.

26,031 (1902). **Sighting of Ordnance.** A. Reichwald, London (Agent for *Major T. Ghensa, Roumania*). A sighting attachment for ordnance in which the sighting device proper is so mounted upon the free end of a rod, the other end of which is so pivoted to the gun or cradle, that it is practically vertical when sighting. By means of this arrangement the adjustment of the attachment may be made very rapidly, and a high position obtained for the sighting line. Accepted July 23, 1903.

28,606 (1902). **Cartridge Carriers.** H. L. Watkins, Swansea. A method of carrying cartridges, consisting in pressing each one, mouth downward, into a ring of metal wherein their rims retain them. The rings are attached to a belt, the attachment forming a hinge about which the ring may be turned upwards to receive the cartridge, and downwards out of the way when empty. Accepted July 23, 1903.

7,688 (1903). **Range Finder.** E. Nicholson, U.S.A. A distance or range finder adapted especially for use on marine vessels. A telescope is rotatably mounted upon a graduated base. Through the medium of this telescope, and a knowledge of the distance travelled by the ship between observations, the range of a distant object may be read off a chart correspondingly graduated with the base of the telescope. Accepted July 9, 1903.

9,394 (1903). **Machine Gun.** M. F. Smith, U.S.A. Automatic or semi-automatic mechanism for machine guns in which a number of improvements are embodied. The gas pressure is so regulated that part of it is caused to minimise recoil and so reduce shock, leaving only the necessary amount to actuate the breech parts. A muzzle attachment is intended to complete this neutralization of recoil. The various parts of the mechanism are also of novel construction. Accepted July 23, 1903.

11,428* (1903). **The Peak Single-Trigger Mechanism.** O. H. Peak, U.S.A.

12,579 (1903). **Projectile Carrier.** C. P. E. Schneider, France. A carrier designed for the conveyance of a load over a short distance in a horizontal direction, as for instance, a projectile from the side of a gun to the breech at the return after recoil. It consists of a rocking beam which may be balanced if necessary. Movement is imparted to the beam by hand through the medium of a crank. The projectile-carrying top describes an arc of a circle about the shaft upon which it works. Accepted July 9, 1903.

13,457* (1903). **Manufacture of Smokeless Powder.** P. M. Justice, London (Agent for *The Int. Smokeless Powder and Chemical Co., U.S.A.*).

13,874 (1903). **Armour-Piercing Projectile.** E. M. Johnson, U.S.A. A projectile constructed for use with the cap described in Patent No. 9,869, 1897. The charge cavity is roughly bottle-shaped, the neck part running through the nose of the shell. Additional strength is in this way imparted to the point of the projectile, and experiment has, it is said, proved that this extra material gives additional strength much in excess of what theory would lead one to expect. Accepted July 30, 1903.

14,026 (1903). **Back Sight for Hand Weapons.** O. Murray, London (Agent for *Colt's Patent Firearms Mfg. Co. U.S.A.*).

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

BACK-SIGHT FOR HAND WEAPONS.

14,026 (1903). O. Imray, London (Agent for *Colt's Patent Firearms Mfg. Co., U.S.A.*). A back-sight designed especially for hand weapons of the pistol and revolver classes is described in this patent. Consequent upon the length of the barrel of this type of arm and the short distance between front and rear sights only a minute difference in the elevation of the back-sight creates a great difference in the angle of elevation. The back-sight must therefore be finely adjusted and firmly held in position. The sight we illustrate is so constructed that the firm adjustment shall be easily obtainable, whilst in its various adjusted positions the sight is held securely against accidental movement.

The sight is adapted to work at the top of the frame *a* of revolver just above the hammer *b*, in a semicircular groove. It is situated

Fig. 1

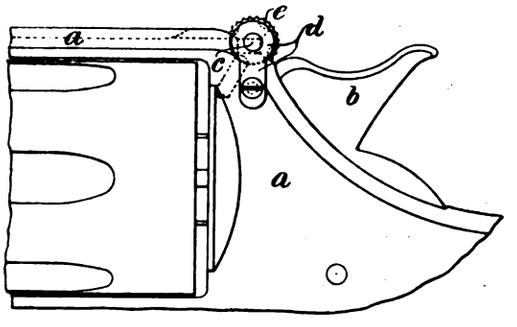
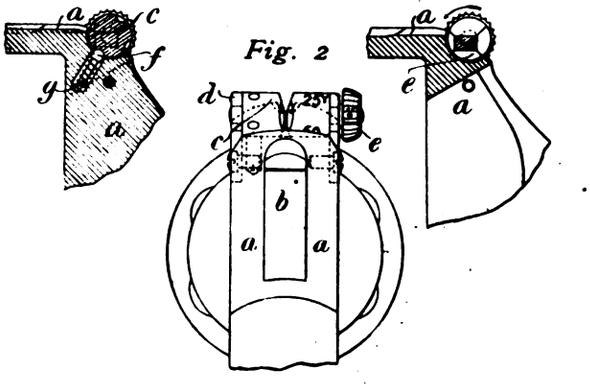


Fig. 2



in the position illustrated in order that it shall be as far away from the front sight as possible, and sufficiently in the rear of the cylinder mortice to avoid weakening the frame. The sight-bar *c* consists of a cylinder at either end of which are trunnions working in bearings formed in the ears *d* projecting upwards from the sides of the frame. One of the trunnions extends through and beyond one of the ears *d*, and fixed thereupon is a small knob *f* by means of which the sight bar *c* is rotated.

The sighting notch in the roll *c* lies in the vertical plane through the axis of the barrel, and consists of a continuous central groove in the periphery of the roll. The bottom and sides of the groove are of varying depths and widths, and from Fig 3 it will be seen to consist of four separate square grooves. The bottoms of these grooves lie at different distances from the axis of the roll *c* and form a parallelogram. Thus every time the roll is given a quarter turn, through the medium of the knob *e*, a different groove is brought uppermost and the sights are adjusted to accord with the range which the grooves are adapted to represent.

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The adjustment of the sight is facilitated by means of the plunger *f* which is forced by its spring *g* into one of the semicircular seats cut in the roll *c*. By this means the rotation of the sight is checked and the roll is held against accidental movement. The range to which the sight is set is indicated by the numerals marked upon each quarter of the roll. It is, of course, obvious that the sight could be constructed with a greater or smaller number of notches, or could be fitted to other types of small-arms. Accepted July 23, 1903.

MANUFACTURE OF SMOKELESS POWDER.

13,457 (1903). P. M. Justice, London (Agent for *The International Smokeless Powder and Chemical Co., U.S.A.*). A method of producing a smokeless explosive, possessing any desired percentage of nitrogen, is explained in this patent. The method consists in dissolving separately nitrated celluloses of different solubility in their appropriate solvents, and combining the solutes thus obtained to form a powder having the desired constituent.

A highly nitrated guncotton, containing above 13 per cent. of nitrogen, indeed, as high a degree of nitration as may be possible approaching the theoretical limit of 14·14 per cent., is dissolved in acetone. A colloid formed in this fashion would be too brittle for practical use, and in order to secure the requisite plasticity and toughness a guncotton of a lower degree of nitration, somewhere below 13 per cent. is dissolved in a mixture of ether-alcohol. Two portions of the nitrated cotton, one containing a high, and the other a moderate percentage of nitrogen are then mixed in any required proportions to secure either a very high, or a moderate content of nitrogen.

To be more exact, a given weight of nitrated cellulose, containing 13·75 per cent. of nitrogen, is dissolved in acetone. Another quantity of nitrated cellulose, containing 12·75 per cent. of nitrogen, is dissolved in ether-alcohol. Suppose it should be desired to produce a smokeless powder with a content of nitrogen of 13·25 per cent, equal portions of these two viscous masses are mixed together. A higher content of nitrogen is thus secured, it is claimed, than has ever before been obtained in a practical way, and a colloid mass is produced which is tough and resistant, and has the valuable properties of the ordinary colloid made by dissolving collodion in ether-alcohol. The proportions of the two constituents may be varied in order to produce a powder of any desired quality for any special purpose.

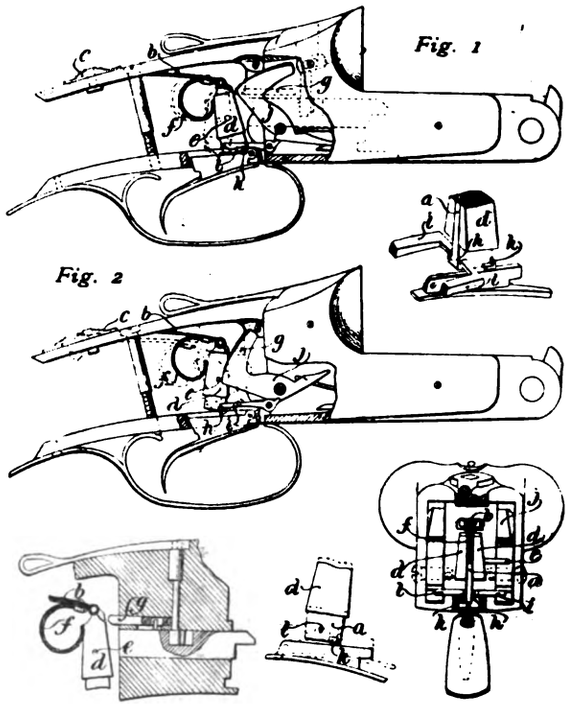
To dissolve a powder formed as has been described, it is necessary to treat the particles successively with different solvents, separating the insoluble portions by centrifugal action. By proceeding in this way it would be possible completely to bring it into solution. Accepted July 16, 1903.

THE PEAK SINGLE-TRIGGER MECHANISM.

11,428 (1903). O. H. Peak, U.S.A. The single-trigger mechanism described in this specification is of the "selective" type. The recoil following the first discharge causes the weighted sear actuator to swing slightly out of position, so that the involuntary pull shall not be the medium of premature second discharge.

The parts in various positions during the operation of firing are illustrated on the annexed drawings. Figs. 1 and 2 represent respectively the positions of the mechanism after the firing of the left-hand barrel, and before the discharge of either. From there it will be understood that the sear actuator *a* (Fig. 3) is pivoted to one end of the flat spring *b*. The other end of the spring *b* is held by the thumbpiece *c*. Attached upon either side of the sear actuator are the weights *d*. The pin *e* passes through these weights and holds them rigidly upon the sear actuator. One end of the pin *e* is extended towards the right-hand lock plate (Fig. 3). The coiled spring *f* tends always to turn the actuator forward upon its pivot.

When the gun is broken down for reloading, the rod *g* is in the well-known manner, caused by the turning of the top lever to force the sear actuator backwards upon its pivot against the pressure of the spring *f*. The position it is caused to assume is that shown in full lines in Fig. 2. The actuator, with its projection *h* situated beneath the right-hand sear tail *i*, is held in this position by the engagement of the hammer *j* with the extended portion of the pin *e*. When the trigger is pulled the right-hand sear nose is lifted out of bent and the hammer *j* drops and discharges the right-hand barrel. The dropping of the hammer releases the sear actuator which is forced forward by the spring *f* until its second sear projection



h is carried beneath the tail of the left-hand sear *l*. The recoil following the first discharge throws the gun back against the shoulder, and during its forward rebound the weighted sear actuator, being suspended, is jerked backwards out of engagement with the left-hand sear tail. The involuntary pull which according to this patent occurs during this rebounding of the gun, is thus rendered inoperative. The weights *d* are so regulated as to allow of the sear actuator effectively overcoming the adverse pressure of the spring *f*.

When is desired just to discharge the left-hand barrel, the thumbpiece *c* is pressed rearwards to the position illustrated in broken lines in Fig. 2. The upper end of the sear actuator is carried backwards, and the foot forwards, the pin *e*, which is held up against the hammer *j* by the spring *f*, forming a pivot. The left-hand barrel is discharged first when the parts are in this position. In order to fire the right-hand barrel immediately afterwards the thumbpiece *c* is pushed forward so that the parts are caused to resume the positions set out in full lines in Fig. 2. The thumbpiece is carried to a position midway between its extreme rearward and forward situations in order to "safe" the parts. This position, in which neither of the sears is engaged by its respective lug *i* and *l*, is illustrated in detail. Accepted July 9, 1903.

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Arms & Explosives

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CONTENTS.

CURRENT TOPICS.

The Pistols Act.—The first month's experience of the working of the Pistols Act has caused mixed feelings among the traders who are affected by its provisions. Those who have decided to abide by a strict interpretation of its various clauses have suffered from the unpleasant experience of seeing much business of a morally legitimate and remunerative nature go by. Their sensitiveness of conscience has been offended somewhat by observing a less thorough carrying out of the provisions of the Act among rival dealers, to whom the responsibilities of the occasion have not yet fully appealed. It is to be hoped that in a very short time the attitude, both of the gun trade and of general dealers in this connection will be sufficiently uniform to ensure equality of treatment to pistol buyers in all parts of the country. Meanwhile, there can be little doubt that until a suitable form of supervision is exercised in regard to all who trade in pistols, differences of procedure will be prevalent, and it cannot but work to the disadvantage of those who observe the strict letter of the regulations.

Government Orders.—In a recent speech of the Kynoch Company's chairman, some bitter things were said concerning the great inconvenience which is suffered by all Government contractors on account of the irregular manner in which Government orders are given out. While we admire the pluck rather than the discretion displayed in thus criticising one's best customer, it cannot be denied that a real and serious grievance is involved in the present mismanaged state of the Government manufacturing operations. Proprietors of private works where large quantities of machinery are used, endeavour to arrange months in advance for a proper succession of work, such as will keep the staff together and in a state of profitable employment. The Government seem to think that this is a factor of the manufacturing problem that can be entirely ignored, both in its own works and in those of the firms to which it issues orders. Immediately on the conclusion of tne South African war it was generally decided that some change would be necessary in the service pattern of rifle to be issued to the troops, and after long delays the new model was finally sealed, and the various works concerned were instructed to push forward preparations for active manufacture. No arrangements were made to avoid an interregnum period, so that the transition from the making of one kind of arm to the making of another would be gradual and of a kind to avoid the dislocation of staff and other arrangements which have taken years to establish.

Unemployed Workmen.—Generally speaking, those members of the working classes who are employed on Govornment work are considered as specially favoured by the terms of their engagement, but judging by results it really looks at the present time as though the Government in its indifference to ordinary commercial practice has caused serious trouble to fall upon those who have given up their lives to the furtherance of its work. No ordinary manufacturer would care to risk the subsequent inconvenience that is involved in a year's idleness due to a change in the model of the staple article of manufacture. As things stand, however, it is an undeniable fact that what practically amounts to a years idleness has been the fate of the ordinary employees of the Enfield, Sparkbrook, B.S.A., and London Small Arms factories. While the tools, fixtures, and gauges for the new model arm are being made, the machine operatives have been thrown out of employment. According to newspaper paragraphs these individuals are described as gunmakers, though in point of actual fact they are a different class of mechanic altogether. That is to say they accept employment with little more mechanical knowledge than is possessed by an ordinary labourer. Each one has learnt to drill a particular kind of hole, to mind a particular class of machine; in fact, to do one or other of the highly specialised processes of machine

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work, which by years of practice they perform with a skill and readiness far beyond what any skilled mechanic could hope to attain except as a result of similarly prolonged attention to one detail.

Alternative Employment.—When these men are out of employment, and trade generally is slack, they cannot turn their hands to other work. We in this country are without a large number of factories performing intricate operations by the aid of special machinery. Otherwise these men would by now be employed in the making of sewing machines, typewriters, or other mechanical apparatus such as may be turned out in large quantities to a pre-determined pattern. Existing conditions are such that these men are thrown entirely out of employment. For a time they seemed to have lived on credit allowed by the local tradesmen, but the latter are in several districts now nearly ruined, so that supplies have stopped. With the winter coming on, and no promise of active work this side of Christmas, the machinists' lot indeed seems hopeless. Homes have been broken up, and the savings of years have been dissipated, and all because ordinary work has been stopped, pending the manufacture of gauges, tools and fixtures for the new pattern of rifle. These facts need only be recorded to show that something must be wrong somewhere. What that something is, and where the blame rests, is an administrative question which we will not attempt to answer. We can only deplore its consequences.

The Supply of Arms to Barbarians.—A curious difficulty is constantly arising in connection with the arms business. Regarding weapons of precision as ordinary merchandise, the manufacturer of these commodities, and for that matter the dealer as well, feels himself perfectly at liberty to obtain orders wherever he can, and naturally to make the greatest possible profit. When, however, trouble arises in any of the barbaric countries which are in a constant state of unrest, the cry goes up that some traitor in the camp has been equipping the native races with arms of greater or less accuracy. The Persian Gulf trade was some years ago the subject of much newspaper writing, the idea being that weapons sent to that quarter ultimately reached the hostile tribes on the Indian frontier, whose insurrection gave so much trouble. Just how far the trade in firearms is to be governed by political considerations is one of the unsettled matters of international politics. For instance, we know at the present moment that Morocco has been purchasing arms in large quantities for many years past. Those of our manufacturers who have profited by their sale will not be blamed because France is the country that must encounter the special difficuties so created. In a similar manner no one has yet blamed the German Government because Mauser rifles were almost exclusively used against us in the South African war. When tens of thousands of arms were constantly reported as having been forwarded to the Boer Government no protest was made, we, simply treating it as a factor in the general situation. Where the great powers are jointly interested, as in China, a general agreement may be arrived at, prohibiting the sale of arms to that country. The general rule seems, therefore, to be that while each nation is perfectly at liberty to supply the enemies of its rivals with firearms, those who supply their own country's potential enemies with munitions of war are guilty of black treachery. Whether the moral blame that is so earned will deter energetic manufacturers and dealers from attempting to sell arms wherever a market can be found is impossible for us to say. Admittedly a large part of this business is carried out under conditions of secrecy that make it very difficult to know who the real culprit is, so much so that the staunchest supporter of a local religious organisation may be putting thousands a year into his pocket as a result of profitable dealing directly or indirectly with barbarian nations across the sea. The main idea seems to consist in not being found out.

Our Lecture on Cartridge Components.—In our lecture this month we have turned away from the more abstruse problems connected with the testing of caps, and have dealt in an ultra-commercial fashion with the materials that go to make up the complete cartridge. We have endeavoured to show that cartridge loading in its more scientific aspects is as much a question of sound commercial methods as of technical exactness in the processes adopted. In giving advice through the colums of a technical and trade journal it is bad policy to concentrate attention upon the scientific aspects of the question while excluding the commercial point of view, which is frequently a dominating factor. Advice as to cartridge loading must take into account the price at which cartridges must be supplied. In just the same way that a wise trader carries on his business by the aid of a proper system of book-keeping, so a loader of cartridges should know to the nearest halfpenny what is the cost price of every hundred rounds of ammunition that he turns out. Some of the difficulties incidental to this process have been cleared up in the accompanying lecture, and it is to be hoped that there are among the young gunmakers who honour these columns with their attention some who will take the lesson to heart.

Trade Prospects.—Just at the present time the gun trade is not in a very optimistic mood concerning the prospects of the current shooting season. The crop of grouse must be pronounced meagre in quantity, and by no means of a high standard as regards quality. The early partridge shooting has fulfilled the anticipations that the unfavourable conditions of the breeding season have had their due effect upon the bags obtained. An undue proportion of old birds has made it quite clear that very few young ones have survived the troubles of their early life. At the present time the partridges so far brought to bag have been shot over dogs, so that there is still hope that when driving commences a more favourable state of affairs will be disclosed. The lateness of the harvest and a number of other conditions have all combined to show things at their worst up to date, and it is, therefore, possible that improved conditions will become manifest later on. Pheasant shooting will of course do a good deal to remedy the stagnation of business which is at present so keenly felt, and although it is quite certain that many owners of shoots have experienced most serious losses, one hears in many quarters that a healthy crop of birds is awaiting the attention of the shooter. No great activity is likely to be experienced until the leaves are off the trees and covert shooting commences in earnest. At the end of October or the beginning of November the time will be ripe for arriving at a definite estimate of the extent to which the current season may be regarded as below the average. There is little doubt that the general experience will be a disappointing one. There is, however, always room for hope that things will not be as bad as they seem.

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THE MARKING OF FOREIGN GUNS.

The Guardians of the Birmingham Proof House met on the 24th ult. for the purpose of effecting a settlement of an important rule governing the marking of guns at proof. The whole of the trade is agreed as to the necessity of some amendment of the regulations now in force. For a long time past it has been apparent that the present methods of marking guns submitted for proof has had a prejudicial effect on the gun trade in this country. So long as British-made guns command a high reputation in the markets of the world, there will be no lack of unscrupulous persons anxious to unload inferior goods under the pretence that they are of our manufacture.

Whatever may be our weakness in other questions of fiscal policy, we are at least committed to the principle that foreign-made goods shall not rank as of British origin if the same can be prevented. Admittedly, we can only deal with manufactured articles that come into this country. Hence we are unable to deal with rival goods that are exported from abroad to colonial and foreign countries where we do business. Another source of weakness arises in connection with articles that are substantially made abroad, but which are finished and marked in this country prior to their sale at home or their dispatch to some distant market. The Customs authorities are bound to insist on the application of a mark denoting foreign origin on all goods entering this country which bear the name or trade-mark of any manufacturer, dealer or trader in the United Kingdom. Finished or partly finished goods bearing no marks at all are passed without special treatment. The subsequent application of British names or marks without any accompanying declaration of foreign origin constitutes an offence under the Merchandise Marks Act, but offences so committed can only be dealt with in respect of proceedings instituted by private persons or corporate bodies.

This is the position of the Merchandise Marks Act so far as it relates to the questions under dispute. It will be seen that the way is quite open for continental manufacturers to send guns to this country for the English proof, and to apply to them any marks or names they think fit when they recieve them back duly proved in all respects the same as if they were of English make. More than this, the way is equally open for English dealers to import foreign guns in a partly finished condition. These may be proved in this country, being afterwards finished and marked as though they were of British manufacture. While the sale of such arms constitutes a punishable offence no action has hitherto been taken thereon. To deal with the fraud so committed, gunmakers as a whole are agreed that the proof marks applied to such guns shall include some distinguishing sign of their foreign origin. The English proof mark is well known to the large majority of gun users throughout the world, and it is esteemed as a sign of British workmanship with all the advantages associated therewith. The fact that the proof regulations have allowed large numbers of foreign guns to pass into use every year bearing this implied warranty of British manufacture, cannot but have had a prejudicial effect on the trade in this country. Hence everyone is agreed as to the necessity for the rule which has just been approved.

However far reaching may be the nature of a reform that is adopted, it seems that there must always be a party of extremists who wish to carry things still further. A small proportion of the working gunsmiths of Birmingham have, through their trade organisation, agitated in addition for the impression of the foreign mark of origin on all guns in which rough tubes of foreign manufacture are used. Associated with them are a limited number of masters, who are makers of barrel tubes. They profess to believe that the amendment they urge will be instrumental in developing the tube-making industry of Birmingham. This might be a laudable enough object, if it were the real one, but while the process of development be proceeding, the gun trade of Birmingham would have to suffer. Against their plea is the fact that for the time being, foreign tubes of reliable quality are much cheaper than those of Birmingham make, while in addition the existing equipment is insufficient to supply the home consumption. It is not, therefore, remarkable that the great majority of the trade is unfavourable to a proposal that would cast a slur on their output in respect to a minor component part that represents a very small proportion of the finished product. If the gunworkers obtained the amendment they demand, the trade could hardly expect to recover from the injury that would be inflicted pending the development of the tube industry. The amendment was consequently thrown out at the meeting of the Guardians by a large majority, and the original proposal was adopted. The agitators threaten to pursue the matter further, stating it as their intention to raise the question before the Secretary of State for War, and to institute proceedings under the Merchandise Marks Act in respect to a gun made from foreign tubes. They may make their minds easy upon both points. The War Office may be expected to exercise its revising powers only in proof questions affecting the safety of users of guns, while as regards the Merchandise Marks Act, well, that is another question. The gunworkers, to win their case, must convince the Court that a gun in which a 15s. pair of foreign tubes has been used is substantially of foreign manufacture.

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SHOOTING LITERATURE.

Interesting matter for thought and speculation may be provided by reviewing the literature of any given specialised subject, with a view to seeing what is its general tendency, and how far it satisfies one's ideas of the ground that should be covered. The father of shooting literature is undoubtedly Colonel Hawker, whose knowledge of practical shooting, and the accessories used therein, has never been equalled by any subsequent writer. Others who have followed his splendid lead have tackled individual parts of the problem with a good deal of success.

Among present day writers who have recorded their experiences in book form, Sir Ralph Payne-Gallwey undoubtedly take a foremost position. His "Letters to Young Shooters," published in three volumes, display a varied and comprehensive knowledge of the different classes of game met with in this country, and the sporting methods by which they are brought to bag. His knowledge of game species is considerable, and he possesses the rare faculty of being equally as familiar with the numerous species of wildfowl that frequent our coasts, as with the more artificially nurtured birds that are reared inland under the intelligent care of keepers. The young shooter who desires to obtain a sportsman's knowledge of his subject cannot do better than make Sir Ralph Payne-Gallwey his guide and mentor. The same author may be read with great advantage in the shooting volumes of the Badminton Library, where again his extensive knowledge and distinctly superior power of expressing his ideas will afford pleasure and profit to the careful reader. On technical subjects, however, the worthy baronet cannot be said to have made an equally favourable impression. He has a sportsman's knowledge of the weapon he uses, but where his writings have covered the more technical ground, his dependence upon second-hand information is very evident, his want of knowledge and lack of appreciation of facts as they exist, being shown in many places.

Among the sportsmen who have communicated their thoughts on shooting purely as a sport, Lord Walsingham and Mr. Archibald Stuart-Wortley stand prominent. The first is renowned as a splendid shot and a thoroughly practical exponent of the subject on which he writes, while the second brings an artistic mind of great literary polish to bear on the problems which he discusses with so much enthusiasm and practical knowledge. In the fur, feather and fin series he has taken a leading part in preparing the volumes that deal with the pheasant, the grouse and the partridge. In the pursuit of each of these classes of game he is an adept and keen observer, so that while the information he gives, is not of an exhaustively encyclopædic character, the impression left on the mind of the reader is that he has learnt to share the author's enthusiasm for the life history of the game as distinguished from the more physical process of doing justice to the shots that are presented as a result of the organising skill of the keeper.

While the authors so far enumerated may be said to belong to the cream of our sportsmen, there are many others of humbler position who have an equal amount of keenness in the use of the gun, but who have not enjoyed the same advantages of seeing and participating in the higher development of the sport. Numerous small handbooks by writers of this description are frequently sent out by our leading publishing houses. Many of them no doubt make pleasant reading, but they are not of the grade that enables them to rank as authoritative expositions of the subject matter covered. Their life is ephemeral, and they do not display the all-round grasp of the subject that justifies keeping them always ready at hand for reference purposes.

Of course in a brief survey of this character it is impossible to do justice to the many incidental branches of shooting that are dealt with by individuals who have made a single subject the material for expert enquiry and research. For instance, books on the rabbit cover some very useful and practical ground. Mr. J. E. Harting's volume in the fur and feather series contains a most exhaustive exposition, not only of the natural history and shooting of the rabbit, but also as to the complex legal technicalities that surround the question as to the conditions under which it may be shot. While the book goes into a large number of special questions, it leaves Mr. J. Simpson's volume on the wild rabbit almost a clear field. The latter author deals with the rabbit from a farming point of view, his statistics, based on practical experience, showing the conditions under which rabbits may be bred on the warren system, either with the object of putting them on the market, turning them out for shooting, or a combination of the two. Modern facilities for book production, and the large number of persons who have the necessary power of literary expression, have led to the creation of a great many works, excellent in themselves, but of secondary importance. To specify anything like the full number of these volumes would entail the filling of a large amount of space, even granting the capacity of the present writer to do justice to such a large subject.

While a general verdict as to the status of shooting literature of the present day must admit that the sporting and natural history sides of the question are thoroughly well treated as a whole, the same cannot be said of the more technical aspects of the subject. Major Fremantle's "Book of the Rifle" certainly represents a very fine piece of work. Not only has he a large amount of practical information derived from his own personal observations and experience, but in addition to this he has the quite exceptional gift of presenting a large amount of useful instruction in a clear and comprehensive form. This he has derived from a variety of sources, disjointed in themselves, but which he has been able to harmonise in a thoroughly well ordered arrangement. When, however, we turn to the technical side of shot-gun shooting with all the multifarious developments of late years as regards mechanism, construction of barrels, and all that goes to make up the familiar sporting cartridge, we find that no author has of late years been plucky enough to endeavour to set out a really comprehensive account of all these things.

What the late Dr. Walsh did twenty or more years ago, no one has had the energy or experience to bring up to date. The hundreds of new developments that have since arisen, and the many ideas then current which have since been abandoned or modified, means that the reading of his book in the present era must be supplemented by a thoroughly complete knowledge of the present day ideas as derived from the hundred and one fragmentary pieces of work, through the medium of which the more recent developments have been made known to the reading public.

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FISCAL POLICY AND PATENT REGULATIONS.

The question of the hour is undoubtedly the fiscal policy of Mr. Chamberlain, and all that it brings in its train. With whatever department of business a man may be connected, the question must necessarily rank as one of urgent importance. Whether or not the working class population of this country will be won over to the view that a tax on food products is a necessary essential to the establishment of mutual trade relations with our colonies it is impossible to say at the present moment. Meanwhile, most practical business men seem to be in agreement as to the necessity for some kind of protective policy whereby we in this country will be placed in a position to secure more favourable treatment than is at present accorded to us. The American market, for instance, was at one time a most useful source of profit to many of our gun manufacturers, but the prohibitive duties that have been established have practically extinguished a trade that was satisfactory to all concerned. While, therefore, we in this country have been yearly increasing our purchases of firearms from the United States, the wall of protection that surrounds that country has prevented the making of many sales that would have been effected had the import tariff against our goods been less severe.

The question as a whole is far too complicated for detailed discussion in these columns; but the fact remains that until such time as a change of some kind can be made we must see a large proportion of legitimate trade, both for abroad and to satisfy the home demand, go to rivals who fix their own prices in their own country and dump into ours the surplus products that keep their establishments in a state of active work. As things stand at present it is impossible for English makers to recoup themselves for the business lost by supplying a greater proportion of the home and colonial demand. As a manufacturing nation the skill and intelligence of our working classes is considerable. Although it is the fashion to decry the intelligence and enterprise of our manufacturers, be they masters or men, the fact remains that we have within us the capacity to do good work under favourable conditions. This fact is most conclusively proved by the results obtained in thoroughly well-equipped factories which have been established in this country under the auspices of American enterprise. To mention only the Westinghouse and Thompson-Houston Companies is to quote instances where, upon practical trial, it has been found that while the grade of quality is undoubtedly as high as the best that America can show, the actual cost of production is materially cheaper than that of the same goods made in America.

One of the reasons why these companies succeed, where many of our home manufacturers fail, is that their business monopoly is protected by comprehensive patent rights. As a general rule the English patent law discourages, or at any rate fails to encourage, the establishment of factories in the United Kingdom. The original idea of a patent was to encourage invention by granting to the original thinker the benefit of his new ideas for a period that would enable him to gain a suitable reward. Reciprocity arrangements with foreign nations made it necessary for us to grant the same privileges to patentees whose inventions were communicated from abroad. The effect of the present working of the Patent Act is that we voluntarily bar ourselves from manufacturing goods in this country which are covered by foreign patents. This in itself does not constitute an injustice, though indirectly we get the worst of the bargain. The English inventor who takes out patents abroad as well as in this country cannot as a rule supply the foreign demand from an English factory. In Germany, the patent becomes void unless it is worked in that country within a reasonable period. In America, the tariff regulations make any kind of export trade almost impossible. Thus it happens that, while we protect foreign inventions and give the articles manufactured thereunder free entry into this country, the sole benefit we can derive from foreign patents taken out by Englishmen is their sale outright or the collection of a royalty.

An interesting example of the curious inter-working of our patent regulations will illustrate the argument. A well-known automatic type-setting machine obtained a great vogue in this country some years ago. An improved machine of great merit was subsequently introduced, and the owners of the then existing machine purchased the patent rights of the improved apparatus both for Great Britain and Germany. The English concern absolutely refused to allow the improved arrangement to be used in this country, whereas in Germany it enjoyed a very large sale. As a result, German printers have been able by the use of the new apparatus to compete with British firms, with the result that a large proportion of the book printing industry of this country has passed to the Continent. Typewriters, cash registers, sewing machines, and dozens of other pieces of complicated apparatus which are bought in large quantities for use in this country are almost entirely made abroad, the consequence being that our mechanics are deprived of the advantages that would follow from the experience gained in high-class machine work, while the country as a whole suffers from the resulting loss of employment.

Strong measures are necessarily required to upset arrangements of this kind, which have enjoyed the sanction of long continued use, and around which vested interests have grown. The one saving factor of the situation is that the strongest personality in the country has thrown down the gauntlet in favour of reform. When once the party of reform is solidly established as a strong organisation, it is possible that the many abuses which have grown up around our present methods of working will be ventilated in a manner that will offer a promise of some reasonable measure of reform. At the present time our business organisation takes it too much for granted that trade will flourish under conditions worse even than actual neglect. This is to say that many of the regulations which affect our commerce seem to be inspired more by the desire to benefit our rivals than to give us reasonable opportunities to apply our energies in the best possible manner, and obtain the highest price for the fruits of our enterprise. The prosperity of the working classes is wrapped up in that of the masters, so that, by advocating a policy that will benefit the one, the other is included by the natural working of the laws of supply and demand.

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A GUNMAKER'S CUSTOMERS.

Upon those who shoot, or intend doing so, a gunmaker's business depends; and his success in money-making largely rests upon his ability to please his customers in satisfactorily supplying their requirements. It is not out of place, therefore, in these columns to devote some attention to the various kinds of people with whom gunmakers are brought into contact in a business way, and to endeavour to describe them and their ways and necessities as shortly as may be.

Shooters as a body may be divided into three classes. First we have those who shoot game every autumn and take out game licences for the whole shooting season; secondly, there are the holders of gun but not of game licences; and thirdly, the large class of Volunteers and rifle-club members who do not require to hold licenses at all. These three classes, embracing all who shoot, might each be still further divided if it were desirable, but we think the division given is sufficiently distinct to enable us to carry our readers along in a few practical remarks under each head of the three given above.

There can be no question that game-shooters form by far the largest proportion of the names on the books of any gunmaker, and contribute the largest proportion of his profits, whether his income is derived from a London or a provincial business. Though varying in number from year to year, the Inland Revenue returns tell us that the fluctuations embrace a well-maintained average. Their general trend, however, is towards a general increase beyond the seventy thousand sportsmen, a number which may be described as the present limit of those annually taking out licences to shoot game. Among them, of course, are many of the wealthiest men in the Kingdom, including most of the nobility, from dukes to baronets. They regard their gunmaker very much as the business man regards his lawyer, generation after generation coming to deal with the same maker of guns, much inattention being required on the part of the latter to break the tie. In return for the attention given to their requirements they take care to recommend their gunmaker to their immediate circle of friends, and they like to hear that their recommendation has been acted on and the result appreciated. Their orders, too, are not usually confined to sporting weapons only for their own use. They make presents of guns to their relations and friends, realizing that no gift can be more acceptable to a sportsman than a fine pair of guns. But though lavish it may be in large orders, they are very often extremely exacting and particular in small matters. They may take delight in haggling over a sixpence in some trifling purchase that comes directly under their notice, while they are careless of cost in the carrying out of more substantial orders. It is politic on the part of the gunmakers to humour them as far as possible in their demands, and so allow them the pleasure of saving their sixpences if they want to do so. Their accounts on the whole are the most profitable on a gunmaker's books, and their influence continually being exerted towards the increase of his clientele.

While our nobility are born sportsmen, and grudge no outlay devoted to sport so long as the result is good, an almost equally desirable class of customer for the gunmaker in these days is the wealthy commercial magnate, who has made his own fortune, or whose father has created a large business, returning a huge annual income. Men of this class also order largely at times, and on the whole are among the gunmaker's best customers, though their sporting acquaintances and friends may be by comparison insignificant. They are not accustomed to receive such attention as the nobility expect, and they are all the more grateful when they receive it. Few of them are judges of sporting fire-arms, and they simply rely on the reputation of the gunmaker for receipt of value for their money. Four out of six want the best of everything in guns and ammunition, and they are willing to pay the usual prices without demur, the remainder probably regard any money saved on shooting requisites as money made, this because they are not fond at heart of shooting, and, seeing little difference between a twenty and a sixty-guinea gun, they regard the difference in the two prices as money thrown away. The very wealthy man is apt to go to the extreme, either in lavishness or stinginess in his dealings, and his gunmaker has to act accordingly, keeping always in view the fact that with increased knowledge the man who at the outset fails to appreciate good work may ultimately become a better customer, so that his account, if small at the start, is at least a safe one, with every chance of improving as time goes on.

These are types only of a few of a good gunmaker's customers, but it is not by them that the gun trade of Britain is mainly supported. The support comes chiefly from the well-to-do middle classes, now every year taking to shooting in increasing numbers. They at least take out gun licences to the number of say three hundred thousand, with, perhaps, another three hundred thousand gun users of various sorts scattered all over the globe, who do not require to pay licence duty for their sporting weapons. To home shooters, wild-fowling and rabbiting, with perhaps a fortnight's licence in the partridge season, affords sport enough, and so large are their numbers that their demand for guns at prices varying from £10 to £40 runs into heavy figures, much larger in the aggregate than the shooting outlay of the upper ten.

For every high-priced gun ordered there are, we should say, more than a score of the cheaper grades sold, while the Colonial demand again is mainly for the latter class of sporting weapon. The gunmaker, therefore, is wise who attends with as much care to the demands of those who cannot afford the best of guns and ammunition as to the richer sportsmen content with nothing less.

In conclusion, we would point out that the dealings in business of every gunmaker are pleasanter as a rule than those of many another trader, who may have to study a very different class of men as well as women. Shooters as a whole are drawn from the best classes, and are themselves, we take leave to think, of the best to be found in each of these classes. When a gunmaker is himself somewhat of a sportsman, his day's work in his establishment should be a daily pleasure to him. The more he can feel it to be so, and show that feeling to his customers who come in contact with him personally, the more likely is he to succeed in increasing his business year after year.

We understand that our contemporary the "County Gentleman" will on the 3rd inst. bring out an issue with several more pages in it, but of reduced size. The idea being to make the paper more easy to handle.

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THE DISPUTED PROOF RULE.

IMPORTANT MEETING IN BIRMINGHAM.

An extraordinary meeting of the Guardians of the Birmingham Proof House took place on the 24th ult., at the Proof House, under the presidency of Mr. W. H. Ward. Amongst others present were Messrs. C. G. Bonehill, W. L. Powell, W. P. Jones, and Enos James, and the City Council representatives, Messrs. Middleton, Kelly, and Fallows. The proceedings were private, a proposal to admit the representatives of the press being defeated.

The controversy is one that has excited a great deal of interest among the members of the trade; indeed, it is many years since a question has arisen that has been so widely and extensively debated, and on which such a wide difference of opinion existed. The proposal to apply a distinctive mark to foreign small arms so that the country of origin might be shown emanated from the Proof House Guardians themselves, who chose this method of preventing the unfair competition of the Belgians, who by getting their guns proved in England, managed to convey the impression that the guns were entirely British made.

In July last, a resolution providing for the imposition of this distinctive mark on small arms submitted for definitive proof was brought before the meeting of the Guardians, but a section of those present desired to go a step further, and suggested the marking with the place of origin of the barrels imported from Belgium, and submitted for provisional proof. Dropping the trade phraseology, the effect of the two proposals may thus be stated: The original resolution would have secured that all finished articles, such as barrels with locks, or complete guns, would, when finally proved, bear, in addition to the ordinary proof mark, a word or sign that would indicate that it was of foreign manufacture. The amendment would have applied the same additional mark to whatever material was obtained from abroad, no matter what was the amount of British labour afterwards bestowed upon it.

The matter was deemed so important that it was decided to take the opinion of the trade on it, and for this purpose, circulars were sent out to all persons interested with a view to a general expression of opinion being obtained in anticipation of the meeting. The replies showed that a considerable difference existed on the subject. The trade generally were in favour of the original proposition of the Guardians, but in many quarters the proposal to mark the barrel as embodied in the amendment was received with great disfavour. A large number of barrels in the rough state are yearly imported from Belgium, and it was urged that to place any restriction whatever on the use of those barrels would involve serious inconvenience and loss to the trade.

It was further contended that such barrels being in the rough were entitled to be classed as "raw material" and treated accordingly. Other arguments brought forward were that the restriction of the importation of Belgian barrels would tend to the creation of a monopoly locally, and that the Belgian mark on the barrel would be likely to convey the impression that the whole of the gun had been manufactured abroad. The supporters of the amendment in favour of marking the imported barrels urged, on the other hand, that the effect would be to encourage home industries, to revive the barrel trade in Birmingham, and to secure honest trading. The controversy has grown stronger as time progressed.

On August 26, the National Sporting and Military Gun Workers' Union called a meeting and passed a resolution condemning the practice of marking foreigh guns or parts thereof with English Proof marks as an immoral and deceptive method of trading, and calling upon the Proof House Guardians so to amend their rules and regulations as to make it imperative that all small arms or barrels should be stamped in such a way as would set forth their place of origin.

The proceedings at the meeting of the Proof House Guardians were of a very protracted character, but in the end the amendment in favour of the marking of barrels was defeated, and the original resolution with some slight modifications was adopted by a large majority. The resolution reads as follows:—"Every imported small arm of foreign "manufacture, and every barrel with actions fitted thereto, "submitted for definitive proof which does not bear the full "name and address of the maker impressed thereon shall be "accompanied by a declaration in writing stating the name of "the country in which the same has been manufactured. Every "such small arm and every barrel with action fitted thereto "shall have impressed thereon, in addition to the proof marks "applicable thereto under any of the foregoing rules, a word "or words indicating that it is foreign made." The following defining resolution was also carried, on the proposition of Councillor Middleton: "For the purpose of these rules and "regulations, the words 'Small arms of foreign manufacture' "shall mean any action or barrels attached thereto or any "barrels united, soldered, or brazed together, or any single "barrel in any stage or condition of manufacture other than in "the tube state that is imported from any foreign country." It is understood that it is scarcely likely that the matter can yet be regarded as finally settled, inasmuch as certain interested persons have intimated their intention of testing the legality of the present system from the point of view of the Merchandise Marks Act. Nor will the decision prevent the appeal to the War Office and the Board of Trade on which the workmen a few weeks ago decided.

A number of communications were received by the Proof House Guardians, and amongst them was one from Mr. Charles Gardner, of St. Saviour's Road, Saltley, who referred to the resolution passed at the National Sporting and Military Gun Workers' Union and claimed that inasmuch as the society only numbered about 130 members, nearly a quarter of whom did not reside in Birmingham, it did not represent the general body of gunworkers even in Birmingham, to say nothing of those engaged in London and the provincial trade. He also pointed out that a large body of workmen, numbering over 600, had shown their disapproval of the views contained in the resolution passed at the society's meeting, by signing a petition favouring the resolution set forth by the Guardians. The petition, a copy of which was forwarded to the Guardians, declared that the amendment in favour of stamping rough tubes or barrels imported from any foreign country whatsoever with the name of the country of origin was impracticable, and that the result would be that considerable injury would be inflicted upon the gunworkers through stoppage of trade —*Birmingham Post.*

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ROUND THE TRADE

Mr. W. E. Dunmore, of 33, Gerrard Street, Soho, will shortly put up for sale a number of guns by different makers. Catalogues may be had on application.

The Winchester Arms Company has lately issued a ·405 calibre high velocity smokeless sporting cartridge, which is a proof that for once in a way the English trade scored a lead over this class of ammunition.

A petition for the winding up of *Land and Water* in bankruptcy has recently been presented by a firm of paper makers. So far as we know at the present time no arrangement as to the paper's future has been made.

Mr. H. A. Thiersch, late assistant to Dr. Dupré, has recently severed his connection with the Safety Explosives, Ld., we feel sure, however, that his merits as a chemist and experimentalist in explosives will not long go unrecognised.

The directors of the National Explosives Co., Ld., have declared an interim dividend of the rate of six per cent. per annum on the preference shares, and five per cent. per annum on the ordinary shares for the half year ended 30th June last.

Accompanying the last number of the *Journal of the United States Artillery* is a separate volume which embodies an index of authors, showing the contributions for which they have been responsible since the establishment of the journal in the year 1892 up to date.

The annual outing of the employees of the firm of Messrs. Boss & Co. took place on the 12th ult. The party left for Hastings on Saturday and the 83rd annual dinner of the firm was held the same day. A very pleasant time was spent. The following evening they returned to London.

The *Dundee Courier* announces that the government authorities have stepped in and prohibited the further use of Broughty Castle as storage accommodation for Dundee's supply of gunpowder, the objection to its continued use for that purpose being that various officials and their families live there.

Mr. Frank Murray, chairman of the Webley-Lebeau-Courally Continental Fire Arms Co., Ld., of Liège, informs us that the Company has opened a London depôt at 1 Lower James Street, Golden Square, where a selection of guns and revolvers will shortly be on view under the charge of Mr. John Wikes.

Last month's number of the *Journal of the United Service Institution* contained a reprint of the lecture delivered by Major-General Luard, Chairman of the Society of Working Men's Rifle Clubs, in June last. In it he discusses a number of interesting questions connected with the development of miniature rifle shooting as a winter evening pursuit.

The Kynoch catalogue for the current season has just reached us. A feature is naturally made of the firm's specialities in loaded cartridges, viz., the Opex, Kynoid, and Bonax. Very full ballistic particulars are given of the various specialities in rifle cartridges, including the new tropical ammunition for giving low pressures in hot climates.

The Schultze Gunpowder Co., Ld., have issued a striking show-card, the main feature of which is a spirited representation of a partridge in full flight, with a sportsman in the background paying it the compliment of shooting at it with "Schultze, the oldest and best smokeless powder." The card is round, which facilitates its dispatch in powder cylinders.

Recently we came across some 2½-inch sporting cartridges, loaded with from 50 to 52 grains of a smokeless powder for which 42 grains was the proper charge. We wonder how long it will be before such outrages on the sportsman will continue. If these things go on in the country districts, factory loading will become more and more a testimonial and less of a slur upon a cartridge.

An advertisement recently appeared in a contemporary in which one shilling was asked for a secret by which success in game shooting could be guaranteed. Upon paying the shilling, a friend of ours was told that the advertiser's secret consisted in the use of No. 8 shot. We present it to our readers free of charge. We are competent to do this as we believe the idea is not covered by patent rights.

A copy of the new Marlin catalogue has been sent to this office for notice. Apart from the many well-known models of Marlin rifles that are in use among sportsmen, the Marlin repeating shot gun receives special notice, the Company making a particular feature of the 16-bore model of this arm, which has lately been introduced. The book contains 128 pages, many of them being of great general interest to riflemen.

Messrs. J. and W. Tolley advertise that they notice that many guns bearing their name are being offered for sale that are not proved for nitro high velocity smokeless powders, and they invite intending purchasers to send for their catalogue of new weapons that have been so proved. It would be interesting to know the names of these nitro high velocity smokeless powders for guns, as we are not aware, speaking from a fairly extensive experience, of any sporting nitro compound that is standardized to give a higher velocity than that of ordinary black powder.

The usual bankruptcy notice has been issued with reference to the affairs of Mr. H. W. Gabbett Fairfax. The cause of failure is attributed to delays incidental to obtaining order of assurance from H.M. War Department, leading to the seizure of the patents by the mortgagees. The statement of affairs seems to show that the debtor mainly carried on his experiments with the aid of borrowed money, and no practical results were forthcoming. The losses incurred are mainly attributed to the difference between the amount at which the patents were formerly valued and the sum for which they were mortgaged.

The report of the directors of Armstrong, Whitworth & Co. for the year ended June 30th last, states that after deducting depreciation and adding £92,449 from last year's accounts, there remains a profit of £578,470 with the interim dividend already distributed and the usual payments on the preference shares, a 33% dividend on the ordinary shares brings the total appropriation to £496,894, leaving £81,576 to be carried forward. The directors refer with regret to their losses by death during the past year of Mr. G. W. Rendel, Mr. H. O. Rendel and Mr. C. W. Mitchell. They have appointed Mr. Henry N. Gladstone to a seat on the board.

The Wilkinson Sword Company recently invited us to inspect an underground range for the shooting of revolvers which they have constructed in the basement of their new building in Pall Mall. The shooting is done through a tube, perfectly ventilated by electric fans, the firing point being lined with felt to deaden the concussion. The target is brightly illuminated so as to afford a perfect definition of the sights. Altogether we must congratulate the Company, and in particular its managing director, Mr. J. T. Musgrave, upon the energy displayed. In fact, we believe this to be the only place in London where a revolver may not only be purchased, but tried before delivery at a practical distance.

The annual report of the Birmingham Small Arms Co., Ld., shows a trading profit of £62,722, which, with interest on investments, £2,474, and the amount brought forward, £3,990, makes £69,186. The directors recommend a further dividend on the ordinary shares of 5 per cent. (making 10 per cent. for the year), together with a bonus of 5s. per share, tax free, and on the preference shares of 2½ per cent., making 5 per cent. They further recommend that £10,000 be carried to the reserve fund, which will then stand at £35,000. This will leave £3,898 to be carried forward. The gun department was well employed during the first half of the year, but practically little or nothing has been done for the last few months, owing to the important alterations now in progress in machinery and plant required for the manufacture of the new Government rifle, contracts for which have been placed with the company on satisfactory terms. These alterations are so extensive as to involve almost a complete reorganisation of this department, as well as the purchase of a considerable quantity of extra machinery.

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LECTURES TO YOUNG GUNMAKERS.

XXIII.—CARTRIDGE LOADING COMPONENTS.

Although many of the lectures which have been given under this heading have dealt with various individual features of cartridge loading, no attempt has been made to deal with the subject of components within the compass of a single chapter. Cartridge loading is probably the subject above all others upon which the retail gunmaker is most anxious to maintain a front position, not only as regards quality, but also with a view to ensuring the most satisfactory possible commercial results at a time when the cost of raw materials and the price received for the finished product leave a very small margin to cover general expenses and profit on turnover. First and foremost the purchase of raw materials must receive attention. These include cartridge cases, powder, wadding and shot. As regards cartridge cases, the most desirable policy that can be pursued is to select one or more grades of cartridge case and place the season's order with one or other of the manufacturers on the best terms available, it being important above all things to ensure that the name of the gunmaker shall be distinctly printed on the tubes of all cartridge cases filled in his loading department.

The purchase of powder is a matter in which the individual gunmaker will find a great opening for the exercise of discretion and forethought. In the first place it is undesirable on many grounds to identify one's business too closely with the sale of any given powder, because its recommendation to customers is apt to be unduly influenced by existing commercial arrangements. Should these at any time be modified, it becomes necessary to tell a fresh story in order to justify the needful change of front. If on the other hand the gunmaker loads specified powders only to the order of his customers, he is in a position to use for his general loading the selected nitros which best suit his class of business. He need not specify, either on the cartridge or on the wadding, the name of the powder used for the general bulk of his trade, this being one of the points in which he should reserve the liberty to act according to his view as to what is best. So as to grasp in a thoroughly practical manner the commercial aspects of the numerous powders which he is invited to purchase by the various manufacturers, he should compile a table that will show him the exact relative cost of the competing nitros. The following table contains particulars of five powders which we have termed A, B, C, D and E:—

	Charge grs.	Cost per Pound.	Weight of Powder per 100 Cartridges			Cost of Powder per 100 Carts.
			in Grains.	in Pounds.	in Ounces.	
		s. d.				s. d.
Powder A	42	3 6	4200	·600	9·60	2 1½
,, B	42	2 7½	4200	·600	9·60	1 6½
,, C	33	4 8	3300	·471	7·54	2 2⅜
,, D	36	4 8	3600	·514	8·22	2 4⅛
,, E	27	3 8	2700	·385	6·17	1 5

In the second column the standard charge for a 12-bore sporting cartridge has been set down. The first two powders require the standard 42-grain charges for the 12-bore load. The third powder is of the 33-grain type, which means that a reduced charge is used for producing the same result. Powder D is the same as powder C, but account has been taken of the fact that with this class of nitro an increased charge is sometimes recommended for certain work, this affecting the values given in the other columns of the table. The powder which we have designated by the initial E, requires a 27-grain charge. In the adjoining column the net cost per pound at the most favourable rates of purchase is specified. So as to arrive at the cost of filling cartridges with a specified powder sold at a particular price, it is necessary to set down the weight of powder required for loading a round number of cartridges. In the present table, a batch of one hundred cartridges has been selected as the basis for the calculation. In the next column of the table, therefore, the weight of powder to load 100 cartridges has been shown in three alternative measures, that is in grains, in pounds and in ounces. It is quite obvious that if one cartridge contains 42 grains, one hundred cartridges will contain 4,200 grains. As 7,000 grains go to the pound, it is necessary to divide 4,200 by 7,000 in order to arrive at the weight in pounds of the powder required for loading one hundred cartridges. The answer is ·6 of a pound for powders A and B, it being more convenient to adopt the decimal system for this purpose than ordinary fractions. The equivalent in ounces of ·6 of pound is obtained by multiplying by sixteen, so that we find that 5,200 grains equals ·6 lb., or 9·6 oz. Having these figures before us, it is a question of simple arithmetic to find out the exact cost of the powder that is contained in 100 cartridges.

A 42-grain powder costing 3s. 6d. per pound., viz. 42 pence, will work out at 2s. 1¼d. per hundred cartridges filled, this figure being obtained by multiplying forty-two pence by ·6, the answer being 25·2 pence, in other words as nearly as possible the figure given in the table. While this represents the price for loading one hundred cartridges with a powder of ordinary price, it must be remembered that there are alternative powders of the same class which cost less money per pound. B powder is an example of this class, and the price per hundred works out at 1s. 6½d. Coming now to powders, of which C is a typical sample, we find that while the price per pound is one-third more, the cost of powdering one hundred cartridges is only 1¼d. in excess of the amount worked out for the A powder. Powder D represents identically the same nitro as C, but as it frequently happens that a 36-grain charge is recommended as a satisfactory measure of powder to go with a reduced charge of shot, it is necessary for the loader to appreciate the influence on his prices of the extra nine per cent. of powder so required. The calculation shows that the extra cost of powder in instances of this kind will amount to 2½d. per hundred, which must, of course, be considered in all exact calculations of cost.

Powder E is taken as an example of a very cheap condensed powder. It is not cheap on the basis of the price per pound, but only by virtue of its price in combination with the fact that the standard 12-bore charge is 27 grains. Thus it happens that with this powder the cost per hundred cartridges works out at 1s. 5d. Further discussion of the above table is unnecessary, since it has, at least, been made quite clear that one of the essential principles of commercial cartridge loading is to work out the cost of materials in a systematic fashion, the model presented certainly having the merit of showing how this requirement may best be satisfied in the case of smokeless powders used for sporting cartridges.

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In dealing with wadding it is extremely necessary that efficiency should be studied as well as cost. Theoretically it is desirable that the best possible quality of materials should be used throughout. Commercially, this is not always possible. Hence it is necessary to endeavour when using second-qualities of wadding to reproduce, as far as possible, the conditions observed when everything is of the best. It very frequently happens that gunmakers endeavour to utilise various fancy forms of wadding that have no justification to claims for superior qualities. It may, for instance, be taken as an axiom that no economy can be exercised in the selection of card wads. The "Field" system of loading has shown that two simple one-twelfth of an inch white cards on either side of the felt will satisfy all needful requirements. These can be purchased at the cheapest prices, and as they have the advantage of getting rid of the complications incidental to the use of so-called "Field" card wad, they avoid the waste of time incidental to the supposed necessity to insert it in the case a given way upwards. Whether, therefore, the cartridges are of the best or the cheapest quality, no change, whatsoever, need be made in regard to the card wads on either side of the felt.

The over-shot wad may be selected and arranged according to the fancy of the gunmaker. It is usual to print on the top face the name of the loader, to which is generally added the size of shot inserted. In many cases the name of the powder also appears. Most well-established cartridge loaders are in the habit of ordering top wads printed according to the needs of their business. In our opinion, existing systems of recording the contents of the cartridge fail in one serious particular. That is in omitting to mention the charge of shot employed. Our advice in such a connection would be to print on the top wad the name of the gunmaker and the size *and charge* of shot, this giving the needful information to the sportsman, and serving to remind the loading staff of their responsibility in connection with the proper adjustment of shot charges. The powder used might be expressed by the colour of the paper employed for the top wad, this being a very suitable means of differentiating between the cartridges without introducing the necessity for informing one's customers of the powder they are using. So much depends upon the skill with which the contents of a cartridge are made up, that it is desirable for the loader to take full credit to himself for the results that are obtained. Beyond the fact that the top wads should be as nearly as possible one-sixteenth of an inch thick and of the same diameter as the other cards wads, no special instructions need be given concerning them.

Coming now to the felt wadding, this is a department of loading where the most rigorous care is necessary to ensure the best results. The highest quality of felt wad is now made of medium hardness for most of the powders that are offered for the use of sportsmen. If a powder is correctly bulked, the ordinary standard thicknesses of felt wadding, as recommended in the "Field" system of loading, will produce a thoroughly firm and well-put-together cartridge. If on the other hand the powder supplied is deficient in bulk or in hardness of grain, it is possible that an extra one-sixteenth of an inch thickness of felt will be necessary in order to ensure a thoroughly firm cartridge. The numerous varieties of felt wadding that are offered for sale in this country must necessarily perplex the cartridge loader who desires to do the best possible for his customers, at the same time not running up the cost too high. Since felt wads are sold by weight it is exceedingly important to find out how many cartridges can be wadded with a given weight of felt. Since grease is cheaper than felt, it is desirable that the gunmaker should, in examining samples of wadding, dissolve the grease and so get at the proportionate weights of the wool and the lubricating mixture. If a felt wad is shaken up in a small bottle of benzine or other suitable spirit, the grease is soon dissolved. By squeezing it in a vice between sheets of blotting paper, it can be dried almost immediately. It is hardly possible in the compass of this lecture to specify exactly the whole of the tests that must be applied in the selection of felt wads. Suffice it, therefore, to say at this point that under no circumstances should wadding be used which is either harder or softer than the standard quality of the best felt, and that under no circumstances should the felt be entirely replaced by cheap substitutes, such as feltine. If cost must be cut very fine, a quarter-inch brown felt may be used, the additional space being filled with a feltine wad of appropriate thickness, this being in our opinion preferable to displacing either of the card wads by the use of an extra thickness of feltine.

As regards the selection of shot for cartridge loading, the question of cost is dominated almost entirely by the current market quotations, though even so, each make has its characteristics, thus rendering it necessary to exercise discrimination before placing a large order. The size and regularity of the pellets must be carefully tested, while in addition to this the loader must decide between the relative merits of chilled, patent and ordinary soft shot. Price must, as a rule, be a governing factor, but this will not prevent the buyer from insisting on conformity with the size ordered within a margin of a few pellets on either side of the average number per ounce.

In dealing with a large turnover of cartridges, the importance of working to exact calculations of cost cannot be exaggerated. The trade is not one that allows any margin for mistakes. Hence the need for keeping the operations of the filling room in close touch with the counting house department. Carelessness in overloading cartridges will easily run up the cost per hundred several pence, to say nothing of the resulting loss of efficiency. The wads, the powder and the shot must be harmoniously blended so as to produce not only a good cartridge, but a cartridge that will show a profit on the operations conducted in the filling room. The young gunmaker will find plenty of scope for his abilities if the loading room is placed under his supervision, and it is only by working on lines such as those here indicated that his efforts will meet with success.

The following announcement was made on the 9th ult. by War Office authority with reference to ammunition to be issued to the Regular troops for field practice:—

"This ammunition is of Service pattern, and formed part of the surplus withdrawn from South Africa on the cessation of hostilities. Though when accepted and passed for service it fulfilled the approved specification requirements, it is probable that, owing to the conditions to which it was subjected in South Africa, occasional hang-fires with it may now occur; and every care must be taken to guard against the possibility of accidents from that cause. In the event of a miss-fire, the firer should not open the breech nor remove the rifle from the 'present' until five seconds have elapsed. Officers in charge of musketry parties should warn their men before commencing each field practice."

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THE TRANSVAAL DYNAMITE FACTORY.

The members of the Chemical, Metallurgical, and Mining Society paid a visit to the dynamite factory at Moddersfontein on the 22nd of August last. The visitors were received by Mr. William Cullen, the general manager, and in the course of their tour of inspection many interesting sights were witnessed. At the conclusion of the luncheon, the health of the genial and enterprising general manager was drunk with great enthusiasm and appreciation.

Mr. Cullen, in reply, said that if the trip had given the visitors the amount of pleasure he had been assured it had, he was equally pleased. Some of the members of his staff were members of the progressive Chemical, Metallurgical, and Mining Society, and as such they were only too anxious to meet their fellow-members and greet them as such, there. But they also welcomed them, and he spoke more for the company now than personally, as representatives of the greatest concentrated mining industry in the world. Someone had mentioned the "old days," and they could not get away from the fact that there had been "old days."

Personally, he looked upon that matter in a very different light to most of his visitors of that day. He looked upon the old company as great benefactors, especially to the staff. But they had been found out—he was forced to say there were other people much the same who were not found out. This much he must say, that although the old company earned princely profits, they looked after their staff well, and the building they were in and the factory they had seen evidenced it. There had been a popular idea—and he was glad they were there to disabuse themselves of it—that the factory was a sardine-box style of thing, the like of which was so common in their country. Their visit must have made them know that it fully justified its claim to rank in a very different class. They were turning out now month by month more nitro-glycerine than any other factory in the world, and that in the face of limited protection. He was sorry he had not had time to prepare some statistics for presentation, but he could give them round figures, which would, perhaps, answer his purpose as well. The capital of the company was £1,100,000. It was quite true that most of the money earned in the past by that company had been spent in building the immense factory, and he could say that that amount was represented to-day by bricks and mortar, and machinery and plant of various kinds. There was such a thing on the Rand as "watering," but, as far as their capital was concerned, their company was not "watered."

The explosive business was a big thing. Not only had they to carry enormous stocks, not only had they to keep reserve stocks of 60,000 cases for three months, but immense stocks of raw material. In one way or another, their stocks represented a sum of very nearly two million pounds sterling. These were big figures, but they had to have a big place to deal with a big industry. They were not turning out very much now, the monthly output being about 18,000 cases, and their sales the same. In comparing the relative mortality there and on the mines where the potential risk was not nearly so great, he had been led to the conclusion that mine accidents were out of all proportion in numbers to the amount of explosives used.

Every man on his staff would sooner be employed to manufacture the explosives than in the mines to use them. He was firmly convinced that some educational authority was needed right along the line of reef to point out to the men the ordinary precautions they must take. In his opinion, legislation might be introduced to prevent accident. There was great room for improvement in the regulations, and he would be willing, and he believed all his staff would be willing, to do all they could by lectures or demonstration to assist in reducing what was really a frightful mortality. Reading the papers, they could not get an idea of the cumulative effect of the accidents constantly recorded. Every miner thought he was an expert in the use of explosives; many of them were, but quite 50 per cent. were not. He was addressing a number of gentlemen who did not consider themselves experts in the practical use of explosives, but he was sure their Society could inaugurate a scheme whereby common sense principles might be instilled in the large number of miners on these fields.

There had been a certain amount of misunderstanding about the dynamite factory, and he was glad to have the opportunity of dispelling it. He should also be glad, from the point of view of his company, if the visit proved equally successful in the matter of business. He was very glad the members of the Society had enjoyed themselves, and had smelt the ozone which he believed strayed about—although it was only nitrogen peroxide—and that they were going back feeling very much kinder towards the company than they had in the past. The *Transvaal Leader*, from whose columns this report is culled, gives the following details of production from January to July of this year:—Blasting gelatine, 81,399 cases; gelignite, 22,442 cases; dynamite, 10,597 cases; powder, 86 cases. Total, 114,524 cases.

MR. WEBLEY AND "THE TIMES."

MR. T. W. WEBLEY has lately been the subject of a very unfair attack by the anonymous writer of a letter to the *Times*. This person quoted extracts as follow from a book written by a gentleman of the name of G. T. Teasdale Buckell:

"Mr. T. W. Webley also knows how to enjoy spending money profitably. One of the feats of which he is most proud is the conquest of Pretoria. The hospitable conquest, we mean. It is not every one who would think it advisable in the interests of business to set a salmon to catch a sprat. The hired commercial traveller would find his principals raging at him if upon occasion he lived and entertained like a prince in the dearest of all towns for half a year, and then was content to come away with an order for a few paltry hundred pounds in his pocket. The principal may regard this as the thin end of the wedge, if he likes; the servant would not be allowed to do so. That, however, was the manner of Mr. Webley's first business with Pretoria, and he was satisfied with any method that acquired the confidence of a President arming to the teeth.

"It so happened on the particular occasion of Mr. Webley's visit to Pretoria that he had packed up his traps to come away * * * when General Joubert walked unexpectedly into his bedroom and declared himself in a difficulty. 'Could Mr. Webley help him?' Mr. Webley was hardly the man to say 'No,' in spite of the fact that he had never manufactured a shell and knew nothing of the cost of them. Joubert the commandant, was out of shells for a certain campaign which was coming off in a few months. * * * Needless to say, the telegraph was much resorted to for the next twenty-four hours, and in the end Joubert got his shells in quick time and Mr. Webley was raised to the greatest dignity bestowed upon Uitlanders by the President; that is, he became the recipient of Mr. Kruger's portrait signed on the back. Yet the Foreign Office is never tired of administering commercial lectures to English manufacturers on the slackness of their enterprise abroad and the superiority of the methods of the foreigners. Consuls' reports may be conclusive evidence in the eyes of Ministers bound to free trade stagnation, but we think that Bir-

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mingham exhibited the very highest enterprise and tact when it secured the manufacture of guns and shells for the English-hating South African Republic. That is only one instance out of many we could name in which English commercial tact has overcome the hostile prejudice of States against our Foreign Office policy It is no wonder that in this beautiful little villa on the outskirts of Birmingham, * * * Mr. Webley should treasure that signed portrait of Mr. Kruger as something for an English business man to be proud of."

The general impression the correspondent sought to convey was that Mr. Webley had been traitorously concerned in the supply of munitions of war to Her late Majesty's enemies. At any rate the question was taken up in this spirit by the *St. James' Gazette*. The facts as explained by Mr. Webley are very simple. Years before there was any question of difficulties with the Transvaal, Mr. Webley obtained a trial order for revolvers to be used by the Boer police, and it was at this time, predating even the Jamieson raid, that he helped Gen. Joubert by getting him some shells that were wanted in a hurry for the suppression of an obnoxious native chief. Other orders followed on the same line, and the goods were passed forward in the ordinary course of legitimate trade. Fortunately Mr. Webley was able to nail to the counter the false innuendo with which he had been assailed. In due course a withdrawal by the *St. James' Gazette*, and the silencing of the *Times* anonymous letter writer showed that the facts of the case had not the unfavourable aspect that was sought to be put on them by the ignoring of dates.

TRADE MARKS.

REGISTRED AUG. 20—SEPT. 16, 1903.

252,372
252,373 Kynoch, Ld.
255,054
255,055
253,384 Westley Richards & Co., Ld.

No applications were advertised in the Journals Sept. 2-23, 1903.

APPLICATIONS FOR PATENTS.

AUGUST 24—SEPTEMBER 19, 1903.

18,312. Overshot Wad for Cartridges. F. Garrett.
18,414. Projectiles. J. R. Hoyle and A. Anderson.
18,476. Gun Case. H. Holmes.
18,514. Driving Bands for Projectiles. R. A. Hadfield and A. G. M. Jack.
18,744. Torpedoes. F. McD. Leavitt.
18,782. Rifle Rest T. H. Masson.
18,816 Explosives. A. E. Verge.
18,982. Sight for Arms. R. S. Brinton and G. N. Osborne.
19,032. Automatic Firearms. The Webley and Scott Revolver and Arms Co., Ld. and W. J. Whiting.
19,096. Magazine Small-arms. T. R. R Ashton.
19,207. Igniting Fuses. G. Touchèr.
19,292. Ordnance. H. C. L. Holden.
19,438. Explosives. C. O. Lundholm.
19,602.* Small-arm Butts. L. D. S. Dale (Agent for *J. Wingfield*).
19,632. Ordnance Sights. F. Wray.
19,686.* Projectile Caps. C. Van, C. Wheeler and A. G. McKenna. (Date of applicatiou in U.S.A. May 1, 1903).
19,694. Small-arm Sights. J. T. Peddie.
19,738. Detonating Apparatus C. E. Wenzel.
19,763. Torpedo Steering Gear F. McD. Leavitt.
19,817. Explosives. J. Nicholas.
19,874. Ordnance Breech Mechanism. Sir W. G. Armstrong, Whitworth & Co., Ld (Agent for *Société Anonyme John Cockerill*).
19,935. Rifle Rest. J. Connor.
19,957. Projectiles. H. Burrows.
20,004. Projectiles T. S. Forbes.
20,132. Firing Naval Guns. Janet M. Ashmore (Agent for *G. P. Ashmore*).
20,194. Gun Mountings. W. Beardmore & Co. and A. Bremberg.
20,216. Explosives. M. Billefeldt.

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

AUGUST 27—SEPT. 17, 1903.

COMPILED BY HENRY TARRANT.

18,030 (1902). **Miniature Practice Arm.** W. Blackband, Newport. A miniature rifle or pistol is attached to a model of the ordinary service arm The shape, weight and balance are the same in the model as in the actual arm. When it is desired to sight as though for the longest ranges, the breech of the miniature barrel is elevated so that it shoots correctly at its limited range Accepted Aug. 13, 1903.

18,161 (1902). **Torpedo Discharging Gear.** A. H. Atterbridge, London. Torpedo-discharging gear adapted to be fitted to the outside of small surface or submarine boats, the space in the interior of which is necessarily restricted The tube is of the skeleton type. The movement of a detent upon the tube through the medium of a lever within the boat sets the torpedo engine in motion, and opens the tube to allow of the discharge. Accepted Aug. 18, 1903

18,410 (1902). **Percussion Fuses** J. P. Hughes, Argentine Republic. Firing mechanism for percussion shells, consisting mainly of a hammer, which is caused to strike back when the shell is fired and so to depress a couple of pivoted arms at the back of the firing chamber. The backward movement of the hammer releases two safety flaps, allowing a free path for the hammer to reach and to detonate the cap upon impact. Accepted Aug. 13, 1903.

19,085 (1902). **Cartridge Carrier.** G. C. Swayne, Glastonbury. A cartridge wallet, so constructed that sporting cartridges may be presented at the outlet ready at once to load into the gun, either singly or in pairs The cartridges fall in turn into a drum revolved by clockwork, a stop holding the drum against rotation between the withdrawal of cartridges. Accepted Aug. 27 1903.

20,307 (1902). **Grip Safety for Small-arms.** J. Tambour, Austria. The grip safety device is illustrated in this patent as applied to a hand weapon of the Webley-Fosbery automatic type. The grip of the hand in firing depresses a locking lever, and creates sufficient space to allow of the disengagement of the sear and the hammer when the trigger is pressed. Accepted Aug. 6, 1903.

21,086 (1902). **Rifle and Shot Gun.** J. Schlagen, Austria. A combined rifle and shot gun, in which the rifle barrel is situated directly over the shot barrel. Both barrels are governed by one breech-mechanism, which actuates two firing-pins. The barrels are arranged to turn down upon a hinge for the purpose of extracting and reloading. Accepted Aug. 13, 1903.

21,261 (1902). **Automatic Targets.** Maj. O. von Kleszky, Hungary. An automatic target, constructed especially for the training of soldiers in the art of shooting. When the target is struck by a bullet it is tilted, and is caused to disappear. Draw lines are manipulated from the firing point in order to cause the target to assume its upright position The target may also be arranged to allow of its being carried down out of sight at will. Accepted Aug. 13, 1903.

21,358* (1902). **Sporting Gun Lock Mechanism.** J. D. Thompson, Birmingham.

21,645 (1902). **Projectile Casting Machine.** G. Wicks, Esher. Apparatus for casting small-arm projectiles adapted to operate on the principle of the rotary type casting machines described in Patents Nos. 4,052, 1899; 4,986, 1894; 17,469, 1897; and 8,269, 1898. A rotating disc, having a number of radiating cylindrical channels, in each of which slides a mould, is arranged to present the moulds in the closed position for the reception of metal. The moulds are opened automatically, and the formed bullet expelled. Accepted Aug. 13, 1903

22,003 (1902). **Rifle Mechanism.** P. T. Godsal, Whitchurch. Improved rifle mechanism of the type described in Patent No. 11,461, 1888 The breech system is classified by the patentee as of the travelling block-action type, since the

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closing piece has a length of only two diameters. This piece is fitted into and travels with a carrier, and it is operated by a lever somewhat similar to the bolt-turning part of the ordinary rifle. The stock is cut away behind the trigger guard to allow of a good grip for bayonet work. Accepted Aug. 22, 1903.

22,088 (1902). **Gunner's Seat for Tripod Carriages.** A. T. Dawson and D. P. Donovan, London. A gunner's seat for tripod carriages, supporting such guns as the "Maxim," which is so arranged that it is partly supported by the trail foot and partly by a portion of the trail in advance of the foot. By this arrangement the weight of the gunner is so placed as to cause part of it to be added to the weight of the front legs of the tripod. The stability of the mount as a whole is in this way increased. Accepted Aug. 6, 1903.

22,324 (1902). **Crossbow Guns.** H. Schramm and L. Schmidt, Germany. An accurately shooting crossbow, in which a bolt, driven by the bow, is caused to strike sharply, and to eject a ball from a spring-holding clip. Accepted Aug. 20, 1903.

22,354 (1902). **Ordnance Cartridge Primer.** A. T. Dawson and G. T. Buckham, London. A primer for igniting ordnance cartridges. It is provided with two chambers. In one is arranged the detonator, whilst in the other the "lighting charge" of guncotton and a black powder disc are contained. The lighting charge is by this means kept free from damp. Hang-fires are so reduced. Accepted Aug. 13, 1903.

23,249* (1902). **Report and Smoke Destroyer.** H. Elgi and F. Lieber, Switzerland.

23,615 (1902). **Shrapnel Shell Projectiles.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). Projectiles for filling shrapnel shell, the penetrative power of which is enhanced by forming them of an alloy of steel with one or more metals of such a quality that they impart to the alloy an increased resistance to compression strains, an increased toughness and a higher specific gravity. Accepted Aug. 27, 1903.

24,633* (1902). **Priming Composition.** J. Wetter, London (Agent for *the Westfälisch Anhaltische S-Ag., Germany*).

28,306 (1902). **Cartridge Cases for Blasting.** W. Hartig, Melling, near Liverpool. Cartridge cases designed to contain hygroscopic blasting explosives, consisting of a thin impervious layer of india-rubber covering the surface of a tube of specially prepared paper pulp. The tube ends are closed by caps composed either of metal or of the same prepared pulp. When securely capped the loaded cartridge is dipped into melted paraffin wax. Accepted Aug. 20, 1903.

494 (1903). **Transportation of Ordnance.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). A method of enabling the barrels of transported barrel-recoil guns to be transported to the barrel-carriage without the aid of special hoisting tackle. This is accomplished by mounting a slide track upon the barrel carriage and coupling the track to the slide track upon the gun cradle. Accepted Aug. 20, 1903.

4,884 (1903). **Sporting Gun Loader.** G. A. D. Goslett, East Grinstead. A cartridge holder, consisting of two spring clips attached to a metal bar, from which clips sporting cartridges may be simultaneously introduced into the two barrels of a sporting gun. Accepted Aug. 6, 1903.

5,799 (1903). **Small-arm Breech-Locking Device.** Baron A. O. von Augezd, Austria. A locking device for securing the breech of automatic small-arms or machine guns at the moment only when the firing pin strikes the cartridge cap. The device is also applicable to the locking of parts of machinery in position. Accepted Aug. 20, 1903.

8,576 (1903). **Loading of Ordnance.** C. P. E. Schneider, France. The complete introduction of ammunition into ordnance without the use of rammers is permitted by providing a movable support or conveyor on which the ammunition is placed, and of a device for operating mechanically and automatically the separation of the support and the ammunition at the entrance to the gun chamber. Accepted Aug. 13, 1903.

12,875 (1903). **Percussion Fuse Mechanism.** H. P. Merriam, U.S.A. Locking mechanism for the hammer of percussion fuses in which the hammer securing devices are actuated to bring about the release of the hammer by the centrifugal force of the revolving shell during its flight. The locking device consists of a number of interlocking bolts which can move collectively, but not individually. Accepted Aug. 27, 1903.

13,061 (1903). **Fuse Head for Electric Blasting.** F. Render, Manchester. Improvements upon the fuse head described in patents Nos. 9,311 (1901); and 9,380 (1902); consisting in providing for the protection of the jointed ends of the wires projecting from the fuse head, especially in cases where a porcelain block is used to separate the wires as was set out in the last-numbered of the patents quoted above. Accepted Aug. 27, 1903.

15,494 (1903). **Control Apparatus for Recoiling Guns.** C. P. E. Schneider, France. Control apparatus for recoiling guns, consisting of an hydraulic brake cylinder, the parts being so arranged that, upon the recoil of the gun, a chamber becomes filled with liquid, which deadens the shock of the return, and progressively discharges itself during the return. Accepted Aug. 27, 1903.

15,749 (1903). **Projectile for teaching Ordnance Loading.** P. A. Guyé, France. In consequence of the difficulty of extracting an ordnance projectile after its driving band has been forced into the chamber cone, loading practice to the extent of introducing the projectile so far has not been convenient. The practice projectile described in this patent reduces to a great degree the effects of forcing or ramming, so that the projectile may afterwards be easily extracted. Accepted Aug. 27, 1903.

* These Specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

PRIMING COMPOSITIONS.

24,633 (1902). J. Wetter, London (Agent for *the Westfälisch Anhaltische S-Ag., Germany*). Recent experiments carried out by the patentees have convinced them that a mixture of trinitro-napthalene with potassium chlorate, dinitro-napthol-sulphonate of diamido-phenol, or another organic or inorganic salt of this acid, and sulpho-cyanide of mercury, makes an excellent priming composition. In comparison with fulminate of mercury, it has, it is claimed, not only the advantage of cheapness, but may be worked up without danger, and allows of the use of larger detonators than heretofore. A cap fitted with this priming composition does not require the addition of a cap of fulminate of mercury in order to cause it to exert its full power, but will directly explode dynamite, picric acid, and other high explosives. Its effect is enhanced when enclosed within a strong walled brass case.

A small quantity of the explosive which is to be detonated, may advantageously be added to the priming composition, being so placed in the form of a layer upon the top of the composition that the cap will first ignite it and communicate the detonation more energetically to the main charge. The following is an example of the relative quantities in which the substances are mixed to form the composition:—Trinitro-napthalene, 25 per cent.; dinitro-napthol-sulphonate of diamido-phenol, 10 per cent.; sulphocyanide of mercury, 30 per cent.; potassium chlorate, 35 per cent. Accepted Aug. 27, 1903.

SHOT-GUN LOCK MECHANISM.

21,358 (1902). J. D. Thompson, Birmingham. A modified system of what is known as the "box-lock" in connection with sporting guns is described in this patent. The mechanism is so arranged that a solid joint pin may be passed right through the body, so obviating the necessity of cutting a short pin in the middle of the body out of the solid, or of fitting one after the body had been filed. To enable this to be done, the pivoted cocking dogs at present used are displaced by sliding cocking bars. The sear spring system is also modified.

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The arrangement of the various parts in this system of lock will be understood by referring to the drawings herewith reproduced. From Fig. 1 it will be seen that the action body *a* is only slightly cut away to form a slideway for the front end of the cocking bar *b*. The movement of the barrels during reloading is communicated through the fore-end to the hammer *c* by the rear part *d* of the bar *b*. The projection *e* upon the end *d* of the bar takes into a hole in the side of the hammer, so that when the bar *b*

Fig. 1.

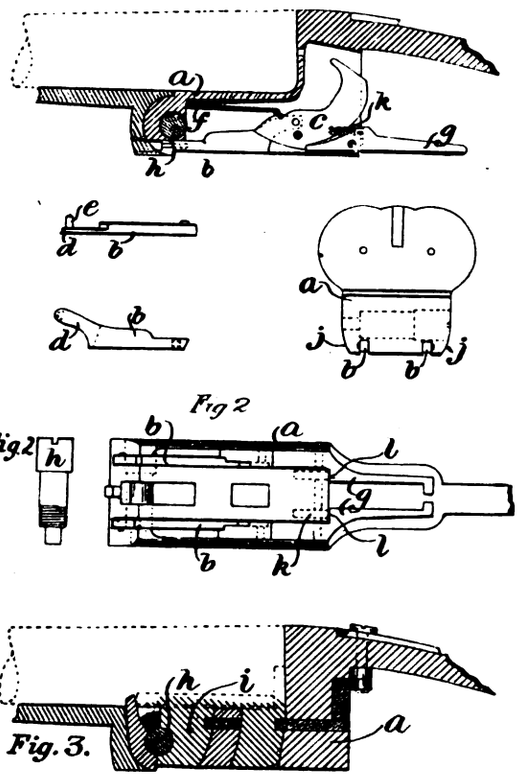


Fig. 3.

is pushed in a rearward direction the hammer is cocked and is held against the pressure of the mainspring *f* by the nose of the sear *g*. The bar *b* is so arranged that it slides in a groove in the body independently of the cover plate which encloses the lock work. The slideway being open to the lower edge of the body, and the front end of the bar *b* being narrow, allows of the use of the joint pin *h*. This pin is passed right through the body, and is of such a diameter as to adapt it to serve as a pivot, around which the barrel lump *i* may work (Fig. 3). When it is required to make provision for ejecting, a piece of metal is attached to the front end of the bar *b*, shaped to accord with the particular ejecting mechanism it is intended to operate. When the barrels are broken down after discharge, these projecting pieces stand in the path of the ejector kickers, and are so caused to operate the ejecting mechanism.

The arrangement of the sear springs in the position illustrated, affords a better opportunity of giving the rounding off surfaces *j* to the sides of the body. The sear springs *k* are of the spiral type. Their rear ends abut against the shoulders *l* upon the sears, whilst their front ends take into deepish holes in the backs of the hammers. These springs, it is claimed, are effective, and are readily placed in position when assembling the lock parts. Accepted August 6, 1903.

REPORT AND SMOKE DESTROYER FOR FIRE-ARMS.

23,249 (1902). H. Egli and F. Lieber, Switzerland. A muzzle loading attachment for deadening the report and for annulling the smoke accompanying the firing of arms is described in this specification. The main idea seems to be to prevent them being heard or seen from a short distance.

The drawings appended represent respectively a front elevation, a side elevation, and a sectional plan of the above-mentioned device. The cylindrical part *a* is provided with the bore *b* for the reception of the muzzle *j* of the rifle. When the muzzle is in position the circular cutting *c* lies directly in line with the bore of the rifle barrel, so that the bullet may pass through the part *a* into the outside space. The cutting *c* is closed by the two spring plates *d*. When the rifle is fired the bullet easily forces these plates apart, but they return to their former position immediately behind the bullet and prevent the escape of the gases of combustion in that direction.

Attached to the underside of the cylindrical part *a* by means of the hollow socket *e* is the damper *f*. Through the centre of the socket *e* runs the channel *g*, which communicates the bore *c*, through which the bullet passes, and into which the gases are shut back,

Fig. 1

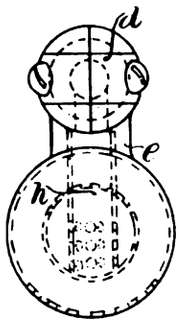


Fig. 2

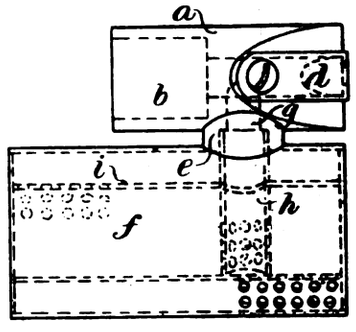
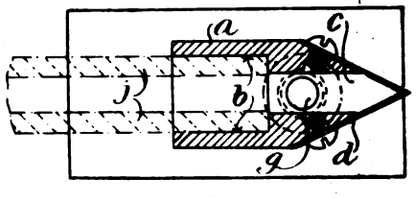


Fig. 3



with the damper *f*. The tube *h* is directly connected with the channel *g*, and when the spring plates *d* close behind the bullet the gases are forced down this tube and through the perforations in the tube's lower extremity out into the damper *f*. From the damper *f* they are forced from the holes in the rear into the outer tube *i*, and are then caused to pass into the air through the series of holes in the end of this outer tube.

The conveyance of the gases of combustion through this series of gradually enlarged passages allows of a gradual expansion, and it is claimed the sound is damped or diminished. The smoke passing out may deposit on the walls of the damper, so rendering the gases, by the time they reach the air, practically invisible. Accepted August 13, 1903.

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CONTENTS.

CURRENT TOPICS.

Cartridge Prices in France.—Our French contemporary, the *Bulletin Mensuel de l'Armurerie Française*, in its last issue, gives some particulars of the steps that are being taken to deal with the unprofitable prices at which loaded cartridges are being supplied by dealers throughout the country. It seems that the French Gun Trade Association has been aroused to action by the general tendency to reduce prices below what will allow a fair margin of profit to the retailer. The association is in no doubt as to what it considers should be the minimum price of the various standard grades of cartridge, and while it admits that the present season is too far advanced for the making of immediate reforms, it seems to be of opinion that a change may be effected in the future. For our own part we cannot feel sanguine as to the outcome of attempts to modify the working of the laws of supply and demand by the giving of advice to the retailers. No class suffers more from the strain of competition than our own English gunmakers who lay themselves out to do a local cartridge trade. The grade of goods supplied by the ammunition factories to general dealers is of a quality and effectiveness that cannot be denied. At any rate, the shooter, with whom the ultimate decision rests is mostly satisfied to base his judgment of a cartridge on price, as long as he finds it all right in the shooting. The gunmaker must adjust his own prices to those at which the inexpert general dealer is willing to trade. Year by year, the sales of factory-loaded cartridges are enormously increasing, and as the respective brands become more widely known, the low prices, which are the inevitable outcome of the established sale of proprietary articles, must reign. If an ironmonger is a cheaper distributor of cartridges than the gunmaker, then the latter must lose ground. He can only retain his hold on the market by devising means, according to his surroundings, whereby he can sell as cheaply as his competitor. If he loads his own cartridges he must above all things be sure that the competing proprietary articles shall not be superior, price for price, to his own work. Prices cannot be regulated, except by the inexorable laws of competition.

The Continual Rain.—That the weather is a current topic of conservation in this country may be attributed to the fact that our geographical position subjects us to the most weird medley of changes. The usual inconsistency of our climate has this year given place to a consistent deluge, which, during the game-breeding season ruined all prospects of a healthy head of birds for the autumn shooting. The continuance of the rain during the summer wrought havoc to the crops, and now that these are mostly ruined, or harvested in bad condition, the spell of misfortune might truly be recorded complete. But in the face of all these misfortunes the bad weather still continues, so that the shooting of such game as there is has been carried on under conditions that take away the main charm of outdoor existence. Had the head of partridges been well up to the average, the prosperity of those dependent for a livelihood on the practice of sport would have been seriously affected. Some of the best laid schemes of hosts, keepers and beaters have been abandoned at the last moment owing to the unpropitious weather. The cartridges so unused must in the nature of things represent so much deficiency in the year's consumption. Other losses comprise the non-letting of shooting rights that generally command a market, and the general indisposition to plan a day with the rabbits or the partridges when the chances seem odds on the expedition proving a failure. The big pheasant shooting of the season is now due, the leaf in the coverts being greatly reduced, so that with ordinary luck business should resume something approaching a normal aspect. As pheasants have suffered from the effects of the bad season less than most other classes of game it is at least to be hoped that the big days will be mostly characterised by fine weather, and such

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subsidence of the existing floods as is possible in the short time available. That pheasant shooting runs on in full activity for the next two months at least gives reason for trusting that we have seen the worst of the trouble, and that with the new year better conditions will prevail, and so make up for the two bad seasons that have spelt loss to so many dependent for a livelihood on this branch of sport.

Technical Education in Birmingham.—A circular has recently been issued by the secretary of the management committe of the technical education classes promoted by the Birmingham Proof House. Its primary object is to secure donations towards the prize fund for rewarding the successful students in the coming session, but incidentally several questions of general interest are raised. It seems that, while the committee has hitherto devoted its attention solely to the teaching of the practical side of barrel filing, action filing, and stocking and screwing, they hope in the near future to make arrangements for theoretical teaching adapted to every branch of the gun-making industry. This highly commendable intention is, we hope, the beginning of a far-reaching development. We have always deplored the fact that while every trade has its classes in which the scientific side of its specialised requirements are taught by practical men, the guntrade, more technical than most industries, is entirely neglected. The all-round gunmaker must have a general knowledge of physical problems, such as fine weighing and measuring. He must also understand the principles of mechanism and the strength of materials. It requires a genius to study these questions, and many others we have not the space to specify, in a comprehensive fashion, and apply the general knowledge so obtained to a special purpose. Life is mostly found too short to work on these lines. The thing that is most needed is a scheme of instruction whereby a competent staff of teachers shall carry out a scholastic programme in which those portions of general scientific knowledge which particularly apply to gunmaking shall be presented in the form of a well-ordered course of training for the benefit of the coming generations of gunmakers. In our lectures to young gunmakers we have endeavoured to follow out some such programme, and however incomplete the result may be we at least trust that it embodies the right principle of working. One of the most important aspects of scientifically applied gunmaking is the making of accurate measurements whether they be of lengths, diameters, thicknesses, weights, or even pressures and velocities. Such things as this could be taught by a happy combination of lecturing and personal experimentation in a physical laboratory equipped for miscellaneous gunwork the same as a chemical laboratory is equipped for the carrying out of experiments with chemical substances.

Powder Tests.—At the present time a general movement is on foot to define the conditions that go to make up a perfect cartridge, and to specify the character of test to which it should be submitted. The fact that the lessons of modern experimentation have yet to be learnt is brought prominently to our notice by reading the circular booklet which is sent out by the makers of one of the less known powders on the market. A velocity for all loaded cartridges of over 1,100 feet is guaranteed. As the distance over which the velocity is to be taken is not stated, the guarantee amounts to absolutely nothing. Another anomaly that is met with in perusing the same pamphlet is the fact that it is urged as a point in favour of the powder that it gives but 1·5 tons pressure. As a matter of fact the chamber pressure of this powder is about double this amount, and if it were as small as the amount stated, the powder would be more suitable for filling halfpenny squibs than for sending a charge of shot along a 12 bore barrel. To condemn a good powder by making ridiculous claims on its behalf seems to be as undesirable from the business as from the scientific point of view. "Good wine needs no bush" is an old truism. The same remark might be applied to nitro explosives by saying that good powders are not in need of incorrect and misleading statements as to virtues they do not possess. A good powder is one that gives an average chamber pressure of about three tons, with a minimum of shots showing pressures much above the normal. Its velocity should be an average of 1,050 feet per second over the 20-yards range. The statement of recoil values is, generally speaking, unnecessary, since if the velocity and shot charge are standard the recoil will follow suit, subject of course to such differences as arise from the weight of powder for the standard charge. The mystery surrounding the testing of sporting cartridges is thus so far dissipated as to make it undesirable to give the results of any tests except those that conform to the conditions under which modern powders are regulated and standardised.

Cartridge Loading by Country Gunmakers.—Mr. Charles Rosson has this month favoured us with a spirited letter in which he refuses to be classed among those country gunmakers who give but superficial care to the supervision of their cartridge-loading departments. He asks that we should specify the black sheep, sooner than let the whole class suffer from the aspersions cast upon individuals not named. This we cannot do for very obvious reasons. It is not our business to publish a black list; our facilities for observation are not sufficiently complete. The policy we have adopted has been to call attention from time to time to typical instances of neglect, whereby trade is lost. There are so many instances up and down the country where the loading of cartridges is not carried out with the care and strict supervision which we consider necessary that we should be failing in our duty if we did not emphasize the fact. There are, of course, a great many notable exceptions, Mr. Rosson for instance, which go to show that if the problem of cartridge loading is properly tackled the quality of the output is uniformly good. It is this good example that we want present backsliders to follow so that cartridge loading by country loaders shall be characterized by a high level of workmanship. The fight carried on by those who turn out uniformly good work is rendered the more arduous by the fact that so many fail to carry out their guarantee of reliability of ammunition supplied. The sportsman cannot always be bothered to separate the wheat from the chaff. Hence his task should be rendered the easier by the observing of a higher standard of workmanship throughout the trade. Meanwhile those who do take the necessary care in the supervision of their loading shops should lose no opportunity of letting the fact be known, so that by the cultivation of a local reputation they may stem in their own districts the tide of competition that flows with ever increasing strength as long as the factory-loaded cartridge is an improving quality, and the local product, to say the least, a stationary item as regards conformity with modern standards;

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THE BARREL MARKING CONTROVERSY.

The long correspondence that we publish in this issue concerning the debatable points of the new proof rules as to the marking of foreign barrels and actions shows that the meeting of the Birmingham Guardians in September failed to result in a settlement satisfactory to the conflicting parties. One of the most regrettable incidents of the whole proceedings consisted in the fact that the resolutions adopted at the meeting reported in our last issue were cancelled at a subsequent gathering of the Guardians. The fact that so much publicity was attached to the first meeting, and so little to the second, necessarily raises the question as to whether things once done should be so readily undone. In explanation of this apparent departure from the recognised rules as to matters decided at a public meeting it is urged that the defining resolution that was put forward at the latter end of the first meeting was not at the time fully understood, and that its effect was hostile to the principles of action already agreed upon. If this be so one can only deplore the regrettable error of chairmanship that allowed a resolution to go to the vote of which proper notice in advance had not been given. Whatever may be our justification for regrets as to manner of attaining the result, the fact remains that the following is the official text of the new rules:—

MARKING OF FOREIGN ARMS.

"62. Every small arm of foreign manufacture, and every "barrel of foreign manufacture, the barrel of which respec- "tively, has been imported in a more advanced condition "than that known as the "Tube State" shall, when pre- "sented for definitive proof, be accompanied by a declaration, "in writing, by the sender, stating the name of the country in "which it has been manufactured. If a small arm or barrel "and action shall be sent from a foreign country for definitive "proof, without having the full name and address of the "maker impressed thereon, it shall be deemed to have been "manufactured in the country from which it has been sent. "Every such small arm and barrel and action shall, after "definitive proof, be impressed, near the definitive proof "mark, with the words 'FOREIGN MAKE' in addition to the "marks applicable thereto under any of the foregoing rules."

"63. Should a small arm or barrel and action be presented "for definitive proof, which, in the opinion of the proof "master of the Company to which it is presented, is subject "to the provisions of the foregoing Rule 62, but is unaccom- "panied by a declaration as provided therein, the Proof "Master shall require a declaration, in writing, from the "sender, showing whether such small arm or barrel and "action is, or is not, subject to the provisions of the said "Rule 62. Failing such declarations, such small arm or "barrel and action shall be marked as provided in the "said Rule 62."

According to the intention which these rules are framed to carry out, a barrel may be imported in any state, and be put to an English action without being subject to the rule. Further, an action may be imported and attached to an English barrel, made, if need be, from a foreign tube, with the same result. Finally, a foreign action and barrel may also be used without the marking if the barrel has been imported separately as a tube. Those who contest the wording of the new rule assert that a foreign barrel in the tube state could be imported into this country and duly receive the provisional proof mark. Still quoting from the same source, such tubes could be sent back to a foreign country, there to be made up into complete actions and barrels ready for definitive proof. The rule apparently lays down that such a gun should be marked "foreign make" at definitive proof, but it seems to be contended that it could get through as English. We are not experienced enough to know whether the rule could be evaded in this way. Certainly the proof authorities would need to be clever judges of workmanship to detect whether the making up of the tubes and the jointing of such barrels to permissible foreign actions were done here or abroad.

Altogether, we feel ourselves in the difficult position of the man who does not know his own mind. At least we know our own view; but we find a difficulty in defining the aspirations of those who want to ear-mark foreign work, at the same time leaving open for exceptional treatment those departments of it which can only be so labelled with the risk of immediate and prospective loss of trade. Adopting the Merchandise Marks Act, we must certainly class as of foreign make things which are substantially made abroad. The German chisel case and the watch case seem to suggest that a gun with a foreign action, fitted to foreign tubes that have been assembled and fitted to the action in this country can hardly rank up to this point as of substantially English origin. We ignore the processes subsequent to provisional proof, as they may be carried out anywhere so far as the proof house is concerned. While, for instance, it may be quite fair to import Martini actions (the making of which has nearly ceased in this country) and finish them off with English barrels, we must be guided in interpreting rules of the kind under discussion, not only from the point of view of the legitimate practices they will allow, but also the loopholes they may leave for evasion. There is, so far as we can see, no reason why a factory should not be equipped in Birmingham for carrying out in guns the processes necessary to prepare foreign actions and tubes for the definitive proof, with a view to returning them to their true country of origin for the finishing processes. If this is openly permitted, it merely means that it is inconvenient to make the Proof Act and the Merchandise Marks Act go hand in hand as regards the definition of foreign make. Whether from a failure to grasp the previous resolution that was discussed in our last issue, or whether it is true that things have changed with the new wording, the fact remains that we are now asked to allow the English proof mark, not solely on guns whose dependence on the foreigner is a question of tubes, but on all guns, whether English or foreign, whose barrels have been jointed and fitted to the actions in England.

Altogether the whole question seems to have reached a development at which it is very difficult to come to any decision. The differential proof marking of foreign arms seems to be considered desirable on general principles. On the other hand the absence of such distinctions in the past has led to anomalies that have only come to light by reason of the proposals recently put forward in favour of a change of policy. What is likely to be the exact effect of the rules now submitted to the Secretary of State for War experience will doubtless show; but to make forecasts thereon seems a hazardous proceeding.

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THE "STATIST" ON B.S.A. FINANCE.

When the whole country is engaged in discussing the financial aspects of our manufacturing industries, it must necessarily be a pleasant task to examine instances where the policy of working on sound methods has brought about notable success. Our contemporary, *The Statist*, has lived up to the spirit of its title by publishing in a recent issue a masterly analysis of the records and achievements of the Birmingham Small Arms Co., Ltd. At the risk of repeating well-known facts we take the liberty of making liberal excerpts from our contemporary's able summary of the B.S.A. position. It writes as follows:—

The Birmingham Small Arms Company, Limited, was formed in 1873 under the title of the Birmingham Small Arms and Metal Company, but in 1896 the Company was reconstructed, assuming the name in its present form. By the terms of the reconstruction each holder of an Ordinary share in the old Company received one Ordinary and one Preference share in the new Company. In 1897 the business of the Adderley Park and Streetly Works was sold to the Birmingham Metal and Munitions Company for £100,000 of that Company's Debentures and 16,000 £10 shares of the Nobel-Dynamite Trust Company. Part of the Nobel shares was distributed as a bonus dividend to the Small Arms Ordinary shareholders, in the proportion of one Nobel share for every three Small Arms. The remaining Nobel shares have since been disposed of, and also £50,000 of the Metal Company's Debentures. In August 1902 it was decided to distribute the reserve fund, amounting to £65,000, together with the sum of £36,575 from the profits of the year ended July 31, as a bonus to the Ordinary shareholders, in the shape of one new Ordinary share for every two shares held. In consequence of this addition to the capital it has been increased by £101,575, making the total amount paid up £507,875, out of an authorised £600,000, which is divided as follows:—

	£
40,630 5% Preference shares of £5 each ..	203,150
60,945 Ordinary shares of £5 each	304,725
Total	507,875

The effect of the distribution of the reserve may be seen from the following comparative statement, where the liabilities and assets of the Company for each of the past three years are set out:—

LIABILITIES.

Year ended July 31—1901.	1902.	1903.
£	£	£
Share Capital 406,300	507,875	507,875
London City & Midland Bank 12,285	Nil	Nil
Sundry creditors 47,456	51,983	42,725
Reserve fund 65,000	Nil	25,000
Profit and loss account .. 65,756	79,467	49,189
596,797	639,325	624,789

ASSETS.

Year ended July 31—1901.	1902.	1903.
£	£	£
Land, buildings, etc. 370,408	378,976	411,267
Sundry stores 59,984	50,958	53,225
Work finished and in progress 77,960	38,745	53,673
Sundry debtors 33,259	35,788	17,478
Investments 55,150	55,150	55,150
Cash in hand 36	29	86
London City & Midland Bank Nil	79,679	33,910
596,797	639,325	624,789

It will be seen from the above comparison that the overdraft at the bankers' on July 31, 1901, has been paid off, and that in its place there is a credit balance at the bank amounting to £33,910. The investments of the Company remain at the same figure as previously—namely, £55,150. The reserve fund disappeared from the accounts of 1902, but has again appeared in the figures for the year ended July 31, 1903. It will also be noticed that the value of the work finished and in progress, which in 1902 fell from £77,960 to £38,745, or over 50 per cent., has taken a turn in the opposite direction again, and has increased to £53,673—a satisfactory rise.

Since its reorganisation in 1896 the total revenue of the Company has been as follows:—

	£
Year ended July 31, 1903	65,197
,, ,, 1902	95,416
,, ,, 1901	88,228
,, ,, 1900	58,158
,, ,, 1899	56,431
,, ,, 1898	60,192
,, ,, 1897	88,345*

* 13 months.

We show below how these profits have been distributed:—

Year ended July 31—1903.	1902.	1901.	1900.	1899.	1898.	1897.*
£	£	£	£	£	£	£
Gross profits .. 62,722	93,049	85,500	54,777	51,984	53,343	
Interest on investments 2,475	2,367	2,728	3,381	4,447	6,849	88,345
65,197	95,416	88,228	58,158	56,431	60,192	88,345
Preference dividend, 5% 9,579	9,551	9,621	9,762	9,813	9,818	10,636
55,618	85,865	78,607	48,396	46,612	50,374	77,709
Ordinary dividend 45,709	60,945	40,630	40,630	40,630	40,630	44,016
(15%)	(20%)	(20%)	(20%)	(20%)	(20%)	(20%)
9,909	24,920	37,977	7,766	5,982	9,744	33,693
Reserve fund 10,000	25,000	36,575	10,000	5,000	9,517	30,000
-91	-80	1,402	-2,234	982	227	3,693
Brought forw'd 3,990	4,070	2,668	4,902	3,920	3,693	—
Carried forw'd 3,899	3,990	4,070	2,668	4,902	3,920	3,693

* For 13 months.

We have more than once had occasion in this Journal to comment on the great unwillingness of our manufacturers to put their houses in order, on their tenacity in clinging to old machinery and inefficient methods, and on their refusal to benefit by the experience of other men and other methods. We have pointed out also the importance of efficient processes and of up-to-date and economical methods of manufacture. We have insisted, further, on the necessity of conservative distribution of profits, so that by building up good reserves and writing off liberally for depreciation purposes our manufacturers would be in the most favoured position for discarding obsolete and inefficient machinery and introducing the latest labour, time, and money-saving appliances. And we have instanced cases where such a liberal policy has been consistently carried out, thereby placing the company in a strong position to meet any possible competition, and giving it a sense of security in knowing that its machinery was thoroughly efficient, while at the same time, it would be able, if necessary, to raise further capital for introducing any further needed reforms. The Birmingham Small Arms Company may be ranked as a notable exponent of such a policy. They have mercilessly swept away obsolete plant and buildings. They were, in fact, doing their utmost to utilise the stimulative and

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beneficial effect of the severe lesson that England had been taught by outside competitors, that the best way to protect themselves against being beaten in the race lay in steadily and consistently remaining abreast of the times, and, above all, of not being afraid of swelling their scrap-heap by sweeping away obsolete appliances, buildings, or plant. They were doing their utmost in the gun department to prepare for the new contract by replacing, wherever it was possible, obsolete methods of hand manufacture by careful arrangements of mechanism which produced a better and more reliable result. That had been the case in the finishing of the stocks and sights, which was previously done by hand labour. More especially was it the case in the barrel department, which had been transferred to a well-lighted building arranged on the most modern lines, and in which, on the initiative of their admirable gunworks manager, Mr. Driver, and his staff, they had introduced the most valuable and important improvements in the boring and setting of barrels. In that they had almost begun a revolution, because the new method would produce better work, more accurate, and at a much decreased cost. They had also, in addition to that building, a new tool and gauge shop right in the centre of the gun factory. That would be of immense value, because, he need hardly tell anyone connected with the interchangeable work that tools and gauges were the foundation of all perfect work. The result of those changes would be that they would be able to meet any demand of the Government in future with far less strain than was the case during the late war, their present power of production being twice or three times what it was before the war began. Another satisfactory point was that the electrical installation was now complete.

Thus, with a large contract in hand for one portion of its business, and with a prospect of continued firmness in the cycle components branch, the outlook may be regarded as distinctly favourable. In order to pay a dividend of 20 per cent. on the Ordinary shares and place £10,000 to the reserve fund it is necessary for the profits to reach £80,000, or £15,000 more than last year. It would be hardly wise to calculate upon the Company achieving this, but it should have no difficulty in maintaining a 15 per cent. rate. On this basis, at the price of £15⅜ for the £5 shares, the yield afforded, allowing for incurred interest, is just over 5 per cent.; while, should 20 per cent. be paid, the yield would be increased to nearly 7 per cent. Consequently the shares seem attractive, and ultimately a higher price should be witnessed. The price of the £5 Preference share is £6¼. At this price the yield afforded is £4 1s. 8d. per cent. On the basis of last year's figures the dividend was covered nearly seven times over, while there was a margin of over £55,000 behind it. The shares, therefore, may be regarded as a well-secured 4 per cent. investment.

We recapitulate below the capital, prices, dividends, and yields afforded:—

Amount.	Description.	Par.	Price.	Dividend	Yield.		
£		£	£	%	£	s.	d.
203,150	5% Preference shares	5	6¼	5	4	1	8
304,725	Ordinary shares ..	5	15⅜	15	5	1	0

Speaking for ourselves in conclusion we would say that the very satisfactory state of affairs revealed by this exhaustive summary of the B.S.A. position shows that when our English firms are able to work under conditions involving the frequent repetition of a single type of manufactured work, no lack of appreciation of the latest methods is shown.

GUN TUBE MAKING IN BIRMINGHAM.

In another part of this issue a reference occurs to the facilities enjoyed by Birmingham barrel makers for the turning out of barrel tubes. While the information given seems to deal mainly with the present and possible output of tubes made on the Damascus principle the fact seems to be ignored that this system of construction is almost a thing of the past. At any rate most authorities are agreed that the barrel of the future will be one of plain homogeneous steel, and that the Damascus coiling and welding will enjoy even less patronage than at present.

It is, therefore, to be hoped that if steps are to be taken to add new life to the barrel tube industry the attempt will not be made in the direction of giving a fillip to the Damascus work, but rather to working on plain steel under the best possible conditions. In the case of steel the problem presented is a fairly simple one. The tests of barrel steel by Messrs. Webley have shown what specification of metal is desirable for the different grades of gun. What then is wanted is for the practical element in the barrel making section of the trade to lay down specific lines upon which the steel makers should be asked to work. The various styles and forms of forging should be clearly marked out, and the prices of each sort be arrived at in the usual way.

The next step would be to ascertain by the joint information of leading practical men in the trade the most economical method of transforming these forgings to barrel tubes. Incidentally it would be desirable to find out whether the present ruling dimensions of barrel tubes are those most suited to the needs of the gunmaker buyer. From information that from time to time comes our way it would seem as though the tube is oftentimes supplied with too crooked a bore, and with too much superfluous metal both inside and out, so necessitating labour on the tube that would be better carried on in the tube factory.

Having arrived at the most favourable possible conditions of working, and at the most saleable form in which a tube should be turned out, the next question to decide would be the terms upon which such tubes could be sold to the trade, and how far they would be capable of competing, quality for quality, and price for price, against those offered for sale by our foreign competitors. Clearly it is not sufficient to be merely told that we can do everything that our rivals can accomplish in the same line of trade, first, because such assurances may not be based on a full knowledge of the facts, and second, because those making the statements referred to may be swayed in their judgment by personal interest. Many contend that Belgian mild steel is both better and cheaper than our own supply of the raw barrel material, and that we should in any case be obliged to go to Belgium for the raw material. That Belgium supplies most of the American requirements in the way of barrel tubes seems to suggest that all is not plain sailing. Naturally, differential proving would prejudice foreign made tubes, but the question is what would be the trouble and cost, immediate and prospective, of changing from foreign to English tubes. Many of our most responsible manufacturers maintain that their business would suffer a shock from which it would never recover, and one cannot but sympathise with such a view.

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BARREL MAKERS' PETITION TO THE WAR OFFICE.

The following is the text of the Barrel Makers' Petition to the Secretary of State for War, Mr. C. G. Bonehill having forwarded the same to the *Birmingham Post* for publication:—

A petition from the master gun-barrel makers of Birmingham and district to his Majesty's Secretary of State for War praying that steps be taken to amend the present practice of proof-marking foreign-made barrels with the same proof-mark or marks as those stamped upon barrels made in the United Kingdom, and to adopt a mark or marks which would be indicative of foreign make, and which would be easily discernible by sportsmen and other purchasers and colonial and foreign Customs officers.

The Gun-barrel Proof Act 1868 recognises gun-barrel making as a distinct section of the gun trade, the work of the gun-barrel maker consisting in producing the barrel from the raw material as far as the condition in which it is required for provisional proof.

Section 132 of the above-mentioned Act permits the branding with English names, &c., foreign barrels after they have been proved in this country. This permission has had the practical effect of placing the English gun-barrel makers' trade at the mercy of the importer by enabling the importer to purchase foreign barrels (and small arms) in any stage of manufacture and, by having them proved and proof-marked in this country, to pass them off as English-made, to the injury of the English barrel makers, and contrary to the spirit and intention of the Merchandise Marks Act, 1887.

The representatives of the gun-barrel makers on the Board are in a minority, and all their efforts to induce the Guardians of the Proof Houses to provide means in the proposed new rules to protect the manufacture of gun-barrels have been ineffectual, the Guardians deciding to absolutely shut out the barrel makers from participation in the advantages incidental to differential proof-marking.

The proposed new rules, Nos. 62 and 63, indicate plainly the attitude of the majority of the Guardians (many of whom are importers as well as manufacturers) towards the English gun-barrel industry. These proposals would allow the proof-marking of the foreign "tube" in the same manner as the English "tube," and would also permit the foreign action to be proof-marked and passed off as English, to the disadvantage of the gun trade. We direct your special attention to this proposed misleading use of the English proof-marks, and we suggest that these two rules be amended to read as follows:

Marking of Foreign Small Arms or Barrels. 62.—Every small arm or barrel of foreign manufacture shall, when presented for proof, be accompanied by a declaration, in writing, by the sender, stating the name of the country in which such small arm or barrel has been manufactured. If a small arm or barrel shall be sent from a foreign country for proof it shall be deemed to have been manufactured in the country from which it has been sent. Every such small arm or barrel shall, after having withstood proof, be impressed near the proof-mark with the words, "Foreign Make," in addition to the marks applicable thereto under any of the foregoing rules. 63.—Should a small arm or barrel be presented for proof, which, in the opinion of the proof-master of the company to which it is presented, is subject to the provisions of the foregoing Rule 62, but is unaccompanied by a declaration as provided therein, the proof-master shall require a declaration, in writing, from the sender, showing whether such small arm or barrel is, or is not, subject to the provisions of the said Rule 62. Failing such declaration, such small arm or barrel shall be marked as provided in the said Rule 62.

Rules Nos. 2, 13 and 14. Rule 2.—Permission is sought to substitute other powders for those named in this rule. Rule 13.—No scale of proof charges for the rifles mentioned in this rule is published. Rule 14.—Power is sought to change the powder referred to in this rule. The above three proposals are inimical to the interests of the public and the gun trade, as, in case the proposals were sanctioned, the changes suggested could be effected without publication and without the authority of the Secretary of State for War. It is, therefore, highly necessary that the right of appeal to the Secretary of State upon any proposal to alter the rules of proof be preserved intact, as provided by Section 117 of the Gun-barrel Proof Act. Copies of signatures:—

Enos James, Yardley, a Guardian of the Birmingham Proof House.

C. G. Bonehill, Belmont Fire-arms and Gun-barrel Works, one of the Guardians of the Birmingham Proof House.

For Rose Brothers (Limited); Baron Rose, Director.

The Birmingham Gun-barrel Co. (Limited); Joseph Hawkes, Chairman.

The Rose Tube Company (Limited); H. W. Pearce, Chief Clerk.

Samuel Smith and Sons, Gun-barrel Works and Barrel Rolling Mill, Witton, Birmingham.

General Rose, Master Gun-barrel Maker, Rumbow Works, Hales Owen.

Thomas Trueman, Master Barrel Maker, Hales Owen.

William Trueman, Master Gun-barrel Maker, Blackheath.

CORRESPONDENCE.

CARTRIDGE LOADING IN THE COUNTRY.

To the Editor of *Arms and Explosives*.

Sir,—In your October issue you mention having come across some 2¼ cartridges containing 50 to 52 grains powder for which 42 grains is the proper charge, and you go on to remark if these things go on in the country districts, factory-loading will become a testimonial.

It is the words "country districts" I take exception to, being in the country myself, and although I am in the country, I respectfully challenge any firm in or out of London to produce more even charges than my cartridges contain. The words seem to me of too sweeping a character; it would seem from them that no one in the country can make cartridges, while I claim no firm can equal Derby-made cartridges, I quite admit our trade has become burdened with so-called gunmakers, having no knowledge of either guns or cartridges, and these are the men who fill 52 grains when they ought to fill 42 grains, but even so I beg respectfully to protest I ought not to be classed with such because it is my misfortune (?) to live and work in Derby. Would it not be better to boldly give the names of such incompetents, and give us all a chance of "reaping as we sow."

Chas. Rosson.

Derby, Oct. 28, 1903.

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THE MANAGEMENT OF A RETAIL GUN BUSINESS.

Most of our English readers will have noticed the solicitude of the Press in teaching traders and manufacturers how to conduct their businesses. The faults of responsible proprietors are held up to public concern, while their want of enterprise and other omissions are narrated with much the same air of sorrow and regret that the wise parent shows in lecturing the child previous to administering correction. While writing on the subject of carrying on a country gun business we hope that we shall at least be free from the prevailing tendency of priggishness, which undoubtedly colours too much of the present day writing on commercial subjects. Advice can seldom be sound unless it is given with a full knowledge of all the circumstances, and this is where so much that appears in the Press falls short of being practical.

Few persons have a more complex problem to deal with than the well-informed and conscientious gunmaker who carries on business at one or other of the large number of provincial centres and market towns which are so widely distributed over the whole area of the country. The fact that many master men in this position have risen from the bench, affords proof in itself that they have plenty of the grit and determination which are necessary to ensure success. It is, however, impossible to expect exactly the same kind of enterprise in a trader with a limited turnover that one is accustomed to meet with in the director of large and prosperous manufacturing concerns, to whom thousands are frequently of less moment than individual sovereigns to the class we are considering. The problem which a country gunmaker must face is to devise the best possible way of showing enterprise and originality within the bounds that necessarily limit his freedom of action.

The gun business is not one which enjoys the advantage of a regularly maintained turnover throughout the twelve months of the year. It is a business whose capacity is concentrated over a limited season, and however many side lines there may be, the fact remains that the gunmaker pure and simple must learn to make a year's profit during the course of a few months. He is at all times subject to two serious forms of competition that attack his two main sources of revenue. His cartridge trade is eaten into by the general dealer and hardware-man who is willing to sell almost anything under the sun that can be put up in boxes and stored on shelves. The margin of profit is largely controlled by the price at which such dealers are willing to sell the goods that are consigned to them, and however personal may be the connection of a gunmaker among his friends in the district, the fact remains that many of them will sacrifice loyalty to the benefit that is supposed to be derived from paying sixpence per hundred less for ammunition.

Now it rests with a gunmaker to make such a systematic study of the cartridges that pass through his hands as to be able to give his customers an article more suited to their needs than the average of what his trade rival is likely to supply by reason of his more limited stock of information as to what will best suit the sportsman. Therefore, in developing a cartridge business the gunmaker must first of all study in an exhaustive manner, the characteristics that go to make up the most satisfactory form of cartridge for each of the different classes of shooting. Information of the kind outlined is to be obtained in several ways, and the wise gunmaker is he who relies not on one method alone, but on a combination of all of them. As a practical sportsman he can obtain information that is not available from taking part in the friendly gossip that goes on between himself and his customers. And, again, experiments at the plate for pattern and general behaviour of the cartridge, while giving a large amount of theoretical information, will not entirely replace the instruction that is to be gained from reading accounts of the latest experiments that are conducted to test the relative qualities of different forms and types of ammunition.

Thus it will be seen that in order to do the fullest justice to a cartridge business, a gunmaker must first of all be a practical exponent of shooting. Next he must be capable of conducting some of the simple tests that are within the reach of everyone having a small open-air range equipped with a few traps and a white-washed plate, while finally he must be able to translate the results of his practical experience and theoretical study of the question into the turning out of a thoroughly sound cartridge free from all cranky methods of construction, and thoroughly capable of doing justice to the sport for which it is to be used. Just how each gunmaker will fulfil these conditions in accordance with the requirements of his own particular surroundings he must settle for himself, but the fact remains that to be at the front he must keep his mind as actively employed as if he were the director of an important manufacturing company.

In the sale of guns and rifles the country gunmaker's chief competitors are the London and Birmingham firms who, when they sell a gun, sell it with a name that is widely known throughout the world of sport. It does not at all follow that the country gunmaker will supply a worse gun than that which comes from London and Birmingham. He has, however, to convince his customers that he can give them thoroughly good value for their money. In this particular connection we have frequently asked friends of ours in the country to show us typical specimens of the weapons they have for sale. As a result of such experiences one is often forced to the conclusion that the assortment of weapons shown is not always such as to tempt the potential purchaser. To do a gun business one must show one's touch with the subject by the power to display a number of well selected standard grades, meanwhile explaining to the possible buyer the characteristics and relative advantages of each.

Although of course it is not always possible to carry out every piece of advice that is given, we are still firmly of the opinion that many gunmakers in the country are not sufficiently ready to give their customers the opportunity of adopting new ideas. The enthusiastic sportsman in many cases possesses, or desires to possess, every new sort of side line in rifles or shot guns that is introduced. If he can afford to gratify his fancy in this direction, the gunmaker on his side should at least give him the opportunity of doing so, by purchasing say one sample of the new lines in rifles and other weapons that are introduced. It is not sufficient in such cases to wait until they are asked for. The gunmaker's window should be a museum of all the latest and most interesting devices in miniature rifles, shot guns, repeating guns, and the dozen and one other arms and accessories that attract the fancy of the enthusiastic sportsman.

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SIGHT FOR U. S. SPRINGFIELD RIFLE.

Lieut. Townsend Whelen, of the Fifth U. S. Infantry, has written a letter to Col. W. P. Hall, acting adjutant general, in reference to the rear open sight it is proposed to adopt for the U. S. Springfield magazine rifle, model 1903. The full text of the letter appears in *Shooting and Fishing* of the 1st inst., and we cull the following extracts from it:—

The sight is placed directly over the balance of the arm, which will make the rifle rather awkward to handle, especially when hot from firing. The sighting bar in placed so near the eye that the rear sight appears blurred to many men. This was demonstrated by actual experiment. The sight when in an elevated position is structurally weak. A blow on the top of the leaf while the sight is raised for longer ranges will bend the leaf and render the sight useless. This might occur easily in shoving the arm into the carbine boot without first lowering the sight.

The elevating bar slips into small notches inside of the slide. These make the sight very difficult to adjust quickly and accurately. In raising the sight from one small notch to the other it slips, and it is apt to fly much farther than desired. With these notches accurate shooting cannot be done at the long ranges. As far as I could determine one notch was equal to about fifteen yards. Now with the short distance between sights, fifteen yards' elevation, plus or minus, would mean an enormous change at 1,000 yards. I believe that these notches on the elevating slide are the worst part of the sight, and that they should be removed and the sight left perfectly smooth.

I wish to call your attention also to the omission of the peep sight in the new arm. The peep sight is so far superior for accurate work that I cannot understand why it has been left off.

Experience shows the pressing need for it on every rifle. I have conversed with prominent riflemen all over the country and they are all of the opinion that the sight adapted to the present service arm is excellent in every particular, and its general design should be copied in adapting a sight to the new rifle. Of the thousands of expert riflemen at Sea Girt this year, only two, to my knowledge, used the open sight, and one of these two told me personally, that next year he would use the peep sight, as he considered it much more accurate. I am confident that, had I been restricted to the use of the open sight, I would never have won the Army competition this year. I used the peep sight throughout the entire competition, even in rapid and skirmish fire. One great advantage of the peep sight is that one always takes the same amount of front sight, no matter what the light or conditions.

I consider the peep sight every bit as good for service as the open. For many years I have spent all my leisure time in hunting large game, and my rifles were always equipped with peep sight. They were just as quick as open sights and for clear vision under trying conditions of light far surpassed them. Many men, myself among the number, cannot shoot open sights on account of slight defects in vision, but with peep everything comes out bright and clear.

Another advantage which the aperture has over the open sight is found in that the elevations are the same for every man. For instance, 500 yards elevation will always remain constant while using the peep sight, but with the open bar will have to be run up or down fifty yards, depending on whether the man takes a full, half or fine sight. Then, again, the difference in light between two shooting days may, with the open sight, cause a much greater or less amount of front sight to be taken, and perhaps many shots are wasted finding the target. This change of elevation from day to day is incomprehensible to the average enlisted man, and destroys his confidence in himself more than anything else except issuing him ammunition of different velocities for his daily practice.

I wish to assure you, sir, that in offering these criticisms, I am not only giving you my own opinion, but also that of many officers and riflemen to whom I have talked on the subject. They all seem to be unanimous in hoping that the Ordnance Department will give us a sight on the new rifle similar to the present sight (model 1902), having aperture as an open bar.

THE MIDDLESEX CLUB DINNER.

Under the presidency of Mr. T. A. Bayliss, the Middlesex Gun Club held a highly successful annual dinner on the 29th ult., this representing the ninth year of the club's existence. While the social side of this function was very similar to that of other club dinners, a special feature was provided by the altogether successful issue of the club's energetic doings during the past and recent years. It has frequently been a subject for comment that clay bird clubs have not shown the tenacity of life that one would desire. The lesson to be learnt from the career of the Middlesex Gun Club consists in the fact that if all organisations of this kind were favoured with secretaries of the energy and enterprise of Mr. A. H. Gale, the tale to be told would be very different from what it is. Of dominant personality and sanguine temperament, he invests all he undertakes with a vigour that carries all before it. Cautious in finance, enterprising where enterprise will produce valuable developments, he has left no stone unturned to ensure on the part of the Middlesex Gun Club a thoroughly successful career. The Chairman, in proposing the toast of the evening, viz., "The Middlesex Gun Club," and Mr. Gale, in responding, were able to quote a highly satisfactory state of affairs. Upwards of one hundred members and friends of the club were assembled to hear a brief survey of the faithful stewardship which had been conducted on their behalf. The club is at the present time in the fortunate position of having £200 invested in consols, and a cash balance at the bank of £120. The membership roll totals 109. During the season which closed on the 1st of October, the club held twenty-eight meetings, with an average attendance of twenty shooters per meeting. Forty-nine thousand one hundred and fifty-six birds were shot at, out of which 31,456, viz., 64 per cent., were "killed," the betting, of which none is allowed, thus being about two to one on the gun. Nine thousand birds were used during the three-days Championship Meeting. The subscription to the club, which covers the use of the club accommodation, including the storage and cleaning of guns, is but one guinea per annum, which Mr. Gale pointed out represented about 5d. per week. A very pleasant social evening was spent, aided as it was by an entertainment of great interest and variety.

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ROUND THE TRADE.

The new draft proof rules reached the War Office on the 20th ult.

The winter season at the Gun Club, Notting Hill, is due to open on the 7th inst.

It is understood that the copyright of *Land and Water* has recently found a purchaser.

Our patent column this month contains a description of the new Boss single-trigger mechanism.

Mr. James Macbeth, of New York electric exploder fame, is spending a prolonged holiday in this country.

Messrs. Hellis & Sons are now connected up with the Post Office telephone system, their number being 828 Mayfair.

Mr. Charles Hellis, Junior, of the gunmaking firm of Edgware Road, was married on the 8th ult. at St. Paul's, Harrow Road.

A police notice has been issued to gunsmiths concerning the sale of revolvers in accordance with the provisions of the new Pistols Act.

A first and final dividend of 4s. 9d. in the pound has been paid in respect to the affairs of Mr. Albert Wickens, gunsmith, of Marden.

The Morris Tube Company have declared an interim dividend for the first six months of 1903 at the rate of 10 per cent per annum.

A young fellow named Henry Thompson was sentenced to two months' imprisonment at Grays sessions for receiving a quantity of gunpowder stolen from the Kynoch factory.

The newspapers continue to be filled with references to the new service rifle, and as far as one can judge all critics seem to be agreed in condemning the continuance of the old system of bolt.

One of the papers which concerns itself with financial affairs has been enquiring why the Colt Automatic Gun Co. have been so silent on the question of issuing a report of their transactions up to date.

The Royal Artillery Institution has issued as a reprint of their proceedings, Capt. J. H. Hardcastle's paper entitled "Notes on Bashforth's Method of Determining V and K_v as inferred from a study of his original note book."

Mr. Justus von Lengerke, of New York, who has been over here for some months, returned home on the 15th ult. after a Continental tour, in which he acquainted himself with the latest developments in gun and rifle manufacture.

The *Times* announce under its Naval and Military Intelligence in the issue of October 5th, that on the prompting of Lord Roberts it had been decided to fit a wind guage on the new service rifle to provide correction for lateral deviation.

Mr. L. G. Duff Grant has recently transferred his services from the Smokeless Powder and Ammunition Co., Ld., to the New Explosives Co. Ld., his position in the latter Company being that of General Manager, in place of Mr. F. Marten Hale resigned.

Messrs. J. R. Watson & Co., the agents for Cooppal powder, have sent us a copy of their price list for this year, from which we learn that they now only make up their powder into English-made cases, Messrs. Eley supplying their requirements in this direction.

Among the list of passengers by the ss. *Walmer Castle* which sailed on the 10th ult. appeared the name of Mr. Charles Whitehead, of Messrs Eley Bros. Our readers will, no doubt, join us in wishing him a pleasant and prosperous trip to South Africa.

The Pistols Act seems still but poorly understood by those who must observe its provisions. Its text is really so simple that there should be no difficulty in the matter. Still the fact that the Act is not found so simple as one would suppose is shown by the large number of letters we receive containing enquiries upon its various points.

Mr. F. Marten Hale recently resigned his position of General Manager of the New Explosives Co., the reason for his departure being stated by the financial papers as due to a disagreement with the Board on matters connected with the policy of the Company.

We are told that Messrs. Francotte have been industriously experimenting of late with a new steel for shot gun barrels, the tests they have made seeming to satisfy them that they will be able to issue tubes of very high tenacity for sale to gunmakers in all parts of the world.

From reports that have reached us from the Continent, there seems good reason for supposing that automatic weapons of various kinds are regarded as the thing of the future, Mr. Browning being among those most actively engaged in such work, his automatic shot gun, as made at the Fabrique Nationale, occupying the bulk of his attention at the present time.

It is announced that the Electric and Ordnance Accessories Co., Ld., of Chester Road, Aston, who have manufactured fuses in part only for two or three years, now propose to produce them complete. With this object in view, Messrs. Vickers, Sons & Maxim, Ld., to whom the works really belong, made application to the Aston magistrates on October 28th for a licence under the Explosives Act, and as no objection was offered the application was granted.

Messrs. A. Hollis & Son, gunmakers of Bombay, have sent us a copy of their 1903-4 season's catalogue, which contains the usual full assortment of information concerning nearly every kind of fire-arm that the world contains. We understand that thousands of copies are distributed in every part of India and the outlying Dependencies. We notice with much interest that the firm describe in full the new *Field* system of cartridge loading, and that they announce that they will be guided by it in their future operations.

Mr. Henry Holmes has recently ranked prominently in the sporting papers by reason of his introduction of a full-length rifle and gun cover, in which the portion that contains the barrels is made of solid leather capable of affording a large measure of protection. He has made a special pattern of the cover for Winchester repeating shot guns which will no doubt be found suitable for boat and other expeditions where it is necessary to keep a gun in some sort of cover, but at the same time ready for instant action.

Vanity Fair in a personal paragraph concerning Mr. T. F. Walker, the deputy B.S.A. Chairman, refers to the fact of the Company having received a contract for the new Government rifle. Whether or not they were unconsciously punning we cannot say, but they quote the sentence in his speech to the shareholders, in which he said that the Government had brought foresight to bear on the question of the new rifle. Most of us are even more concerned over the backsight than over the foresight, to say nothing of the breech action.

The National Explosives Co., Ld., issued a circular notice dated the 20th ult. to the effect that they have recently acquired Bell's patent for the formation and compression of guncotton in solid charges for use in submarine mines, torpedoes and shells. The circular proceeds to state that a complete plant for carrying out this work will immediately be erected at Hayle, and will be worked under the personal supervision of the inventor, Mr. G. W. Bell. In connection with this branch of their business, the Company have secured the services of Mr. F. Marten Hale, late of the New Explosives Company.

The Committee of the Birmingham Technical Education classes proposes as soon as possible to arrange for the giving of theoretical instruction in the following subjects:—Plain Mechanical drawing to scale. Strength of Angles, movement of levers, hinges, etc. Hardening and tempering. Elementary mechanical principles, such as force, work, energy, and power; laws of work and friction; reversing motion, quick returns, cams, etc.; force of a blow; compression of materials used in construction; stiffness and strength of springs; rolling friction, brakes; examples of frame work, with diagrams of stress; lines of resistance; effects of a blow.

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SIGHTING OF SMALL RIFLES.

A point which has frequently been urged in these columns is the great importance to all gunmakers of acquainting themselves with all the latest devices for the sighting of small rifles. Our own personal hobby runs so much in this direction that we frequently find cases where practical experience shows how far individual experiments will carry a conscientious investigator in the direction of perfecting the existing methods of sighting. Only the other day we gained a fresh piece of experience which will serve to illustrate our argument. We had been engaged in the construction of a special form of foresight which, while giving the finest shooting, did not require to be kept in focus by the eye. We all know that the Lyman aperture backsight is not focussed by the eye in the same way that ordinary backsights have to be. In the sight with which the experiments were conducted the foresight was similarly thrown up in the form of a hazy ring. In handing a rifle so fitted to a friend whose eyesight required the wearing of strong glasses he found himself in an exceptionally favoured position for fine holding. He explained that his glasses, while perfectly effective for distant objects, did not allow the range of adjustment that enabled him clearly to define the ordinary rifle foresight, and he found in consequence that the quality of his aim was greatly increased by the use of a foresight that did not require to be focussed.

Sundry little experiments with the table rest similarly bring out very many aspects of the sight question which cannot be exemplified, except by the knowledge that comes of personal acquaintance with the subject. Different sportsmen have different views. Many of them absolutely refuse to adopt any more perfect sighting than the ordinary open V backsight and a bead or barleycorn foresight. Others, on the other hand, are openly astonished that any sportsmen will consent to use such crude methods of sighting. The minimum that will satisfy them is a well-fitted pair of Lyman sights. While the back sight of this pattern is more or less a standard piece of mechanism it might even here often happen that advantage would accrue from slightly opening out the small aperture, so as to bring the size of the hole to something midway between the extremes represented by the alternative sizes ordinarily available. In foresights there is a great variety of choice. The Beach combination sight has more or less attained the position of a stock article of commerce, and yet the coarseness of its bead and its want of concentricity with the ring surrounding it condemns it in the eyes of many practical exponents of shooting. As an alternative to this pattern of sight the fine wind gauge sight of Lyman pattern offers many advantages. It is provided with a bead of such fineness as to make it possible to take the finest alignment on a small distant object such as a rabbit's head. The power of lateral adjustment, while ordinarily associated with target practice, is in reality the very finest adjunct to a minature sporting rifle. One never quite knows how it happens but the foresight seems frequently to require a slight adjustment one way or the other, according to the ammunition which is used and the changing characteristics of the shooter's method of pull-off. The wind gauge sight offers every facility for making these fine adjustments, and it must, therefore, rank as a sight that is at least worthy of being carefully studied by the enterprising gunmaker, whose ambition it is to carry his customers along with him towards the goal of greater perfection of shooting. While the trade in the true type of rook rifle has become stagnant of late years, it is not because the taste for rifle shooting has died out, but that other forms of weapon have superseded those most used some twenty or more years ago.

THE PROOF RULES DISPUTE.

INTERESTING CORRESPONDENCE ON THE MARKING OF FOREIGN GUNS AND THE STATUS OF THE ENGLISH BARREL MAKER.

To the Editor of *Arms and Explosives*.

Sir,—Permit me to point out that your editorial article on this subject does a very great injustice to English Gun Barrel Makers, the views expressed therein respecting the relative importance of the Gun Barrel Industry to gunmaking being contrary to fact.

Section 4 of the Gun Barrel Proof Act, 1868, provides the (only) legal definition of "barrel": "*Barrel*" includes every barrel of every Small Arm, and every Breech of every Small Arm, and every part of every Small Arm which would in the User of the Small Arm contain all or any Part of the Charge of the Small Arm, and every part of every Small Arm in, from, or through which Part in the User of the Small Arm all or any Part of the Charge thereof would be exploded or discharged:

"*Barrel*" also includes every Barrel welded, forged, or cast, *finished or unfinished*, or in any other progressive State of Manufacture, and any and every Part of a Barrel.

"*Double Barrel*" includes every Barrel of or constructed for every Small Arm having any Number of Barrels more than one.

"Proof" is also defined in this section:

"'*Provisional Proof*' means Proof of a Barrel liable in any subsequent Stage of Manufacture to be reduced in Strength before it forms Part of a Small Arm in a finished State."

"'*Definitive Proof*' means Proof of a Barrel not liable in any subsequent Stage of Manufacture to be reduced in Strength before it forms Part of a Small Arm in a finished State."

Section 38 defines the Qualification of Members of the Birmingham Gun Trade: "*The Qualification of a Member of the Birmingham Gun Trade* shall be his being of full Age, and a Master Gunmaker or Master Gun Barrel Maker carrying on business as a Master Gunmaker or Master Gun Barrel Maker in or within Ten Miles of the Borough of Birmingham . . . : Provided also that the Expression 'Master Gun Barrel Maker,' wherever used in this Act, shall include a Master Breech-Loading Action Maker, but shall not include any Person who, not being a Master Breech-Loading Action Maker, makes or wholly or partially completes in a finished State a Part or Parts only of Gun Barrels."

Sections 21, 22 and 23 defines the *Qualification of Elected Guardians of the Proof House*, the principle requirement being that they "shall be or shall have been Master Gunmakers or Master Gun Barrel Makers carrying on business in or within Ten Miles of the Borough of Birmingham."

It will be observed from the foregoing that the Proof Act recognizes *three divisions of the Gun Trade* as separate trades in themselves, and it is self-evident that *none* of the various productions, whether components or complete arms, of any of these three trades can be classed as raw material:

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(1) *Gun Barrel Making*, that is, customarily, the production of barrels as far as what is known as the "Tube State," namely, the state in which they are required for Provisional Proof, in which state foreign barrels are generally imported, or in the Proved State, namely, the "tube" after being provisionally proved.

(2) *Breech-Loading Action Making*, that is, making and fitting the Breech Action complete so that cartridges can be fired from the barrels (the condition requisite for definitive Proof), preparatory to the subsequent operations of stocking and finishing into a complete Small Arm.

Gun Making. This may include all the operations from the making of the Tube (and may include the making of the "iron," *viz.*, the piling or mixing of the iron, or iron and steel, and other operations necessary to prepare the strip from which the "tube" is made by coiling spirally and welding) to the completion of the Small Arm, or may indicate making up tubes into Arms, or Breech-Loading Actions into Arms.

The Act entitles Gun Barrel Makers and Breech-Loading Action Makers to precisely the same amount of consideration as that which it accords to Gunmakers, equal *status* being given to each of the three sections by the Act; and, it should go without saying, that the permanent interests of the Gun Trade demand that these two sections should be maintained in a sound and prosperous condition and that the necessary means should be taken to protect them from the insidious competition which the present practice of English proof marking foreign barrels and small arms encourages.

Gun Barrels do not come within the same category as tubes of other kinds. Their production, besides requiring a special and expensive plant of machinery, demands special skill in every operation, from the forging upwards. For example, it would be impracticable for an ordinary smith to weld barrels.

The safety and accuracy of the arm depend principally upon the quality of the material and workmanship employed in producing the "tube," which is the most essential component, in fact, the *sine qua non* of every Small Arm.

The superior resisting power of the material used in the manufacture of English barrels is too well-known to need comment; and the prestige of English workmanship is, and has been, the *raison d'être* of that sincerest flattery—imitation.

It is the determination of the self-reliant element of the trade that gun barrel making shall resume its rightful position in this country. This branch has suffered more than any other from the competition we complain of, and, as soon as differential proof-marking shall have received the sanction of the Secretary of State for War a revival of the industry will be assured, and enterprise on the part of barrel makers will inevitably result upon the restoration of confidence. This outlay would in future be protected from being rendered unremunerative by the volume of business being reduced by privileges given by the English Proof Authorities to foreign manufacturers.

All fears respecting sufficient supply of barrels are absolutely groundless, and are only possessed by persons who are not practically acquainted with the manufacture of gun barrels and who are, consequently, ignorant of what has been, is being, or can be accomplished. Double or treble the number of barrels could be produced by existing plant in this country. Every difficulty could be overcome within a few months of a favourable decision being given by the Secretary of State for War and every barrel required in the United Kingdom could be produced in this district. To have the Gun Trade self-contained within the country would be an unquestionable advantage to all parties concerned, even to those who are at present relying upon imported barrels and other components.

Respecting the competition of "goods that are exported from abroad to colonial and foreign countries where we do business" the adoption for barrels and arms made in the United Kingdom of *distinctively British proof marks, self explanatory to intending purchasers*, would be amply effective to protect British gunmakers from unfair competition and traders and sportsmen from imposition. Such marks would become popular and purchasers would soon get into the habit of looking for them. Thanking you in anticipation of your inserting this in your next number.

Birmingham, Oct. 23, 1903. A. TUNSTALL.

FROM THE EDITOR OF *Arms and Explosives* TO MR. TUNSTALL.

DEAR SIR,—I have to thank you very much for your very careful exposition of the Birmingham gunworkers' attitude on the subject of barrel tube making, and I shall have much pleasure in inserting the same in the next issue of *Arms and Explosives*.

There is, however, one point which you deal with as though there were no possible opening for difference of opinion thereon, and I should like to hear from you further upon it to guide me somewhat in my editorial references to the subject.

You say that all fears respecting a sufficient supply of barrels are absolutely groundless. This and other statements you make suggests that the Birmingham trade could immediately supply tubes on competing terms with Belgium. My own information from thoroughly practical men and manufacturers is that it is extremely difficult to obtain really sound tubes of Birmingham make at the price requisite for the making up of cheap guns. Birmingham manufacturers definitely state that comparing the output of the two countries the Birmingham quality is worse and the prices higher than for Belgian work. One maker told me that the price of finished Belgian tubes is actually less than the cost of the labour necessary for doing the same work in Birmingham. This he says is due to the fact that women and children work in the Belgian factories, and that the conditions and hours of work and pay received are such as could not be met by working under English conditions.

In these matters we must be quite frank as to what is intended, and I should, therefore, like to know whether underlying your own contention is the view that it would be better to pay increased prices for Belgian work, sooner than go abroad for what you object to my terming components. Personally I think it would be better, but I consider that the proper means of attaining the end is not by Proof House regulation, but by the carrying out of Mr. Chamberlain's tariff proposals.

In conclusion I should like to tell you that I am thoroughly in sympathy with the workmen's efforts to improve the status of the Birmingham trade as a whole, but I am against endeavouring to carry out this policy by methods that would be prejudicial to the legitimate manufacturing work that is at present going on, and I fear that the sudden action you advocate would do harm to the trade pending the re-organisation of the barrel industry.

London, Oct. 27, 1903. THE EDITOR.

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To the Editor of *Arms and Explosives.*

Dear Sir,—I am in receipt of your letter of yesterday's date, and for which I beg you to accept my best thanks. I appreciate the candid expression of your own views and your courtesy in requesting my opinion upon them by way of contradiction.

As I have already stated, in my previous letter, the fears as to the practicability of supplying the trade with barrels made in this country arise entirely from want of knowledge, not only as to what can be done to meet any extra demand upon English barrel makers, but as to what is now being done.

1. The barrels employed in the plainest English Breech-Loader are what are called Skelp Twist. The barrels for these guns are supplied almost entirely by local barrel makers.

2. The next quality, a one-strip "figured" barrel, called "Boston," classed as "Damascus," is also almost exclusively supplied locally.

3. Steel Barrels are extensively supplied by local makers. There is no difficulty whatever on the part of the local makers in producing these barrels.

4. Fine Damascus Barrels, principally 2 strip and 3 strip. It is with regard to these barrels that the objections of importers to differential proof marking are chiefly directed.

Large numbers are imported for use in guns of higher grades than those in which the Skelp Twist and Boston are employed. In the production of guns of this class a trifling difference in cost, higher or lower, is not so serious a matter as would be the case in guns of plainer qualities. It is these barrels besides those of the other three classes, that we desire to make in this country.

The foreign maker, by employing softer materials than the English maker does, is enabled to produce barrels which lend themselves more readily to the action of the chemicals generally used by gun barrel browners, and, which, therefore, show up the "figure," that is to say, render more distinct, and, consequently, in greater contrast—the respective colours (dark and light brown) of the chain-like intertwinings of the two metals of which the "Damascus" is composed, namely, iron and steel. Thus, in order more easily to produce this clearness of demarcation or "figure," the durability and genuine quality of the barrel is, to a large degree, sacrificed.

This sacrifice is entirely unscientific and antagonistic to the interest of all concerned, even, eventually to the importer of foreign barrels, notwithstanding that he is unable or unwilling to see it. It is especially important, as the use of smokeless powders and the demand for guns light in weight are now almost universal, that the material from which gun barrels are manufactured should be the toughest, hardest, and most resisting that can be produced. The employment of the softer material, which is, of course, more easily operated throughout the whole course of manufacture, renders a gun which is made up with foreign Damascus barrels less resisting than one which has for example English Skelp Twist Barrels.

Further, it is the practice of foreign makers, for the sake of economy, to use an outer strip (thinner than the strip used by English makers) coiled around and welded to an inner tube of common iron. The English barrels of every kind are made of one material throughout, no inner tube being employed.

So far as resisting power goes, the object of the foreign maker is to supply barrels, strong enough to withstand provisional proof, his interest and responsibility ceasing with so doing.

The material from which the English Damascus Barrels are produced is the hardest, toughest and most durable, but it is correspondingly difficult to manipulate, and, therefore, it costs a little more to produce them than corresponding foreign barrels. But their quality is proportionately superior, whilst the total extra cost would not exceed from 1s. to 2s. per pair.

Those facts are not generally known to purchasers of guns. The same English proof mark is at the present time put upon the foreign barrel as upon the English barrel. The foreign barrel is thus given an equal *status* with the English barrel, and, in fact, is palmed off as such. This is the state of things we desire to alter.

You will see from the foregoing, the discouraging position in which the English gun barrel manufacturer is placed. The adoption of differential proof marking would give him his rightful place, and he would have a market for increased production. His dependence upon the gunmaker for orders, and the existence of local competition, which could at any time be increased, would suffice to induce him to maintain a plant in the highest state of efficiency. He would be further encouraged to vigorous effort if the difference in resisting powers of English and foreign barrels could be made widely known among sportsmen.

The only requisite stimulus to increased enterprise is the prospect of *an increase of profit by means of increased output.* This prospect would be secured by the differential proof marking of barrels, much more effectively than by the imposition of duties on components or arms. Belgium, our principal competitor, is practically a free-trade country, and it is questionable in the event of any alteration being made in the fiscal policy of this country, whether any duties would, be placed on Belgian goods of any kind.

As regards the "figure" of English Damascus, foreign and English Damascus barrels require respectively special treatment by browners, who ordinarily, apply one treatment for Damascus barrels of all kinds; which is to say that if a quantity of barrels, some foreign and others English, were sent in to brown together they would usually be treated alike. As the majority of Damascus barrels are at present foreign, browners generally adopt the treatment most suitable for them, the result, with respect to the English Damascus barrels, being that the "figure," which is in the barrels and only requires the application of suitable processes to bring it out, is comparatively poorly demonstrated. Conversely, if the conditions were reversed, browners would adopt the treatment most suitable for demarking the "figure" of the English Damascus barrel, with correspondingly satisfactory results.

The difference in resisting powers applies equally to Skelp Twist and to Boston Barrels, so that the English Skelp Twist barrel has greater resisting powers than a foreign fine Damascus barrel.

I have recently had an unique opportunity of acquiring every needful information as to the present means of supply, and I have discussed the subject with all the master gun barrel makers in the locality. I am thereby able to assure you that there is not a firm who could not treble its present output if called upon to do so. There is ample capital in the trade; but, so long as the foreign barrel can, by means of the English official proof mark, be passed off as the product of these firms, there is a reluctance to spend money in improving the means of production; but, upon the necessary change in

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proof-marking taking place, manufacturers would not hesitate to make any outlay necessary to render the plant capable of producing in the most efficient and economic manner.

Under the present system of manufacture both foreign and English twisted barrels are liable to acquire the blemishes known as "greys." The present controversy has led to the study of this subject. The cause of these blemishes has, fortunately, been located; and, in consequence of recent inventions, it is now practicable to obviate them, at any rate, so far as English barrels are concerned. Upon differential provisional proof-marking becoming an accomplished fact, the increased demand for material would not fail to induce the makers to take advantage of the remedy.

I desire particularly to add that there is no necessity whatever for purchasers of guns to specify foreign steel barrels of any kind, the barrel makers in this district being capable of supplying the finest steel barrels produceable. The manufacture of steel barrels requires very special knowledge. This knowledge is amply possessed by the firms who specialize in the production of barrels of this class, and you may be quite sure as to the ability of these gunmakers to meet any demand, however stringent specifications may be.

The Skelp Twist and Boston barrels are purchased from local makers at about the same figure as those charged by their Belgian competitors; but taking into consideration the cost of operations which it is necessary to do here on the imported barrels, the English barrels have the advantage in price. The employment of English barrels in English guns adds to the prestige of the English gun trade, also to that of the English proof mark, and the adoption of differential, provisional and definitive proof marking would greatly augment it.

I would add that I have been uninterruptedly associated with barrel making in this district for the last 25 years, and I can speak from personal observation of the methods of barrel manufacture in Belgium. The Belgian barrel maker is as good a type of a well fed man as one would find. The talk about the employment of women and children in barrel making on the Continent is, practically speaking, imagination. I do not remember having seen a child at work. What portion of barrel making could a child do? As to women, they sometimes assist in treading together the coal and clay to make the particular fuel used in the welders' hearths, and in the simplest kind of boring, but anything more is practically out of the question.

Regarding the proposed new proof rules 62 and 63, I beg to specify what will be their practical effect upon the English manufacturing trade. If sanctioned, dealers here could, as they can at present, import foreign barrels in the tube state, and, after having them provisionally proved and proof marked with the same proof mark as that put on English barrels, return them to Belgium, or elsewhere abroad and have them made up into complete actions and barrels ready for definitive proof. They could then be re-exported to this country definitively proved and proof marked exactly as English arms and subsequently be stocked and finished here, or be again returned abroad for completion. Foreign makers could take advantage of the rules for the same purpose.

These two rules have been worded purposely in order to permit this kind of competition against English barrel makers, breech loading action makers and gunmakers to be carried on by persons, some of whom may be unable, and others unwilling, to go to the expense and trouble of establishing and maintaining manufactories in which skilled workmen are employed, which establishments are the real support and backbone of the trade. The veriest *courmouseuse* must admit that if such conditions are permitted to continue, progress, which it is the desire of the manufacturing element to encourage, must of necessity be continually hampered and checked, if not entirely extinguished.

For example, a representative of a manufacturing firm calling on London or provincial purchasers would be shown the English-proof-marked foreign imitation by his quondam customer. He may have purchased it from a self-styled English gunmaker, or from a foreign manufacturer. The latter, in order to do business with purchasers in this country or in the colonies or any other markets abroad, sends a part of his productions to England for the purpose of getting the English proof mark put on them, thereby enable his trade customers to pass them off in due course as English made. The foreign imitation is sold to the dealer at less than it is practicable to offer the genuine article. The English maker and workman suffer, the foreigners and the dealers gain. The sportsman is "hoodwinked."

Birmingham, Oct. 28, 1903. A. TUNSTALL.

TRADE MARKS.

APPLICATIONS ADVERTISED. SEPT. 30–OCT. 21, 1903.

256,495. Pulverfabrik Hasloch a. Main Gesellschaft und Beschränkter Haftung. Device representing a shield with three rabbits, arranged to form a triangle, depicted thereon. To apply to ammunition and cartridges. August 10, 1903.

TRADE MARKS REGISTERED. SEPT. 17—OCT. 14, 1903.

255,680. The Carbonite Syndicate, Ld.

APPLICATIONS FOR PATENTS.

SEPTEMBER 21—OCTOBER 17, 1903.

20,249. Air Guns. G. L. Jefferies.
20,272. Rifle Sight. R. A. Rogers and F. Cantelo.
20,311. Projectiles. R. A. Hadfield and A. G. Mck. Jack.
20,328. Target Indicator. T. P. Woollatt and W. Slater.
20,336. Projectiles. T. S. Forbes.
20,355. Machine Gun Feed. F. Coe.
20,380. Artillery. G. C. Topp.
20,429. Small-Arm Sights. J. T. Peddie.
20,456. Projectiles. J. R. Bayliss.
20,477. Small-Arms. G. B. Ollivant.
20,586. Small-Arm Foresights. W. G. Woolfrey.
20,761. Cartridge Belts. A. H. Corbet and G. G. Blackwell.
20,764.* Shot and Blasting Cartridge Closing. B. Behr.
20,773.* Pistols B. Müller (Date of application in Switzerland, September 27, 1902).
20,814. Time Fuses. A. Reichwald (Agent for *Fried. Krupp, A.-G.*).
20,936. Small-Arms. A G. Melhuish and E. W. Beech.
20,965. Explosives. C. H. Curtis, C. L. W. Smith, D. J. Metcalfe, A. C. Pearcy and A. F. Hargreaves.
20,999. Explosives A. C. Luck.
21,123. Ordnance Sighting. Sir W. G. Armstrong, Whitworth & Co., Ld., and R. T. Brankston.
21,170. Cross Hairs of Sighting Telescopes. A. W. Peterson.
21,241. Trueing Gun Barrels. W. Pearson.
21,365* Explosive. Nelly Schnebelin (Date of application in Belgium, October 30, 1902).
21,439. Air Gun Trigger. N. Hall.
21,454. Range-Finder. T. R. R. Ashton.
21,481. Explosives F. E. W. Bowen.
21,482. Explosives. F. E. W. Bowen.
21,518.* Powder Charges. P. du Buit.
21,544 Ejecting Mechanism for Small-arms. S. R. Perry and T. E. Wayne.

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21,632. Ignition of Petards. F. Hülsmann.
21,670. Explosives. A. C. Luck.
21,710 Tangent Sights. F. Groves.
21,716. Recoil-operated Small-Arms. H. F. Woodgate.
21,738. Automatic Feed for Cartridge Tubes. H. Iles and Kynoch Ld.
21,787. Gun Sights. G. Forbes.
21,789. Nitrated Cellulose. P. Noguès and H. M. Proveux.
21,828. Sighting Instruments. C. Fritsch.
21,887. Binocular Telemeter. C. Pulfrich and A. König.
21,944.* Projectiles. J. B. Sample.
22,078. Breech Mechanism of Ordnance. A. T. Dawson and G. Buckham.
22,144. Targets. T. B. Ralston.
22,160.* Ordnance Mountings. A. T. Dawson and G. T. Buckham.
22,174. Small-Arms. G. Knight.
22,243. Gun and Accessories. L. W. Broadwell.
22,283. Gun Mountings W. E. Corrigall.
22,351. Semi-Automatic Machine Guns. T. R. R. Ashton.
22,485. Ammunition Wagons. A. T. Dawson and G. T. Buckham.
22,486.* Electrical Range Finder. H. Shoemaker (Date of application in U.S.A., January 10, 1903).

* These Applications were accompanied by complete Specifications.

SPECIFICATIONS PUBLISHED.

SEPTEMBER 24th—OCTOBER 22nd, 1903.

COMPILED BY HENRY TARRANT.

20,321 (1902). **Telescopic Sights for Ordnance**. C. P. Goerz, Germany. An arrangement of telescopic sights for ordnance, by means of which the bearings of the telescope may be so altered as to allow of the gunner sighting any object situated in a circle, without changing his position behind the protective shield. Accepted September 10, 1903.

23,846 (1902). **Blasting Explosive**. C. E. Bichel, Germany. A process of gelatinising nitroglycerin, consisting in dissolving colloidal substances, such as glue, in a liquid, say glycerin, having a boiling point higher than water, and in mixing the product, that is the glue-gelatine, with nitroglycerin. Accepted September 3, 1903.

24,150 (1902). **Automatic Ordnance Sighting.** R. C. Barnes, Bexley Heath; and R. Bauld, Erith. A method of making large adjustments of the sliding sight carriage upon the sight bar of rear or tangent sights, generally used upon machine guns, quickly and without the noise, due in the present type, to the rattle of the pawl over the rack teeth upon the bar. Accepted September 17, 1903.

24,246 (1902). **Ejector Tubes of Automatic Guns.** Vickers, Sons, and Maxim, Ld., London (Agents for *The Deutsche Waffen und Munitions Fabriken, Germany*). By the present arrangement of the ejector tube in automatic guns, it is possible when unloading the gun, that one of the two loaded cartridges which at one time must be within the tube, will explode the other. To obviate this difficulty, the ejector tube spring is dispensed with, and a lateral opening is provided, so that the ejection of one cartridge is independent of the ejection of the other. Accepted September 10, 1903.

25,025 (1902). **Blasting Explosive**. W. O. Wood, South Heiton by Sunderland; and H. Knudsen, London. A method of, and apparatus for, obtaining explosive effects through the medium of liquid air or gas. The liquid gas or air is contained in a suitable metal case, which is placed within the hole and tamped in the ordinary way. The interchange of temperature between the liquid air or gas and the material around to be rended, causes the liquid quickly to assume its gaseous condition. Accepted October 1, 1903.

25,170 (1902). **Miniature Practice Cartridges.** M. Mullineux, Manchester. Improvements upon the breech adaptor described in patents Nos. 10,026, 1896 and 4,149, 1897, consisting in providing the tubular chamber lining with a circumferential groove into which is filled a winding of thread. The thread is adapted to bite the chamber walls. A hole is provided near the mouth of the adaptor for the purpose of removing the tube through the medium of an extractor lever. Accepted September 10, 1903.

25,412 (1902). **Percussion Fuse.** F. M. Hale, Catford; and J. B. Reavil, Stowmarket. A delayed action percussion fuse, in which a slow-burning composition is interposed between the magazine and its detonator. By this arrangement the delayed action is obtained without materially changing the construction of the ordinary Service percussion fuses. Accepted September 3, 1903.

25,464 (1902). **Movable Targets.** W. L. White, Hedon, near Hull. Movable targets especially adapted for Morris tube practice applied to ordnance. The targets are caused to travel on a belt. They may be adjusted at any angle, and if desired, can be arranged to disappear. Accepted September 17, 1903.

25,540* (1902). **Blasting Explosives.** J. Wetter, London (Agent for *The Westfalisch-Anhaltische Sp-Ag., Germany*).

26,549 (1902). **Ordnance Sighting Apparatus.** Sir W. G Armstrong, Whitworth & Co., Ld., and C. H. Murray, Newcastle-on-Tyne. A method of so regulating the inclination of the part which carries the telescope on the fore and rear sights, that the arrangement is more compact; the eye of the sighter is less displaced in following an inclined aim, and a smaller sighting port can be employed. By means of a cam plate between the rack and the sights or telescope the inclination of the rear sight with its guide and rack to allow for the drift of the projectile, is automatically produced. Accepted October 1, 1903.

26,770 (1902). **Rifle Carrier.** Lt.-Col. J. H. Patterson, Uxbridge. An appliance for carrying a rifle when mounted, consisting of a spring clip attached to the saddle, and a slot and stud connection upon the rider's belt. The rifle is securely held, but may be readily detached. Accepted September 24, 1903.

26,802 (1902). **Blasting Explosive.** H. Dreany, Canada. The preparation of a blasting explosive, consisting first in mixing from 70 to 80 per cent. by weight of nitroglycerin with from 10 to 15 per cent. by weight of pretrolatum at a temperature of from 100° to 110° Fahrenheit. To this mixture is added from 10 to 15 per cent., by weight, of oil of mirbane at about the same temperature. The proper quantity of wood pulp and nitrate of soda to modify the action of the explosive is added to the mixture before it cools. Accepted September 17, 1903.

27,178 (1902). **Rifle Sight Mountings.** A. T. Dawson and G. T. Buckham, London. A sight mounting for a small-arm back-sight of the "Grubb" type. An elevating arc, working in a bracket on the side of the rifle, is provided with a rack which is adapted so to grip the teeth on the pinion moving it, that the sight is always held steady. A thumb screw is graduated on its periphery to accord with different ranges, and the turning of this part actuates the pinion and thus the rack and so elevates or depresses the sight. Accepted September 3, 1903.

241* (1903). **The "Boss" Single-Trigger Mechanism.** J. Robertson (Boss & Co.), London.

1,220 (1903). **Percussion Fuses.** A. Reichwald, London (Agent for *Fried. Krupp, Germany*). Two ports leading from the ignition chamber of a percussion fuse to the bursting charge of the shell are so arranged that one is regulated by a cock, whilst the other is filled with a retarding composition. The shell may thus at will be caused to explode either with or without retardation. A safety bar to be used during transport is also described. Accepted October 1, 1903.

7,923 (1903). **Cartridge Bags.** E. P. and H. W. Lawrence, and J. Row, London. The mouth of the ordinary cartridge bag is formed with a soft and yielding edge. This edge the patentees stiffen by means of some pliable material. The result that the removal of cartridges is facilitated, the mouth retaining its shape although it is allowed to yield under pressure. Accepted September 3, 1903.

8,155 (1903). **Loading of Ordnance.** C. P. E. Schneider, France, A device suitable for ordnance of all types in which the recoil of the gun is utilized not only for returning the gun to battery, but also for opening the breech; aligning the charge with the gun; introducing the complete charge into the gun; withdrawing the carrier from the gun; closing the breech, and maintaining all the parts in their various positions, no matter what may be the elevation or depression of the gun. Accepted September 3, 1903.

11,972 (1903). **Magazine Rifle.** R. C. Sevenson, Kilmarnock. A magazine rifle of the bolt type, in which the moving parts

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are few, and are so designed as to simplify the general construction and to allow of easy and quick manipulation. Accepted September 10, 1903

12,398 (1903). **Small-Arm Magazine.** P. S. Mauser, Germany. A detachable magazine for automatic rifles, adapted to carry a large number of cartridges. When the magazine is detached, two lips are caused to hold the cartridges therein, and when it is replaced the lips are automatically removed to allow the cartridges to be fed up to the chamber. By a peculiar arrangement of spiral springs and rollers the cartridge platform is given a uniform and regular action up and down the magazine. Accepted September 3, 1903.

15,963 (1903). **Clay Bird Trap.** G. C. Marks, London (Agent for *The Chamberlin Cartridge and Target Co., U.S.A.*). A clay disc-throwing trap, the direction of which is regulated by the feet of the loader. After the discharge of a bird, the puller releases the main throw spring which he governs from the firing point by means of a strong lever. When the main spring is released the arm is automatically returned to its loading position by another spring. To discharge the bird, the puller elongates the main throw spring until the trigger holding the arm is actuated. Accepted September 17, 1903.

16,455 (1903). **Gun Carriages.** J. E. Bousfield, London (Agent for *P. Nordenfeldt and E. Ternstrom, France*). A modification of the gun carriage described in Patent No. 6,426, 1902, wherein provision was made for allowing a long recoil for short guns having hydraulic mechanism for recoil checking. Two regulating valves and back-pressure valves are combined with this mechanism for the purpose of controlling the resistance to the recoil and the resistance to the return to the firing position independently of each other. Accepted September 3, 1903.

16,504* (1903). **The "White" Single-Trigger Mechanism.** G. Harrison, London (Agent for *J. P. White and B. D. Haines, U.S.A.*).

16,963 (1903). **Loading of Ordnance.** C. P. E. Schneider, France. A modification of the automatic loading apparatus described in the above Patent No. 8,155, 1903. The energy of recoil is absorbed by springs instead, as is set out in the specification mentioned, by the compression of air. Accepted September 10, 1903.

17,778 (1903). **Spring Recoil Guns.** G. Ehrhardt, Germany. A method of facilitating the removal and the replacing of the recoil spring in ordnance, consisting in providing part of the brake cylinder with a hollow screw threaded socket which is engaged by an external screw thread upon the end of the other part of the cylinder. The spring is easily compressed by the screwing of the one into the other. Liquid may be introduced into the cylinder from the rear without disturbing the bearings or the spring. Accepted September 17, 1903.

* These Specifications are more fully described under "Selected Patents."

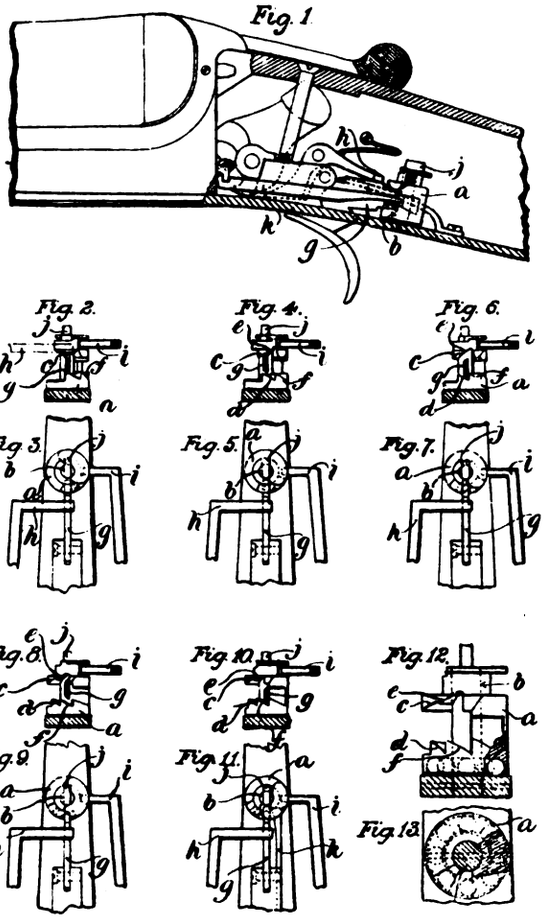
SELECTED PATENTS.

THE "BOSS" SINGLE TRIGGER MECHANISM.

241 (1903). J. Robertson (Boss & Co.), London. The system of single-trigger mechanism dealt with in this specification is a modification of the type which was set out in a previous patent, No. 22,894, 1894. In the prior arrangement the "capstan"—a part adapted to intercept the involuntary pull and to lift the second sear—was turned around upon its pivot by a spring. Experience has proved to the patentee that this spring might break or might fail to act effectively and so render the mechanism inoperative. It is deleted, therefore, and its function of turning the capstan is performed by the movement of the trigger itself. In its upward and downward movements the top and under edges of the trigger blade are caused to work over inclined surfaces upon the capstan, and so to turn it around. The same principle is applied in the case of two other methods of discharging the two barrels of a gun by means of only one trigger. In one case a limb is hinged to the tail of the trigger blade and works in conjunction with an inclined-plane-carrying part fixed to the trigger plate; whilst in the other a limb is caused to slide upon the trigger blade, being shifted to a position for discharging the second barrel, through the medium of the inclined planes, by the different pulls of the trigger. We illustrate the first-mentioned mechanism in which a capstan, or tumbler, is the intermediate pull absorber, and the second sear releaser.

The tumbler *a* is so mounted as to be capable of partial rotation around the pillar *b*, and in certain positions, of a vertical sliding movement thereupon. The tumbler is provided with the inclined surfaces *c*, *d*, *e*, *f*, between which the end of the trigger blade *g* is situated. When the trigger is pulled or released the trigger blade contacts with either one or other of these inclined surfaces and through the movement of one over the other the tumbler is caused to rotate upon the pillar.

The parts are illustrated in the positions they occupy when the gun is ready for the discharge of the first barrel in Figs. 2 and 3. As will be seen the sear *h* of the right hand lock extends over the trigger blade. It is raised when the trigger is pulled. The



upward movement of the end of the blade *g* during this first pull takes it into contact with the first inclined surface *c* upon the tumbler *a*, and the tumbler is by this means turned upon its pivot until it occupies the position illustrated in Figs. 4 and 5. The involuntary release of the trigger due to the recoil, carries the under edge of the blade into contact with the surface *d* and the tumbler is again rotated into the position indicated by Figs. 6 and 7. The involuntary pull follows instantaneously, and, carrying the top of the trigger blade end over the third surface *e*, the tumbler is turned into the position shown in Figs. 8 and 9. The trigger finger, after this involuntary pull, relaxes its pressure voluntarily, and during

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its downward progress into its normal position of rest the under edge of the trigger blade is caused to turn the tumbler once more by its contact with the surface *f*. The position finally occupied is that in Figs. 10 and 11. The second voluntary lifting of the trigger carries the tumbler upwards, and taking the nose of the sear *i* out of bent, discharges the second barrel. Only when in the position set out by Figs. 10 and 11 is the tumbler *a* allowed to rise vertically. When in this position a recess in the tumbler is situated beneath the lateral extension *j* upon the post *b*, so that upward movement is not denied the tumbler by this obstacle. The tumbler is returned to its normal position by the rod *k* which is actuated by the top lever. In order to allow the tumbler to be easily turned, friction is reduced by the provision of a ball bearing as is illustrated in Figs. 12 and 13. Accepted September 10, 1903.

BLASTING EXPLOSIVES.

25,540 (1902). J. Wetter, London (Agent for *the Westfälisch Anhaltische Sp.-Ag.*) According to recent research, say the patentees, the disruptive power of explosives may be substantially enhanced by the admixture of finely divided metals which are easily oxidisable and which will consequently get oxidised during the deflagration of the explosive at the expense of the oxygen in the explosive. This process is accompanied by considerable generation of heat. From further experiments it has been discovered that the physical structure of the metal has much influence upon the degree of its action in the explosive composition. A woolly condition, obtainable, for instance, by the process described in Bühne's patent No. 21,357, 1900, is best adapted to enhance the dynamic energy of the explosive. These readily combustible metal wools, which, in addition, possess, besides catalytic properties, an extraordinary degree of fineness and consequently an enormous surface, produce an effect far superior to that obtainable from the same metals when they are in a state of fine division produced by ordinary mechanical disintegration.

Among the metals tested as additions to explosives, aluminium wool has been found to be very useful. The nature of the explosive and the effect desired regulate the quantity used. In some cases it may be as great as 50% of the compound employed.

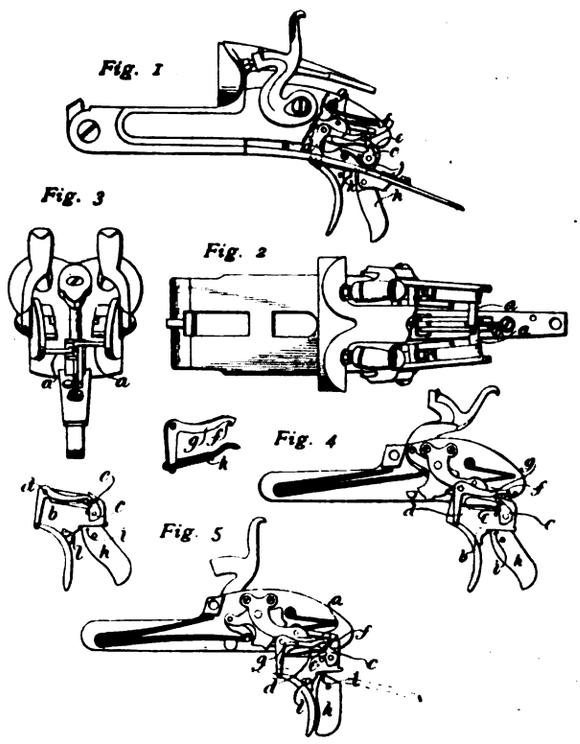
The three examples of explosives given, into the composition of which metal enters, are as follow:—Picric Acid 80 parts, Aluminium wool 20 parts; "Westfalite" 85 parts, Aluminium wool 15 parts; Carbonate 90 parts, Aluminium wool 10 parts. The oxygen carrier forming part of the explosive may be in the shape hitherto used. This metal wool may with advantage also be added in the manufacture of priming composition. Accepted September 24, 1903.

THE WHITE SINGLE-TRIGGER MECHANISM.

16,504 (1903). G. Harrison, London, (Agent for *J. P. White and B. Haines, U.S.A.*). The system of single-trigger mechanism described in this patent is such that the barrels must be fired in the "right first and then left" order. By the shifting of a part the left-hand barrel only may be discharged, but the part has to be carried back in order to allow of the cocking and disengagement of the right-hand sear and its tumbler.

The mechanism is illustrated in the appended drawings in working relation with the gun of the outside hammer type. The locks are of ordinary construction, with the exception of the tumblers and the sear tails. The sear tails *a* are shaped to adapt them to the action of the single trigger, whilst the tumblers are provided with cam-shaped surfaces immediately beneath the bents in order, when down, or uncocked, to throw the tails of the sears up. The parts are in their normal position as is illustrated in Fig. 1. When the right hand hammer is pulled back into cock the right hand sear tail *a* is dropped into engagement with the top of the trigger blade *b*. In its downward movement the tail is caused to engage the part *c* pivoted on the side of the trigger blade and called the "fly," and to force it forward against the pressure of its spring *d*. The lug *e* upon the side of the fly *c* is by this movement brought directly beneath the notch *f* situated upon the end of the right-angled detent *g* (Fig. 4). The left-hand hammer is then cocked.

When the trigger is pulled the right-hand sear tail is lifted and the corresponding barrel is discharged. As the blade is elevated the lug *e* is carried right into engagement with the hook *f* upon the detent *g*, and the fly is positively held in an ineffective position. The lifting of the trigger performs another function, inasmuch as it releases the limb *h* which gravitates into a perpendicular position, causing its nose *i* to hold the trigger against downward movement. The momentary fixing of the trigger in this position (Fig. 5), prevents the shifting of the parts over to the left-hand sear until the involuntary pull has passed. The trigger spring *j*, however, almost immediately causes its influence to be felt, and the trigger is forced back into its normal position. The depression of the trigger disengages the lug *e* from the notch *f*, and the right-hand sear tail *a* being removed by the fallen right-hand hammer, the fly *c* is turned back to its original position by its spring *d*. The lug



e is thus carried backwards to a position beneath the left-hand sear tail, which tail is lifted with the second predetermined pulling of the trigger. When it is desired to use only the left-hand barrel, the right-angled detent *g* is turned over upon its pivot, by means of the leaf spring *k* into such a position that its end *f* locks the fly *c* in its position beneath the left-hand sear. When the detent is in this position, the right-hand hammer cannot be cocked, simply because the right-hand sear-tail is brought up against the locked fly *c* before the nose of the sear reaches bent.

The length of the pull of the trigger is adjusted by means of the cam-shaped screw *l* upon the side of the trigger blade. The screw engages the underside of the trigger blade and so prevents upward movement of the trigger beyond a certain point. Accepted, September 3, 1903.

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CONTENTS.

CURRENT TOPICS.

New Proof Rules.—According to the general opinion in the trade, it seems to be agreed that the progress of the new rules of proof is being very seriously delayed by the questions that have arisen in connection with the marking of foreign guns and barrels. It is quite certain that our observations of last month, fully represent the opinions of the more thoughtful among our leading gunmakers. Briefly, it seems to be recognised that while it is most undesirable that the markings of the two proof houses should be utilised by our trade rivals for giving the buyer a false view as to the origin of goods supplied, at the same time it seems clear that those most concerned are unwilling to make the personal sacrifice that is involved in placing the marking of articles of foreign, or partly foreign origin, on a logical basis. It must of course follow, that if our foreign rivals have been doing a trade in foreign, or partly foreign arms submitted for English proof, they must have agents and other interested parties, who benefit to some extent in the trade which is so done. Everyone knows that it is frequently more profitable to merchant than to manufacture. Hence, if the foreigner is willing to do the manufacturing, there will always be a plentiful supply of merchants who will find a market for the goods. The foreigner thus has friends at court, and the influence of these friends has gradually whittled away the effectiveness of the recent proposals for the marking of foreign, or partly foreign arms. Those who have been making a livelihood by the handling of foreign arms, have naturally been able to command a market, by reason of the small prices at which such goods may be sold. The moment this trade is attacked by proposals for differential marking, they are up in arms to insist that a special exception shall be made to suit their case. Thus we are asked to allow the free import of cheap rook rifle actions and barrels, Martini actions and barrels, and large falling-block rifles for the firing of cordite express ammunition. By the time the rules have been so modified, the original intention of encouraging British manufactures, by the differential marking of goods substantially made abroad, is cast aside in favour of a system of differential marking, which is mainly characterised by the facilities with which it can be avoided. Thus from our point of view, we are quite prepared to admit the futility of a trade, in which the interests of its members are so mixed, endeavouring to legislate in favour of the future at the expense of the present. Such action if it comes at all, must arise from the more independent judgment of our national legislature. Meanwhile, therefore, we should prefer to see the question of marking entirely separated from the passing of the new proof rules which strictly relate to the efficiency of our test for firearms as such. If there is anything left as a basis of discussion in connection with the differential marking of foreign guns, it should be dealt with separately, after the purely proving rules have been adopted. The discussion upon the marking question might then assume a purely academic form. If any advantage is to be gained by the passing of what remains of the original proposals, then let it be passed by all means. Meanwhile, it is against the interest of the trade that the very desirable reforms in the procedure of testing firearms should be held over any longer. In saying this we believe we are reflecting the views of those in the trade whose opinions carry the greatest weight.

The Progress of Single-Triggers.—At the present time of day we hear very little about single-trigger guns. In fact the many points which have been discussed in this connection seem to have settled themselves on a practical basis free from the complicated issues that were raised upon purely theoretical discussion. The single-trigger has undoubtedly established itself as a very effective form of mechanism for the

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best class of guns in which both barrels are bored alike. That is to say, for the man who indulges in rough shooting, and as a rule requires closer shooting from the left than from the right barrel, it is a decided convenience to be able instinctively to select the particular barrel which is best adapted for the shot which for the moment presents itself. The wealthier class of sportsman on the other hand, whose work is mainly at driven game, and who takes his shots at such a rate as to leave him but little time to distinguish between one barrel and the other, finds that the single-trigger greatly facilitates the operation of the gun. For this branch of sport it is seldom considered necessary to build a gun with materially greater choke in the left than in the right barrel, though even where this is introduced on the principle that the second barrel is used on the average at greater distances than the right barrel, the single-trigger still offers more advantages, due to increased facility of action, than disadvantages arising from inability to use one or other barrel on the spur of the moment. We dismiss in this connection the mechanisms which provide for the optional use of either barrel, since even those who make the best types of them are prone to discourage their use. Single-triggers, as such, would undoubtedly have made greater headway by this time had the mechanical difficulties been less serious. Even at the present day, the number of mechanisms which satisfy a comprehensive test are few and far between. A light, short and crisp pull is a first principle that must be observed in gun construction, and no difficulties are encountered in satisfying it in the case of ordinary double-triggered guns. On the other hand it is very difficult to secure this condition in the firing of the two barrels with a single-trigger. The adjustment must be perfect, and under no circumstances must the second barrel fail to go off at the proper time. In three-pull guns it is exceedingly difficult to ensure the nicety of movement of the intermediate pull, so that it may be unconsciously performed by all shooters, no matter what may be their personal idiosyncrasies. In summing up the single-trigger question after ten years of experience, we must, therefore, admit the utility of the principle, while deploring the fact that amid the multitude of guns sold in this country, in only a small proportion is this form of mechanism to be found.

Weights and Measures.—A circumstance that recently came to our notice, provides a very curious commentary on the manufacturing capacity of a firm in this country. For accuracy of work, Becker weights are known the world through. Their refinement of finish and their precision is as remarkable as the lowness of the prices at which they are supplied. A box of grain weights can be purchased from this firm for the price of 12s. 6d., the set consisting of twenty-one actual pieces which are correct to an exceedingly small fraction. As this firm does not lay itself out to supply avoirdupois weights we recently placed an order with a well-known English firm, asking them to supply us at their own terms with a box of pound and ounce weights of the finish and refined accuracy that distinguishes the metric and other weights of foreign manufacture. The firm in the first place forgot all about the order for a period of about eighteen months, and then having suddenly discovered it in some forgotten place, they hastened to complete the work and delivered the weights. Though cased in a handsome mahogany box, the lack of finish in the weights themselves was remarkable. The heads had been smashed and bent over by the clumsy use of the marking stamps. Their bases were rubbed away with rough files, leaving them with sharp edges considerably out of truth. On the point of accuracy they were so deficient that in most of the smaller weights which were tested, errors amounting to from three to five per cent. were by no means uncommon. As regards finish, apart from their bad mechanical form, they were clumsily polished and were not lacquered. In due course they developed a kind of fungus growth which required the constant application of polishing paste to keep them in order. Considering the dependence of cartridge loaders upon accurate weights, it seems almost criminal that a firm should turn out such bad work as we have described. At a time when the whole nation is discussing fiscal policy, we must never forget instances such as the one we are quoting, which go to show that the first essential to holding one's own in the markets of the world, is to supply something reasonably suitable for the end in view.

The late Mr. Siegmund Loewe.—By an accident, tragic in its suddenness, Mr. Siegmund Loewe lost his life on the evening of the 24th ult. Riding with a friend in a motor car on the previous Sunday from Maidenhead to London, he was thrown out of the car and sustained a fracture of the skull, which terminated fatally two days later. Mr. Siegmund Loewe could undoubtedly be classed as one of the most capable business men in an age when great enterprises bring forth the finest organising qualities that are latent in the human intelligence. Mr. Loewe joined the board of the Maxim Nordenfelt Company about the year 1892. He was elected general manager of the Company as from the 1st October, 1895, and he has continued to take a most prominent part in the direction of this Company up to the present day, he being among those who became a source of increased strength to the Vickers Company when the two concerns were amalgamated in their present form. Mr. Loewe was brother of the famous Ludw. Loewe of Berlin, the greatest machine tool maker of modern Germany. His abilities were particularly marked in the direction of a wonderful capacity for grasping the intricate threads of a huge business, and harmonising the working policy towards the one aim of profitable enterprise. Sound policy is inspired by a consistently clear judgment applied to the numerous questions that have to be dealt with from day to day, and although in the success of the Vickers-Maxim Company many fine intellects are constantly at work, the late Mr. Loewe's colleagues, the Company's rivals, and the Company's shareholders, will all agree that the part he took was as creditable to himself as it was undoubtedly beneficial to the Company. One cannot, therefore, but regret that the sincerest sorrow that a man in the very prime of his business usefulness, should thus pass from full activity into a state of unconsciousness terminating only in death.

We hear that Mr. E. J. Churchill has just recovered from a serious illness.

A receiver has been appointed in *re* the Arms and Ammunition Manufacturing Company.

According to an advertisement addressed to capitalists, cartridge makers and others, the best offer is wanted for the patent rights of Lock's patent breeched cartridge. Offers should be addressed to Mr. W. Lock, of Norfolk Terrace, Windsor.

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CHAMBER SIZES.

RECENT discussions on the new proof rules have put upon one side a question only second in importance to the regulations under which our guns are to be tested by the two bodies who are invested with the necessary authority. The gun trade of Great Britain, like most other industries is attacked on all sides by the most vigorous competition, and our only weapon of defence is to take all possible measures to see that nothing shall be lacking in the quality of our output. The manufacture of guns may be broadly divided into two very definite categories. In the first lies all that is related to mechanism, workmanship and the skilful use of tools in the production of a sound and artistic product. In the other is the formation of the bore of the barrels in a manner consistent with the work subsequently to be done by the gun. While we think the gun trade is as a whole omnipotent in the first, as regards the second we firmly believe that the merits of the problems presented are seldom appreciated on a truly scientific basis. Many clever barrel borers and action filers are but partially instructed in the scientific laws that control their work, so that their tendency towards science frequently leads them to become cranks guilty of committing serious errors of judgment.

As it is impossible to consider the question of chambers apart from the rest of the barrel we will proceed to develop the question in what appears to us the only logical way. The diameter of a gun barrel is a fixed quantity in theory. Its values is as specified by the rules of Proof House procedure. These figures agree with the custom of the trade as regards all bores but 4 and 32. In the former the true barrel calibre is much smaller than the proof house size, so much so in fact that barrels are marked at proof as of this gauge when their true size differs from it by more than the tenth of an inch. Similarly in the 32-bore the current size is as nearly as possible one-fortieth of an inch less than the official value. With these two exceptions it may be agreed that the calibre of barrels is as specified in the rules of proof.

Now in order that a cartridge may properly fulfil its functions it must be fired from a chamber correctly related in size to the bore of barrel through which its contents will be projected. Experience tells us that the interior bore of the cartridge must exceed the diameter of the barrel by a few thousandths of an inch. In the case of the 12-bore it is found that the cartridge must be capable of receiving and gripping with the needful amount of tightness, a wad some ·008 to ·010 of an inch larger than the bore of the barrel. Taking the diameter of the wad at ·738 in., and allowing for the thickness of the wall of the cartridge tube, we find that the external size of a wadded cartridge approximates ·788 of an inch. Experience once more comes to our aid by telling us that a minimum of ·010 in. free play between cartridge and chamber must be allowed to give the best results. Thus we find that a most vital relation exists between the bore of the barrel and the front end of the chamber. This relation must be separately arrived at for all bores of cartridge. It is useless for instance to tell gunmakers as in the case of the 32-bore cartridge that a ·560-inch chamber is suited to a ·526-inch barrel. To do so is to propagate the anomaly that a ·510 bore wad will give satisfactory shooting in a ·526 bore barrel.

Having determined the diameter of the front end of the chamber it is necessary to specify the size under head. Following the very appropriate rule of a taper at the rate of ·005 change of diameter for every inch of length, the exact excess of back end over front end can be determined by the aid of a very simple calculation. The result is, however, apt to work out in this form :—·744490 in., which is the exact size of the back end of the taper walls of a gun chamber at the place which adjoins the rim recess. The nearest decimal value of three places may be stated at ·744 in. While this is near enough for a gun chamber size, difficulties arise in the making of gauges. The gauge maker must work to the nearest ten thousandth of an inch. Thus a gauge made to the nominal chamber size would have an error of nearly half a thousandth of an inch on the true taper.

The anomaly becomes worse confused if we take the case of a gauge maker who is asked to make a 3 in. plug for 12-bore guns, the same to be equally serviceable in the three different lengths of chamber. The nominal diameter at one place, as stated in three places of decimals represents an error of half a thousandth below the size of a truly tapered plug. A little further along the nominal measure is still about the same amount out, but a quarter of an inch further on the error becomes ·0003 in. in the opposite direction, making an error of nearly ·001 of an inch in the respective diameters of the plug at places but a quarter of an inch apart. This demonstrates the necessity for stating two sets of sizes for the back end of gun chambers, the nearest dimension in three places of decimals for ordinary gun work, and to four places for gauge work.

Granting the production of a fresh set of chamber sizes in which the anomalies of the past are deleted, the question arises as to the extent to which they will be adopted. Our own opinion, which is based on the scientific knowledge obtainable from exponents of best gun and cartridge manufacture, is that the efficiency of a gun as regards shooting, depends vitally upon the correctness of the chambering and coning processes. Few gunmakers, we might almost say no gunmakers, have the instruments that are capable of determining the extent to which the gun chamber and cone are responsible for the difficulties they encounter in regulating their guns for shooting. It is possible that a fault in the chamber or cone may be partly remedied by regulating the choke. But the fact remains that so many guns are sold which give excessive velocities when fired with normal cartridges, so destroying the regularity of the pattern, as to indicate that the true relation between the chamber and cone of a gun on the one hand and its shooting properties on the other is little understood, even by those who have devoted a life-time to the business.

We know an instance of a well-known firm of actioners who were called to task for spoiling the shooting of barrels actioned by them by cutting cones of excessive length. The actioner's retort was that if after a life-time's experience of gunmaking, he, above all others, did not know how to cone a pair of barrels, who in the universe did. This, from a man who probably never shoots a gun at a range, and to whom the question of velocity is no more than the hobby of faddists, provides us with some justification for our remark that gun making progress in mechanism is far in advance of that sister section of the business which belongs to the problems of shooting. If the English gun is to hold its posi-

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tion in the markets of the world, the shooting must be regulated by more precise methods than the mere firing of patterns at the plate. At any rate, the fact that the chamber cone has the most important influence on the gun's ballistics must be duly appreciated, and manufacturers should at least study their interests to the extent of adopting the specification for chambers and cones which comprises the most favourable conditions as determined by actual experiments of greater amplitude than the individual gunmaker can command.

ROUND THE TRADE.

An explosion occurred on the 9th ult. at the high explosives factory of the Cotton Powder Co., Ld.

Mr. T. R. Bayliss, the genial chairman of the King's Norton Metal Co., and of Messrs. Eley Bros., is reported as having been adopted as the Unionist candidate for North Worcestershire, in place of the present member, who has re-joined the Liberal party.

Mr. Tunstall has written in correction of some remarks which appeared in the last issue. He says that three Birmingham firms make a speciality of the manufacture of Martini actions, viz., The Braendlin Armoury Co., The Field Rifle Co., and Messrs. Skett, of Moland Street. He further points out that all these firms could easily increase their output.

Messrs. F. Joyce & Co., Ld., have sent us a little Christmas booklet, which they term the "Sportsman's *Vade Mecum*." The pocket-book contains a number of useful figures and information concerning various matters connected with shooting, together with loading particulars of most of the smokeless powders. The end of the book is occupied with blank pages for the recording of game bags and the keeping of a shooting account.

Mr. L. G. Duff Grant has issued the following circular notice under the letter heading of the New Explosives Co., Ld.:—"I beg to inform you that, after having been connected with the Smokeless Powder Co., Ld., for the past 15 years, first as secretary, and latterly as secretary and manager, I have accepted the appointment of general manager of the New Explosives Co.. Ld. The manufactures of that company are so well known, and have such a high reputation for their excellent quality, that it is unnecessary for me to do more at present than mention that with the exception of sporting powder they include almost every variety of modern explosives, the principle being Cordite (all sizes for rifles and artillery), Guncotton, Gelignite, Gelatine Dynamite, Blasting Gelatine, Pitite and Stowite, the last two being 'permitted' explosives sanctioned for use in coal mines. If any of them are of interest to you I shall be glad to quote you, and in any case I shall at all times be very pleased to see any of my old friends, customers, and correspondents, or to hear from them at my new address."

The Remington Arms Co. have sent us copies of their latest printed matter, which includes a leaflet describing the Remington-Lee long-range target rifle, specially designed for 800, 900, and 1,000 yards shooting, also other military and match rifles suited for fine work at the target. A small pamphlet describes in great detail the above Remington-Lee magazine rifle, special illustrations showing the individual parts and also the sporting pattern of the rifle. The company's full-size 1903 catalogue is a fine piece of work, running to some 60 odd pages, and it leads off with full particulars of the Remington double-barrel shot guns, all of which seem to be particularly strongly built. Each pattern of shot-gun is supplied in 10, 12, and 16-gauge, with a variety of weights and barrel lengths for each calibre. What with single guns, take-down rifles, small-bore pistols, and other Remington specialities, the catalogue contains a large variety of very interesting material, which should certainly be studied by every gunmaker who is in the habit of handling arms of the kind made by this company.

THE BIRMINGHAM GUNMAKERS' ASSOCIATION.

The annual report of the Birmingham and Provincial Gunmakers' Association has just been issued, and the following excerpts have been taken therefrom:—

The Executive has pleasure in presenting the seventh annual report, by which it will be seen that the Association is in a very flourishing position. The balance in hand is £320. Mr. C. R. Smith has resigned from the Executive during the year, and Mr. J. B. Asbury has been elected a member of it. Mr. Joseph Rowlands has been appointed Solicitor to the Association.

STANDARDISATION OF SHOT GUN CHAMBERS.—This important question has not yet been finally settled or abandoned. It will be remembered that several sets of figures have, during the past three years, been issued, some of which only dealt with one or two bores. Last year an attempt was made to deal with all sizes from four to ·360 bore. The result was in a measure satisfactory, but did not prove to be a solution of the question. A Sub-Committee of the Association, consisting of Messrs. Scott, Bonehill and Asbury, has during the past year made a very careful study of the matter, and some few months ago drew up a memorandum and recommendations of the sizes which in their opinion required modification on the 1902 figures issued. A copy of this was sent to the Gunmakers' Association, London, for their consideration, and it is hoped that this important matter will at the earliest possible moment be settled to the mutual satisfaction of the gun and ammunition makers respectively.

TECHNICAL INSTRUCTION.—From the Technical Instruction Committee's report of September 24, 1903, extracts of which have been issued to the trade generally, it will be seen that the classes have made satisfactory progress. It is intended to remove the school from the Proof House to a site nearer to the gunmaking district, where accommodation will be provided for a much greater number of pupils, and classes will be added for theory and scientific instruction. Appeals for subscriptions for the prize fund have been sent to gunmakers throughout the United Kingdom.

PISTOLS ACT.—This Act, to regulate the sale and use of pistols and other firearms, has been passed during the year, and is now in force. The Executive was successful in obtaining a very important modification of the Act, affording considerable benefit to the trade.

MARKING OF FOREIGN-MADE GUNS.—An extraordinary meeting of the Association was held on September 23, 1903, to consider the new rules, framed by the Guardians of the Proof House, as to the marking of foreign-made arms. These rules submitted were approved by the meeting.

BLACK LIST.—A black list has been opened and entries made during the year. It is kept at the Proof House, and is available for the use and guidance of Members of the Association.

The statement of accounts for the year ending October 31, 1903, shows receipts during the year to the amount of £54 1s. 6d. for members' subscriptions, and £6 11s. for bank interest on deposit account. The expenditure for the year includes printing and Treasurer's expenses, etc., £5 19s. 3d., the surplus on the year thus becoming £54 13s. 3d. The report is signed by Mr. W. H. Hughes as Chairman, and Mr. A. A. Bonehill in the capacity of Hon. Treasurer.

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THE USES OF ADVERTISEMENT.

IF we credited all the statements made by the conductors of advertising trade publications, we should have to believe that no business could succeed without advertising. They endeavour to impress us with the information that nowadays everyone dependent upon public patronage and support advertises in one way or another, in the knowledge that he who does not court publicity in his business, no matter what that business may be, is more than likely to miss success. They will tell you that the wholesale merchant requires to keep his name before his customers and possible customers just as much as the retailer, if increasing business is to result; that the painter as well as the politician, the author as well as the actor, all benefit by making their names widely known among the classes likely to benefit them by their support. This is the age of advertisement, they maintain, and the man who does not advertise falls behind in the race.

There is much truth, and at the same time some error, in such sweeping statements. They are made by those who have a direct interest in widely publishing them and urging their acceptance by business men of all classes. The benefits of advertising are too often exaggerated, without discrimination as to the particular kind and amount of publicity required, and its cost to the advertiser in proportion to his possible turn-over in the branch of business he may be engaged in. Let us therefore endeavour to ascertain whether the general rule laid down as to the necessity of advertisement applies in full strength to the gun and allied trades. If it is found to do so, the further question comes up for consideration as to the best means to be adopted by these trades to secure the publicity desired for retaining and increasing the volume of business done by them at the present time.

Advertisement has been likened to the motive power of steam in the boiler that drives machinery. The simile is not inapt, in that there is a limit to the amount of steam that should be generated in that boiler; too much might burst it, and too little might fail to make the machinery move. In the same way, advertising can be overdone, and then there is a waste of money, which may also occur where the advertisements are inserted in *media* that do not reach the people the advertiser wishes to influence. In considering the value of advertisement then to any trader or manufacturer one has to stipulate for judicious advertisement, proportionately in expenditure to the size of the business possible to the advertiser, and in the best possible channels of communication with those who may respond to the offers made to sell the goods they require, when brought prominently before them. Where the article or articles advertised are of a kind that can be used in every household the more widely the merits are made known the better, and the question of the means of attracting publicity of all kinds becomes very much simplified. In gunmaking, however, the advertiser is only able to deal with one class in the community, and he has to consider with the greatest care the most likely means of bringing his business to the knowledge of that particular class, which is alone likely to yield him a remunerative return on his advertising outlay. A periodical may have an enormous circulation, and yet be of little value to him as an advertising medium; and the error of advertising in it may prove fatal to success, leading him to the conclusion that advertising does not pay, whereas the exercise of good judgment and careful investigation might have brought him to the opposite conclusion. For we may safely assume that judicious advertising within limits of possibilities must improve a business in the end. The difficulty lies in all cases in exercising the necessary judgment as to how publicity can be most effectively secured in each case, with due regard to the amount that can be rightly expended in obtaining it.

There are many forms of advertising available to the gunmaker in addition to that in published periodicals appealing to the sportsman, to whom alone he looks for patronage. If that gunmaker be located in a country town, his window in a main street, dressed with the articles he offers for sale, is his first advertisement. It appeals to every passer-by, and if the articles shown are interesting in themselves, a considerable proportion of those passing may stop to inspect and purchase, particularly if they happen to be shooters. Much skill can be displayed even in the dressing of that window. It is found advisable in most businesses to draw special attention to the superior merits of one single article, neatly displayed, as worthy of examination by all observers interested in shooting. Its exhibition in the window is practically an invitation to the public to step inside and inspect at their leisure. And if such visitors are treated as guests for the moment, and every courtesy shown to them, business probably results in the end, due to the judicious window advertisement. The local railway station, again, by which all country customers arrive in town should be a profitable advertising medium, looking to the cost of a displayed advertisement on its walls in a position that must bring it before the eyes of passengers arriving and departing by rail. Another advisable mode which most gunmakers adopt consists in having their names printed on all ammunition and other accessories as well as on the guns supplied by them to their customers. Such advertising is as cheap as it is effective in particular localities, where sportsmen shoot together in parties at which notes are compared and discussions arise as to the merits of the various products used. No gunmaker, wherever his establishment may be located, can have a better advertisement of his business than a friendly and satisfied customer, who will take the trouble to recommend his friends to the man who serves him well with all he requires in shooting. Every gun of good quality in use, with a maker's name upon the barrels, is a standing advertisement in his favour, which becomes doubly effective when supported by the strong recommendation of its owner. Every hundred well-loaded cartridges also have their effect in bringing the skill of the loader to the notice of fresh clients, dissatisfied, it may be, with the ammunition they are using, and ready to change it for better, if easily procurable. Every pleased and satisfied shooting client takes pleasure in extolling the merits of the maker who has supplied him with his shooting requisites, which he feels safe in recommending to his friends as something superior to those they are using. In no other business we know of is more done in the way of recommendation by the purchasers of creditable workmanship in guns or ammunition than is usual in the case of good gunmakers, who take pains to meet all their customers' requirements to the best of their ability.

These are all simple means of bringing forward a gunmaking business available to any and every gunmaker, who knows his work and desires to make his ability widely known

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in the particular district in which he may have set up in business. In his outlay on advertising of course he must be guided largely by the possibilities of its proving remunerative in that particular place. The expenditure that might be justified in a large city might be quite uncalled for in a small town, where the amount of turn-over that could be expected would be comparatively small. But all advertising should be limited according to the amount of outlay properly available annually, and the possible result aimed at in securing increased busines. But, having decided on a course of procedure to make his business better known, a gunmaker should not be disappointed in not being immediately able to trace results. The effects of judicious advertising are cumulative, and it is often impossible directly to trace its effect. The result comes unfailingly to those who persevere, even though no results can be traced, as evidenced by the enormous sums judiciously spent on posters and plaques upon the walls, and street hoardings and erections to which it would be hard to trace the business that results. But that business nevertheless does result, and that in remunerative and steadily increasing volume all large advertisers are free to bear witness. What pays on a large scale also pays proportionately in the end on a small one to those who have the courage and patience to wait for the tide of fortune, neither over-doing their advertising, nor paying insufficient attention to its claims, but according to their means, steadily persevering to build up success in their calling, which is the aim of every good and successful business man in the gun, ammunition, or any other line.

SOCIETY OF MINIATURE RIFLE CLUBS.

THE first annual general meeting of the members of the Society of Miniature Rifle Clubs was held on the 27th ult.. at the Royal United Service Institution, Whitehall. General Sir A. Power Palmer occupied the chair, in the absence of Lord Roberts, the president. The council, in their report, stated that there were 183 rifle clubs affiliated to the society, representing about 6,000 members. Although working men's clubs had not used their halls for evening rifle shooting to the extent that had been hoped, the practice of miniature rifle shooting as a pastime was steadily gaining ground. The society confined its efforts to the encouragement of miniature rifle shooting, but its operations were much restricted by want of money. The report was adopted.

General Sir Power Palmer said the society had been started as a first means of preparing the manhood of the nation to take their place in the national defence. The object of the society was to engender a taste for rifle shooting. As a sign that the movement was progressing, he mentioned that the National Rifle Association had suggested that the society should join with them in a competition somewhat similar to that which was held last year at the Crystal Palace. He trusted that a programme might be arranged, and that a successful meeting would be held. If the people of this country wished to avoid conscription or an enormous income-tax for the pay of regular soldiers, the youths and young men should learn to shoot at these miniature ranges, and gradually work up to shoot at long ranges.

A discussion followed on the work of the society, and the proceedings terminated with a vote of thanks to the chairman

AUTOMATIC SHOT GUNS.

The development of a new mechanical device generally follows, more or less, well established laws. In the case of the bicycle we have seen the introduction of a series of improvements following one another in such quick succession as to bewilder the person who would endeavour to keep pace with the mechanical forms in which the new departures are represented. At all times during the development of the cycle industry the question of the moment, whether it relate to free wheels, back brakes or variable gear, has been well defined. The history of the gun presents a similar series of developments, though these have advanced at a much more gradual pace than has characterised the bicycle.

It is a necessary limitation of history that it should be brought to a close at the most interesting moment of all, that is at the time of writing. Those who endeavour to carry history further than the present day change their title, and are known as prophets. The writers of a past generation, who have engaged in this department of historical writing, have been stultified by the happenings of a later day. The whole of our experience in the improvement of the shot gun, shows us that it is at no time possible to express the view that the weapon of the present day has attained its final stage of development. Similarly it is almost impossible to deal with any authority with the probable developments of the immediate future.

The automatic principle of ejection and re-loading have been made familiar to all classes of sportsmen during the ten years just past, by reason of the successful introduction of automatic pistols. Their limitations are quite as marked as their ingenuity, though of course a principle of working which has once been proved to be a sound one leaves the way open for the introduction of minor improvements, such as will extend its general applicability. Whether the automatic system can be applied to shot guns is a question which would require a lot of answering at the present juncture. We have actually in our possession an automatic shot gun which undoubtedly performs its functions with a precision that says much for the skill of its designer. This, however, does not quite deal with the point which we are arguing.

In just the same way that the repeating shot gun replaces the double-barrel sporting weapon at a very low cost, so the automatic shot gun may prove a still more formidable competitor. In skilled hands the magazine shot gun is a terrible instrument of destruction, as is shown by the amount of game and wildfowl that are yearly killed in America by its aid. The users of these weapons require a special form of skill, which enables them to counteract the natural disadvantages of the peculiar balance and other conditions that magazine shot guns present. While, therefore, we admit the feasibility of the automatic principle in shot guns, we must of course suspend our judgment for a time, at any rate as to how such weapons would be regarded by sportsmen who think so much of the efficient handling of the weapons they at present use. Of one thing we can at least be sure. It is that if the automatic principle is received with any favour at all, it will not come as a detailed improvement to existing weapons, but rather as a revolutionary type, by which the designing of guns will commence from an entirely new beginning.

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THE CONSTRUCTION OF RIFLE GALLERIES.

WE have received from the Laflin and Rand Powder Company of the United States a copy of a very interesting little book entitled "The Rifle Gallery, its Construction and Use," by James E. Bell, Major and Inspector-General of rifle practice, District of Columbia Militia. The book is turned out in very good style, the pages being exactly one hundred in number, and the price the very nominal one of ten cents. The author sets himself the task of explaining the various alternative methods of fitting up miniature rifle galleries, so as to suit them for providing a large amount of practice for a number of learners at a minimum cost, both in outfit and in current expenditure. In addition to dealing with the galleries themselves the author is able to speak with thorough practical knowledge on the best methods of re-loading military ammunition for gallery practice, the idea being to use up old cartridge cases with special miniature ball, without the expenses incidental to the employment of adaptors of one kind or another. We notice that he is very strong on the cleaning of rifles, and he very appropriately shows that all possible care must be taken of full-power rifles which are used for gallery work, otherwise their effectiveness is soon destroyed. On the subject of aiming drill he also speaks as one who has been through the mill himself, and the course of instruction he lays down is especially adapted to develop the beginner into a capable rifle shot, free from the little tricks and mannerisms that do so much to prevent many otherwise good shots from attaining the higher flights of marksmanship.

A very interesting incident that shows the value of aiming and sighting drill is quoted at length in one of the chapters of the book, and the lesson it teaches justifies our publishing the full particulars, which are as follows:—

"The Haymaker Rifle Team of the 2nd Battalion of Infantry, Maryland National Guard, composed of men of fair ability as marksmen, visited Chicago in 1887 to take part in the Interstate and so-called International contests held under the auspices of the International Military Encampment Association. Under a promise of ample opportunity for range practice at Chicago, the team left for the West without having had a single practice over the distances, trusting to the six days' work over the range there to place them in trim to meet the flower of the Western National Guardsmen. The dismay and consternation of the team captain, may better be imagined than described when he discovered that the range was incomplete and could not be used until the day of the opening contest. A council was held and the situation was discussed in all its bearings. Some were for returning home, but the team Captain, knowing what might be accomplished through conscientious aiming and firing practice, persuaded the council, in view of the fact that the Governor expected him to return victorious, to remain and make the trial.

"It was decided to have at least one practice a day over the distances to be shot over in the match, namely, 200, 500, and 600 yards; accordingly they were immediately staked off on the level common, and the targets were fastened to the rear of some stables. Nearly a riot was precipitated by some of the stable men tearing the targets down, as they protested that they were not going to risk their lives by working in the stables while the team fired at the targets where they were located. They were soon assured that no harm would come to them from the blank cartridges to be used, and the practice proceeded without incident save that it attracted considerable attention from the visitors from the surrounding settlement. The team Captain decided that the practice should be conducted with all the care which would have characterised range work. Shooting partners were selected and the coach stationed at the firing point to give the necessary information required of such an officer. The windage and elevation to be used by each individual was imparted privately to the statistical officer for the purpose of discovering the amount of information each possessed upon the important points. All pledged themselves to announce the exact value of each shot, as pulled, and with these details arranged the practice proceeded. It might be well to state here that an expert rifleman, atmospheric conditions being fairly good, can call his shots, or tell where they should strike the target, judging from the way his rifle was held when the trigger was pulled. The team fired the ten blank cartridges furnished them for each distance with all the deliberation and care which would have have characterised them in actual practice, and after the day's work was over and the result announced, the features of the contest were discussed with an unusual amount of interest. This daily practice was continued after the arrival of the Western Guardsmen fresh from their contests over their State ranges. They looked on, winked, smiled and walked away, talking deprecatingly of the chances of the silly Marylanders. The team Captain encouraged his men to believe that they were going to win, notwithstanding the great odds which were against them. Each team stood on an equal footing so far as the conditions of the match were concerned, as no sighting shots were permitted.

"The morning of October 12th, the day of the match dawned clear and bracing, and there was a perceptible inclination towards buck fever on the part of some of the team, but it soon disappeared and confidence was restored when the results of the scores of the first two men showed Maryland, 81; Minnesota, 75; Michigan, 74; Iowa, 62; with the Indians less than 20 points to their credit. They withdrew from the contest before the 200 yards stage was finished, as their shooting was as wild as the shooters, and dangerous to residents in the outlying country. When the scores at this range were totalled up, it was found that Michigan was in the lead with a total of 368, Maryland, 364; Minnesota, 355; and Iowa, 335; but at the end of the 500 yards score, victory was conceded to the Marylanders, as they were fourteen points to the good. The confidence was not misplaced, as the lead was increased nine points at 600 yards, and victory rested on the banner of the team which had not fired a single ball cartridge out of their rifles for ten days previous to the match."

It is clear from the above that the book which has been sent to us, not only contains a large amount of technical instruction, but in addition, reading matter of a kind to appeal to the intelligence of the ambitious marksman. The mechanism of the United States service rifle is described at length, information being given as to the nomenclature and function of the various parts, together with the approved method for taking the rifle to pieces, and ensuring its maintenance in proper working condition. Altogether we feel thoroughly justified in characterising the book as the outcome of practical knowledge, combined with a gift to express the same in a manner congenial to the reader.

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AMMONAL EXPLOSIVES, LD.

THE above is the title of a new company, the prospectus for which was issued at the end of last month. Its *raison d'être* is to manufacture a new explosive named "Ammonal," the special characteristic of which is that it is of the safety class of explosive, and that aluminium enters into its composition. Ammonal is of Austrian origin, the well-known firm of G. Roth having manufactured it themselves for some time past, and having succeeded in obtaining its adoption by the Austrian War Office for filling shells. Herr George Roth has accepted a place on the new English company's board of directors.

Mr. William Macnal reports upon the explosive as follows:—

"Ammonal is an entirely new departure in explosives, and presents several features of the greatest interest. It is essentially a mixture of aluminium and ammonium nitrate, with sometimes the addition of charcoal or similar bodies, and in this mixture advantage has been taken of the large amount of heat given out by the combustion of aluminium to enhance the explosive effect of the gases evolved by the explosive decomposition of ammonium nitrate. It is interesting to note that it is only within the last few years that the possibility of commercially using such an explosive as Ammonal has become possible, owing to the great reduction in the price of aluminium which has taken place.

By invitation of Mr. G. Roth, of Vienna, I visited his works at Felixdorf, and saw the whole process of manufacture of Ammonal, and also a most exhaustive series of experiments demonstrating the safety and strength of this explosive and its suitability as a blasting explosive, and as a bursting charge for shells. I have also carried out a prolonged series of experiments and trials with Ammonal made in Austria, and with samples made here, testing it for strength in the Trauzl lead blocks, and comparing it with other well-known explosives. I have also seen it used in quarries in Austria and in Wales, and have seen it tried for bursting charges for shells at Messrs. Sir W. Armstrong, Whitworth & Co.'s range at Reedsdale.

As the question of the effect of moisture on the explosive was especially raised, I have particularly experimented on this point, although considering the practical success which has attended the use of many explosives which are composed principally of ammonium nitrate, and which have to be protected from the action of moisture, no special difficulty was to be apprehended on that score. Of course, this explosive has to be packed in a similar manner to Roburite, Dahmenite, Bellite, Westfalite, and such like explosives. However, actual tests which I made with cartridges prepared at Felixdorf proved that, although exposed to an atmosphere saturated with moisture for a prolonged period, they have not deteriorated in any way. I have fired cartridges with a quantity of moisture far in excess of what can be taken up by this explosive during careful manufacture, or after fair storage, and the results have been entirely satisfactory. I have also successfully detonated cartridges containing 10 per cent. of moisture by placing a dry cartridge containing the detonator on top, without any loss of power. I can, therefore, emphatically state that no difficulty is to be apprehended on this point.

Important points to be considered in judging of the merits of an explosive, apart from the question of cost, are the degree of safety during manufacture, use, and storage, and the strength and suitability for the work to be done. As is well known, the ammonium nitrate class of explosives is the safest to manufacture and use, and Ammonal is not an exception to the rule. In fact, all the experiments which I have carried out prove to me that Ammonal is the safest explosive at present known. It possesses, in a still higher degree, the insensitiveness to shock or friction, and reluctance to burn, which render the ammonium nitrate explosives so highly prized for their safety. It is not affected by frost, and thus the dangers are avoided which result from the careless thawing of nitro-glycerine explosives, which is the cause of many accidents. Ammonal is also extremely stable, for as is well known, aluminium is practically unacted on by nitric acid, and ammonium nitrate does not attack it. It has passed the tests of the Home Office, and is now on the 'Permitted List,' and will, therefore, be available for use in fiery mines.

Ammonal offers the great advantage that by varying the proportions of the components the strength of the explosive can be varied between wide limits, thus adapting it to the work it has to do. As to strength, the strongest mixture is rather more powerful than blasting gelatine, as tested in the Trauzl block, and gives a more shattering effect when fired open on small lead cylinders, 'Crusher Test,' the 'Stauch Probe,' of the Austrian Government. Trials which I saw made in quarries proved that Ammonal is at least as strong as the best high explosives now in use. From the composition of the explosive it is obvious that the gases resulting from the explosion will be harmless, and experience proved that when Ammonal was fired in close headings no noxious gases were produced. This, of course, is a most important point in regard to the health and comfort of the miners.

For blasting work Ammonal is fired with a detonator. As a filling charge for shells for military purposes Ammonal offers advantages possessed by no other explosive. I have seen shells filled with it fired through thick steel plates without causing the Ammonal to explode. In some instances the shells were intact, in others they were broken by the impact, but the explosive was always found unexploded. Notwithstanding the great compression the Ammonal had undergone through the impact, it still could be detonated easily. This fact that Ammonal can be exploded when in a highly compressed state is of very great importance, for it enables charges for shells to be compressed into forms which closely fill the shell, and thus permit of a greater charge being put in than if the explosive were added in powder form; while for blasting purposes it can be compressed into cartridges of suitable size.

Comparative trials made with Ammonal and picric acid showed that the former is by far the more powerful explosive. Ammonal used for shells can be exploded with only a percussion cap, such as is used for firing black powder charges, and does not require the strong detonators which are now used with some of the modern explosives, and which are always dangerous when used in guns.

In conclusion, Ammonal is an explosive which is characterized by an extraordinary degree of safety, though its strength far surpasses that of any other explosive except blasting gelatine, which, however, it slightly exceeds. It is an ideal explosive for shells, being far more powerful than Lyddite, Melinite, or any of the picric acid mixtures, and at

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the same time safer than any of them. It will explode even after the greatest compression, thus differing entirely from the other known explosives composed principally of ammonium nitrate. For quarrying and mining purposes it offers the advantages of the greatest safety, and all degrees of power to suit the class of work to be done, and an entire absence of noxious fumes. Finally, it can be manufactured at a cost which I consider should enable it to compete successfully in this respect with any other high explosive, and, in my opinion, should have a brilliant future, both for military and industrial purposes."

Although the explosive is new to this country it has been well known in Austria for some time past, largely on account of the "flattering" attentions that have been bestowed upon it by persons hostile to its existence. As already stated, its chief characteristic is the employment of aluminium in its manufacture, the proportion of this ingredient varying according to the purpose for which it is intended.

The capital of the company is £100,000, and has been appropriated as follows:—

	Shares issued as fully paid.	Payable in cash.
For patents, etc.	£35,000	£11,000
For promotion expenses	12,500	1,500
For Works in Cornwall	15,000	
Remainder for working capital	£25,000	

It will thus be seen that the share of the company's capital put forward for public subscription amounts to £37,500. Each £1 share will thus be represented by 9s. 2d. towards purchase of patents and other rights, 2s. 10d. for promotion expenses, 3s. for purchase of works, and 5s. for working capital. Under the contract for sale the company acquires 14 patents covering Great Britain and various colonies and dependencies, besides which it has the option to purchase within the period of one year other patents now granted or to be granted in the Transvaal and certain other British colonies, and within six months the French, Portuguese, Spanish, Italian, and Belgian patents, all upon terms which the directors consider in each case to be advantageous. The factories to be taken over by the new company are situated at Herodsfoot and Trago in Cornwall, and are stated to be well equipped for the manufacture of Ammonal.

The board of directors is as follows:—

Sir Charles Stewart Forbes, Bart., of St. Albans, Herts.

J. D. Bonner, 9 Victoria Street, S.W. (Chairman of the British Aluminium Co., Ld.).

George Roth, Vienna, ordnance manufacturer.

F. A. Szarvasy, 19 Weymouth Street, Portland Place, W.

E. L. Todisco, Vienna } Directors of the Anglo-Austrian

C. Allmann, Vienna } Bank, Vienna and London.

The consulting chemists are Mr. William Macnab, F.I.C., and Hans Ritter von Dahmen, of Vienna. The secretary is Mr. Henry M. Savage, who was for seven years secretary to the Nobel-Dynamite Trust. Altogether, there seems to be every indication that the new company means serious business, and from the very practical interest taken in its fortunes by the firm of G. Roth, there seems to be good reason for believing that the faith of the directors in the future of the business is well grounded. According to the prospectus, the subscription of the whole of the capital has been guaranteed. We understand that the amount offered for public subscription was over applied for, and that manufacturing operations will be in full swing at the opening of the new year.

LECTURES TO YOUNG GUNMAKERS.

XXIV.—CARTRIDGE LOADING BY GUN-MAKERS.

Few things are so easy and at the same time so difficult as the loading of sporting cartridges. The position of the gunmaker to-day is very different from what it was twenty years ago, somewhere about the time that black powder was on the point of giving way to the modern nitro explosive, and the young gunmaker of to-day will no doubt see the further development of the changes which we will endeavour to summarise. Cap and wad difficulties did not exist with the old compound. Consequently any ironmonger who desired to sell cartridges had only to equip a small filling room to be able to do justice to his customers' requirements. When nitro powders came along the difficulties of manufacture were such than an altogether exceptional amount of skill had to be exercised in dealing with them. The cartridge trade thus passed into the hands of the gunmaker, who had very nearly a monopoly of the business. The powder maker was not in those days so sure about the best method of loading as he is to-day. Consequently there was a good deal of scope by which the gunmaker was able to exercise individuality in the filling of cartridges.

This individuality did not always tend in the right direction. For instance, sample cartridges of twenty or twenty-five years ago which recently came before our notice, contained in a number of instances a pinch of black powder, whose presence was explained by the necessity for ensuring the effective ignition of the nitro compound. Peculiar wadding, unusual combinations of charge, and irregularity of loading characterised the output of those days, as compared with the more exact methods that are now current, Some ten years ago a number of new nitros were put upon the market at about the same time, and the storage rules were such that gunmakers could not stock the whole of the compounds submitted to their notice. More than this, many of these compounds required exceptional treatment in the loading, with the result that gunmakers fought shy of complicating their business by the handling of condensed and other nitros which were so easily overloaded, and which produced dangerous pressures when so mistreated. As a result of the difficulties encountered in placing the new powders upon the market, their respective makers started loading in competition with the gunmaker, asking him to take loaded cartridges where he expressed inability to buy powder in bulk. Many gunmakers short-sightedly refused even this small measure of recognition to the rival powders clamoring for attention. The result was that the companies interested therein sought the services of other retailers in marketing their cartridges. The business so established naturally developed, with the result that factory loaded cartridges now represent a very large proportion of the total output covering the consumption of the four quarters of the Kingdom.

Prices have reduced coincidently with an all-round improvement in the quality of factory loaded cartridges. The capital and the expert supervision of a prosperous powder company enable it to take scientific precautions for the regulation of its output, far and away beyond what the gunmaker could hope to do in his smaller manner of working,

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and yet at the present time thare are many gunmakers who have risen to the occasion to the extent of continuing to wage effective competition against the rival productions of the factory loader. The question that each must consider for himself is the manner in which this competition may best be met.

The answer to the question necessarily involves the adopting of the best elements of factory loading, combining therewith such expert supervision and special attention to customers' needs as the gunmaker is in a position to guarantee, provided he is a man of erterprise and industry. The first parting of the ways is necessarily concerned with the particular specification of loading that shall be adopted. The influence of the powder companies is year by year increasing to an extent that cannot possibly be denied. The gunmaker must, therefore, sooner or later recognise the very obvious fact that his loading must be of a kind that commends itself to the judgment of the man who makes the powder. A powder in these days is a more exactly standardised product than anything that has ever gone before. The conditions under which it will do its most effective work are laid down with a precision that leaves no loophole for variation. If a powder is standardised to perform its functions under a specified set of conditions, the gunmaker must abide by them, even though he may feel convinced in his own mind that certain altered conditions he could impart to the cartridge would increase its general effectiveness. The powder maker is ready with an answer to most suggestions concerning his recommended system of loading. The latter he puts forward as the system which he has adopted a result of comprehensive researches far more complete than any gunmaker can possibly claim to be in a position to conduct. More than this, he has the authority which comes of his chemical knowledge as the manufacturer of the powder. He knows the characteristics of its composition, and the effect on ballistics of every change in its physical condition; and he says with all the emphasis at his command that his powder can be seen only at its best under clearly specified conditions which the gunmaker may follow with full confidence that he is considering the best interests of his clients.

Assuming, therefore, that a gunmaker has taken the very wise course of agreeing to follow the lead which is given to him by the maker of the powder, the question arises as to the particular direction or directions in which he can exercise his own business qualifications and power of organisation. Since the waddings are specified by the powder maker within very narrow limits of variation he may lay in a stock of these on the best available terms. Samples of recommended materials are available for the asking. Consequently, it is merely a matter of securing quotations either for the identical article, or for something as closely approaching it as is possible within the limits of price which he must observe. One must not suppose the conditions laid down by the powder maker are of an onerous kind. In fact, on examining the latest recommended systems of wadding, it will be found that they are on the whole simpler, more economical, and less liable to introduce errors than any which have hitherto been in common use. This much at least applies to the card wads employed in cartridge loading.

In the case of felt wads the task of the gunmaker is not such a simple one. He knows that for the bulk of his work he cannot afford to purchase the very best qualities. On the other hand, he can exercise a considerable amount of care and discretion to ensure that the cheaper kinds he orders as nearly as possible reproduce the particular degree of firmness of texture and pliability which is given to him as standard. However the question of wadding may be regarded, it certainly is not one that need cause a very considerable amount of trouble. Beyond ordering what is wanted, and seeing that he gets it, the gunmaker cannot do more. Admittedly there are scores of mistakes made that he must avoid, but most of these errors are excluded when once he decides that the safest and most satisfactory course to pursue is to abide by the very simple code of rules which are laid down by his scientific expert, the powder maker.

In the ordering of cases he is similarly in the hands of his purveyor. The various grades of quality in cartridge cases are well understood; and all that is necessary is to order according to his probable requirements, meanwhile remembering that it is highly advantageous to see that what is supplied to him carries his name properly marked on the tube. The shot and powder may be purchased through the usual channels, though in regard to the former it is advisable to be more strict than ordinary to ensure a reasonable amount of conformity between the size ordered and the size delivered. In this particular respect the shot-makers take far too many liberties; and the latitude they adopt is largely the fault of the gunmaker, who is too prone to accept something there or thereabouts, thereabouts frequently meaning the straying of one size more than half way towards the next.

Having his components around him, the gunmaker's real task commences. He must know the correct charge for every powder, every bore and every length of cartridge. A chapter might be written upon this and similar questions, but we will endeavour to summarise the most important points in the following series of rules:—

(1) Abide strictly by the actual charges of powder laid down by the powder companies, and ensure the correct setting of the machines by the use of an accurate chemical balance and an accurate set of grain weights.

(2) For all powders and shot charges that constantly arise make or purchase special brass weights clearly engraved with the correct denomination, and adjust them accurately to the tenth of a grain.

(3) Remember that powders may be grouped into three catagories, viz., (*a*) those in which the bulk occupied by three drams of black powder is represented by 42 grains of smokeless, (*b*) those in which the same bulk and strength are represented by 33 grains, and (*c*) those of the condensed class, in which no special relation exists between bulk and weight.

(4) Remember that condensed powders should as a rule be filled into cases with cone bases adapted for utilising the space unused on account of their small bulk.

(5) Make a general rule of using 42-grain powders for full charges of shot, and 33-grain powders for reduced charges of shot. Example: (*a*) 42 grains and 1⅛ oz. of shot, (*b*) 33 grains and 1$\frac{1}{16}$ oz. of shot.

(6) Remember that the contents of the cartridge must be such as to compress the powder about one-tenth of an inch, the principle being adopted in 12-bore cartridges that every $\frac{1}{16}$-oz. reduction of shot must be balanced by an increased thickness of felt wadding equal to $\frac{1}{16}$ of an inch.

(7) When loading sporting charges into long cases fill up unused space with feltine wadding over the felt.

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(8) In loading cartridges of smaller bore than twelve avoid any tendency to overcharge, the safe rule being to repeat in such cartridges the respective lengths of powder column, wads, and shot that are met with in 12-bore cartridges.

In seating the wads make sure that the over-powder card is independently placed on the powder, but not to the distance that it will occupy in the finished cartridge, its final position being determined by the ramming of the over-felt wad to the distance necessitated by the charge of shot, top wad and amount of case required for turnover.

(10) Check a definite percentage of the powder charges that are thrown by each machine, and be sure to test the adjustment every time a new tin of powder is placed in the hopper.

(11) Make a point of occasionally submitting sample cartridges to the maker of the powder with which they are filled, asking him to report upon them without reserve, and make whatever suggestions he may think desirable.

(12) Keep a sample turnover in a prominent position in the loading shop, and endeavour to ensure the accurate repetition of its shape and firmness in all cartridges turned out.

(13) Remember that in these days of standardised powders the correctness of the shot charge, as regards weight, is only second in importance to that of the powder charge.

(14) For the testing of patterns keep sample tins of shot which have been specially selected from large deliveries as in exact agreement with the nominal size.

(15) Never use counted charges of shot unless the counted charge agrees with the specified weight.

(16) Remember that £2 will buy an accurate chemical balance and a set of grain weights.

(17) In loading "perfect" or brass cases remember that the charge and wadding used must be appropriate to the interior diameter of the case, and not to its nominal bore.

(18) Keep the latest edition of the *Sporting Goods Review* loading card in a prominent position, and be acquainted with its contents by constant reference thereto.

(19) Make a point of cutting open and carefully examining and recording the contents of all loaded cartridges which come on to the premises, taking care to examine not less than five of each to arrive at the average charge and the standard of regularity observed in the loading.

If these rules are consistently followed, and the gunmaker classifies in his own way the large amount of information on cartridge loading which is brought to his notice in one way or another, he will be in a very good position to turn out a cartridge equal to the very best that is on sale in the market. The actual mechanical operations of the filling room must be supervised with a considerable amount of mechanical ability. There is no firm which supplies absolutely perfect charging and wadding apparatus, and consequently it will frequently happen that mechanical improvements may be devised which will greatly enhance the quality of the output. The powdering machines that are used must be capable of easy setting so as to correct such variations of density in the powders used as occur, and no notice must be taken of the charges marked on the dials. Above all things, it is necessary that the powdering machines should be mounted on a bench absolutely rigid in itself and free from all vibration. Otherwise the powder will settle in the hopper with a degree of density varying with the time it has so remained subject to vibration. When the hopper contains powder, and the machine is not in use, the measuring chambers should be cut off from the hopper, and in any case the first set of charges drawn should not be filled into cartridges. The powdering department should be isolated from the rest of the loading room by a glass screen or other partition, and no operations should be conducted in this room, except the filling of powder and the inserting and seating of the first wad.

The charging of the shot and the remaining wads should be conducted in the main loading room, in which the precautions requisite for the powdering room need not be enforced. The mechanical features of this portion of the loading business need very expert control; for it is in the due insertion of the proper wads and the adjustment of the ramming that the ultimate success of the cartridge depends. An essential part of the work is to adjust the ramming machine so that it shall bring the wads to the correct position in the cartridge. Anything in the nature of spring-operated wad seaters is to be deprecated as undesirable. In the same way the seating of the over felt wad should not depend upon the personal touch of the individual operating the lever. The distance of entry of this wad should be fixed beforehand by the adjustment of a screw stop, and every wad in every cartridge should be carried down to the specified distance. If it is carried down to any other distance an unsatisfactory cartridge will result, and it is only by the recognition of this fact that successful cartridge loading can be accomplished. To test whether the distance of ramming is suited to the contents of the cartridge, two very simple checks may be recommended. The first is to see that the distance is sufficient by noticing whether the pellets of shot show a mark on the exterior of the case. The other is to press the top wad with the finger, and note whether the contents of the cartridge are capable of supporting the pressure. A good cartridge is so easily recognisable when produced that the loader should have no difficulty about knowing when he has produced a satisfactory result. The real test of cartridge loading is not a question of producing one cartridge, but of maintaining a high average for all sizes and varieties turned out in the course of a season's work.

MODERN IMPROVEMENTS IN TOOL STEEL.—Among the remarkable developments of modern machine methods, none is more extraordinary than the adaption of tool steels to the special work they are called upon to perform. Our recollections of the past bring us to a time when the operator of the lathe used to keep his machine idle while he was unskilfully forging, filing, grinding and hardening the tools with which he did his work. Since then it has been recognised as uneconomical for a machine to stand idle so long as a tool-maker could be constantly employed, fashioning with a high degree of skill the various cutting instruments that were employed. Later on the lathe attendant was forbidden even to sharpen his own tools, it being evident that the instinct that develops with constant working on a tool grinder, produces a far superior grade of work than is possible to the man who has specialised in a quite different direction. As the art of tool-making has become distinct from ordinary manufacturing processes, improvements have developed, until at the present time in modern workshops the most favourable angle of tool for each class of work has been systematically arrived at, and is repeated with unfailing exactitude on every occasion. Modern self hardening steels, which must be raised in a gas furnace almost to a melting heat before they are ready for the

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chilling process, and which do not require the tempering process, are capable of lasting almost as many days on the heaviest work, as the old-fashioned tools lasted hours. They do not lose their temper however they may be warmed up by the work they are doing. In fact the improvements made in cutting tools are so marked that we even know of an instance where the re modelling of this department showed its most notable economy by a reduction in the amount of coal consumed in the boiler, the engine power required for the driving of the factory responding to the superior shape of the tools and their capacity to retain a sharp cutting edge over long hours of continuous work.

SPECIFICATIONS PUBLISHED.

OCTOBER 29th—NOVEMBER 19th, 1903.

COMPILED BY HENRY TARRANT.

21,472 (1902). **Rifle Sights.** J. Neumann, Austria. A foresight for rifles which is so constructed that a rifle may be rapidly and correctly sighted. The foresight is provided with a broad upper edge and with a ledge projecting towards the back-sight. When the sighting is too coarse the ledge is visible above the back-sight notch. Lateral deviation is indicated by the position of the broad top edge in relation with the backsight notch. Accepted October 2, 1903.

21,651 (1902). **Moving Targets.** P. Risley, Barnsbury. In Specification No. 8,177, 1902, a circuitous track upon which travelled a mechanically propelled target-carrying truck was described. In the patent now under review the details of construction of the truck are dealt with, the various parts being so modified as to create an improved carriage. The carriage is designed to afford better practice for the shooter. Accepted October 3, 1903.

22,622 (1902). **Range Finder.** J. G. Stewart, Natal. An optical range finder, in which a binocular is arranged in conjunction with mirrors and with two telescopes. The movements of the telescopes in sighting the object is communicated to a train of gearing. The gearing actuates two pointers and the angle and range are indicated by the position of these pointers upon two dials. Accepted October 15, 1903.

23,532 (1902). **Field Gun Sighting.** A. T. Dawson and G. T. Buckham, London. The elevating and traversing gear and the sight of field guns having gear of the kind set out in Patent No. 14,298, 1902, is so arranged according to the present patent as to allow of the simultaneous or of the independent action of the gun and sight so that the gun may be "ranged" by one man whilst it is "pointed" by another. Accepted October 8, 1903.

23,576 (1902). **Bolt Rifle Mechanism.** T. R. R. Ashton, London. In a recent issue we fully described the contents of Patent No. 4,532, 1902, which dealt with a bolt rifle, the complete length of which was shortened without taking away any of the length of the barrel. In the present patent several details of construction are dealt with such for instance as the trigger mechanism, a bolt locking device, bolt removing facilities and the cocking mechanism. Accepted October 28, 1903.

24,290 (1902). **Ordnance Sighting.** Lt.-Col. Kerr Scott, Farnborough, Hants. A method of laying naval guns so as to counteract the rolling of the ship, consisting in suspending the sights and in restricting the eye of the layer to one line of sight by using a telescopic sight. The variation of range is obviated by using the bubble of a clinometer which indicates to the gunner the exact moment when the gun should be discharged. Accepted October 29, 1903.

24,934* (1902). **Safety Blasting Powder.** T. R. Curtis, A. C. Pearcy, D. J. Metcalfe, and C. L. W. Smith, London; and A. T. Hargreaves, Midlothian.

25,964 (1902). **Target Apparatus.** General C. E. Luard, Sevenoaks. Improvements upon the target apparatus described in Patent No. 7,041, 1901, consisting in leading the endless wire to which the targets are attached from a driving wheel at the firing point to the front of the butt, then around the back of the butt and back to the firing point. Accepted October 22, 1903.

26,056 (1902). **Aiming Instruction.** E. F. Kelaart, London A device for imparting instruction in the correct sighting of firearms, consisting of a tube provided with sights. The novice is instructed to lay the tube at the target as though it were a gun. The bore of the tube is then opened by removing a screen, and light is allowed to pass through it. A bright spot is thus thrown on to the target, and the exact spot at which the tube was laid is indicated. Accepted October 8, 1903.

28,245* (1902). **Blasting Explosive.** C. E. Bichel, Germany.

28,376 (1902). **Armour Piercing Projectiles.** J. R. Hoyle, Sheffield; and A Anderson, Dore. An armour piercing projectile, the head of which is of truncated cone form This head is covered by a cap of ogival shape, the shape of the whole projectile being in this way practically the same as that of an ordinary shell. The cap reduces the shock of impact and retains the form of head best adapted for accurate shooting. Accepted October 22, 1903.

1,130 (1903). **Detachable Locks.** L. B. Taylor, Birmingham (Agent for *A. E. Lard, U.S.A.*). A method of securing side lock-carrying plates in the side openings of the bodies of sporting guns, consisting in dispensing with screw pins and substituting concealed fastening and unfastening mechanism. By means of this arrangement the locks may quickly be detached in a way similar to that described in a former Patent 17,731, 1897 (J. Deeley and L. B. Taylor), in connection with box-locks. Accepted October 29, 1903.

1,392 (1903). **Firing of Ordnance.** J. Salt, Buxton; and J. Brightwell, Tideswell. A thin hollow metallic device, convex-concavo in shape, is filled with oxygen. This is placed between the powder charge and the breech block. It is claimed that the force which would otherwise be stored as recoil is utilized in freeing the compressed oxygen, and in so adding to the propulsive power. Fouling is also decreased. Accepted October 8, 1903.

2,868 (1903). **Hydraulic Brake Apparatus for Ordnance.** F. T. Fisher and F. W. C. Dean. (This Specification is a Secret Document).

13,137 (1903). **Breech Mechanism of Ordnance.** V. C. Tasker, U.S.A. The principle parts of the firing mechanism described in this patent are covered by Patent No. 21,276, 1902. The present specification deals with modified means of insuring against firing until the breech block is locked; of inserting and removing the firing mechanism from the rear by hand; of dismantling and assembling the breech mechanism by hand even when the block is locked; and of preventing rotation of the block while swinging in its open position. Accepted October 8, 1903.

15,521 (1903). **Telemeters.** H. E. Purcy-Cust. (This Specification is a Secret Document).

16,913* (1903). **Rifle Sights.** A. J. Boult, London (Agent for *Dr. F. A. Shanz, Germany*).

16,964 (1903). **Shrapnel.** Capt. B. W. Dunn, U.S.A. In order to decrease the weight of shrapnel, the missile propelling charge is composed of compressed powder. The diaphragm upon which the shrapnel balls rest is decreased in weight, fear of the inertia of the balls exploding the compressed charge when the shell is fired being obviated. The centre of the compressed powder charge is occupied by some loose powder which the fuse first ignites. Accepted October 15, 1903.

19,602* (1903). **Rifle Butt Hinge.** L. D. S. Dale, London (Agent for *T. Wingfield, New Zealand*).

19,686 (1903). **Projectile Caps.** C. Van, C. Wheeler and A. G. McKenna, U.S.A. A method of attaching a cap to the head of a projectile so that there shall be no fear regarding its accidental removal. Both the head and the cap are provided with semi-circular grooves which register when the cap is in position. Through two holes in the cap two pieces of circular rod steel are forced into the circular recess formed by the two grooves. The cap is held by these rods securely upon the projectile head. Accepted October 15, 1903.

20,764 (1903). **Cartridge Cases.** B. Behr, Germany. A closing for shot or blasting cartridge cases. The mouth of the case is so cut as to leave four regular triangular pieces sticking up. When the case is filled the triangular pieces are turned

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down over the contents so completely enclosing them without the aid of a wad. Accepted October 29, 1903.

* These Specifications are more fully described under "Selected Patents."

APPLICATIONS FOR PATENTS.

OCTOBER 19TH—NOVEMBER 21ST, 1903.

22,756* Ordnance Sighting. A. H. Gordon.
22,787* Prevention of Erosion in Ordnance. J. Luciani. (Date applied for in France Nov. 4, 1902).
22,821. Targets. W. Bailey.
22,860. Single-trigger Mechanism. T. Southgate.
22,897. Gun Sights. L. G. P. Thring.
22,950. Cartridge Case. W. Lock.
22,970* Nitrocellulose. D. Bachrach.
22,973. Bandoliers. J. Lewin.
23,038. Short Base Range-finder. H. D. Taylor.
23,061* Sighting and Firing of Ordnance. P. M. Justice (Agent for *H. E. Curtis*).
23,085* Gun Sights. F. E. Heinrich.
23,124. Range-finder. F. M. Baker and J. Lena.
23,234. Rifle Sight Protector. A. Jochmann.
23,458. Pivot Gun Carriages. A. Reichwald (Agent for *Fried. Krupp, Ag*).
23,462. Cleaning Rifle Barrels. H. G. Maclennan.
23,472. Explosive. J. P. O'Donnell (Agent for *C. J. Frank*).
23,765. Ignition of Air Torpedoes. W. T. Unge.
23,766. Slow Combustion Competitions. W. T. Unge.
23,783. Gun Shields. J. Magnus.
24,078. Gun-laying Apparatus. J. Taylor.
24,190. Sword Cleaner. A. Althoff.
24,372. Time Fuses. The King's Norton Metal Co., Ld., T. A. Bayliss and H. M. Smith.
24,432. Air Gun Ammunition. F. Clarke.
24,458. Small-calibre Projectiles. A. Reichwald (Agent for *Fried. Krupp, Ag.*).
24,478* Percussion Fuses. H. H. Lake (Agent for *H. Wilson and M. A. Lynch*).
24,511. Explosives. Marie E. A. C. Yonck.
24,703. Ordnance Sighting. A. T. Dawson and G. T. Buckham.
24,789 Ordnance. A. Reichwald (Agent for *Fried. Krupp, Ag.*).
24,896. Catching Bullets at Target Butts. A. C. MacGregor.
24,946. Bandolier. E. H. B. Laing.
25,106. Air Gun Target. T. D. Dales.
25,116. Projectiles. The King's Norton Metal Co., Ld., T. A. Bayliss and H. M. Smith.
25,236. Portable Rifle Range. C. H. Marshall and W. R. Webb.
25,358. Revolvers. C. C. J. Cailliez.

* These Applications were accompanied by complete Specifications.

SELECTED PATENTS.

RIFLE SIGHTS.

16,913 (1903). A. J. Boult, London (Agent for *Dr. F. A. Schanz, Germany*). A sighting device is described in this patent. Its object is to render the image of the rear sight on the retina more clearly defined without affecting the intensity of its light.

The system of sighting is illustrated in the appended drawings. The front sight consists of the small metal mirror *a*, which is provided with the notch *b*. A plate *c* occupies the place of the ordinary back-sight. Marked upon this plate is a T-shaped figure —black upon a white ground. The T-shaped mark is so situated that it is reflected in the mirror. When correctly aiming, the point of intersection *d* of the T is made to coincide with the bottom of the notch, whilst the target *e* appears in the centre of the notch, as is illustrated in Fig. 1. The incorrect method of sighting is illustrated in Fig. 2.

The blurred impression of the rear sight, which is experienced with the ordinary sights, is explained by Fig. 3. The eye *f* is represented as being focussed upon the target *e*, whilst *g* is the rear sight, and *h* the front sight. The eye focussed upon the target projects an image at *i*, an image of *h* at *j*, and of *g* at *k*. A sharp image of *e* is produced upon the retina, whilst *h* and *g* give only diffused circles, which are larger or smaller in accordance with the distance they are from the eye.

The sighting device forming the subject of this patent has the advantage, it is claimed, of rendering the image of the sighting device considerably more clearly defined than hitherto. In Fig. 4

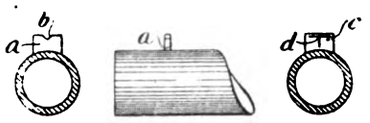


Fig. 1 Fig. 2

Fig. 3

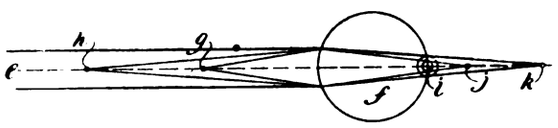
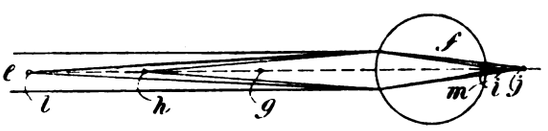


Fig. 4



f, *e* and *h* remain the same, but *g* is altered. In place of *g* is its reflection *l*. This image is as far behind the mirror as *g* is in front of it. The image, which the optical apparatus of the eye makes of *l* is at *m*. The diffusion circle produced by *l* on the retina is considerably smaller, therefore, than that which is produced by the ordinary rear sight. Accepted Oct. 15, 1903.

BLASTING EXPLOSIVE.

28,245 (1902). C. E. Bichel, Germany. In order to enhance the safety of "safe" explosive compounds, such salts of ammonium as ammonium oxalate, ammonium acetate, ammonium sulphate, ammonium chloride, and other salts have been employed. The most powerful of these heat-reducing agents is ammonium chlorate, but even this substance, says the patentee, evolves free hydrochloric acid gases, which are unpleasantly noticeable when the explosive is used underground. When the ammonium chloride is used together with equivalent quantities of potassium or sodium nitrate, or with both, it is claimed that its action is doubly beneficial, both as regards the safety of an explosive wherein these chemicals are incorporated, and in the prevention of the generation of gases capable of exercising harmful effects.

The results of a series of experiments are set out in the specification. Various known explosive compounds, treated in the above mentioned manner, were fired in the presence of benzine vapour and coal-dust in suspension. One experiment deals with Ammonium Carbonate I., the composition of which is nitroglycerin 4 per cent.; nitrate of ammonia 75·5 per cent.; potassium nitrate 9·5 per cent.;

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coal dust 0·5 per cent.; and flour 10 5 per cent. This explosive when fired alone produced a flame of 0·403 secs. in duration and 54 centimetres long. To 95 per cent. of the explosive 5 per cent. of ammonium chloride was added, and the duration of the flame became 0·262 secs., whilst its length was reduced to 45 centimetres. A mixture of 92 per cent. Ammonium Carbonate I., and 8 per cent. of ammonium chloride produced a flame of 0·210 secs. duration, 40 centimetres in length. The power displayed was reduced by 3 per cent. when 5 per cent. of ammonium chloride was used.

Thus, by adding chloride to Ammonium Carbonite I., already containing 9·5 per cent. of potassium nitrate, the number of heat units, the time of flash, and the length of flame are reduced, whilst safety from fire-damp becomes double what it formerly was. Experiments were carried out also with Roburite, Donorite, and a nitroglycerin explosive. In the case of the last two, safety was enhanced, but the power was diminished by 8 per cent. and 1 per cent. respectively. With Roburite, however, where ammonia chloride was substituted for the ammonium sulphate in its composite, both safety and power were increased. Accepted Oct. 22, 1903.

SAFETY BLASTING POWDER.

24,934 (1902). T. R. Curtis, A. C. Pearcy, D. J. Metcalfe and C. L. W. Smith, London, and A. F. Hargreaves, Midlothian. The above patentees have in times past protected a number of explosive compounds of the non-detonating class suitable for use in fiery coal mines. These compounds have depended for their safety upon the introduction of substances to lower their heat of combustion, and upon the avoidance of the production of inflammable gases. It has generally been believed that the evolution of a large quantity of carbon monoxide would lead to ignition of fire damp or coal dust.

Now the patentees have concluded, that provided this gas is produced in conjunction with others, which are either non-inflammable or do not support combustion, the danger is obviated. The ingredients of the compound covered by the present patent are, therefore, proportioned in such a manner that there is not sufficient oxygen evolved to convert the whole of the carbon of the charcoal into carbon dioxide. The heat units of the explosive are, it is claimed, reduced considerably below those of ordinary gunpowder. The loss of expansion by heat is largely compensated by the increased volume of gas, owing to the fact that 28 parts by weight of carbon monoxide occupy the same volume as 44 parts by weight of carbon dioxide.

In order still further to reduce the temperature of the products of explosion and the amount of solid residue, such substances as cupric sulphate, or a compound of cupric sulphate and ammonium sulphate are added to the explosive. Other sulphates, such as those of iron, zinc, aluminium, manganese, or magnesium are chemically equivalent to cupric sulphate, but having less stability as regards their water of crystallization they are not so eligible. Good results have been obtained with cupric sulphate mixed with ammonium sulphate in the proportion of two parts by weight of the former to one of the latter. Beyond the cooling effect produced by the volatilization of the water of crystallization contained in the metallic sulphates, they possess the power of decomposing the carbonate of potash formed as a result of the combustion of the explosive, and by liberating the carbon dioxide therefrom, increasing the quantity of non-inflammable gas. When ammonium sulphate is used either mechanically mixed with cupric or other sulphates as a double salt, its use is to obtain the benefit of a large volume of ammonia gas which acts as a deterrent of flame.

The following composition has been found to be perfectly safe when fired into the gas mixture at the Home Office Testing Station:—To the mixture composed of 75 per cent. saltpetre, 22 5 per cent. of charcoal (about 75 per cent. carbon) and 2·5 per cent. sulphur is added a mixture of 33⅓ per cent. of ammonia sulphate and 66⅔ per cent. cupric sulphate. A blasting pellet is composed of 85 parts of the first-mentioned mixture, together with 15 parts of the second. Instead of using 15 parts of the second mixture, 15 parts of cupric sulphate alone may be used. Accepted Oct. 22, 1903.

RIFLE BUTT HINGE.

19,602 (1903). L. D. S. Dale, London (Agent for *J. Wingfield, New Zealand*). The invention described in this specification consists of a hinge situated at about the grip of a rifle stock. The object of the hinge is to allow of the bending up of the stock for long range shooting.

The device is illustrated in the accompanying drawings. The tongue *a* of the hinge is situated between the sockets *b* and *c*. It is provided with the two notches *d* and *e*, the former being used when the bend of the stock is normal, and the latter when the stock is to

Fig. 1

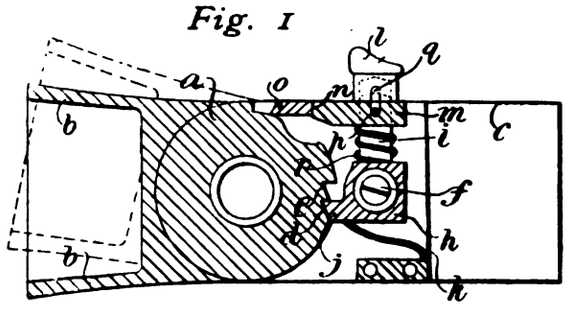
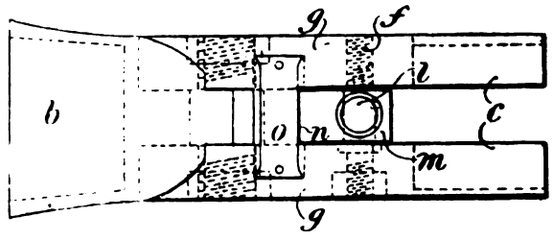


Fig. 2



be straightened to allow the eye more easily to reach the elevated sights. Free to move on the pin running through the fork *g* of the hinge is the head *h* of the bolt *i*. The head *h* is provided with a projection *j*, adapted to be pressed into engagement with one of the notches by the spring *k*. Sliding over the free end of the bolt *i* is a cap having a thumbpiece *l* and a pawl *m*, the nose *n* of which contacts with the edge of the bridge *o*. The bridge *o* crosses the space between the fork *g*, and so locks the tooth *j* in one or other of the notches. The cap and pawl are guided in their vertical movements by the pin *p*, the free ends of which work in the slots *q* in the cap. The spiral spring *r* keeps the pawl and head apart normally. When it is necessary to straighten the stock, the thumbpiece *l* is pressed downwards. The pawl *m* is carried by this means downwards below the bridge *o*. The head *h* is turned over on the pin *f* to disengage the part *j* from the lower notch. The butt is then turned upwards upon the hinge, and when the pawl *m* is taken back into its original position behind the bridge *o* the spring *k* is free to press the projection *j* into engagement with the top notch. Accepted Oct. 15, 1903.

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