

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		Dangerous War Relics ... ..	7
The Service Revolver ... ..	3	ROUND THE TRADE ... ..	7
Honour to whom Honour is due ... ..	3	THE DEVELOPMENT OF NITROCELLULOSE.—III. ... ..	8
REVOLVERS OR PISTOLS? ... ..	4	THE ROSS STRAIGHT-PULL MAGAZINE RIFLE ... ..	10
<b>NOTES:</b>		APPLICATIONS FOR PATENTS ... ..	12
Explosives on the Gold Coast ... ..	5	SPECIFICATIONS PUBLISHED ... ..	13
Telescopic Sights at Bisley ... ..	5	<b>SELECTED PATENTS:</b>	
The Remington Target Pistol ... ..	6	Magazine Mechanism for Rifles ... ..	15
The Late Mr. Daniel Fraser ... ..	6	Explosives Cooler ... ..	15
Normal Powder and Ammunition Co., Ltd. ... ..	6	Automatic Rifle Mechanism ... ..	16

## CURRENT TOPICS.

**The Service Revolver.**—An article which appears on another page of this issue might at first sight appear to be a direct attack made against the Service revolver and its makers. This is not so, however. Our contributor, who is well-qualified to deal with the subject, has indeed instituted a somewhat severe criticism of the Service revolver, simply because it is a revolver and because it is at present the weapon used in the Service. But the reason should be apparent from the general trend of his article, for he evidently is of opinion that for military purposes the revolver is rapidly becoming an anachronism. The advent of automatic pistols has shown that the ballistics of any weapon with a fixed barrel and revolving cylinders must necessarily fall short of the best results attainable with a given weight, size, and calibre of weapon, owing to several well-defined causes which the article enunciates. The revolver has served its turn, and may still continue to render useful service within the limitations of its powers, but there is little hope that its radical system of construction and operation can compete successfully against an automatic arm allowing of the use of more efficient ammunition, provided that the latter can be perfected in its own particular line. To say this is not to declare the name of any weapon which might be substituted at present for the Service pistol.

**Honour to whom Honour is due.**—We notice with regret that at the recent annual general meeting of the Birmingham and Provincial Gun Makers' Association, the Chairman seemed to attribute an altogether undue measure of credit to that body in regard to the work so far done in the direction of fixing

standard minimum chamber sizes for shot guns. The same fault was committed a twelve month ago, the reports of the Birmingham Association for both 1900 and 1901, and the resulting Chairman's speeches, referring to the matter in such a way as to give to those who are not better informed the impression that the standardisation of gun chambers is a question that was initiated and carried to its present stage of progress by "the Association." We cannot but think that this method of ascribing credit for what is admittedly a desirable and most important piece of work is eminently unfair to the other body on which the real burden of the task lay. It must be quite well known to Mr. Hughes that the initiation and all the creative work of establishing standard minimum sizes for gun chambers are entirely due to *The Gunmakers' Association*, and not to the Birmingham and Provincial Gun Makers' Association, which latter body at the inception of the enterprise was better known as the Birmingham and Provincial Gun Makers' Union. It was *The Gunmakers' Association* which first took in hand the question, and drafted figures for the chambers of 12, 16 and 20 bore guns, and it was not until all this preliminary work was accomplished that the Birmingham Association, in conjunction with leading firms of ammunition manufacturers, were called into consultation at a joint conference for the purpose of approving the proposed dimensions. A representative of the Birmingham Association attended the Conference and subsequently subscribed his approval, on behalf of that body, to the figures then approved. So much for the part taken by the Birmingham Association in the first stages of the work. More recently, *The Gunmakers' Association* compiled a similar standard set of chamber dimensions for other bores of shot guns in general use, and summoned another joint conference, to which a representative

of the Birmingham Association was again invited. On this second occasion, however, the Birmingham Association's representative failed to attend, so that that body actually took no part whatever in the conference, and is only informed at second hand, and by inference mostly, as to what took place at the meeting. As a matter of fact, the figures then put before the meeting are likely to be brought forward for revision at a further conference, there having been some little divergence of opinion on one or two points. We have felt constrained to relate this little piece of history in justice to the Gunmakers' Association, which has so far borne all the brunt of drafting the proposals which will shortly be made public, and from which the Birmingham Association seems to seek a borrowed and distinctly unmerited lustre. Surely the Birmingham Association can obtain sufficient credit to itself for the part it has taken in helping forward the matter of technical education in the gun trade of its own flourishing city, and in other directions, without claiming unearned honours. *Palmarum qui meruit ferat!*

## REVOLVERS OR PISTOLS?

Now that the Small Arms Committee are beginning to show a vigorous indication of life, I trust they will not end their labours with rifles and rifle ammunition, but will turn their attention to the much neglected pistol, which for years has been allowed to live as the Service weapon with very little, if any, official attempt to ascertain whether it was the best procurable or whether its conditions were most suitable even for its own requirements. There is no doubt that the present Service pistol is an excellent weapon, and at the time of its adoption was superior to all comers. But times have changed and conditions of warfare are altered, inasmuch that other nations, who have consistently given attention to the improvement of their pistols, outclass our weapons at once, and so entirely nullify the advantages it had in its youth. It behoves us, therefore, to keep moving in pistols as well as in every other small arm or munition of war.

It is an interesting, but I think regretful, fact that the War Office has persistently left the manufacture of the pistol out of its Ordnance Factories for so many years. Even in the "Handbook on Small Arms" no mention is even made of it, except to chronologically state the part it played in the evolution of the rifle, when the pistol was first cousin on the carbine side of the family.

I have alluded to the manufacture of this weapon in the Royal Ordnance Factories because it appears to have a very important bearing upon the matter. It is only natural that the greatest interest should be centred in articles of one's own production, and private contractors have not the facilities the Ordnance Factories have for ascertaining the requirements and possible improvements which might be effected. Consequently, the pistol occupies the position of a good and, doubtless, well-intending servant, which, however, not being "one of the family," rarely, if ever, enjoys intimate intercourse with the experts who preside over the destinies of the more fortunate weapons which claim almost filial alliance to these improvable and inventive genii.

This lack of interest is clearly shewn in the history of the ammunition for the Service pistol. Under the old black powder conditions the cartridge followed in the orthodox lines

of its compeers in other countries, and its ballistics showed favourable results in comparison. But when cordite came upon the scene, the incongruities of its adoption under existing conditions became painfully apparent. The old cap was discarded and a solid anvil adopted, and something about equal to the original result with the old cartridge was produced, except that it was not so regular. The new ammunition gave blow backs and split cases through higher pressures, without the equivalent rise in velocity, and this trouble existed for years. No one cared about the pistol. The Ordnance Factories authorities' only anxiety was to make cordite ammunition, hoping thereby to bring the weapon up-to-date with a minimum amount of worry. What has happened? Only those who have had to make and prove the Service pistol ammunition can tell. The hoped-for velocities are almost unattainable. Cordite is partly to blame, as it is expensive to manufacture, owing to the small amount used. Moreover, the bullet is unsuitable, and, after numerous experiments, it seems that the sooner the pistol is treated as an integral part of the ammunition, and not merely an accessory, the sooner we shall gain some amelioration of the ballistic difficulties.

Here a new field is opened up. If any alteration is necessary, is it worth while commencing afresh or improving the present pattern? The main points in a pistol would be roughly summarised thus:—(a) Ballistic results; (b) Shape and weight; (c) Ease of loading; (d) Balance. To criticise these in detail, one must, at the outset, endeavour to find out why the velocity of the ammunition is not what it ought to be. First, we carefully examine the result of firing, and find that the chamber of the revolver is bound owing to its construction to give windage to the bullet. What this means is simply that the gases are escaping past the bullet before it has time to bed itself in the rifling. This can be cured by a flat based, or very slightly coned, bullet, and a gas check of jute. The latter is used at present, but with very little result; for the jute disc is blown into the hollow base of the bullet, which may be verified by picking up the discs after firing, if they are not meanwhile blown to pieces or charred out of recognition. Under these circumstances, the so-called gas check is at present of no earthly use and only increases the initial pressure. Hence we find we must have a flat base bullet to fire correctly with cordite so that a gas check can be adopted. I do not imply this is the only way, but the other means would entail very difficult if not impossible mechanical alterations to the pistol. In order to get a flat base without entirely reconstructing the bullet—and possibly also the calibre, owing to difficulties with sectional density—a clay plug or other material might be adopted, but it would mark a retrograde step.

Another objection to the revolver chamber is the distance the bullet has to travel before it enters the rifling. There is space in which to acquire a considerable force which tends, on the occurrence of the momentary retardation due to the shock of the bullet encountering the rifling, to strip the bullet. This may be observed by examining a fired bullet, which shows the grooves tapering down in a marked degree from the place at which the bullet began to take the rifling to actual width at base—sometimes in the ratio of 2:1. Another interesting point strikes one when looking at a fired pistol bullet, and that is what a comparatively small effect the pressure has had upon the walls of the cavity toward the base of bullet.

It would have been reasonably supposed that owing to slight circumferential resistance of the walls, the rifling and marks of pressure would have been most impressed at that end, but, as a matter of fact, it is hardly impressed at all, the bottom cannellures being almost intact. This is probably due to the cushioning of the gases passing externally.

It would appear, therefore, that in order to get the best ballistic results, the bullet should be properly gas-checked until it enters the rifling, and that the shoulders of the bullet should be up against the entrance to the lands, so that the rotary motion may be imparted without abnormal shock or retardation. For these reasons the chamber should be part of the barrel, and the cartridges pressed home as in a rifle, and on this account I would do away with the revolving chamber. These considerations would, in fact, induce one to reflect as to the advantages of the revolving chamber. We find that the shape of the pistol is seriously affected by this bulging piece of mechanism. A revolver is impossible for the pocket, and is awkward to stow away in anything but a specially constructed holster, whereas a magazine action offers a flat-sided weapon without any projections, and very little, if anything, over an inch in width. The barrel of the Service pistol is heavy and clumsy, and if the thickness of the walls of the chamber is any criterion as to the thickness necessary in construction, the barrel seems disproportionately thick.

When we come to the vital question of loading, we find the revolver action is sadly wanting; to be obliged to put in one cartridge after the other, by hand, and, in all probability, at moments of the greatest excitement, is an outrage on common-sense, when it can be done mechanically and in one fraction of the time. Nor is this its gravest objection. Unless one counts each round, there is no indication as to when the chamber is empty. Many a valuable life may have been lost, owing to miscalculation that another round was still left. On the contrary, though it is certainly a fault on the right side, the whole chamber may be ejected when possibly it still contains several unfired cartridges.

There appears to be at any rate a *prima facie* case for the Small Arms Committee to deliberate upon. With a magazine pistol fed by a clip of say 10 cartridges, and a magazine in the butt of weapon, a perfect balance is obtainable, whereas in the present pistol the balance varies as each round is discharged. Add to the above an automatic feed and ejector and a stop when the last cartridge is fired, and such a pistol may be said to come up to modern requirements. The knowledge that a weapon of this description is possible makes us wonder why we still entrust valuable lives to a fire-arm which, however much we may respect it as an old comrade which has done good service, has already failed to meet the exigences of re-armament in other countries.

I have been careful to indicate no special make of pistol, nor have I offered any suggestion as to calibre, so I think that before deciding either of these points, the various actions of magazine weapons are worthy of a very close consideration. Nor do I wish to imply that the Ordnance Factories should necessarily meet all the Service requirements. A good part of the orders that would result from a re-armament might go out to the trade, while a proportion might well be given to our Birmingham Factory at Sparkbrook, which diminishes as the Enfield Factory grows, at any rate in output. There can be little doubt that every man in the army ought to have

a pistol, and in that case there should be plenty of orders for all British manufacturers, yet none to spare for firms abroad.  
CYCLOPS.

## NOTES.

EXPLOSIVES FOR THE GOLD COAST.—According to a Bill which has been gazetted to amend the Explosives Ordinance (Gold Coast) 1884, and which has been read a first time, Section 2 of the former Ordinance is repealed, and the following substituted: In this Ordinance, unless the context otherwise requires, the term "Explosive" means nitro-glycerine, dynamite, gun-cotton, blasting-powders, fulminate of mercury or of other metals, coloured fires, and every other substance, whether similar to those above-mentioned or not, used or manufactured with a view to produce a practical effect by explosion or a pyrotechnic effect. Provided that nothing in this Ordinance shall be deemed to apply to gunpowder, percussion caps, rockets, or fuses, Section 4 of the principal Ordinance is hereby repealed, and the following substituted: The Governor, or any person deputed by the Governor for that purpose, may by written permit under his hand authorise the landing and importation of explosives, and such permit shall specify the description, quantity and quality of the explosive, the port of importation, conditions as to sampling and any special conditions as may be specially directed by the Governor, or by any person deputed by him as aforesaid, with his approval.

TELESCOPIC SIGHTS AT BISLEY.—The Council of the N. R. A., recognising the great importance of long-range shooting, have decided to repeat the competition for Service rifles fitted with telescopic sights at the Bisley Meeting, 1902. The conditions describe the weapon as "the .303 Service rifle, from which the existing aperture and dial long-range sights may be removed if desired; the fittings remaining up in the rifle when the telescope is removed must be simple, and such as not to interfere with the individual or the rifle." The attachment must be adapted primarily for firing in the prone position; must avoid interference with the free working of the breech-action; and must be strong, compact, and not easily liable to damage; at the same time admitting of the telescope being easily and rapidly attached and detached. In respect to the sight, nine inches must be the extreme length of the telescope, the weight, including all elevating gear, not exceeding one pound, and the minimum field of view six degrees. The arrangement for obtaining elevation must be simple and provide for all distance up to 3,000 yards, which is practically equivalent to eleven degrees of elevation, and the sight must be capable of being carried conveniently when detached from the rifle. An arrangement for obtaining lateral adjustment, of a simple character, may be provided; and at the firing point artificial rests may be used. The target will be of a dull colour, and have on it figures or objects not clearly distinguishable by the naked eye. Each proposed design of telescopic sight must be submitted for approval prior to the holding of the meeting. It will be remembered that the Winans Telescopic Sight Competition at last year's meeting, which had exactly the same conditions as here repeated, was not formulated in sufficient time to give much chance to

manufacturers. It is to be hoped that ample notice is now given, and that due advantage will be taken of it.

**THE REMINGTON TARGET PISTOL.**—We have recently received for notice a sample specimen of a single-shot pistol, specially intended for target and gallery practice, which is a very fine example of the work turned out by the Remington Arms Co., of Ilion, New York State, U.S.A. This type of pistol is made in two calibres, for the '22 short rim fire, and for the '44 S. & W. Russian central fire cartridges respectively. At our request, the weapon sent to us is of the smaller calibre, and the accompanying illustration shows its leading features. It has a 10-inch barrel of good weight, the pistol weighing altogether about 2½-lbs., and it is well-balanced and holds well in the hand. The trigger-pull is adjusted to from 3 to 3½-lbs. As will be noted, the breech mechanism is of the well known Remington pattern, with a sound method of extraction. With so good a length of barrel, the sighting of the pistol presents no difficulty, there being about 9-inches between the ivory-

claim of the makers to have produced a well-balanced, accurate and finely-adjusted arm.

**THE LATE MR. DANIEL FRASER.**—We regret to have to chronicle the death of Mr. Daniel Fraser, which took place at his residence, Sycamore Bank, West Duddingston, on the 7th ult. Mr. Fraser was famous as a gunmaker, especially with regard to rifles, and was well known as an expert and practical exponent of the art of rifle shooting. He served his apprenticeship with Mr. Alexander Herry, of Martini-Henry renown, and subsequently entered into partnership with his brother in the firm of D. and J. Fraser, the style subsequently changing to the present one of D. Fraser and Co. The firm, and Mr. Daniel Fraser in particular, devoted marked attention to the possibilities of the small-bore rifle, and in 1880 the Elcho Challenge Shield competition was won by a Scottish team, most of whom were supplied with rifles by the firm. At Wimbledon and Bisley also the firm has scored many successes, both personally and by proxy. Mr. Fraser was in



THE REMINGTON TARGET PISTOL.

bead front sight and the back sight. An adjustable wind gauge rear sight is fitted if required, but the particular pistol under notice has not got this capacity for adjustment. The pistol seems to be well-nigh an ideal weapon for the purpose for which it is intended, and though its calibre and the relatively weak ammunition which it is chambered to receive do not perhaps afford scope for all round experience in pistol shooting, owing to the slight degree of recoil resulting from the small powder charge in conjunction with the weight of the weapon itself, on the other hand it will afford a variety of sport under conditions that might preclude the use of a more powerful arm. On "the other side," we believe that a number of sportsmen have taken to carrying a '22 calibre pistol in addition to their rifle or shot gun, the pistol being employed for bringing down wood-chucks, squirrels and similar small game at reasonably short range. Messrs. Charles Osborne & Co., of Birmingham and London, are the agents in this country for the Remington Arms Co., and we believe that they have recently received a consignment of these target-pistols. A trial of the specimen now before us seems to bear out the

the Scottish Twenty in 1874, 1875, 1876, 1880, and subsequent years, being for over a quarter of a century a prominent member of the Queen's Edinburgh Rifle Volunteer Brigade. In later years, at Bisley, he had a stand for the exhibition of his sporting guns and rifles, which was well known to frequenters. The Queen's and King's Prizes have repeatedly been won by marksmen with Service rifles supplied by Messrs. D. Fraser and Co., as we pointed out at the time of the last Bisley meeting. They also do a large business in sporting guns of a high-class character. Since going to reside at Duddingston, Mr. Fraser fitted up a range there for the testing of his guns and rifles, and Lord Milner, amongst other distinguished personages, has been fitted thus with guns for sport abroad. The gunmaking profession has lost a noteworthy member, and one difficult to replace, though it is satisfactory to know that Mr. Fraser's eldest son bids fair to follow in his father's footsteps.

**NORMAL POWDER AND AMMUNITION CO., LD.**—In accordance with a circular issued to the shareholders in



October last, the accounts of this company have been kept open for a period of eighteen months from April 1st., 1900, to September 30th., 1901, therein following the previous practice as regards this company in respect to drawing up the balance sheets on eighteen months' accounts. It must be admitted that the report of the directors for the period in question, which was duly presented to a general meeting of shareholders held on the 17th inst., shows little improvement on previous reports so far as any substantial results are concerned. Certainly, it states that the actual trading during this last period has shown a considerable improvement, so much so, in fact, that on this head alone the profit made has increased fourfold. However, the directors regret that they are still unable to show a profit on the whole business—which is what the average shareholder is interested in—though they do not despair, for the report goes on to say:—"As the loss has so far been reduced during the last eighteen months to half of what it was in the preceding period, they hope that this may be the last occasion on which any loss may appear in the balance-sheet." The debit balances for each succeeding eighteen months of the 4½ years measuring the life of the company have in fact been, in round figures, £9,500, £6,500, and £3,000 respectively, and a study of the ratio may possibly inspire hopes as above quoted. Still, the fact remains that up to date, out of a total public subscription of £25,000, something like £19,000 has filtered away in the several debit balances. As an excuse for the past and a source of hope for the future, the directors point out:—First, that as can be seen in the balance sheet—which by the way did not accompany the report,—several debit items will probably not appear again. Secondly, that £1,168 appears as a charge for free carriage, most of which can be considered as a dividend to shareholders who are sportsmen. Thirdly, that since the introduction of Normal Powder in this country severe competition has sprung up, increasing the difficulty and expense of the undertaking, and retarding the prospects then anticipated of the success which so excellent a powder should ultimately attain. It appears that the directors derive some satisfaction from a statement that other manufacturers have followed the lead of their own company, and so instituted the competition referred to, since such imitation may "be regarded as a disadvantage to this company, but it is also a compliment, showing that the inventors of Normal Powder, which has never altered, understood from the first the requirements of sportsmen." Unfortunately, shareholders are sufficiently mercenary to expect something more substantial than compliments of this character.

### DANGEROUS WAR RELICS.

In consequence of the occurrence of several fatal accidents through the bursting of shells brought home from South Africa as relics of the war, the Home Office has felt it necessary to issue a warning to the public as to the danger incurred in the handling and storage of those mementoes. To begin with, the keeping of filled shells or cartridges for quick-firing guns is illegal under the provisions of the Explosives Act, 1875. This does not apply to small arm ammunition, which may be lawfully, and as a general rule safely, kept, nor does it include merely fragments of shells or other articles that, whatever their original condition, no longer contain explosives. The smallest shell which would be likely to contain explosive is that of the 37-mm. "pom-pom," which

is about an inch and a half in diameter and nearly four inches long, and starting from that basis, all sizes of shell, and all unfired cartridges containing such shell, are distinctly liable to prove dangerous in handling, and moreover, under the Act quoted, may not lawfully be kept in an unlicensed place. Apart from the legal aspect of the case, a shell that has been fired and has failed to explode is generally in a far more sensitive condition than the same shell before use, and may often be exploded by quite a trifling blow, to say nothing of the risks to be incurred in attempting to screw out the fuse. There was a melancholy example of this danger in the fatal occurrence on the range at Okehampton to which we drew attention a few months ago. We cannot but think that this official warning is distinctly well-timed, and is deserving of wide circulation. Of course, it may be interesting to possess such relics, and may even give an added importance to the friends of some of our gallant troops, but that is quite a different affair from giving storage accommodation to a deadly missile which almost certainly has acquired additional facilities for working wide-spread destruction by the very circumstances under which it has been acquired.

### ROUND THE TRADE.

The Meisenbach Co., Ltd., inform us that their City office is removed to 173-5, Fleet Street, E.C.

During the rebuilding of their well-known premises at 27, Pall Mall, the Wilkinson Sword Co., Ltd., are occupying temporary show rooms at 41, Pall Mall.

Mr. Astor has presented the handsome sum of £10,000 to the National Rifle Association for the express purpose of encouraging the formation and development of Civilian Rifle Clubs.

The directors of Messrs. John Brown and Co., Ltd., announce an interim dividend of 6d. per share on the ordinary £1 shares (15s. paid), and of 8d. per share on the ordinary £1 shares (fully paid).

We understand that the War Office has ordered thirty-six Greener Humane Cattle Killers for shipment to South Africa. These are to be issued to troops at the front, and will be used for the purpose of killing wounded horses.

Mr. Charles Lancaster, of 151, New Bond Street, London, W., has been appointed gunmaker to H.I.H. the Grand Duke Vladimir Alexandrovitch of Russia, through the courtesy of the Baron Graevenich, Chargé d'Affaires of the Russian Embassy.

M. Josef Dertina, civil engineer, Maschinenbau-und Patent Bureau, No. 19, Brandhofgasse, Graz, informs us that he has taken over the cleaning fluid for small-arms, patented by M. A. Beck, of Austria (No. 15,078, 1901), which was one of the "Selected Patents" in our last issue, page 201.

A new Order relating to the use of Explosives in Coal Mines has been made by the Home Secretary, in pursuance of Section 6 of the Coal Mines Regulation Act, 1896. This Order amends the Order of October 1st, 1901, and the effect of it is to add three new items to the list of permitted explosives, viz., Clydite, Haylite No. 1, and Victorite. All these have passed the special test.

Messrs. Curtiss's and Harvey, Ltd., have forwarded for our acceptance a very neat and compact little diary for 1902, which they are producing in accordance with their usual custom as a memento to friends in the trade, and customers. It is bound in crimson morocco, with two days to a page, and contains a calendar and tables of useful information for sportsmen.

We have received from the Marlin Fire-Arms Co., of New Haven, Conn., a sample of a choice little desk calendar for 1902, printed in twelve colours, which is a fine specimen of

art lithography. It is tasteful in design, and illustrates the different varieties of game which the Marlin rifles and shot-guns are capable of accounting for. The Marlin Co. will send a copy to any of our readers who apply and send a stamp to cover postage.

We have received from Messrs. Wm. Bennett, Sons and Co., of Roskear Safety Fuse Works, Camborne, another of their annual desk calendars, of the same attractive and convenient type as those issued on former occasions, and of the same royal red colour. These calendars, which show a complete month at a time, are of a most useful character, but the case is of so durable a nature that it seems quite a pity to throw away last year's because the cards accompanying it are out of date.

The Webley and Scott Revolver and Arms Co., Ltd., have recently made two very fine revolvers for the Grand Duke Michael Mikhailovitch, of Russia, the stocks being of mother-of-pearl, with fittings and implements of gold. The same company have also built a couple of double-barrel top lever action sporting guns, for presentation to the Rajah Pahamand Singh Bahadur of Banauli, the stocks of which have been cut in ivory. The butt plates and inscription medallion are of gold, heavily chased, the barrels are heavily gilt, and the implements are of ivory and gold.

Mr. Charles Lancaster, the well-known Bond Street gun-maker, recently had the honour of showing to H.R.H. the Prince of Wales, at York House, the Ross Straight-pull Rifle, which is described elsewhere in these columns, and the Harris Rifle Magazine. The Prince showed a most lively interest in the two inventions, and appeared to enter thoroughly into their principles of construction and operation. It may be remembered that Mr. Lancaster had previously shown a Lee-Enfield Service rifle, fitted with the Harris Magazine, also the Ross rifle, to H.M. the King, to H.R.H. the Duke of Connaught, and to F.M. Lord Roberts.

At the second ordinary general meeting of Messrs. J. and E. Hall, Ltd., the directors announced that after paying dividend on the preference shares at the rate of 6 per cent. per annum, and a dividend at the rate of 8 per cent. per annum on the ordinary shares, there would be a balance of £962 to carry forward. The profit for the year ending July 31st last had been £17,039, after deducting expenses of management, but of this a large proportion was due to the vendors as up to November 30th, 1900. The prospects for the current year are considered to be in every way satisfactory, and the recent improvements in the company's works at Dartford will tend to reduce the cost of output to a material extent.

According to the Board of Trade returns for the eleven months ending on November 30th last, under the heading of Arms, Ammunition and Military Stores, small firearms to the number of 104,870 were shipped abroad, as compared with 90,465 and 114,151 for the corresponding periods of 1900 and 1899 respectively. Shipments of gunpowder show signs of making up leeway, the total for the eleven months being 6,413,456 lbs., as compared with 6,563,100 lbs. and 7,305,000 lbs. in the similar periods of the two previous years. In November alone there has been an increase of nearly 280,000 lbs., as compared with the export in the same month of 1900. The various unclassified items, which come under the heading of "All other Kinds," continue to show a steady increase, the figures being respectively—£2,021,200 for 1901, £1,649,238 for 1900, and £1,452,634 for 1899, so far as the first eleven months of each year are concerned.

## THE DEVELOPMENT OF NITROCELLULOSE.—III.

### INFLUENCE OF THE NATURE OF THE CELLULOSE.

In the manufacture of nitrocellulose on a large scale cotton waste or cellulose prepared from woody fibre is generally used. The term cellulose includes a variety of substances which behave very differently when submitted to the usual manu-

facturing processes of nitration, and consequently the opinion prevails—even excluding wood pulp—that commercial celluloses, as represented by the various cotton products, are not one and the same thing as far as the production of nitrocellulose is concerned.

Professor Lunge investigates this matter; he collected five varieties of commercial cottons, and nitrated them in an identical manner as regards bath, &c. In each case he obtained a collodion of about 11.65 per cent. nitrogen and 100 per cent. solubility.

He states as a consequence that the variations previously observed "must therefore not be attributed to variations in the quality of the cotton employed, but more probably to unequal conditions of nitration." It is a pity Professor Lunge shows such over-confidence in his experiments. Published results exist, showing that the nature of the cotton used in the production of nitrocellulose is an important factor in nitration. Moreover, the commercial experience which Lunge set out to refute is certainly more convincing than any isolated experiment, no matter how carefully performed.

Bruley's second series of experiments show clearly the difference between cotton wool and cotton waste. In most instances there is a drop in nitrogen, a more tardy reaction, and a disappearance of the high soluble nitrocelluloses obtained with cotton wool. With cotton waste the highest soluble nitrate Bruley produced had only 12.2 per cent. nitrogen and a low viscosity. Even cotton wastes differ, and it is more than probable this difference is due to chemical as well as physical conditions. The latter is easily understood, and the former may be explained by the effects of bleaching and the treatment with soda usually applied to cotton wastes to prepare them for making gun-cotton.

Cellulose prepared from woody fibre is no doubt quite a different substance from cotton cellulose. We understand that, whereas the latter gives with the usual 1 : 3 acid bath the highest stable nitrate of 13.47 per cent. nitrogen, the former gives similarly only 13.10 per cent. nitrogen.

### INFLUENCE OF THE RELATION BETWEEN THE WEIGHT OF ACIDS AND CELLULOSE.

In the production of nitrocellulose, nitric acid enters into combination, and water is formed, consequently, as nitration proceeds, the percentage of nitric acid falls and that of water rises. It is therefore easy to understand that, when the weight of mixed acids bears a small ratio to the cellulose acted upon, the product resulting will differ from that formed in a bath of the same composition, but where the weight of acids per unit weight of cellulose is much greater.

Lunge's results, figured in Table 1, (see A. & E., Dec., 1901) show this plainly with the bath 1 : 3, reducing the acids in the proportion of 30 to 12 caused a drop in nitrogen of 0.30 per cent., and in the 1 : 5 per cent. bath a reduction of 8 lowered the nitrogen 1.27 per cent.

### INFLUENCE OF TEMPERATURE ON NITRATION.

The temperature of the acid bath has a marked influence on the result of nitration. It increases the speed of the reaction, and in the production of soluble nitrocelluloses appears to lessen the formation of insoluble. When, however, the temperature is very high, subsidiary reactions take place, causing the cellulose and the nitrocellulose to go into solution, thus reducing the yield.

Professor Lunge investigated the effects, and gave th

following results with a bath composed of three parts of strong sulphuric acid and one part of strong nitric acid, immersing one part of cellulose in about 60 parts of mixed acids.

TABLE IV.

Temperature.	Duration of Immersion.	Nitrogen. Per Cent.	Loss of Cellulose. Per Cent.
0°C ..	½ hour	10.71	—
	7 hours	13.19	—
10°C ..	7 "	13.37	—
	7 "	13.38	—
15°C ..	½ hour	12.72	—
	7 hours	13.39	—
40°C ..	½ hour	13.07	trace
	7 hours	13.06	1.61
60°C ..	½ hour	13.08	1.95
	7 hours	13.07	5.67
80°C ..	½ hour	13.07	6.52
	7 hours	13.12	27.45
			52.76

Professor Lunge also gives a table for collodion, but this does not show any new feature. Hot baths are generally used for the production of collodion, because they give a quick reaction, allowing the use of large volumes of mixed acids, and in combination lessening the formation of insoluble products. The maximum temperature is generally fixed at 40 deg. C.

**INFLUENCE OF THE DURATION OF IMMERSION.**

It has been shown under the last heading that the duration necessary to complete nitration is affected by the temperature. Even at ordinary temperatures it is a material factor, as reference to Table 2 (see A. & E., Dec., 1901) will show. This is more particularly the case for baths containing less than 20 per cent. nitric acid. Bruley states that for high and low soluble nitrocelluloses, the maximum nitration is hardly obtained before the end of two hours, and for guncottons or insoluble nitrocelluloses as much as 8 or 10 hours are required.

**ON THE PRODUCTION OF THE HIGHEST NITRATES OF SOLUBLE AND INSOLUBLE NITROCELLULOSE.**

In our first article we pointed out that the limit at which Vieille put the highest product of nitration (viz., 13.47 per cent. nitrogen) has had to be abandoned. Hoitsema in 1898 prepared nitrocellulose up to 13.90 per cent. nitrogen by using a mixture of equal parts of nitrogen-pentoxide and phosphorus-pentoxide, and Lunge later has gone quite as high without having resource to more than ordinary nitrating mixtures. He immersed cellulose in about 50 times its own weight of mixed acids, and obtained amongst others the following results (see Table 5.)

TABLE V.

ACID MIXTURE.			Nitrogen. Per Cent.	Yield Per Cent.
Sulphuric Acid. Per Cent.	Nitric Acid. Per Cent.	Water. Per Cent.		
63.35	25.31	11.34	13.92	173
62.95	24.95	12.10	13.83	175
64.56	25.31	10.95	13.75	175
68.02	25.28	5.70	13.76	—
67.32	32.53	0.15	13.62	176.5

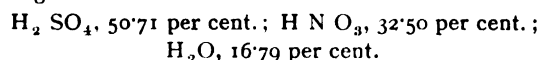
It will be seen that the two highest nitrogens are given by

acid mixtures in the ratio of 1:2½, and which contain 11 per cent. to 12 per cent. of water.

These high nitrogens are, however, only ephemeral. Lunge states that a few days in the desiccator caused them to fall to 13.5 per cent. and remain perfectly constant at this point. Moreover these high nitrates can only be produced when washing is done at low temperatures; boiling immediately reduces them to the 12.5 per cent. limit. Probably these circumstances explain why they have hitherto escaped discovery. Endeca-nitro is thus the highest stable nitrate, and the evidence above points to the twelfth hydroxyl as having an entirely different value in the cellulose molecule to the remaining eleven.

Eder placed the highest soluble nitrocellulose at 12.75 per cent. Lunge's experiments have raised this limit; he obtained a product of 99.32 per cent. solubility, and a nitrogen of 13.02 per cent. with a yield of 165 per cent.

In this instance his nitrating bath on analysis gave the following:—



Publications previous to Lunge's have never given the nitrogens of soluble nitrocelluloses above 13.0 per cent. We understand, however, that in some private laboratories the fact that soluble nitrocellulose of such high nitrogen did exist was well known.

**INFLUENCE OF THE LOWER OXIDES OF NITROGEN PRESENT IN NITRIC ACID ON THE PRODUCTION AND STABILITY OF NITROCELLULOSES.**

Nitric acid specifications generally limit the amount of tetro-oxide at 1.5 per cent., and there is a general opinion that higher percentages have a detrimental effect on the production of nitrocellulose and nitroglycerin. Lunge's investigations show that, so far as nitrocellulose is concerned, such fears are groundless. Admitting this is so, yet from the standpoint of purity alone, the specified limit of tetro-oxide is a useful one.

Lunge added quite large amounts of tetro-oxide to his nitrating baths, even up to the amount of 9.28 per cent., and he found that as regards yield, nitrogen contents and stability, tetro-oxide has no detrimental action on the production of guncotton. He gives the following for one nitrating bath:—

Nitrogen-tetro-oxide. Per Cent.	Nitrogen. Per Cent.	Yield. Per Cent.
0.13	13.55	174.53
0.99	13.50	175.02
1.84	13.56	173.98
5.15	13.56	175.60

Moreover, these different products by Abel's heat test, and also by the temperature of inflammation, showed no difference, thus establishing the fact that they were of equal stability.

Lunge naturally hesitates about giving an opinion on the influence of tetro-oxide on the nitration of glycerin; probably Bertholot's experiments, which indicated that a nitro-nitroso derivative of glycerin existed, induced this caution. If such an ester of nitric and nitrous acid can be produced, one can understand why nitro-glycerin manufacturers take such trouble to reduce the tetro-oxide to the lowest limit.

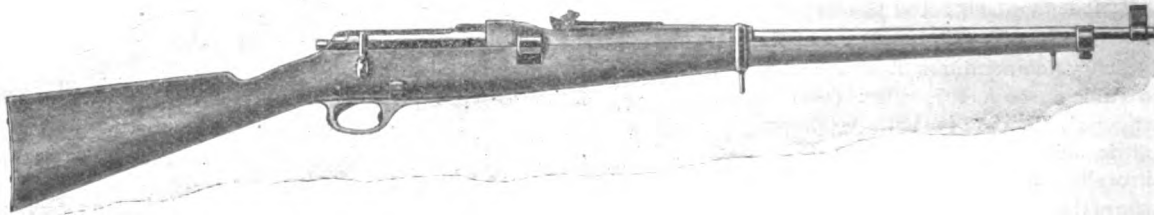
(To be continued).

## THE ROSS STRAIGHT-PULL MAGAZINE RIFLE.

WE were recently enabled, through the courtesy of its inventor, Sir Charles Ross, to witness a private demonstration of the working of the Ross Straight-Pull Magazine Rifle, which is designed as a military weapon primarily, though its capacity for adaptation to the needs of the sportsman follows as a matter of course. The demonstration took place at the well-known shooting ground of Mr. Charles Lancaster, at Willesden, and this, the first exhibition of the rifle as a military arm in actual use that has so far been conducted in this country, proved to be an unqualified success, and must have been exceedingly gratifying both to the inventor and to Mr. Lancaster, who is to some considerable extent interested in the career of the rifle. At present, as a matter of fact, the Ross magazine rifle is practically unknown to all except a favoured few, on this side of the Atlantic, though Mr. Lancaster has had the honour of showing it to H.M. the King, H.R.H. the Prince of Wales, the Commander-in-Chief, and their respective *entourages*, all of whom evinced a most keen appreciation of its many noteworthy qualities. Under the circumstances, therefore, we are in a position to give much fuller details of the military type

if any firing has to be done subsequently. Another feature to be noted is the continuation of the wood-work in one unbroken piece from butt-plate to muzzle locking-ring, in place of the ugly and unpractical dividing of the stock just behind the shoe in the Lee-Metford and Lee-Enfield rifles, which was adopted, apparently, for no other reason than because the Martini-Henry had, perforce, to be so divided. These are features which are at once to be appreciated by a practical observer, but as regards other external characteristics it may be said that the rifle which Sir Charles Ross has brought over from Canada is what is termed a "shop pattern," and may be capable of some modification, as, for instance, in the matter of providing a half-pistol grip to the stock. On the other hand, this weapon in its present form "handles" beautifully in every respect, and the wood-work is finely modelled without sacrificing any of the strength requisite in an arm destined to the unceremonious treatment of a "Tommy" under Service conditions.

Turning to the mechanism of the rifle, the bolt is of the front-lock straight-pull variety, a single rectilinear movement backwards and forwards serving to lock and unlock the breech-action and cock the firing-pin. This simplicity of operation, which is very marked in firing the rifle as compared with the usual turning-bolt, is attained by making the bolt-head separate from the main portion of the bolt, the two en-



THE ROSS STRAIGHT-PULL MAGAZINE RIFLE.

than have so far been made public, and to describe its operation in practical use on the first occasion on which it has been fired in this country.

Sir Charles Ross has been wisely inspired in producing as his sample British weapon one which is adapted for the existing '303 Service ammunition, since this at once places it within the region of practical politics as a military arm that is well worth the careful consideration of the Small Arms Committee, and allows of a ready comparison with the Lee-Enfield on all counts. But beyond the leading conditions of having a barrel of Service calibre chambered to suit the Government cartridge, the rifle has few points of similarity with that now issued to the British Army. Even in external appearance the differences are sufficiently striking. For example, the magazine of the Ross rifle is flush with the wood of the stock, so that there is no unsightly metal projection in front of the trigger guard to worry the soldier in every conceivable way, and to prevent him from "sloping arms" according to the time-honoured custom prevailing before 1892. It is well-known that the method of carrying the Lee-Enfield sideways at the "slope," which is necessitated by the obtuseness of the magazine at the place which should naturally rest on the shoulder, proves excessively tiring to the wrist and hand during a long march, and tends to cause a marked unsteadiness

gaging by a series of volute grooves in such a manner that the pushing of the bolt home rotates the head, so that two lugs upon it enter into corresponding recesses in the front end of the breech-shoe as in the turning-bolt system, and *vice versa*, the withdrawal of the bolt rotates the head so as to free the lugs. It should be noted in this connection that Sir Charles Ross has fitted a long and strong mechanical extractor, which, in conjunction with the easy action of the bolt movement, suffices to dislodge even the most obdurate cartridge-case. The extractor is in reality, a long piece of steel, spring-tempered so as to allow it to snap over the rim of the cartridge but for extraction it does not rely on its strength and springiness. On the contrary, the under-cut lug laps over the extractor during the withdrawal of the bolt, thereby locking it mechanically against the cartridge case. That Sir Charles combines the practical knowledge of the soldier with the mechanical ingenuity of the born inventor, is shown in his arrangement of the sear and trigger. He has so designed these that, though a strong trigger-spring is provided, the rifle would be quite as effective were it broken or lost. The sear-piece consists of two parts, the one being of the usual bell-crank form working on a rocking pin, with one end engaging in the trigger and the other in the usual manner in a detent in the cocking-piece for the purpose of holding back the striker

in the cocked position. But, in addition, there is another arm on the rocking-pin, reaching forward and normally in contact with the under side of the bolt; it is compelled, except under the stress of *force majeure*, to act on the sear proper by the pressure of a very powerful spring, so that even were the trigger-blade entirely disconnected, the sear would be compelled to engage with its corresponding detent in the cocking-piece as the bolt was shot forward into locking position. So far, so good; but we may imagine that both the trigger-spring and this special sear-spring become inoperative through breakage or any other cause. In this case the trigger itself provides a solution to the difficulty. The back of the trigger-guard is slotted, and the trigger is made of extra depth so that it projects backwards an appreciable distance through this slot. In the natural process of handling the rifle and operating the breech mechanism, the middle finger of the right hand presses against the back of the trigger-guard; just



THE ROSS RIFLE AT MR. CHARLES LANCASTER'S PRIVATE SHOOTING GROUND.

at the very spot where there is this projection of the trigger, and that pressure of the finger operating through the trigger to the sear affords at once the missing impulse to engage the sear with the cocking-piece.

The next point of interest lies in the magazine, which, as has already been pointed out, is of a compact form kept flush with the woodwork of the rifle. Generically, the Ross magazine belongs to the same class as the Harris magazine, which was described and illustrated in these columns some few months ago, to the extent that it consists practically of a metal box, into which the cartridges, five in number, can be dropped haphazard on to a platform depressed for that purpose by hand, the arrangement of the cartridges in proper zig-zag fashion ready for use being accomplished automatically, or at worst assisted by a slight shaking of the platform. In addition, it permits of the use of a clip or charger such as is adopted in the Mannlicher and Mauser rifles. But beyond that general likeness, the two magazines have little in common. Without instituting any odious comparison, it may

be said that the Ross magazine is decidedly the simpler in its mechanism, and consists of the fewer parts, three, as against eleven. The platform extends into, and is concealed in, the wood of the fore-end below the barrel of the rifle, and normally the platform is pressed upwards by the force of a strong and sufficiently flexible steel spring of Z shape. The platform, however, can be operated readily by hand, it being for this purpose provided, midway along its length, with an extension piece, which comes up on the right side of the rifle barrel through a suitable recess cut in the wood of the stock and hand-protector covering that portion of the barrel, in such a manner that, though not constituting a marked projection, the visible portion is easily reached by any of the fingers of the left hand when holding the rifle at its centre of balance, as would be done naturally during the process of firing and loading. One finger suffices to work this ingenious contrivance for lowering or shaking the cartridge platform, and the more so since its total downward travel in depressing the platform to its utmost extent in less than half an inch. Before leaving this point it should be mentioned that a simple indicator fitted in conjunction with the depressing stud shows at a glance how many cartridges are in the magazine at any given moment, and that miss-feeds cannot occur from accidentally depressing the platform, as might be the case were a forward movement required to depress it. There is another feature of the magazine which also requires notice here. In accordance, no doubt, with the marked partiality of our War Office authorities for a magazine rifle, which may on occasion be worked as a single loader, Sir Charles Ross has provided his rifle with a "cut-off." His conception of a cut-off is, however, in marked contrast to the freak of fancy that fitted our Service rifle with the awful atrocity which does duty in that respect—except when it is bent out of shape or broken off. The cut-off of the Ross rifle is worked by an unobtrusive slide on the right side of the breech-shoe, which simply drops the interior of the magazine so that the cartridge which happens to be at the top is kept clear of the bolt in its travel backwards and forwards. For single loading, then, with the cut-off in use, nothing remains but to place single cartridges one by one on top of those held in reserve, and to fire them separately.

In the interval that has ensued between our first inspection of the Ross rifle some months ago, and the trial at which we were present at the beginning of December, Sir Charles Ross has not been idle. Sufficient has surely been written here to show that he has produced a military weapon which is absolutely practical in every respect, and on the face of it capable of being handled rapidly and easily, even by comparatively unpractised users. But he has further devised for use in conjunction with this splendid weapon a system of carrying ammunition, that greatly enhances its efficiency. Unfortunately, we are precluded at present from giving a detailed description of this system, which is not yet fully protected; but without breach of confidence this much may be stated, that the cartridges are put up in separate cases into batches of five, each package thus constituting a magazine charge. These cases, which are made in tin or in cardboard, to suit climatic and other requirements, are so made that a single motion strips off the cover, and the contents can be poured direct into the magazine. The cases, opened or closed, can be carried in a bandolier, and this system at once removes one of the crying evils brought to light in the still-enduring

South African War, since it is practically impossible to lose ammunition when made up in this fashion.

Having so far dealt with the rifle entirely as regards its constructive details, it remains to speak of it in operation. As is now well-known, the Canadian Government has lately adopted the Ross rifle for the armament of the Dominion troops. This was not done, however, without submitting the weapon to tests which were probably more severe than any to which a rifle has hitherto been subjected. We are not at liberty, even did space permit of it, to give in detail the nature of those tests, but some idea of their severity and completeness may be gathered from the fact that they were modelled on the tests of the U.S. Ordnance Board, with every additional rigour of detail that ingenuity could devise. It is enough to say that the Ross rifle emerged satisfactorily from each and every of the series of trials, with the result that the authorities concerned signified their approval in the manner already indicated. More extended mention may be made of an endurance test, made with the rifle that we afterwards saw and handled. This consisted of the firing of 500 rounds in 10 series of 50 rounds each. The total time occupied in actually firing the whole series amounted to 19 minutes 4 seconds, the best time for an individual 50 rounds being 1 minute 32 seconds, which, curiously enough, happened to be the last of the series, and the worst—which was the first—2 minutes 39 seconds. Immediately on completing this test, when the barrel must have been nearly red-hot and the wood-work was actually charred and smouldering, the rifle was tested and found to be in perfect working order.

The trials made in our presence were scarcely of so exacting a nature as those conducted in the Dominion across the seas, but they were nevertheless sufficiently thorough to demonstrate the remarkable qualities of the rifle. A certain number of shots were fired at 100 yards for diagram, under circumstances not particularly favourable to that test, but all the same the grouping showed good results. It may, in fact, be said at once that the whole of the trial, so far as the Ross rifle was concerned, took place under a disadvantage, inasmuch as Sir Charles Ross, who handled the weapon as demonstrator, had only landed from an Atlantic steamer on the previous day, after one of the roughest passages on record, and could scarcely be expected to show his average "form." It follows, therefore, that the actual and undoubted success of his demonstration had a far greater value than might at first sight appear. In earlier Canadian trials of this same rifle, as has been mentioned, he was able to show extreme rapidity of fire, seven out of the ten batches of 50 rounds each being fired well within two minutes per batch. Sir Charles wished to give us a sample of this rapidity by firing a series of 50 rounds. Apart from being out of "form" himself, he was further handicapped by the fact that, in place of having 10 of his ingenious carrier-chargers ready to hand, he had less than half the number, and they had to be recharged in turn to make up the requisite number of rounds, and this work being accomplished by unaccustomed hands caused several perceptible pauses in the reloading of the rifle. Under all these adverse conditions, however, the 50 rounds were fired within 2 minutes 10 seconds, about the same time as was occupied in firing the second batch of 50 in the endurance test made in Canada. With this result as a basis, an expert volunteer marksman was set to fire a similar number of rounds from the Service rifle. The conditions were, to fill

the magazine and use it as a magazine rifle throughout, without the cut-off, but the marksman was allowed to have the whole 50 rounds disposed at his side ready to hand. After following the smooth operation of the Ross straight pull, and the ease of loading, it was almost painful to watch the efforts of the expert with his Lee-Enfield and loose cartridges. The time occupied in firing 50 rounds from the Service rifle was 4 minutes 40 seconds, or 2½ minutes longer than with the Ross. In one case there was no hurry, and no taking of the rifle from the shoulder; in the other, all was bustle and quick spasmodic actions, to say nothing of loose cartridges dropping about in a manner eloquent of awful waste during the strenuous moments of active service.

Altogether, about 100 rounds were fired from the Ross rifle in our presence, and if this personal test cannot be accepted as conclusive, it was sufficient at all events to convince us that the inventor has brought to a state of practical perfection a magazine-arm of extraordinary capacity, sound alike in design and in construction. It seems well-nigh the ideal of what a military rifle should be, and the fact that it has emerged from tests so stringent as those imposed upon it by the Canadian authorities is sufficiently eloquent to need no further elaboration in demonstrating its fulfilment of every possible Service requirement.

For sporting purposes the Ross straight-pull magazine rifle has been adapted to the .256 Mannlicher, the .303 and the .370 calibres, and at the present time it is in contemplation to supply it to the .400.

**Explosion at a Firework Factory.**—The report of Captain A. P. H. Desborough, H. M. Inspector of Explosives, on the fatal accident which occurred on September 26th last at the firework factory of Mr. M. G. Riley, at Longlands, near Ossett, has been published. A general labourer was engaged in the manufacture of coloured stars, and had about 8½ lbs. of composition at hand when the explosion took place, inflicting such injuries and shock that he died on the following day. Immediately after the accident, the deceased told Mr. Riley that it was caused by his braying the mixture too hard in the process of forming it into stars, and H. M. Inspector is of opinion that this is the true explanation of the occurrence.

## APPLICATIONS FOR PATENTS.

NOVEMBER 18th—DECEMBER 20th, 1901.

- 23,269.\* Torpedo Launching Apparatus. S. J. J. Drzewiecki.
- 23,284.\* Explosives. M. Fiedler.
- 23,285. Bandolier. G. C. Palmer.
- 23,298.\* Armoured Gun Turrets. R. Geelhaar.
- 23,302. Double-Barrelled Guns. P. V. Delahalle.
- 23,310.\* Range Finders. M. Serédi.
- 23,320. Range Finders. P. O. Aubrey.
- 23,451. Rifle Bucket. F. J. Dignasse.
- 23,725. Rifle-Supporting Clips for Cycles. H. Lucas.
- 23,740.\* Explosives. F. L. Nathan and R. Robertson.
- 23,780. Small-Arms. H. Skerrett (Agent for *V. Hamal*.)
- 23,781. Bandoliers. P. A. Martin.
- 23,783. Ammunition Pockets. P. A. Martin.
- 23,808.\* Automatic Pistols. T. Bergmann.
- 23,879. Priming Composition for Caps. M. Bielefeldt.
- 23,939.\* Gun Carriage. W. L. Wise (Agent for *The Skodawerke Actiengesellschaft*).
- 23,937.\* Gun Carriages. W. L. Wise (Agent for *The Skodawerke Actiengesellschaft*).
- 24,118. Ammunition for Small-Arms. R. Slazenger.
- 24,259. Pigeon Traps. T. H. Nuttall.



- 24,314\* Air-Gun Slugs. P. Newton, T. J. Rosewell, and F. Joyce & Co., Ltd.
- 24,372. Explosives. L. Davies.
- 24,410. Ordnance. W. S. Simpson.
- 24,482.\* Double-Barrelled Guns. A. and C. Guinaud.
- 24,508. Bandolier Fastenings. W. Lindsey.
- 24,588.\* Revolvers. D. B. Wesson.
- 24,597.\* Revolvers. D. B. Wesson.
- 24,609. Revolvers. J. Krimmel.
- 24,730.\* Gun Carriages. W. L. Wise (Agent for *The Skodawerke Actiengesellschaft*).
- 24,791.\* Projectiles and Time Fuses. W. Ruegg.
- 24,814. Sighting of Guns from Cover. W. Youlten.
- 24,838.\* Recoil Apparatus for Ordnance. W. D. Wise (Agent for *The Skodawerke Actiengesellschaft*).
- 24,915. Telescopic Sights for Ordnance. A. A. Common.
- 24,917. Cartridge Loading Machine. W. H. Greenwood and W. Breakspear.
- 24,925.\* Firing of Projectiles. G. C. Marks (Agent for *A. A. Low*).
- 24,934. Cartridge Packets. Sir C. H. A. F. Lockhart-Ross.
- 24,949. Bandolier. W. T. and O. Thorn.
- 25,034. Movable Targets. T. B. Rilston.
- 25,088. Automatic Pistols. T. K. North.
- 25,233.\* Blasting Explosive and Cartridge. W. Bate.
- 25,289.\* Fire-Arms. J. Gaut (Date applied for in New Zealand. July 5, 1901).
- 25,294.\* Ordnance. G. Ehrhardt.
- 25,369. Telescopic Sights. T. Y. Baker.
- 25,418.\* Ordnance. W. L. Wise (Agent for *Skodawerke Actiengesellschaft*).
- 25,450. Cleaning of Gun Barrels. A. C. Drummond and T. W. Laymon (Date applied for in U.S.A., May 14, 1901).
- 25,585.\* Sights for Ordnance. L. K. Scott.]
- 25,600. Projectile Fuses. A. T. Dawson and L. Silverman.
- 25,623. Range Finder. G. Brown.
- 25,661. Cartridge and Fuse for Flash Powders. P. Hargreaves and J. F. Chapman.
- 25,681. Magazine Rifles. E. Punchard.
- 25,712. Magazine Small-Arms. T. R. R. Ashton.
- 25,761. Device for Indoor Practice with Ordinary Arms. A. Mandl.
- 25,762.\* Cartridge Clips. F. R. Von Mannlicher.
- 25,788.\* Blasting Squib. H. J. Richards, C. B. Dougherty, and M. and A. L. Williams.
- 26,797.\* Torpedo Launching Apparatus. Count G. Hoyos.
- 25,815. Rifle Carriers for Cycles. J. B. Brooks and J. Holt.
- 25,873. Machine Guns. F. G. Gass.
- 25,884. Blasting Composition. J. Wetter (Agent for *The West-falisch-Anhaltische Sprengstoff-Actiengesellschaft*).
- 25,891. Explosive Projectiles. A. and G. Vetter.
- 25,994. Explosives. R. Robertson and W. Rentoul.
- 26,010. Cartridge Holder. S. H. and W. H. Shershall and A. T. Latham.
- 26,069. Automatic Sights for Ordnance. N. E. Andersson (Date applied for in Sweden, May 22, 1901).
- 25,080.\* Signal Detonators. A. Fentz and A. Müller.

\*These Applications were accompanied by complete Specifications.

## SPECIFICATIONS PUBLISHED.

NOVEMBER 23RD—DECEMBER 21ST, 1901.

COMPILED BY H. TARRANT.

- 15,273 (1900). **Sighting of Guns from Cover.** W. Youlten, London. By means of two mirrors mounted, one in a tube behind the sight, and the other in a vertical tube in front of the gunner's eye, the object sighted is reflected downwards so that the gunner is enabled correctly to sight his rifle whilst his head and body are concealed. A false butt fitted beneath the ordinary stock enables the shoulder of the shooter to receive the recoil. Accepted November 28, 1901.
- 20,693 (1900). **Range Finder.** W. A. Burns and F. N. Baker, Shoeburyness; and J. Lena, London. An instrument for finding the range of a distant object, the base height being known, and for enabling any changes in the range to be followed. The instrument is particularly intended for following and showing changes in the range between moving vessels. A drum, attached to frame of the instrument, when adjusted to give the correct base height, determines the posi-

tion of a cam lever, upon which the arm of a movable reflecting mirror works. The lever indicates the range on a graduated scale. Accepted November 16, 1901.

- 21,120 (1900). **Cartridge Wads.** T. Perkes, Eton. In order to decrease the recoil, or to concentrate the charge of shot, the wads used in small-arm cartridges are constructed of any suitable shape and thickness, and consist of glutinous compounds formed with the use of such materials as fibre, cork, hemp, flax, size, grease, wax, or any other vegetable or animal matter. The object of so constructing wads is to make them more or less elastic or pliable. Accepted November 22, 1901.
- 21,453 (1900). **Multi-Barrelled Gun and Carriage.** M. H. Bowman and W. O. Hughes, U.S.A. A multi-barrelled gun is described, which is mounted inside an armour-covered wagon. The gun is so mounted as to be quickly adjusted for various ranges by means of a spring lever, the end of which fits into teeth cut upon the top of the mount. The area covered by the barrels may be increased or diminished. Accepted November 27, 1901.
- 21,743 (1900). **Machine Gun.** A. J. Boulton (Agent for *G. Perino, Italy*). A machine gun in which the mechanism is worked by the combined impulses of recoil and gases of combustion. In machine guns in which recoil alone is the power used to work the mechanism, the gun is sometimes stopped whilst firing through weak recoil; and when the gases of combustion alone bring about the automatic working of the gun, as in the Hotchkiss, recoil interferes with the aim, and the gas being taken through a vent half way down the barrel, the impulse of the projectile is lessened. These disadvantages it is intended to obviate by combining and using the two forces. The gas is taken through a vent near the muzzle. Accepted November 30, 1901.
- 22,922 (1900). **Holder for Detonators.** G. Edwards, Chorley. A case, in which detonators may be carried so that they shall not be lost. The case is made of felt or chamois, and it takes the shape of a book. The inside is provided with cells, in which the detonators are held. It is impossible for the firer accidentally to drop one detonator when such a case is used, and he can safely withdraw one at a time as required. Accepted November 23, 1901.
- 23,292 (1900). **Stocks for Rifles.** T. Sheldon, Hastings. Instead of forming the butt solid, as in the present military rifle, the patentee cuts away the centre and leaves only the frame of the stock. The rifle is thus made lighter. More especially this construction is intended to afford the user a better grip for the right hand, and to make the rifle longer and more effective when using with the bayonet. Accepted November 9, 1901.
- 23,623 (1900). **A Trap for Pigeon Shooting.** F. Perry, Margate. A trap for releasing live birds for match shooting, consisting of a cage-like arrangement formed in halves. These two parts are hinged to a base, and two springs are adapted to bring about the opening of the cage when the pin holding the halves together is withdrawn. Accepted November 2, 1901.
- 23,705 (1900). **Movable Targets.** T. B. Kallston, Glasgow. A movable target consisting of a travelling frame, upon which is fixed a longitudinal shaft carrying a series of suitably-shaped targets. A lever and ratchet arrangement raises the targets at a predetermined moment into the view of the shooters during the travel of the carriage. Accepted November 9, 1901.
- 213 (1901). **Automatic Magazine Rifle.** K. K. Bjerkness and J. Waugh, Canada. Automatic mechanism for magazine rifle, consisting of a movable sleeve working upon the muzzle of the arm, and actuated by the gases of combustion. The sleeve is connected with the breech by means of a rod running beneath the barrel. Cocking, ejecting, and re-loading are performed automatically. Accepted November 23, 1901.
- 519 (1901). **Cartridge Extractor for Bolt-Action Rifles.** Sir C. H. A. F. L. Ross, Ross-shire. A cartridge extractor lock is illustrated in this patent as part of the mechanism of the bolt-action rifle described in Patent No. 2,002, 1900. The extractor lock is an added part so designed as to lock the hooked extractor against the rim of the cartridge during the rearward movement of the breech-bolt. The slipping of the extractor over the rim during the racking operations is thus prevented. Accepted November 30, 1901.
- 608 (1901). **Carbine Bracket for Cavalry.** T. Frost, Doncaster. A rifle or carbine carrier for mounted troops, consisting of leather bucket, shaped so that the rifle sight shall be protected, and so that no assistance is needed from the horseman



- to hold it steady. The bucket is fixed by means of straps to the saddle and to the overgirth. The bolt of the arm fits into a curved part of the carrier, and the rifle is in this manner locked against movement. Accepted November 30, 1900.
- 837 (1901). **Foresights for Rifles.** H. C. Sparrow, Ashstead. A combination foresight for rifles, which may be changed at will to suit the different lights which prevail at different times. The sight is mounted upon a turntable, and four different sights may be presented to the eye by merely turning the table about the base. The sight is not of the folding type, and consists roughly of two vertical rings parallel to each other, midway between which is placed the sight proper. Accepted November 9, 1901.
- 984\* (1901). **Explosive Cooler.** C. H. Curtis, C. L. W. Smith, D. J. Metcalfe, and A. C. Percy, London; and A. F. Hargreaves, Midlothian.
- 1,065 (1901). **Cartridge Clip for Rifles.** H. H. Lake (Agent for *H. F. Landstad, Norway*). A clip constructed to hold a certain number of cartridges which is cut and pressed out of a single piece of metal, so shaped as to form a guide for front and rear ends of the cartridges. The sides of these guides are connected on one side by a bridge of metal. The holder is shaped to fit the breech of the rifle so that it will remain steady whilst the thumb presses the cartridges into the magazine. Accepted November 23, 1901.
- 1,322 (1901). **Projectiles for Ordnance.** A. Reichwald (Agent for *Fried. Krupp, Germany*). By using gunpowder as the detonating charge in explosive shells the patentee enables them to be handled with safety. Gunpowder is not itself powerful enough to detonate the bursting charge. But by an arrangement of a series of separate charges in separate chambers, one behind the other, the explosions become more violent as they are communicated from one chamber to another, and the bursting charge is ignited with certainty. Accepted November 9, 1901.
- 1,323 (1901). **Fuses for Projectiles.** A. Reichwald (Agent for *Fried. Krupp, Germany*). A safety device designed to secure the moving parts of both the time and percussion fuses in compound fuses. The device consists of two pins, connected by a cross-piece, one pin securing the priming bolt of the time fuse, and the other the moving parts of the percussion fuse. The safety device may be removed by a single movement of the hand, when it is desired to put the compound into action. Accepted November 23, 1901.
- 1,727 (1901). **Bolt-Action Rifle Mechanism.** N. Pieper, Belgium. A trigger spring and an extractor for the breech mechanism of bolt-action rifles are described in this specification. The trigger spring consists of a long thin blade upon the top end of the back of which is fixed a sear which holds the firing pin in the cocked position. The extractor is a part free to slide upon the top of the spring, and is caused to withdraw the spent cartridge from the chamber by the backward movement of the bolt. Accepted
- 4,924 (1901). **Revolver Mechanism.** W. J. Whiting, Hands-worth. A number of modifications of the Webley-Fosbery revolver mechanism are described in this patent. The objects of these modifications are to simplify the construction and arrangement of the cylinder-rotating mechanism; to simplify the method of locking the cylinder to the barrel; and to provide new parts for ensuring the correct alignment of the chambers of the cylinder successively with the barrel and hammer, and for releasing the cylinder when the revolver is closed. These last parts work in conjunction with the device which ensures the rotation of the cylinder in the proper direction. The cylinder lock and alignment parts may be applied to the revolver of the ordinary type. Accepted November 16, 1901.
- 10,797 (1901). **Illuminating Projectiles.** A. J. Boulton (Agent for *The Marine Torch Co., U.S.A.*) A projectile adapted to be fired from a gun, to float upon the water, and to produce a brilliant light for some time after reaching its destination. Phosphide of calcium is the igniting substance. The action of the water upon this material when the shell strikes generates phosphoretted hydrogen, which gas ignites upon reaching the atmosphere. The calcium carbide within the shell body evolves acetylene when combined with water, and the acetylene is ignited by the phosphoretted hydrogen. Accepted November 30, 1901.
- 11,674 (1901). **Automatic Machine Guns.** T. Bergmann, Germany. A number of improvements, chiefly designed to simplify the construction of automatic machine guns, are set out in this patent. The principal feature consists in the provision of a locking piece automatically for securing the breech bolt in its closed position at the proper times during the backward and forward motions of the barrel. Another part consists of a pivoted lever which holds the firing pin and prevents it being moved forward to fire the cartridge except when the breech-bolt is locked to the barrel sleeve. Accepted November 16, 1901.
- 12,721 (1901). **Manufacture of Electric Fuses.** H. and H. Firmann, Austria. A machine for manufacturing electric fuses for cartridges. In order that the conducting wires should be placed perfectly centrally within the charge-holders, the preparing, cutting, soldering and inserting had to be performed by hand. By the aid of the machine described in this patent a great number of fuses can be set simultaneously, the conducting wires being notched, cut off and soldered in an even manner, and subsequently inserted centrally within the sleeves, and the materials cast around them. Accepted November 23, 1901.
- 13,124 (1901). **Magazine Mechanism.** C. H. Edwards, Aberdeen. A modification of the magazine mechanism for rifles described in Patent No. 4,415, 1901. The principal objects of the improved mechanism, which consists of a thumb lever operating another lever which depresses the cartridge raising platform, are to reduce the number of parts; to simplify the fitting of the parts together; and to reduce the cost of the arrangement. Accepted November 23, 1901.
- 14,480 (1901). **Chambers of Ordnance.** E. Gathmann, U.S.A. A method of constructing the chamber in ordnance from which shells containing large quantities of explosives are thrown. The chamber from that part containing the propelling charge and the beginning of the rifling is slightly inclined. The band of the projectile is forced over this plane before entering the rifle, and thereby the charge within the shell is given sufficient set-back to ensure its co-rotation with the shell when the latter enters the rifling. Accepted November 9, 1901.
- 17,167 (1901). **Automatic Rifle Mechanism.** H. H. Lake (Agent for *The Winchester Repeating Arms Co., U.S.A.*) An improvement relating to automatic rifles. The improvement consists of a tubular arrangement working through the centre of the shock from breech to butt which forms the magazine, and into which the cartridges are loaded through the side of the stock. The rifle illustrated is not the type in which the whole of the mechanism is enclosed within an outer casing. Accepted November 9, 1901.
- 17,191\* (1901). **Rifle Magazine Mechanism.** P. Jensen (Agent for *O. H. J. Krag, Norway*).
- 17,341\* (1901). **Automatic Rifle Mechanism.** S. H. Bang, Denmark.
- 18,413 (1901). **Safety Device for Fuses.** W. Ruegg, Prussia. A safety device for percussion fuses for projectiles, consisting of a ring of powder which must first burn out before the locking pin, holding the percussion bolt, is capable of free movement to permit the bolt to operate and ignite the percussion cap. The safety ring of powder is ignited at the moment of firing by a cap. Accepted November 16, 1901.
- 18,414 (1901). **Percussion Fuses for Shell.** W. Ruegg, Prussia. In percussion fuses for shell of the type which are not ignited instantaneously upon impact, but in which the explosion is retarded until a predetermined time after striking; a method is described of enabling the retarding device to be adjusted from outside for any desired time of retardation. The retarders consists of a ring of compressed powder arranged in a rotatable part of the fuse, which must burn out before the shell charge is ignited. Accepted November 2, 1901.
- 18,467 (1901). **Pivot-Fork for Fire-arms.** J. T. S. Schouboe, Denmark. A forked support for mounting light fire-arms. The support works upon a tripod. The gun trunnions are held in hooks upon the top of the support, and are there fixed by a spring-actuated locking part. The gun may be turned about freely in any direction in order that the movement of a distant object may be followed. The support is constructed so that it may be mounted and dismounted very quickly. Accepted November 30, 1901.

- 18,785 (1901). **Gun Carriages.** F. Müller, Germany. The ordinary wheels of a gun carriage are dispensed with, and shield wheels composed of rimmed discs of steel take their place. These shield wheels can be turned from their parallel position so that they enclose any desired angle, and are in this way adapted to protect the gun. The interior of the wheels are also converted into ammunition cases. Accepted November 23, 1901.
- 19,358 (1901). **Torpedoes.** Count G. Hoyos and A. E. Jones, Austria. A device, for attachment to torpedoes furnished with Obry's gyroscopic-steering gear, which is adapted to cut off the supply of air from the machine and sink the torpedo should the steering-gear fail to act. The cut-off of the air supply opens a sinking valve, and so brings about a stoppage of further travel of the torpedoes. Accepted November 23, 1901.

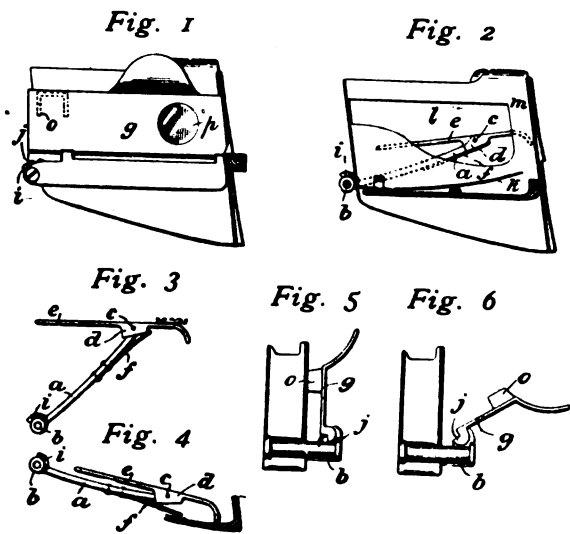
\* These specifications are more fully described under "Selected Patents."

SELECTED PATENTS.

MAGAZINE MECHANISM FOR RIFLES.

17,191 (1901). P. Jensen. (Agent for O. H. J. Krag, Norway.) In our issue of September last we published a description of the Krag-Jorgensen Magazine Mechanism which was dealt with in patent No. 21,891 by the above patentee. The mechanism described in the present specification is a modification of the former arrangement, the alterations tending to simplify the magazine, and to adapt it to quick loading.

Fig. 1 in the accompanying illustrations, is a side view of the magazine, showing the gate covering the opening through which the cartridges are inserted; and Fig. 2 is a sectional side view of the magazine. Figs. 3 and 4 represent the lever and spring which lift



the cartridge platform; and Figs. 5 and 6 are front end views of the magazine showing the gate in its opened and closed positions.

The cartridge-lifting lever *a* is, at one end, attached to the boss *b*, working upon bearings. At its other end it is pivoted at *c* to the projection *d* on the platform *e*. In order to ensure that the platform *e*, in the course of its upward and downward travel within the box, shall retain a correct and steady position, the spring *f* is attached to the lever *a* in such a position as always to tend to bear upon the flat bottom of the projection *d*, and so to keep the platform *e* in the position shown in Fig. 2. When the platform is brought into contact either with the receiver at the top of the magazine as in Fig. 3, or with the bottom of the magazine as in Fig. 4, it is caused to assume the

positions as illustrated. In the position shown in Fig. 3 the platform is adapted to act as a bed or cut-off so that the rifle may be used as a single loader.

The lifting lever with the platform are automatically depressed by the opening of the gate *g*. This automatic action is effected by the engagement of the projection *j* upon the end of the gate *g*, with the inclined surface cut upon the face of the cam *i* carried by the boss *b*, to which the lever *a* is attached. When the gate is opened the projection *j* slides over the surface of the cam *i* and so forces the lever *a* round upon its bearings to the bottom of the magazine box. When the magazine is loaded and the gate is closed the cam *i* is disengaged from the projection, and the spring *k* is then free to force the lever and platform upwards to feed the cartridges into the receiver.

In order to prevent the cartridges being forced out of the opening *l* during the closing of the gate, the opening is given a peculiar shape. The length of the opening is less than the length of the cartridge. The cartridges are inserted in a sideways fashion so that when within the magazine their bases lie behind the flange *m*. The narrowness of the forward end of the opening helps also to retain the cartridges during the closing movement. When the gate is closed the projection *o* upon the inside of the gate lies flush with the top and bottom of the box side and so forms a guide for the noses of the cartridges during their travel towards the receiver. A hole *p* is cut in the side of the gate through which it is possible to ascertain the number of cartridges in the magazine. The hole is covered with some transparent material. Accepted Nov. 9th, 1901.

EXPLOSIVES COOLER.

984 (1901). C. H. Curtis, C. L. W. Smith, D. J. Metcalfe, and A. C. Percy, London; and A. F. Hargreaves, Midlothian. The patentees, in this specification, describe the method of application to explosive compounds of two cooling substances. They have discovered that when these are added in moderately small proportions they have a powerful effect in reducing the temperature and rendering certain explosives less liable to ignite inflammable atmospheres. The two materials are carbonate of magnesium and carbonate of manganese. These carbonates besides absorbing heat upon their decomposition, evolve gases which are further expanded by the heat absorbed from the explosive, thus making up, more or less, for the loss of heat, and so keeping the dynamical power of the explosive up to the mark.

Either or both of these materials are used only in combination with that class of explosives, embracing nitrate mixtures, such, for example, as those of the gunpowder type into which charcoal, or other granular forms of dessicated carbon, enters as one of the principal components, together with saltpetre with or without other ingredients such as sulphur. The quantity of the safety material combined with an explosive depends entirely upon the degree of safety it originally possessed, and the degree of safety desired to be obtained. When sulphur is present in any considerable quantity there is little original safety judged by the standard required to enable such explosive to be safely used in gaseous mines; and for this reason the patentees prefer to add their coolers to compounds into which sulphur only enters in very small proportions or is absent entirely.

To an explosive composed of 80 parts of nitrate of potassium and 15 parts of charcoal, 5 parts of either carbonate of magnesium or manganese may be added; but the best results have been obtained by adding three parts of either carbonate to a mixture of 84.5 parts of potassium nitrate, and 12.5 parts of charcoal. The dynamic power of such a compound is not affected, and the cooling results obtained are satisfactory. The amount of either of the materials used with explosives of varying composition will never be more than 10 per cent., or less than one per cent.

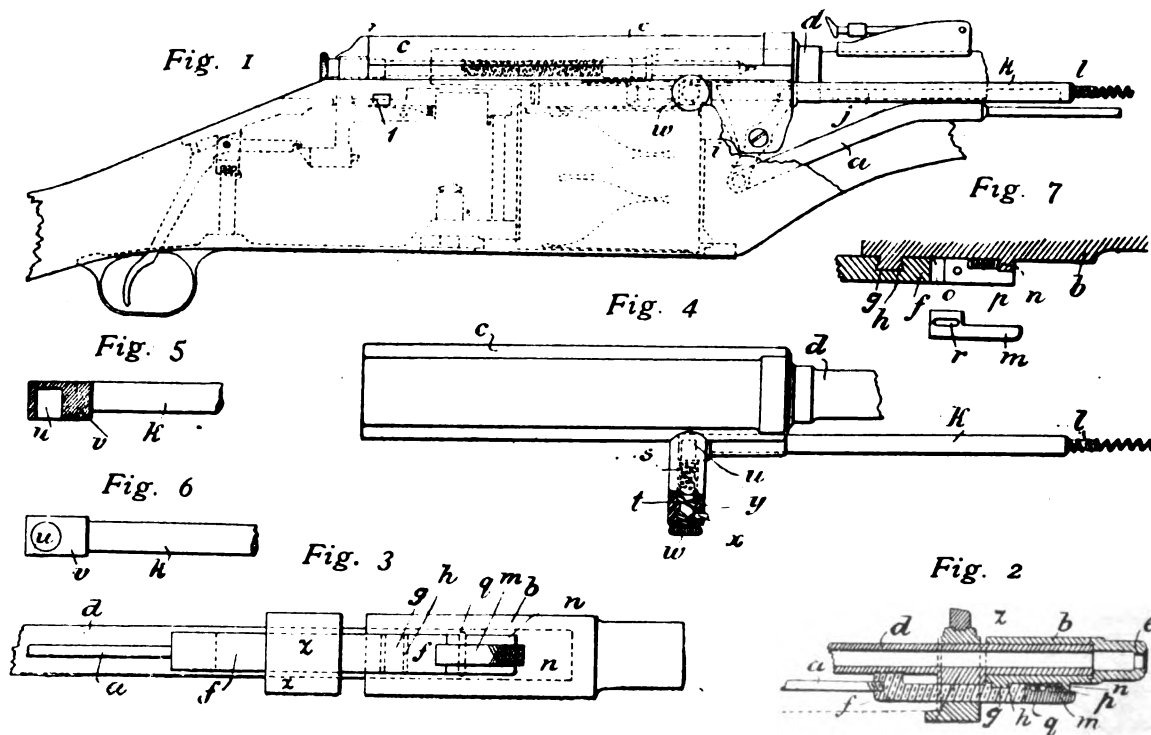
Carbonate of magnesium in its pure amorphous condition is not readily obtainable; but ordinary commercial magnesium alba answers the same purpose. Of the two forms of magnesium alba—magnesium alba levis, or light carbonate; and magnesium alba ponderosa, or heavy carbonate—the patentees prefer the latter. The carbonate of manganese used is either that in the pure form or that combined with one or more molecules of water as is ordinarily obtainable. Both these substances, when heated moderately, evolve carbon di-oxide and water vapour, varying slightly in quantity. The carbon di-oxide acts also as a flame extinguisher. Accepted November 2, 1901.

AUTOMATIC RIFLE MECHANISM.

17,341 (1901). S. H. Bang, Denmark. In this patent, mechanism is described consisting of a sleeve working around the muzzle of the barrel, and connected with the breech bolt by means of a rod. The muzzle mechanism is actuated by the gases of combustion and a

The turning of the sleeve *a* in relation to the link *f* is prevented by means of the bolt *m*, which is roughed in front and is located in a fork-shaped bracket *n* upon the sleeve (see Figs. 3 and 7). The back of the bolt *m* projects into the recess *o* in front of the link, and is kept in that position by the spring *p*. The pin *q* holds the bracket *n* and the bolt *m* together, the longitudinal bolt *r* allowing of a longitudinal travel of the bolt. When it is desired to detach the sleeve *b* from the barrel, the bolt *m* is drawn forward, against the pressure of the spring *p*, until it is free of the recess *o*. The sleeve is then rotated about the barrel until the dovetail and groove *g* and *h* are disconnected. The sleeve may then be taken straight off.

The connection between the rod *k* and the breech bolt *c* is effected by means of the spring-actuated pin *s* (Fig. 4), which turns with the handle *l* attached to the breech bolt. The inner end of the pin when turned completely in enters the recess *u* cut in the shoe *v* at the end of the rod *k* (Figs. 5 and 6.) The outer end of the pin is provided with a milled head *w*, and when this head is turned the pin *x* projecting



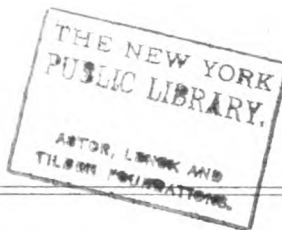
limited movement of the sleeve fully opens the breech, and so ejects the spent cartridge. A spring returns the bolt to the closed position.

In the annexed drawing Fig. 1 is a side elevation of the breech mechanism. Fig. 2 is a sectional elevation of the muzzle mechanism; and Fig. 3 is a view of the same parts from beneath. Fig. 4 represents the breech in plan, and Figs. 5, 6, and 7 are enlarged drawings of parts.

The lever *a* connects the movable sleeve *b* with the breech bolt *c*. The sleeve *b* works upon the end of the barrel *d*, and is provided with an aperture *e*, slightly larger in diameter than the bore of the barrel. The link *f* is connected with the sleeve *b* by means of the dovetail and groove *g* and *h*, and the rod *a* in turn screws into the back end of the link *f*. The back end of the rod *a* is pivoted to one arm of the two-armed lever *i*. The other arms project into the groove *j* of the sliding rod *k*, which directly actuates the breech bolt. When the bolt is closed the upper arm of lever *i* engages the rear wall of the groove *j*. The rod *k* is connected with the spring *l*, which closes the breech.

into the spiral groove *y* causes either an outward or an inward movement.

The parts operate in the following manner:—The distance between the end of the barrel and the aperture *e*, when the sleeve is in its normal position, is slightly smaller than the length of the projectile. When the front end of the bullet enters the slightly enlarged aperture *e* the gases rush into the space beyond the muzzle and drive the sleeve forward until the back portion of the link is brought up against the mounting *z*. The forward movement of the sleeve is conveyed to the two-armed lever *i* by means of the link *f* and the rod *a*. The upper arm of the lever *i*, bearing against the rear wall of the groove *j*, causes a strong backward movement of the rod *k*. The momentum imparted to the rod and thus to the breech bolt during the short but strong movement of the lever *i*, is sufficient to carry the bolt backwards until the shoe *v* is brought up against the projection *r*. The bolt is returned to its closed position by the spring *l*. The cocking, ejecting, and re-loading operations are performed in an ordinary manner during the backward and forward travel of the bolt. Accepted Nov. 9th, 1901.



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- "Treatise on Service Explosives." 1900. 133 pp. This handbook deals with the explosives enumerated under Classes I., II., and III., Group I., and their respective ingredients. It is divided into three parts: one containing a historical summary of the manufacture of gunpowder, the second division dealing with guncotton, nitro-glycerin and cordite, and the third with the miscellaneous explosives of Group I .. 1s. 6d.
- "Treatise on Ammunition." Sixth Edition. 1897. 628 pp. A compendious volume containing full information on practically every detail in the composition, manufacture and supply in completed form of all types of ammunition for small-arms and artillery of all calibres used in the British Services; also of rockets and signal lights for the same. This edition is the latest issued, and is corrected up to January, 1897, a guarantee of its accuracy consisting in the fact that it has been prepared by the Instructional Staff (Ammunition Branch) of the Artillery College, Woolwich .. 6s.
- "Treatise on Service Ordnance." Fifth Edition. 1900. 669 pp. This is entirely rewritten as compared with previous editions, and contains copiously illustrated descriptions of every type of Service ordnance now in use, including special references to all new breech mechanisms, percussion locks, and similar details. Separate chapters on "Aiming Rifles" and "Tampions" have been added, but such subjects as Exterior and Interior Ballistics, and descriptions of the Crusher Gauge and Chronograph, are now omitted, as they are fully dealt with in the "Text-Book of Gunnery." The latter, however, is temporarily out of print .. 10s.

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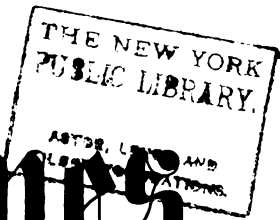
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# Arms & Explosives



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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>ROUND THE TRADE ...</b>	27
Two Explosions ...	19	A REVIEW OF MODERN MACHINE METHODS ...	28
Irish Clay Pigeon Tournament ...	19	THE GUNMAKERS' ASSOCIATION: GENERAL MEETING	29
The Prophet in his own Country ...	19	THE DEVELOPMENT OF NITROCELLULOSE.—IV. ...	30
A Gorgeous Special Issue ...	20	CORRESPONDENCE ...	31
Maximum Sizes... ..	20	APPLICATIONS FOR PATENTS ...	31
AN M.P. ON RIFLE SHOOTING ...	20	SPECIFICATIONS PUBLISHED ...	32
N. R. A. REPORT ... ..	21	<b>SELECTED PATENTS:</b>	
THE NEW SERVICE EXPLOSIVE ...	22	Bergmann Pistol Mechanism... ..	33
TESTING CHAMBER PRESSURES ...	23	A New Explosive ... ..	33
THE GUNMAKERS' ASSOCIATIONS ...	24	Small-Arm Projectiles... ..	34
NOTES ... ..	25	Projectiles for Ordnance ... ..	34

## CURRENT TOPICS.

**Two Explosions.**—It is a somewhat remarkable confirmation of the old adage that misfortunes never come singly, that within about a week Messrs. Nobel's Explosives Co., Ltd., should have experienced two serious explosions. One took place on the 9th ult. at the Ardeer Factory, resulting in the death of one man, and the other occurred on the 16th ult., at Ferranporth, and resulted in three fatalities. Messrs. Nobel's various establishments have achieved a well earned notoriety for the magnificent organisation which regulates them all, so that accidents such as these simply show that, given certain conditions, even the most careful arrangement and supervision are powerless to prevent explosions. On the other hand, the small loss of life and the limited extent of the damage in each case are testimonies to the extreme care which is taken to isolate the various sections of the work one from another. In dealing with explosives it is, so far as can be seen, humanly impossible to prevent absolutely all risk of accident, but the record of these two casualties serves to show that by the adoption of suitable precautions the resulting damage may be rendered extremely local; and in expressing our sympathy with Messrs. Nobel's on account of these two misfortunes, we equally tender our congratulations at the restricted extent to which what might have been widespread disasters were confined by a well-nigh perfect system of isolation.

**Irish Clay Pigeon Tournament.**—A preliminary announcement is made of a clay-pigeon tournament to be held in Dublin next May, in connection with a bazaar, the

proceeds of which are to go to the Royal City of Dublin Hospital. The tournament will be under the management of Mr. W. Lane Joynt, the well-known Irish sportsman, who has been successful in getting together a most attractive collection of prizes. Messrs. William Kavanagh & Son, John Rigby & Co., and W. J. Jeffery & Co., offer respectively a 12-bore gun, a rook rifle and a gun case, and Messrs. Curtis's & Harvey, Ltd., the Normal Powder and Ammunition Co., Ltd., Nobel's Explosives Co., Ltd., and the "E.C." Powder Co., Ltd., also give prizes in money or in their specialities in ammunition, while Messrs. Kynoch, Ltd., offer a prize of £10. Messrs. Eley Bros. Ltd., offer no fewer than 10 prizes, each consisting of an "Expert" trap and a barrel of 500 clay-birds, and, as if that was not enough, they have also generously promised to provide 15,000 clay-birds for use during the tournament. *The Field* and the I. B. S. A. are also among the prize-givers, and needless to say that several manufacturers of the "craythur" are to the front with their special brands of liquid sustenance. Full details of the events will be forthcoming in April, and it is to be hoped that there will be a strong muster of sportsmen to help to swell the funds of a very deserving institution.

**The Prophet in his own Country.**—Mr. Frank H. Mayer, who is, we believe, a well-known all-round sportsman "on the other side," has been indulging in a somewhat wild vein of prophecy in the columns of *Outdoor Life*. He writes in what must at the least be characterised as an optimistic spirit when he commits to cold printers' type the following:—"Simplification is the natural trend in mechanical evolution. I predict that in the very near future the best types of military and sporting weapons will be made without a permanently rigid

or fixed part, no screw of any kind being used in their construction, being built in such a way that the weapon may be dismounted and reassembled by the naked, unassisted hand of the user. The rifleman of the future won't have to bother with screw-drivers, clamps, or any other tools in order to dismember his arm for inspection and cleaning. And I further confidently look forward to a completely combustible cartridge, whose substance shall be entirely dissipated in its conversion into propulsive energy, thus eliminating all possibility of sticking shells, clogged action, &c., as well as the unnecessary weight of ammunition now entailed by shell and primer. And there is more than a possibility that, in time, even the lock-work will be replaced by an electric contact point of more certain and speedy function." This is simplification with a vengeance. So far as the first-mentioned features are concerned, Mr. Mayer is not far in advance of the present age. There are already a number of military and sporting rifles, and one or two pistols, which can be dismantled and reassembled without implements, and even sporting guns are showing a tendency in the direction of similar simplification. But the combustible cartridge and the electric detonator open up possibilities which would probably not lend themselves to simplification, except possibly by eliminating the sportsman himself. Moreover, surely both these ideas have already been materialised some years ago, and promptly abandoned as absolutely impracticable.

**A Gorgeous Special Issue.**—For a reason that is both sensible and apparent, our Transatlantic contemporaries generally devote special energy to making their first issue for the new year the most noteworthy, instead of producing a Christmas number which, as in this country, may possibly make its appearance many weeks before the festive season. The *Sporting Goods Dealer*, of St. Louis, follows this custom, and its January issue is, so far as appearance and get-up are concerned, quite a record-breaker, which is bestowing high praise on a publication always of the best in that respect. Its contents also seem to have been chosen with a view to matching the general style of the issue, and comprise a selection of articles dealing with subjects of interest both to the sporting goods dealer and his customer. In our own particular line there are several interesting articles. One deals with the collection of small-arms in the National Museum at Washington, and is copiously illustrated with photographic reproductions of weapons, ranging from a Chinese match-lock, and similar antiquities, to the latest military, repeating and match rifle of modern America. There is also a historical sketch of the development of gunpowder, which, however, shows signs of having been worked up from various sources of information, not too well blended. Much of its matter seems to be out of date, and parts are obscure. For example, a table is printed with the following heading:—"The muzzle velocity given by the average well-made breech-loading shot-gun of 12-gauge, which is now standard, using the chronograph over a range of 40 yards, is, on an average, about as follows:—" It is somewhat difficult to understand why the muzzle-velocity is qualified by the condition of using the chronograph over a range of 40 yards. There is an implication that had the chronograph been used over a range of 60 yards, or 80 yards, the value of the muzzle velocity might have been different. Perhaps the writer really meant mean velocity. An article on military rifles is illustrated by a small scale reproduction of

our illustration of the latest German Mauser rifle, Model '98, together with some part of our descriptive matter, though we fail to notice an acknowledgment of the indebtedness. Taken as a whole, however, the special number represents one of the best efforts of a journal always interesting and "newsy," which does not claim to be specially technical.

**Maximum Sizes.**—It will be noticed that Mr. Bonehill, in the latter half of the letter which is published elsewhere in this issue, raises the question of the desirability of settling, not only the sizes for minimum chambers and cartridges, but also the limits for maximum chambers and minimum cartridges. It is, of course, obvious that as much trouble might arise from undue size of the gun-chamber and of the cartridge over and below their mean lines respectively as *vice-versa*. But we do not consider it necessary to define the diverging limits in the same positive manner as is requisite for the converging dimensions. The one vital idea underlying the process of standardisation seems to be accomplished in the agreement as to a fixed minimum dimension of gun-chamber, with its corollary of a maximum dimension of cartridge. This means that henceforth no standard cartridge should ever fail to enter and to work satisfactorily in a standard gun-chamber, there being a working margin of so many thousandths, as may be agreed, at each corresponding portion of the two surfaces. It does not seem necessary to define with any great exactitude the exterior limitation of that working margin. If we assume that the normal margin left between chamber and cartridge at all diameters is .002 in., and that a chamber and cartridge are brought together which are respectively above and below this standard to the extent of .005 in., there will be a total discrepancy of .012 in. between the one and the other. It cannot be disputed that many thousands of cartridges are fired every season with completely satisfactory results under conditions far more disadvantageous than these. Possibly some suggestion as to the toleration that would be advisable in chambering guns and in manufacturing ammunition to standard sizes might be put forward with advantage when the time comes for issuing the set of dimensions for all bores of shot-guns, but in reality the matter is capable of easy adjustment in accordance with individual practice, and should produce no difficulty. The matter really lies in a very small compass. If a gun-maker elects to adopt the system of standard minimum chambers, he will be careful to keep within practical limits of the minimum dimensions, because he will know that any question of unsatisfactory results accruing from the use of standard ammunition will be decided against him. And the same holds good with regard to the ammunition manufacturers. If, on the other hand, the case refers to a gunmaker who is not working to standard dimensions, he will pay no more attention to maximum than to minimum sizes.

**AN M.P. ON RIFLE SHOOTING.**—Mr. Joseph Hoult, who is M.P. for the Wirral Division of Cheshire, is an enthusiast on the subject of rifle-shooting. At a supper recently held in his constituency, he suggested that every Parliamentary division should have a non-political committee or association to encourage the formation of clubs, and that the councils or municipal authorities should provide conveniently situated ranges. He held that the supply of rifles and ammunition was a matter in which the Government should assist local efforts.



### N. R. A. REPORT.

THE Annual Report of the National Rifle Association has recently been issued, but as it arrives at a time when the interests and discussions of the Bisley meeting have to a great extent died down, the material contained in its pages is of necessity of interest only for general reference purposes. It is, of course, a great advantage to have such a complete record of the scores at the various competitions, particularly as these are in many cases supplemented with details of the rifles and ammunition used at the special competitions. Obviously, with so many other things to look after, the Association is not able to exercise sufficient supervision over the range officers to ensure the giving of full particulars of the many and diverse forms of rifle and cartridge selected by individual shooters. Just where the expert would like to know the exact cartridge used he finds only the calibre, and thus he is reduced to guess work as to the actual one, of the family of cartridges described, which has been used. Many shooters are very well acquainted with the special interest that attached to the comparative performance of different weapons, and they in consequence give full particulars; but others are more lax, and the range officer has in very few cases sufficient all-round knowledge of rifles to be able to deal effectively with this particular side of his work. The National Rifle Association does not, however, receive sufficient proportion of its income from the competitions under exceptional conditions to induce it to go into minute details. The McNaughton competition was doubtless one of the most interesting to sportsmen, since those who are acquainted with the difficulties of regulating the shooting of double-barrel sporting rifles will appreciate the severe conditions of a competition in which shots are taken alternately from the right and left barrels at a 500 yards target. The competition in question was open to double-barrel rifles of any make, but we believe that the only two rifles on the ground were of the make of McNaughton and Fraser, both Edinburgh gunmakers. It would be interesting, indeed, to have detailed particulars of the rifles used in this competition, but no particulars are given, and hence it is impossible to know how the two competing rifles stood in relation with one another.

In sporting rifle competitions the rifles used have been more carefully recorded, but as usual there is evidence that a certain amount of latitude is taken concerning the particular method of describing rifles, whose original source is obvious, but which have emanated from the establishment of some retailer. As a general rule, the Lee-Enfield or Metford sporting rifles run a close race with the Mannlicher for premier honours. Both are military forms of rifle, and for target work, and at the running deer, they appear to possess advantages which force other rifles into an inferior position. The Bisley meeting has, however, ceased in a very great measure to act as a source of reference concerning the relative merits of purely sporting weapons. The calibre and weight of bullet have in so many cases to be regulated to the particular conditions of sport that exist in various countries, that accuracy pure and simple is only one of the many factors that must of necessity be studied by the individual sportsman. Among the powerful rifles that have of late years come into use, accuracy has to some extent been sacrificed on account of the recoil that is induced by the heavy charges used; but in any case the carefully-regulated conditions under which the charges for these rifles are

in the first place worked out, and in the second place adhered to, insures to the sportsman a regularity of action which leaves very little to be desired. Powerful rifles will, however, never be favourite weapons for target competitions. Their recoil, while of little or no account for the occasional shots that are met with in the course of a day's big game shooting, would be terribly distressing at the ranges, and therefore it must of necessity follow that the rifles used in the Bisley competitions will seldom be more powerful than the ordinary Service pattern of military arm.

As regards the more general shooting at the Bisley meeting, the work done at the revolver ranges and in match rifle shooting, there is nothing of any special interest to record as a result of the publication of the annual report. The Smith and Wesson revolver has apparently attained more general recognition than in previous years, while the Webley-Fosbery has also made marked advances on previous performances. It seems to be generally recognised among the shooters as a thoroughly practical weapon, giving satisfactory results with the ordinary Service revolver ammunition.

At the miniature ranges American rifles enjoyed less of a monopoly than usual, the Greener .310 bore Club rifle being the most prominent arm among those emanating from English firms. It is to be hoped that the excellent example set by Messrs. Greener will be followed by other gunmakers. When writing about the 1900 Bisley meeting, we expressed regret that this firm, and two others whom we named at the same time, showed so little appreciation of what was needed in a rifle required for 100 yards shooting, and we indicated as the particular features that were wrong, lightness of barrel and other structural defects which militated against getting the best possible work out of the cartridge. Since that time Messrs. Greener have brought out their No. 2 Model of rifle, which is all that could be asked for a rifle of its class, and this is, indeed, a high compliment to pay, bearing in mind how short a time English firms have set their attention to the task of competing against American rifles in one of their favourite fields. Messrs. Westley Richards have also made some progress with a miniature rifle, and the cartridge for which the rifle is specially bored is of a power that enables it to be used at distances as great as 500 yards.

Messrs. Cogswell & Harrison, who have also entered the lists as regards the production of a miniature rifle, in the same way omitted to make use of the last Bisley meeting as a test for their special model of rifle. We understand, however, that they are actively engaged in modifying the general dimensions of their rifle so as to suit it for firing one or other of the powerful miniature cartridges which have been developed during the past year or so. All these conditions point to a renewal of interest in the short range work at the Bisley meeting, and gunmakers should be reminded by the issue of the National Rifle Association report that they have just nice time for preparing weapons for the 100 yards competitions that will doubtless be held. What is likely to be the outcome of the present rifle club movement it is as yet difficult to say.

Miniature rifles seem to us to be the best solution of the troubles that are at present agitating the minds of those concerned. Ammunition of this class is inexpensive, and at the same time it does not involve the arranging of expensive safeguards which are necessary where Service ammunition is used. Whether the present demand for a cheap ammunition of Service pattern can be met it is difficult to say, but at any rate

there can be little doubt that many clubs must of necessity depend for their success upon the practice obtained with miniature rifles, and the more effective these are rendered for their work the more likely is shooting on the club system to survive the enthusiasm that has led to its inception.

### THE NEW SERVICE EXPLOSIVE.

IN the course of a lecture delivered before, of all strange audiences, a literary society at a small town in Scotland, Mr. R. B. Haldane, K.C., made the long-expected announcement that the Explosives Committee had at last, after deliberations extending over a period of nearly two years, "invented" a powder which was believed to be at the very least as good as any foreign powder, and as little erosive. This statement cannot be regarded as more than semi-official, especially having regard to the circumstances under which it was made public; but it at least must possess that much of authority, since Mr. Haldane is himself one of the members of the Explosives Committee. Naturally, rumours as to the course which the deliberations of the Committee were following have been rife for some time past, and there have not been wanting those well-informed people who could say definitely exactly what was likely to be the outcome, even to the very composition of the new explosive. But absolute credence could scarcely be attached to these rumours, backed though they were by most convincing circumstantial evidence, and for the present we really know nothing more than Mr. Haldane has vouchsafed to impart to the Tranent Literary Society.

There is no need to recapitulate the now ancient history of the introduction of Cordite into the British Services. Mr. Haldane himself became well acquainted with the explosive in connection with certain legal proceedings, and it was doubtless the insight he then acquired into the subject which led eventually to his being appointed to a seat on the Explosives Committee. On its appearance in concrete form, Cordite was very severely condemned by experts, on many grounds and possibly from various reasons. In practice, however, it seems to have lived down well nigh every objection urged against it, except that of producing excessive erosion. Apart from this somewhat serious drawback, it has compared favourably with the products of Government factories abroad, and at the present time is still held, by authorities whose opinions are of value, to be superior, at least as a small-arms explosive, to any foreign powder so far as uniformity of ballistics and general suitability to varying conditions of service are concerned. So that Mr. Haldane's testimonial with regard to the new explosive has that much less weight, save in respect to the one detail of erosion.

Apparently, the Explosives Committee put in 18 months of hard work before arriving at the conclusion that Cordite is much more erosive than certain of the powders of foreign nations. This, however, was a well-known fact previously, and required no proof, and moreover the formation of the Committee was principally due to an agitation which arose on this very point. The matter is serious enough, especially as affecting the life of ordnance of large calibre and expensive construction. For example, the effective duration of a 12-in. gun, which costs at the outset about £10,000, is not much more than 100 rounds with full Service charges of Cordite, and the provision of a new A-tube at the conclusion

of that period costs about £2,000, and lays the gun aside for a twelvemonth. Even in peace time, this shows Cordite to be an expensive luxury, but in case of war coming to pass, the question of so limited a duration of efficiency for the main armaments of our battle-ships might lead to a national catastrophe. As regards ordnance of smaller calibres, the duration of life is proportionately increased, while with small-arms, as is well-known, the efficiency of the barrel varies to a remarkable degree, in accordance with individual care in attending to its preservation.

These salient facts have been thoroughly appreciated for years, but apparently it required the experience of the artillerymen in the early stages of the still-continuing Boer war to bring matters to a crucial stage. It was not until the spring of 1900 that the War Office and Admiralty agreed as to the necessity of a special commission to inquire into the question of existing Service explosives, the official announcement being given by Lord Goschen in May of that year. At first, the Explosives Committee consisted only of three members, Lord Rayleigh as Chairman, Sir Andrew Noble, and Mr. R. B. Haldane. Subsequently, Sir William Crooke and Sir W. Roberts-Austen joined the trio, the whole representing the War Office and the Admiralty. This Committee invited manufacturers to submit for trial any propellants or high explosives which they thought suitable to replace the Service explosive, all trials to be treated as confidential. During the existence of the Committee it has tested a large number of explosive compounds, with the able assistance of members of the Ordnance Committee, Major Nathan, R.A., Dr. Kellner, and others. The net result appears to be that the Committee has decided on a modification of the Service Cordite, which will be known as "Cordite M.D."

There is a general opinion in the trade that, as the name implies, this new "powder," concerning which Mr. Haldane has made his semi-official disclosure, is simply our old friend Cordite—with a difference. The change would probably take the shape of a reduction in the amount of nitro-glycerin. As is well-known, the composition of Cordite is roughly as follows:—Nitro-glycerin, 58 per cent.; trinitrocellulose, with a small proportion of soluble gun-cotton, 37 per cent.; and vaseline, 5 per cent. Such excessive erosion as is caused by Cordite is undoubtedly due to the large proportion of nitro-glycerin, the combustion of which is accompanied by great heat, resulting in consequent damage to the surface of the bore of a gun or rifle. By reducing the proportion of nitro-glycerin, the explosive can be rendered less destructive in this respect, as was proved by Sir Andrew Noble some two years ago in a course of experiments made with Cordite containing from 10 per cent. to 60 per cent. of nitro-glycerin. He found that the erosive effects of the explosive were in direct proportion to the admixture of nitro-glycerin. Thus, a 30 per cent. mixture gave about one-half the erosive effects of the Service Cordite with its 58 per cent. proportion.

Assuming that the Explosives Committee have proceeded on the lines indicated, and that their new "invention" is in reality Cordite still, with reduced quantities of nitro-glycerin, it is to be hoped that in their desire to do away with the trouble of erosion they have not introduced other defects from which the present Service compound is free. At first sight, such a suspicion might be thought to be uncalled for, but in justification of it we would urge that so far as the majority of the members of the Committee are concerned,

their intimate acquaintance with the composition and manufacture of explosives is little more than two years old at the most, and it is somewhat difficult to credit that these new men could, in so short a time, have become efficient inventors and manufacturers of explosives. On the other hand, Mr. Haldane points out that the Committee now has its own chemists and its own experts in gunnery manufacture and explosives.

But Mr. Haldane seems to have conveyed a hint as to the direction in which the Committee's investigations had tended, in referring to the explosive of the future. He said that the next step consisted in being able to get such an excess of oxygen as would completely convert the carbon, not merely into carbon-monoxide, but into carbon-dioxide at once. If this result were attained, a new kind of explosive would be got which would be not only smokeless but flameless, whereby it would be impossible to locate the guns of those using it. It would seem from this that the Committee believe that flame is due to the oxidation of the carbon-monoxide and free hydrogen at the mouth of the gun, at the moment of the hot gases coming into contact with the atmosphere. This is a theory which, if not directly due to Professor Vivian B. Lewes, was certainly made popular by his advocacy. Without entering into the question as to how far that theory is accurate, the scheme proposed seems an obviously impracticable method of effecting flamelessness, unless the proposition goes so far as to abandon nitric compounds such as gun-cotton and nitroglycerin. Under firing conditions, these bodies when mixed with present-known oxygen carriers sufficient to produce the desired effect would most certainly give rise to oxides of nitrogen. The products would possibly not be erosive, but it is certain that they would be eminently corrosive, a state of affairs that would admit of little choice between the two evils.

We are pleased to notice that Mr. Haldane stated that the Explosives Committee seemed likely to prove, not a transient committee, but what they wished it to be, a permanent institution, corresponding to the German Centralstelle. If this prove to be correct, there ought to be cause for congratulation at the existence in this country of an institution constantly devoted to the investigation of all matters connected with the development and science of explosives. At the present time, it is sad to remember, all the important investigations which are the foundation of explosive knowledge are left to our French neighbours. Certainly, in the 'sixties, Professor Abel and Sir Andrew Noble were responsible for several brilliant researches, which did much to increase the science of that age, but during the last 20 years, at least, practically all the published researches of any great merit, in connection with explosives, have issued from the laboratories of one or other of that famous trinity, MM. Berthelot, Vieille, or Sarrau. It would be flattering to our national pride, therefore, if the Explosives Committee could carry out researches of an equally important character; but to do so it would seem necessary that, with a view to completing their all-round efficiency, they should seek the co-operation of a scientist, pure and simple, who would be able to impart to their investigations just that quality which otherwise may be lacking. In conclusion, we do not think it unreasonable to expect, in the near future, published results of the work so far accomplished by the Committee, which would supply a satisfactory proof of the usefulness and general merit of their proceedings, and some sort of guarantee as to the efficiency of the new Service explosive which they have brought into being.

## TESTING CHAMBER PRESSURES.

A CORRESPONDENT of the United States *Army and Navy Journal* has written a long letter in which he claims to have devised a new system of ascertaining the chamber pressures of small-arms of the military type, without the use of complicated apparatus or expensive instruments. Certainly the system, as applied, is simplicity itself, but whether it is as accurate as it is simple is a question somewhat difficult to answer offhand. As is well-known, the existing and recognised method of taking pressures, even with the aid of "complicated apparatus and expensive instruments," is not in itself conclusive, but is at the best only approximate and comparative. It is, in fact, so far from yielding complete satisfaction that at the present time a committee of experts is engaged on the task of revising the method so as to bring pressure readings into line one with another and with the actual pressure which they should represent. Having this condition of affairs in mind, therefore, it must be admitted that the idea formulated in the letter referred to does not at once commend itself as a practical scheme. On the other hand, the correspondent partially disarms criticism of the most searching order when he makes the following disclaimer:—"I do not wish to be understood as saying that the results obtained by this method will be as accurate as those given by the Service apparatus, but I do assert that it will afford a ready means of determining chamber pressures within narrow margins of error, and safeguard against dangerous pressures; so that an investigator may proceed intelligently, and an officer in the field, remotely removed from the Service facilities, might, in cases where explosives are thought to have suffered changes due to heat or other causes, quickly determine not only whether or not the pressures were dangerously high, but could tell, within very close limits of accuracy, just what pressures were being developed."

Briefly, the system employed is to take advantage of the upset of the solid metal composing the head of the cartridge case, which taking effect in a line in the direction of its length—i.e., from front to back—has the result of increasing the diameter of that portion of the case immediately forward of the rim. The extent to which this enlargement of diameter takes place is utilised to determine the chamber pressure. To read off the values, the only instrument used by the experimenter was a Brown & Sharpe No. 16 Micrometer with ratchet stop and with a vernier for reading to '0001 in., though for quicker readings he has also employed a bar of hardened steel having a slot varying in width from '460 at one end to '454 at the other, and marked with figures for direct reading. This was especially made to suit the cartridge case of the '300 U.S. magazine rifle, which has apparently formed the sole basis of the experiments.

The theory on which the system is built up is thus stated—"At the instant of explosion the metal of the gun itself, as well as the case, is expanded, and the metal of the case, being more resilient than the metal of the gun, contracts to a greater degree when the reaction occurs. At the moment of greatest pressure, I fancy, the brass has followed the outward movement of the steel wall of the chamber and completely fills the then enlarged space, and I am persuaded this would occur whether the case originally measured '452 in. or '454 in., the only difference in the fixed size (under exactly the same

pressure) would be the difference due to the increased or diminished resiliency possessed by cartridge cases varying, say, .0001 in. in diameter, which, seeming to me to be so small a factor, I have not hesitated to neglect it." It seems, then, that the experiments take no account whatever of the actual degree of expansion of the metal walls of the cartridge, nor do we find any allowance made for variation in the size of the chamber of rifles. Of course, if all tests are conducted in one rifle, the chamber of which presumably will not vary in diameter to any measurable extent, the readings may allow of comparison, but no mention is made of any such restriction. Surely it cannot be that the inventor of the system neglects the factor of working toleration in the chambering of rifles, equally with that of similar toleration in the manufacture of ammunition. If that be so, we must confess to doubting the value of the system *in toto*. Moreover, nothing seems to be allowed for differences in the quality of the metal utilised in making the ammunition. The cartridges which were used in the tests required to formulate the theory were all of one make, and presumably of metal possessing a fair degree of uniformity. Assuming that they gave results in accordance with such uniformity of composition, the question remains as to how to differentiate results obtained from two or three makes of ammunition. For example, our own Service cartridges are produced at various factories, Government and private, and the quality of the metal employed may show considerable variations. How is one reading to be reconciled with another?

Bearing these points in view, we should be inclined to reject the proposed system as utterly unpractical, were it not that the experimenter seems to have carried out a series of tests which certainly, on his showing, give some sort of relation. He has, in fact, made out a table of co-efficients and pressures based on his system, and checked, though to what extent and in what detail is not stated, by the standard apparatus at Frankfort Arsenal and by the Lafin & Rand Powder Co. No useful end would be served by reproducing this table, since it refers to ammunition of one particular calibre and make only, but a brief description may be given of the manner in which the co-efficients are arrived at. The simplest explanation will be to take a concrete instance. Three cartridges were fired, with an average observed velocity, at 53 ft. from the muzzle, of 2,218 f.s. Their greatest diameters after firing showed an average of .45836 in., and the co-efficient of pressure is arrived at by the simple process of taking the last three figures of the series, namely 836. By the table which has been constructed in combination with results obtained from actual pressure tests with recognised apparatus, this co-efficient corresponds to a pressure of 45,000 lbs. per sq. in. Another instance shows a series of three cartridges with an average observed velocity at the same distance of 1865.6 f.s., and an average greatest diameter after firing of .45670 in. Here the co-efficient is 670, corresponding to a pressure, according to the table, of 29,750 lbs. per sq. in. It will be seen that there is here some relation existing between the two series as regards observed velocities, maximum fixed diameters, and pressures, and provided other tests to a considerable number have, as we understand, shown similar relation, there seems to be good reason for assuming that this very rough-and-ready system fulfils some part at least of its originator's claims. Taking this for granted, however, the system is still of little practical value unless a series of co-efficients and pressures be worked out, and

checked, for different types of ammunition in use, and a standard chamber of absolute and not approximate dimensions be selected for the testing of each series.

## THE BIRMINGHAM GUN MAKERS' ASSOCIATION.

On another page of this issue we give publicity to a letter written by Mr. A. A. Bonehill in reference to our remarks made last month on the subject of the Birmingham and Provincial Gun Makers' Association. We publish the letter in question, not with a view to promoting a correspondence that can now scarcely serve any useful end, but simply in accordance with the dictates of common fairness which should allow of a reply. On the other hand, we claim the right to comment on that reply, and to suggest that it can scarcely be accepted as an explanation. So far as our original remarks are concerned, Mr. Bonehill seems to make two points, one being that at the annual general meeting of the Birmingham and Provincial Gun Makers' Association, as reported in the *Birmingham Daily Post*, the Chairman was careful to explain that "the operations of last year, then under consideration by the meeting, of the *two associations* had been in connection with the outside sizes of shot-guns from 4 to .360," the remainder of his remarks dealing with the question generally, and totally apart from any attempt to apportion credit for the work performed, much less to claim special credit for his own Association. The other point accentuated by Mr. Bonehill was the shortness of the notice given to him prior to the holding of the Joint Conference, which he failed to attend.

With regard to the first point, we cannot accept the brief quotation given by Mr. Bonehill as fully representing the context. In the Birmingham Association's Annual Report some care seems to be taken to avoid stating exactly the constitution of the Committee responsible for the work of standardisation, but to anyone not conversant with events there could be no question that the Committee was composed wholly or chiefly of members of the Birmingham Association. As to what was the nature of Mr. Hughes' reference to the matter in his speech at the meeting, unfortunately we have no copy by us of the newspaper report quoted by Mr. Bonehill, but we have another which probably transcribes the Chairman's words with equal exactness. From that we learn that "last year the Association were able to report that standard minimum sizes had been adopted for 12, 16 and 20 gauges, and the attention of the two Associations during the past year had been devoted to other sizes, from 4-bore to .360. These dimensions had been arrived at after much consideration undertaken in conjunction with the London Association and the leading cartridge firms. When the sizes had received official sanction, the Association would convey the dimensions to the members." In comment upon this method of apportioning the credit, we need do no more than refer our readers to the remarks made in our last issue, which still hold good. It would be impossible, we maintain, for anyone who is ignorant of the real facts to avoid drawing a conclusion directly contrary to those facts, to the extent of assuming that the credit for both initiative and all preliminary work was due to the Birmingham Association. So far for the first point raised by Mr. Bonehill.

In respect to the point made as to an insufficiency of notice prior to the holding of the Joint Conference, we find that the Conference was convened for the 3rd of October by a circular sent out on the 23rd of September. It may be that a clear ten days' notice is insufficient to suit the engagements of a business man, but, on the other hand, it can scarcely in strict fairness be characterised as "very short." But however that may be, Mr. Bonehill has misunderstood our reference to his absence from the Conference. We simply stated the fact of the Birmingham Association being unrepresented for the purpose of showing that that body had, in fact, no acquaintance with the various factors relating to the proposed standardisation of chamber sizes other than the 12, 16 and 20-bores until after the Conference, and consequently could not in justice claim to have had much to do in arriving at any conclusions brought forward by the Conference. We might have added what we take the opportunity to say now, that the Conference was the poorer through the absence of Mr. Bonehill and its consequent loss of his experience and practical knowledge of the subject under discussion.

## NOTES.

**THE WEBLEY AND SCOTT REVOLVER AND ARMS CO., LD.**—According to the report of the directors of this company, after making due provision for repairs, maintenance, and depreciation, there remains on the past year's trading a balance of £21,907, which, with the balance brought forward, gives a total sum available for distribution of £28,328. After paying the preference dividend, and a dividend of 5 per cent. per annum on the ordinary shares of the company, there remains a balance of £11,578, which the directors propose to apportion as follows:—£1,494 to be written off as the outlay incurred on automatic pistols and revolvers; £5,000 to be allocated to special reserve fund, which it is proposed to invest in securities outside the business of the company; and the remaining balance of £5,084 to be carried forward to the next year's account.

**NEW EXPLOSIVES CO., LD.**—According to the report and balance-sheet of this company, which have come to hand as we go to press, the net profit for the year ending Dec. 31st last amounts to £19,273, which, with the balance of £8,272 brought forward from 1900, gives a total sum available for distribution of £28,445. The directors recommend that a dividend of 10 per cent. for the year be paid, that £5,500 be placed to reserve on account of extension to "property, plant and buildings" now in hand, and that £6,054 be written off the "property purchase account" for depreciation of property, plant and machinery. The balance of £7,891 will be carried forward for working capital. It will be seen that the company has had a very prosperous year, and the directors feel sanguine as to even better times in the future. They report that they have received encouraging expressions of opinion concerning the new patent guncotton moulding and pressing plant from high and influential authorities, and that negotiations are in progress with several governments, from whom remunerative business is expected. That they keep abreast of the times is shown by the fact that the shareholders are informed that necessary arrangements for the manufacture of the new Government

powder are already made, so that the company will be able to execute orders as soon as received. The ordinary business in blasting explosives for commercial and industrial purposes is showing signs of continuous and healthy development.

**THE KYNOCH BREECH ADAPTOR.**—We have received an artistic little brochure from Messrs. Kynoch, Ltd., giving full particulars of the Mullineux Patent Breech Adaptor, which is intended to bring the Service rifle into use at miniature ranges. The adaptor itself consists of a steel tube of the exact external dimensions of the .303 Service cartridge case, while inside it is bored and chambered to take a miniature cartridge shooting a .303 bullet, the adaptor being, in fact, a bushing of the Service chamber to suit less powerful ammunition. This steel shell is held in place by means of a split pin passing through the gas hole on the left side of the breech shoe, and is recessed at the right side so as not only to clear the extractor, but to allow it to engage on the rim of the miniature cartridge. The adaptor and the ammunition to be used in conjunction with it are both very cheap, yet it is possible to obtain good shooting up to 100 yards and even more. It may be remembered that at Bisley last year, in the special competition open to this class of device, the Kynoch Adaptor won the first four and the seventh out of 10 prizes offered. Sighting is obtained with the usual sights by making certain fixed allowances, which Messrs. Kynoch have worked out into simple form. Another speciality brought out by this enterprising company is the Mullineux Bullet Catcher, for use in miniature ranges. It is a bell-mouthed screen of cast-iron and steel, which is placed behind the target, and it is so designed that all bullets striking it are deflected into a circular chamber, in which they are speedily brought to rest and deposited in a tray provided for the purpose.

**THE DEATH OF MR. JOHN HARRISS.**—We chronicle with regret the death of Mr. John Harriss, the London manager of the Webley and Scott Revolver and Arms Co., Ltd., which took place at the Company's West-End premises on the morning of January 3rd. In the absence of actual eye-witnesses of the accident which resulted so fatally, it is, of course, difficult to ascertain precisely what took place. According to the evidence produced at the inquest, on the morning in question Mr. Harriss went down to the basement with an automatic revolver and some Government cartridges, for the purpose of making tests. He fired one shot and then returned to the ground floor, and remarked that the pistol had jammed. He then opened the revolver, extracting the cartridges, and replaced them with five others, leaving the uppermost chamber, which was the one opposite to the hammer, empty. With the pistol in this condition, Mr. Harriss left the shop, evidently with the intention of making a second test, and as he was walking down the passage at the rear of the shop, one of the clerks heard him bring the automatic action of the pistol into play, which would have the effect of causing the cylinder to revolve, and at the same time cock the hammer. Almost immediately afterwards there came the sound of a shot being fired, and a fall, and Mr. Harriss was found lying on his back in the passage with the pistol underneath him. Exactly what happened cannot be stated. Assuming that Mr. Harriss had prematurely got the pistol cocked ready for the trial, he may have slipped in descending two brass-bound steps, and in the effort to save

himself may have turned the pistol towards himself while his finger was on the trigger. On the other hand, he may have done what we have often seen done by people handling unloaded automatic pistols, namely, pressed the muzzle against his chest so as to push the barrel back on its slide, in order to actuate the automatic mechanism. In either event, the result proved equally fatal. The bullet pierced the breast-bone on the right side of the heart, and continued its course through the main artery of the aorta and the spinal column. Mr. Harriss lived only a few moments after the occurrence, but he was able to explain that the sad occurrence was an accident. He was 45 years of age, and was well-known in trade, having been associated with a firm in Dublin for many years before taking up his position with Messrs. Webley.

**THE PROJECTILE COMPANY (1902) LIMITED.**—A subscription list for shares in this company was opened at the close of last month. The total share capital amounts to £250,000 in £1 shares, and the public are also invited to take up £150,000 in £100 five per cent. first mortgage debentures, subject in each case to the fact that the vendors, directors, and individual shareholders of the Projectile Co., Ltd., and others have applied for £50,000 in debentures, and the same amount in ordinary shares, which will be allotted in full. This new company takes over the business of the Projectile Co., Ltd., as a going concern, at a purchase price of £365,000, thus leaving £35,000 of the total subscription as working capital. The purchase price is made up as follows:—Premises and plant, covering an area of about 2½ acres, held on lease with 64 years still to run, £122,954 3s. 7d., according to the valuers' estimate; cash and stock of stores and material, £31,000; and goodwill, £211,045 16s. 5d. This latter item apparently refers to patents, secret processes, pending contracts and engagements, as well as that most intangible of substances known as goodwill; but in any event it seems to possess a distinctly inflated value as compared with the total share capital of the new company, while the amount allocated for working expenses in a concern that must necessarily depend largely upon Government contracts appears to be proportionately attenuated. It must be admitted, however, that the most remarkable feature of the prospectus advertised by the company relates to the last three years' trading of the vendor company. Two well-known firms of accountants certify that the profits earned by the Projectile Company, Ltd., during the three years and eight months of its existence have averaged £95,815 7s. 2d. per annum. This is the more astounding when it is remembered that the vendor company was formed as a private limited company to take over the business and assets of a former company of the same name, which had been sold by order of the Court of Chancery on the motion of a debenture holder, some time in February, 1898. If the figures quoted be correct, and we can scarcely question the statements of two reputable firms of accountants, then all that can be said is that the business of manufacturing projectiles for the British Admiralty and War Office, with orders "from time to time" from the Spanish, American, and Japanese Governments, must be far more lucrative than is generally supposed. On the other hand, the prospectus conveys no idea of the manner in which those profits were obtained. We notice that Mr. Claud T. Cayley, who was managing director of the vendor

company, is appointed general manager of the new Projectile Company (1902) Ltd. The present directorate does not comprise any names particularly well-known in connection with the speciality of the company, but possibly the additional director, who is to join the Board after allotment, will supply the deficiency.

**AN ADAPTED SERVICE RIFLE FOR SHORT RANGES.**—One of the objections frequently urged against the present-day development of civilian rifle clubs is that so many of the clubs are unlikely to be of the slightest use in training their members for military purposes. This criticism refers not so much to a desire to see the members of such clubs execute squad drills, as to the training they are likely to receive as rifle shots. It is said, and with some amount of truth, that a man can only be taught to become a military sharpshooter by accustoming him to work with the Service weapon. He has to learn to handle and hold his rifle so as to use it efficiently, and this ease of usage can only be obtained by familiarity with the arm itself. As against this proposition, taken in conjunction with the development of civilian Rifle Clubs, are two very salient features to be found in the Service rifle. It is not suited for short distances, and to get at its real practical efficiency means the provision of ground sufficient for the laying down of ranges extending for any length from 400 yards up to, at least, 1,000 yards. To obtain this land and to erect suitable stop-butts such as would constitute it a safety range, means an expenditure that nothing but a club composed of millionaires, or stockbrokers, could entertain. But even were the range provided free, the use of ammunition so expensive as that of our Service arm would prove a serious hindrance to that constant practice which is requisite for the making of a good marksman. As a compromise, therefore, rifle clubs have to resort to miniature rifles or to adaptors of the Service rifle. In either case, the marksmanship which they learn is widely removed from that suited to military conditions; in one instance, because the weapon used is throughout of a different class from the Service arm; in the other, because the device is at best a makeshift, which does little good to the weapon adapted, and by its nature gives necessarily uncertain shooting. Under the circumstances, there seems to be a distinct opening for such a rifle as is now being placed upon the market by Messrs. Buck & Co., which is specially designed for the use of members of rifle clubs. It is nothing more nor less than the Service rifle fitted with a barrel of smaller bore. The stock, breech mechanism and fore-end are exactly similar to those of the Lee-Enfield, but in place of the .303 barrel is one bored and chambered to take the Morris-Tube ammunition of .230 calibre, or the .22 rim-fire cartridge. Of course, even this arrangement must necessarily be something of a makeshift, since the conditions set up by recoil with this type of ammunition will be widely different from those obtaining with the .303 cartridge; but apart from that obvious and insuperable objection, this form of adapted rifle should certainly prove to have marked advantages. Provided that the barrel be suitably bored and rifled, it should give as good shooting as the cartridge used in it is capable of yielding at practicable ranges, and at the same time the marksman should become habituated to the mechanism and general handling of the Service arm. We shall expect to hear more of this adapted weapon as time progresses.



## ROUND THE TRADE.

In the list of companies registered at Somerset House at the close of last year appears a notice of the Explosives Acid Co., Ltd., with a capital of £2,000 in £1 shares.

We are pleased to learn that the genial Master of the Birmingham Proof House has recovered satisfactorily from the effects of his recent accident, and is again at work.

We are informed that Mr. Donald Mackintosh Fraser will for the future occupy the position in the firm of Messrs. Daniel Fraser & Co. which was left vacant by the lamented death of his father.

The directors of Messrs. Vickers, Sons and Maxim, Ltd., have given an emphatic denial to the rumour that the Government are about to purchase the company's shipbuilding yard at Barrow-in-Furness.

The Carbonite Syndicate, Ltd., have registered under Class 20 for explosives to be employed for blasting purposes, a trade-mark consisting of the word "Thunderite" and a conventional representation of lightning.

Messrs. Schwarte & Hammer inform us that they possess the sole right of sale, in England and the Colonies, of the Mannlicher and Mannlicher-Schönauer ammunition manufactured by the Hirtenberg Cartridge Works (Keller & Co.)

The following extract from the report of the directors of the De Beers Company may be of interest to some of our readers:—"The works at the dynamite factory are proceeding satisfactorily, but have been greatly impeded by the war."

The winter general meeting of the National Rifle Association will be held at the Royal United Service Institution, Whitehall, S.W., on Wednesday, February 5th, at 3 p.m., when certain alterations in the rules will be proposed on behalf of the Council.

A company has been registered under the style of Wm. Thorne, Ltd., with a capital of £7,000 in £5 shares, to take over the business of gunsmiths, dealers in ammunition, &c., now carried on by Mr. William Thorne, at Tiverton, Devonshire. There was no initial public issue.

Messrs. W. Brunton & Co., of the Cambrian Safety Fuse Works, Wrexham, inform us that they have opened a London office at 36, Lime Street, E.C., which is under the charge of a representative thoroughly acquainted with the firm's process of manufacture.

We notice that the head quarters of the National Rifle Association have been removed to Gloucester House, 19, Charing Cross Road, W.C. The former offices of the Association in Pall Mall, East, had been in their occupation since the formation of the N.R.A. in 1860.

We were pleased to meet Mr. Harry Newton about the middle of January, and to see that he was his old self as nearly as could be expected, considering his recent severe illness. Our congratulations are due to him for his complete recovery, and his return to the sphere of his labours in the trade.

We learn that Mr. H. A. A. Thorn has now received the diploma and bronze medal awarded to him personally by the executive of the Paris Exposition of 1900, in respect to improvements in fire-arms brought out by him as the representative of Mr. Charles Lancaster, in addition to the honours already bestowed upon him under the latter name.

Mr. Charles Larking, who has acted as trustee to the estate, has recently issued a circular-letter stating that the purchase of the property at 8, Oxford Hill, Norwich, now in the occupation of Messrs. J. H. and G. M. Emms, who are trading as the late Mr. G. Jeffries' executors, has been completed, and that as soon as the accounts are passed by the committee of inspection, the dividend will forthwith be declared.

We understand that there is likely to be considerable opposition to the proposed bill which is promoted by Nobel's Explosives Co., Ltd., relative to the supply of water to their factory at Ardeer. One of the clauses of the Bill would enable them to sell surplus water to all and sundry with the consent of the local authority having statutory powers for the district, but apparently this scheme runs counter to vested interests in the neighbourhood.

Mr. August Reichwald, who is the makers' sole representative for the United Kingdom and the Colonies, draws our attention to the fact that shot-gun and rifle barrels made of Krupp's "Fluss-stahl" (Acier fondu) are being imported indirectly into this country, and he issues a warning that this metal, though of good quality, must not be confounded with Krupp's "Special Gun Barrel Steel," which bears as a trade-mark the words just quoted over three interlaced circles or rings, with the words "Fried. Krupp, Essen," below.

There are rumours of an agitation for the reconstitution of the Normal Powder and Ammunition Co., Ltd., one remedy suggested as a means of solving the difficulty being the extinguishing of the capital at present unissued. It may be that this scheme would tend to place the company on a more healthy footing than it now occupies, but we should imagine that more drastic measures than the one suggested will be necessary in order to change the conditions of affairs whereby in 4½ years of its existence the company has lost something like £19,000. However, it is a matter in which the shareholders should have more vital interest than any outside observer can claim to possess.

Mr. Henry Baldwin informs us that he resigned his appointment as Secretary of Messrs. Curtis's and Harvey, Ltd., at the close of 1901, and that he is now associated, with a view ultimately to becoming a partner, with the firm of Messrs. Denton, Lichtenheim & Co., oil importers and refiners, and manufacturers of high-class lubrications and solid anti-rust compositions, of Denlico Works, Battersea. Mr. Baldwin spent some five years in travelling in the Colonies and abroad for Messrs. Pigou, and incidentally established a record in the trade that has probably never been beaten, having made the tour of the world no less than three times in that period. Needless to say that he made many friends during his wanderings.

A company was registered at Somerset House on the 21st ult., under the style of William and Enos James & Co., Ltd., with a capital of £30,000 in £1 shares. The object of this company is to acquire the businesses now carried on at Staniforth Street, Birmingham, and the Alexandra Stamping Works, Willenhall, Staffs., as William and Enos James and William James, and to carry on those businesses as manufacturers of and dealers in guns and gun-barrels, and cycles and cycle accessories, gas, water, and steam fittings, iron, brass and other metal tubes, casters, stampers, engineers, makers of ordnance, machine and other guns, torpedoes, gunpowder, shot, bullets, cartridges and other projectiles and explosives, motor car builders, makers of all kinds of india-rubber goods. There was no initial public issue.

According to the Board of Trade Returns for the completed twelvemonths ending December 31st, 1901, under the heading of Arms, Ammunition and Military Stores, small fire-arms to the number of 111,570 were shipped abroad, as compared with 96,683 and 118,498 for the years 1900 and 1899 respectively. Shipments of gunpowder showed a steady improvement towards the close of the period in question after a somewhat poor beginning, the total for the year being 6,920,016 lbs., as compared with 7,021,000 lbs. and 7,923,600 lbs. for 1900 and 1899. The various unclassified items, which come under the heading of "All other kinds," have maintained the satisfactory lead already noticed, the figures being respectively—£2,208,537 for 1901, £1,708,096 for 1900, and £1,575,937 for 1899.

It is announced by the directors of Messrs. Vickers, Sons and Maxim, Ltd., that a provisional agreement has been made to acquire one-half of the ordinary shares in the firm of Messrs. William Beardmore & Co., of Glasgow, the well-known manufacturers of armour plates, railway material and forgings, and ship-builders. This amalgamation of interests is apparently due to the initiative of the Sheffield Company. In view of the combination, the Glasgow business is to be converted into a limited liability company, with an ordinary share capital of £1,500,000, and in consideration of the half-interest taken by Messrs. Vickers, Sons & Maxim, Ltd., 400,000 additional ordinary shares are to be created and allotted, as fully paid, to Mr. Beardmore. There is to be an interchange in the directorates, two directors of the Vickers concern joining the board of Messrs. Beardmore, and Mr. Beardmore himself joining the board of the Sheffield Company.



## A REVIEW OF MODERN MACHINE METHODS.

It is unfortunately only too well known that the British manufacturer is far behind his American or German rivals in the adoption of modern machinery of an automatic or semi-automatic character, and to that extent suffers when in competition with the increased facilities for rapid production and interchangeable duplication of standard patterns which are afforded by such developments of machine methods. In some cases, no doubt, the character and reputation of British workmanship is such that it stands pre-eminently above rivalry, but as time progresses and machinery approaches more and more closely to the all-round adaptability of the handicraftsman, this superiority of skilled manual production becomes less apparent. In recent years it is satisfactory to note that there has been a tendency on the part even of conservative British firms to adopt the latest developments of machinery, but even now there are possibly but few establishments in this country in which as full advantage is taken of such aids to exact and rapid work as is common certainly on the other side of the Atlantic, and to almost an equal degree in the leading workshops of the Continent.

As an aid to the spreading of the gospel of machinery *versus* hand labour, a paper recently read by Mr. H. F. L. Orcutt before the Institution of Mechanical Engineers is likely to have great effect. It may be premised that what Mr. Orcutt does not know about modern machine methods is of little practical value. He has studied at first hand all the systems and processes that have survived the experimental stage, and has seen in America, and elsewhere abroad, machinery which is capable of doing well nigh everything that the human hand can accomplish, and many things that are beyond the limitations of that useful and ancient instrument. As the London representative of a German firm, which is, perhaps, second to none in the production of machinery and tools of a labour-saving character, he has been in a position to keep abreast of every development as it came about, while his experience has enabled him rightly to appraise the value of each new device as it was brought under his notice. We cannot pretend to reproduce here his very interesting paper, nor would it perhaps be found that the paper was in its entirety particularly applicable to the trades represented by this journal. At the same time, a short review of some of the more salient points brought out by Mr. Orcutt may prove of interest.

Mr. Orcutt began by pointing out that automatic machine operations are not invariably more economical than hand-work, but that the producing power of the individual, aided by the labour-saving automatic machine, is practically unlimited as compared with the limit of production reached by the skilled worker using only simple machines and hand tools. So far as accuracy is concerned, a high degree can be obtained by either the old or the new method; but accuracy combined with cheapness is possible only under new conditions, while interchangeability is commercially impossible except in establishments fitted with the best machines, tools and gauges. In this connection it should be noted that there are very few mechanical operations of the present day that are strictly new. They date back many years to the time when the planer and milling machines superseded the chisel, and the

power lathe and the drilling machine replaced the bow stick. In fact, turning, milling, planing, grinding and boring, are all of them as old as the hills—or thereabouts. This being taken for granted, it is the latter-day developments of these various processes which are of interest to the manufacturer of progressive tendencies, and while some of these developments may date back twenty years, there are others that have not had five years of existence, and new methods are always arising. It was with these most recent methods that Mr. Orcutt was principally concerned.

Limit gauges comprise a subject on which Mr. Orcutt can speak fluently and with enlightenment. There is no need for us to reproduce the section of his paper dealing with this matter at any length, since previous issues of this journal have fully described the modern application of such gauges and their suitability for gunsmith's work. Speaking from experience, however, the lecturer was able to state that comparatively unskilled labour can, assisted by a proper outfit, quickly learn to produce work accurate within limits of .0006-in. when using external limit gauges, and within limits of .0016-in. when using the internal limit gauge. Such limits are fairly close for the production of interchangeability. For this purpose the gauges should themselves be accurate within at least .0001-in., and it is possible to obtain this degree of accuracy at a reasonable figure as regards expense. For very fine work, of course, the gauges should be produced with even greater standards of accuracy, and the limits of work gauged would be also correspondingly finer.

Milling machines are tending to displace the planer and shaper as a great saver of labour, but one of the essentials to their successful adoption must be a fairly up-to-date outfit and careful supervision of the cutters and tools. As regards circular milling, Mr. Orcutt pointed out that one of the simplest and most effective methods is neglected to an astonishing degree, even by those who have large milling equipments. The milling machine is too often regarded as a means for merely removing metal, instead of an instrument for producing accurately finished surfaces, requiring little or no subsequent hand work. In many cases five minutes more on the machine would make a saving of ten minutes' fitter's work, while files would be saved and greater uniformity secured. This point was brought home to us some years ago in going over an establishment devoted to the production of ordnance of various calibres, chiefly small. The shops were at that time perhaps more completely equipped with milling and other modern labour-saving machinery than any similar works in the country, and yet we noticed that the machinery seemed to stop short and give place to hand work at a point where the machine processes might still have produced economical and accurate results. For heavy work the milling machine and the planer seem to be about equally employed, but there can be no comparison in their work as regards time, the saving of the miller being sometimes as much as 75 per cent. At present, the adoption of the milling machine for this class of work is restricted by the initial outlay in cutters, but as with all labour-saving devices, the question should be, not how much does the outfit itself cost, but how much does it save, and how much does the article cost that it turns out. On the other hand, a number of improvements have recently been effected in the planer which, though individually inconspicuous, have materially affected its standing as a tool.

Mr. Orcutt waxed enthusiastic on grinding in its latter-day

development. Its use is no longer restricted to the tool-room or to finishing hardened parts, but it is found to be the cheapest and best method for producing mechanically correct cylindrical surfaces, where good work and interchangeability are requisite. He thinks that the turner and the file cannot compete with the grinding machine and the limit gauge, and he believes that it is safe to state that, except in heavy work, the grinding machine and the turret lathe will, in the near future, absorb 50 per cent. of the lathe work now performed by skilled turners. "Chucking" is another development of machine work for which Mr. Orcutt predicts a great future, on account of its all-round utility and the accuracy of the work done. One prominent British manufacturer has said that the introduction into his works of a chucking department revealed the fact that he had never before made holes that could be called round. So far as the lathe pure and simple is concerned, Mr. Orcutt considers that in the future it will be largely used as a roughing-out machine. The turret machine is largely supplanting it in many lines, and would do more still, save that the use of turret machine tools demands the brains and skill of the high-grade tool-maker, who is somewhat of a rarity in many establishments. Drilling is now becoming recognised as a specialist department, and its utility is greatly extended by the introduction of properly designed jigs and suitable boring and finishing tools.

The paper under review has also something to say on the matter of portable machines, the tool-room, and the erecting department. Of the tool-room Mr. Orcutt said that by that term was meant an equipment of the best grade of machine tools and small tools necessary for the maintenance and supply of the special tools and fixtures which are used for manufacturing purposes. In an old-fashioned plant this equipment might consist mainly of a forge and a grind-stone. He thinks that many manufacturers attempt tool-room practice in a groping sort of fashion, and that some who have fairly good outfits make the mistake of turning their tool-rooms into manufacturing establishments for the production of articles which could be purchased more cheaply and better from a trustworthy maker. By this practice, they also run the risk of being behind the times in respect to latest designs. Economy in this department is likely to be the worst extravagance, as the skill and intelligence shown in the tool-room is a measure of the productive capacity of the establishments. American manufacturers, who generally recognise the value of a proper tool-room, commonly pay from 12s. to 16s. a day, sometimes even 20s. a day, for good tool-makers.

Mr. Orcutt concluded his most instructive paper by remarks upon organisation, the possibility of an extensive development of modern methods, and on the apprenticeship question. Evidently he is no great believer in technical education as applied to machine shops. He said that the answer to the question, Where can I get good men? was, Train them, in your own shops, on your own machines, with your own instructions, in your own time. Neither municipalities nor governments can do it for you. As regards this aspect of the case, it must be remembered that Mr. Orcutt has been for years in contact with the product of the much-vaunted German technical schools, and presumably speaks that which he knows. He has neither enthusiasm nor admiration for their methods.

## THE GUNMAKERS' ASSOCIATION.

### GENERAL MEETING.

A GENERAL MEETING of the Gunmakers' Association was held at Effingham House on Thursday, January 23rd, 1902, at three o'clock in the afternoon, and there were present:—Messrs. C. E. Greener (in the chair), H. J. Blanch, A. H. Gale and R. T. Woulfe.

MINUTES.—The minutes of the previous meeting were read and confirmed.

MESSAGES OF REGRET.—Messages of regret for non-attendance were read from Messrs. C. Boswell, E. Harrison, H. W. Holland, John Rigby, John Robertson, H. A. A. Thorn, J. Tisdall and T. W. Webley.

MESSAGES OF CONDOLENCE.—It was proposed by Mr. Gale, seconded by Mr. Blanch, and carried, that the Secretary be instructed to forward messages of condolence on behalf of the Gunmakers' Association to:—

Messrs. D. Fraser & Co., Ltd., of 4, Leith Terrace, Edinburgh, on the death of Mr. Daniel Fraser.

Messrs. the Webley and Scott Revolver and Arms Co., Ltd., of 81-91, Weaman Street, Birmingham, on the death of Mr. John Harriss.

ELECTION OF NEW MEMBER.—The application of Mr. Donald Gray, of the firm of Messrs. D. Gray & Co., 36, Union Street, Inverness, N.B., to become a member of the Gunmakers' Association came up for consideration, proposed by Mr. H. A. A. Thorn, seconded by Mr. E. Harrison. Mr. Gray was unanimously elected.

STANDARD MINIMUM CHAMBER SIZES.—The Executive submitted their printed suggestions for the standardisation of shot-gun chambers, pointing out that these might require modification on further consideration. The following resolution was put to the meeting and carried unanimously:—

"Resolved, that the suggestions and recommendations as submitted to the Executive Meeting of January 9th, 1902, and as set out in the printed document circulated amongst the members for this meeting, be referred back to the Executive with full power to finally approve such suggestions, with or without modification, and to submit same for confirmation after agreement with the other parties interested."

The Secretary was instructed to write to Mr. T. W. Webley, in answer to his letter bearing on this subject.

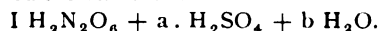
CONCLUSION OF MEETING.—The meeting concluded with the usual vote of thanks to the Chairman for presiding.

MESSRS. ELEY BROS., LD., have recently installed a special and remarkably ingenious machine for the production of slugs for air-guns. It has a great capacity of output, and turns out with absolute precision beautifully moulded slugs, all made to one standard gauge and weight, thereby securing a maximum of precision. The slugs are somewhat light, weighing just over 7 grains a-piece, and on that account are suited rather for target practice than for sport at small game. For indoor work they should be very suitable, as they are less dangerous than the heavier bullets commonly used, on account of their smaller penetrative powers, their tendency being rather to break up on the target than to fly off at an angle. We are afraid to state the capacity of the machine in thousands—or is it millions?—per week, but it is something phenomenal.

## THE DEVELOPMENT OF NITROCELLULOSE.—IV.

BEFORE leaving the subject of the production of nitrocellulose, it will be interesting to note a communication of Col. Kisniensky, published in the *Mémoriaux des Poudres et Salpêtres* of 1899-1900. Kisniensky took Bruley's results, and he found that if the nitrating mixtures be written down in molecular proportions, some important observations were possible.

He expressed the baths as follows:—



Where I corresponded to two molecules of nitric acid, the factors a and b being arranged in proportion to correspond to each mixture, then  $1 + a$  is the sum of the acids. Also we may denote by D the difference between this sum and the proportion of water present; this difference D is termed by Kisniensky the characteristic of the acid mixture, thus:—

$$(1 + a) - b = D.$$

Kisniensky, from Bruley's experiments, drew the following general conclusions:—

- (1) Where  $D > 0$ —i.e., positive—the resulting products are only slightly soluble in ether alcohol.
- (2) Where D is  $< 0$ —i.e., negative—the products are soluble in ether alcohol.
- (3) Where  $D = 0$ , the products are variable as regards solubility. As a matter of fact, for  $D = + 0.3$ , the prediction of solubility is doubtful.

For Bruley's results the above is a very fair generalisation, Lunge, in his American publication, states that the indications are quite uncertain, and, in many cases, directly misleading; but in his German paper, with Dr. Bebie, he says that, in general, their results were in agreement with Kisniensky's formula, the unreliability existing mainly when  $D = + 0.3$ , as admitted by the author.

One can hardly expect a mere formula to predict a suitable nitration mixture, but if this of Kisniensky's indicates a plan whereby experimentalists can formulate their results, our thanks are due to its author.

*Stability of Nitrocellulose.*—The methods for determining the stability of explosives of the "nitro-compound" class have been subjected to considerable criticism of late years. The "Abel heat-test," or some modification of it, is universally adopted. Recent discussions have shown that it can hardly be regarded as a stability test pure and simple—that is to say, it does not give an absolute value for the rate at which an explosive compound decomposes. As applied to guncotton and nitro-glycerin in manufacture, the conditions being always the same, it is a washing and purification test on which great reliance can be placed, as its results have been checked, and their value demonstrated, by long experience of storage. When applied, however, to explosive compounds, the opinions of experts indicate that it is not wholly reliable. The test is so very delicate that the physical condition of the explosive substance, and the presence of ingredients in exceedingly small amounts, have an unusual and irregular influence on the time limit. Consequently, there have been many proposals to avoid this. Guttman proposed to replace the iodide paper by diphenylamine paper, seconding his proposal with results to show that such a change would overcome the irregularities due to composition. Experts have, however, in

the main, condemned the change. Thomas proposed to keep  $2\frac{1}{2}$  grammes to 5 grammes at about 100 deg. C., and note the time before red fumes appear, and he states that physical condition, and even corrosive sublimate, have little or no influence on the time it takes for the red fumes to develop themselves. If this should really prove to be the case, this reversion to a very old test would be wise.

Professor Will\* has recently carried out experiments on new lines, which give a quantitative value for decomposition, and at the temperature of his experiments—viz., 135 deg. C.—it is undoubtedly a real stability test. He estimated the rate at which nitrogen was evolved from 2.5 grammes of nitrocellulose kept at a temperature of 135 deg. C., a current of carbonic acid gas being passed through the explosive during the test, to remove the products of decomposition as evolved. These products were passed over red-hot copper, the carbonic gas being absorbed, and the nitrogen being collected in a graduated tube. This gave Professor Will the rate at which nitrogen was evolved, and enabled him to establish several important points:—

I. Nitrocellulose made with acids containing varying amounts of water. The stability of these products were such that the greater the water the more stable the compound, and the less boiling required for a fixed rate of decomposition. It was inferred from these results that the difference was due to the water present, but as no nitrogen determinations were made it leaves this conclusion doubtful; it might be that the results would follow from the differences in nitrogen contents.

II. With any particular nitrocellulose the rate of decomposition decreased with the increase of boiling for purification, and in a comparative test with "Abel's heat-test" the two gave similar indications. This similarity, however, only exists with the boiled nitrocelluloses which have been washed after boiling.

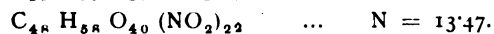
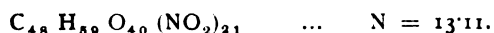
III. The Will's test showed no difference whether the boiled nitrocellulose was washed or not, but the "Abel test" gave a stain in 30 minutes for the washed product, and a stain at once for the same before washing.

It seems III. gives an explanation of many of the unaccountable results of the "Abel test." The samples were boiled 100 hours, and therefore equally stable in reality, and, as shown by the Will's test. Nevertheless the results with "Abel's test" are entirely different. Probably this difference is explained by the retention of the products of decomposition, and, if so, might it not be that inferences with regard to the lessened stability on storage of explosive compounds, which, owing to their physical condition, retain the products of decomposition, have a similar explanation—viz., unsuitability of the "Abel test"?

*Constitution of Nitrocellulose.*—We mentioned in our first article that Lunge was satisfied with Vieille's classification with the addition of dodeca-nitro. This is somewhat surprising, considering his results; certainly he states the actual molecule may be a multiple of Vieille's ( $\text{C}_{24} \text{H}_{28} \text{O}_{20} (\text{NO}_2)_{12}$ ).

These experiments show that for some of the preparations this formula must be at least double. This is apparent when one considers that Lunge made an insoluble nitrocellulose of 13.50 per cent. nitrogen and a soluble of 13.02 per cent. nitrogen. The smallest molecule which will include these two different compounds is as follows:—

\* Researches on the Stability of Nitrocellulose. By Professor Will, Centralstelle, Neu-Babelsberg. Berlin, 1900.



We have, therefore, to give the lowest molecule for some kinds of nitrocellulose 48 atoms of carbon.

There have been many attempts to fix a constitutional formula for cellulose, from the teachings of nitrocellulose; the opinions, however, at present are so various and formed on such doubtful evidence, that we may truly report that published investigations have not materially advanced this aspect of the study of nitrocellulose.

## CORRESPONDENCE.

### THE STANDARDISATION OF CARTRIDGE CHAMBERS.

TO THE EDITOR OF *Arms and Explosives*.

SIR,—I have read with surprise the complaint made in this month's issue of *Arms and Explosives* that "at the recent annual general meeting of the Birmingham and Provincial Gun Makers' Association, the chairman seemed to attribute an altogether undue measure of credit to that body in regard to the work so far done in the direction of fixing standard minimum sizes of shot-guns."

I beg to refer you to the report of the meeting which appeared in the *Birmingham Daily Post* of December 5th, from which it will be seen that the chairman was careful to explain that "the operations of last year, then under consideration by the meeting, of the *two associations* had been in connection with the outside sizes of shot-guns from 4 to 360," the remainder of his remarks dealing with the question generally, and totally apart from any attempt to apportion credit for the work performed, much less to claim special credit for his own Association.

There is no desire on the part of the Birmingham Association to detract from the importance of the part taken in the work by their London *confrères*, the consistent support given by the Birmingham gunmakers to the undertaking from its inception being sufficient evidence of this.

With regard to your remarks respecting the absence of the Birmingham delegate from the last meeting (held at the offices of the London Association), I beg to say that the notice given me was very short, and I was reluctantly compelled, by pressure of business, to forego the opportunity of attending. I was desirous of making a few suggestions relative to developing the work.

The scope of the work accomplished is not sufficiently extensive, in my opinion, to ensure the carrying out of what, I presume, is the desired object. For example, it is obvious that as there is at present no restriction as to maximum chambers and minimum cartridges, cases might arise in which the difference between a maximum chamber and a minimum cartridge fired from it, would be sufficient to cause accident or inconvenience, and it is therefore desirable that a practicable limit should be placed to this difference. *The maximum dimensions of chambers would be fixed best by fixing the maximum sizes of chambering tools.* In limiting this difference the limits of elasticity of (paper and of brass) cartridge cases and the variety of pressure exerted in consequence of the variety in fit of wads, owing both to varying diameters of wads and of interior diameters of cases differing from standard diameters, would require to be taken into consideration, on account of

safety and of easy extraction of fired cases. I would, therefore, suggest that the work begun be followed up until it has been finished, its completion being of the greatest importance alike to gunmaker, cartridge maker and sportsman.

I think also that, for the benefit of all concerned, cartridge makers should be requested to fix a date after which cartridges only of dimensions suitable to standard chambers will be supplied by them.

I remain, Sir, yours faithfully,

ARTHUR A. BONEHILL.

The Belmont Fire-Arms and Gun Barrel Works,  
Belmont Row, Birmingham,  
January 22nd, 1902.

EXPLOSION AT ELTERWATER.—The report made by Captain M. B. Lloyd, one of H. M. Inspectors of Explosives, on the circumstances attending an explosion which occurred at the factory of the Elterwater Gunpowder Co., Ltd., near Ambleside, on October 23rd last, has been issued. This explosion took place in the corning house during the progress of extensive repairs, and its immediate effect was to seriously injure four men, one of whom subsequently died owing to tetanus supervening. Damage done to the building itself was of a slight character. Captain Lloyd attributes the accident to the use by the workmen employed in the repairs of a naked light, which probably ignited some few pounds of powder dust which had in the course of time accumulated behind the wood casings of the corning machine, and which had failed to be neutralised by the damping of the building which had been resorted to before starting the repairs. H. M. Inspector is of opinion that neither legal nor moral blame attaches to anyone on account of the accident, the building at the time being exempt from the rigorous conditions attaching to a danger building. He recommends, however, that in all such cases facilities should be arranged for getting behind all wood casings at periodical intervals with a view to checking the accumulation of powder-dust, which is otherwise well-nigh inevitable. The use of naked lights in powder buildings under repair should, he thinks, be absolutely prohibited. And, furthermore, he suggests, as a precautionary measure, that when in a building under repair work is begun on any part which has not been washed down within 24 hours, this part should be thoroughly wetted before work is begun.

## APPLICATIONS FOR PATENTS.

DECEMBER 21st, 1901—JANUARY 18th, 1902.

- 26,146. Detonators. C. W. A. Goodfellow.
- 26,170. Small-Arms and Ordnance. W. S. Simpson.
- 26,228. Single-Trigger Mechanism. L. Henry.
- 26,265. Guns for Target Shooting. A. E. Elmes.
- 26,270. Targets. J. Meggs.
- 26,335. Sighting of Ordnance. C. P. E. Schneider and J. B. G. A. Canet.
- 26,352. Gun Mounting. J. H. Apjohn.
- 26,371. Breech Mechanism of Ordnance. A. T. Dawson and L. Silverman.
- 26,382. Breech Mechanism of Ordnance. A. T. Dawson and L. Silverman.
- 26,500. Torpedo-Steering Device. A. E. Jones.
- 26,546. Drop-Down Small-Arms. J. Rogers.
- 26,558. Small-Arms. P. Mauser.
- 26,596. Rifle Sights. A. A. Common.
- 26,617. Blasting Explosive. J. Wetter (Agent for *Westfälisch-Anhaltische Sprengstoff-Actiengesellschaft*).
- 26,732. Gun Mounting. C. Holmström and A. Bremberg.

- 1902.
14. Running Targets. W. P. Jones.  
62. Breech Mechanism for Ordnance. C. Holmström and A. E. Mascal.  
80. Machine Guns. A. W. Schwarzlose.  
151.\* Range Finders. P. M. Justice (Agent for C. Davis).  
168. Machine Guns. T. M. Morgan.  
311.\* Bandoliers. T. G. Wilson, Jun.  
346.\* Rifle-Carrying Clip for Cycles. T. N. Harwood and T. S. Rose.  
363. Target Practice with Ordnance. A. J. B. Lége.  
398. Cartridge Belts. G. Daws.  
715.\* Back Sights for Rifles. J. T. Meredith.  
769. Automatic Guns. T. K. North.  
865. Projectiles. O. P. Hockin.  
921.\* Revolvers. G. Tresenreuter.  
984. Pressure Gauge for Explosives. J. E. Petavel and J. J. Bruce-Kingsmill.  
1,137.\* Shot-Firing Apparatus. R. C. W. Wood and J. Holmes.  
1,209.\* Range Finders. A. C. C. Spring.  
1,228. Gun Sighting Apparatus. A. A. Common.  
1,303. Magazine Fire-Arms. C. L. Graham and A. Henry.  
1,319. Hydraulic Breech Mechanism for Ordnance. A. T. Dawson and J. Horne.  
1,398. Target Carrier. M. Mullineux.  
1,434.\* Rifle-Stand. H. Green.  
1,457. Fire-Arms. J. Otter.

\*These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

DECEMBER 28TH, 1901.—JANUARY 18TH, 1902.

COMPILED BY H. TARRANT.

- 22,248 (1900). **Range-Finder.** J. Waddell, Glasgow. A range-finder consisting of three telescopes. When intended to be operated by one observer, two of the telescopes are formed with elbowed tubes, so that, by means of right-angled prisms at the elbows, images of the object are reflected from the objective lenses to the ocular lenses, which are situated close together. A small telescope is fixed above one of the elbowed telescopes. When the cross lines of the three telescopes simultaneously coincide with the object, the range may be read off from a scale. The distance of the point reflected when the lines of sight of two telescopes cross is known. Accepted Dec. 7, 1901.
- 22,501 (1900). **Shrapnel Shells.** R. Fiedler, Germany. Heretofore it has been difficult to ascertain whether a shrapnel shell had struck the object aimed at, when 3,000 yards distant or over, owing to the small volume of smoke produced by the small quantity of gunpowder in the shell. The patentee, therefore, inserts in the space between the bullets within the shell, amorphous phosphorus, instead of the usual sulphur or resin. When the shell bursts, the combustion of the phosphorus creates a dense volume of white smoke, which is visible at a great distance. Accepted Dec. 10, 1901.
- 52 (1901). **Cartridge Carriers.** H. M. Singer, Dereham. The top of the front part of an ordinary cartridge bag is provided with a light tray. A number of holes are bored in this tray, so that the cartridges may be therein inserted, in order that the loader may easily and quickly withdraw them. The bag forms a receptacle also for loose cartridges. A box is also described, constructed so that it may be carried around the loader's shoulders, which is provided with two trays hinged one above the other. Accepted Dec. 31, 1901.
- 76 (1901). **Machine Gun.** H. H. Lake (Agent for E. W. Feter, U.S.A.). A machine gun in which a number of sets of barrels are rotatably mounted about a common centre. A chamber, containing the cartridges, is fitted between the breeches of the barrels and the firing mechanism. The arrangement of the sets of barrels is such that the firing mechanism may be shifted so as to be opposite any one set of barrels. The set is used until it gets hot. Another set is then presented to strikers. Accepted Dec. 31, 1901.
- 849 (1901). **Machine Guns.** A. T. Dawson and G. T. Buckingham, London. A construction of automatic guns of the Maxim 37 mm. type, having a sliding barrel and a water jacket, which enables the water jacket to be quickly removed for convenient transport. The breech end is formed with lateral fins engaging corresponding grooves in the recoiling plates. The breech end of the water jacket is also formed with dovetail grooves for the reception of corresponding ribs on the breech casing. A tool is used to release the jacket smartly. Accepted Dec. 14, 1901.
- 2,093 (1901). **Breech Mechanism of Ordnance.** C. Holmström, Harrow-on-the-Hill. A method of effecting the locking and unlocking of a cylindrical breech block provided with a De Bange obturator, without angular or rotative movement about its axis; and also without any cutting away of the threads of the block or its chamber. The chamber into which the block is locked is adapted to rotate within its setting in the gun end. This chamber, or bushing, is screw-threaded, so that when it is turned the block is forced slightly outwards until the interruptions in the screw enable the block entirely to be withdrawn. Accepted Dec. 14, 1901.
- 2,577 (1901). **Obturator for Ordnance.** A. T. Dawson and G. T. Buckingham. An obturator constructed in such a manner as to obviate any liability of injury to the canvas covering of the pad. The pad is provided with a protector consisting of the combination of a metallic cup and a split ring. These are fitted over the front of the pad in such a way that the obturator bolt, when forced back on to the pad, causes the metallic cup to make a gas-tight joint at the periphery of the pad. The cup protects the covering of the pad against injury. Accepted December 21, 1901.
- 3,725 (1901). **Guncotton Press.** A. Hollings, Chorlton-cum-Hardy. A method of preventing the guncotton from becoming lodged between the rammer-head and the sides of the mould; and means for preventing the adhesion of the explosive to the ramhead when it is withdrawn. The ramhead is formed with a space, preferably in the form of a helical groove, all round between it and the sides of the mould. Water under pressure is led into this space, and the explosive being pressed is thus prevented from entering. Should it enter, the water keeps it wet, and so prevents it being dried and exploded by friction. Accepted Dec. 21, 1901.
- 3,897\* (1901). **Small-Arm Projectiles.** L. B. Taylor, Birmingham.
- 4,474 (1901). **Brakes for Gun Carriages.** A. Reichwald (Agent for Fried Krupp, Germany). A collapsible brake for gun carriages, which is pivoted to the carriage or to the spade carrier by means of an eccentric bolt. By turning the bolt the spade is locked in either its operative or inoperative position to the carriage or to the spade carrier. The spade forms a fixed abutment for the spring brake rod, and is adapted to be folded back with its blade in the opposite direction to the travel of the gun. Accepted December 21, 1901.
- 5,967 (1901). **Detonators.** W. C. Roberts Austen, K.C.B. This Specification is a Secret Document.
- 7,433 (1901). **Cartridge Belt.** A cartridge belt manufactured with a double strap at the front. Each band of the split front portion carries a number of pouches which are adapted to contain two or three loaded clips of cartridges. The double-banded portion of the belt lies across the chest of wearer. The pockets are also constructed to contain loose cartridges. Accepted December 31, 1901.
- 13,156 (1901). **Torpedo Registering Device.** T. J. Moriarty, and J. T. Reagan, U.S.A. A combined rolling and depth recorder for torpedoes. The instrument consists of a device which is attached to the head of the torpedo. It is provided with a propeller and two recorders, one recorder being operated by the propeller and the rolling movement of the torpedo, and the other by the propeller and the pressure of water which passes through the instrument. Accepted December 14, 1901.
- 16,403 (1901). **Gun Carriages.** A. W. Schwarzlose, Germany. A construction which reduces the weight of a carriage without diminishing strength; facilitates limbering up and training; and enables the gun to be fired in a lower position. The construction is such that the carriage or frame is arranged in front of the axle of the wheels—that is, the muzzle of the gun and the trail are upon the same side of the axle. The gun is connected to the axle by means of vertical trunnions so that it may be trained horizontally within the axle. The gun is rotated with the axle for elevation or depression. Accepted December 7, 1901.

- 17,626\* (1901). **A New Explosive.** H. H. Lake (Agent for *The Eastern Powder Co., U.S.A.*)
- 20,755 (1901). **Detonating Composition.** J. Führer, Austria. A detonating composition distinguished for its safety against shock, blow, friction or fire, consisting of an intimate mixture of 30 parts of copper ammonium nitrate, 42 parts of nitrate of potassium, 10 parts of sulphur, and 18 parts of aluminium. The ignition of this fulminate can be effected directly in a hermetically-sealed space by means of a strong powder fuse, or by means of a small nipple cap. Accepted December 31, 1901.
- 21,343\* (1901). **Projectile for Ordnance.** P. M. Justice (Agent for *Lt. C. Davis, U.S.A.*)
- 21,344 (1901). **Gun Carriages.** P. M. Justice (Agent for *The Bethlehem Steel Co., U.S.A.*) A gun carriage designed to be taken apart into four sections for convenient transport. The carriage may be taken to pieces by the removal of several pins. In the case of a three-inch mountain gun and carriage, the pins are five in number. The pins are the two lynch-pins, a pin holding the elevating gear to the slide, and two pins holding the straps which go over the top of the gun to confine it to the cradle. In packing the parts on the backs of horses, the loads consist of the gun; the cradle; and slide; the wheels and axle, and the trail. Accepted Dec. 31, 1901.
- 21,367 (1901). **Rifle Rest.** D. Mannington, Bexley Heath. A rifle rest which is carried by means of clips beneath the rifle barrel. The rest has three legs, which are hinged to a plate carried by a collar. The collar is fixed around the rifle barrel. The plate is adapted to be raised or lowered so that the rest may be made to suit any firing position. The legs are folded up and held along the underside of the barrel by means of a spring clip. Accepted December 7, 1901.
- 21,947 (1901). **Turret Mountings for Ordnance.** T. C. Fenton, U.S.A. Means for mounting guns on board ship, consisting in the construction of two independently operative, superimposed turrets, the lower carrying the heavier guns, and the upper the lighter guns. The guns in each turret may be trained independently; and the protection for the ammunition hoist and mechanism for rotating both turrets, is secured without necessity for the duplication of parts that is experienced when the turrets are not superimposed. Accepted December 31, 1901.
- 23,740 (1901). **Manufacture of Explosives.** F. L. Nathan and R. Robertson. This Specification is a Secret Document.
- 23,808\* (1901). **Bergmann Pistol Mechanism.** T. Bergmann, Germany.
- 23,936 (1901). **Gun Carriage Brakes.** W. L. Wise (Agent for *Skodawerke Actiengesellschaft, Austria*). A device for securing the rigid spade brake in its operative and its inoperative positions. The spade is pivoted on the trail shoe and carries projections which engage with other projections on an oscillating sleeve. A handspike is used to oscillate the sleeve so that the sleeve projections shall engage the projection on the spade. In one engagement the spade is locked in its operative position, and in another it is locked in its inoperative position. Accepted December 31, 1901.
- 23,937 (1901). **Spade Brakes for Gun Carriages.** W. L. Wise (Agent for *Skodawerke Actiengesellschaft, Austria*). An oscillating brake-spade so constructed that it may easily and rapidly be turned from the operative to the inoperative position. The spade is connected by means of a bolt to a spring carrying rod working on the trail. This connecting bolt is provided with rectangular projections, which are adapted to slide over arc-shaped guides on the side of the trail. When pushed forward over these guides, against the action of the spring-rod, the spade is turned completely over so that it lies in the position convenient for transport. Accepted December 31, 1901.

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

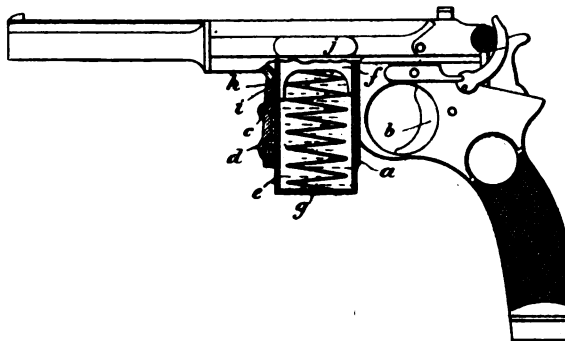
## SELECTED PATENTS.

### BERGMANN PISTOL MECHANISM.

23,808 (1901). T. Bergmann, Germany. This specification deals with the Bergmann automatic pistol, and the modifications

described are intended to improve the construction of the pistol. The magazine is so arranged, that instead of loading the cartridge through the breech, the cartridge holder may be drawn out of the magazine casing. It may then be quickly loaded and re-inserted.

From the appended drawing it will be seen that the magazine casing *a* is arranged in front of the trigger *b*. The forward side of the casing *a* is provided with a lever *c*. The bottom of the lever is forced outwards by the spring *d*. The cartridge holder *e*, in the interior of which the cartridge platform *f* works under the influence of the spring *g*, is adapted to be inserted into the casing *a* from the bottom. The holder is held within the casing by the catch *h*, on the top of the lever *c*, which is pressed by the spring *d* into the notch *i*,



cut in the holder *e*. When the holder is empty the bottom of the lever *d* is pressed. The holder may then be withdrawn, reloaded and quickly re-inserted.

When the breech bolt is forced back after firing, the spent cartridge is withdrawn from the chamber in the ordinary way, and is ejected from the slot *j* cut in the side of the breech. In order to cheapen the construction, and to ensure stability, the barrel, breech, and butt are made in one piece from cast steel or wrought iron. Accepted Dec. 31, 1901.

### A NEW EXPLOSIVE.

17,626 (1901). H. H. Lake. (Agent for *Eastern Powder Co., U.S.A.*) This patent relates to the production of an explosive which will not explode unless held under pressure in confinement, as in a bore-hole or at the back of a projectile. It is semi-smokeless, flameless, and odourless.

The materials which form this explosive compound, and the proportions in which they are mixed to form the best powder, are as follow:—Nitrate of sodium, 70½ per cent; highly gaseous bituminous coal, containing 30 to 40 per cent. of volatile matter, 15½ per cent.; sulphur, 12½ per cent.; hydro-carbon, preferably gasoline, 1½; and about three gallons of boiling water.

Assuming that 300 pounds of the explosive is to be manufactured, 211½ pounds of nitrate of sodium and 46½ pounds of bituminous coal, each reduced to an impalpable powder in a pulverising apparatus, are transferred to a mixer and thoroughly incorporated. To this mixture half a gallon of volatile hydro-carbon, preferably gasoline, is added. When these three substances are thoroughly mixed, they are transferred to, and spread evenly over, the bottom of a steam-jacketed mill, and made as hot as possible by means of steam. Whilst the mill is in operation two to three gallons of boiling water are added to the mixture. The water causes a union between the nitrate and the coal-dust. After the mill has been running twenty minutes, 38½ pounds of pulverised sulphur are added. The mill is run on for another forty minutes, until the mixture assumes a dark brown colour and is as dry as it is possible to make it.

The mass is removed from the mill and is transferred to a hydraulic press. It is then subjected to a pressure not exceeding 4,000 pounds per square inch, and is pressed into cakes. The cakes are taken to a corning mill and are there grained, the dust being



removed from the grains by means of a screen. The grains are dried in an atmosphere heated to about 175 degs. for a period of 10 hours, and are finally glazed. From the glazing-barrel the grained powder is taken to the sizing mill, which assort the various sizes of grain, from dust powder to the coarsest grade.

The volatile hydro-carbon has a softening effect on the coal dust, enabling it the more readily to unite with the nitrate before the addition of the boiling water and sulphur. The softening effect is apparent throughout the subsequent steps of manufacture, particularly assisting in the pressing operation and giving to the particles greater adhesiveness. Thus the hydro-carbon has indirectly a binding effect. Accepted December 21, 1901.

SMALL-ARM PROJECTILES.

3,897 (1901). L. B. Taylor, Birmingham. This patent relates to the application of a hollow cap to lead or soft metal bullets of the type referred to in patent No. 13,460, 1899, in order to obtain a greater mushrooming of the bullet upon impact; and also when applied to lead bullets having anything but a rounded nose to increase accuracy of flight.

In the annexed drawings, Fig. 1 illustrates the ogival-shaped cap of thin metal. Fig. 2 is a section of the cap attached to a bullet; and

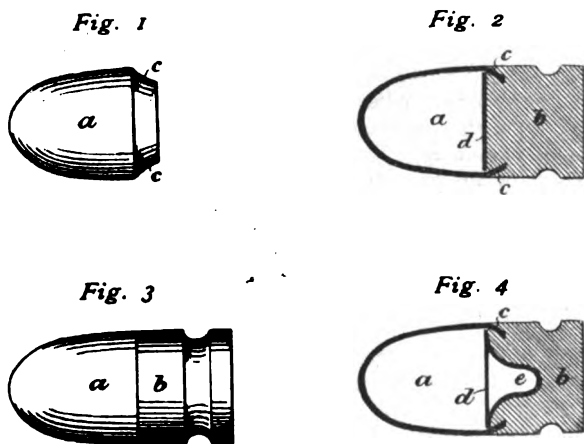


Fig. 3 is a view of the bullet with cap complete. Fig. 4 is a sectional view showing the lead reduced in order to lighten the bullet.

The cap *a* is formed of thin copper, brass, or other suitable metal. The lead *b* is poured into a mould, and surrounds the flange *c* of the cap. When set, the lead holds the cap firmly in the position illustrated. The disc *d* is provided to prevent the molten lead running into the interior of the cap.

The advantages of this construction are, the bullet is lengthened without materially adding to the weight; and the accuracy of flight is increased. This lengthening of the bullet is of value when the cap is applied to bullets used in large calibre arms. The form of application illustrated is convenient for such large calibre bullets as those used in ball and shot guns. Fig. 4 illustrates the method of lightening the bullet by taking away part of the lead as at *e*. The cap may be attached to bullets of solid lead by cannelluring, the use of the disc *d*, in this case, being dispensed with. Accepted Dec. 31, 1901.

PROJECTILE FOR ORDNANCE.

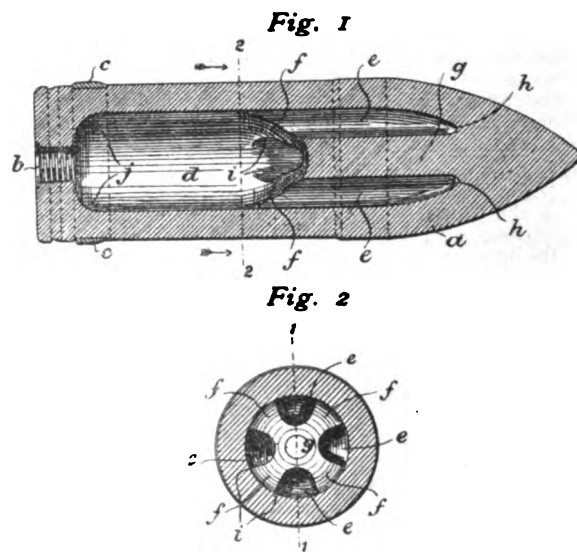
21,343 (1901). P. M. Justice (Agent for Lt. C. Davis, U.S.A.). An explosive shell for ordnance, so designed that it shall give a maximum perforating power consistent with a maximum capacity for an explosive charge. It is necessary, in order that the character

of this invention may be grasped that the action of projectiles upon impact on face-hardened armour plate should be understood

When the point of the projectile meets the hard face of the armour plate, an elastic dishing of the surface layer is caused. The stress of the impact is transmitted to the tough back of the plate, and the whole area of depression is concentrated to resist the advance of the projectile. This resistance tends to stop the projectile, or materially to reduce the velocity in a short space. The projectile is thus caused to expend its energy upon itself, the tendency being to break it up along its weakest lines.

The patentee has observed that when an ordinary shell strikes a plate which it cannot penetrate, it is first bulged. It then gives way along longitudinal lines in strips evenly distributed around the circumference of the bourrelet. Disruption along transverse lines follows, the tendency to complete rupture being enhanced by the rotation of the projectile. Sometimes, when the point of the shell enters a plate, the head is held fast, and the tendency of the body to continue to rotate causes a break-off at the rear of the apex.

From these observations the patentee concludes that the increase of metal in the walls of the shell causes the bulging, when the velocity of the shell is checked in a short space. Therefore, he so



designs the interior of his shell, that while the capacity for containing a bursting charge is increased, the penetrating power is increased. Roughly, to obtain this improvement, the weight of metal is concentrated in the line of attack.

In the accompanying drawings, *a* represents the shell, *b* the fuse, and *c* the driving band. The interior of the shell consists of a large chamber *d* terminating in the front half of the shell with four longitudinal chambers *e*, which are separated from each other by the webs *f*, which connect the central portion *g* with the body of the shell. The construction will be easily understood on referring to Fig. 1, which is a longitudinal section along the lines 1—1, Fig. 2; and to Fig. 2, which is a transverse section along the line 2—2, Fig. 1, looking in the direction of the arrows. It will be noticed that the interior of the shell is as free of angles as is possible, the points of connection being curved, as at *h*, *i*, *j*.

The advantages claimed for this form of shell are, increased penetrating power for the same weight of shell; increased capacity of the interior to contain a bursting charge; improvement in quality due to its form, which makes it more susceptible to treatment from a metallurgical aspect; and improvement as regards disruption upon ignition of the bursting charge, whereby the shell will break up into a relatively greater number of pieces. Accepted Dec. 7, 1901.



# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>THE WEBLEY AND SCOTT REVOLVER AND ARMS CO.,</b>	
The Loading of Cartridges ... ..	35	LD. ... ..	44
Pressures ... ..	35	<b>THE SPRINGFIELD MAGAZINE RIFLE</b> ... ..	44
National Rifle Clubs ... ..	36	<b>RELIEF</b> ... ..	45
The Greener Sharpshooter Rifle ... ..	36	<b>A TYPICAL GUNMAKER: MR. CHARLES BOSWELL</b> ... ..	46
The Boer and his Rifle ... ..	36	<b>APPLICATIONS FOR PATENTS</b> ... ..	48
<b>INCIDENTAL JOTTINGS</b> ... ..	37	<b>SPECIFICATIONS PUBLISHED</b> ... ..	48
<b>THE PISTOLS BILL, 1902</b> ... ..	38	<b>SELECTED PATENTS:</b>	
<b>NOTES</b> ... ..	38	High Explosive Projectile ... ..	49
<b>LECTURES TO YOUNG GUNMAKERS: XII. PRESSURES...</b>	40	Apparatus for Testing Straightness of Barrels ... ..	50
<b>ROUND THE TRADE</b> ... ..	27		

## CURRENT TOPICS.

**The Loading of Cartridges.**—To judge by the sporting papers, and by such conversation as one hears among gun-makers and shooting men generally, the past season has been mainly remarkable for the large number of injuries to guns which have arisen from one or another fault in the behaviour of the cartridges that have been supplied. Our knowledge of caps and smokeless powders has so enormously advanced since some eight years ago, when nitro-powders were less numerous, that it is surprising to have to record what seems like a falling off in actual effectiveness. It always happens that in striving to gain some slight advantage over previous performances one runs the risk of stumbling into difficulties that could not have been foreseen. It seems to be a matter of great difficulty for the gunmaker to produce a weapon that will be proof against bursts under such conditions as occur when the shot travelling up the barrel encounters the charge of the previous cartridge which had not been properly ejected. Under certain conditions there seems to be a very fine dividing line between what will produce a thoroughly effective discharge and what will result in so feeble a fizzle as just to remove the shot anything from a few inches to a couple of feet up the barrel. As surely as this happens the barrel is likely to suffer, the extent of the damage being from a ring bulge to a complete bursting away of the material. The gun-makers can strive to select a barrel steel that will bulge under conditions that provoke an actual burst, but they cannot guarantee that every cartridge that passes through their hands shall be properly set off by a normal blow from the striker. Gunmakers also cannot very well test cartridges

upon laboratory principles, because the expense is prohibitive, bearing in mind how little profit is available for covering such expenditure. They are bound, therefore, to take a very great deal on faith, and hence we are bound to have a somewhat unsatisfactory state of affairs when the actual blame-worthy individual is so difficult to trace once the accident has happened, and its promoting causes cannot be determined with exactness.

**Pressures.**—In another column will be found an announcement relating to the taking of shot-gun pressures by means of lead crushers. At last, and this means after some ten or fifteen years of anarchy, the various controlling authorities in this country have settled down to a uniform method of taking pressures which will clear the air of a vast amount of misunderstanding. The controversies which have waged around *The Field's* method of taking pressures with crushers ostensibly of a different composition from those used by other people, and a table also giving a different ratio of values, have been duly reflected from time to time in our own columns, and certainly the unsatisfactory state of affairs that arose from differences of method, where no question of relative advantage existed, placed everyone in a state of doubt as to whether pressure-taking could be of any practical value, while experts were disagreed upon very considerable issues. At any rate, the time has now gone by when any such hesitation will attach to the acceptance of properly taken pressures. The Eley leads have for a considerable period been recognised as standard. In future they will be translated by an equally standard table, bearing the official endorsement of those who have every right to deliver a formal pronouncement. The

next most immediate need in the taking of pressures with lead crushers is that there should be some guarantee that every proof gun is in very close accord with recognised standard dimensions for gun chamber, cone and barrel. By securing uniformity in these important relations, and at the same time regulating the quality of the hammer blow, the powder will burn under specific conditions, such as would be the same at every centre where such tests are conducted.

**National Rifle Clubs.**—The National Rifle Association is now recognised throughout the country as the ruling and directing body that controls the working of the newly formed rifle clubs which are expected to become a feature of our national existence. The number of clubs and the aggregate number of members belonging to those clubs run into large figures, but, of course, it is possible that a great many of these organisations are little more than a name. There is, however, evidence that a great many other clubs are displaying a vitality that promises well for the national development of the sport when the artificial stimulus has ceased to operate. The National Rifle Association with its close military connections is naturally pushing the use of the Service rifle wherever possible, and even miniature clubs are asked to use it with some form of adapter fitting it for the firing of small cartridges. The ruling powers have, however, adopted quite a tolerant view towards the use of rifles selected solely for their accuracy at the distances over which shooting is done, and this tolerance, coupled with the large proportion of civilians belonging to rifle clubs, gives every assurance that free trade in rifles and ammunition will be the order of the day in years to come, especially if the present gun licence restrictions are eased so as to absolve the owners of private rifles exclusively appropriated to use at club ranges. Gunmakers should, therefore, keep closely in touch with the most effective devices of rifles and sighting, and they should study the subject to such purpose that any advice they may give will be the outcome of really definite knowledge.

**The Greener Sharpshooter Rifle.**—Mr. Greener has made use of our advertisement columns for the purpose of inviting correspondence with members of the Gunmakers' Association concerning the adoption of the Greener "Sharpshooters Club" rifle. This well-known Birmingham house took up the question of a rifle for use in club shooting on purely patriotic motives. They produced a weapon which is a marvel of value at the price, and they spent some considerable time and trouble in working out a suitable cartridge. The result is that their three-guinea rifle is a weapon which for accuracy, convenience and finish is far superior to anything we have seen at the same price, either from America, Belgium or Germany. The only way in which such a venture can be guaranteed a permanent success is to ensure the maker a large turnover, and the firm of Greener, admitting the need for co-operation in their enterprise, have taken the very practical step of inviting fellow members of the Gunmakers' Association to participate. While it is in many ways difficult to see just why the Greener rifle should shoot about twice as well as any other rifle at the shorter distances, the most striking proof of this self-same fact is to be obtained by firing it in competition with other rifles. With it there seems to be an almost complete absence of individually wild shots, and the general grouping observable is far beyond what is generally experienced. The present writer speaks from knowledge gained by

the firing of many hundreds of shots, and his experience is that, while many rifles do fine things occasionally, the Greener can always be relied upon to make a good string of shots. As this note is not intended merely as a puff of the Greener rifle, we will recommend those of our readers who fall within the qualifications laid down to buy one of the rifles and try it for themselves. It is extremely likely they will then be convinced that this weapon more than any other will do justice to any care that is lavished in the adjustment of accurate sights, and the proper marking off of elevation for the different ranges right away from rabbit shooting distances to 500 yards.

**The Boer and his Rifle.**—There is a feature of the still-continuing war in South Africa to which little attention seems to be attracted, though it is one having a large influence on the future, and that is the discrepancy that exists between the number of Boers killed, captured or surrendered, and the rifles gathered in at the same time. A glance at the official returns any time during the past twelvemonths will illustrate the point to which we draw notice. For example, we may read that the result of a week's work has been, say, 20 Boers killed, 40 wounded, and 60 surrendered, and then, amidst a list of other captures of carts, cattle and so forth, we find recorded the capture of, say, 70 rifles, or, in another report, we may read that 40 Boers surrendered themselves, with 25 rifles. Now, it is common knowledge, outside our own War Office, that the two South African States had obtained, shortly before the invasion of Natal, at least 150,000 rifles, apart from countless others which had been steadily accumulating from prehistoric times. During the progress of the war they have also, unfortunately, become possessed, by capture, of some thousands of British Service rifles. It would probably be no exaggeration to say that at one time or another since October, 1899, they have possessed at the very least 200,000 fairly modern and wholly serviceable weapons, or an average of from three to four for every able-bodied burgher in the field. It is, of course, known with some certainty how many of these burghers we have accounted for by death or capture, but there is no doubt reason to fear that we have not by any means accounted for their arms. In the absence of figures, which possibly do not exist, we can scarcely hazard a guess as to the number of rifles captured or surrendered, but we doubt whether they bear anything like a proper relation to the number of men who have come into our hands. We may assume that a certain portion of the arms with which the war was started are now to all practical intents placed *hors de combat* by neglect, ill usage, or ordinary wear-and-tear. But on the other hand, a large number may be stored away, in various secret hiding-places, which are as perfect as on the day when they first issued from the factory. If there is anything like the number in such a condition, as we fear, the existence of these supplies of arms, with corresponding ammunition, will constitute a serious problem in the future. Even if the suggestion be carried out, as is recommended in some quarters, that the Boers shall, after the cessation of hostilities, be restricted to the use of sporting arms alone, who is to exercise control and secure the enforcement of that regulation? Certainly, some restriction may be placed on imported arms, but the existence of the large supply of military rifles that must still be hidden in various *caches* will always constitute a source of uneasiness. As it is, our authorities out at

the front apparently do not see that they are being hoodwinked by the wily Boers who surrender in the proportion of at least three men to every two rifles handed over. One would think that a primary condition of surrender would be the yielding up of arms. But then, the war so far has, in its grim way, outvied the wildest flights of topsy-turvydom to be found in a Gilbert and Sullivan opera.

### INCIDENTAL JOTTINGS.

**HALDANEITE.** The Tranent Literary Society claims the honour to have drawn from the Father of the War Office Explosives Committee the verdict and sentence on Cordite. We thank you, Tranent, it has eased our troubled minds, and, now we know the worst we can, it will give us strength to bear our burdens. We are none of us the chosen ones; all have failed, but the Committee, who have now got "their own chemists and their own gunnery experts," have "invented" a powder which "is believed to be, at the very least, as good as any foreign powder." I think all our readers will agree with me that this Committee deserves the highest congratulations on their fortunate position; they are superior to anyone but themselves, though many of us should be pardoned for thinking that with "our own chemists," "our own gunnery experts," and "our own powder," we might feel equally proud and happy if we also had full confidence that cruel experts—not of our own flock—could not shatter our idol, if the worst came to the worst, until so much money had been spent on setting it up that its adoption became compulsory by the stern logic of committal to this final test of expenditure.

#### IT'S NOT A "FLASHY" AFFAIR.

I do not want to appear sarcastic, nor to project unfair criticism upon any real attempt to improve our arms or explosives, but I cannot fail to note that in speaking of the qualities of the new powder, much stress was laid on the fact that it is flameless. I remember, some years ago, it was demonstrated to the War Office that a flameless powder existed and was desirable, but the War Office then saw nothing in it, and apparently never gave the matter another thought; yet now it is hawked as a novelty to enhance the merits of this new prodigy. I think I am correct in saying that both Rifleite and Troisdorff are flameless—at the muzzle of the gun. This certainly serves to accentuate one of poor Cordite's worst faults. The spectacle of a Maxim gun fired at night would do credit to a Brock's Benefit show. Imagine a sphere of flame about 2 feet in diameter, with little comets of burning Cordite flying in all directions, and there you have some idea of its effect.

#### FACTS ABOUT MISSING CHARGES.

I recently read with great interest in a sporting journal a well-written article which promulgated a theory that seemed to carry most striking conviction, to the effect that the cause of many burst guns, with the accompanying accidents, may be due to the carelessness of the cartridge-maker in omitting inadvertently to put the powder charge into the cartridge, though completing it otherwise. In such an event, it was urged, the firing of the cap alone would be sufficient to drive the wads and shot a few inches up the barrel, while the shooter, taking

it as a misfire, would extract the case and insert another cartridge. This, on being fired, would encounter the obstruction, and so cause a burst without leaving any visible cause for such conduct. It must, at least, be said that this theory possesses considerable ingenuity, and seems to provide an explanation for many otherwise unaccountable casualties. In the natural course of events, therefore, it was only to be expected that our contemporary should deduce morals and expound philosophic doctrines upon the discovery of this possible source of disaster, with a view to inducing the stalwart sportsman to turn pale at the awful thought of unseen death lurking in that innocent uncharged cartridge, which might so easily be taken for a misfire, and to vow that henceforth, in all cases of apparent misfire, he would look down his barrel to see that all was clear. Moreover, the makers of ill-designed guns and the dealers in weapons of the cheap-and-nasty variety would possess in this theory a means of making a powderless cartridge the paschal lamb to bear the blame of their own iniquities.

#### CHARGES ABOUT MISSING FACTS.

It was, however, only natural that anyone of at all an enquiring mind should at once experiment in accordance with this theory with a view to ascertaining whose caps were the strongest, and consequently whose were most likely to drive the wads and shot up the barrel. In this way it would be possible to follow up the new theory with data which would most inevitably blast the reputations of at least one or two makers of caps and cartridges. I, for one, had the enquiring mind which is proverbially the index of a lively understanding, and I made a series of experiments with very contradictory results. I fired powderless cartridges of every make, but "devil a bit" would any of the charges move. Then I altered the wads and removed the card wads, but even then all, without exception, failed to move the turn-over even. In desperation I truncated the cartridge below the turn-over, and then, only then, robbed of all but peripheral friction, the charge entered the barrel to about 1 inch in front of the chamber.—We breathe again.—Next theory please.

#### EXPLOSIVES ACTS.

The Explosives Act of 1875 sometimes comes in for a few hard knocks, and an esteemed contemporary, in commenting on the recent action of its administrators regarding tin-foiled caps, describes it as "grandmotherly." Undoubtedly the method of the Americans was bad, and we should like to see the Home Office "choose aye the middle course," but it is for the cap-makers to suggest such. Personally, knowing the advantage of tin-foiling, I am not so much in sympathy with the complainant. Taking it all round, it is undoubtedly a popular Act, and its moral effect is proved by the small percentage of casualties. Indeed, it is a pity that the Act cannot be enforced in all its severity, so as to prevent individual fools from thawing their dynamite cartridges on the top of stoves, and indulging in similar acts of thoughtlessness which yield their inevitable crop of casualties. If America lived under so beneficent an administration of explosive law, the lamentable accident we heard of recently would not have been so severe, though the gentleman who found his lighted candle had fallen from the shelf on to some paper adjacent to the dynamite stored there, was a type of what we encounter in every country, and for whom special accommodation is provided.

CYCLOPS.

## THE PISTOLS BILL, 1902.

ON January 21st, a Bill was introduced to the House of Commons by Mr. Norval W. Helme, M.P., for Lancaster, and other members, having for its object the regulation of the sale and use of pistols and other fire-arms. The provisions of the Bill are simple to enunciate, and may be condensed into the following brief summary:—(1) Pistols or other fire-arms may not be sold to, or bought by, any person under the age of sixteen, unless such person is the possessor of a gun licence, and produces it at the time of purchase; (2) Ammunition suitable only for a pistol may not be sold to, or bought by, any person under the age of sixteen; (3) A boy or girl under the age of sixteen may not use or carry a pistol; (4) No person shall use or display or carry a loaded pistol of any kind whatsoever in any public place, such as the highway, a theatre, music-hall, or other place of public resort, without the written permission of the chief officer of police for the district. This clause does not apply to anyone in H.M. Army, Navy, or Volunteer Services, to cadet corps, or to constabulary in the performance of duty or when engaged in target practice. Penalties varying from £1 to £10 attach to the infringement of these provisions by vendor or purchaser, and pistols unlawfully carried are subject to forfeiture to the police.

It will be seen that this Bill is of a comparatively simple nature, and is far less drastic in its character than most of the measures that have so far been brought forward for the purpose of regulating the sale and use of fire-arms. The two main conditions are, to prevent persons under a certain age, presumably that of discretion, from purchasing and using deadly weapons, and to prohibit the carrying of loaded fire-arms by adults in public places. These are two most reasonable restrictions, with which it would be difficult to find fault. Certainly the gun trade can scarcely take exception to proposals which are obviously intended to interfere as little as possible with legitimate business. On the other hand, there remain two questions that may be asked, one being whether the measure thus drafted is sufficiently comprehensive to remedy the evil it is intended to meet, that attending the fatal facility with which fire-arms can be obtained, and the frequency with which their indiscriminate use is attended with deadly consequences. There can be no doubt that at present it is far too easy for irresponsible or feloniously-minded persons to acquire deadly weapons, more especially of the pistol type, and while in the one case conduct little removed from lunacy frequently results in a coroner's inquest, in the other is afforded proof that the reflection, "How oft the sight of means to do ill deeds, makes ill deeds done," is as true now as when it was first put into the mouth of King John by our greatest poet some 300 years ago. At the same time, it is certainly difficult to devise any legislation which can absolutely safeguard society against the freaks of unconfined lunatics who "didn't know the gun was loaded," or against the deliberate homicide. Even a definite policy of repression would not avail in the one instance, perhaps in neither.

So far as the Bill under consideration is concerned, it must be admitted that the provisions can scarcely be accepted as affording a practical solution to a vexed question. Should the Bill survive its second reading, for which it is likely to come up on March 19th, and should it become enrolled in the Statute Book in its present form, there will be afforded a striking object-lesson as to the facility with which a coach-

and-four can be driven through an Act of Parliament. The age limit, good though it may be in principle, will in practice be inoperative, owing to the difficulty in discriminating between a well-grown boy of fourteen and a stunted youth of one-and-twenty. Who is to decide the delicate difference without recourse to a birth certificate? Without interfering considerably with the liberty of the person, how is it to be discovered whether a boy or girl is carrying a pistol, or whether an adult is carrying a loaded pistol in a public place? Is everyone who carries a bulky parcel in a side-pocket to be liable to be searched by the police lest he have a loaded pistol concealed about his person? If it be not loaded, apparently he may carry it at pleasure, provided that he has also a gun-licence. As regards the ammunition clause, there is little to be said except that nowadays there are few brands of cartridge which are made exclusively for pistols, and to what degree would the matter be affected if it could be shown that one maker at least chambered rifles to take pistol ammunition? The word "pistol," for the purposes of the Bill, includes every fire-arm not exceeding fifteen inches in length, from which any shot, bullet, or other missile can be discharged. How does this affect pistols, automatic or otherwise, which are fitted with detachable stocks, the combined length with which may exceed this limit? It seems to us that with the best will in the world, the framers of this Bill will have to subject it to a very large degree of revision before it passes muster as a practical measure. Experience goes to show that the question of draughting a Pistols Bill is hedged around with almost insuperable traps and pitfalls for the unwary, if it is to be rendered at once really efficient and, at the same time, non-repressive to a large and important trade.

THE ASTOR GIFT TO THE N.R.A.—The following are the chief conditions attaching to the generous gift of £10,000 made by Mr. William Waldorf Astor to the National Rifle Association, brief reference to which was made in our January issue—The fund is to be kept distinct from the other funds and money of the Association, and is not intended to be permanent. The council is authorised to expend a certain proportion of the capital each year for the purpose of establishing in villages and towns of Great Britain rifle clubs constituted as follows:—(a) They shall consist of civilians and volunteers, or civilians only; (b) they shall conform to such regulations not inconsistent with these conditions as the council of the N.R.A. shall consider reasonable; (c) they shall be affiliated to the N.R.A.; (d) they shall undertake to use rifles of Service pattern; (e) the annual subscription required of members shall not exceed 1s. each per annum; (f) annual returns shall be sent by every club to the secretary of the N.R.A. giving the name, address, and occupation of every member, and such other particulars as the council of the N.R.A. shall from time to time require. A small grant shall be made to any rifle association through whose direct instrumentality a rifle club complying with these conditions may hereinafter be established. A grant may also be made to every club hereafter established complying with these conditions towards the initial equipment, but as a rule an equivalent contribution will be required from the club or from subscribers in connection with it. It should be noted that the Astor gift is only intended to assist in the creation of rifle clubs, and not for the maintenance of existing clubs.

## NOTES.

**FRENCH PROOF-HOUSE RETURNS FOR 1901.**—According to the *Bulletin Mensuel*, the number of weapons passing through the Proof-house of Saint Etienne last year was largely in excess of the total of 1900. In all, 75,450 barrels were submitted for proof, of which no fewer than 72,278 succeeded in passing the tests and were duly marked, showing an increase on the figures of 1900 of 16,386. There was an almost corresponding advance in the numbers of finished weapons sent for test, the total submitted for proof with either black or smokeless powders being for 1901 no fewer than 40,595, as against 34,467 in the preceding twelve months. Of these, only 4,207 were single-barrel guns, the rest being double-barrel guns of various makes, and 16,008, or about 44 per cent., were nitro-proved. Only 994 of the sets of double-barrels undergoing proof were built for muzzle-loading guns. It will be inferred from the foregoing figures that the weapons manufactured at Saint Etienne are generally of a fairly high quality, judging by the proportion of nitro-proved barrels, and l'Armurerie Française is to be congratulated on showing results which must be well above those of all the other factories in France taken together.

**MESSRS. WALKERS, PARKER & CO., LD.**—The directors of this company, in presenting their thirteenth annual report and balance-sheet, state that the trading for the year has been very disappointing, and a continued fall in the price of lead, aggregating to £6 per ton, is responsible for the greater part of the deficiency of £24,721 shown in the profit and loss account. On the other hand, the shrinkage has gradually set free large sums hitherto locked up in stock and book debts, and has brought about a better condition in the state of the company's finances. Sales of surplus land at Chester and Newcastle have now been completed to the amount of £19,597, and the proceeds devoted to the purchase and cancellation of £22,400 of the company's debentures. This transaction reduces the amount payable for interest on the debenture debt by £1,000 per annum. It is satisfactory to learn, in view of the results of the year under notice, that considerable economies have been made in many directions, which will materially benefit the current year's financial situation.

**THE NEW EXPLOSIVES CO., LD.**—Some interesting facts were brought to remembrance at the annual general meeting of this company, which was held on the 13th ult., that may well be mentioned here in connection with the very satisfactory balance-sheet presented to the shareholders. Some nine years ago the concern was practically in a bankrupt state, and it is almost entirely due to the energy and initiative of the present directorate that the company is now able to pay a 10 per cent. dividend on its capital. Under this new control the dividends have shown a steady rise. For example, the average for the last eight years has been 5½ per cent., and for the last four years 7½ per cent., culminating in the 10 per cent. paid in respect to the year 1901. During the last twelvemonth it was noteworthy that the company had not made a single bad debt, but had on the contrary actually recovered an old debt that had hitherto been regarded as hopeless. With regard to the outlook, as was mentioned in

our last issue, the prospect is most encouraging. The company is prepared to undertake the manufacture of the new Government explosive at the expense of a very trifling extra outlay in machinery and plant, while their patent guncotton moulding and pressing plant is receiving consideration from several Governments. Apart from this Government business, the company may expect to obtain a large accession of purely commercial trade, for which it is fully equipped by the erection of large new workshops and sheds, which have been provided entirely out of revenue. Needless to say, a resolution to present an additional honorarium to the Chairman and directors, over and above their usual remuneration, met with a hearty response.

**ROBURITE EXPLOSIVES CO., LD.**—According to the report and balance-sheet to be submitted by the directors of this company at the twelfth annual meeting on the 6th inst., the net profits for the year ending December 31st last were £8,495, to which is added the sum of £1,102 brought forward from the previous account, thus giving a total of £9,597 available for distribution. Of the year's profits, 10 per cent., or £849, is set aside for the reserve fund, and £2,470 had already been allocated to the payment of an interim dividend at the rate of 5 per cent. on the preference shares. The directors recommend the payment of a further dividend on the 10 per cent. preference shares, to discharge the arrears of cumulative dividend for the twelve months ending June 30th, 1900, making altogether during the year the payment of eighteen months' arrears of this dividend. There remains £1,339 to be carried forward to the next account. The directors report that the company has more than maintained its volume of sales during the past twelve months, in the face of greatly increased competition, and point out that, although manufacturing costs and other charges have been exceptionally high, the net profits show a satisfactory improvement. We note that there is no allowance for depreciation as regards patents and goodwill, plant and machinery, during the past year, or in respect to leaseholds, buildings, and licences, laboratory and office furniture, since the end of 1897, when the capital of the company was severely written down.

**ELEY BROTHERS, LD.**—According to the report and balance-sheet submitted by the directors of this company at the annual general meeting held on the 6th ult., the trading for the year ending December 31st last shows a profit, after payment of remuneration to directors, expenses of management, income tax and all other expenses, of £37,743, to which may be added £16,741 brought forward from 1900, the total available for distribution being £54,488. This sum is apportioned as follows:—In addition to the payment of an interim dividend at the close of the half-year, of 10s. per share, a final dividend is allowed for of 20s. per share, which thus makes up the customary dividend of 15 per cent. per annum, or a total of £37,500; a further sum of £219 is written off the item of £1,419 standing in the company's books in respect to patent rights in clay-bird traps and birds; the remaining balance of £16,765 is carried forward to the next account. The directors were able to report that the works had been fully employed during the twelve months, and that the demand for sporting ammunition had been excellent, despite the effect of the war in South Africa. The war, by the way, had led to considerable orders for military ammunition, but this had not been productive of much profit. On the whole, the company

has done a much larger business than usual during the year, perhaps the largest since its incorporation; but if so, the profits accruing were scarcely in proportion, one reason being the enhanced price of copper. The Amalgamated Company in America, which practically controls the market to a great extent, has been able to maintain the price of copper at about £15 per ton above normal quotations. Another adverse influence tending to keep profits down has been the general demand for cheap cartridges, which necessitated cutting prices to meet the competition of other manufacturers. It may be remarked, however, that the general result is distinctly satisfactory, and the company has little to complain about, considering the conditions of trade now prevailing.

**MINIATURE RIFLE CLUBS.**—Conditions for the formation of Miniature Rifle Clubs have recently been issued by the N.R.A. These are somewhat stringent, as will be seen from the following extract:—Such clubs shall consist of not less than twenty members, and shall pay an affiliation fee of 10s. per annum to the N.R.A. Rules and practice regulations must be submitted for approval of N.R.A., and cannot subsequently be altered without further approval. The range shall be not less than 25 yards, and must be approved by military authorities, and on all occasions when ranges are open for use an authorised person shall be in charge, who shall enforce the rules and regulations. Rifles and ammunition must comply with following requirements:—Calibre not to exceed .320, and rifle not to exceed 8 lbs. in weight, except it be the Service Rifle with Morris tubes. Trigger pull not to be less than 4 lbs. Butt to be plain, without projections at toe or heel. Any sight except telescopic. Repeating and magazine rifles strictly prohibited, except so far as the use is allowed of the Service rifle when fitted with Morris tubes. Morris tube ammunition will be issued on repayment at current prices, present rate being 15s. 6d. per 1,000. Purchase of ammunition limited to 500 rounds per member per annum. Club rifles and ammunition must be stored at the club, and must on no account remain in the possession of individual members. There are other rules relative to registration of members, and the standard for miniature targets.

**GERMAN GUN MANUFACTURERS.**—According to the recently-issued report of the Rhenische Metalwahr and Maschinen Fabriks Gesellschaft, of Dusseldorf, that company has sustained, during its last year's trading, a loss of £85,000, which will be written off by appropriations made from the reserve fund. The dividends paid by the company during recent years have been, 6 per cent. in 1897, 14 per cent. in 1898, and the same in 1899, 6 per cent. in 1900, and nil in 1901. It will be remembered that this is the establishment which, about a twelvemonth ago, supplied the British Government with 18 batteries of quick-firing field guns on the Ehrhardt system. With regard to the defects which were discovered in the guns on delivery, the report submits that these were not faults affecting the essential construction of the weapons, but were due to the great haste that was necessary in accommodating the details of the guns to the requirements of the purchasers. The reason given for a failure on the part of the company to obtain any repeat orders, is that the British War Office, presumably as a consequence of the outcry made at the time in respect to the purchase of German guns, will not place their contracts with a concern whose workshops are not in England.

## LECTURES TO YOUNG GUNMAKERS.

### XII.—PRESSURES.

In order to keep our lectures up to date it will be necessary from time to time to supplement some of those which have gone before, and which were complete up to the time of publication. Certain remarks, in addition to what appeared in our last pressure lecture, which was published in March, 1901, are now necessary. It will be remembered, in commenting upon the Eley scale of pressures for use with the shot-gun crusher gauge, a set of values relating compression to pressure were published by Messrs. Eley, as a result of numerous experiments. By means of an accurately-adjusted hydraulic machine arranged to impart a given load for a definite period of time, a series of equivalent values were arrived at, which professed to represent the behaviour of lead crushers under variable loads. Bearing in mind the general

#### STANDARD TABLE OF PRESSURES

FOR USE WITH ELEY'S SHOT-GUN LEAD CRUSHERS (.325 in. X .500 in.), SHOWING REMAINING LENGTH IN INCHES, AND CORRESPONDING PRESSURES IN TONS PER SQUARE INCH.

In.	Tons.	In.	Tons.	In.	Tons.	In.	Tons.	In.	Tons.
500	—	475	2.61	450	3.30	425	3.92	400	4.52
499	1.00	474	2.64	449	3.33	424	3.95	399	4.55
498	1.32	473	2.67	448	3.35	423	3.98	398	4.57
497	1.80	472	2.70	447	3.38	422	4.00	397	4.59
496	1.63	471	2.73	446	3.41	421	4.02	396	4.61
495	1.74	470	2.75	445	3.43	420	4.05	395	4.63
494	1.83	469	2.78	444	3.46	419	4.07	394	4.65
493	1.89	468	2.81	443	3.48	418	4.10	393	4.67
492	1.95	467	2.84	442	3.50	417	4.13	392	4.69
491	2.01	466	2.87	441	3.53	416	4.15	391	4.71
490	2.06	465	2.90	440	3.55	415	4.18	390	4.73
489	2.11	464	2.92	439	3.58	414	4.20	389	4.75
488	2.16	463	2.95	438	3.60	413	4.23	388	4.78
487	2.21	462	2.98	437	3.63	412	4.25	387	4.80
486	2.25	461	3.00	436	3.65	411	4.27	386	4.82
485	2.29	460	3.03	435	3.68	410	4.30	385	4.84
484	2.32	459	3.06	434	3.70	409	4.32	384	4.86
483	2.36	458	3.09	433	3.72	408	4.35	383	4.88
482	2.40	457	3.11	432	3.75	407	4.37	382	4.90
481	2.43	456	3.14	431	3.78	406	4.39	381	4.92
480	2.46	455	3.17	430	3.80	405	4.41	380	4.94
479	2.50	454	3.20	429	3.83	404	4.44	379	4.96
478	2.53	453	3.22	428	3.85	403	4.46	378	4.98
477	2.56	452	3.25	427	3.88	402	4.48	377	5.00
476	2.58	451	3.28	426	3.90	401	4.50		

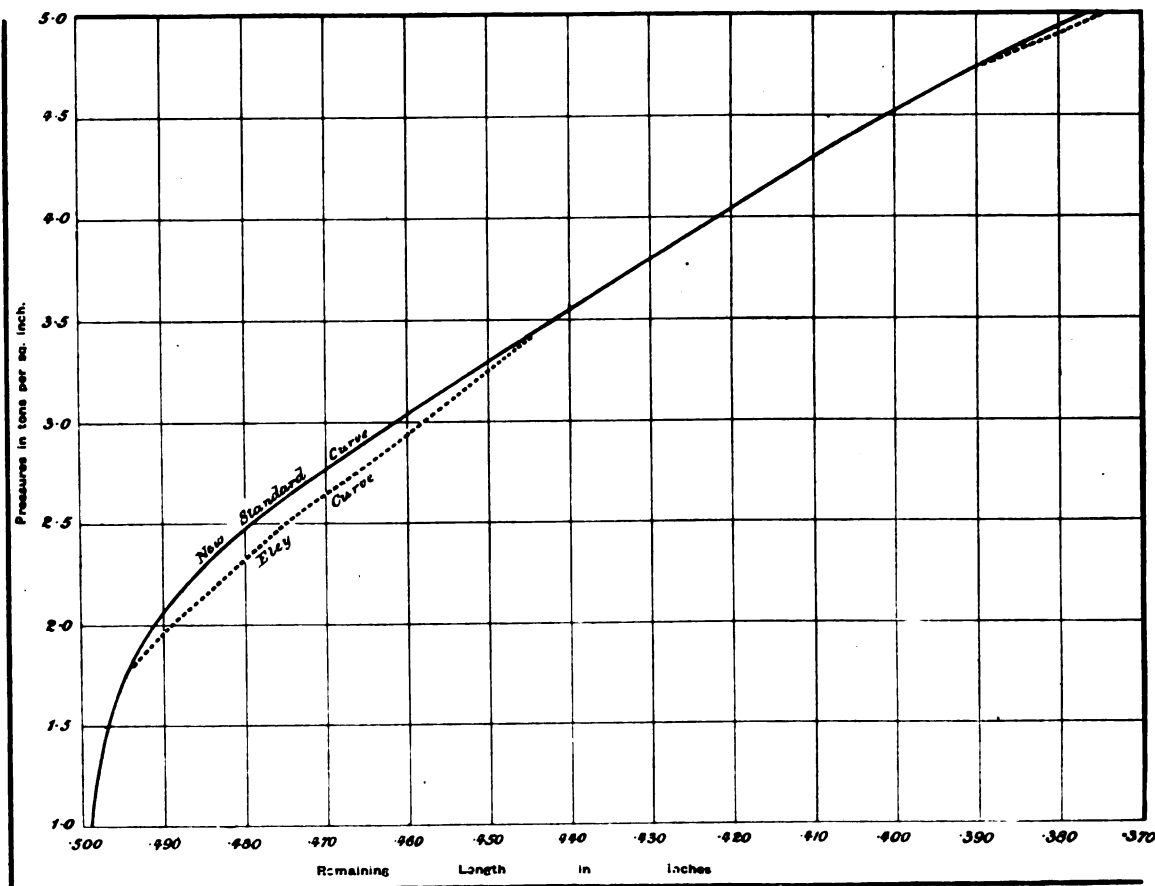
state of knowledge at the time when the Eley table was published (that is about seven years ago), it must be recognised that it attained a very fair degree of accuracy. Since then, however, further researches have been made, a digest of which was published in our lectures on pressures. Therein it was made clear that lead crushers could be examined by two forms of dead-weight pressure, the one where the weight was brought into contact with the face of the crusher, and was suddenly let go, and the other where the weight was allowed to sink very gradually upon the crusher, and the point at which rapid compression gave place to a very slow but continuous reduction of length was noted. These two methods of examining lead crushers are known as static and dynamic loading, and we showed that all exact methods of examining the behaviour of metal crushers must be carried out by one or other of these methods. We showed at the same time that the Eley table was evidently arrived at by a sort of combination of the two methods, the curve lying at irregular distances between the two curves already referred to. Bear-



ing in mind that the Eley table corresponds very closely with the curve of static loading, we remarked upon the advisability of rounding out the Eley curve so that it should lie substantially parallel with the static curve arrived at with slowly descending weights.

In order to make so widespread and important a change, it was necessary that something more should be done than simply to publish a lecture calling attention to the evident necessity for a change. Fortunately, our lectures were able to include among their readers a larger audience than merely young gunmakers. As a result of the extended knowledge upon pressures, which was conveyed by the publication of the researches carried out by our esteemed collaborator, the

rounded outline, taking a bolder sweep at the point where the change of direction commences. The curves rejoin further on, with the result that the Eley values remain substantially as before, except for a slight change at the extreme top of the curve. The original drawing, whereon these curves were carefully mapped out, was designed on a very large scale, so as to take account of the most minute variations. As a result, the new curve is characterised by a proportionate development throughout its length, and this may be further demonstrated by turning to the tabulated figures which accompany this lecture. They represent the new pressure table which will in future be exclusively used for Eley lead crushers by all authorities of standing. The conformity of the curve with



ground was prepared for making a definite change in the method of taking pressures. The initiative was taken by our contemporary *The Field*, and by its influence an important conference was convened, at which the question of pressures was exhaustively considered. The first and foremost business before the meeting consisted in adopting the Eley lead crusher as a standard article for use by experimentalists and a table of compression for use therewith, giving a revised value for the tons pressure, was adopted at the meeting, and proper authorisation was given by a formal resolution for carrying the change into effect.

In the diagram here published it will be seen that we have reproduced the Eley table by means of a curve drawn to the vertical and horizontal scales printed on the margin. It will be observed that the somewhat irregular form of the Eley curve has been modified by redrawing a fresh and more

the statical pressures published in our issue of a year ago add considerable value to the new figures. More than this, it will be possible at an early date to make a comparison between the results shown on this curve and those obtained by copper crushers on the system recommended in these columns. At the conference of experts authority was given for the carrying out of experiments with copper crushers, and there is little doubt that this method of checking off the values obtained with lead will be available for general reference purposes.

We trust that the very practical outcome which has followed from a careful and exact enquiry upon the testing of pressure will convince our young gunmakers that there are merits in research, provided it be carried out, which go far to compensate the observer for the pains and difficulties which he may encounter at the outset.

## ROUND THE TRADE.

Messrs. Nobel's Explosives Co., Ltd., are building a new factory at Lidlithgow, for the manufacture of "strum," or safety fuse.

Mr. H. J. Hussey has gone for a short trip to the United States, for the purpose, we understand, of pushing the sale of his guns in that country.

The Commander-in-Chief has approved of the fixing of the date for the annual Bisley Meeting of the N.R.A., which will be held from the 14th to the 20th July next.

Mr. Eugene Du Pont, of the well-known firm of E. F. Du Pont de Nemours & Co., died at his home at Wilmington, Del., U.S.A., on January 28th, at the age of 61.

Messrs. Wm. Moore & Grey have, we understand, disposed of the lease of their establishment at 165, Piccadilly, W., and intend at an early date to remove to other premises in the vicinity.

We are pleased to learn that Mr. G. E. Lewis, of Lower Love-day Street, Birmingham, who has for some time been suffering from a serious illness, is now on the way to a complete recovery.

Sir Charles Ross has gone back to Canada, where he will no doubt find plenty of work awaiting him in connection with the adoption of his straight-pull magazine rifle by the Dominion Government.

We notice under the heading of winding-up petitions that it was resolved, on the 17th ult., that the High Explosives Co., Ltd., be wound up, and that Mr. W. H. Fox, of 9, Austin Friars, E.C., be appointed liquidator.

We learn that Mr. G. H. Hyam has been appointed to succeed the late Mr. Whitehead as manager of the Birmingham branch of Messrs. Eley Brothers, Ltd. Mr. Hyam has for many years been travelling over the United Kingdom for Messrs. Eley Bros.

Under Class 20, the Carbonite Syndicate, Ltd., have registered a design consisting of a five-pointed star, with rays of forked lightning projecting from it, for explosives used for blasting purposes. No claim is made to the exclusive use of the word "Thunder."

The National Explosives Co., Ltd., inform us that they have appointed Mr. W. G. Hammond to the position of assistant manager. Mr. Hammond has been with the company for 11 years, and is therefore well qualified to undertake the responsibilities of his new office.

A new company was registered on the 12th ult., with a nominal capital of £250, under the style of the Sports and Pastimes Exhibition, Ltd., having for its object the promotion of tournaments, sports and games, with power to deal in the various accessories required.

Rear-Admiral S. M. Eardley Wilmot has been appointed Superintendent of Ordnance Stores in the department of the Director of Naval Ordnance, as from the 25th ult., in succession to the present Store-keeper General of Naval Ordnance, Sir Thales Pease, K.C.B.

We regret to have to record the death of Captain J. Hoey, Quartermaster of the 2nd V.B. East Surrey Regt., who was well-known to visitors to the meetings of the N.R.A. for many years both at Wimbledon and Bisley, in his capacity as the Association's Superintendent of Works.

The War Office has ordered a large refrigerating installation from Messrs. J. and E. Hall, Ltd., for the cold storage department at Gibraltar. This is the second installation supplied by the company for the same station, and, like its predecessor, is on the Hall carbonic acid system.

The well-known Elswick Ordnance Works applied to the County magistrates at Newcastle-on-Tyne, on the 22nd ult., for permission to establish a factory at Scotswood, for the manufacture of ammunition for the British and other Governments. The required application was granted.

Since the unfortunate explosion at Perranporth, which was briefly referred to in our last issue, an agitation has been set on foot by the residents of Truro to arrange for the conveyance of explosives for shipment by a different route. Truro is a convenient shipping port for both Perranporth and Hayle.

Messrs. Kynoch, Ltd., recently founded a rifle club among the members of their staff, and this new club has just lately been trying conclusions against the older Birmingham Rifle Club. The match was contested with the Service rifle at 200 and 500 yards, and resulted in a tie, each team scoring 367 points.

The Guardians of the Birmingham Proof House have issued a notice to the effect that any person claiming to be a member of the gun trade of the city whose name does not appear on the register now in force, or who is desirous of making a new claim, must send in particulars before the 10th inst.

We believe that the very valuable researches made by Mr. W. D. Borland, of the E.C. Powder Co., Ltd., into the subject of the composition and ignition of caps, has been recently recognised in a suitable manner by his appointment as adviser and expert to the Laboratory at Woolwich in that particular detail.

In their announcement of the issue of the balance of 875 five per cent. preference shares of £1 each, which have so far not been allotted, the Abbey Improved Chilled Shot Co., Ltd., give the interesting information that their output of shot for the year ending January 31st last exceeded 800 tons, as compared with 302 tons in 1895.

A modification of the Bergmann pistol is now on the market. It is known as the Bergmann automatic carbine, and is similar to the pistol, except that it has a longer barrel and a detachable walnut stock, with swivels for a sling strap, and sights graduated for hunting distances. The total length is about 32 inches.

Official notification of the alteration in the composition of Cordite, to which we drew attention in our last issue, has been made to the various contractors who supply the Government with ammunition. The following are the charges for the Service weapons which will be adopted for the new explosive:—303 Lee-Enfield rifle, 30 grains; 3-pounder, 6½ ozs.; 6-pounder, 7½ ozs.; 12-pounder, quick-firer, 1 lb.; 4.7-in. quick-firer, 5 lbs. 7 ozs.

Sir Hiram S. Maxim is not only a prolific inventor, but versatile withal. One of his latest patents does not deal with electric lighting, flying machines, ordnance, or explosives, but with a new system of roasting coffee, whereby the natural aroma of the berry is retained in the commercial product. We remember trying some three or four different samples of coffee roasted by Sir Hiram about a twelvemonth ago, which certainly seemed to have retained a more than usual degree of aroma.

A special meeting of shareholders in Messrs. Vickers, Sons and Maxim, Ltd., held on the 14th ult., confirmed the resolution adopting the creation of £400,000 more of share capital to be allotted to Mr. William Beardmore, in respect to the half interest acquired by Messrs. Vickers in the firm of Messrs. William Beardmore & Co., of Glasgow. By arrangement, Mr. Albert Vickers and Lieut. Dawson will represent the Sheffield board at Glasgow, and Mr. Beardmore will become a director of Messrs. Vickers, Sons & Maxim, Ltd.

According to the Board of Trade returns for the month ending January 31st, under the heading of Arms, Ammunition and Military Stores, small fire-arms to the number of 9,024 were shipped abroad, as compared with 14,408 and 8,190 for the corresponding periods of 1901 and 1900 respectively. Shipments of gunpowder were relatively small, the total for January, 1902, being only 3,903 cwts., which is a marked decline from the totals of 4,762 cwts. and 6,219 cwts. which were sent abroad in the first months of 1901 and 1900. This declension is also manifested in the various unclassified items which come under the heading of "All other kinds," the values being respectively £93,187 for January, 1902, and £163,921 and £152,673 for the same months of 1901 and 1900,

## THE WEBLEY AND SCOTT REVOLVER AND ARMS CO., LD.

IN our last month's issue we were able to give a brief review of the report and balance sheet which were to be presented to the shareholders in this company at the annual general meeting, the results of the year's trading being as follow:—After making due provision for repairs, maintenance and depreciation of buildings, plant, machinery, and tools, there remains a balance of £21,907, to which is added the sum of £6,421 brought forward from last year, giving a total available for distribution of £28,328. Of this total £8,375 is apportioned to the payment of the usual preference dividend, and a similar amount to the payment of a dividend at the rate of 5 per cent. per annum on the ordinary shares. Of the remainder £1,494 is written off the outlay on automatic revolvers and pistols, £5,000 is allotted to a special reserve fund, and the balance of £5,084 is carried forward to next year's account. It is proposed to invest the special reserve fund in securities outside the business of the company.

The annual general meeting of the company was held on the 4th ult., with Lord Ebury in the chair, and we reproduce here in condensed form the chairman's speech and subsequent discussion. Lord Ebury began by saying:—

“Although we have not succeeded in making as much profit during the past as we did during the preceding year, I do not anticipate much disposition to regard the results as unsatisfactory on the part of those who are aware of the circumstances under which they have been achieved. The demand for revolvers which was so active in the final quarter of 1899, and which continued with little abatement throughout the year 1900, cooled down materially during the period under your notice, a circumstance reflected alike in Government contracts and in commercial requirements. The sporting trade, meanwhile, has naturally remained under the shadow of that depression from which it cannot emerge until the return to our shores of the multitude of its good friends and supporters who are fighting for the honour of the Imperial flag. Under such conditions very brilliant results could hardly be expected, but your wisdom in permitting us last year to maintain a strong financial position leaves us to-day with a balance by no means unsatisfactory, out of which we can not only make up 5 per cent. for the year upon the Company's capital all round, and lay the foundation of a reserve fund in the true acceptance of the term, but also extinguish the whole of that expenditure gradually incurred upon experiments, which could not justifiably be charged to revenue. Gentlemen, although we propose to write off that expenditure, it must not be concluded that it has been incurred in vain; on the contrary, it has left behind it a very valuable asset in the shape of the “Webley-Fosbery Automatic Revolver,” which, after a long process of incubation, has come to hand in full completeness and vitality. We have recently been selling these revolvers as fast as we can manufacture them, and no doubt the fact that they take the Service cartridge is much in their favour; but in case any preference for smaller ammunition should be developed, the necessary tools and fixtures are being made for machining two smaller sizes, of which the models have already been approved.

“The new barrel-boring apparatus, both for rifles and shot guns, has now been brought into full working order. We are

beginning to supply the trade, both in London and Birmingham, and both for rifles and shot guns, with barrels in the tube state made of a special steel. The output of this department might be rapidly increased if it were not for the difficulty of obtaining a ready and ample supply of skilled labour, and we have every reason to be gratified at the appreciation with which our endeavour to keep abreast with the latest and highest developments of science is met by the trade.

“Another transaction of the past year, which may not improbably result in a perceptible addition to the Company's revenue, deserves a word of comment. With the city of Bucharest the old firm of P. Webley & Son at one time had somewhat close relations, which were never quite lost sight of. It happened that a man in that city, of whom we had some knowledge as the possessor of a good gun business, was overtaken by misfortune and in danger of being forced into liquidation. Local opinion was so unanimous as to the trustworthiness of his character, and as to the fact of his misfortune having been both unmerited and unavoidable, that we considered and eventually agreed upon the propriety of advancing him capital enough, on terms, to rehabilitate his business. I don't put it forward as any great achievement; but I have not passed it over because there is a trace of it in the accounts, and because it affords an illustration of the fact that we keep our eyes open, and are always willing to take a fair commercial risk with the object of deepening the channel of the Company's affairs.

“In deference to those who find the past dull, and feel more interest in the chances of the immediate future, I will venture to say that the prospects of this business do not seem to me to afford any reasonable ground for anxiety. We have Government work enough to carry us on for the present, and we feel little doubt that when the usual period for the distribution of contracts arrives we shall get more. The slackness in the commercial demand for revolvers is something more than on the mind. As to the prospects of the sporting trade, these must depend, to a large extent, upon the course of the war. I will not venture to give an opinion upon a subject which has baffled the foresight of wise men, but when the revival does come, it will find this Company better prepared than it ever has been before to turn the occasion to profit, and to command an ample share of the long-deferred prosperity.

“Passing on now to the accounts, and commencing with the debit side of the profit and loss account, the first five items, as compared with the figures of the preceding balance-sheet, show a collective decrease of £335, the most important contribution to which proceeds from the fifth item, viz., that which embraces administrative expenditure. The item for repairs and maintenance under its respective sub-sections, first of plant, machinery, and tools, and then of buildings, comes out with a saving of nearly twelve hundred pounds; the amount to be expended on the repair of plant, machinery, and tools depends, of course, to a great extent, upon the amount of work they are called upon to do, and the figure pretty accurately reflects fluctuation of turnover. The final item on the debit side of the profit and loss account is the net profit, and this is where the shoe pinches, because the conditions, already described to you, lessened it by a little more than five thousand pounds.

“The three items on the credit side of the profit and loss account total up to a little over £6,000 short of the previous corresponding record, the difference in the loss of gross and

net profit being only about £1,000, which shows that we did not reach the high-water mark in the volume of turnover during the past year, at which, owing to the comparative insignificance of additional expenditure in production, net profit overtakes gross profit with giant strides.

"The debit side of the balance sheet next claims our attention. The capital account remains unaltered. The creditor's account shows a decrease of nearly £2,000, resulting from a recently adopted system of closer payments with their corresponding discounts. The reserve against bad debts comes in for its normal increase, with deduction only of the very small sum debited against it during the past year, and the revenue account is sufficiently self-explanatory to need no comment from me. On the credit side, £4,497, credited as an addition to the plant account, is made up of the following figures:—£2,769 for completing the electric installation, £375 for additional barrel boring plant, £700 additional tools and fixtures for automatic revolvers, and £646 for a new well, which furnishes an ample supply of good water suitable to our requirements. We have additional stock on hand amounting in value to £1,015, due to an accumulation of revolvers consequent upon the autumnal slackness in that trade demand, the recent freshening up of which is one of the distinctly favourable features of the situation. The outlay on automatic pistols and revolvers appears on this sheet as an asset, but, as you will have observed, on the front page of the report it is to be written off out of profits, thus enabling us to start the current year with a clean slate.

"Lastly, I come to the figure under the heading of patents, goodwill, licences, and trade-marks, which I have heard it said at these meetings should be reduced in amount. I confess I do not share that view, because it is by no means clear to me that the property is not worth what you gave for it. There is, however, a parallel precaution—viz., the establishment of a suitable reserve fund invested in securities, which do not participate in the risks of the business which that reserve fund is designed to protect. And now, gentlemen, with your permission, I will propose 'That the directors' report and accounts to the 31st December, 1901, duly audited, be received, approved, and adopted.'"

Colonel C. E. Macdonald seconded the motion, but before it was put to the meeting a criticism of the report and balance sheet was invited.

Mr. Davis thought that the directors could not be congratulated on the result of the year's working, and he quoted from the *Financial Times* to the effect that "If you cannot do well in a time when arms and all ammunition companies are doing so well as they have done this year and last year, I do not see how you will do well when this unfortunate war is over." After referring to the reduction in directors' fees and managerial expenses, which he contrasted with the reduced dividend, Mr. Davis went on to criticise the fact that nothing had been written off patents, good-will, licences, and trade-marks since the inception of the company.

Mr. Woodhouse endorsed the remarks of the last speaker, and asked for particulars as to the allocation of the Special Reserve Fund. He also drew attention to the price at which the shares of the company stood in the market. Further, he suggested that a close watch should be kept on the various items of expenditure comprised under the headings of stationery, stamps, printing and advertising, travelling and general expenses, and managers' and general salaries and

directors' fees and expenses, which, he thought, ought to be specified in greater detail.

Mr. Scott raised the question of the advantages which should accrue from holding future annual meetings in Birmingham rather than in London.

The Chairman dealt with the various points raised, after which the motion adopting the accounts and report was duly put and carried.

Mr. Edwin Ludlow, the retiring director, was unanimously re-elected.

In his concluding remarks, Lord Ebury paid tribute to the services rendered to the company by their secretary, Mr. Frank T. Murray, by the chief of the engineering department, Mr. Whiting, and by the manager of the sporting department, Mr. Hobday.

The proceedings then terminated.

## THE SPRINGFIELD MAGAZINE RIFLE.

GENERAL CROZIER, Chief of Ordnance, has ordered the Springfield Armoury to manufacture 5,000 rifles of a new model, which will be distributed to the army and thoroughly tested. It is proposed to gradually retire the Krag-Jorgensen arm. The new rifle retains the essential features of the Krag, but is simpler and stronger, and has an increased muzzle velocity. It can be used either as a single-loader or as a rapid-fire magazine rifle. The present stock of Krags will be distributed to the militia of the several States, but this will not occur until the entire army has been supplied with the new arm.

The new gun incorporates the best points in the Krag-Jorgensen, the present army rifle, and the Mauser, used by Germany, Spain and many other countries, and is the result of the best inventive ingenuity at the Government's command, and a long and exhaustive series of tests and experiments.

This gun's calibre is .30, the same as that of the present rifle, and it fires a rimless cartridge. The weight of the bullet, 220 grains, is the same as that of the present Service cartridge. The new rifle gives a muzzle velocity of 2,300 ft. per second, which is remarkably high. This combination gives it a muzzle energy which makes it the hardest hitter among the military rifles of the world.

These high qualities give it the following advantages over the present Service rifle, and over the Spanish and German Mauser, recently adopted:—First, a flatter trajectory, or path of projectile, with consequent greater accuracy; second, greater striking energy at all ranges, on account of the density of this heavy bullet more readily overcoming the resistance of the air; third, greater penetration; fourth, greater range.

In form it combines the strength of the Krag-Jorgensen firing mechanism with an improved double-lugged bolt and the fine magazine of the Mauser, to which have been added certain improvements. In addition, it has several original features that are not given for publication.

Ever since Lieut.-Col. Frank H. Phipps assumed command at the Armoury he has worked to produce a more effective modern rifle, to be submitted to the War Department for tests before the proper Boards, with a view to adoption as a Service weapon. In designing such a rifle he has been

assisted by the officers now stationed in the Armoury, Major J. E. Greer, Captain John D. Thompson and Captain O. C. Horney, Foreman D. J. Manningi and Draughtsman F. L. Murphy. The result is this new gun, designated the Springfield Magazine Rifle.

For nearly 100 years the Springfield musket and rifle have made the name of Springfield famous in the military world. This was not only due to the superior workmanship on these arms, but also to the originality of their designs, to the machines used in their manufacture, and to the improved methods of shop practice. Prior to 1892 the small-arms used in the United States Army were products of American invention.

In that year, however, the Springfield rifle, calibre .45, the perfection of the breech-loading system, was replaced by a new magazine rifle, calibre .30, the Krag-Jorgensen, with a system of breech and magazine mechanism greatly modified and improved, called the United States magazine rifle. This was undoubtedly the best of the numerous magazine rifles thoroughly tested by a Board composed mainly of officers representing the fighting branches of the Service. Its adoption was strongly opposed by American inventors, although, after reconsideration, its decision was adhered to. It passed the crucial test of war in Cuba, the Philippines and China, as shown by numerous favourable reports of both officers and men.—*The Union*, Springfield, Mass.

## REVIEW.

*Mémorial des Poudres et Salpêtres. Tome XI.* Paris: Published by Gauthier-Villars. 1901-1902.

The issue under notice is Part I. of Volume XI. Usually the *Mémorial* contains reports of a series of investigations of a theoretical nature, and it is these researches on the part of our French neighbours which have contributed so materially towards setting explosive knowledge, and the theory underlying it, on a sound basis. In this issue, however, there is an absence of matter of this character, which is an omission to be regretted. The journal is, in fact, practically made up of reports from the various departments of the Government Service, dealing more particularly with chlorate blasting powders, the ignition of various French sporting powders, and the effects of "tamping" blasting charges so far as considerations of safety are concerned.

Very painstaking investigations have been conducted by the French authorities with regard to several chlorate mixtures, the end in view being their adoption as State blasting compounds. These researches are all the more important since the electrolytic production of chlorates and perchlorates has considerably reduced the cost of manufacturing those compounds. The mixtures reported on appear to be, in comparison with other and better known explosives, well up to the standard of strength and violence of action, but the processes of manufacture show signs of being relatively dangerous, and experiments seem to prove that so far the detonation of a blasting charge of such compounds is neither regular nor reliable. Apparently, the difficulty which had to be encountered, and which is so far not overcome, lies in the necessity of making these compounds free enough from the danger of ignition by friction during the course of manufacture, which prevents them from being sufficiently sensitive to the usual means adopted in firing a charge. To overcome

this difficulty is no doubt only a matter of time, and the more so since chlorates are, among blasting powders, oxygen carriers *par excellence*. We have several chlorate mixtures in our own Authorised List, but up to the present they have shown no signs of attracting the general trade. It should be pointed out that the exhaustive manner in which the French authorities investigate the properties of new compounds should afford an instructive lesson to our own departments.

The report on the ignition of French sporting powders is not completed in the issue under review, and so far as it goes at present only one new feature of interest seems to be brought to notice, viz., the determination of the period of time which elapses between the striking of the cap and the emission of the resulting flame. The values of this factor seem to be fairly constant for all French Service caps, at about the same figure as is obtained by Eley's medium cap.

With regard to the report dealing with the effects of "tamping," the result of investigations and experiments seems to have been to show that when practical conditions are observed sand brings out the effectiveness of a charge much more satisfactorily than the more plastic tampings, such as clay, etc., and that in preventing a "blown-out shot," with its consequent dangers, sand is a better substance to employ for tamping than clay. These results are not immediately obvious, and on that account are the more interesting to note. The experiments also serve to show that, in regard to a consideration of the dangers attending the ignition of a charge by friction during the process of tamping, in cases where the explosive might foul the bore-hole, such risks are really very remote, while the nature of the substance used in "tamping" does not affect the result.

Speaking generally, this issue of the *Mémorial* is scarcely so full of interest as some of the preceding numbers.

We have received from Messrs. Kynoch, Ltd., a handsome wall calendar of the single-day tear-off variety, which, while fulfilling its most important function of providing a date memorandum capable of being read at a range of fifty yards without telescopic sights, is also of a highly artistic nature. The pad of dates is mounted on a stout card measuring 15½ by 10½ by ¼ in. thick, on which is printed a photographic reproduction of what purports to be a panel carved in oak. In the centre is a reproduction, also apparently carved, of a picture by Mr. Archibald Thorburn, entitled "On the Outlying Beat." If the card is really a copy of an original in carved oak, then that original must be a remarkably fine example of the wood-carver's skill, while if, on the other hand, it is reproduced from a wash-drawing, the artist is to be congratulated on his close imitation of the real thing.

Messrs. F. Joyce and Co., Ltd., have brought out a new type of lead slug for air guns, which embodies some novelties of design. The pellet weighs almost exactly 7½ grains, and is in the form of a truncated cone, the head being slightly rounded. The body of the slug is of much smaller diameter than the bore of the gun, and has on it a series of longitudinal ribs, which terminate in a ring at the base, this ring being the only place at which the slug takes its bearings in the bore, and as it is slightly over-size, the necessary compression to place it in the gun serves to make a perfectly air-tight fit. These slugs are said to carry very straight, though we have had no opportunity to test them, the longitudinal ribs assisting the relatively solid head in keeping them end on, and further serving to preserve their direction of flight. It is satisfactory to find well-known British firms entering the market even with these small accessories in open competition with Continental manufacturers, for there is a large business done in air-guns and ammunition, the profits of which might well be handled in the United Kingdom.

## A TYPICAL GUNMAKER.

### MR. CHARLES BOSWELL.

MR. CHARLES BOSWELL, whose portrait we reproduce on this page, is an excellent example of a successful, up-to-date gunmaker, who owes nothing to past generations. The leading men in the trade, and notably in London, are almost without exception not the original founders of the businesses they represent. They have succeeded by inheritance, by arrangement, or by purchase—more often the latter—to businesses the originators of which have long since disappeared from mortal ken, and while there is none the less credit due to the present owners for continuing, under widely different circumstances of trade, these valuable connections, which were initiated at a period when processes of manufacture were far less complex and competition was comparatively trifling, the fact remains that the latter-day representatives of some of the



MR. CHARLES BOSWELL.

best-known firms in the gun trade began their careers with the very valuable assets of a well-known trade-name, a wide connection, and all the other machinery of a going concern. Mr. Boswell is typical of quite another set of conditions. Starting for himself in the trade, without money, name, or influence, he has, within the last thirty years at most, by sheer pluck, dogged energy, and unflagging enterprise, built up a first-class business which owes everything to the personal factor of its originator. What this means, as happening under the strenuous conditions of the latter part of the nineteenth century, probably only he and his competitors in the trade can fully appreciate.

There was no question of being "born to the purple." Mr. Boswell first saw the light at Hertford, in December, 1850, and there was nothing in the manner of his childish surroundings and up-bringing that might have tended to direct his efforts into the line he has pursued with so much success. He was, however, fond of guns and shooting at an early age, and this boyish taste was so far humoured that at the age of fourteen he was apprenticed to the gun trade with Mr. Gooch,

of Hertford, a gunsmith of the old school. At the termination of his seven years' indentures, Mr. Boswell obtained employment as a sight-filer at the Royal Small-Arms Factory, at Enfield Lock, where he remained for two years. He was already married, and the increased responsibilities ensuing no doubt induced him at this stage to make a bold bid for fortune. At all events, on leaving the Government factory, he went to live at Edmonton, and started business for himself as a gunmaker, which was a sufficiently daring step to take, seeing that he had neither money nor connection. At first his business was only a very little one, most of his work being repairs and fitting, and we may take his word for it that there were some anxious times before the success of the enterprise became assured. But Mr. Boswell was possessed of an asset which possibly was of more value to him than generations of trade ancestry. He is one of those brilliant shots who must surely be born since they do not appear to be capable of being made. From the age of 20 onwards he has held the reputation of



MR. OSBORN GEORGE BOSWELL

being a crack pigeon-shot, as is abundantly proved by the trophies he has won at that sport, some forty in number having been carried off at Hendon. As a pigeon-shot who was also a gunmaker he at once began to secure a business connection among the sportsmen whom he met and defeated in competition. They argued, and not without some show of reason, that a man who could shoot with his degree of success should know something about guns suitable for pigeon shooting, it being only human nature to attribute results rather to the gun than to the man behind it. However this may be, Mr. Boswell began little by little to gather a connection among practical sportsmen, and while there can be small doubt that he obtained the connection by his own personal skill with the gun, he retained his customers by giving them of his best in design and workmanship. Once fairly under weigh, the business increased so rapidly and extended so far that Mr. Boswell found it necessary to "centralise," and some twenty years ago he removed his establishment from Edmonton to the well-known premises, No. 126, Strand, W.C., which he still occupies.



Before leaving Edmonton, Mr. Boswell's business underwent a somewhat remarkable development—remarkable, that is to say, in view of the peculiar circumstances which brought it about, and the resulting consequences. Even at that time, some of his guns had got out to Australia, and they were viewed with such favour by practical sportsmen that almost without effort on his part he installed an agency "down under," his first representative being Mr. Harry Ackland, of Woolahra. This was the beginning of what is now a large Australian connection, the growth of which is all the more noteworthy when it is realised that Mr. Boswell has never been to Australia, and that the success of the venture must be absolutely and entirely due to the suitability and general excellence of his guns. Shortly after the removal of the business to the Strand premises, Mr. Sayer, who was the secretary and founder of the Melbourne Gun Club, wrote to Mr. Boswell, and suggested that he should send a few sample guns out to him. This was agreed to, and Mr. Sayer took up the agency with most satisfactory results, his position of influence no doubt largely assisting to popularise Boswell guns among the crack-shots of the Club, though to say so is to suggest no undue influence. At the present time Mr. Levy is Mr. Boswell's principal representative in Australia, but he has agencies throughout Australia and New Zealand doing good business. Boswell guns have won more than £50,000 at the various English and Australian gun clubs. Nor is Australasia the only colonial market supplied. Cape Colony is now well nigh as important a connection as the Federation, and we understand that among numerous other sportsmen in South Africa who use Boswell guns are the Hon. W. Ross, M.P., Sir James Sivewright, Mr. Justice Solomon, Hon. I. D. Logan, M.L.C., and Major Johnson.

Throughout, Mr. Boswell's business has not depended on a chance connection. It is built up entirely of regular customers, experienced sportsmen who want a good gun, and do not mind paying a fair value for it. This style of business possibly means a comparatively limited output, but it equally means no locked-up capital and no surplus stocks. Moreover, it incidentally contributes in other ways to reducing expenses. Mr. Boswell has no imposing ground-floor frontage, with its accompanying high rental and wages bill. His customers have no objection to climbing a flight of stairs to the first floor, and if on arrival they find the "boss" in his shirt-sleeves, himself engaged in actual work at the bench, as often happens—for Mr. Boswell is as much of an enthusiast at his trade now as ever—that affords only another indication of the practical interest taken by the maker in the weapons which bear his name. In the same way they will find the second generation at work, for Mr. Boswell's second son, whose portrait we reproduce side by side with his father, is in training to take up the burden of the business when the founder sees fit to relinquish it to a successor. So far as that goes, however, the date is probably far distant. Mr. Boswell is still in the prime of life, and while he has countless outside interests and amusements, we believe that the "shop" holds first place, and that he would feel lost without the daily journey into town, and the real pleasure of doing good work himself and supervising the labours of others. Mr. Osborn George Boswell is, like his father, a good all-round shot, and fond of all kinds of sport. He has been apprenticed to his trade, and can now always be seen at work at the bench.

It would be difficult, however profitable it might be for the

guidance of a younger generation, to name any one particular reason as accounting for Mr. Boswell's success, when we take for granted his pluck and perseverance. We think that, on the whole, the secret is to be found in the fact that he is a thorough sportsman. As a sportsman he took the initial risks of starting his business without any extraneous aids; as a sportsman he fought the uphill fight; and as a sportsman he enjoys the resulting success. Moreover, in a business of so personal a character as that he has made for himself, the reputation of being a sportsman is a valuable asset. There is a certain amount of publicity attaching to such a reputation, and if the possessor of it is known to be "straight" and a jolly good fellow, he provokes that fellow-feeling that "makes us wondrous kind." Now, Mr. Boswell is all this. A ready index to his character and reputation is afforded by the fact that, except in affairs of state, he is never "Mr." Boswell, and "Charles" Boswell is known only as a name which is used for letter-paper—and bill-heads, while "Charley" Boswell is recognised everywhere. When a man's Christian name is ill-treated in this fashion, it speaks well for the owner. For the rest, it may safely be said that Mr. Boswell is a fairly wealthy man. He lives in a nice freehold house with a large piece of land attached, out at Potter's Bar, and has a range fitted up in the grounds for testing his guns.

We have made much of Mr. Boswell's reputation as a sportsman, and have referred to his recreations outside strict business. He is something of an "all-round" man. A crack pigeon-shot for upwards of thirty years, as the ownership of forty cups testifies, and an enthusiastic member of the National Gun Club, on the committee of which he has sat for years he also takes his turn with the best of them at pheasant, partridge, and grouse, to say nothing of ground game. He knows more than a little about dogs, and at one time used to breed and exhibit spaniels with great success. But in live stock his real fancy is for "a little bit of blood" between two shafts. Motor cars and bicycles are all very well, and he has had experience of both, but he thinks them both tame and mechanical when compared with a good fast trotter doing its twelve or fourteen within the hour. Mr. Boswell ought to know, for he has owned a fine selection of real "good 'uns" at different times, and has seen a fair amount of trotting. He was steward at the Alexandra Park and on the Committee of the Trotting Association for many years. Then he knows something of the points of a man with the gloves on, one of his recreations being an afternoon at the National Sporting Club when two "gluttons" are at work dealing out and taking punishment. He almost looks as though he could "put up" his hands himself, quite in a friendly way. All this may not be gunmaking, but it is the making of a man, and if Mr. Boswell had not been a sportsman to begin with, he quite possibly might not be the gunmaker that he is to-day.

We understand that the new central offices of the National Rifle Association, which are now under construction at Bisley at a cost of £4,500, will be ready about the middle of May, in ample time for the great event of the year. By the way, also, the bookings of the various ranges on the ground by volunteer corps and rifle clubs during the present year are said to be exceptionally heavy, every range being fully engaged for practically every date throughout the spring, summer and autumn.

## APPLICATIONS FOR PATENTS.

## SPECIFICATIONS PUBLISHED.

JANUARY 20TH—FEBRUARY 22ND, 1902.

JANUARY 25TH—FEBRUARY 20TH, 1902.

COMPILED BY H. TARRANT.

- 1,504. Ammunition Carrier. H. F. L. Allen.  
 1,553. Machine Guns. A. W. Schwarzlose.  
 1,560. Air-gun Projectiles. C., J. B., E., and H. W. Lane.  
 1,614. Small-arm Sights. O. Lodder.  
 1,753. Sighting of Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 1,776. Telescopic Sights. A. Watson.  
 1,780. Torpedo Steering. C. G. G. Brannerhjelm.  
 1,811. Air-gun Projectiles. C., J. B., E., and H. W. Lane.  
 1,849. Gun Carriages. T. K. North.  
 1,946. Gun Carriage. T. H. Seccombe.  
 1,959. Sights. J. T. Peddie.  
 1,966. Game Carrier. J. Wilson.  
 2,150. Projectiles. F. C. Fairholme and J. E. Fletcher.  
 2,237. Ordnance. H. C. Dunlop.  
 2,256. Ordnance. Sir W. G. Armstrong, Whitworth & Co., Ltd., Sir A. Noble and R. T. Brankston.  
 2,476. Collodion Prepared from Artificial Silk. J. Douge.  
 2,523. Magazine Small-arms. G. M. Brand.  
 2,618. Small-arm Lock Mechanism. R. Bloomer.  
 2,629. Cartridges. E. Jones.  
 2,665. Sight Mountings. B. B. Hill.  
 2,678. Machine Guns. F. W. Moss.  
 2,724. Explosives. C. G. Redfern (Agent for *La Soc. Gen. pour la Fabrication de la Dynamite*).  
 2,746. Range Finding. G. Stewart.  
 2,822. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 2,852. Sighting of Guns. A. A. Common.  
 2,899. Lock Mechanism of Small-arms. W. Baker.  
 2,947. Single-Trigger Mechanism. F. Beesley.  
 2,976. Manufacture of Caps. H. and H. Firmann.  
 3,021. Spring Guns. A. V. Dakin.  
 3,047. Field Gun Carriages. A. T. Dawson and G. T. Buckham.  
 3,064. Projectiles. J. T. Jennings.  
 3,144. Detonators. W. P. Thompson (Agent for *R. H. F. Kennick*).  
 3,145. Magazine Rifles. T. Meacock.  
 3,202. Nitrocellulose. W. R. Hodgkinson and J. B. Finlaison.  
 3,238. Detonating Composition. F. Hess.  
 3,267. Targets. F. L. Lake.  
 3,334. Explosives. J. Wetter (Agent for *The Westfälisch-Anhaltische Sprengstoff Aktiengesellschaft*).  
 3,359. Miniature Ammunition. J. Richards.  
 3,391. Safety Fuses for Blasting. W. F. Bennett.  
 3,524. Torpedo Delivery Doors. F. G. P. Preston and G. C. Ralston.  
 3,535. Range-Finder. B. F. S. Baden-Powell.  
 3,564. Bullets. A. C. McLeod.  
 3,616. Sighting of Howitzers. A. T. Dawson and G. T. Buckham.  
 3,618. Shot-Making Machine. W. H. Pearson.  
 3,621. Gun Mountings. A. T. Dawson and G. T. Buckham.  
 3,726. Time Fuses for Cartridges. C. Röstel.  
 3,822. Machine Gun-Feeder. T. K. North.  
 3,845. Small-arms. H. W. Holland and T. Woodward.  
 3,925. Magazine Mechanism for Rifles. T. Meacock.  
 3,929. Ordnance. G. Ehrhardt.  
 4,031. Detonating Compositions. F. M. Hale and G. W. Bell.  
 4,088. Orthoptics. T. D. Clarke.  
 4,095. Machine Gun Feeder. F. M. Garland.  
 4,108. Percussion Primer. A. T. Dawson and G. T. Buckham.  
 4,148. Magazine Small-Arms. H. H. Lake (Agent for *T. Thorsen*).  
 4,176. Machine Guns. A. W. Schwarzlose.  
 4,178. Wad for Cartridges. L. A. le Couvreur.  
 4,205. Projectile Moulding Apparatus. A. J. Astbury.  
 4,206. Guns. J. B. Kidney.  
 4,213. Tumbler Safety Sear for Small-Arms. R. Bloomer.  
 4,284. Artillery Practice. J. F. Fogerty and E. F. Kelaart.  
 4,344. Gun Cleaners. J. B. Crepau. (Date applied for in U.S.A., Feb. 28, 1901).  
 4,401. Telescopic Sights. T. Thorp.  
 4,532. Breech Mechanism for Rifles. T. R. R. Ashton.  
 4,565. Targets. F. M. Gaudet.
- \* These Applications were accompanied by Complete Specifications.
- 2,127 (1901). **Blasting Fuse Heads.** W. A. and S. R. Malson, Chesterfield. Fuse heads for either high or low tensions, so constructed as to insure the central location of the wire ends within the firing composition. The wires are firmly secured and are safe within the head. The ends of the insulated wires are located in a central hole made in a short tubular plug of rolled paper. This plug with the exposed ends of the wires just protruding, are placed within a paper tube containing the firing composition. A kink in the wire on the underside of the plug prevents the wire being pushed further into the plug. Moulton sulphur is poured into the paper casing, and when solidified this holds the wires and plug in the proper positions. Accepted January 2, 1902.
- 2,934\* (1901). **Apparatus for Testing Straightness of Barrels.** F. Stordeur, Argentine.
- 3,961\* (1901). **High Explosive Projectile.** J. E. Bott and W. K. Webster, Glasgow.
- 4,453 (1901). **Cartridge Belts.** Ellen J. Pennefather, Bristol. A device constructed to hold cartridges within a belt so that they shall not fall out. It consists of a leather thong, which passes around the belt so that it lies over the tops of the cartridge loops. The thong is held by means of metal loops, and is loose enough to allow of the easy withdrawal of the cartridges. Accepted January 23, 1902.
- 4,465 (1901). **Apparatus for Musketry Instruction.** P. G. Christie, Kingston-on-Thames. A device constructed for instructing recruits as to the exact methods of sighting under different conditions according to prevailing atmospheres. The device consists of a representation of a foresight and backsight, which may be moved in relation with each other over a card, upon which is drawn an ordinary regulation target. Accepted January 16, 1902.
- 4,698 (1901). **Holder for Cartridge Belts.** C. F. Greenfield, Bangor. A cartridge holder for attachment to belts, consisting of a box of stiff leather in shape like a truncated four-sided pyramid. The interior of the holder is provided with partitions to prevent the cartridges from falling out. Any convenient number of rows of cartridges may be placed within the holder. The bandolier is preferably made so that it might fit the neck of a horse. A mounted rifleman is by this means enabled to carry a spare supply of ammunition. This belt was fully described and illustrated in our issue for November, 1901. Accepted January 2, 1902.
- 4,770 (1901). **Cartridges for Ordnance.** A. Reichwald (Agent for *Fried. Krupp, Germany*). A cartridge case for ordnance designed to prevent the propelling gases from entering the space between the chamber and the case. One or more of the driving bands on the projectile are made to fit into an enlargement of the mouth of the case. The gases of combustion press this enlarged part of the case tightly against the wall of the chamber until the projectile has left the barrel. The gases are thus prevented from getting back, so stopping any fouling of the chamber or of the breech block. Accepted January 2, 1902.
- 4,783 (1901). **Sighting Apparatus for Ordnance.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and E. W. Lloyd, Newcastle-on-Tyne. Improvements in Captain Scott's gun-sighting apparatus used for practice purposes. The trigger of the firing pistol is electrically connected with a pencil which records upon a moveable target through the medium of an electro-magnet, the direction of the gun when the pistol trigger was pulled. Accepted January 16, 1902.
- 6,513 (1901). **Nitro-Explosives for Ordnance.** Sir W. Crookes. This Specification is a Secret Document.
- 9,311 (1901). **Fuse Head for Electric Blasting.** F. Rinder, Manchester. A fuse head consisting of a cylindrical copper casing, which encloses the end of the electric-igniting wires. These insulated wires are passed through into the head in the form of a loop, and are secured by an insulating cement. The loop is subsequently cut, leaving the exposed ends in

position for sparking. The fuse head is provided with a rim which prevents it being pushed too far down the detonator tube, thus preventing it being forced against the fulminate. Accepted January 16, 1902.

11,169 (1901). **Instructional Targets.** J. A. Stephens, Bridport. An instructional target for drill with range finders and artillery, consisting of an object which is adapted to slide along a taut wire held across the surface of a rectangular board. When the object is made to slide along the wire by means of actuating drums, the ranges, lateral speeds and speeds of approach or departure, as measured by the range-finder, depend partly upon the inclination of the taut wire, and partly upon the speed at which the object is traversed longitudinally. Accepted January 16, 1902.

16,402 (1901). **Breech Mechanism of Ordnance.** A. W. Schwarzklose, Germany. Firing gear for breech-loading guns, in which the drawing back of the striker is effected partly by the striker spring, which, upon the turning of a striker sleeve through the pulling of the trigger cord, forces the striker a certain distance forward. The energy thus imparted to the striker imparts to it enough inertia to carry it forward over the remaining distance between its point and the cap. The spring draws the striker only slightly back after firing, the return movement of the striker sleeve, and thus the full return of the striker, are automatically accomplished during the opening of the breech. Accepted January 16, 1902.

18,829 (1901). **Head Rest for Rifle Stocks.** W. & A. McArthur, Ltd., London (Agents for J. Marsland and J. Gaut, New South Wales.) An adjustable head rest for rifle stocks adapted to be raised or lowered to suit the different positions of the shooter when at various ranges. The rest consists of a part of the comb of the stock, which is cut away. The rest is mounted upon two legs pivoted at their middles. The legs act in a scissor-like fashion, one end of one leg sliding in a slot in the underside of the rest, and the other end engaging a row of teeth in the stock above the barrel. The other leg is pivoted at both ends, one to the back end of the rest and the other to the front of the stock. The nearer the legs are to the vertical the greater is the height of the rest. Accepted January 2, 1902.

22,386 (1901). **Liquid Brakes for Ordnance.** K. Haussner, Germany. A device for regulating the flow of glycerine liquid gun brakes consisting of a valve so arranged as to be worked from outside by the turning of the piston. The section of the passage is capable of increase or decrease, to suit the state of the glycerine, or to allow of a quicker flow for high elevation, or a smaller flow for small elevation. Accepted January 30, 1902.

24,314 (1901). **Slug for Air Guns.** P. Newton, London, T. J. Rosewell, Waltham Abbey, and F. Joyce & Co., Ltd., London. A slug for air-guns constructed with an enlarged back portion, which is adapted closely to fit the bore of the gun, and thus to prevent the escape of air between the slug and the bore of the barrel. In order to afford a better grip for the fingers when handling the slug, the body is milled or roughened, so making it a much easier matter to insert this slug in the gun than to load with a smooth one. Accepted January 2, 1902.

24,730 (1901). **Gun Carriages.** W. L. Wise, London (Agent for The Skodawerke Actiengesellschaft, Austria). A top carriage for ordnance, consisting of a hollow body which surrounds and fits, with a certain amount of play, the moving part of the recoil carriage connected with the rear portion of the gun barrel. Rings are arranged in this hollow body to engage with corresponding surfaces formed on the recoil carriage cylinder. These rings are provided for the purpose of guiding the cylinder. The hollow body also protect the recoil carriage and its mechanism from injury by the entrance of dirt, and from stoppages caused by external shocks. Accepted January 16, 1902.

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

## SELECTED PATENTS.

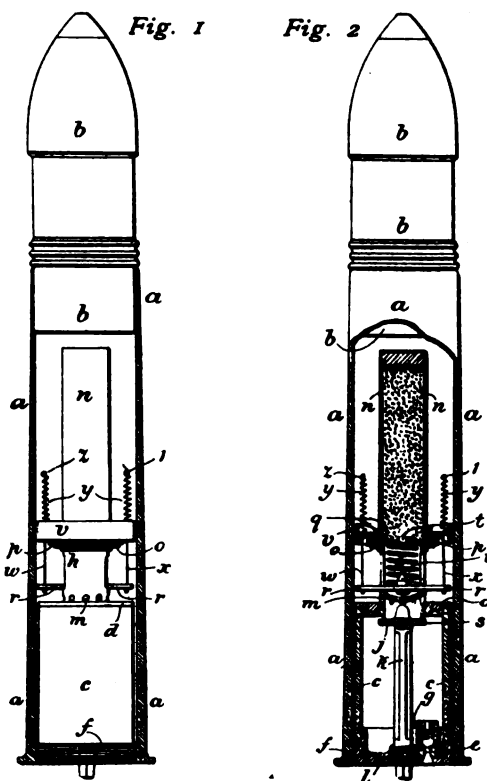
### HIGH EXPLOSIVE PROJECTILE.

3,961 (1901). J. E. Bott and W. K. Webster, Glasgow. A cartridge is described in this patent from which a shell, loaded with

a high explosive, such as dynamite, may be discharged with safety, without smoke, and with little noise.

In the illustrations appended the cartridge is shown in section the internal parts of the cartridge being shown in elevation in Fig. 1, and in section in Fig. 2.

As will be seen from the drawings the cartridge consists of an ordinary solid drawn case *a*, to the front end of which is fixed in the usual way the projectile *b*. Arranged within the cartridge is a metallic chamber *c*, adapted to contain compressed air or gas. This chamber is closed at its top and bottom by the caps *d* and *e*. The flange *f* of the bottom cap is screwed to fit a correspondingly screwed part of the base of the cartridge case. The chamber *c* is thus secured to the case. A non-return valve *g* admits gas into the chamber *c* until a pressure gauge indicates that a sufficient quantity is stored therein. The hollow pillar *h* is screwed into an opening in the top of the chamber *c*. It is formed at its inner end with a valve

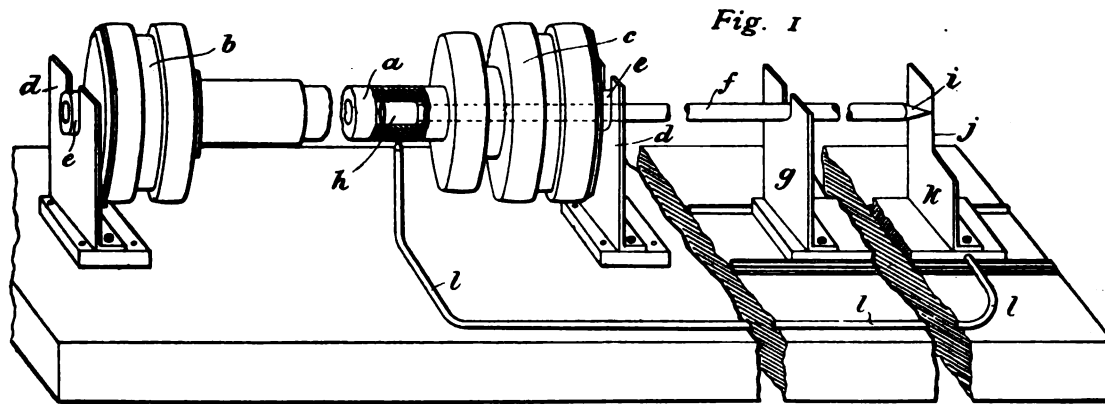


seat *i* for a release valve *j* on the valve rod *k*, which extends through the chamber *c*, terminating below the base of the cartridge with a square part, which is adapted to take a corresponding socket in a firing pin carried in the breech block of the gun. The turning of the valve rod *k* through the screw at *l* opens the valve *j*, so that the gas from the chamber *c* may escape into the body of the cartridge case through the holes *m*. The part *n* is clamped to the top of the cylindrical pillar *h*, and is adapted to contain a propelling charge of cordite or other powder. The chamber *n* is fixed to the pillar by means of the double-flanged ring *o* screwed into the top of the pillar, and by the ring *p*, which rings grip the flange *q* of the powder chamber *n*, and attach it securely to the pillar *h*. The firing bar *r* works in two vertical slots cut diametrically opposite each other in the circumference of the cylinder *h*. The striker *s* is attached to the firing bar, and is held from detonating the cap *t* by the spring *u*. The bar *r* is attached to the diaphragm *v* by the wires *w* and *x*. The diaphragm *v* is a ring which is adapted to work easily up and down within the cartridge case, its inside and outside circumference just clearing the outside of the cartridge case *n* and the inside of the

cartridge case *a*. The wires *w* and *x* terminate above the diaphragm in two springs *y*. The spring-heads *z* and *l* are fixed, so that when carrying or shifting the projectile they prevent the diaphragm moving forward towards the mouth of the case.

The action of the cartridge is as follows:—The cartridge, with its shell attached, as shown, is placed in the breech of the gun, and the breech closed. The firing pin engaging the rod *k*, is actuated, and the valve *j* is opened. The compressed gas within the chamber *c*

must take part in any eccentric movement of the barrel when it reaches the part where the bend occurs. This movement is communicated to the pointer *i* at the other end of the rod, the extent of the movement being exactly equal at both ends, provided the fulcrum plate *g* is moved to the middle of the rod. The roller *h* is cylindrical, but it is permitted to oscillate slightly on the rod end, as will be seen from the enlarged illustration in Fig. 5. The extent of the bend is indicated by the amount the point *e* of the rod *f*



rushes out through the openings *m*, and overcoming the pressures of the springs *z*, *l*, and *u*, causes the diaphragm *v* suddenly to move forward, dragging with it the firing bar *r*. The sudden forward movement of the diaphragm compresses the air in the forward part of the case, and this pressure, combined with the gas pressure, starts the projectile easily, and without imparting any shock to its contents. By the time the projectile has been started up the bore of the barrel, the firing pin has been brought into contact with the detonator *t*. The cordite is then exploded, and the pressure of the gases of combustion are added to the compressed gas and air pressure. The velocity of the shell is thus brought up about to the level of that of an ordinary projectile of the same bore, and the fear of the shock of firing detonating the dynamite within the shell is obviated. Accepted Jan. 2, 1902.

recedes or advances from or towards the tapered edge *j* of the movable plate *k*. The two plates *g* and *k* are movably mounted upon the same base, so that they may follow the movement of the rod *f* through the barrel. A rod *l* is fixed to the plate *k*. The free end of this rod terminates in a pointer situated exactly level with the roller *h*, so that the position of the roller within the barrel is always indicated.

The chucks *b* and *c* are similar in construction except in the methods of barrel attachment. The chuck *b* has a screw socket, to accommodate the breech end of the barrel; and the chuck *c* has a longitudinally split socket *m* adapted to receive the muzzle end of

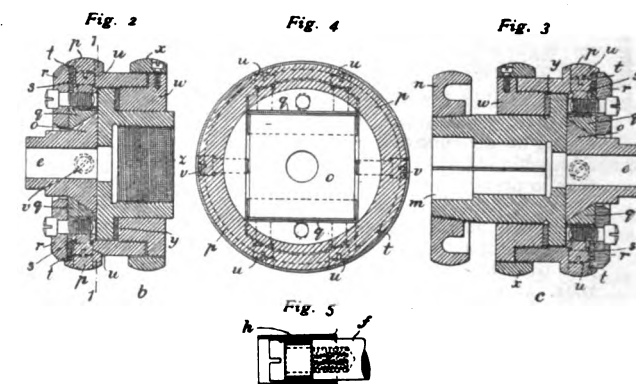
#### APPARATUS FOR TESTING STRAIGHTNESS OF BARRELS.

2,934 (1901). F. Stordeur, Argentine. The apparatus described in this patent is designed to indicate any sinuosities in the bore of a gun or ordnance barrel. The device enables the necessary correction to be made at the exact spot, and with the proper amount of force, since the exact position and amount of the bend in the tube are indicated, together with the corresponding point, on the outer circumference of the barrel.

In the annexed drawings Fig. 1 is a perspective view of the machine, and Figs. 2 and 3 are axial sections of the two chucks in which the barrel is held. Fig. 4 is a sectional face view on the line 1—1, Fig. 2.

The barrel *a* to be tested is held firmly at its ends by the two centering plates or chucks *b* and *c*. The chucks are supported freely in the bearings *d*, *d*, so that the barrel may be turned by the hand of the operator. The chucks are capable of lateral and vertical adjustment to allow the bore of the barrel to be made co-axial with the journals *e*, *e*. When the barrel is turned, therefore, it will be understood that the slightest bend in the bore produces an eccentric movement of its axis at the point where the sinuosity occurs.

The amount of the bend is indicated by the rod *f*, which is supported or fulcrumed so that it is free to rotate in a notch in the movable plate *g*. One end of the rod is provided with a feeler roller *h* of a diameter equal to that of the bore of the barrel; and when the barrel is revolved the roller *h*, working through the bore,



the barrel. A coned tightening screw *n* closes the socket about the muzzle. The journal *e* of each chuck is provided with the dovetailed base *o* (Fig. 4), held in a rectangular aperture in the ring *p*, between the dovetailed clamps *q*. The clamps *q* are held in the rings *p* by the ring *r*, which is secured to the ring *p* by screws. The clamps *q* are provided with flanges *s* which are guided by the ring *t*, so that they cannot shift after being adjusted.

The adjustment is effected by means of the pins *u*, which bear against the backs of the clamps *q*, and by the screws *v*, situated at right angles to the screws *u*. The screw collar *w* screws internally into the ring *p*. The ring *x* is fixed to the collar *w* by means of radial screws. The collar *w* and the washer *y* serve tightly to clamp the flange of the part *z* to the ring *p*, when the parts are centred. Accepted Jan. 2, 1902.

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
CURRENT TOPICS:		LECTURES TO YOUNG GUNMAKERS: XIII.—THE	
The late Mr. James Irvine ... ..	51	CHEMICAL BALANCE ... ..	56
Definite Facts in Gunmaking... ..	51	ROUND THE TRADE ... ..	56
The Special List of Permitted Explosives ... ..	51	EXPLOSIVES TESTING AT WOOLWICH ... ..	60
The late Mr. E. C. Tye ... ..	52	THE GUNMAKERS' ASSOCIATION ... ..	63
Pressure Card ... ..	52	REVIEW ... ..	63
Short Range Practice ... ..	52	APPLICATIONS FOR PATENTS ... ..	64
The Future of Cartridge Loading ... ..	52	SPECIFICATIONS PUBLISHED ... ..	64
LONG RANGE SHOOTING AT TWENTY-FIVE YARDS ... ..	53	SELECTED PATENTS:	
NOTES ... ..	55	Magazine for Rifles ... ..	65
		Revolver Mechanisms... ..	66

## CURRENT TOPICS.

**The late Mr. James Irvine.**—Just as we go to press we hear the sad news that Mr. James Irvine died suddenly at Brighton on Easter Sunday. It is difficult at such short notice to realise what a loss has been sustained in the removal of one who has grown up with the modern cartridge business, and has probably done as much as, or more, than any other individual to create the very high standard of work to which we are all accustomed. The firm of Eley has throughout his life had the benefit of his great enterprise and experience, and although he had many able collaborators, his own work on the practical side stands definitely to his credit. Fortunately he had a son with all the thoroughness he himself possessed, and Mr. J. C. Irvine has for the past ten or fifteen years been so closely identified with the firm that he represents them on every technical question where the interests of the firm are at stake. Our sympathy goes out to the son who has lost such a father, to his co-directors and colleagues who have lost so valuable an ally, and to those in the trade who have lost a friend. We cannot at this moment do more than give expression to our feelings of regret, and we speak of him only as we have known him personally and by repute, since he had carried out his more strenuous work of his life before the present writer first came to know him.

**Definite Facts in Gunmaking.**—We have frequently referred in this column to the subject specially discussed in the current Lecture to Young Gunmakers. On the present occasion we wish to call attention to a more or less novel departure distinguishing it from its predecessors in the same series. We

have taken the line that the gunmaker at every turn of his day's work is called upon to give information or to satisfy himself upon weights and measures of powder charges and so forth. Of course it would be ridiculous on our part were we to suggest that any properly-qualified gunmaker is not fully acquainted with the accurate weighing and measuring appliances in the every-day work of gunmaking. So many powders and bullets can only be identified by their weight that a means of ready reference in this direction will do much to improve one's appreciation of many things at present but vaguely understood. We have, therefore, dealt with the chemical balance as a sort of friend in daily demand for reference upon moot points that are continually arising, and we have shown that the cultivation early in life of a familiarity with weights and measures does much to lay the seeds of a valuable knowledge that will be of inestimable advantage as the years go on.

**The Special List of Permitted Explosives.**—Among those who lived and argued amid the controversies that waged around the question of safety explosives some six or seven years ago, it will be a matter of satisfaction to realise upon retrospection that passions have subsided, and the life of the miner is safer than ever before. Certain explosives claimed to be possessed of a kind of monopoly of the attributes of safety, and all investigations upon the relative properties of different explosives in this connection were to some extent under suspicion of being *ex parte* statements on behalf of one side or the other. However, it fortunately happened that organisations of an independence beyond question made experiments upon well-defined lines, tending to establish the relative safety of various forms of explosives. From the

mass of facts that were published, it became apparent that no argument could disprove the assertion that some explosives were safer than others, and that safety was not in conflict with efficiency. Upon the urgent demands of various inspectors of mines, the question was forced to the attention of the Home Office, and in consequence the Testing Station at Woolwich was established as a logical result of the Act of Parliament that was passed. In an article which appears in another part of this issue, we have endeavoured, in a cursory fashion, to remind our readers of the substantial progress that has been made in the manufacture and testing of truly safety explosives. The fairness of the tests that are conducted have provided miners with a selection of explosives by no means favouring any individual firm, but yet safeguarding the lives of those who carry on their dreary toil underground.

**The late Mr. E. C. Tye.**—A sense of loss and regret followed the announcement early last month that Mr. Ernest Tye had succumbed to the effects of an operation for appendicitis. He had more than a local reputation for his knowledge and influence in connection with rifle shooting. At a very early date after the inauguration of the Birmingham Proof House ranges, he became identified with the formation of a rifle club, which has since held regular meetings on the spot. As a journalist, and as a kind of political agitator upon matters relating to the welfare of rifle clubs, he showed marked individuality. His chief characteristics were boundless energy, a keen interest in all that appertained to shooting, and a peculiar agreeableness of presence that endeared him to all with whom he became connected. Birmingham was his headquarters, and he made guns and rifles his special study since the time when the cycling boom quietened down into a state of routine, not to say stagnation. Little by little, he mastered many of the problems that interest shooting men and gunmakers, so that the notes which he sent up from the Midlands provided a happy reflection of his own acute perceptions and active peregrination. Although Mr. Tye had no connection with this journal, we feel that our columns would be incomplete without some reference to one who was a clear-headed thinker, and by all accounts without a single enemy in the world.

**Pressure Card.**—In our business columns a notice will be seen announcing the early publication of a card recording the pressures for Eley's lead crushers, the figures for which were given in our last issue. As is well known, Messrs. Eley place in every box of their crushers a printed sheet showing the equivalent values, and although these no doubt get well distributed in the course of time, it is astonishing how difficult it is to lay one's hands upon a copy of the table at the moment when it is required. Some cautious individuals have mounted and varnished Eley's printed table, so as to ensure at least one available copy in the laboratory. Recognising the advantage of a properly-mounted card, we took the occasion afforded by the issue of new values to prepare a very carefully-printed edition of the values in large type suitable for reading at a distance of several feet. This sheet we have caused to be mounted upon stiff strawboard and varnished, with cloth edges, in a manner similar to the storage instructions for nitro-compounds, which may be found in many hundreds of gunmakers' premises up and down the country. Every available means has been adopted, including the use of distinctive type, for the proper displaying of the

pressure values, and the result is a card which should be possessed by every gunmaker, whether he be a pressure experimentalist or not. At any rate, the extended adoption of this card will serve to avoid the possibility of firms continuing to work with the old values now that the new ones are formally recognised.

**Short Range Practice.**—The overwhelming proportion of rifle clubs, whose ranges are limited to the standard Morris tube distance of 25 yards, has in the past led to the introduction of all manner of devices for providing effective practice bearing some relation with the open-air work at military distances. Since the rifle club movement is largely patriotic, it is also greatly dominated by military ideas. When we read of civilian rifle club members receiving military rifle drill, we must recognise the tendency that is displayed. The principle of Morris tube firing, which is also that of every other kind of practice ammunition used in Service rifles, is to sight at one spot and catch the bullets at another, the distance between the two being due to a difference in trajectory between 25 yards and the distance for which the sights are set. While the Morris tube ammunition has been reduced in price, by the cutting rates quoted by Government contractors, to a point at which efficiency is seriously impaired, it still commands the market as the approved method of short-range practice with Service rifles. It is only to be expected, however, that in some instances an effort will be made to introduce methods providing greater accuracy of shooting, even at an enhanced price, and hence we find that a large number of devices are in vogue for using the natural rifling of the barrel, and so avoiding the erratic results due to the use of a tube. The method of reloading old cartridges, of which full particulars are given in an article in the body of this paper, is interesting as a proof of the refinements of shooting and sighting which are available for those who desire to go a little more closely into the matter than is possible with the regulation volunteer drill-hall target, and its series of nicks which are converted into targets by the use of blacking.

**The Future of Cartridge Loading.**—Among those who are in a position to judge the working out of the laws of competition in the gun trade, no development is more interesting than that of cartridge loading. It cannot possibly be denied that the best all-round cartridges of to-day are those that are loaded to a strictly uniform standard with a view to giving standard results of the kind which experience has shown to be required by sportsmen. The more that the cartridge is standardised the better equipped is the large loader for dealing effectively with the trade there is to do. He can afford expensive gauges, and he can enforce his demands in the way of a strict specification upon the contractor who supplies the various essentials that go to form the complete cartridge. He alone can afford the expensive instruments that enable a proper estimation of pressure, velocity, and rapidity of ignition to be made, and as a consequence the all-round efficiency of his cartridges is likely to be superior to that of the comparatively small loader, who relies upon more careful methods of hand working and the use of special methods of wadding and loading to satisfy his clients. Of late years the effect of nearly every conceivable variation from standard methods of loading has been studied by the experts, and as a consequence it has been found that no alteration need be made from the

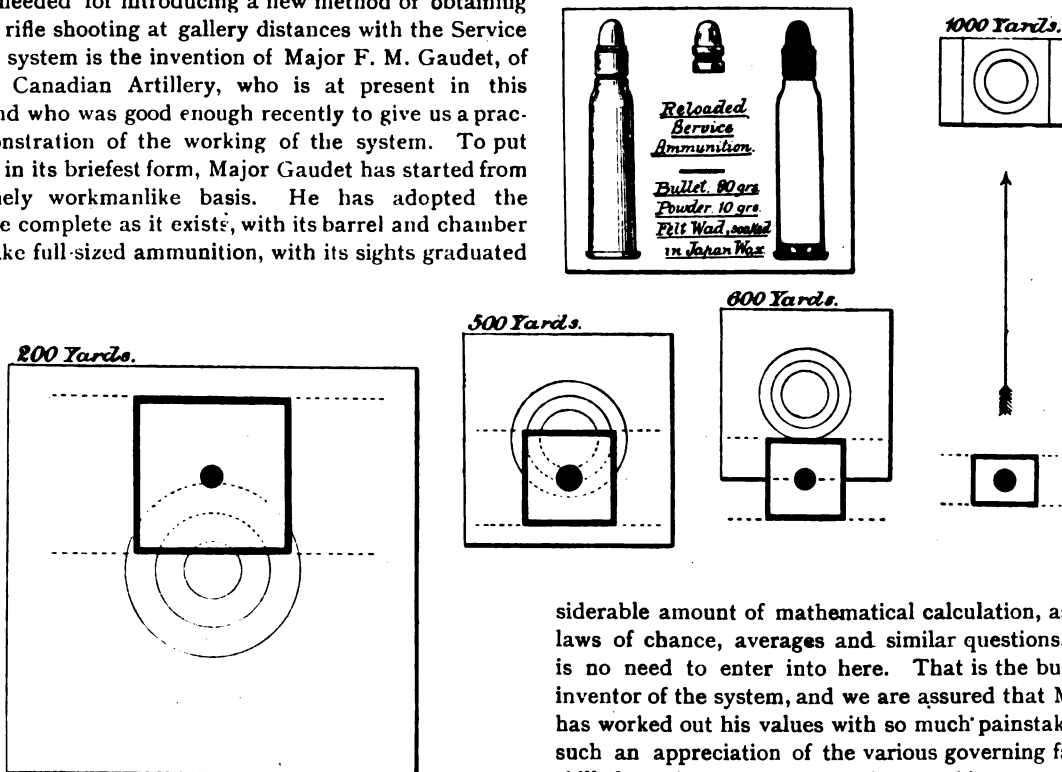


ordinary card and felt wads between powder and shot and the medium or thin over-shot wad. The behaviour of feltine wads and the sundry varieties of cloth wadding are well understood, and where an advantage can be shown the manufacturer is able to give a good reason for its use. In all the other cases it must be remembered that the manufacturers of powder regulate their production to give the best results under standard conditions of loading, and it takes knowledge quite out of the ordinary to produce an improved result by reason of attention to detail. These facts cannot be denied. Hence it would be as well that their full significance should be appreciated.

### LONG-RANGE SHOOTING AT TWENTY FIVE YARDS.

At a time when rifle clubs are so much in evidence, no excuse is needed for introducing a new method of obtaining practice in rifle shooting at gallery distances with the Service arm. The system is the invention of Major F. M. Gaudet, of the Royal Canadian Artillery, who is at present in this country, and who was good enough recently to give us a practical demonstration of the working of the system. To put the matter in its briefest form, Major Gaudet has started from an extremely workmanlike basis. He has adopted the Service rifle complete as it exists, with its barrel and chamber bored to take full-sized ammunition, with its sights graduated

certain type capable of being used in the Service rifle, and the other consisting of a set of targets adapted to reproduce with this ammunition at a range of 25 yards the same quality of accuracy as is obtained from the Service ammunition at the usual practice ranges, such as 200, 500, 600 and 1,000 yards. Given this special ammunition, of a uniform quality, its figure of merit at a range of 25 yards is easily obtained. In the same way, the figure of merit of Service ammunition, at the several ranges already quoted, is quickly arrived at. In order to reproduce at the 25 yards' range an average of marksmanship comparable with that to be looked for at the full ranges, it is necessary to mark out on the target a bull's-eye, inner, magpie and outer, having diameters proportioned to the accuracy of the ammunition used at this short range as compared with the diameters of the same rings on the full-sized target at any given range, with the controlling factor of the known accuracy of the Service ammunition at that particular range. To arrive at the necessary result involves a con-



up to extreme ranges, and with its magazine. There is, therefore, no disturbance of the weight or balance of the rifle, the ammunition used can be worked with magazine loading, and a fundamental principle of the system is that the marksman shall be taught to set his sights to any suggested range. Add to these essentials that the practice will all take place on a range of 25 yards only, and that the actual results approximate to real target practice at full-sized ranges of anything from 200 to 1,000 yards, and it must be admitted that, if these conditions be really fulfilled, Major Gaudet's system makes a promise of becoming a practical success.

The system as a whole is comprised of two distinct elements working in combination, one being ammunition of a

siderable amount of mathematical calculation, as regards the laws of chance, averages and similar questions, which there is no need to enter into here. That is the business of the inventor of the system, and we are assured that Major Gaudet has worked out his values with so much painstaking and with such an appreciation of the various governing factors that a skilled marksman, accustomed to making a certain score at the different ranges, can reproduce that score when practising on this miniature range of 25 yards with its proportionate targets.

So much for general principles. Taking the two elements of the combination in detail, we give in the accompanying diagram a half-size drawing of the cartridge used on the 25-yard range. Major Gaudet's official position with regard to the Ammunition Factory of the Dominion Government has undoubtedly aided him in the production of a cheap form of cartridge exactly adapted to his requirements. As a matter of fact, he employs the fired cases of Service ammunition which has already served its purpose at full-sized ranges. These cases are carefully picked up and returned to the Government Factory, where they undergo the processes

necessary for conversion into miniature ammunition. The fired caps are removed by a particularly ingenious method, which is also simple. They are filled with water, and a plunger which exactly fits the mouth of the case is inserted and pressed downwards with irresistible force. It is a beau-

ful example of hydraulic action, for the water passes through the two fire-holes in the base of the cartridge and pushes the fired cap out of its recess. Following this initial process, the case is thoroughly washed and cleaned. It is then put through a resizing machine which restores it to gauge, incidentally bringing the shoulder of the bottle neck slightly further down towards the base, and forming a cannellure  $\cdot 04$ -in. deep at a distance of  $\cdot 317$ -in. from the mouth of the case. The cartridge is next re-capped, and for this purpose Major Gaudet has so far used the ordinary Service Cordite cap with complete success. His standard charge consists of 10 grains of Curtis's & Harvey's black powder, and he uses a bullet weighing 90 grains, its composition being 1 part of tin to 9 parts of lead. The shape of the bullet is indicated in the diagram. It has an ogival head, which does not merge into the parallel sides, but is, on the contrary,  $\cdot 021$ -in. less in diameter. The bullet is seated on a felt wad soaked in Japan ware, which in its turn is supported all round by the cannellure made in the neck of the cartridge. Ammunition reloaded in this manner has been carefully tested for uniformity, and has proved quite satisfactory. It gives an observed velocity at 30 feet of 759 f.s., and its mean of accuracy at the desired range of 25 yards in  $\cdot 742$ -in.

Turning now to the targets used with this ammunition and the Service rifle at 25 yards, the accompanying set of diagrams shows the set of four for reproducing practice at ranges of 200, 500, 600, and 1,000 yards respectively, reduced to one-eighth the actual size. A point to be mentioned here is, that each set consists of two separate targets. The marksman aims at the black bull's-eye enclosed within a square border, and if his aim be accurate, his bullets strike the skeleton bull's eye shown by a plain ring on the large target. At 25 yards, the black disc has the actual apparent dimensions of the regulation bull at the full range, so that the marksman takes his alignment at an object the apparent diameter of which he is familiar with. He cannot, however, see the marking of the skeleton target on which his bullets strike, so that he can only rectify any errors of aim by noting the hits signalled by the marker, as at full-range butts. It will be noted that a fundamental principle underlying the whole system is to reproduce as nearly as possible the conditions of ordinary range shooting. The marksman has to adjust his sights for each range, and the effect will be seen in the position of the aiming bull on the target. Thus, in firing at the 200 yards' target, with the back sight down to point-blank, it will be noticed that allowance is made for the drop of the bullet of the reloaded ammunition, the aiming-bull being nearly  $\frac{1}{4}$  ins. above the real bull. When the sights are raised for 500 yards, however, the aiming-bull is about  $1\frac{1}{4}$  ins. below the actual point of impact at 25 yards, and this difference is increased to about  $3\frac{1}{4}$  ins. and to  $16\frac{1}{4}$  ins. as the sights are raised for 600 and 1,000 yards respectively. This, however, has nothing to do with the marksman, whose sole concern is to adjust his sights to the proper range, and to align on the small black bull which is alone visible to him. These aiming bulls are separate from the targets, and are intended to be stuck on as they are wanted. It will be seen

that their top and bottom edges are continued to either side by means of parallel dotted lines. These serve to guide the vertical position of the aiming bull as regards the target, but they have another purpose also, for by pasting the aiming bull to the right or left along these parallel lines, it is possible to produce the effect of a wind blowing across the range, and the marksman can be taught to make the necessary allowances. At 25 yards, a deviation of angle of 1 minute is equal to  $\frac{1}{4}$  in. deviation on the target.

It will be seen that the whole outfit is both simple and inexpensive. Given a Service rifle and a barrack-yard, or a back garden with a clear 25 yards range, and it is possible to reproduce practically all the conditions of a 1,000 yards' range, at a trifling cost to the Government or private individual, as the case may be. Major Gaudet gives the price of ammunition he has so far adapted as 1 cent. per cartridge. That is, in our reckoning, 4s. 2d. per 100, or £2 1s. 8d. per 1,000. The targets now in use have been printed in comparatively small numbers, and cost about  $\frac{1}{4}$ d. apiece, including the aiming bull as one with the target. By manufacturing the ammunition in large quantities, the price would no doubt be greatly reduced, and of course the cost of the targets could equally be brought down—though that is a minor consideration, as one could scarcely complain at being called upon to pay a 1d. for a set of 4, for the ranges specified. So far as our own trial of the system is concerned, we must, of course, confine ourselves within certain limitations. The afternoon chosen was not so favourable as it might have been, and the rifle used was not correctly sighted. We found, however, that the ammunition worked perfectly in the magazine, that it gave no trouble in fouling or in leading the barrel. Indeed, the rifle was not cleaned from start to finish, yet the last five shots of a series of 80 fired at the different ranges all fell within a rectangle measuring  $\cdot 70$  in. by  $\cdot 80$  in., which should be a sufficient testimonial to the accuracy of the loading. That they were grouped on the right-hand top corner of the 1,000 yards' target instead of on the bull was a detail, and is attributable to the defective sighting of the rifle—or to the marksman. There was a fairly uniform error at each range. While the tests we made cannot perhaps be considered conclusive, owing to various accidental circumstances, they were sufficiently instructive to show very clearly that Major Gaudet has invented a singularly practical system of training rifle-shots, and one which we consider to be well worth the publicity here given to it.

THERE seems to be considerable activity in the market for supplying air-gun ammunition. This is the third month in succession in which we have had to announce novelties in slugs for air guns, and it is a noteworthy fact that in each case, though the three batches are of different pattern and distinct characteristics, the manufacturers have adopted a standard weight of pellet of about  $7\frac{1}{4}$  grains, 10 pellets of each weighing from 72 to 72.5 grains. The particular pellets now under notice are brought out by Messrs. Lane Bros., and are distinguished by being known as "rotary" bullets. A full description of them is given in our advertisement columns in this issue, and though it may be open to doubt, and certainly difficult to prove, whether they actually do rotate in their passage through the air, it can readily be understood that the provision of wings should tend to accuracy of flight, and direct end-on impact, which, after all, are the real desiderata of the designer.

## NOTES.

**BIRMINGHAM PROOF HOUSE RETURNS.**—We have received an advance copy of the accounts of the Gun Barrel Proof House for 1901, which we are pleased to note show a very prosperous condition of affairs. Leaving extended examination of the actual work accomplished for next issue, it may be mentioned here that in spite of the generous impulse towards technical education which the Proof House authorities initiated, and which has involved an expenditure of revenue of £158 during the months during which the classes have been in operation, the accounts still show a surplus of £563 to be carried forward to the capital account, which now stands at £26,809.

**NOBEL'S EMPIRE POWDER.**—Messrs. Nobel have submitted for our notice a sample of their new Empire powder, which is bulked up equal to black powder, and has a weight which makes the standard charge for the 12-bore cartridge 33 grains. It will therefore be seen that the powder is one of the same class as the Imperial Schultze and E.C. No. 3, which have proved so popular during the past season. The colour of the powder is dark blue, and the granulation is of the ordinary round form, the grains themselves being exceedingly hard, and at the same time flowing nicely through an ordinary hopper loading machine. We will not at this stage speak with more detail, as we should prefer to shoot the powder before committing ourselves to dealing with its actual properties.

**TRADE IN BIRMINGHAM.**—A recent visit to Birmingham convinces us that the gun trade, taking it all round, is not as active as we should wish. The war appears to be mainly responsible for this slackness, and all interested are looking forward to the time when peace is declared. Notwithstanding the complaints as to slackness of business, many gunmakers in Birmingham appear to be suffering from a difficulty in getting what work there is put in hand, the available supply of workmen being insufficient; and it is not possible, owing to the special character of gun-work, to obtain assistance from mechanics in other branches of engineering work. In addition to the difficulty of obtaining a proper supply of hands, the hands themselves have an undue liking for holiday relaxation, due to the facility they find in making up for lost time on resumption of work. Most of us are satisfied with Friday to Monday holiday at Easter, but the many attractions in Birmingham necessitate an extra week for the exhaustion of money by the working gunsmith, who makes a practice of getting in a number of little accounts previous to the holiday. A firm who recently advertised locally for piece-workers on gun parts discovered that there were only twelve men of any particular use out of three hundred applicants. The Birmingham Small Arms Co. has been actively engaged in discharging hundreds of hands during the past few weeks, owing to absence of work. This is no doubt largely due to the end of the financial War Office year, and the consequent exhaustion of contracts. No doubt, however, political influence will set to work to hasten the resumption of manufacturing operations. Meanwhile, of course, the discharged hands cannot be of any use to the ordinary gunmaker, since they are chiefly employed in tending machine operations.

**THE HOTCHKISS ORDNANCE CO., LD.**—It is certain that the shareholders in this company are scarcely to be congratulated on the result of the last year's trading. The net profit amounts to £14,097 only, which is a conspicuous decrease even upon the low figures of 1900. Altogether, there are £18,835 available for distribution, but after providing £5,861 for interest on debenture and debenture stock, £1,500 for service of the sinking fund, £500 reserve for income tax, and £1,126 loss on realisation of investments, there remains only a balance of £9,847, out of which the directors are unable to recommend the payment of a dividend. On the other hand, they propose to set aside £5,000 as a reserve fund for depreciation of the shares held in the American Ordnance Company, leaving the remaining £4,847 to be carried forward. No allowance is made in the balance sheet for depreciation in the value of patents and goodwill.

**THE NATIONAL EXPLOSIVES CO., LD.**—This company is to be felicitated on having passed through the most successful year of its existence, and while for the sixth year in succession the ordinary shareholders receive a dividend of 11 per cent., the preference shareholders, also for the sixth time, have their statutory 6 per cent. dividend swelled to 9 per cent. by the provision entitling them to a proportion of surplus profits. Since, however, the net profits for 1901 were £40,771 as compared with £25,452 in the preceding twelve months, there is a surplus of £15,000, which it is proposed to add to reserve, thus bringing that account up to £30,000. There is a balance, after these apportionments, of £1,507 to be carried forward. With the addition of £6,752 expended on extensions of the factory during the year, and after writing off a certain amount for depreciation, the property account of the company stands at a total of £126,752. It is satisfactory to note that this particular company seems to have benefited from the demand for war materials, however some competitors may be affected by reduced consumption of commercial products.

**THE COTTON POWDER CO., LD.**—The directors of this company are able to lay before the shareholders a most satisfactory condition of affairs. During the year now ended, a sum of £11,000 has been laid out on enlargements of the company's works at Melling and Faversham, which is deducted from the profits, and is in addition to other expenditure for repairs to the works and plant. Notwithstanding this outlay, however, the net profit for the twelve months ending December 31st last amounted to £20,480, to which may be added £1,828 brought forward from 1900. It is proposed to apportion this total as follows:—£1,314 to the payment of a 14 per cent. dividend on the A preference shares, £970 to the payment of a 10 per cent. dividend on the B preference shares, and £4,920 to the payment of a 20 per cent. dividend on the ordinary shares. Of the balance £10,000 is placed to the general reserve fund, thereby increasing it to £20,000, and £2,000 is allotted to the contingency reserve fund, which thus reaches £5,000. There is still a balance of £3,104 to be carried forward. This company is to be congratulated on a most successful year, which marks a most distinct advance even on the favourable results of previous years' trading, and which is certainly more fairly attributable to perfection of business organisation than to any exceptional prosperity in the explosives industry.

**MR. LAWRENCE'S RETIREMENT.**—Mr. James J. Lawrence, who retired from the service of Colt's Patent Fire-Arms Manufacturing Co., Ltd., on the 31st ult., had been connected with the company for over forty-five years. He was first employed by the late Colonel Samuel Colt, at his factory, Thames Bank, Pimlico, in 1853, and afterwards at the London offices, receiving the appointment of manager in 1897. By his kindly manner and never-failing courtesy, Mr. Lawrence gained the esteem and regard of all with whom he came into contact. The Colt agency has always occupied a position of its own in the gun trade. Unlike other agencies, it is run for the sole and only purpose of supplying the goods of the parent concern. Many other American agencies are taken over by the retail or wholesale dealers who are not dependent on any one individual source of income. The



result of the Colt method of conducting business in London has been that one invariably met with a courteous reception when making any enquiry concerning the firm's specialities. In addition to the splendid stock of samples always in hand, the officials at Glasshouse Street are in excellent touch with headquarters, and would always oblige by putting an enquiry through if the question was not one to be answered off-hand. Mr. Von Oppen and Mr. Lawrence vied with one another in showing their enthusiasm for pleasing the firm's customers and friends, and we therefore regret the more keenly that the former gentleman's retirement some five years ago should be followed by that of Mr. Lawrence at the present date.

Mr. W. P. Jones, of Whittall Street, Birmingham, has recently introduced a new apparatus providing running targets for practice at moving objects, which is suitable for either gun or rifle, and gives a choice of sport ranging from a rabbit to a deer, to say nothing of a running man. The track is laid in an undulating form, and arrangements are made for regulating the speed of the moving object in accordance with the habits of the particular kind of "game" put up. The targets are of cast steel for shot guns, and of millboard or canvas for rifles, and a track of 60 or 70 yards in length can be laid down. The apparatus is called the "Universal" Interchangeable Target, and the price of the whole equipment is extremely moderate.

## LECTURES TO YOUNG GUNMAKERS.

### XIII.—THE CHEMICAL BALANCE.

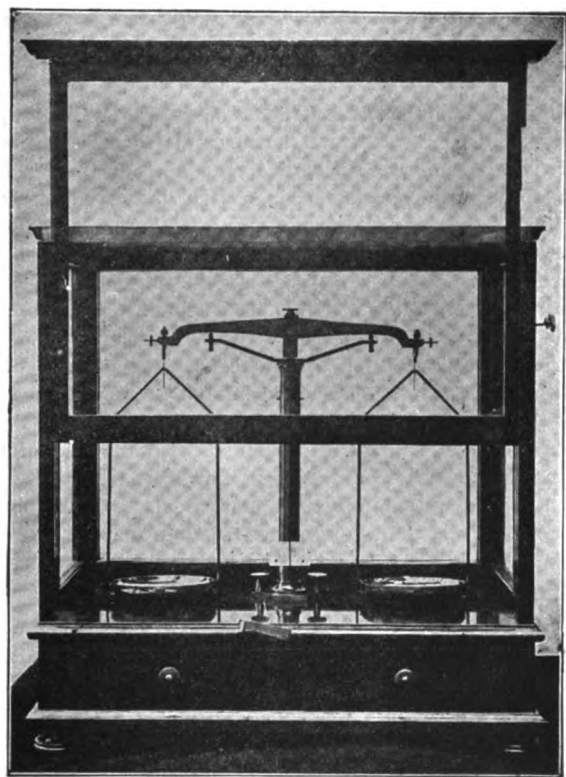
It follows apparently as a necessity that the course of lectures to young gunmakers appearing in these columns should be largely concerned with the scientific side of the industry. As a matter of fact a great deal connected with the behaviour of fire-arms necessarily involves the understanding of scientific laws. It is, therefore, by way of a change that we have decided to touch upon a very elementary subject in the present lecture. It will suffice to maintain the series until such time as a fresh course, dealing with a more intricate question, has been properly prepared.

The chemical balance is a term applied to a pair of accurate scales, though it is generally regarded as heresy to use the word "scales" in connection with anything so accurate as a laboratory appliance. Whether or not we are right in attributing the word scales to those machines used for weighing merchandise, in which it is necessary that the material being measured out shall bear down its side of the beam, we do not know, but at any rate the chemical balance may be distinguished from the grocer's scales by the fact that the equality of the two loads is demonstrated either by the beam maintaining a horizontal position, or by its swinging see-saw fashion an equal amount each way. To the young gunmaker the possession of an accurate balance is a guarantee of one of the most effectual educational mediums possible. By its use he can speak of definite quantities with a certainty not otherwise to be attained. At every step in his daily vocation he deals with weights and values, which, if he is to know his business in a practical manner, must be real living actualities with a definite significance. The man who does not know the number of grains to an ounce, nor the relation of the various scales of weights and measures, is hopelessly at sea when dealing with guns and ammunition. In order, therefore, that a few of the more obvious relations may be made clear we will explain the manipulation of the chemical balance and some of its applications to the every-day business of the trading gunmaker.

In the matter of purchasing a chemical balance one cannot to one's advantage be patriotic. English firms are not noted for the production of handy and efficient instruments at an economical price. On the other hand, the Continental firm of Becker supplies balances at prices ranging from 15s. to many pounds. The use of these balances is so universal in the gun and powder industries, that we feel no apology to be necessary for having referred to them by name in this column. All the large ammunition manufacturers have dozens of these balances at every one of their factories, and a little instrument can be purchased for the very small price of 25s. This instrument may be met with wherever powder charges are weighed. It will turn to the one-hundredth part of a gram, and it is mounted on an adjustable tripod, enabling the plum-line levelling arrangement to assume a vertical position. In addition to this, there is a small thumb-screw, the turning of which enables the user to compensate for wear and tear by adjusting the beam so that it shall balance accurately on its fulcrum. It follows as a matter of course that a catalogue price of 30s. and a net sale value of 20 per cent. less, will not allow for anything extravagant in the way of agate pivots at the vari-

ous suspending points of the beam and scale pans. But at any rate, the absence of these refinements does not detract from the substantial accuracy of the instrument, and the fact that it will perform its functions many thousands of times before the need arises for replacing it with a new one, is a sufficient recommendation according to our way of thinking.

Perhaps a more convenient form of balance for the occasional use that a gunmaker's business provides for will be one of similar type to that already described, but mounted in a glass case, protecting it from dust, damp and rough handling. An illustration of a balance of this description is here given, and the extra cost of the case is fully justified in view of the greater practical convenience involved. The uncovered balance, on the other hand, is a bench instrument, more suitable for the constant use it would receive in the loading shop than its more expensive and more carefully protected proto-

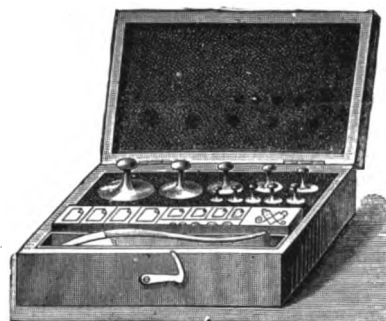


type. Therefore, both forms of the chemical balance have their advantages, and it will be necessary for each person to decide for himself which will best suit his own particular kind of work.

The next essential after the chemical balance has been procured is one or more sets of weights. Here it is necessary that a word of caution should be spoken. Many cheap sets of grain weights are sold by those who supply the photographic amateur, and others not particular to a few per cent. inaccuracy so long as the price is moderate. We have known a 200-grain weight as much as 30 grains out, while the error in the other weights of the series was proportionately nearly as great. Half a guinea represents the very cheapest price at which a reliable set of grain weights can be obtained. A mahogany case containing the following set of grain weights, together with a pair of tweezers for their more convenient

handling, can be purchased for 12s. 6d.:—1,000, 500, 200, 200, 100, 50, 20, 20, 10, 5, 2, 2, 1, .5, .2, .2, .1, .05, .02, .01. We give an illustration herewith of a rather superior case of weights, which are gold-plated so as to protect them from alterations due to corrosion; but the ordinary quality weights, which we have described as suitable for the work of the gunmaker, are made in brass for those of 20 grains and upwards, and aluminium for the smaller sizes. The utility of the last-mentioned metal for this purpose consists in the fact that for a given weight there is a comparatively large piece of metal to handle, and furthermore it resists the tendency to tarnish almost as effectively as gold itself. Assuming now that the young gunmaker has expended a portion of his savings on an instrument that will do a great deal to further the advance of his knowledge throughout all stages of his career, we will proceed to a more careful explanation of its practical working.

The English weights and measures are admittedly of a very complicated character. The gunmaker speaks of the weight of his gun in pounds and ounces. He weighs his shot charges by the ounce, his black powder charges by the dram, and his smokeless powder is judged according to its weight in grains. Here there appears to be a medley of confusion, which is no doubt the cause of much ignorance and also much bad work in the loading of cartridges. There is, however, a connecting link between pounds and grains which is easy to remember



and which practically removes every difficulty. 7,000 grains troy equal one pound avoirdupois. The troy grain need not specially be distinguished from the apothecary's grain, nor need the troy table be taken into account. Measurements in grains deal only with grains, even if there be a thousand of them. Hence the grain, in terms of which the weight of powder and bullets is stated, is a value standing by itself, but bearing a relation to the pound weight, which latter is universally used in British commerce. Bearing in mind that the chemical balance provides a means for accurately weighing all quantities up to about two ounces, it would be as well for the student to copy out in his note-book a table of values showing the number of grains to an ounce and various fractions of an ounce. As a matter of fact, a pound being represented by 7,000 grains, one ounce can be shown to be equal to 437.5 grains, viz., one-sixteenth of 7,000, and the black powder dram is one-sixteenth of an ounce, or 27.3 grains.

In a similar manner the equivalent for one and one-eighth ounces will be 492.2 grains. As a matter of practical convenience, however, it will be found better in dealing with shot charges of one ounce and more to state the number of complete ounces separately from the extra grains representing the sixteenths and eighths. The sixteenth of an ounce is equal to 27.3 grains, and one-eighth of an ounce is 54.7 grains. When, therefore, the young gunmaker desires to check the weight of

a charge of shot to ascertain whether the loading machine is doing its work properly, or whether the shot conforms with nominal size, he will find it more convenient to state his weight in ounces and grains. In order to obtain an accurately adjusted ounce weight, it is sufficient to place 437½ grains into one side of the balance and an ordinary ounce weight in the other. By a process of careful filing, or by the use of soft solder combined with filing, the ounce weight can be regulated so as to be accurate to the one-hundredth part of a grain. It may be argued that this degree of accuracy is quite unnecessary in dealing with shot charges, but as a matter of general principle it is as well to have one's weights as true as the balance will allow. Having such a weight the operator can place the one-ounce weight in his scales, and can record the remainder of the charge in grains. In this way he will find it more easy to remember the various weights for the standard shot charges in general use, and the process of checking off the loading operations will be the more easily accomplished.

So far we have dealt chiefly with the weighing of shot charges. As a matter of fact, the adjustment of powder weights is even more important, and the young gunmaker can apply his knowledge both to increasing the accuracy of loading and to the study of the relative cheapness of various kinds of powder, bearing in mind the weight of the standard charges. In dealing with the loading of smokeless powders the young gunmaker must, like his elders, possess himself of one of the sheets of loading cards which are sold at the offices of our contemporary, the *Sporting Goods Review*. These cards give particulars of the standard charges with every kind of smokeless powder for the leading sizes of cartridge. With one powder is required a charge of 33 grains for the standard 12-bore cartridge, another 42 and a third 26. It is an interesting little problem in arithmetic to calculate the relative values of the different powders, bearing in mind the relative charges that are necessary for accomplishing the same amount of work. This may be termed the economics of cartridge loading, and as science is largely applied to commercial ends, we make no apology for introducing such a subject.

As regards the accuracy of work by any given cartridge-loading machine, it must be remembered that there are two directions in which this accuracy can be demonstrated. The one is that a machine shall be capable of throwing a uniform charge round after round with a minimum of variation. The other is that the average value of the charges so thrown will agree with the nominal charge required for the cartridges under treatment. In other words, it is necessary to test for conformity as between one charge and another, and also for a general uniformity of all the charges with the standard. Most cartridge loaders claim publicly that the greater part of their living hours are spent in checking the accuracy of the charges in the cartridges they supply. It is interesting as a matter of personal information to check off such claims of perfection by means of actual examination of the results produced. All experimental weighing of powder charges should be carried out to the nearest one-tenth of a grain, and the individual value of a series of charges should be carefully set out in a note-book, and their average taken. The relation of this average to the nominal charge should be noted, as also should the amount of divergence of the highest and lowest rounds from the midway value. When a loading machine is once settled down into steady work, and the operator has

acquired the power of regular manipulation, the greatest variation on either side of the mean should not be more than ½ of a grain. Many of our best loaders maintain this extraordinary level of accuracy in individual batches of cartridges they deliver in the ordinary course of business, and such a result is its own testimonial for the care that is exercised in checking off the operations of the loading shop. Others who talk about the accuracy of their loading to the fraction of a grain—a vague phrase that means very little—are probably only acquainted with a very crude form of weighing machine, to judge by results. Probably their weights are inaccurate as well, and hence crude appliances lead to an equal crudeness of result, and overcharges and undercharges of from 10 to 20 per cent. are thus accounted for. In these days of strenuous competition in cartridge-loading a practical gunmaker cannot afford to give a single chance away, and hence our reason for urging the younger members of the craft to acquaint themselves with the use of the chemical balance.

(To be continued.)

A POLYGLOT PRICE LIST.—Messrs. J. P. Clabrough & Johnstone have issued an elaborate catalogue of their sporting and military guns and rifles, revolvers, &c., and the necessary accessories of the sportsman, in a style that might be commended to the consideration of others in the trade. The list consists of some 60 odd pages, and is profusely illustrated with examples of the firm's goods, but the most noticeable feature consists in the fact that the whole of the letterpress is given in three separate languages, English, German, and Spanish, thus appealing to the three great markets of the world. This firm is to be congratulated on its enterprise in thus boldly encountering one of the chief drawbacks to British trade extension, which has so often formed the text of Consular reports. We would suggest, however, that prices also should be expressed in foreign equivalents, and we note in the Spanish text that, in a few cases, the translator seems to confuse the difference between four-stripe Damascus and Krupp steel in describing the barrels.

THE ROSS-HARRIS RIFLE MAGAZINE CO., LD.—We have received the draft prospectus in connection with the formation of this company, the capital of which consists of £85,000, divided into £35,000 in ordinary, and £50,000 in deferred shares. The deferred shares will not rank for dividend in any year until the ordinary shares have received 5 per cent., after which the deferred shares will be entitled to take up the profits to the extent of 5 per cent., and thereafter the two grades of shares will rank *pari passu* for any further dividend. This company has been formed for the purpose of acquiring the patents in connection with the Harris magazine, the Edwards magazine, and the Ross lifter, three inventions relating to magazines for rifles, which have been selected by the Small Arms Committee of the War Office for trial at Hythe. There is also a special form of belt and bandolier suitable for use with this type of magazine, in which the company possesses a half-interest. The magazines in question are capable of application to all types of bolt-action rifles, whether for military or sporting purposes. Profits are estimated as being derived from Government purchases of the rights, royalties, licences, and the sale and fitting of magazines to rifles. The company proposes to have its goods manufactured for it, and to own nothing more than a fitting shop.



## ROUND THE TRADE

Messrs. Moore & Grey's new address is 8, Craven Street, Strand, W.C.

Mr. W. D. Barlow, gunmaker, of Bedford and Norwich, has now opened premises at Cambridge.

Mr. J. Goodman, who was formerly with Messrs. Moore & Grey, is now, we understand, representing Messrs. F. Joyce & Co., Ltd.

We are pleased to learn that Mr. W. W. Greener has put in hand for the coming season no fewer than 3,000 of the '310 Sharpshooters' Club rifles.

The Gunmakers' Company have recently acted up to a good precedent in making a donation of £5 to the poor-box of the Southwark Police Court.

The Newcastle Chilled Shot Co., Ltd., is about to be wound up voluntarily, Mr. John Roberts and Mr. Charles Humble, of 12, West Street, Gateshead, being appointed liquidators.

The late Lord Dufferin was well-known as an enthusiast on rifle-shooting, and many years ago arranged a series of All-Ireland Championship matches, which were shot in his grounds at Clandeboyne.

The Acting-Master of the Gunmakers' Company, and other representatives of the same body, were present at the banquet given by the Lord Mayor to the Masters of the City Livery Companies on the 12th ult.

Mr. H. Beesley, formerly with Mr. F. T. Baker, has, we understand, been appointed manager of the London branch of the Webley & Scott Revolver and Arms Co., Ltd., in the place of the late Mr. J. Harriss.

We understand that Mr. Arthur Chamberlain, jun., the son of the well-known chairman of Messrs. Kynoch, Ltd., has taken up his position as head of the sporting department of the company's business at Witton, and will in future exercise general supervision over that department.

Messrs. Ellis Bros., of 16, St Mary's Row, Birmingham, is the name of a new firm that has recently started operations. The active members of the new business were connected with Messrs. Richard Ellis & Sons, which was one of the three firms that amalgamated to form the Webley combination.

It is with regret that we chronicle the death on the 9th ult., at the age of 86, of Mr. Thomas Bentley. The deceased gentleman was a member of the firm of Messrs. Bentley and Playfair, of Birmingham, and had been associated with the gun-making industry for practically the whole of his life.

The directors of Messrs. S. W. Silver & Co., and B. Edgington, Ltd., recommend a dividend at the rate of 11 per cent. per annum for the six months ended December 31st last, thus making with the interim dividend already paid an average of 8 per cent. for the year. There are £386 to be carried forward.

We understand that the French War Department has decided to adopt for use in the army the woven cartridge belt invented by Brigadier-General Anson G. Mills, retired, U.S.A. The contract will most probably be given to the Mills Woven Cartridge Belt Co., of the United States, which concern has a factory in Paris.

Col. Sir C. E. Howard Vincent, commanding officer of the Queen's Westminster Rifles, has approved the plans furnished by the architect of the N.R.A. for the new Queen's House at Bisley, which is to take the place of the existing structure. The "Queen's Lodge," as it is termed, will be ready for occupation about the end of May.

A company, with a capital of £1,500, in £1 shares, has been registered under the title of the Hull Rifle Range and Land Co., Ltd., its object being primarily the promotion of skill in rifle shooting, for which purpose it proposes to acquire land suitable for a rifle range. The registered offices are at Colonial Chambers, Land of Green Ginger, Hull.

The Middlesex Gun Club opened its new season on the 15th ult. under most favourable auspices. Members turned up in good numbers, and competed freely in the various

events. The weather was quite spring-like, though a somewhat high wind tended to introduce an element of uncertainty into the shooting which was perhaps not altogether welcome.

At the Royal Aquarium recently, a Herr Fass has been showing some remarkable experiments with electrical waves. One of the most startling consists in the explosion of a powder charge by means of wireless telegraphy. It does not follow, however, that this means a realisation of the idea of exploding warships' powder magazines by means of apparatus fitted on another vessel or on shore.

Our American contemporary, *Shooting and Fishing*, is responsible for the statement that a new company has been incorporated at Newark, N.J., under the style of the Remington Metallic Cartridge Co., which has no connection with any of the established cartridge companies, nor with the Remington Arms Co., despite the fact that Mr. Eliphalet Remington, of Ilion, N.Y., is president of the new company.

The Swansea Safety Fuse Co., Ltd., have applied for the registration as a trade-mark for a safety fuse of a pictorial device representing a soldier standing at attention, in conjunction with wording indicative of the brand. The essential particular of the trade-mark is the combination of devices, and the applicants disclaim any right to the exclusive use of the added matter.

Messrs. Schwarte and Hammer request us to notify that the old-established business of Messrs. Aug. Schriever and Co., of Liège, manufacturers and dealers in all kinds of arms and ammunition, has been taken over and will be continued on the same lines by Mr. O. Ganzenmüller. The style of the new firm will be O. Ganzenmüller, succ. d'Aug. Schriever and Co., and Messrs. Schwarte and Hammer will retain the representation of the firm in this country.

We cannot say, in the absence of detailed statistics, whether care has recently brought about an increase in the death-rate of cats, but they certainly seem to be unequal to their duties at present. At least, this may be inferred from the information given us by Messrs. Lane Bros., to the effect that a number of large wholesale firms are buying that firm's air-guns for the purpose of killing the rats that do such damage to their stocks.

The firm of I. Hollis & Sons, of Lench Street, Birmingham, is now the richer by virtue of the admission into partnership of Mr. Harry Howard Smith and Mr. Robert J. Peterson. These replace the two Mr. Tates who died, the one in November, 1900, and the other in October, 1901, leaving Mr. Northwood for the time being the burden of carrying on the business unaided. We trust the new partners will collaborate as successfully as did their predecessors in maintaining the reputation of the firm for business enterprise in the supply of a high quality of fire-arms.

It is evident that the worst of the pressure that has been experienced in the supply of war material, and especially as regards small-arms and their ammunition, consequent on the South African trouble, is now over. We understand that the Government factory at Woolwich is reducing its staff in accordance with the laws of supply and demand, while the contracts given outside for military rifles are now so normal in character that the Birmingham Small-Arms Co., Ltd., have begun to bring their *personnel* down to a peace footing.

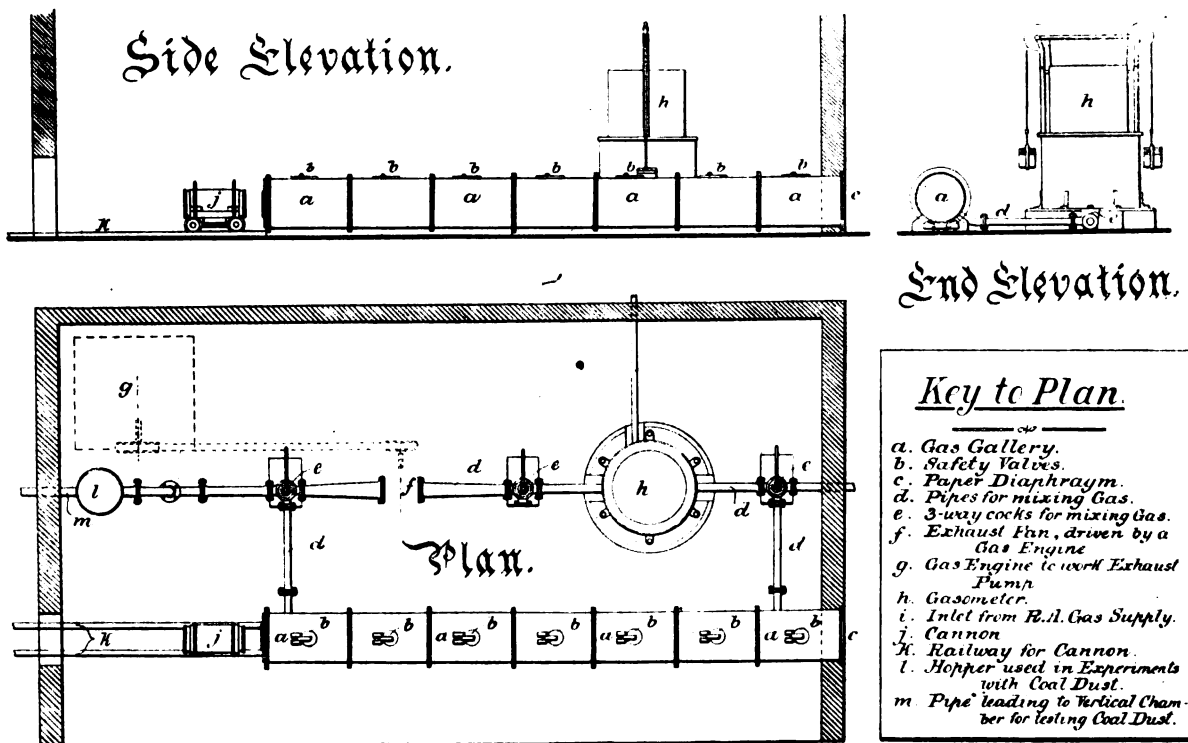
According to the Board of Trade Returns for the two months ending February 28th, under the heading of "Arms, Ammunition, and Military Stores," small fire-arms, to the number of 17,706, were shipped abroad, as compared with 23,852 and 16,011 for the corresponding periods of 1901 and 1900 respectively. Shipments of gunpowder were relatively small, the total for the first two months of the year being only 7,784 cwts., which is a distinct decline from the totals of 8,988 cwts. and 10,109 cwts., which were sent abroad in the same periods of 1901 and 1900. This declension is also shown strongly in respect to the various unclassified items which are grouped under the heading of "All other kinds," and which amounted to a value of only £188,250 for the two completed months of the present year, as compared with values of £387,982 and £273,058 for the corresponding months of 1901 and 1900 respectively.

## EXPLOSIVES TESTING AT WOOLWICH.

It may be remembered that in our issue of May, 1897, we gave a brief illustrated description of the testing station for explosives which was then in course of installation at Woolwich. The station was the direct outcome of a special Order in Council in connection with the Coal Mines Regulation Act, and was established by the Home Office authorities, and placed under the control of H.M. Inspectors of Explosives. The need for some such institution conducted under Government auspices was distinctly felt, as providing a complementary adjunct to the laboratory work in connection with the testing and analysis of commercial explosives, which have for long been so ably conducted by Dr. A. Dupré F.R.S., the chemical

erected by the Westphalian Miners' Provident Society, of Bochum, at Schalke. In the meantime, in 1888, under the auspices of the North of England Institute of Mining and Mechanical Engineers, a Flameless Explosives Committee was organised and placed in possession of a fine plant for experimental purposes.

So much for the previous history of testing stations, upon one or other of which the Government station at Woolwich was doubtless modelled. It should be remembered, however, that the Home Office installation is provided for judicial, not for experimental purposes only. On that account it is perhaps somewhat less complex in its mechanism and more restricted in its scope than some pre-existing apparatus. It is fitted, in effect, for the special purpose of making certain well-defined tests, no explosive being accepted for trial, even experimentally, until it has already been placed on the list of



HOME OFFICE TESTING STATION, WOOLWICH.—DETAILS OF GAS GALLERY.

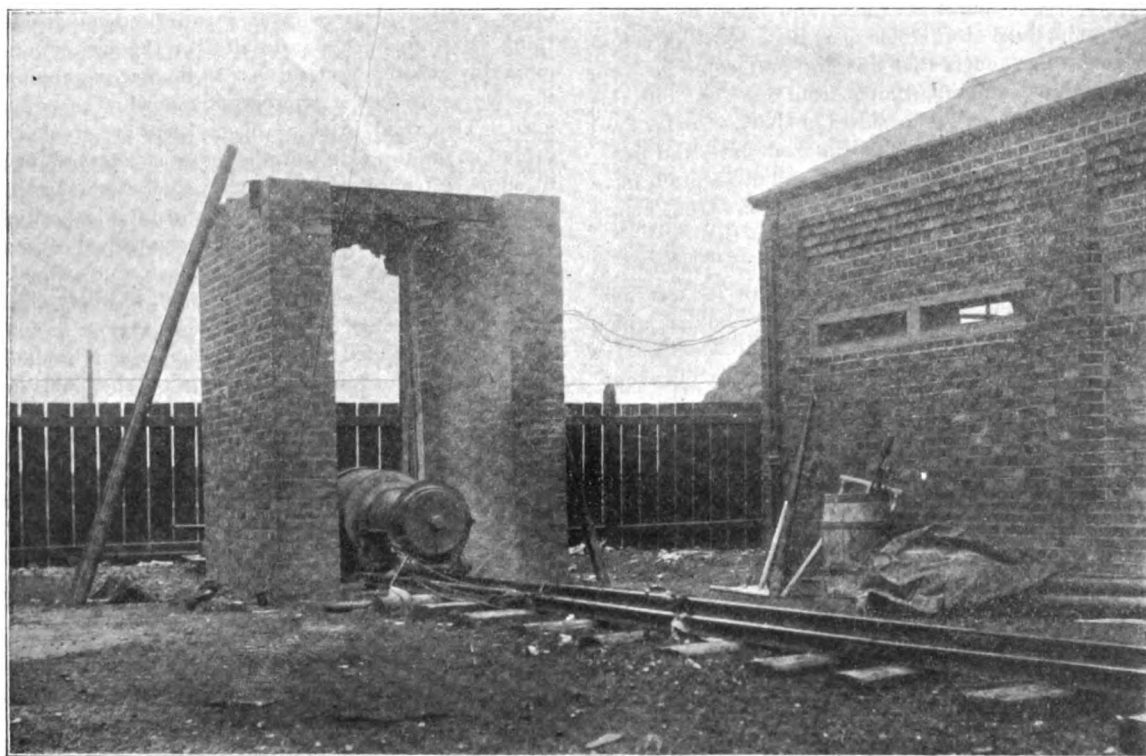
adviser to the Home Department. Already testing stations had been provided in other countries. For example, in our issue of January, 1895, we described and illustrated an installation at Bochum, in Westphalia, which was originally erected at the expense of the State in 1882. After Dr. Schon-dorff had completed a series of investigations on behalf of the Prussian Fire-damp Commission, comprising some thousands of experiments, the plant was subsequently taken over by the Mining Association of Westphalia. Another experimental station was erected at Neunkirchen, in 1884. In France, a commission was appointed in 1887 to study the questions involved in the use of explosives in fiery mines, and this brought about the erection of a testing apparatus at the Sevran. Livry Powder Mills. In 1894, Herr Bergassessor Winkhaus conducted many valuable experiments with explosives by means of a plant consisting of a gas gallery and other requisites

Authorised Explosives issued by the Home Office. The station was established in full working order under the charge of Captain Cooper-Key, in May, 1897, and was then arranged much in the form shown in our issue of that date. Captain M. B. Lloyd took it over in 1898, and brought about certain improvements in detail which were suggested by experience, and in 1899 Captain A. P. H. Desborough succeeded to the post, and still remains officer-in-charge of the testing station. Through the courtesy of Captain Desborough we were recently enabled to pay a visit to Woolwich, and to see with our own eyes the extent of the plant and the general character of work undertaken by that capable officer.

Though an illustration of the apparatus was given in our notice of the station already referred to, certain modifications have been made, mainly by the present officer-in-charge which render a fresh diagram at least desirable. As originally

installed, the plant included a special apparatus for the testing of coal-dust mixtures, and the arrangement adopted for that end was duly shown in our issue of May, 1897. This is still in existence, but it is found that the test can be conducted quite as successfully in the open as within a closed chamber, and on that account, and because of certain difficulties inherent to the now disused system, the apparatus is practically disconnected, and may be omitted from our illustration. At the outset, a strong concrete wall was built up at the end of the gas chamber by the side of the gun, with the object of protecting observers from any risk in the event of a charge bursting the gun. This was, however, found to be quite a needless precaution, since the construction of the gun is such as to render a burst physically impossible under any conceivable

and at the same time acting as sight-holes, by means of which any issue of flame may be detected. Captain Desborough has also utilised one of these valves for the ignition of the gun-cotton tell-tale. Originally, this tell-tale was placed outside the end of the gas-chamber, but in that position it was exposed to the weather, and also liable to be struck by the tamping, which issues from the chamber with considerable force at each shot-firing, of which more anon. Under such circumstances, the action of the tell-tale could scarcely fail to be erratic, depending as it did on various accidental surroundings. An alternative was suggested of providing a subsidiary chamber for the express reception of the gun-cotton tell-tale; but this was found to raise other difficulties. Captain Desborough has hit upon a scheme which seems to provide against all con-



HOME OFFICE TESTING STATION, WOOLWICH.—MORTAR FOR TESTING BALLISTICS.

conditions, while the intervention of the concrete screer had the disadvantage of preventing observation of the recoil of the gun and any phenomena that might call for notice. The concrete wall, therefore, has been removed.

In its present form, therefore, the gas-gallery and its accessories are practically as shown in the accompanying diagram, and are contained within a shed possessing three walls and a roof, the fourth side being entirely open, and thus allowing of full observation from the shelter of the main building of the station, which is a combination of laboratory and workshop. The gas-gallery consists of a long tube, the dimensions of which are 27 ft. by 2 ft. 3 ins., built up of seven lengths of flanged boiler plate. Over the centre of each section is fitted a manhole with a heavy lid, these serving as safety valves in the event of an explosion developing more force than usual,

tingencies. He has removed one valve, and closes the manhole for each shot with a sheet of varnished brown paper, which is held in place by means of a heavy ring of lead. Above the paper is a wire bracket, to which the gun-cotton is attached, and it is found that in this position the tell-tale acts perfectly in registering an ignition of the gas by explosion. It has, in fact, acted perfectly with only a 7 per cent. mixture ignited by a powder fuse. At the same time it possesses the great advantage of being under cover and out of the line of fire by the clay tamping.

One end of the gas-gallery is closed by a wrought-iron disc, having an orifice in its centre to take the muzzle of the cannon. The cannon itself is a very strong piece of mechanism, consisting of steel tubes bound round with wire, and could scarcely be burst by any charge that its bore would accommodate

However, the lining tube requires constant renewal. When the Special Test was instituted on October 18th, 1899, the large charges that were employed caused the failure of two of the existing guns in rapid succession, and a new and heavier gun had to be built for the work. The Royal Gun Factory are responsible for the execution of the work, and have produced a very strong arrangement; but even now the life of the lining tube barely exceeds 80 rounds. At the other end of the gas chamber is provided a diaphragm of varnished paper to enclose the gas mixture. This, of course, has to be replaced at each test, as, even if no explosion occurs, the tamping charge is projected through it with great force. In fact, the force and penetrative power of the tamping, which ordinarily consists of about 9 inches of dry, finely-powdered pottery clay well rammed, is one of the most remarkable features of the tests. Beyond the end of the gallery is built up a bank of solid concrete, about four feet thick, and faced by a one-inch iron plate inclined at an angle of 45 degs. to the direction of fire. It might be thought that this stop-but would be proof against any amount of bombardment from dry clay, but this is far from being the case. The series of charges so far fired have punched a large hole through the iron plate, and penetrated nearly a yard through the backing, and incidentally have cracked and bulged the whole mass of concrete, so that before long the entire stop-but will require reconstruction.

Having explained the use of the gun and gas chamber, it remains to see how the latter is provided with its test mixture. In close proximity to the gallery is a gas-holder, which is connected with the main supply of the Royal Arsenal Gas Works. It was so proportioned with regard to the cubical contents of the gas gallery, as to fire a 9 per cent. mixture for ordinary tests, which is now increased to 15 per cent. for the special test. The gascmeter is connected by pipes, fitted with suitable valves for establishing the necessary connections and closures with the gallery, and a centrifugal fan driven by a gas engine is placed in the circuit, so that the mixture can be thoroughly established by a system of efficient circulation. The operation of making a test is reduced to very simple drill. The cannon is first loaded with the working charge of whatever explosive is on trial, which is tamped with about 9 inches of dry clay, and is then run up into position at the orifice of the gas gallery. Meanwhile, the paper diaphragm and paper closure to the tell-tale valve are fitted so as hermetically to seal the other openings of the gallery. Next, the inlet valve of the gas-holder is opened, and it is filled with gas to the desired amount, when further supply is cut off. The three-way valves on the connecting pipes are next put in position to establish the circuit, and the centrifugal fan begins to drive the gas and air through the pipes and gallery. In from one to two minutes the mixture is complete, and the valves are then cut off, and the gasholder emptied into the gallery. It is now time for retirement to shelter, and Captain Desborough and his assistant withdraw to the main building, to watch the results of the firing from behind loop-holes. The firing is effected by a Holden double-pole firing key, and the result of the test is measured, not so much by observations, as by the evidence of the tell-tale gun-cotton. After each shot, care is taken to ensure that the tube is thoroughly cleared of residual gases, and the same operation is repeated for further tests. When the station was first instituted, only the ordinary test was in force, but in October, 1899, as has already been mentioned, a Special Test was established, largely at the request

of leading mine-owners. This Special Test has, since November 1st last, superseded the old ordinary test, and consists of the use of larger charges of explosive in a 15 per cent. gas mixture, and a single ignition of gas is sufficient to cause the rejection of the explosive under trial.

For testing the ballistic force of explosives, Captain Desborough has, during his term of office, erected a very ingenious piece of mechanism. Hitherto, the determination of the explosive force of any compound was arrived at by the use of the Trauzl lead block, which is practically a lead mortar of known dimensions, the modifications of which by the force of an explosion afford some form of comparative data. It is well-known, however, that the behaviour of lead under different degrees and durations of pressure cannot always be accepted as providing a definite measure of the force employed. On this account, Captain Desborough sought some other method of arriving at the desired conclusion, and we think he is to be congratulated on the production of a remarkably effective apparatus. In the accompanying illustration we reproduce a photograph showing the apparatus as fixed. Two solid brick walls or piers are erected, and connected at the top with iron tie-beams. These tie-beams serve to support trunnions fitted with steel roller bearings, from which depend stout slings holding in suitable position a five-ton 13-inch mortar, supplied by the Royal Arsenal. The mortar, supported in this fashion, is free to swing to and fro in a fore-and-aft direction, and, in fact, so freely does it swing in its roller-bearings that even a slight breeze is sufficient to cause a very decided pendulum action, which is sometimes inopportune. The backward swing of the mortar can be measured to one-hundredths of an inch by means of a sliding rule, which, the moment it has registered the maximum of the swing, drops into a cradle provided for the purpose. To use the apparatus, a cannon charged with the explosive to be tested is brought up to within a suitable distance from the mouth of the mortar, and the charge is then fired into the bore of the mortar. The force of the explosion swings the mortar back on its trunnions to an extent proportioned to the force, and the sliding scale duly registers the swing. In the illustration here given, the gun is shown placed in front of the swinging mortar, and it will be possible to make out the leading details of the appliance.

Enough will have been written in this very brief description to show that the testing station is established on sound and practical lines. The trials here conducted are, indeed, the final arbiters as to the safety or otherwise of explosives intended for use in dangerous mines, and to that extent provide a very useful complement to the tests made by Dr. Dupré. Moreover, though this is by no means a necessary conclusion, the relations between the officer in charge and the manufacturers of explosives with whom he is brought into contact are invariably of a most cordial nature, and what might quite conceivably be conflicting interests seem to come into complete agreement. As regards seeing the installation in actual use, we were not sufficiently fortunate to time our visit for a date when real tests were in operation, but Captain Desborough was kind enough to arrange several interesting little explosions to show the working of the apparatus.

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STAFF-SERGEANT C. BEAZLEY, of the Civil Service Rifles, has been appointed Hon. Sec. of the Middlesex R.A. in place of the late Mr. Clementi Smith.

## THE GUNMAKERS' ASSOCIATION.

A GENERAL MEETING of the Gunmakers' Association was held at Effingham House, on Wednesday, March 12, 1902, at 2.30 in the afternoon, and there were present Messrs. C. E. Greener (in the chair), A. H. Gale, G. E. Lewis, T. W. Webley, and R. T. Woulfe (solicitor).

MINUTES.—The minutes of the previous meeting were read and confirmed.

MESSAGES OF REGRET.—Messages of regret for non-attendance were read from Messrs. H. J. Blanch, E. C. Green, G. Hinton, J. Hobson, J. E. Martin, W. R. Pape, John Rigby, C. Rosson, and H. A. A. Thorn.

ELECTION OF NEW MEMBER.—The application of Mr. Donald Mackintosh Fraser, of the firm of Messrs. Danl. Fraser & Co., 4, Leith Street Terrace, Edinburgh, to become a member of the Gunmakers' Association, came up for consideration, proposed by Mr. John Rigby, and seconded by Mr. H. J. Blanch. Mr. D. M. Fraser was unanimously elected.

ANNUAL GENERAL MEETING.—The question of arranging the date and place for the holding of the annual general meeting, and the appointment of a sub-committee to carry out the necessary details, next came up for consideration. It had been suggested that the annual meeting might with advantage be held this year in Birmingham, and members had been invited to state their views on the subject. Letters were read from Messrs. E. C. Green, J. Hobson, G. E. Lewis (who was also present), J. E. Martin, and W. R. Pape, all of whom were in favour of the proposition. It was decided, after due consideration, that the date of the Annual General Meeting be fixed for Wednesday, April 23rd, and that it be held in Birmingham. A sub-committee was appointed to arrange the details of the meeting, consisting of the Chairman, Mr. Thorn, and the Hon. Secretary, with power to add to their number, if required.

PISTOLS BILL, 1902.—Consideration was given to the question as to what action, if any, the Association should take with regard to the Pistols Bill, 1902, which was down for second reading on March 19th. A copy of the Bill had already been sent to all members, who had been invited to submit their views on the matter to the Secretary prior to the meeting. Letters on the subject were read from Messrs. E. C. Green, G. Hinton, J. Hobson, G. E. Lewis (who was present), W. R. Pape, C. Rosson, and T. W. Webley (who was also present). After some discussion on the bearings of the Bill as affecting the gun trade, it was resolved that the matter be referred to a sub-committee of the executive for the purpose of drafting and circulating the objections raised to the Bill on behalf of the legitimate trade.

STANDARD MINIMUM CHAMBER SIZES.—The meeting was called upon to receive the report of the joint conference which was held on February 27th with regard to the standardisation of minimum chamber sizes for shot-guns. That conference, at which were present members of the executive and two delegates from the Birmingham and Provincial Gunmakers' Association, had decided to recommend for adoption by the trade generally the revised rules and dimensions for minimum chamber sizes as suggested at a meeting of the executive of the Gunmakers' Association held on January 9th, and it was this recommendation which the general meeting was asked to confirm. It was proposed by Mr. Webley, seconded by Mr.

Greener, that the report be accepted, and the figures as proposed be adopted, and that the executive be empowered to approve of the form in which the revised dimensions are to be issued to the public.

It was further proposed by Mr. Gale, seconded by Mr. Lewis, that a vote of thanks be presented to Mr. Greener for the great interest and trouble he had taken in the preparation and testing of the revised dimensions.

## REVIEW.

*Tir des Fusils de Chasse. By Lieut.-Col. Journée. Published by Gauthier-Villars, Paris.*

THOSE who read speculative theory concerning the behaviour of shot in the cartridge, while passing down the barrel, upon its first contact with the outside air, and finally during its flight, will all have seen certain ingenious illustrations which have been used over and over again to accentuate the theories put forward. Many, for instance, will remember an illustration of a cartridge of impossible dimensions fired in a gun chamber of equally impossible size, in which various little arrows indicate the gases rushing past a small wad, and scattering the shot while still in the barrel. This and many similar illustrations owe their first being to the author of the present work. He made a series of researches upon shot guns, which were published in the *Mémorial des Poudres et Salpêtres*, and he drew attention to the effects of certain faults in the proportioning of gun and cartridge the one to the other. His illustrations may be excused for their want of proportion on the grounds that they are an exaggerated statement or fable representing a real truth at the foundation.

We quote *Journée* upon almost every fact connected with modern science of fire-arms. The able researches of Mr. Griffith into the difficult questions of recoil were largely inspired by the very clever and suggestive experiments made many years ago by the then Captain *Journée*. At the present time we find him publishing a second edition under a cover of its own, enlarging his original work, and bringing the results up to date. As a consequence we get one of the most valuable books that could be possessed by the gun or powder expert who is also a French scholar. The methods of working out the behaviour of shot guns, and the comparisons between actual recorded observations, and theoretical reasoning anticipating the same, teach the reader two valuable lessons—first, to think for himself, and second, to act for himself to the extent of making the simple little experiments that are within the grasp of the humblest worker in the cause of scientific truth. Gunmaking is generally quoted as an art. This it is, or at least it can be made so, but as a science its position is unquestioned. Every detail must be intelligently fashioned with a view to the ultimate purpose of shooting, and when we consider that the mere increasing of the depth of the rim recess of a shot gun is likely to spoil the working of the whole gun, we can appreciate the value of such a book as that of Colonel *Journée's*, which is throughout so suggestive in its reasoning, and so carefully accurate in its conclusions, as to tempt the reader to be more painstaking in his efforts to attain perfection than ever before. In one word, therefore, this book is the work of a man who thinks for himself, and who has the happy knack of setting other persons to work on the same mental process.

## APPLICATIONS FOR PATENTS.

FEBRUARY 24TH—MARCH 15TH, 1902.

- 4,595. Magazine Fire-arms. J. H. Topham.  
 4,657. Gun-Sighting Apparatus. A. A. Common.  
 4,659. Self-loading Fire-arm. T. Bergmann.  
 4,677. Sight Corrector. J. H. Steward.  
 4,695. Shrapnel Shells. H. D. Rattray and J. S. Kershaw.  
 4,696. Shrapnel Shells. H. D. Rattray and J. S. Kershaw.  
 4,697. Shrapnel Shells. H. D. Rattray and J. S. Kershaw.  
 4,776. Projectiles. J. B. Semple.  
 4,781. Explosives. W. C. Quinby, H. B. Sharpe, and D. J. Greger.  
 4,814. Night Sights. W. B. Wallace.  
 4,926. Magazine Arms. W. Fogge.  
 5,205. Percussion Primer. C. Holmström and G. A. Köhler.  
 5,218. Sighting of Ordnance. Sir H. Grubb, A. T. Dawson, and G. T. Buckham.  
 5,234. Cartridges. C. A. Bailey and J. von Lengerke.  
 5,504. Torpedoes. F. Banduin.  
 5,582. Rifle Carrier. J. H. Patterson.  
 5,592. Electric Target. W. G. Williams and H. H. Edwards (Date applied for in Queensland, August 20, 1901)  
 5,644. Shooting Ranges. J. S. Mason.  
 5,681. Gun Breech Mechanism. C. Holmström.  
 5,748. Fire-arms. C. Bolé (Agent for *H. Schlaegel*).  
 5,753. Elevation Device for Ordnance. A. A. Mauersberger.  
 5,769. Rifle Sight Adjuster. G. H. Burbidge.  
 5,790. Range Finder. E. M. Nelson.  
 5,817. Gun Carriages. A. T. Dawson, and G. T. Buckham.  
 5,883. Gun Carriages. J. E. Bousfield (Agent for *P. Nordenfelt and E. Teinstrom*).  
 6,103. Charges for Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 6,162. Gun Carriages. T. A. Smith.  
 6,211. Cartridges. R. W. Scott.  
 6,235. Detonating Signal. A. Bianchi.  
 6,286. Projectiles. W. R. Cornings (Agent for *Actiengesellschaft für Cartonnagen Industrie*).  
 6,309. Small Arms. A. J. Muntz.  
 6,341. Rifle Mechanism. T. R. R. Ashton.  
 6,348. Motor Gun Carriage. H. P. Osborn.  
 6,365. Small Arms. The Webley and Scott Revolver and Arms Co., Ltd., and T. W. Webley.  
 6,426. Gun Carriages. J. E. Bousfield (Agent for *P. Nordenfelt and E. Teinstrom*).

\* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

FEBRUARY 27TH—MARCH 20TH, 1902.

COMPILED BY H. TARRANT.

- 22,127 (1900). **Sighting Device for Guns.** Sir H. Grubb, Dublin; A. T. Dawson and G. T. Buckham, London. In Patent No. 12,108, 1900, Sir H. Grubb described sighting devices so constructed that rays proceeding from a luminous body were rendered parallel before reaching the eye of the observer, thus producing an image of the sight proper which could be viewed under the same optical conditions as the distant object. The present patent describes means for increasing the reflecting power of the inclined surface from which the image of the sight or the distant object is reflected, and to modified means for forming an image of the sight by parallel luminous rays. Accepted February 5, 1902.
- 3,634 (1901). **Lock Mechanism for Guns.** O. Horton, Glasgow. In order to obviate such faults as dragging pulls, rapid wear and tear of sear noses and bents, which result in loss of throw of the hammer, and variation in the weight of pulls, the bent in the tumbler of a sporting gun lock is cut at the largest available radius of the tumbler. The shape of the sear is altered to accommodate the different position of the bent. A screw device acting on the sear spring is also provided, so that the weight of the pull may easily be adjusted from the outside of the gun. Accepted February 6, 1902.
- 4,171 (1901). **Breeches of Sporting and Punt Guns.** H. W. Holland and T. Woodward, London. In order to overcome the difficulty of breaking down a shot-gun for reloading due to the protrusion of the striker beyond the standing breech, a sliding limb operated by the top lever is adapted slightly to force the tumbler back when the lever is turned to open the gun. The strikers are thus released and are free to be withdrawn by springs into the body. A hinged flap, which closes down on to the rim of the cartridge, is designed to facilitate the loading and unloading of punt guns. Accepted February 27, 1902.
- 4,493 (1901). **Cleaners for Ordnance.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and S. M. Murray, Newcastle-on-Tyne. A brush for cleaning the barrels of ordnance, composed of a number of bundles of bristles which are doubled and inserted into a groove turned helically around the circular wooden head of the brush. Accepted February 27, 1902.
- 4,513 (1901). **Cartridges.** J. J. Mangon, Belgium. A perforated cup-shaped diaphragm is described in this patent, and is provided to create a space between the cap and the powder, and to decrease the pressure necessary to obtain a given velocity. Accepted February 20, 1902.
- 4,520 (1901). **Ordnance and Cartridges.** W. S. Simpson, London. A method of holding the gases of combustion within the cartridge case in ordnance for a certain time after ignition until a predetermined pressure is obtained. Accepted February 6, 1902.
- 5,765 (1901). **Breech Mechanism for Ordnance.** A. T. Dawson and G. T. Buckham, London. Mechanism for opening and closing the breech of a gun, that by the rotation of the hinge pin in one direction the plug is unlocked and retracted, and the carrier is unbolted and swung away from the breech, and by the rotation of the hinge pin in the opposite direction, the carrier is swung to and bolted to the breech and the plug is advanced and locked. Accepted February 27, 1902.
- 6,062 (1901). **Cartridge Magazine Mechanism.** O. H. Edwards, Aberdeen. Cartridge-raising mechanism for the magazines of small-arms, consisting principally of a spring-controlled arm, which carries the cartridge-raising platform. This arm is depressed by means of a thumb lever. The mechanism is designed especially to allow of the different limbs being interchanged when worn or broken. Accepted February 6, 1902.
- 6,089 (1901). **Hardened Steel Projectiles.** R. A. Hadfield, Sheffield. This patent relates to the manufacture of hardened steel projectiles with steel produced as set out in Patent No. 27,753, 1897. The patentee heats his projectiles to a temperature which is governed by the degree of hardness required (about 900 degs. C.), and cools them by directly exposing them to the action of air in the form of a blast. Accepted February 13, 1901.
- 6,091 (1901). **Manufacture of Projectiles.** R. A. Hadfield, Sheffield. In the manufacture of projectiles of the kind in which the point, or point and a portion of the body, are alone hardened, the patentee guards against overheating of the exterior of the projectile by providing a pyrometer, which is so arranged as accurately to indicate the temperature of the interior of the projectile during the heating process. Accepted February 13, 1902.
- 6,729 (1901). **Ammunition Hoists.** A. T. Dawson, London, and J. Horne, Barrow-in-Furness. Modifications of the ammunition-hoisting apparatus, set out in Specification No. 24,948, 1899, form this patent. Accepted February 2, 1901.
- 7,328 (1901). **Repeating Pistol.** A. G. Bloxham, London (Agent for *Waffen-und-Maschinenfabrik, Actiengesellschaft, Hungary*). A repeating pistol, in which the supply of a cartridge, the cocking of the hammer and the firing are accomplished by pressure upon the trigger. Upon pressing the trigger the breech-block and firing-pin are raised into the firing position. Further pressure cocks the firing-pin, and an increased pulling of the trigger disengages a blade spring and releases the firing-pin. The forward movement of the trigger lowers the breech-block ready for reloading. Accepted February 20, 1902.
- 8,559 (1901). **Built-up Ordnance.** F. P. and A. M. Roberge, U.S.A. A method of so building up ordnance as to ensure against the outer jacket breaking under the force of the explosion. The central lining or bore of the gun is covered with a number of casings. The outermost casing is bound round with wire in the known manner. A number of cir-



cumferential resilient bands are secured over the wire. These bands or rings are longitudinally corrugated, so as to be capable of circumferential expansion. A similarly corrugated jacket covers these rings, and forms the outside jacket of the gun. Accepted February 6, 1902.

- 8,625 (1901). **Shrapnel Shells.** F. Blau and E. Egger, Hungary. A shrapnel shell in which the ball charge is so arranged that the bursting of the shell distributes it both forwards and backwards, and not in one direction, as in the ordinary shrapnel. Accepted Feb. 20, 1902.
- 8,707 (1901). **Bullets.** Kynoch, Ltd., Witton, and R. H. Housman, Moseley. A practice bullet for .303 rifles, which can be fired accurately with a higher charge than that ordinarily used. The bullet is of lead, and is covered at the base only with a closely-fitting cup metal cap, cupped and drawn in the usual way. This cup holds the base firmly, and grips it sufficiently securely to prevent it parting with the lead when taking the rifling. By constructing rook rifle cartridges in this manner a heavier charge may be used. Accepted Feb. 27, 1902.
- 9,348 (1901). **Rifle Sights.** A. L. Winsor, Bristol. The block in which is cut the sighting V in the back sight of a rifle is, according to this patent, arranged so as to be capable of a sliding movement along the bar which works up and down the folding leaf. The V can thus be shifted to allow for wind, or for any other purpose. Two V notches are provided on the sighting block, so that a sight may be taken when the leaf is in either the raised or lowered positions. Accepted Feb. 13, 1902.
- 11,735 (1901). **Carriage for Howitzers.** C. P. E. Schneider and J. B. G. A. Canet, France. Modifications in the construction of howitzers or mortar carriages, consisting in the provision of mechanism for permitting the gun to return very quickly to loading position after discharge without affecting the sight; in a method of fixing the spade to the trail so that it may quickly be secured either in the anchoring or the travelling positions; and in grouping the mechanism for training vertically and laterally upon the gun. Accepted Feb. 13, 1902.
- 18,998 (1901). **Bullet Lubricator.** W. J. Quadling, Plumstead. A machine is described in this patent which is designed to lubricate bullets, mechanically dealing with large quantities, so saving time and material. A revolving carrier wheel, holding about 30 bullets, is adapted to receive the projectiles, which fall by gravity into position in notches in the wheel. The bullets are caused to rotate in the notches, and as they revolve the lubricant is applied by means of a metal disc, the edge of which revolves in a pan of melted wax. Accepted Feb. 6, 1902.
- 24,588 (1901) \* **Revolver Mechanism.** D. B. Wesson, U.S.A.
- 24,597 (1901) \* **Revolver Mechanism.** D. B. Wesson, U.S.A.
- 24,791 (1901). **Time Fuse for Projectiles.** W. Rüegg, Germany. A time fuse for projectiles, in which the powder charge takes the form of a straight rod arranged in the longitudinal axis of the projectiles. An endless band, similarly arranged, regulates the time of ignition. This band is provided with a touch-hole and a scale, upon which are indicated the various burning periods according to the adjustment of the band. A percussion fuse is combined with the time fuse. Accepted Feb. 13, 1902.
- 25,289 (1901). **Head Rest for Rifle Stocks.** J. Grant, Australia. An adjustable rest for the head of the rifleman when shooting at long ranges, adapted to be raised or lowered to suit the range or the elevation of the rifle. When not in use the rest reposes in the stock in such a manner as to preserve the shape of the stock. Accepted Feb. 20, 1902.
- 25,418 (1901). **Firing Gear for Ordnance.** W. L. Wase (Agent for *Skoda Werke, Actiengesellschaft, Austria*). In this patent mechanism for the firing gear for ordnance is described, which, upon pulling the trigger, first compresses the striker spring, and then suddenly releases it for the purpose of striking the primer. After the shooting forward of the striker the mechanism automatically returns it to its original position, no matter whether the charge has been ignited or not. The gear can thus be operated without any necessity for manipulation of the breech-block to recock the striker. Accepted Feb. 20, 1902.
- 35,788 (1901). **Squib for Blasting.** H. J. Richards, C. B. Dougherty, M. and A. L. Williams, U.S.A. A blasting squib designed to obviate the danger of the powder escaping from

the tube into the match; to enable it to be fired without cutting off the end of the powder tube; and to allow of an extension or contraction of its length, in order to regulate the time between the ignition of the match and the firing of the charge. The squib consists of a shell portion, which contains the powder, and the match which surrounds the shell, and which is capable of adjustment on the shell, regulates the time between ignition and explosion. Accepted Feb. 27, 1902.

- 15,797 (1901). **Torpedo Launching Apparatus.** Count G. Hoyos, Hungary. Apparatus for launching torpedoes obliquely from a ship in transit, which offers protection to the torpedo during its discharge from the vessel, and, therefore, does not necessitate any strengthening of the torpedo to withstand the dynamic pressure of the water produced by the motion of the vessel. Accepted Feb. 27, 1902.

26,588 (1901). \* **Magazine for Rifles.** P. Mauser, Germany.

- 715 (1902). **Back Sights for Rifles.** J. T. Meredith, Ebbw Vale. The block carrying the V notch in the back sight of a rifle is adapted to be moved horizontally along the bar which slides up and down the leaf sight. A screw works through a hole in the block, and the turning of this screw moves the V either to right or left to counteract wind or other disturbing influences. Accepted Feb. 13, 1902.

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

## SELECTED PATENTS.

### MAGAZINE FOR RIFLES.

26,588 (1901) P. Mauser, Germany. The magazine for rifles which is described in this patent is designed to contain ten flanged cartridges in as small a space as possible. The portion of the magazine projecting beyond the stock takes the form of a curve, running from the trigger guard gradually up to the body of the stock. In order to allow of this construction the cartridges are arranged within the magazine in a fan shaped manner, the depth of the double row of cartridges gradually decreasing from the wide rims to the narrower noses.

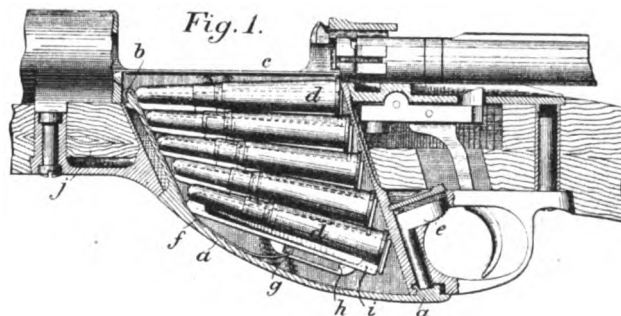
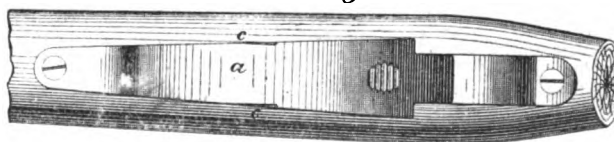


Fig. 2.



Referring to the accompanying illustrations, Fig. 1 is a longitudinal section of the magazine, and Fig. 2 is an underside view of the casing and stock.

The curved bottom plate *a* carries the cartridge-lifting platform and its spring, and is adapted to be detached from the stock. The plate *a* is continued right up to the point *b*. It extends into the magazine *c*, so forming the front wall of the magazine, against which rest the noses of the cartridges *d*. The plate is secured in the closed position, as illustrated, by means of the spring catch *e*, the action of which will be understood on referring to the drawings. The spring *f* is suspended from the top *b* of the plate *a*. Its end *g* is adapted to

slide in a guiding slot *h* cut in the cartridge-lifting platform *i*, so that it may move and adjust itself to the motion and position of the platform during its travel up and down the magazine box.

The cartridges are fed into the magazine from a clip, the flanges occupying the deep back part, and the noses the shallow front part, of the magazine. This method of arranging allows of the bottom plate *a* gradually curving up from the guard until it merges into the curve of the stock *j*. Accepted Feb. 20, 1902.

#### REVOLVER MECHANISMS.

24,597 (1901). D. B. Wesson, U. S. A. In the construction of the ordinary revolver, in which the cylinder swings out sideways upon a yoke for the purpose of reloading, the cylinder is locked in the frame only by a short pin, which engages a recess at the rear of the cylinder. The disadvantage of this method is that the forward end of the cylinder is liable to be sprung out from such cause as the existence of foreign matter behind the yoke. In this specification the patentee describes a method of locking the cylinder securely to the frame at both ends, so ensuring a perfect alignment of the chambers of the cylinder with the bore of the barrel.

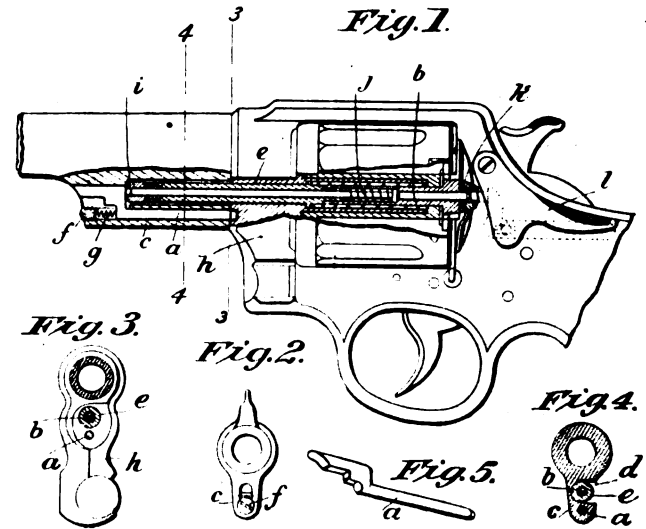
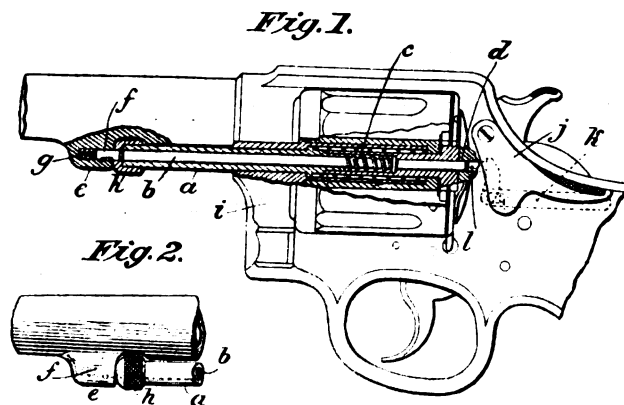
Referring to the appended illustrations, it will be seen that running through the interior of the extractor-stem *a* is a centre rod *b*, arranged in such a manner as to be capable of a sliding movement therein. A spring *c* works around this centre pin. One end of the

It might be mentioned that in order to provide a chamber in which the spring *c* may be located the extractor stem is constructed in two parts, which are united by means of a screw joint. Accepted Feb. 27, 1902.

24,588 (1901). D. B. Wesson, U. S. A. The cylinder-locking mechanism described in this specification operates in a similar manner to that described in the foregoing Patent No. 24,597, except that in place of the locking bolt engaging the end of the extractor stem, another bolt is provided, which not only locks the stem, but also the yoke upon which the cylinder is swung out of operative relation with the barrel. By means of this construction the cylinder is locked in the firing position with the utmost rigidity.

In the accompanying drawings Fig. 1 is a side elevation, partly in section, of the revolver; Fig. 2 is a view of the front end of the barrel and yoke locking device; Fig. 3 is a sectional view on the line 3-3, Fig. 1; Fig. 4 is a sectional view on the line 4-4, Fig. 1; and Fig. 5 is a perspective illustration of the locking bolt.

The bolt *a*, which takes the place of the bolt *f* in the mechanism described above, is operated by the centre pin *b*. The bolt works in a groove cut in the downwardly-extending rib *c* of the barrel, its



spring has a bearing upon a collar on the centre pin itself; and the other end has a bearing on a shoulder on the interior of the extractor stem. The spring *c* tends always to force the rod in a rearward direction. Thus, when the cylinder is in the firing position, the rear end of the rod is forced into the hole *d* bored in the frame.

Immediately in front of the forward end of the extractor stem *a*, a lug *e* is formed upon the barrel of the revolver. This lug is bored out in axial alignment with the centre pin *b* for the reception of the bolt *f*, which is always forced towards the front end of the centre pin by the spring *d*. When the cylinder is in the closed position, and the centre pin *b* is forced back into the hole *d*, the bolt *f* is forced by its spring *g* into the hole at the end of the extractor stem. In this way the cylinder is locked to the frame at its forward end. The spherical-shaped head *h* is provided on the end of the extractor stem for the purpose of sliding over the similarly-shaped end of the bolt *f*, in order to crowd it back into the lug *e* during the swinging of the cylinder on the yoke *i* into the frame.

When it is necessary to unlock the cylinder from the frame, the centre pin *f* is forced forward against the action of the spring *c* by means of the thumb lever *j*. The lever, when depressed, communicates its movement to the slide *k*, the nose *l* of which presses against the end of the centre pin. The forward movement of the centre pin, besides releasing the back end of the cylinder, also unlocks the front end by pushing the bolt *f* out of the end *h* of the extractor stem.

long projecting end sliding in a hole bored in the rib beneath the groove *d*. The groove *d* does not extend to the extreme end of the rib, and is provided to allow the extractor stem *e* to swing in under the barrel into its proper position. The screw *f* holds one end of the spring *g*, the other end of which bears against the back of the bolt *a*, and tends always to force the nose of the bolt into a hole bored for its reception in the yoke *h*. The short nose *i* on the top of the bolt is adapted also to register axially with the centre pin *b* when the cylinder is in the firing position, and is arranged to enter the forward end of the tubular extractor stem, when the centre pin *b* has been pushed back into the recess *k* by its spring *j*. Thus, when the cylinder is snapped to into the firing position, the spring *j* forces the centre pin into the recess *k*, so locking the rear end of the cylinder, and the spring *g* forces the bolt bodily towards the cylinder, causing its noses to enter the hole in the yoke and the hole in the extractor stem, so firmly locking the front end of the cylinder and the yoke. The chambers of the cylinder so secured cannot fairly be forced out of the line of the barrel. Neither can the yoke swing up into the locking position should any dirt or obstruction be present between the yoke and the frame. Pressure upon the lever *l* unlocks the cylinder by forcing the centre pin forward as in the foregoing description of the other mechanism. Accepted Feb. 27, 1902.

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>NOTES</b> ... ..	76
Decimals of an Inch ... ..	67	<b>REVIEW</b> ... ..	77
The New Powder Season ... ..	67	<b>ROUND THE TRADE</b> ... ..	78
The Gunmakers' Association Dinner ... ..	67	<b>APPLICATIONS FOR PATENTS</b> ... ..	79
Single-Trigger Mechanisms ... ..	68	<b>SPECIFICATIONS PUBLISHED</b> ... ..	79
Rook Shooting ... ..	68	<b>SELECTED PATENTS:</b>	
<b>THE BIRMINGHAM PROOF HOUSE RETURNS</b> ... ..	69	The Lard Single-Trigger Mechanism ... ..	80
<b>THE GUNMAKERS' ASSOCIATION—ANNUAL GENERAL MEETING</b> ... ..	69	The Remington Single-Trigger Mechanism ... ..	81
<b>A TYPICAL GUNMAKER—MR. JOHN ROBERTSON</b> ... ..	70	The Powell Single-Trigger Mechanism ... ..	82
<b>LECTURES TO YOUNG GUNMAKERS—THE MICROMETER AND VERNIER</b> ... ..	74		

## CURRENT TOPICS.

**Decimals of an Inch.**—Our usual reference to the current Lectures to Young Gunmakers enables us to call attention to the increasing application of the screw micrometer throughout the gun trade. However much pride the English mechanic may take in the superior perfection of English hand work, he must always recognise that a wonderful amount of the accuracy of modern-day mechanical achievements is due to the extensive use of this American tool. The Brown and Sharpe micrometer is as much a standard article as the Eley cartridge, and what we have endeavoured to point out is that the earlier in life that a young gunmaker possesses himself of one of these instruments the earlier will his real education commence. The use of a micrometer by those who do not understand it is generally regarded as a sixth standard operation, necessitating a high grade of intellect for its accomplishment, and yet upon closer acquaintance the micrometer proves to be one of the most elementary tools in existence. Accuracy is attained without complication or fragile construction, so that these good qualities, which go to promote more efficient work at the bench, merit, in our opinion, the special notice that they receive this month.

**The New Powder Season.**—While the gun trade is experiencing its period of greatest dulness, the cartridge-loading departments of those firms who specially concern themselves in this work are in a state of embryo animation. Next season's supplies must be ordered, and the waddings selected. Batches of samples are under careful consideration, and

every effort is proceeding in the hope that by suitable attention to detail satisfaction will be given to the shooter with profit to the loader, due to a complete absence of bad or unsuitable material. As years go on, the cartridge is settling down into more and more of a standard article, and excellence of loading is, therefore, concerned with the use of accessories that produce the result demanded by the sportsman. This result is not obtained by striking departures from everyday practice, but by scrupulous attention to detail. Those firms, therefore, who are most anxious to do well in their cartridge trade are, as a rule, best advised in endeavouring to secure a good average loading which can be repeated by the thousand without substantial variation. This is a laudable ambition, and one, we hope, that will be accomplished by virtue of due appreciation of the standard to which the powder maker regulates the behaviour of his production.

**The Gunmakers' Association Dinner.**—A bold step is generally only to be justified by a successful result, and we are pleased to record that the holding of the annual dinner of the Gunmakers' Association at the Grand Hotel, Birmingham, has received this endorsement. It at least shows that the senior Association is possessed of no party feeling, and that it embraces in the scope of its good wishes every branch of the gun trade. At one period in the history of the Gunmakers' Association it appeared that the Birmingham Union was started as a kind of counterblast against what was regarded as the aggressiveness of the London gun trade. But notwithstanding that the nucleus of the Gunmakers' Association was the exclusively London Armourers' Club, the newly constituted committee, which embodied representatives

from different parts of the country, showed its independence of any single centre of trade, and legislated for gunmakers as a class. There is no doubt that the consistent attitude of the Gunmakers' Association has allayed many of the suspicions that were rife at one time or another. At the present date we find the Birmingham organisation very happy to be associated with much of the work that is inspired from London, and we can only hope that the unisance of interests and the good feeling displayed on both side are indications of a tendency to unite forces to promote the common welfare.

**Single-Trigger Mechanisms.**—A recrudescence of discussion on the perennial question of single-triggers has once more arisen, and our columns contain certain references to a recent demonstration which was no doubt evolved by the feeling that certain views would be the better for re-expression. Our own attitude upon this subject during recent years has been that, by a process of exhaustion, the multitude of systems will settle down into a limited number of recognised actions. The Boss single-trigger has more than maintained its position as a standard invention, and other mechanisms, while not occupying the same public position, are accumulating a record of steady work that tends to a general adoption of the single-trigger system. The appreciation of the inventor of the Boss single-trigger, both as a gunmaker and a mechanic, which adorns our columns this month, is but a modest recognition on our part of one whose patient efforts have been rewarded, but not more than they deserve. The reputation which is possessed by Boss guns among the very highest class of sportsmen of the present day is a tribute to the matured knowledge of the proprietor of the firm, and it is in that capacity, and as the inventor of the Boss mechanism, that we give him a more personal introduction to our readers than we have ever before attempted.

**Rook Shooting.**—The time of rook shooting has once more come upon the gun trade as a slight relief to the period of slackness that comes with the close season for game. A certain amount of briskness occurs in nearly all country districts where there is a healthy disposition to keep down the rook population for the benefit of the farming interest generally. The social aspects of rook shooting have also a great deal to recommend the sport. Hence the little gatherings where the shooting of the rook is a prelude to an evening's enjoyment. The squire and tenant then meet for pleasant speeches, and pledge one another on the prospects of a successful season's husbandry. While trade in rifles is not likely to form the leading department of the country gunmaker's business, it is at the same time of growing importance, and certainly rifle shooting is on the increase to an extent which should justify every dealer in acquainting himself with the latest principles and methods. Therefore, in place of following the old lines, and sticking as a matter of necessity to old traditions, the gunmaker of to-day is wise to acquaint himself with the best types of modern rifles and the alternative systems of sighting, this leading to a class of trade preferable to the sale at cut prices of routine types of American and Belgian fire-arms. The rifle shooter, above all others, is willin to pay a small extra price for a little special attention, the gunmaker will be well advised if he devotes particular care to the study of his customers' needs in the rook shooting line.

## THE BIRMINGHAM PROOF HOUSE RETURNS.

FOLLOWING the brief note inserted in our last issue, which stated the salient features in the financial condition of the Birmingham Proof House during the year ending December 31st, 1901, we now find space for a few figures dealing with the amount of work done. In the aggregate number of proofs there has been a distinct falling off from the figures of the four preceding years, as is shown in the table given below:—

	Provisional.	Definitive.	Total.
1894	173,878	125,395	299,273
1895	182,514	146,277	328,791
1896	160,684	164,214	324,898
1897	176,535	225,580	402,115
1898	219,559	173,380	392,939
1899	63,251	312,262	375,513
1900	69,177	321,091	390,268
1901	92,909	262,361	355,270

For the third year in succession there were no African barrels submitted for provisional proof, the total of 92,909, as above, being made up of 64,657 twisted double and single birding and rifle tubes, 21,809 plain iron and steel double and single birding and rifle tubes, and 6,362 plain iron and steel military tubes. It is to be regretted that the system of enumeration adopted in the Proof House accounts admits of no analysis of a nature to show the quality of the barrels proved. Certainly the antique terms quoted above convey little information to the ordinary intelligence, and there is good reason to doubt whether the classification means anything definite to the expert, outside the Proof House itself.

Under the heading of definite proofs there is a considerable falling off from the previous year's figures in muzzle-loading barrels, which is almost entirely due to a reduction in the number of African barrels submitted. As regards breech-loading arms, the details are as usual of a decidedly cryptic tendency. Thus, we learn that proofs were made of presumably British double and single birding and rifle barrels to the number of 53,320, and of 25,909 foreign barrels of the same type. It will be noted that in this case, as in the provisional proofs, there is no attempt to separate shot guns from rifle barrels. Then follow 609 nitro-proved rifle barrels, and 361 express rifle barrels. Of British military barrels 4,145 were submitted to ordinary proof, and 3,732 were nitro-proved, while foreign military barrels were submitted to these proofs to the number of 14 and 203 respectively. Under the heading of supplementary proofs is to be found a further batch of breech-loading barrels, consisting of 10,474 double and single birding barrels, nitro-proof, and 197 of the same class proved with nitros, and 157 rifle barrels proved with nitros. An inquiring mind might find scope for healthy exercise in considering the general scheme adopted in these classifications. British revolver barrels and chambers to the number of 38,319 underwent definite proof, in company with 24,024 of foreign origin, while as regards breech-loading single pistols, the foreign element was decidedly in the ascendant, with 237 as against 46. In addition, there were 772 muzzle-loading pistols proved. The remaining items in the list of definite

proofs comprised 882 of a miscellaneous character, such as toy cannons and special barrels:

The revenue derived from proofs shows a better average price per barrel as regards the definitive tests than in the previous year, 262,361 proofs producing £3,222 in 1901, as against 321,091 proofs and £3,653 in 1900. On the other hand, provisional tests yielded a relatively less income, 92,902 proofs producing only £826 in 1901, as against 69,177 proofs and £709 revenue in 1900. It would perhaps be erroneous to attempt to draw any very definite conclusions from these comparisons, but they certainly seem suggestive as affording some measure of the condition of the gun trade from year to year.

## THE GUNMAKERS' ASSOCIATION. ANNUAL GENERAL MEETING.

THE Annual General Meeting of the Gunmakers' Association was held at the Grand Hotel, Birmingham, on Wednesday, April 23rd, 1902, at 3.30 p.m., and there were present Messrs. C. E. Greener (in the Chair), H. J. Blanch, W. Golden, E. Harrison, J. Hobson, S. R. Jeffery, H. W. Latham, G. E. Lewis, J. T. Musgrave, W. L. Powell, Leslie B. Taylor, and Reginald T. Woulfe (Solicitor).

**NOTICE OF MEETING.**—The notice convening the meeting was taken as read.

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

**MESSAGES OF REGRET.**—Messages of regret for non-attendance were read from Messrs. J. Anderson, C. Ingram Annan, H. Esau Akrill, F. Beesley, J. G. Benbow, C. Boswell, E. Chamberlain, L. G. Clough, A. E. Cole, J. Dickson, A. H. Gale, Donald M. Fraser, W. Garden, H. W. Gibbs, D. Gray, R. Gray, E. C. Green, G. Hinton, H. W. Holland, W. R. Leeson, C. F. Liversidge, L. H. Mackie, J. Macnaughton, J. E. Martin, W. Milburn, T. A. C. Mortimer, J. H. Mountstephen, G. Newnham, A. H. O'Keefe, C. Playfair, H. H. Reilly, W. Richards, C. Playfair Robb, J. Robertson, C. Rosson, E. C. Slingsby, P. Small, J. F. Smythe, H. A. A. Thorn, H. Tilney, J. Tisdall, T. H. Turner, and E. Wilson.

**ANNUAL DINNER.**—A letter was read from Mr. E. J. U. Turner, Hon. Secretary of the Birmingham and Provincial Gun Makers' Association, relative to the invitation sent to members of that body to meet the Gunmakers' Association at their Annual Dinner. Mr. Turner explained that the letter of invitation had been mislaid, and had not come before his notice until too late for members of his Association, with but few exceptions, to avail themselves of the opportunity.

**REPORT AND BALANCE SHEET.**—The Report and Balance Sheet for the year ended March 31st, 1902, having previously been circulated among the members, was taken as read. The various items in the Income and Expenditure Account were carefully considered, and it was proposed by Mr. H. W. Latham, seconded by Mr. E. Harrison, that the Report and Balance Sheet be accepted, which was unanimously agreed.

**ELECTION OF OFFICERS.**—*Executive.*—The following members were elected to serve on the Executive during the year 1902-3:—Messrs. C. Ingram Annan, H. J. Blanch, C. Boswell, A. H. Gale, H. W. Gibbs, C. E. Greener, E. Harrison, H. W. Holland, J. T. Musgrave, J. Victor Pape, W. L. Powell, John Rigby, John Robertson, H. A. A. Thorn, and T. W. Webley.

*Solicitor.*—It was proposed by Mr. C. E. Greener, seconded by Mr. G. E. Lewis, and unanimously carried, that Mr. R. T. Woulfe be re-appointed Solicitor to the Gunmakers' Association. Opportunity was taken of the occasion to give a very hearty vote of thanks to Mr. Woulfe for the services he has rendered the Association in the conduct of its legal cases, in framing objections to the Pistols Bill, 1902, and in advice on many other matters.

*Hon. Treasurer.*—It was proposed by Mr. C. E. Greener, seconded by Mr. E. Harrison, that Mr. H. W. Holland be asked to undertake again the duties of Hon. Treasurer to the Association.

*Hon. Auditor.*—It was proposed by Mr. H. J. Blanch, seconded by Mr. S. R. Jeffery, that Mr. Herbert White be asked to continue to act as Hon. Auditor to the Association.

*Hon. Secretary.*—Mr. Max Baker having thought that, in view of his inability on so many occasions to be present at meetings of the Association, he should relinquish the title of Hon. Secretary, to which he felt that he was no longer in a position to do adequate justice, it was resolved that the resignation be accepted. It was proposed by Mr. C. E. Greener, seconded by Mr. Leslie B. Taylor, and unanimously carried, that Mr. Max Baker be elected an honorary member of the Association.

It was further proposed by Mr. C. E. Greener, seconded by Mr. E. Harrison, that a very hearty vote of thanks be tendered to the Hon. Treasurer, Hon. Auditor, and Hon. Secretary for their services to the Association during their past year of office. This motion was unanimously carried.

*Secretary.*—It was proposed by Mr. C. E. Greener, seconded by Mr. Harrison, that Mr. Geo. Fredk. Bird be re-elected Secretary to the Association for another year on the same terms as before. This was carried unanimously.

**GENERAL DISCUSSION.**—In the course of a general discussion which followed, Mr. Leslie B. Taylor asked the position of the Association with regard to the Proof House and the new Rules of Proof. Mr. C. E. Greener reported the correspondence which had passed between the Association and the Proof House authorities. Mr. E. Harrison suggested that the Association ought to have an opportunity to see the new Proof Rules before they are definitely accepted and passed. Mr. Greener then drew attention to the wording adopted in the Annual Report with respect to the matter, and Mr. W. L. Powell confirmed the impression there stated that the Proof House was receiving outside expert assistance. He promised to lay the views of the Association before the Committee appointed to draft the new Rules of Proof, with a view to allowing the Gunmakers' Association to see and comment upon the new rules.

Mr. Greener read a telegram he had received from Mr. J. C. Irvine, announcing the confirmation of an agreement that had been arrived at in the matter of the new minimum chamber sizes for shot gnns.

A statement was also made with respect to what was being done to procure standard master gauges to the new chamber sizes.

**CONCLUSION OF MEETING.**—At the conclusion of the meeting it was proposed by Mr. Leslie B. Taylor, seconded by Mr. W. L. Powell, that a hearty vote of thanks be given to Mr. C. E. Greener for the services he had rendered to the Association during his term of office as Chairman of the Executive, and this was most unanimously carried.

## A TYPICAL GUNMAKER.

### MR. JOHN ROBERTSON.

MR. JOHN ROBERTSON, whose portrait we reproduce on this page, is a worthy representative of the type of gunmakers of which the celebrated Joe Manton, in his time, was the admitted leader. Joe Manton was a working master gunmaker. Every part of each gun he made was known to and critically examined by him, if he had not made it with his own hands. Joe Manton closely supervised the building of his guns from beginning to end, and being able to produce unsurpassed workmanship himself, he took care to make certain that his employees came up to his standard in every detail of

"not only for the benefit of his friends and the sporting world, but for the good of his king and country."

The reputation of London as a gunmaking centre in the early part of the last century, therefore, was made by a working master gunmaker—a reputation still sustained by the same class of men—a class that in the London gun trade had almost died out a few decades ago. One of the first to revive the old order was the subject of our present notice, who became proprietor by purchase of the old-established business of Boss & Co., which, by his perseverance, skill and inventive genius, he has built up into the prosperous and flourishing concern it is to-day.

Mr. Robertson comes of a race of gunmakers. For sixty years his father (Mr. John Robertson) carried on a gunmak-



MR. JOHN ROBERTSON.



A FAMILY GROUP.

gunmaking. He was, in short, not only a splendid judge of good workmanship in others, but he was able to show them, by the exercise of his own skill, how the finest work that up to his time had ever been seen in gunmaking could be produced. He surrounded himself with the finest workmen he could find, and he paid them the highest wages earned by gunsmiths in his day. In him the best workmen recognised a master of gun mechanism able to recognise true merit in his employees, and to appreciate it by liberal remuneration, and they flocked to his banner. And when once employed by Joe Manton these highly skilled gunsmiths adhered to him in adversity as in prosperity, proud to serve under the liberal master, whom Colonel Hawker, in writing an inscription for his tombstone, described as in his time "the greatest artist in fire-arms that ever the world produced." In writing this Colonel Hawker did not overstate the merits of the man of genius in gunmaking, the working master gunmaker, who had lived and worked

ing business in the old Scottish town of Haddington. There his son was born some sixty-two years ago. He served his apprenticeship under the parental roof, and one of his earliest recollections in gunmaking was the fitting of telescopes to rifles by his father nearly half a century ago, as can be proved by the business books of the latter, now in Mr. Robertson's possession at 73, St. James's Street. Having learned everything his father could teach him, Mr. Robertson, while still in his teens, desired to enlarge his knowledge of gunmaking by entering a wider and larger sphere, and went to Manchester, determining, by energy and perseverance, to push his way to the front. There he entered the employment of the late Sir Joseph Whitworth, then at the summit of his reputation for rifle-making, where he remained for some years until he had mastered all the mysteries of rifle manufacture. His standing as a skilled gunsmith in the immense establishment of Sir Joseph Whitworth, in the year 1858, may be estimated by the



fact that he had then the honour to be employed in the making of the Whitworth rifle, with which Her Majesty the late Queen Victoria opened the first Wimbledon Meeting.

Having gained all the skill and experience of rifle manufacture of every description obtainable in the employ of Sir Joseph Whitworth, Mr. Robertson, ever on the alert to improve his knowledge of the business to which he had resolved to devote himself, changed his location to Birmingham, where he spent some time in the establishment of the late Mr. Westley Richards, a leading authority at that period on the manufacture of both military and sporting fire-arms. There he became acquainted with the manufacture of such sporting and military weapons as were produced in Birmingham at a time when the Birmingham gun trade was in its most flourishing condition. But Mr. Robertson soon became ambitious of taking part in the performance of the best gun-making work at that time produced in London, and hearing of a vacancy in the establishment of Mr. James Purdey, he came to the metropolis and personally applied for the vacant post. He was successful in obtaining the desired position, and for the next ten years he worked hard in the employment of that famous sporting gunmaker, thoroughly mastering his trade in all its branches. He soon became as expert in the manufacture of the best sporting guns, as he was in that of the finest rifles.

As one of the right-hand men on the staff of Mr. Purdey, Mr. Robertson had attained the highest and most lucrative position available to an employed gunmaker. His next step in advance was to start in business on his own account as manufacturer for the London gun trade, the greater part of the work of his factory at the beginning being taken by the late Mr. Stephen Grant, for whom during this period in his career he stocked, screwed and finished the guns that obtained the gold medal at the Paris Exhibition. His work similarly assisted to obtain gold medals at various exhibitions for Messrs. Holland and Holland and Mr. Lang. While so engaged he occupied his spare time by turning his abilities to invention. His first patent was for an intercepting safety for hammerless guns, which he sold to Messrs. P. Webley and Son. With Mr. Henry Holland, also, he was co-patentee in several inventions for ejectors and hammerless guns. The result of his skill and attention to details soon became manifest by a large increase in his manufacturing business. He made guns for nearly every firm in the London gun trade, and every weapon turned out of his establishment helped to increase the reputation of London for unsurpassed gun work. In truth, the experience then gained of the best London work, joined to a previous experience of all branches of the gun trade, such as few gunmakers had obtained, gave Mr. Robertson the reputation he now holds in the trade of being one of the best living judges of workmanship and materials in a sporting gun.

But during all this time his skill, experience, and painstaking carefulness in building guns, though recognised and admitted by the gun trade, were entirely unknown to the sporting world. Learning, after some twenty years of manufacturing as described, that the old-established business of Boss & Co., through the serious illness of the proprietor, was in the market, Mr. Robertson, who had supplied that firm for years with most of its guns, purchased it. It had been founded about 1820 by Mr. Thomas Boss, who had been employed by Joe Manton, and was afterwards one of the best

workmen of Mr. James Purdey, at one time with Joe Manton, and the founder of the present famous firm. On the death of Mr. Thomas Boss, his widow took into partnership the late Mr. Stephen Grant as manager of the business. On the expiration of that partnership Mr. Grant started gunmaking on his own account, and the business of Boss & Co. was carried on by a nephew of the founder, from whom Mr. Robertson acquired the business over ten years ago. At that date the business, though of the highest class, had a comparatively small turnover; it is now one of the best gunmaking businesses in London, turning out annually over six times the amount of work that was called for in 1892. This marked success has been achieved by the hard, persistent work, mechanical skill, and inventive genius of Mr. John Robertson, who typifies to the letter the working master gunmaker, who, solely by his own conspicuous ability and perseverance, has raised himself to the position of one of the recognised leaders of the London gun trade.

Success has not spoiled Mr. Robertson nor changed his habit of occupying himself at his bench in his shirt sleeves where he is to be found all day long engaged in improvements and inventions in gunmaking, to him a labour of love he would not exchange for any other work in the world. He is the heart and soul of his business, and every detail of the mechanical side of it passes under his personal inspection. His greatest achievement has been the successful invention of his single-trigger for shot-guns. We elsewhere deal with this subject in our columns. From the first Mr. Robertson took a leading part in this latest improvement in sporting fire-arms, and there can be no doubt that though he may not have obtained all the credit and remuneration he believes due to him, he has done more than anyone else to popularise the new departure by his strenuous recommendation of it to sportsmen generally. He advocated the single-trigger as an advance in gunnery when few other makers had faith in its efficiency and advantage, and it is only fair, now that the utility of the invention is evidenced by its manufacture by all leading gunmakers, that Mr. Robertson should reap some of the fruits of his enterprise, foresight and inventive skill.

Whatever may eventuate as regards pecuniary results, it is generally admitted that Mr. Robertson was indebted to no one for his system of single-trigger, which was arrived at solely by his own consummate skill and inventive talent, joined to a varied experience of gun-mechanism such as has been the fortune of few gunmakers to have acquired.

Mr. Robertson is further fortunate in being the father of three grown-up sons, all in the gun trade, and of the greatest assistance to him. Two of them (Mr. John Robertson, Junr., and Mr. Samuel Robertson) carry on the business in the factory formerly occupied by their father when he bought the business of Boss & Co. The third son (Mr. Robert Robertson) is his father's assistant in the business at 73, St. James's Street, his particular charge being the fitting of guns and instruction in shooting with them, in which he is rapidly making a high reputation. While dealing with Mr. Robertson's capable staff, we must not forget the valuable services rendered for many years by Mr. A. F. Embleton in the commercial side of the business. All three sons, whose portraits are reproduced here in a group with their father, are first-rate gunsmiths, and excellent judges of good workmanship in guns, taught by the experience that nothing short of the finest work in every part can pass the keen inspection

and criticism of their father, one of the hardest taskmasters where work is not in every respect up to the very highest standard.

Best work and best material in best guns only, may be said to be the business rule rigidly adhered to by Mr. Robertson, who is almost alone among gunmakers in declining to make or sell a second grade quality of sporting gun. A wide reputation for fine work in guns is the result of this policy, carried out since the days of Thomas Boss, who no doubt in his day initiated it on the lines followed by Joe Manton. That policy and that reputation it is that enables Mr. Robertson almost annually to raise the price of his sporting guns and still to find the number of his orders for them a steadily increasing quantity, some recompense perhaps for the loss of such profits as might be made by the manufacture or sale of cheaper guns of the lower grades.

But so far as can be judged, there would be little demand for these from Messrs. Boss & Co. Sportsmen do not go to that firm from economical motives. They go to it and cheerfully pay its price, because they know that in return they will have done for them all that consummate skill in gunmaking can accomplish.

Having given the leading features of Mr. Robertson's career as a typical gunmaker, it can be seen that his success is accounted for by his mastery of mechanism, his great experience and unsurpassed judgment of the finest work, and his fixed determination that only the very best workmanship and material, irrespective of cost, is to be found in every gun that bears the name of his firm. To this join his genius for invention, and the position accorded him is easily understood.

But to his gifts as a mechanic must be added a genial kindly personality before the portraiture is complete. Thorough in everything, thorough in his work, thorough in his opinions, and thorough in his friendships, is "Jack" Robertson, as he is familiarly termed by everyone in the London gun trade. Working gunsmiths respect and regard "Jack" Robertson as a workman who has strenuously toiled throughout his life, and thoroughly deserves the position he has secured by his own perseverance and talents. Master gunmakers, on the other hand, recognise in him an addition to their ranks, whose mastery of gunmaking greatly helps to uphold the reputation of London gun manufacturers. Mr. Robertson finds his greatest recreation in mechanical experimenting at his bench, where, from morning to night, he can almost always be found enthusiastically devoting himself to the solution of some problem in gunmaking, or examining in minute detail the work done by his large skilled staff. If he takes an occasional day off it is likely to be spent gun in hand in the field, or among the spectators at a football or cricket match, or driving in the country. But his holidays are few, no one in his establishment working harder than he does, his greatest pleasure appearing to consist in being among his staff and superintending their work, severely criticising where he considers such criticism is called for, and praising enthusiastically where praise is due, with the result that the best guns of Boss & Co., having passed the minutest inspection in every part, from start to finish, by one of the most keen and critical judges of fine work, himself a workman of consummate skill, are rightly regarded as second to none in the world.

The distinctive quality of the Boss gun, granting the finest workmanship and the best material, is style. This is a some-

what elusive property, the equivalent of quality in a good race horse or beauty in a fine yacht, in a word, the absence of lumber. The metal is in the right place and none of it in the wrong; the sweeping lines of the stock satisfy the artistic eye, leading to strength as well as handiness and accurate balance. The gun looks well and shoots well, the use of it being a continuous pleasure to the shooter. Colonel Hawker termed Joe Manton not only a gunmaker, but an "artist in fire-arms," an expression thoroughly correct; and in pronouncing Mr. John Robertson's work in gunmaking as not only fine but artistic, sportsmen are only giving him a verdict to which he is entitled.

Having thus sketched Mr. John Robertson's interesting career, a short space may well be devoted to a description of the Boss single-trigger mechanism. The various stages of development which the mechanism necessarily underwent before its appearance in the present perfected form, have already been chronicled from time to time in our columns, and we have even given detailed drawings of the existing type under the heading of "Selected Patents." For the purposes of this article, however, it is deemed better to show the

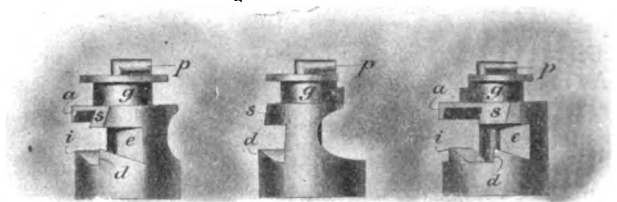


FIG. 1.—THE CAPSTAN OR TURRET.

mechanism in perspective, under two separate conditions, with further elevations of the capstan or turret which forms the vital feature of the whole. As is now well-known, the Boss mechanism is of the "three pull" order, an intermediate pull of the trigger being necessary before the second barrel can be discharged. In snapping off dummy cartridges, this intermediate pull is clearly perceptible, but in actual shooting no sportsman is conscious of it. It is, in fact, the involuntary pull which follows on recoil, and which, without suitable provision to absorb or neutralise it, would result practically in a double discharge. For many years this constituted one of the chief obstacles in the way of inventors.

Of the accompanying illustrations, Figs. 2 and 3 show the mechanism before and after firing the second barrel, and before firing the first barrel, respectively, while Fig. 1 shows three different views of the capstan. To obtain simplicity, the drawings are divested of all details not necessary to an understanding of the working, even to the elimination of the left sear-tail, which engages in the groove *g* of the capstan, and is controlled in its vertical movement by the capstan. The capstan itself rotates on the pin *p*, which is fixed to the trigger plate, and has its other end bent over so as to prevent any vertical movement of the capstan except when it occupies the position shown in Fig. 2, when sufficient upward movement is allowed to disengage the left sear from the bent of the tumbler. Rotation of the capstan is effected by means of a coiled watch-spring within its base, which imparts a constant tendency to revolution in a right-handed direction.

Taking the action in detail, and starting with the position

indicated in Fig. 2, the opening of the gun causes a Purdey bolt, not shown in the illustration, to press against the surface *e* of the capstan, thereby rotating the latter against the pressure of its spring until it assumes the position shown in Fig. 3. In doing this, the inclined plane *i* raises the trigger blade and with it the right sear-tail *r*, which half projects beyond the step cut in the blade, and this action allows the arm *a* of the capstan to pass below the sear-tail, so that, on the trigger-blade being lowered after clearing the inclined plane, the arm *a* engages with the shoulder at the end of the sear-tail which is provided for that purpose. The gun is now

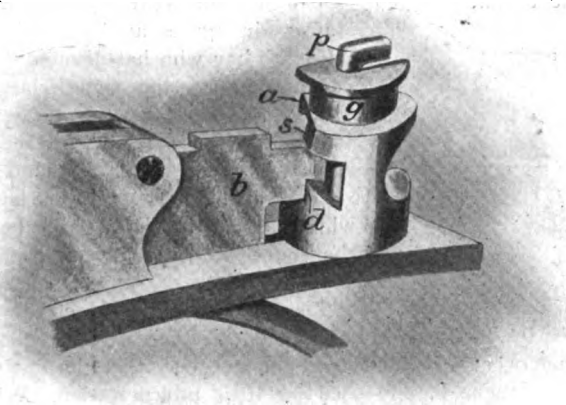


FIG. 2.—BEFORE AND AFTER FIRING SECOND BARREL.

presumably, loaded—at least both tumblers are at full cock. If the trigger is now pressed, the trigger blade is raised until it is in contact with the underside of the arm *a*, and this movement necessarily elevates the right sear-tail, thereby releasing the right tumbler, and at the same time allowing the arm *a* to slip beneath it directly the pressure on the trigger is released. Under the influence of the coiled spring, the capstan rotates until the detent formed by the inclined plane *i* comes in contact with the trigger-blade. In quick succession follows the involuntary pull resulting from recoil, which again raises the trigger-blade sufficiently to clear the detent *i*, and the capstan again rotates until it is brought to rest by the vertical edge of the shoulder *s* encountering the raised trigger-blade. Released from the involuntary pull, the trigger-blade is again lowered, clearing the shoulder *s* and the capstan is finally brought to rest with the detent *d* in contact with the trigger blade, while the upper edge of the latter is below the shoulder *s*, as is shown in Fig. 2. When the capstan has performed its rotation to this limit, it is so situated with regard to the head of the pin *p* that it can move vertically, and a study of the illustration, Fig. 2, in conjunction with the knowledge that the left sear-tail is engaged in the groove *g*, will serve to show that a third pull of the trigger will raise the capstan bodily, and with it the left sear-tail, thereby releasing the left tumbler.

It will be noted that the action throughout is absolute, and as carefully regulated as the escapement of a watch or clock. The capstan can only rotate in well-defined movements, and only after the operation of two preliminary pulls of the trigger does it arrive at the position when it is itself capable of vertical movement, while until that point is reached it is impossible for the left barrel to jar off. As regards other

mechanical features of the arrangement, there is only one detail that is the least open to question, and that is the durability of the capstan spring. It may readily be inferred that a failure of that spring would put the whole mechanism out of action. But the possibility is almost too remote for serious consideration. The springs used have little strain put upon them; they are only called upon to effect about a quarter of a complete revolution, and they are of a quality equal to the finest work put into watches or clocks. All the same, it is interesting to learn that Mr. Robertson is actually producing the same type of mechanism without any coiled spring at all, the rotation being effected by an ingenious ratchet movement. For some time past he has fitted a selective device to enable either barrel to be fired first at will.

Mr. Robertson recently invited a Press gathering to witness a demonstration in which he showed sundry modifications of the system described above. He explained that sportsmen who examined his single-trigger guns, and snapped off dummy cartridges, complained of the intermediate pull, being ignorant of the fact that in actual shooting this would be a quite involuntary action on their part. Accordingly, he had prepared a few variants of the three-pull system. In one case, by removing the upper part of the detent *i*, he was able to show how, in snapping off dummy cartridges, only two pulls were necessary; while with live cartridges the involuntary pull still came into operation. Another modification consisted in making the involuntary pull a frictional stop entirely, and this again would be a two-pull only with dummy cartridges. Finally, he showed his capstan without either the detent *i* or the shoulder *s*, the trigger-blade working in a plain groove

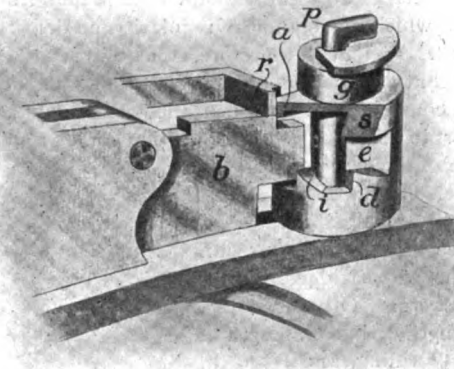


FIG. 3.—BEFORE FIRING FIRST BARREL.

and depending for the absorption of the involuntary pull on a slow rotation of the capstan by means of a weaker spring. We omit giving further details of these modifications for the sufficient reason that Mr. Robertson did not put them forward as practical types, but rather as examples of "how not to do it." It must be admitted that they all worked perfectly in accordance with the claims made for them, both with live and dummy cartridges, but there seems to be little necessity to disguise the intermediate pull since it is quite imperceptible to the sportsman in actual shooting, and that is the real test of efficiency.

## LECTURES TO YOUNG GUNMAKERS.

### XIV.—THE MICROMETER AND VERNIER.

In our last lecture we explained the use of the chemical balance, and how by its aid the gunmaker could satisfy himself at first hand concerning the weights and quantities upon which he must be in a position to give a decision. The determination of numerical values is not, however, confined to weights, but it also includes measures. Thus it happens, for instance, that a 12-bore gun has a calibre such as will take

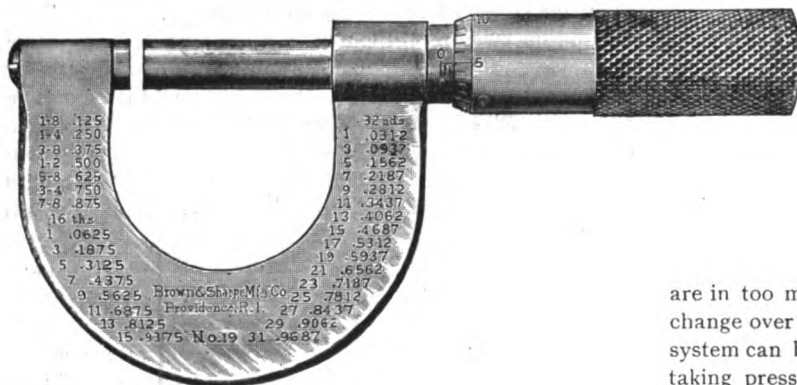


FIG. 16—SCREW MICROMETER.

spherical bullets weighing 12 to the pound; but in practice it is found more convenient to calculate the diameter that corresponds with a given standard specific gravity of lead. Hence we find that 12-bore is more correctly stated as applying to a diameter of  $\cdot 729$  of an inch than in terms of lead bullets, for which no standard regularity of density can be maintained. Weight is, therefore, so closely related to lineal measures that any lecture on the one would be incomplete without a companion discourse on the other.

The most important measurements that come prominently to the notice of the gunmaker are, as a rule, less than an inch. Few barrels exceed this amount in diameter, and about the only instances where measures of over one inch are of vital importance occur in relation with the lengths of cartridges, bullets and chambers. Other lengths, such as length of barrel, length of one turn of rifling, and so forth, can, as a rule, be approximately measured with the requisite accuracy by means of an ordinary straight edge. If this lecture serves no other purpose than to aid the reader in discarding the improper use of vulgar fractions, as applied to the inch scale, it will not be written in vain. It is nearly as difficult to say off-hand which is the larger, viz., 5 thirty-seconds of an inch or three sixteenths, as it is to settle off-hand which are the longer odds in betting 100 to 30 or 7 to 2. If one desires to study the relative values of a series of fractions with different denominators, it is necessary to find their least common multiple. The constant change of denominator, according to the fractions to be dealt

with, is an ever-present source of complication; but with decimals it is different. There is no fraction that cannot be expressed with sufficient exactitude with ten or a power of ten for denominator. An eighth of an inch may be expressed as two-sixteenths, four thirty-seconds, or eight sixty-fourths, but as a decimal it stands as  $\cdot 125$ , and the latter can be better grasped in relation with adjoining values than can any other method of stating it. Obviously we have here one-and-a-quarter tenths, or twelve-and-a-half hundredths, but simplest of all, 125 thousandths of an inch.

The French school boy spends two hours a week at arithmetic, and at the age of 15 can perform as great a variety of operations in figures and quantities as the English boy who has devoted three times as long to the same class of study. The reason for the difference is that on the Continent the metric system is in force, and in England we are still tied to a system of measures in which the 'inch is related to the length of the thumb joint, and the next measure to the dimensions of an average foot.

While most persons are agreed that we are in too many ways tied to the use of English measures to change over to the metric, no one can deny that the decimal system can be largely used for their interpretation. When taking pressures, we do so in tons-per-square-inch, and we express fractions of those tons in decimals, and in measuring our crushers we take their lineal dimensions in decimals of an inch remaining length. By common agreement, therefore, we select for a given measuring operation the most convenient unit of length, and we express any fractions in decimal values of the unit selected. In weighing powder charges and bullets, we take the value in grains and decimal fractions of a grain, while of exact values of length, we refer exclusively to the inch. A pair of barrels is either 28 or 30 inches long; it never measures 2 ft. 4 in. or 2 ft. 6 in., as the case may be; for to express the value thus would be to confess oneself out of touch with the custom of the trade.

Modern machine methods have vastly improved since the days when the most skillful workmen were obliged to regulate the accuracy of their operations by means of steel scales

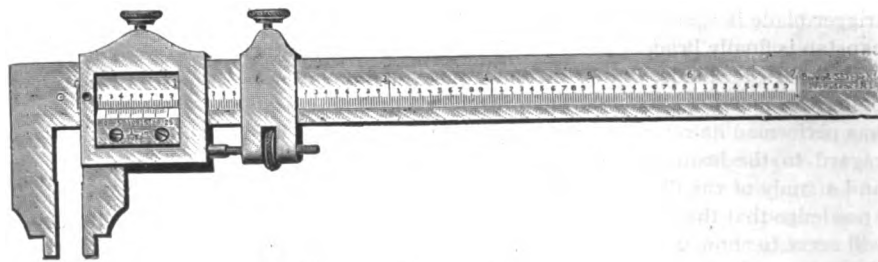


FIG. 17—VERNIER CALIPER.

giving direct readings in multiples of the 64th of an inch. The development of interchangeable work created a need for greater exactness for expression. Fortunately, vulgar fractions were discarded, and the practical value of the decimal became recognised. In mechanics it is possible to turn or file a piece of work so that it shall agree, according to the test of touch, with the space enclosed by the measuring points

of a pair of calipers. But it is vastly more difficult to express that distance in an exact fashion in the equivalent in inches, and the mere readjustment of the old calipers once the setting was lost was nearly as arduous as truing up a piece of work to the same standard of accuracy. Under these conditions we believe it is no exaggeration to say that the screw micrometer, as here illustrated, is the greatest educational medium that the world of mechanics has ever known. It can be set in an instant to any fraction of an inch from one-thousandth upwards. The relative thickness of a piece of tissue paper and a bank-note can, with its aid, be determined by any intelligent boy, and yet the whole outfit can be purchased for a sovereign, notwithstanding that it will sustain ten years' rough work on a bench without appreciably losing its accuracy. With it the painstaking mechanic can equip himself with a wonderful variety of standard plugs and gauges, each of them serving in some way to increase the value of the work that is carried out.

The method of reading is most simple, and can be grasped in a few minutes. The scale is marked in tenths of an inch, so that the first place of decimals is directly obtained from the markings in plain figures. The second and third places are read in connection with the working of a screw within the stem of the micrometer. The threads are so cut that the handle rotates 40 times in moving the gauging point over a distance of one inch. The visible scale is, therefore, divided into fortieths of an inch; that is, each tenth is divided into quarter-tenths. A little sum in arithmetic will show that each fortieth of an inch is equal to  $\cdot 025$ . Thus, if our scale shows three complete tenths and one quarter-tenth in addition, the value registered is  $\cdot 325$ . If there are two quarter-tenths or fortieths, the reading will be  $\cdot 350$ ; if three, it becomes  $\cdot 375$ . The radical principle of the instrument is, however, involved in the dividing of each fortieth of an inch into 25 separate parts. If the screw advances one fortieth of an inch for each revolution, one-25th of a revolution is equal to one-thousandth of an inch ( $\cdot 001$ ). Therefore, if our scale shows the three-tenths of an inch, plus two-fortieths, that is  $\cdot 350$ , as above, and a small extra amount in addition, then this extra amount can be judged by reading the number of strokes the handle has been turned beyond the zero mark on the circular scale. Supposing there are 13 of them, then  $\cdot 013$  must be added to  $\cdot 350$ , and the setting of the calipers is  $\cdot 363$ . This mental process is performed in about two seconds, so that every measure that the young gunmaker needs to make in the course of his career can be accomplished in less than the time needed to light a cigarette.

In order to measure distances greater than one inch, it is necessary either to invest in an expensive series of screw gauges of the kind already described, each adapted to measure a given inch, say from 4 in. up to 5 in. as a maximum, or else a sliding vernier may be used, which will give all values from zero to 6 in. For all-round work the vernier serves the purpose excellently, but if there is a very frequent demand for the recording of true measurements, its slower power of adjustment and reading becomes a disadvantage. The principle of the gauge can be readily seen from the accompanying illustration. The jaws are adjusted to the approximate position required, then the lower portion of the slide is locked by the thumb screw, and the longitudinal screw is worked until the fine setting of the measuring jaws is accomplished. The principle upon which readings with a vernier are taken is not difficult to explain with the help of suitable illustrations.

We therefore show herewith three diagrams, Figs. 18, 19, and 20, showing the application of the vernier system of division to the measurement of distances. What is known as the beam-scale, that is the markings on the beam or stem of the vernier calipers, is marked at the top of the scale line, and the vernier which slides over the beam is marked below this line. We have shown a series of divisions on the beam-scales, and the reader should regard them as inches for the sake of convenience of description. The vernier scale is marked so as to divide the divisions on the beam into tenths. To effect this the vernier scale must consist of ten divisions, occupying exactly the same space as nine divisions on the beam scale. Fig. 18 shows the zeros of the two scales opposite, which is equivalent to saying that the distance to be measured is an exact number of inches without fractions. Fig. 19 shows the

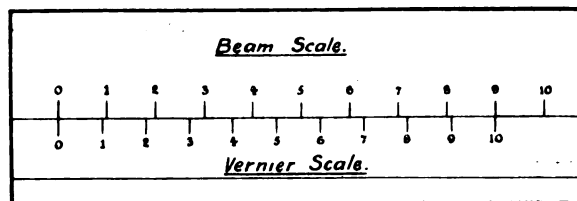


Fig. 18. Vernier Scale adjusted at zero.

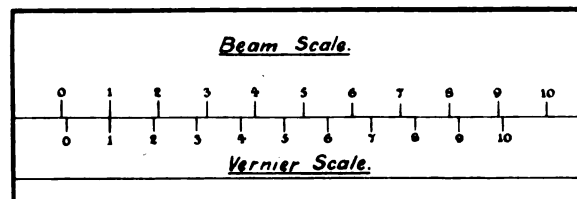


Fig. 19. Vernier Scale adjusted at  $\frac{1}{10}$  of an inch.

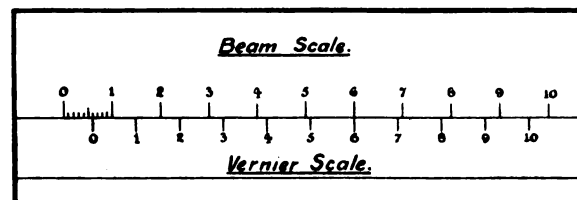


Fig. 20. Vernier Scale adjusted at  $\frac{6}{10}$  of an inch.

vernier scale moved along so that its zero has traversed exactly one-tenth of the distance "0" to "1" on the beam-scale. It will be noticed that this movement has brought the figures "1" on the two scales exactly opposite. This, of course, must happen so, since each of the vernier divisions is equal to nine-tenths of a division on the beam, the extra tenth representing the movement of the vernier zero. In Fig. 20 it will be seen that the vernier zero has moved six-tenths of the distance "0" to "1" on the beam-scale, and, therefore, that the "6" mark on the vernier comes opposite the corresponding mark on the beam. Again it will be clear how this happens. The vernier zero has moved six-tenths of an inch, and the six divisions of the vernier scale represent the extra 54 tenths necessary to make up the six divisions on the beam-scale. The rule, therefore, in reading a vernier is to take no notice of the figures on the beam, and to count the number of vernier division from zero to where two lines come exactly opposite, and the number recorded gives the requisite fraction

of the smallest division on the beam-scale. The illustrations here given are for the purpose of explaining the principle, and are not suggestive of actual practice. In considering such coarse measurements as tenths of an inch, no refinement of this nature would be necessary. But when we are dealing with hundredths, and still more with thousandths of an inch, it is obvious that some method must be adopted for differentiating between divisions, the diversity of which would be no more than the breadth of the most delicate line that could be drawn on a sheet of steel. The unaided human eye is incapable of making these fine distinctions, and it is at this point that the micrometer calipers and the sliding vernier scale step in to supply the deficiencies of ordinary vision.

Our illustration, Fig. 21, is copied from a recent issue of the *American Machinist*, and very clearly represents, on an enlarged scale, the system of vernier marking on the Brown & Sharpe caliper illustrated in Fig. 17. It will be noticed that the beam-scale is marked in tenths and quarter-tenths (fortieths) of an inch; in other words, exactly in the same manner as the more familiar screw caliper, Fig. 16. In order to measure with the vernier caliper the user should read the beam-scale exactly as he would that of any ordinary screw micrometer, and the odd thousandths are read from the vernier. That is to say, the eye is run

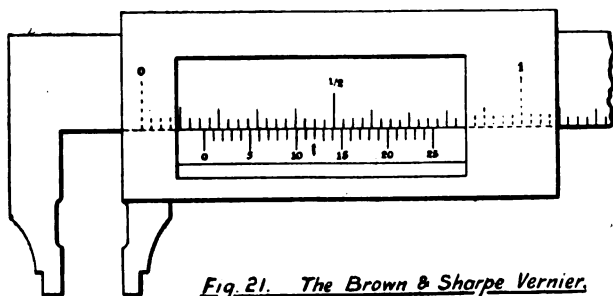


Fig. 21. The Brown & Sharpe Vernier.

along the scale until two lines are met with which come opposite to one another. In the case shown this happens at the mark 12, hence  $.012$  is the odd fraction to be added to the value already taken from the beam-scale by direct reading. The actual measurement recorded in the illustration is  $.1 + .05 + .012 = .162$  in.

The young gunmaker must not allow himself to be put off by the apparent difficulty of fathoming what we have set forth. He will be well advised if he takes our word for it, that to learn the working of the screw micrometer and the vernier caliper is not more troublesome than long division.

We have received from Messrs. Robert Hughes & Sons, of Birmingham, a copy of what is termed the "Jubilee" edition of their pricelist. This is a tastefully covered pamphlet, containing some 80 odd pages, fully illustrated, and giving all necessary particulars of the large range of guns, rifles, pistols, and accessories produced or handled by the firm.

Mr. Charles Smith, of Khama Gun Works, Weaman Street, Birmingham, has forwarded us a copy of his latest catalogue and price list of sporting guns, rifles, revolvers, saloon and air guns, of which he has a fairly representative range. A speciality to which attention is drawn is the "Rhytum" target rifle, which is a bolt action arm adapted to take .300 or the .32 Winchester ammunition. Mr. Smith makes a feature of repairs, re-stocking, re-jointing, re-boring, and the various other incidentals which from time to time are found requisite.

## NOTES.

**NORMAL CARTRIDGES.**—We have received from the Normal Powder & Ammunition Co., Ltd., specimens of the two leading types of the cartridges which they are submitting for the coming season's shooting. We have examined them most carefully, both as specimens of loading and for ballistic efficiency, and we congratulate the company on having attained regularity in loading, while for shooting results we find the cartridges well up to the requisite standard.

**THE TRANSVAAL DYNAMITE COMPANY.**—This huge concern is about to undergo transformation by the conversion of its constitution to that of an English company. There is no doubt sound common-sense underlying this resolution, since by getting rid of old associations the company has the better chance of preserving its monopoly in the new colonies. We understand that among the changes to be brought about by this revision will be a gradual strengthening of the British element among the officials and employees.

**THE BIRMINGHAM SMALL ARMS CO., LD.**—We are pleased to be able to modify a statement made in our last issue, which, read on its own merits, might be calculated to convey a wrong impression. Having referred to a reduction in the number of hands employed by the Birmingham Small Arms Co., Ltd., it should be emphasised that this has affected only 5 per cent. of the employees, and means simply the abandonment of night work, which was necessitated during the greater part of last year by Government requirements. At the present time, therefore, the factory is working at its normal productive capacity, and there is a sufficiency of work under contract to keep the company fully occupied on this basis during the next twelve months. The output of the financial year just closed has, we understand, included 100,000 rifles supplied to the Government.

**THE ROSS RIFLE IN CANADA.**—Mr. Borden, Minister of Militia to the Dominion Government, announced in the House of Commons at Ottawa recently that a contract had been entered into with a company to manufacture the Ross Rifle, which, as has been announced in our columns, has been definitely adopted for the arming of the Dominion troops. The factory, which we understand will be established in working order in a very few weeks, is located at Quebec, near the Government arsenal, and at the outset will probably be able to turn out from 12,000 to 15,000 rifles per annum, a number which may be doubled when it reaches its fuller developments. It will be remembered that we were enabled, through the courtesy of Sir Charles Ross, to publish an illustrated description of this rifle in our January issue of this year.

**MESSRS. JOSEPH LANG AND SON, LD.**—We have received this firm's latest price list, which contains full details of the different types of shot guns and rifles produced at 102, New Bond Street, W. Naturally, some considerable prominence is given to the single-trigger mechanism brought out by this company, which was fully illustrated and described among our "Selected Patents" some little time ago. This mechanism has since been modified so as to give an optional selection of the order in which the barrels are to be fired, with



a view to meeting certain customers' requirements; but it is an open secret that the makers themselves regard this as a useless refinement, involving needless complications. An interesting feature of the list consists of illustrations and particulars of the ammunition used in Messrs. Lang's high-velocity Cordite rifles.

**TO SECURE IMPROVED SHOOTING.**—The following memorandum has been issued from the Home District Headquarters:—"With reference to par. 10,687, List of Changes, dated October, 1901, complaints have been received at Birmingham Small Arms Factory from several corps of the Regular and Auxiliary Forces as to the looseness of barrels in fore-ends. It is usually assumed that the looseness is due to careless manufacture and inspection, and attempts are made locally to tighten up the lower band and nose-cap screws, and even to wedge up the barrels with pieces of wood. The attention of all concerned is therefore drawn to the provisions of the paragraph, List of Changes, already referred to, which reads as follows:—'It having been found that the shooting of rifles and carbines of the above-mentioned description was improved by permitting a slight movement between the barrel and the fore-end, it has been decided that for future manufacture and repair at Enfield and Birmingham, arms will have the barrel hole in nose-caps and upper bands enlarged .02 ins., so as to give a clearance of .01 round the barrels. The barrel groove will also be enlarged, commencing at the lower band in rifles and at the back sight in carbines, and increasing until flush with the barrel hole in nose-caps and upper bands.' Arms so altered have been issued June, 1901."

**MESSRS. F. JOYCE & CO., LD.**—We have received the report and balance sheet of this company for the thirteen months ending January 31st last. It will be noticed that the end of the financial year has thus been shifted so as to come at the close of the shooting season, which is likely to prove distinctly advantageous. The net profits of the business during that period, after deducting all expenses of management, providing for bad or doubtful debts, and writing off a substantial sum for depreciation of buildings, plant and machinery, and in reduction of goodwill, amounts to £1,612, making, with the balance brought forward, a total of £2,150 available for distribution. Out of this it is proposed to pay a dividend at the rate of 3 per cent. per annum, free of income tax, and to carry forward the balance of £350 to the next account. The directors call attention to the comparatively small amount of profit available for dividend, and attribute it to the fact that for the first few months following the lamented death of Mr. Courtman, the new management had not got into full working order. The price of metal also had an adverse effect on profits, but there is every reason to hope that the future prospects of the company are decidedly promising.

**EXPLOSION AT PERRANPORTH.**—Major A. Cooper-Key has issued his report on the circumstances attending an explosion at the Perranporth Factory of Messrs. Nobel's Explosives Co., Ltd., on January 16th last. The accident seems to have happened through the derailing of a tram conveying 533½ lbs. of partly manufactured blasting gelatine, and the three men in charge were killed, and two others at a short

distance were injured. Owing to the death of the principals concerned, exactly what happened is somewhat difficult to ascertain, three hypotheses being available, namely, the derailing and subsequent righting of the tram, contact of a hob-nailed boot with the rails, or friction of the same with ground on which explosives had previously been spilt. Any of these might have caused the explosion under suitable circumstances, but Major Cooper-Key is of opinion that no blame can be attached to the management, on which he comments in terms of high praise. He makes several recommendations for future guidance. He thinks that all derailments of trams should be treated as "breakdown of machinery," and should be left for the chief foreman to inspect before attempting to place the tram back again. He suggests that tubs should in future have lids, and perpendicular sides, so as to avoid the risk of spilling the contents in transit. Furthermore, he is of opinion that hob-nails in the boots of tram pushers should be of copper, aluminium, or other soft metal in place of steel. The latter has been the rule in gunpowder factories since the Chilworth explosion, but has not so far been considered necessary in dealing with dynamite.

**EXPLOSION AT ARDEER.**—Captain J. H. Thomson's report on the explosion which occurred at the Ardeer Factory of Messrs. Nobel's Explosives Co., Ltd., on January 6th last, has just been issued. This accident, which resulted in one fatality, happened in one of the final washing-houses for nitroglycerin, and after reviewing all possible causes, H.M. Chief Inspector of Explosives attributes it to the brass handle of the skimmer used by the deceased man striking against the lead lining of the washing tank, on which there would be in all probability a film of nitroglycerin thrown up as spray. In view of this solution of the case, the metal handles have since been removed, and wooden rods tipped with india-rubber are now being used for immersing the skimmers; but Captain Thomson is careful to say that he attaches no blame for the explosion either to the company or the deceased, the occurrence being purely accidental.

## REVIEW.

*Dictionnaire des Matières Explosives.* By Dr. J. Daniel. Preface by M. Berthelot. Published by Dunod, Paris, 1902. 815 pages. Price 30 francs.

In his preface Berthelot commences by saying that this is "A huge book, an excellent book, a useful volume, devoted essentially to the practical study of explosives," and he closes his interesting historical preface as follows:—"Briefly, Dr. Daniel's book constitutes a veritable encyclopedia of explosives, nearly innumerable, which have been invented during a quarter of a century. It is a practical manual, indispensable to the engineer, the manufacturer and the artilleryman." The opinion we have formed of this book is not less than that of M. Berthelot.

The subjects dealt with by Dr. Daniel may be considered under three distinct headings, viz.:—(1) As a dictionary of explosives; (2) as a chemical handbook of explosive materials and substances used in the manufacture of explosives; (3) and also as a treatise on questions connected with explosives.

As a dictionary of explosives, it is unique in several respects. The number of explosives described is immense and

the description, although brief in many instances, is such as would be given by the different inventors, no invidious comparisons having been made. In very many cases an analysis of the products is given, and in that of rifle powders, ballistic results are attached. The latter feature is new to dictionaries of explosives, and adds considerably to the usefulness and interest of the book before us. Tabulated shooting results are given for the powders, Cordite, Ballistite, Rifleite, Normal and others, both in rifles and in ordnance. This feature also extends in some instances to shot-gun powders.

The author has devoted a large part of his work to the subject of explosive materials and the substances used in the manufacture of explosives, and thereby, in our opinion, has increased its value far beyond that of any mere dictionary of explosives. For instance, nitrocellulose and nitroglycerin occupy 57 pages of the book. There is also mention of most of the nitro-carbo-hydrates and nitro-hydro-carbons of any interest. Some of them are only briefly described, but of these sufficient details are given to enable any reader interested to refer to the original papers on the subject. The solvents used in the manufacture of smokeless powders have received a fair treatment as regards their properties and the chemical tests used to ascertain the degree of purity. Under this head we also notice the rules and regulations for the storage and use of mercury fulminate, the analysis of cap compositions, and a description with tables of the various methods in vogue for determining nitrogen in nitric-ethers and nitro-compounds.

The questions connected with explosives noticed by Dr. Daniel are almost as numerous and as exhaustively treated as those mentioned under the previous headings. Some idea of their nature may be gathered from the following:—The calculation of the characteristics of explosives, *i.e.*, the temperature, the heat and gas resulting on combustion, also the determination of the potential; the application of electricity to firing blasting charges and the various means adopted to ignite fuses; lightning conductors applied to magazines; lastly, infernal machines.

We have attempted to give our readers a brief outline of the scope of this book, and of the subjects therein dealt with. In a work covering so wide a field, errors of description are almost certain to creep in; those we have observed are few and unimportant. It is a pity the book is marred by some half a dozen indifferent illustrations, reproduced from photographs, of English manufactures. This, however, does not detract from the usefulness of the book, and, in our opinion, those who wish to keep in touch with the past and present history of explosives will do well to include this work in their collection. To the beginner it will prove an almost unlimited source of information, and to the expert its pages will recall many past experiences and numerous studies, making for him an invaluable note-book of interesting events and useful memoranda.

A copy of Mr. W. W. Greener's 1902 price list of single rifles for sporting and target work has come to hand, which contains an amount of interesting information on the qualities and performances of these weapons. First place is given to the wonderful little .310 bore "Sharpshooter's Mark II. Club" rifle, which has shown such excellent results in shooting. This take-down model has now almost entirely superseded the "Mark I." pattern, which is not provided with the same method of compensating for wear in the screw threads. Mr. Greener is evidently still a firm believer in the general efficiency of the Martini breech action.

## ROUND THE TRADE.

The authorities in Natal have decided to send a team to compete at Bisley this year.

We regret to note that, in recording the opening of new premises at Cambridge by Mr. W. D. Darlow, a printer's error crept into the spelling of his name, which is as above.

The Canadian Government Arsenal at Quebec is being enlarged so as to provide for an increased normal output of 7,000,000 cartridges per annum, with a full time capacity of 20,000,000.

Messrs. Curtis's & Harvey, Ltd., have registered under Class 19 devices consisting respectively of the word "Mastiff," and of the head of a bull dog, with the word "Bull Dog" above it, for uncharged cartridge cases.

By an Explosives in Coal Mines Order, dated March 24th, 1902, the two explosives, Albionite and Arkite, have been placed on the List of Permitted Explosives for use in coal mines. This brings the number of permitted explosives up to a total of 27.

Formal notice was advertised, under date of March 29th, requesting creditors of the Projectile Co., Ltd., to send particulars of their claims to the liquidator of the Company, Mr. Gerald Sturt, 7, King's Bench Walk, Inner Temple, E.C., upon the 30th ult.

We regret to learn of the death, in his 68th year, of Mr. T. F. Derrington, of 66, Lower Loveday Street, Birmingham, on the 14th ult. During a period of 40 years Mr. Derrington had built up a reputation as a gun-stock merchant to the trade which was probably second to none.

The directors of the Birmingham Small Arms Co., Ltd., have declared interim dividends for the six months ended January last, on the preference shares at the rate of 5 per cent. per annum, and on the ordinary shares 5s. per share, the former being less income tax and the latter free of income tax.

The directors of Messrs. Holland & Holland, Ltd., after paying the dividend on the 5 per cent. preference shares, and placing £2,000 to the reserve fund, have declared a dividend at the rate of 12 per cent. per annum for the half-year ending December 31st, 1901, making 10 per cent. for the year, and a bonus of 1 per cent.

The New Explosives Co., Ltd., have recently been conducting some extensive official trials with wet gun cotton at the Ridsdale Range of Sir W. G. Armstrong, Whitworth & Co., Ltd., for the purpose of testing a new safety exploder. These trials were perfectly successful, and it is probable that we may refer to them in greater detail in our next issue.

In answer to a question asked in the House, the under Secretary for War announced that, since the 1st of September, 1899, rifles and carbines to the number of 450,000, and small-arm ammunition to the extent of 240,000,000 rounds, have been supplied to the troops in South Africa. These figures include the rifles and ammunition in the hands of the troops on the date in question.

Messrs. F. Joyce & Co., Ltd., inform us that they have transferred their Birmingham agency to the hands of Messrs. Clabrough & Johnstone, of Price Street, St. Mary's, and, further, that they have fitted up a large depôt at 50, Loveday Street, Birmingham, where they will hold an extensive stock of all kinds of ammunition, so as to be able to give prompt delivery within the Midland district.

Messrs. Joseph Lang & Son, Ltd., inform us that they will shortly be opening a new range and shooting ground, at Perivale, near Ealing, which will be known as the West London Shooting School. The installation will be spread over a fine acreage of ground, and will be thoroughly up-to-date in character. A necessary feature of all such grounds is a tower, and in addition there will be butts for driving, and part of the grounds will be cut into rides to give practice in walking up to the game, this latter being something of a novelty.

The air-gun slugs patented in the names of Messrs. P. Newton, T. J. Rosewell, and F. Joyce & Co., Ltd., which were described in our March issue, were the subject of an action before the Comptroller of Patents on the 14th ult., it being claimed by Messrs. Banks & Co. that this was an infringement of their patent of 1892. The Comptroller decided, however, after hearing evidence, that this was not a case in which he would be justified in refusing the patent. Among those present during the hearing were Mr. Percy Newton, Mr. Banks, and Mr. Buck.

We are informed that the business of Alexander Henry & Co., of Edinburgh, has been acquired by the firm of Alexander Martin, of Glasgow and Aberdeen, who are armourers to the Scottish Rifle Association. The partners in the firm of Alexander Martin are Mr. J. E. Martin, of Glasgow, and Mr. F. R. Martin, of Aberdeen, and the latter gentleman will take over the active management of the business at Edinburgh, where he is already well known in the rifle-shooting world. It is safe to predict that the old-established reputation of Alexander Henry & Co. will not suffer through the change of proprietorship.

Among the victims of the disaster at Ibrox Park, Glasgow, on the occasion of the International Football Match early in April, was Mr. Andrew Scott, who for the last five years had been assistant manager to the firm of Charles Ingram, gun-makers, of Renfield Street, Glasgow. Mr. Scott had been a member of the 1st Lanark R.V. for several years, and was one of the best shots in Scotland, having been five times in the Queen's Hundred, three times in the Scottish Twenty, and once in the Kolapore Cup team, besides winning many prizes. The funeral procession included the partners and employees of the firm of Charles Ingram.

## APPLICATIONS FOR PATENTS.

MARCH 17TH—APRIL 19TH, 1902.

- 6,591. Loading of Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 6,624. Manufacture of Projectiles. H. Burrows.  
 6,669. Torpedo Steering. A. J. Lee and T. Clarke.  
 6,693. Projectiles for Ordnance. J. S. Hoodless.  
 6,745. Fire-Arms. C. R. S. J. Hallé and M. E. Ribbenthorp.  
 6,821. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 6,847. Cartridge Carriers. W. Lindsey.  
 6,925\*. Blasting Cartridge. T. F. Durham.  
 7,013. Magazine Arms. J. H. Topham.  
 7,033\*. Cartridge Loading Machine. T. and W. H. Nichol.  
 7,143\*. Ordnance. K. Haussner.  
 7,144\*. Gun Carriages. K. Haussner.  
 7,145\*. Gun Carriage Brakes. K. Haussner.  
 7,302. A New Explosive. A. Brock.  
 7,497. Automatic Fire-Arm. H. Stamm.  
 7,596. Rifle Sling. J. H. Patterson.  
 7,605. Bandoliers. T. G. Wilson.  
 7,610. Ordnance Breech Mechanism. C. Holmström and A. E. Mascoll.  
 7,729. Rifle Clip for Cycles. W. N. Liversidge.  
 7,735. Projectile Fuses. A. Reichwald (Agent for *Fried. Krupp*).  
 7,764. Target. T. Goucher.  
 7,815. Target. J. Mason.  
 7,894. Lathe for Grooving Projectiles. A. J. Astbury.  
 7,951. Gun Carriage. C. Holmström and A. Bremberg.  
 7,986. Percussion Fuses. A. Reichwald (Agent for *Fried. Krupp*).  
 8,045. Lathe for Grooving Projectiles. A. J. Astbury.  
 8,150. Lathe for Grooving Projectiles. A. J. Astbury.  
 8,177. Moving Targets. P. Risley.  
 8,278. Fuses for Blasting. G. Bower (Agent for *A. Fernandez*).  
 8,399. Small-Arms. W. Foggo.  
 8,413. Rifle Bucket. P. A. Martin.  
 8,437. Lathe for Grooving Projectiles. A. J. Astbury.  
 8,464. Loading of Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 8,465. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 8,547. Lathe for Grooving Projectiles. A. J. Astbury.

\* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

MARCH 27TH—APRIL 24TH, 1902.

COMPILED BY H. TARRANT.

- 1,381 (1901). **Ammunition Hoists.** A. T. Dawson, London, and J. Horne, Barrow-in-Furness. Apparatus for supplying ammunition to the platforms of turret gun mountings, in which a pair of endless chains working over sprocket wheels, and provided with trays to contain the ammunition, are adapted to raise and maintain a continuous supply of charges and projectiles to a pair of turret or barbette guns. Accepted March 21, 1902.
- 6,159 (1901). **Blasting Cartridges.** W. Kirsanow, Russia. A blasting cartridge, the casing of which is cylindrical and is closed at one end by a hemispherical bottom. The case is charged with an explosive consisting of 60 per cent. potassium chlorate; 30 per cent. potassium picrate; 5 per cent. elemi resin; and 5 per cent. of a solution of celluloid in sulphuric ether and alcohol. Accepted March 22, 1902.
- 6,496 (1901). **Projectiles.** P. M. S. Dalmeny, co. Dublin. The construction and application to the noses of conoidal ordnance projectiles of caps having their fronts flattened or cupped. When the leading edge of the nose impinges on armour the pressure tends to bring the projectile in a line at right angles to the surface of the armour. Penetrative efficiency is thus enhanced. Accepted March 22, 1902.
- 6,584\* (1901). **Single-Trigger Mechanism.** W. L. Powell and A. Dean, Birmingham.
- 7,142 (1901). **Trimming of Ordnance.** A. T. Dawson, London, G. T. Buckham, Barrow-in-Furness. Modifications in the training apparatus of the revolving platforms of ordnance, which are designed to permit of the use of electrical driving gear in the extremely slow and slight movements which heretofore could only be obtained by the use of the hydraulic apparatus. For this purpose electrical driving gear is combined with a hydraulic apparatus. Accepted March 27, 1902.
- 7,148 (1901). **Detonating Composition.** M. Bielefeldt, Germany. A detonating composition containing aluminium in the shape of powder, in addition to oxygen-yielding substances. An example is as follows:—Pulverised aluminium, 20 per cent.; picric acid, 50 per cent.; potassium chlorate, 30 per cent. Accepted April 3, 1902.
- 7,309 (1901). **Telescopic Sights.** A. A. Common, Ealing. A method of mounting a telescopic sight upon a hinged plate, the movement of which is controlled by a cam, in order to obtain angular difference between the axis of the gun and the optical axis of the telescope in elevation. Another plate, worked by a screw, controls the horizontal displacement of the telescope. Accepted March 13, 1902.
- 8,132 (1901). **Projectiles for Ordnance.** W. Munro, Hebburn. A projectile, the front portion of which consists of a torpedo-shaped shrapnel part, and the rear portion of a cylindrical casing. The cylindrical casing grips the tail of the torpedo part, and contains an explosive charge which is timed to be fired when the compound shell is at the highest point in its trajectory. Fresh velocity is thus imparted to the torpedo, vanes or fins being employed to rotate it and keep it from deviating from the correct line of flight. Accepted March 20, 1902.
- 8,374 (1901). **Gun Mountings.** A. T. Dawson, the Hon. S. P. Bouverie, and G. T. Buckham, London. A tripod gun mounting in which the front legs are pivoted to the long rear leg. The mounting is such that it can be varied to suit the height of the cover, and the top carriage can be adjusted to bring the gun on a level when the mounting is placed on rough ground. The mounting is folded up for transportation. Accepted March 6, 1902.
- 8,463 (1901). **Explosive Projectiles.** Sir H. S. Maxim, London. A fuse for projectiles containing high explosives, the ignition of which is delayed for a time sufficient to allow the projectile to pass through a plate of armour. Centrifugal force caused by rotation of the shell opens a passage through the explosive charge up which the fuse has to travel before reaching the firing pin. Accepted March 20, 1902.
- 8,654 (1901). **Gun Mounting.** J. H. Mann and Mann's Patent Steam Cart and Wagon Co., Ltd., Leeds. A method of mounting a gun upon a steam or other motor carriage in

- such a manner as to enable it to be taken into the firing position with its muzzle pointing in the firing direction. The turning movement, which at present has to be made when the gun is in position, is thus obviated. Accepted April 3, 1902.
- 9,181 (1901). **Gun Carriages.** A. T. Dawson and G. T. Buckingham, London. A number of improvements in the mechanism of a field gun carriage by means of which a quicker and more accurate training of the gun is gained; a firmer support upon the ground is obtained; the gun is more readily adjustable either for travelling or firing; and a more efficient recoil is provided than heretofore. Accepted March 20, 1902.
- 9,517 (1901). **Automatic Guns.** Sir. W. G. Armstrong, Whitworth & Co., Ltd., and Sir A. Noble, Newcastle-on-Tyne. A number of modifications in the mechanism of automatic guns are described. The improvements are principally connected with the automatic opening and closing of the breech, and with the mechanism for loading the gun automatically by transferring the cartridges from a hopper to the chamber. Accepted March 20, 1902.
- 9,670 (1901). **Breech Mechanism of Ordnance.** C. Holmström, G. A. Kohler, and A. Bremberg, Glasgow. A method of so constructing the breech mechanism of ordnance that an obturator ring, having a minimum amount of taper or no taper at all, can be employed without cutting away the screw threads for enabling the block to enter and leave the breech. Accepted March 20, 1902.
- 9,805 (1901). **Disappearing Gun Carriages.** A. Reichwald (Agent for *Fried. Krupp, Germany*). A disappearing gun carriage in which the counterweight for returning the gun to the firing position is so connected to the carrier as to provide for an effectual advance of the gun into the firing position, as well as establishing favourable conditions relative to the force of acceleration and state of equilibrium between the gun barrel and the counterweight. Accepted March 27, 1902.
- 10,372 (1901). **Cartridge Carrier.** P. Dagnall, London. A flat cylindrical casing adapted to be strapped to the shooter's body. The casing is arranged to carry a number of cartridges in rows of short tubes, which are provided around its outer circumference. Accepted March 20, 1902.
- 11,062\* (1901). **Single Trigger Mechanism.** L. B. Taylor (Agent for *A. E. Lard, U.S.A.*).
- 11,425 (1901). **Brakes for Ordnance.** A. Reichwald (Agent for *Fried. Krupp, Germany*). Improvements in fluid pressure brakes of the type in which the liquid passes between the piston and the wall of the cylinder, as described in Patent No. 14,262, 1900. The improvement relates especially to means for brakeing the return motion. Accepted March 6, 1902.
- 12,172 (1901). **Percussion Fuse for Shells.** A. Reichwald (Agent for *Fried. Krupp, Germany*). A percussion fuse for shells, which is provided with a device by means of which the projectile may be caused to burst either at the moment of impact or after it has passed through the target. Accepted March 27, 1902.
- 18,586 (1901). **Gun Barrel.** W. F. Cole, U.S.A. A smooth bore rifle barrel, which is cylindrical in the breech proper and also in the section between the chamber and the barrel. The remainder of the barrel bore is smooth, but is elliptical in cross section, and is twisted. Accepted March 27, 1902.
- 20,362 (1901). **Automatic Fire-Arms.** R. Frommer, Hungary. Automatic mechanism applicable either to pistols or shoulder arms, in which the breech bolt and barrel slide back and part under the influence of recoil in the known manner. Simplicity and compactness of the various parts is claimed by the inventor. Accepted March 13, 1902.
- 22,397\* (1901). **Single-Trigger Mechanism.** H. H. Lake (Agent for *The Remington Arms Co., U.S.A.*)
- 23,269 (1901). **Torpedo Launching Apparatus.** S. J. J. Drzewiecki, France. Apparatus for launching torpedoes, which is adapted to be arranged either upon ordinary ships or upon submarine boats. The apparatus is lowered or anchored below water level when in use upon an ordinary ship. Accepted March 6, 1902.
- 24,838 (1901). **Recoil Apparatus for Ordnance.** W. I. Wise (Agent for *Skodawerke Actiengesellschaft, Austria*). A compound return apparatus for recoil brakes, consisting roughly of two or more coiled springs arranged between telescopic tubes, the outermost tube being adapted to slide in the top carriage and is connected to the piston rod of the brake, whilst the innermost tube is adapted to slide on the brake cylinder. Accepted March 20, 1902.
- 25,233 (1901). **Blasting Explosive.** W. Bate, Hayle. An explosive for blasting purposes, the sensitiveness of which to friction or percussion is greatly reduced as compared with other explosives. The explosive is composed of a combination of petroleum jelly or castor oil with blasting gelatine or other explosive containing nitroglycerin. Accepted March 27, 1902.
- 26,335 (1901). **Sighting of Ordnance.** C. P. E. Schneider, and J. B. E. A. Canet, France. A device for automatically compensating the error in sighting caused by the rolling of a ship altering the angle of sight allowed for the drift of the projectile. The sight is so suspended as to keep the vertical planes pressing through the sight and through the axis of the gun constant. Accepted March 13, 1902.
- 151 (1902). **Range Finder.** P. M. Justice (Agent for *Lieut. C. Davis, U.S.A.*). A range finder designed especially for use on shipboard, where the motion of the gun platform or enemy render frequent observations necessary. By means of two telescopes the range may quickly be determined, without elaborate calculation. Accepted March 20, 1902.
- 1,137 (1902). **Shot Firing Apparatus.** R. C. W. Wood and J. Holmes, Eastwood. Electrical shot firing apparatus, in which binding screws are dispensed with. The generator terminals, together with the wire ends of a separate cable, constitute a double pole firing key. Accepted Mar. 27, 1902.
- 1,434 (1902). **Rifle Stand.** H. Green, St. Albans. A collapsible rifle stand, consisting of a bar suitably shaped to receive the stocks of the rifles, and of a top bar provided with sockets to receive the barrels. The two bars are connected by folding uprights. Accepted March 6, 1902.
- 2,976 (1902). **Priming Caps.** H. and H. Tirmann. In order to provide for the better ignition of the detonating composition in primers, a longitudinal hole is made down the centre of the fulminate when in the wet state and during compression. A greater surface is thus presented to the air, and the fulminate is more completely dried. Accepted March 13, 1902.
- 3,238 (1902). **Detonating Composition.** F. Hess, Austria. A method of reducing the danger in the manufacture of and in the use of detonators, consisting in composing the detonator of two parts, one of which is rendered indifferent by the admixture of a non-explosive, and the other of a comparatively small quantity of fulminate. Accepted March 20, 1902.

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

## SELECTED PATENTS.

### THE LARD SINGLE-TRIGGER MECHANISM.

11,062 (1901). L. B. Taylor (Agent for *A. E. Lard, U.S.A.*). In this specification a number of improvements are described in the single-trigger mechanisms dealt with in Patents Nos. 16,897, 1898, and 3,952, 1899, by A. E. Lard. With dummy cartridges the mechanism acts as a "two-pull," and in actual firing the recoil itself blocks the parts and prevents the involuntary pull discharging the second cartridge.

Referring to the accompanying drawings, it will be seen that the trigger *a*, shown in detail in Figs. 5 and 6, is pivoted at the point *b*. The part *c* (Fig. 7) called the firing plate, also works around this pivot, and is raised with the trigger when the trigger is pulled. The spur lever *d* is pivoted to the firing plate *c* at the point *e*. The upper arm of this lever is connected to the top part of the trigger *a* by means of a short link *f*. A weight *g* (Fig. 8) is pivoted to the lower part of the firing plate, and it is kept in the position illustrated by a spiral spring *h*, which works in a groove in the plate *c*. The wire spring *i* connects the lower arm of the spur lever *d* with the lower part of the firing plate *c*, and tends always to pull the

foot of the spur lever in a direction towards the breech of the gun. This, however, it is only permitted to do during the dropping of the trigger after the pulling off of one of the sears. Under the influence of this spring the spur lever is caused to assume the position shown in Fig. 4. The surface of the trigger plate upon which the foot of the lever rests when in this position is file-cut, or roughened, in order to ensure a positive contact between the two parts.

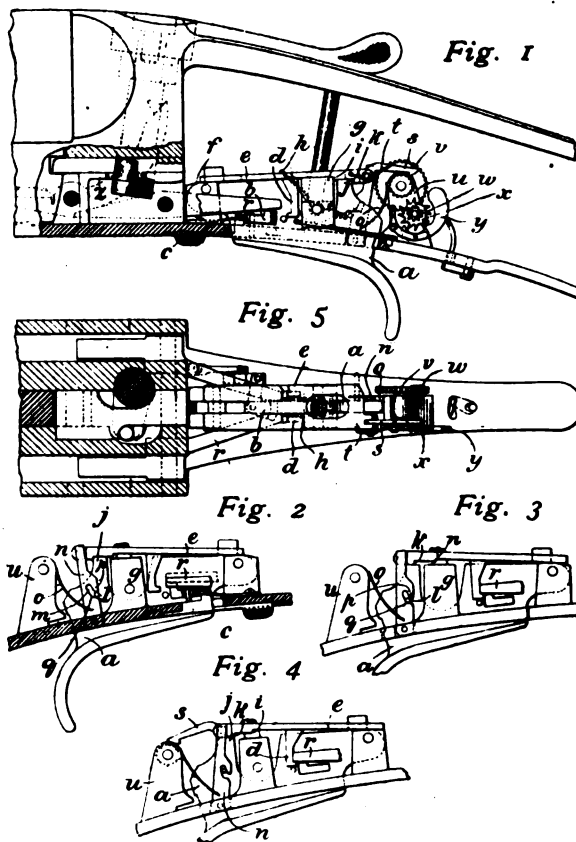
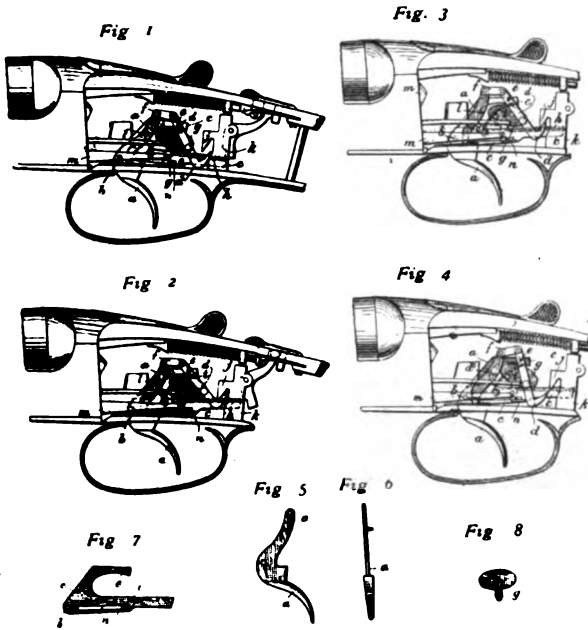
When the trigger is pulled to discharge the first cartridge, the firing plate *c*, and thus the spur lever *d*, are raised. This

THE REMINGTON SINGLE-TRIGGER MECHANISM.

22,397 (1901). H. H. Lake (Agent for *The Remington Arms Co., U.S.A.*). A two-pull single-trigger mechanism is described in this patent. A retarder, consisting of a kind of escapement mechanism, permits the involuntary pull to take place before the parts arrive at such a position as to permit of the firing of the second barrel.

Referring to the annexed drawings, it will be seen that the trigger blade *a* is slotted, to allow of the insertion of a switching limb *b*, the position of which is controlled by a slide *c*. This limb *b* is adapted to be switched from beneath one sear-tail to a position below the other, and whichever sear it is situated beneath is the first to be raised when the trigger *a* is pulled. The second sear is raised through the medium of the hooks *d*, which extend downwardly from the part *e*, called the stepping sear controller.

This sear controller *e* is supported by the lugs or posts *f* and *g*, and is retained in the position illustrated in Fig. 1 against the action of the spring *h*, which tends to move it forwards, by the engagement of the step *i*, and the rear upper edge of the lug *g*. The top of the rear portion *j* of the trigger blade *a* is adapted to engage a second step *k* upon the underside of the sear controller. Thus, when the trigger is pulled to discharge the first barrel, the sear controller *e* is raised, and the step *n* is disengaged from the lug *g*. The spring *h* at this point exerts its influence to force the sear controller slightly forward



action takes the spur of the spur lever into engagement with the hook *j* on the locking post *k*, as illustrated in Fig. 2. The momentary release of the trigger between the first pull and involuntary pull which immediately follows discharge, liberates the spur lever and allows of a momentary disengagement of the spur and the hook *j*. This disengagement, however, is not allowed to be completed, since the recoil jerks the weight *g* forward, and causes it to deal the pin *l* upon the trigger a sharp blow. The blow turns the trigger round upon its pivot, and thus the link *f* jams the spur tightly up against the hook *j*.

Upon the complete release of the trigger the wire spring *i* exerts its influence to turn the spur lever around on its pivot into the position illustrated in Fig. 4. When the trigger is again raised, the spur lever escapes the hook *j*, and allows the trigger to be raised through a space sufficient to release the left-hand sear *m* through the left-hand flange *n* on the firing plate. After the second discharge the spur lever is returned to the position as in Fig. 1, by a rod which is actuated by the top lever.

The main principle of the invention will be understood from the foregoing description. In the specification several modifications of the weight *g* are described, and also of the firing mechanism. The safety parts and the selective mechanism are also described and illustrated.

The selective mechanism consists of a slide beneath the trigger plate, which controls the position of a T-shaped part, working in a slot in the trigger plate *c*. The T-shaped arm is capable of a horizontal angular movement, and the branches of its crossing head are adapted to overhang either one of the flanges upon the firing plate, through which the sears are raised. The barrel first to be discharged is that beneath the sear of which the branch of the crossing head of the T-arm is situated. Accepted March, 27 1902.

to the position shown in Fig. 2. The raising of the trigger also carries the projection *l* upon the trigger blade into the slot *m* cut in the limb *n*, which works in link-like fashion around the pivots in the trigger plate and on the end of the sear controller *e*. This link *n* is always under the influence of the spring *o*, which tends to push it around on the trigger plate pivot in a direction towards the breech. The projection *l*, coming into contact with the point *p* of the slot *m*, allows the trigger to be raised only a sufficient distance just to release the first sear.

When the trigger is released after the first discharge, the projection *l* is brought into contact with the lower surface *q* of the slot *m*; the complete return of the trigger to its normal position is thus prevented. It must be understood that the distance between the point *p* and the surface *q* at the mouth of the slot *m* is such that it corresponds with the depth of the second step *k* on the sear controller *e*. Thus, when the trigger is released, it is allowed to drop only a sufficient amount to disengage the part *j* of the trigger blade and the step *k*.

The springs *h* and *o* then again exert their pressures to force the sear controller and the link *n* in a forward direction to the position illustrated in Fig. 3. The exact speed of this forward movement is governed by the retarding arrangement of wheels, shown at the back of the mechanism. The speed of this movement is so regulated that the involuntary pull following the first discharge takes place before the sear controller has completed its forward travel, and before the depending hooks *d* are taken beneath the sears *r*. When the sear controller has completed its movement, and the trigger is again pulled, the stud acts upon the hooks *d*, and so lifts the second sear.

It will be seen that the object of the slotted link *n* and the projection *l* is to retain the trigger in a raised position after the first discharge, so that the second pull shall only be a short one. The position of the parts when the trigger is pulled to discharge the second barrel, is that illustrated in Fig. 4.

The retarder works in the following manner:—A pawl *s* is connected with the end of the sear controller, and is adapted to engage under the pressure of the spring *t* the teeth of the ratchet wheel *p*, which works upon a shaft turning in the lug *u*. The spur wheel *v* works upon the same shaft, and its teeth engage those of the spur pinion *w*. On the shaft on which the spur pinion *w* works, an escapement wheel *x* is mounted. The teeth of this escapement wheel engage a vibrating escapement drag pawl *y*. This train of gearing is set in motion by the pawl *s*, which is dragged forward with the sear controller; and it will be understood that the escapement can be so adjusted as to control the speed of the forward movement of the sear controller.

When the gun is broken down to reload, the turning of the top lever forces the slide *z* to push the sear controller into its backward position, at the same time turning the link *n* round on its pivot, thus disengaging the slot *w* and the projection *l*, and allowing the trigger to drop and be secured by the engagement of the step *i* and the lug *g*. Accepted March 13, 1902.

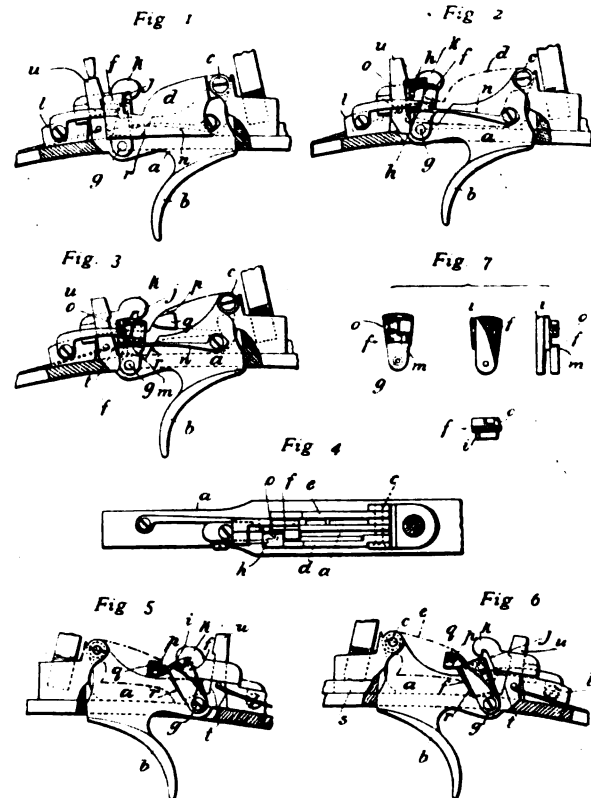
#### THE POWELL SINGLE-TRIGGER MECHANISM.

6,584 (1901). W. L. Powell, of the firm of W. Powell & Son, and A. Dean, Birmingham. The single-trigger mechanism described in this patent is of the three-pull type, the involuntary or immediate pull being a necessary operation to bring the parts into position for the second discharge. A block pivoted to the trigger blade is worked from its normal vertical position to a tilted position, by a succession of steps, and is thus brought progressively into a series of positions, in which it first actuates the right-hand sear, then comes into an intermediary inoperative position and finally into a position beneath a projection on the left-hand sear ready to discharge the left-hand barrel.

Referring to the appended drawings, the blade *u* of the trigger *b* is pivoted in the usual way at the point *c*. Working around this same pivot are also two supplementary, or sear-lifting blades *d* (Fig. 4). These blades are raised by the trigger in succession in the right first then left order through the medium of the upstanding block *f*, pivoted at *g*, to the tail end of the trigger blade *a*. This pivoted block *f*, is shown in detail in Fig. 8.

The action of the mechanism is as follows:—In Fig. 2 the parts are illustrated in the position when the trigger has been raised to discharge the right-hand barrel. In pulling the trigger the block *f*

is raised, and its top is brought into contact with the projection or flange *h* upon the right-hand sear-lifting blade *d* (shown clearly in Fig. 4). By this means the right-hand barrel is discharged, and the point *t* (Fig. 7) upon the left-hand side of the block *f* is caused to slide up the inclined surface *j* upon the hook *k*, which is fixed the block *l*, forming part of the trigger plate *b*. The sliding movement, as will be easily understood, turns to the block *f* slightly forward from its position as shown in Fig. 1 to that illustrated in Fig. 2. The curved shoulder *m* upon the block is thus brought into contact with the spring *n*, which spring has a tendency to carry the block *f* around upon its pivot from the vertical to a tilted position. When the trigger is released after the first discharge the block descends with it, but the spring *n* is prevented from tilting the block *f* by the



stop limb *h*, the point of which engages the front of the little projection *o*, and holds the block against any further forward movement.

The involuntary pull which follows immediately upon the first discharge again carries the trigger and block upwards. This time the block escapes the hook *k*, and is carried by the spring *n* into the inoperative position shown in Fig. 5, the point *i* upon the left-hand side of the block *f* falling against the curved top *p* of the shoulder *q* on the left-hand sear-lifting blade *e*. When the trigger is released completely after the intermediate pull, the spring *n* carries the block still further forward, causing the nose *i* to slide beneath the shoulder *p*. The block *f* is prevented from being carried too far forward by the stop *r* upon the trigger blade. When the trigger is again lifted the nose *i* on the block *f* engages the shoulder *e* and so lifts the sear-releasing blade *d* (see Fig. 6).

When the gun is opened to reload, the turning of the top lever drives the rod *s* backwards against the block *f*, so forcing that part around on its pivot, until stopped by the face *t* of the upright part *u*, to its normal position as in Fig. 1. The trigger is locked in the ordinary way, a downwardly-extending leg upon the safety slide engaging the top of the upright part *u* of the trigger blade. Accepted March 20, 1902.



# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>A SET OF CHAMBER GAUGES</b> ... ..	90
Peace! Peace! Beautiful Peace! ... ..	83	<b>ROUND THE TRADE</b> ... ..	91
The Prosperity of the Gun Trade ... ..	83	<b>LECTURES TO YOUNG GUNMAKERS, XV.—THE SHOT</b>	
The Prodigal Officer ... ..	83	<b>COUNTER</b> ... ..	92
Educational Birmingham ... ..	84	<b>NOTES</b> ... ..	95
Patterns and Shot Sizes ... ..	84	<b>THE SALE OF PISTOLS</b> ... ..	96
Rifles in Safes. ... ..	8	<b>CORRESPONDENCE:</b>	
An Explosives Committee ... ..	84	<i>Re</i> Alexander Henry ... ..	96
THE VEXED QUESTION OF CHAMBER SIZES ... ..	84	<b>APPLICATIONS FOR PATENTS</b> ... ..	96
THE LOADING OF SCHULTZE POWDER ... ..	85	<b>SPECIFICATIONS PUBLISHED</b> ... ..	97
THE WINCHESTER SALUTING CANNON ... ..	89	<b>SELECTED PATENT</b> ... ..	98

## CURRENT TOPICS.

**Peace! Peace! Beautiful Peace!**—As our issue goes to press penny trumpets and the waving of twopenny flags tell us that at last the country is released from the enslavement of war. Its every effort to create a happy state of business affairs, and its desire to do justice to the prevailing wish to celebrate the Coronation, have been marred by the ever-present knowledge that life and treasure have been ebbing away in a portion of the British dominion, where so much of our manhood has gone never to return. With the signing of peace every question of the day seems to bear a new aspect. The country is once more free to resume the developments of commerce, and the nightmare of a nation fighting for national existence has terminated by the happy awakening to an assured victory. Every member of the community must benefit by the change that will gradually come over our affairs, and it is only to be hoped that the opening up for development of an especially valuable territory will do much to ensure for the nation that activity and prosperity which make things boom in every department of business. Therefore, all we can say is, now that peace is once more with us, let us make the best possible use of its blessings.

**The Prosperity of the Gun Trade.**—At a time when the richest and the highest in our land are spending their surplus cash in refurbishing up their town houses, and in ordering ermine gowns and diamond coronets, the gunmaker is left in doubt whether there will be any money left for expenditure in his direction. Probably there will be nothing in the nature

of the harvest that will come into the pockets of the caterer and the costumier. But in any case the influx of a large number of strangers to London is more likely than not to aid in the production of orders for guns. While the class that is heavily struck by the unusual expenditure will be inclined to make old guns do for another season, another class will take advantage of the unaccustomed stay in London to see two practitioners, who, in the nature of things, take time over their work. The dentist will be asked to provide new sets of molars in place of old ones worn out or decayed, and the gunmaker will carry out the process of trying and fitting, which is an essential preliminary to the manufacture of a best gun on behalf of one who feels that advancing years need a little humouring in the way of bend and cast-off. When we add to our calculation an allowance for the foreign visitors and potentates who wish to become the possessors of a case of best guns, we see that there is every possibility that things will turn out really nicely before the shutters are once more put up in Mayfair and Belgravia.

**The Prodigal Officer.**—The young man with money becomes an officer in the army; the English officer is a great sportsman; and the great sportsman is essentially a traveller. These three conditions, considered as a concrete whole, imply that the backbone of a gunmaker's customers are the officers of the British Army. Besides ordering shot guns they order rifles, and when a man once starts ordering rifles he is inclined to get together something in the nature of a battery. Now one of the peculiarities of the class of officer which has made the British Army famous is that he has a wonderful capacity for spending money on sport. While at the front sport against human game has been plentiful, and

yet free of all cost, save that of human life. Thereby the estates and investments at home have had a rest, money has accumulated, and guns will need replenishing, especially those which were taken out to the front and spilt overboard in crossing drifts of various widths and depths. Following upon a time of war, the alert energy of the officer must needs cause him to turn the more eagerly to sport, and nothing will be more popular than the idea of starting the new shooting season with a case of guns containing three of the very best, with all the latest improvements and refinements of finish. We trust that gunmakers will find a real harvest after the disappointments and postponements which have beset their path during the past three years, and we earnestly believe that the return of the British officer will put things on a proper basis.

**Educational Birmingham.**—In the course of the annual meeting of the Birmingham gun trade, it is almost certain to happen that something in the nature of an oratorical gem will be unconsciously put forward by one or other of the speakers present. This time, we think, we may well award the palm to Mr. W. L. Powell, whose gifts as a speaker, and whose dignity in addressing a public meeting, can only be compared with his natural birthright of a mellow, powerful, and yet expressive voice. In descanting upon the merits of the technical education of young gunmakers, he pointed out that a certain proportion of the efforts put forth must fail in their intended effect to benefit Birmingham by the fact that they will provide skilled mechanics for the London gun trade. Now, as a matter of fact, if there was no more leakage from Birmingham than is caused by the workers who travel to London, no great trouble would be encountered; but it must be remembered that the skilled workers of Birmingham are in demand the world over, the ordnance factories and the armourers to the British army absorbing most of the talent that goes straying from the happy fold in Birmingham. Whatever goes to London should, at least, not be begrudged. London gunmakers, by their attention to detail, maintain the reputation of the English gun trade at a level where it could not stay for 24 hours if the London view were to cease its beneficial regulating power. There are plenty of firms in Birmingham who work for London makers, and some of them have been known, at odd times, to supply private friends with guns at wholesale prices. At first sight this might seem an economy to the purchaser, but he nevertheless loses more than the difference between wholesale and retail prices when he deprives himself of the inspection, regulation, and adjustment, which is known in the trade as London viewing. Therefore, we say that anything that Birmingham can do to help to uphold the traditions and really practical services which the small minority, represented by the London trade, perform on behalf of the industry as a whole, should not be begrudged. Rather should they do all in their power to help London to maintain the premier position for which its individual items work so earnestly.

**Patterns and Shot Sizes.**—Probably there is no question which is quite so simple on the face of it, and quite so complicated when really examined, than that of the behaviour of shot pellets after leaving the gun. A set of punctuation marks is found upon the whitewashed targets after the discharge of the gun, and just why they have arranged them-

selves in the particular positions noted provides food for much reflection and speculation. In the hope of reducing one of the least necessary of the complications met with, we have endeavoured in our lecture this month to the young gunmakers (who are supposed to be earnestly listening to our every word) to lay down the more obvious and practical laws governing the actual relation of weight to number of pellets in a charge of shot. The mere fact that the figure 6 is stencilled on a bag of shot does not necessarily imply that there are 270 pellets to every ounce of its contents. In fact, the betting is a good many to one against any chance 270 pellets weighing one ounce. Therefore, in dealing with patterns we hope that every effort will be made to insure at least that the experiments have not been complicated by irregular charges of shot, that is, irregularities in number, or in weight, or in the two combined. If in calling attention to the various little points in the every-day work of the gunmaker, that need to be the subject of strict enquiry and observation, we are able to lead one here and there to attend closely to these matters, then our work will not have been in vain, because a very few will leaven a very large mass with the instincts of accuracy and intelligent appreciation of detail.

**Rifles in Safes.**—If only the Birmingham newspapers knew it, they could qualify in a marked degree for any vacancies that may be apparent amid the ranks of our so-called comic papers. "Chips" and "Cuts" are not in it for real wit and humour with the papers that can earnestly debate the possibility of transmitting practical quantities of arms in the concealment afforded between the walls of iron safes. Some years ago we were amused at hearing that the then South African rebels had been importing ammunition inside steam boilers. A mathematician rather more accurate than the rest, calculated the cubical contents of a million rounds of ammunition, and he showed that if the British fleet all needed boilers at the same time it might be possible to stock within their interstices a sufficient number of rifles and cartridges to carry on a small campaign with a few blacks in an African swamp. The suggestion that rifles in any quantity can be carried concealed within specially arranged spaces in an iron safe, is only one degree more humorous than the notion of arming a civil population by the help of boilers with false bottoms. We, therefore, hope that the good people of Edgbaston, Moseley, and Barnt Green will not be entirely deprived of their night's slumber when contemplating the awful calamity of our enemies having been armed by the help of such rifles, cartridges, and air-gun slugs as can be got out of the country within specially created cavities in safes. In fact, when it really comes to a question of being funny in the matter of safes, we should at least remember that in France they can run a mystery of this kind with far greater success than ourselves, as witness, for instance, the Humbert safe, which, after much strife, contained nothing more interesting than a brace button, though it is possible that Birmingham had a hand in its manufacture.

**An Explosives Committee.**—We are at least assured that our most sacred national possession has been guaranteed a permanent tenure of existence. Monarchs may come and go, governments may dwindle and disappear, and the official organ of the Liberal party may shout itself hoarse without creating any particular sensation. In fact, while all these

things are going on, and each day's newspapers contain their records of the passings away of the great, we have one thing always with us: that is, an Explosives Committee that will be available to re-discover any old ideas that it may be found necessary to appropriate, and to conduct tests for the purpose of confirming Government officials in opinions they have already decided to adopt. In other words, we have a Committee that will be as useful to the explosives world as a Select Committee of the House of Lords is to the placid legislators who are worried by people always on the look out for some national grievance to set right. The way to fame and prosperity will no doubt be by means of membership of this Committee. A mere Secretaryship will no doubt confer departmental favour and promotion; and thus we find that an item in our Government organisation has been added, the value of which can only be appreciated by those who have the power of grasping the vital aspect of developments in embryo. If not the first, we hope at least to be among the most sincere in congratulating the Committee, both as a body and as individuals, upon the guarantee it has received against all liability to dissolution.

### THE VEXED QUESTION OF CHAMBER SIZES.

MANY will have noticed that at the annual general meeting of the Gunmakers' Association a brief reference was made to the fact that an agreement had been arrived at between the Association and the ammunition manufacturers with regard to the figures for minimum chamber sizes for all bores of shot guns. That such a result has been achieved is matter for congratulation to all parties concerned, and is likely to prove of the greatest possible benefit to both the gun and ammunition trades. Standardization is becoming more and more of a necessity in all branches of manufacture, but possibly in no case to a greater degree than in these allied trades, when the ammunition is supplied by one set of manufacturers to be used in the weapons made by another. Of course, it may be said that without absolute standardization a gun could be chambered to suit a given cartridge made to the working gauges of the ammunition manufacturer. This is, no doubt, true, and would be satisfactory enough in its way if the production of cartridges were in the hands of one firm. But if the trade be divided over two or three, or 30 firms, each working to its own gauges, the need for standardization at once becomes apparent, when it is considered that the owner of a gun cannot be bound down to use one make of ammunition exclusively.

All this is ancient history, as is also the fact chronicled by us at the time, that the Gunmakers' Association, acting in concert with the Birmingham Association and the ammunition manufacturers, published some time ago a set of standard minimum chamber sizes for 12, 16, and 20 bore guns. Since then consideration has been given to producing a similar standardization in regard to all other recognised bores of shot guns, and, according to the official statement referred to above, the task is now practically completed. For the moment the figures are barely ripe for publication, but we think that when the time arrives for issuing them it will be found that the new dimensions are fully worthy of the consideration devoted to their production, and are a credit alike

to the Gunmaker's Association and to the ammunition trade. For the first time in the history of the allied trades a serious attempt has been made to reduce gun chambers and ammunition to some logical sequence of proportions. The new standard gun chambers for all bores are, in fact, built up in accordance with certain predetermined rules, based on one or more fixed constants, forming a foundation from which all other dimensions can be produced with infallible exactness.

One aspect ever present in considering a change of dimension such as this must necessarily be retrospective in character. It may readily be appreciated that if gunmaking were a new art, the formulation of rules relative to chamber sizes would afford but a few difficulties to a committee of experts. As it happens, however, the trade has attained its present proportion without any particular rule but that known as "rule-of-thumb," and this process of development has been productive of many seeming anomalies as between one size of chamber and another. No system of revision can be successful which fails to take note of the fact that such differences exist, and that they apply to all guns now in use, and to vast quantities of ammunition more or less suited to those guns. The task recently accomplished has, therefore, been no easy one. On the one hand, has been the knowledge of the obligations imposed by existing practice, and, on the other, the desire to reduce future manufacture to conditions worthy of modern progress and enlightenment. At first sight the work of harmonising these conflicting ends might seem well-nigh insurmountable. It was found, however, that, proceeding on the lines of least resistance, there was still a possibility of framing rules for the new chamber sizes which, without any undue straining of the degree of working toleration usual in the gun trade, would allow guns chambered to the new dimensions to shoot existing ammunition, and similarly permit of cartridges made to the newly agreed figures to work satisfactorily in the guns still in use. To have reached this end cannot fail to prove a triumph to the allied trades.

**CLIP LOADING FOR REVOLVERS.**—The Webley and Scott Revolver and Arms Co., Ltd., are now placing on the market a loading clip for revolvers, which was patented some little time since, and was duly noted in our Patents list. It differs from previous attempts at the same end, inasmuch as the clip and cartridge cases are firmly united, the clip really consisting of a flat plate, which grips the cartridges round the rims, and which is retained in the pistol during the action of firing, this being possible by the fact that the plate is no deeper than the rims, and consequently only occupies the hitherto open space between the chamber and the breech face of the weapon. On breaking down the revolver after firing, the clip and fired cases are ejected together, and a fresh clip can at once be inserted. It will be seen that this is a real and practical application of the idea of clip loading to the peculiar circumstances of a revolver, and the system can be adapted to any service Cordite cartridge, though its main object doubtless was to work in conjunction with the Webley-Fosbery automatic revolver. We understand that it is possible to shoot 72 cartridges per minute with this addition to the equipment of that weapon, though, under ordinary circumstances, half that rate of fire would no doubt be ample. The chief point of merit is not so much the possibility of a sustained rapidity of fire as the advantage of being able to reload all of six chambers simultaneously, ready for emergencies. We are informed that the provision of the clip adds from 10 to 15 per cent. to the price of the ammunition, which is made up into boxes of 24, each of the four clips being contained in a separate compartment. Messrs. Kynoch, Ltd., are manufacturing the ammunition in this form on behalf of the Webley and Scott Company.

THE LOADING OF SCHULTZE POWDER.

It is a matter of some difficulty for a newspaper having both the trade and technical branches of a business to look after, to make month by month a suitable selection from the subjects available for treatment. We feel, however, that there can be no question as to the general interest that must attach to an article dealing with the loading of Schultze powder. Practically the growth of nitro powders into popularity and favour kept pace from the start with the increase of knowledge as to the most suitable methods of loading them. Schultze, in its early days, suffered more from setbacks due to the unpar-

bored within a few thousandths of this minimum limit. The Gunmakers' Association has similarly effected a great change in the matter of chambering. The agreed sizes are posted up all over the country, and gunmakers fully appreciate the utility of closely following the instructions laid down. As regards systems of boring, things are still a little uncertain. The shape of the cone, the cutting of a slight relief or bell

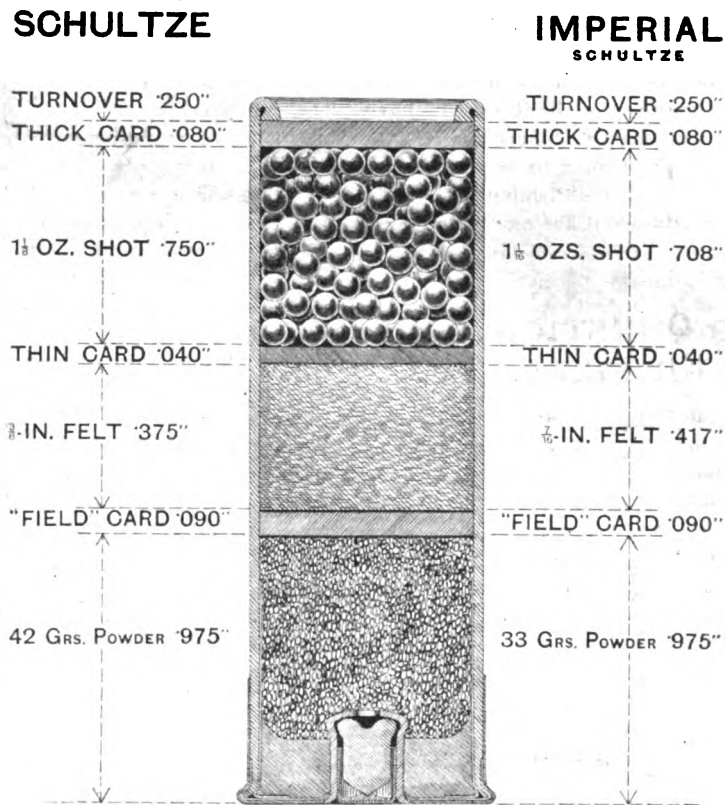
mouthling before the parallel walls of the barrel are reached, and the various forms of choke at the muzzle are all subject to variations in practice. In spite, however, of all these complications in the task of ascribing a de-



Mr. F. C. BORER.

donable deviations from standard loading than from any inherent defects in the powder itself. Nowadays, the case is very much the same, except that the powder is less affected by deviations of loading, and, furthermore, such deviations as are now indulged in are, as a rule, more intelligently conceived than those which were popular some 20 years ago. *The Field* recently published an article analysing and describing authenticated specimens of cartridges which were collected in the early eighties. The astonishing charges and methods of loading thus brought to light no doubt explain the defects noticed at the time. Nowadays, we have gained wisdom, in that we appreciate that a powder is at its best when shot from a standard cartridge in a standard gun.

Of course there is a great deal of difficulty in defining anything in the nature of a standard. Practically there is no rock bottom finality in any scientific matter, least of all in guns and powders. Nevertheless, 12-bore has a definite value as the diameter of a shot gun, and most reliable guns are



Mr. R. W. S. GRIFFITH.

finite specification to the standard gun, we still find that the powder maker is able to take a gun or a series of guns which, for his own purpose, he is quite justified in treating as standard specimens of those in use among shooters. He

then regulates his powder to shoot well in such guns, and his regulation is carried out in connection with a system of loading which experience shows to be suited for obtaining the best results under a variety of conditions.

In order that an explosive shall do its work properly, it should be so firmly closed in as to enable it to get thoroughly well alight before the first movement of the shot begins to open out the volume of the powder chamber. This really is the whole principle of a good cartridge, but its actual carrying out in practice necessitates an amount of attention to detail that goes far beyond two or three, or even a dozen, simple rules.

There are, in fact, so many items included in the formation of a good cartridge, that a simple definition is not easy. What is wanted by the shooter is a cartridge that



Mr. C. GOLDRING.

is true to the gauge of his chamber, free from hang-fire, which gives good penetration and regular pattern without undue recoil or internal pressure, and with a minimum of smoke. To arrive at this, the cartridge must be one in which the explosive promptly responds by means of a suitable fulminate charge to the pull of the trigger, and propels the shot with a maximum velocity, yet without undue deformation of the pellets, leading to scattering, or without balling the shot, and this with a minimum of discomfort, such as blowbacks or recoil, to the shooter, and a moderate and regular stress on the gun.

Putting aside the gun, the shooting of the finished cartridge is governed by many conditions—the nature and the quantity of the fulminate, the size of the flash hole, the nature and the amount of explosive, the gauge, thickness and elasticity of the wads, the size and amount of shot, the internal diameter of the tube and its stiffness, and the amount of turnover given and its nature. Of these it may be taken that the wads and the turnover are the two points that need to be enquired into most exhaustively to arrive at the absolutely best shooting to be obtained from any given gun; but although it is impossible to regulate a standard cartridge for every barrel in which it may be used, it may be reckoned that the best shooting is on the average obtained by the use of the charges and wadding and methods recommended by each manufacturer for his own explosive. There are a considerable number of loaders, however, who depart from these recommended methods, and adopt special systems of their own. These special systems may suit some special gun or some special condition, but such systems are sure to break down when put to the test under average conditions.

In the diagram which we reproduce herewith, an effort has been made to illustrate the Schultze cartridge in a pictorial form, as the Schultze Company recommend it to be loaded. On one side we have shown the loading that applies to Schultze powder, while, on the other hand, the loading of Imperial is similarly expressed. As practical cartridge loading is mainly a matter of making appropriate use of the space within the case, we have set out by approximate measurements the position of each item in the loading. We do not wish to suggest that everything is true to the absolute hundredth of an inch. It will be noticed, for instance, that we have taken a little latitude in expressing the decimal value of the seven-sixteenth felt wad, so that the total of the column shall agree with the nominal 2.56 for the length of the cartridge case.

A little extra compression here, and a slight variation of thickness somewhere else, may affect the values we have put down; but, anyhow, they will serve for the guidance of the student in loading. They show him how to appropriate the available space, and how far the standard system of loading is adapted to that end. The charge of powder placed in the case, with a *Field* card firmly seated upon it, occupies, if anything, a little less than the space marked. Then comes the felt wad, which should, of course, be three-eighths of an inch thick, though, admittedly, it is sometimes a little more and at others a little less. The thin card is next placed upon the felt, then comes the shot, and, if all has been properly done, there is just room for the top wad and a nice turnover.

As regards the actual wadding used, the all-essential part is that the card wad placed over the powder should be of substantial thickness, and some five-thousandths of an inch larger in diameter than the internal bore of the cartridge case,

so as to ensure a perfectly gas-tight fit between itself and the case. The felt wad need not be of larger dimension than the internal tube. A thin card is desirable above the felt and below the shot. The wad over the shot should not be too tight in its fit, and can vary from a thin card to one of medium thickness; too thick a card is undesirable. One quarter of an inch of case should be left after all is in for the turnover, which should be a firm one. By the use of materials such as these to standard dimensions, the best average shooting cartridge is obtained, and in the Schultze loading factory the cartridges are sampled regularly, and submitted to definite tests, which they must satisfy.

It is not, however, quite sufficient to have the best materials without a knowledge of how they should be put together. There are certain points to be attended to which become second nature to those who are always in the loading shop, but which may be overlooked by those not versed in the practical side of the work, such as the necessity for placing the wads squarely in the case, and not in any way in a slanting position. A slanting wad over the powder is fatal to good shooting. Then this wad should be seated upon the powder, not

with such force as to compress the powder to a hard block, but simply to keep the grains together in a compact mass without much air space. Above all, care should be taken not to overload either with powder or shot, which is such a common fault of the individual loader. It does not follow that an increase in the powder charge will give increase in effectiveness of the killing power; it may only result in scattering the pattern to an extent that makes it very ineffective. Nor does the increase of shot always give an increased killing circle. The lighter charge of shot, propelled with a good muzzle velocity, and without much upsetting of the charge by internal pressures or the rush of gas from the muzzle, will often do extraordinarily good work.



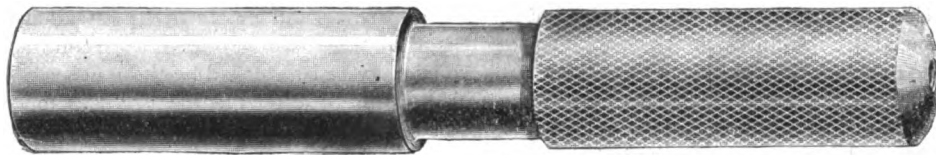
SOCKET GAUGE MADE BY MESSRS. ELEY BROS. TO THE STANDARD MINIMUM GUN CHAMBER SIZES.

As regards the cartridge case itself, this is the subject of a most carefully drafted specification. Every dimension is stated with exactitude, and the limits of variation are laid down according to the accuracy required and the possibilities of manufacture. The external dimensions of the case, as a rule, are governed by the test of entry into a gauge representing the minimum chamber size, which is by inference the rejecting or maximum gauge for the cartridge. The minimum sizes of the cartridge are determined by tests of each individual part, though, of course, the crucial test is the capacity to fire without showing signs of cracking or undue expansion. The other details of construction, such as size of flash-hole and quality of the cap composition, are all regulated in accordance with well-known practice, though, of course, every loader of Schultze powder would do well to keep the firm's speci-

cation before him, in order to have an answer to any queries that may arise. It is, however, to the internal diameter of the tube that the cartridge loader must pay the most careful attention. The nominal 12-bore being equal to  $\cdot 729$  of an inch, the size of the interior of the case should be something approximating thereto. The Schultze Company have fixed the limit sizes for this part of the cartridge at  $\cdot 735$  for a maximum and  $\cdot 730$  for a minimum, and plugs of the kind illustrated are used to determine the relation of these sizes to the individual cartridge. The maximum internal diameter of the cartridge being  $\cdot 735$ , it will be clearly understood that in order that a wad should make a firm tight-fitting union in the tube, its diameter should approximate to  $\cdot 740$  of an inch. It

are best served by turning out a sound article well loaded, and of known capability.

When the Schultze Company decided to undertake the loading of their cartridges they followed out the idea of showing their patrons the best that could be done. In districts where complaints were met with, the customers for the powder have been induced to buy cartridges instead, and the complaints have thereupon ceased in every instance. This article will thus serve the double purpose of showing, in the first place, how Schultze cartridges should be loaded, and, in the second place, it will serve to make clear to the buyer of loaded cartridges the care that is taken by the Company to live up to the system of morals it has formulated. In calling



PLUG GAUGE MADE BY MESSRS. ELEY FOR TESTING THE INTERIOR DIAMETER OF THE CASE.

is, of course, difficult to apply any very great exactness of gauging to a substance with so approximate an outline as a punched wad. But, anyhow, in practice it is found that a wad which gauges nicely to  $\cdot 740$  of an inch goes quite comfortably into the ordinary cartridge tube, while wads a few thousandths smaller make the looser fit, which is considered suitable for the over-felt and over-shot wads.

A standard cartridge, put together as above described, is rapidly becoming recognised and adopted. The slight variation from standard results shown by such a cartridge in various borings of guns is not easily detected, except by accurate testing appliances; but, broadly speaking, the more open is the boring the lower the penetration will be, and, conversely, the more narrow the bore the greater will be the penetration; but, as a matter of fact, the rise and fall of a few feet of remaining velocity at a killing range is not noticed by the shooter. Hang-fires should be at the present day unknown, since there is a sufficiency of cap composition in the cartridge cases, as now issued, to ensure prompt ignition of powders in general use, and should hang-fires still be met with, the cause will, in all probability, be found in the striker.

One might imagine, in seeing an article with the heading used above, that we had set out to describe and illustrate some new principle in cartridge loading. But we think it will now be clear that the chief rule consists in following the very simple and obvious system of loading that has been known to us over a period of many years. Perfection is solely a question of intelligent repetition and care at every stage of the work. The cartridge cases must be received in good condition, and they must be stored at an equable temperature. The loader will do well to bear in mind the inadvisability of lightly undertaking variations from the standard charges. Unless a gun is proved to shoot really badly with the standard cartridge, it should not be humoured, and although shooters are admittedly always on the look out for an ideal charge, it follows, as a matter of fact, that the earlier advice given in this article is really the soundest in the end. Gunmakers may suppose that a large part of their trade depends upon fostering the loading of special cartridges, but they will find in the long run that their interests

attention to the loading factory, we must ascribe the credit for its inception, organization, and administration to three persons—Mr. R. W. S. Griffith, Mr. F. C. Borer, and Mr. Charles Goldring. The first-named is, of course, responsible for the scientific guidance of the work that is done. Mr. Borer is too well-known to require any special introduction, so that we can state his claims in a nutshell. It is his enthusiasm and power of initiation which have made the department a commercial success. The everyday work of the factory rests in the hands of Mr. Goldring, who has had upwards of 14 years' experience in this line, his first insight into it being when in the employ of the Kynoch Company. It was with a full sense of the able work which had been put into the loading shop that we recently made our way to the firm's loading premises, where we had an opportunity of seeing the work in progress. The establishment is at York Place, Buckingham Gate, S.W., and it is at the present time more or less in a transition state, as further accommodation is already found to be necessary to meet existing requirements, and the plant and space now occupied is no more than is requisite to cope with ordinary standard loading. In the course of a few weeks, when alterations now in progress are completed, there will be practically two separate departments, the one devoted exclusively to this standard loading, and the other to the execution of special orders which depart from ordinary practice.

In following the various operations conducted in such an establishment as this, from the first state of the empty cartridge case to the familiar wooden box containing one hundred loaded cartridges, we are able to understand how it is that the term "factory-loaded" is no longer used to express scorn. Since the building up of a complete cartridge is now reduced to an exact science, contempt can no longer be shown for methods which permit of the loading of hundreds and thousands in complete agreement with recognised standards. Regularity is brought about by the use of machinery and appliances which secure absolute uniformity, but, apart from that, there is a system of making constant tests, while the operations are in progress, so as to check any tendency, however remote, to departure from the required sample.



As our readers are well aware, since we published a specification of the cartridge cases supplied to the Schultze Company some two years ago, the cases have to comply with a very stringent set of conditions as regards dimensions and quality, and are liable to rejection if they fail to meet the requirements laid down. Moreover, they are not taken on trust, but samples are chosen from each batch as they come in, which have to pass the gauges of the loaders. The Schultze loading shop is provided with a very complete set of gauges for this purpose, for testing the exterior and interior diameters of the paper tube, the thickness of rim, and other vital points, and the strength of the caps also requires checking from time to time. No very novel purpose would be served by illustrating the gauges used in their entirety, but for our purpose it is enough to show two specimens. The plug gauge shown is one of a set used for testing the internal diameter of the paper tube. These gauges have plain and perfectly cylindrical surfaces, and they correspond in dimensions with the maximum and minimum sizes for the interior of the tube. Our other illustration shows a socket gauge, which marks the maximum limits permissible in the cartridge case, and its manner of use is self-evident. A cartridge case, loaded or unloaded, must be capable of entering this gauge, and equally show itself to be a good fit as regards rim and mouth.

Assuming the empty cases to have passed the requisite tests, they are placed in trays holding one hundred each, and passed into the powder room to undergo the first operation. Here they are charged with the required load, which is measured out to ten cases at a time from a Dixon or a Jones' Accuratus measuring machine. A machine of this class that will throw accurately under all conditions has, no doubt, still to be invented, but a constant check is maintained by the system of taking out charges from time to time and weighing them, so that any slight variations may at once be detected and the reason sought for and removed.

From the powder-room the trays are brought out to receive their next treatment in a wad-seating machine, which, in some of its details is a distinct speciality of the Schultze Company. The machine as it exists is said to be the joint production of Mr. Griffith, Mr. Borer, and Mr. Goldring. Speaking generally, it consists of three separate power-driven sets of plungers, each ten in number, which are capable of adjustment, so as to seat the wads to any required depths. One set of plungers is adjusted to seat the *Field* card on the powder, another to follow this up with the felt wad and thin card, and another to seat the card over shot. Ten cartridges are supplied with wads at one movement of any of the sets of plungers, and a feed is fitted to the machine, which allows the boy in charge, by ten successive movements of a hand lever, to seat the wads in one hundred cartridges.

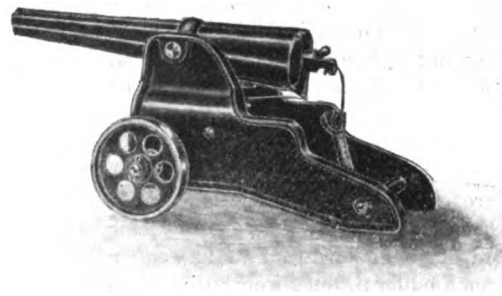
The charge of shot is measured out by a Dixon machine loading ten cartridges at a time, and this machine, as also that for powder, is subjected to constant tests for accuracy. After receiving the card over shot, the cartridges are, for the first time, removed from the trays, and passed into a turnover machine. At present two of these are in use, each having a capacity for passing through from 2,400 to 2,500 cartridges per hour. They are, needless to say, automatic. The boy in charge places the cartridge in an inclined trough, down which they roll by gravity, until each in turn is clutched by the rim, pressed forward with unvarying force against the

rapidly revolving turnover clutch, and then dropped into a receiver. As each emerges, it is examined by the boy in charge, whose only duty consists in maintaining the free flow of the cartridges towards the machine. A great advantage of this method against the hand turnover machine is that the power-driven appliance will give as perfect a turnover at the end of a day's work as at the beginning, whereas hand work is liable to vary with bodily fatigue. From the turnover machine the now completed cartridges are handed over to the packers, and are closed down in wooden waterproof-lined boxes, each containing one hundred, and, after the boxes are stencilled on the lid with the name and designation, they are transferred to the store where they are stacked ready for consignment to the company's customers.

### THE WINCHESTER SALUTING CANNON.

In the accompanying illustration we show a view of the remarkably neat little cannon lately brought out by the Winchester Repeating Arms Co., of New Haven, Conn., U.S.A., for saluting and signalling purposes. It was primarily designed to meet the demand for a low-priced breech-loading cannon, possessing the three cardinal virtues of safety, simplicity of construction, and ease in handling, and, so far as can be seen, these are admirably combined with a quality of design and finish which render the miniature weapon a real ornament. The weight of the mounted piece is about 14 lbs., and it measures 17 inches in length from muzzle to trail, 7½ inches in height, and 7 inches in width.

The gun itself consists of a 12-inch barrel of rolled steel, blued and cylinder-bored, with a chamber to take a standard



Winchester 10-bore cartridge, mounted by means of trunnions on a cast-iron carriage, which is supported in front on a pair of 3½-inch wheels, the whole being very solid and strong. There is an elevating screw for raising or lowering the gun on its carriage. The breech action is both simple and strong. There is a breech-block hinging on a pin on the underside of the gun, which has attached to it a rotating piece, which is practically the interrupted screw of artillery breech-blocks; that is to say, when turned vertically, by means of a breech-bolt handle, it occupies the same width as the breech-block proper, and the two can be swung outwards and downwards, while a half-turn to the right on the part of the handle causes it to rotate transversely, and engage in two slots in the breech of the cannon, thus holding the breech-block firmly against the mouth of the chamber. Hinged on the same pin is a

striker, controlled and actuated by a powerful main-spring, so that it occupies one of two positions, cocked or with its nose projecting well through the breech-block.

The firing is accomplished in orthodox fashion by means of a lanyard, which pulls the striker over the dead-centre and impinges it with force against the cartridge; but it is to be noted that the striker can only reach the cap when the breech-bolt is absolutely locked, any intermediate position preventing it from passing beyond the face of the breech-block, while, on the other hand, the striker itself holds the breech-block securely locked after firing. The makers recommend for use with this gun a 10-bore Winchester brass or paper cartridge, specially loaded with 9 drams of black powder behind two black-edge and one card wad, in order to produce the loudest possible report.

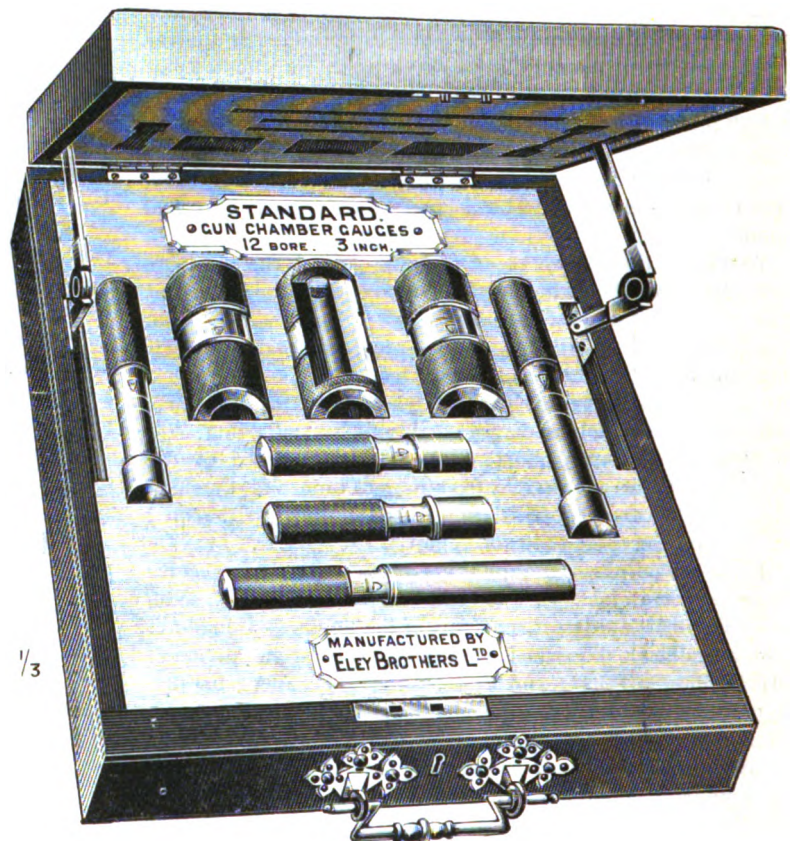
Neither the cannon itself nor the ammunition is expensive, and we believe that the weapon is regarded with favour "on the other side" for use in Fourth of July and other celebrations requiring noisy forms of salute. Possibly there are Coronation enthusiasts in this country who may find it equally suitable to give voice to their feelings of loyalty on the forthcoming occasion. But it will probably find its greatest vogue among yacht-owners, since it seems to be well suited for saluting and signalling purposes, and is so easily worked. The sole agents for the Winchester Repeating Arms Co. in England are the London Armoury Co., Ltd., of 114, Queen Victoria Street, E.C.

**AUTOMATIC PISTOLS.**—There can be little doubt that at the present moment there is a decided slump in automatic pistols, in this country, at all events. Inquiries we have made reveal the fact that gunmakers are doing little, if anything, in this line, despite the fact that the trade in revolvers has undergone no appreciable diminution. The fact is, that all automatic pistols so far put on the English market are of too severely a military pattern.

They are of the high velocity, long range type. Ordinary civilians, desirous of being armed for self protection do not want a weapon that will put a bullet through from 10 to 15 one-inch deal boards, or that will give good shooting up to 800 or 1,000 yards. Nor do they require one which needs a special holster and belt to carry it by. Power for power, an automatic pistol is generally a more compact affair than a revolver, but, so far, nothing of the sort has been obtainable here at all comparable with the numerous types of pocket revolvers which find so ready a sale. There seems to be no reason forthcoming why some of the automatic systems now in vogue should not be adapted to pocket weapons, and, in fact, we know that on the Continent this has already been done. All the better known types of automatic pistols on sale in this country occupy, to some extent, an anomalous position. They are deficient in ballistic energy for military purposes, on account of the relatively small weight of bullet employed, and, at the same time are too cumbersome for civilian requirements. The question is really one of levelling up or down, and meanwhile the attitude of the public appears to be eminently logical.

## A SET OF CHAMBER GAUGES.

WE have recently had the opportunity afforded us to inspect a set of gauges for testing gun-chambers which were manufactured by Messrs. Eley Brothers, Ltd. They were constructed to the dimensions published in our October issue of last year as relating to the 3-inch 12-bore chamber, and they comprise the full set of plug gauges there illustrated; also the more important of the socket gauges. They are, however, noteworthy for the evidence they give of the splendid workmanship and fine degree of accuracy that is attained in the factory of their makers. Messrs. Eley Brothers, Ltd., have stated that they are prepared to submit these specimens of their work to the severe ordeal of being tested to .0001 of an inch as regards agreement with the published diametrical dimensions. For our part, a prolonged trial of the various plugs and sockets



has convinced us that there is an agreement between the several components of the set which seems fully to bear out that claim to accuracy as between one and the other.

The set of gauges is contained within a handsome rosewood case lined with plush, the whole presenting the general appearance indicated in the accompanying illustration. It is, however, impossible to convey by means of a woodcut on a reduced scale any just idea of the quality of the finish which, in conjunction with accuracy of dimensions, form a welcome excuse for drawing attention to this admirable specimen of British manufacture in a line in which other countries are generally supposed to have secured a definite pre-eminence. It is satisfactory to find that there is no occasion to go far afield to obtain gauges of an excellence in every essential that could scarcely be surpassed.

## ROUND THE TRADE.

There are now 73 members on the register of the Birmingham Gun Trade.

Mr. Rowland Watson informs us that it is his intention shortly to introduce a single-trigger gun.

We are pleased to learn that Messrs. Moore & Grey are doing big business at their new premises.

The *Field* will bring out a Coronation number, in which the King's collection of guns will receive notice.

Correspondence on foreign-made guns bearing English proof-marks still continues in the Birmingham daily press.

The directors of the Kynoch Company have recommended a ten per cent. dividend for the year ended March 31 last.

The Morris Aiming Tube and Ammunition Co., Ltd., at the annual general meeting, declared a dividend for the year of 6 per cent.

Mr. Lorenzo Henry, the well-known shot at the Gun Club, is, we hear, the inventor of a very practical single-trigger mechanism.

The rook-rifle trade seems to have been fairly prosperous this season, several gunmakers reporting that good business has been done.

The Nobel Dynamite Trust are paying a dividend for the year ending April 30th, 1902, of 9 per cent., and carrying forward £3,360.

We understand that Messrs. Westley Richards are in a position to execute orders for guns fitted with their new single-trigger mechanism.

Messrs. Nobel's Explosives Co., Ltd., have registered the word "Arderite" for use as a trade-mark for explosives included in Class 20.

The Hamburg Dynamite Co. (formerly Alfred Nobel & Co.), after writing off £17,500 for depreciation, is able to pay a dividend of 13 per cent.

The Gigas Bazaar is said to have resulted in a net profit of £200, this amount having been handed to the Dublin Hospital as proceeds of the meeting.

There is a general concensus of opinion in the gun trade in favour of closing up from Wednesday night in Coronation week to the following Monday.

Mr. H. Beesley is now thoroughly well established at 78, Shaftesbury Avenue, the Webley firm having the benefit of his energetic attention to business.

The West London Shooting School is now in full swing, and the sporting papers have reported favourably on the general character of the ground.

A new explosive, said to have the usual remarkable qualities, has been invented by Mr. F. L. M. Masury, of the Masurite Explosive Co., New York, U.S.A.

At the spring general meeting of the N. R. A. there was the usual preliminary discussion of the Bisley meeting, but nothing of special interest transpired.

There is every indication that the Sherwood rifles are catching on, which is no doubt due to their effectiveness as low-power rifles for shooting up to 500 yards.

The London Trust Co., Ltd., is authorised to receive subscriptions at par for £150,000 4½ per cent. first mortgage debenture stock of the National Explosives Co., Ltd.

Messrs. Westley Richards have issued a neat little pamphlet containing particulars and press notices of their capped bullets as adapted for Mauser pistols and cordite express rifles.

The three days, ending July 19, have been fixed for the I. B. S. A. Championship Meeting, and the function will be held at the Middlesex Club grounds, the same as last year.

In reference to our note of last month, we now hear that Mr. W. A. Derrington has made arrangements to carry on the gun stock business in which his late brother was engaged.

Kynoch's price list is in the hands of the printer, but

enquiries at the last moment elicited the information that, while admittedly overdue, its advent will not be much longer delayed.

We are reprinting the material on the Boss single-trigger, which appeared in our last issue, and those who would care to file a record of Mr. John Robertson's achievements should send for a copy.

The "Swiftsure" projector, for throwing clay-birds, which is noticed elsewhere in this issue, is in good demand, and apparently is repaying Messrs. Cogswell & Harrison, Ltd., for their enterprise.

An interesting illustrated article on the new process for manufacturing guncotton charges, as carried out by the new Explosives Co., Ltd., at Stowmarket, appeared in a recent issue of our contemporary, *Engineering*.

Messrs. Joseph Lang and Son, Ltd., have secured, for their West London Shooting School, the services of Mr. Richmond Watson, at one time well known to sportsmen visiting Messrs. Cogswell and Harrison's ground at Blagdon.

The sale of gun and rifle implements no doubt provided an index to the state of the trade, and we are, therefore, the more pleased to hear that Messrs. Lightwood, of Birmingham, report a steady increase of trade during the past two years.

The new De Beers dynamite factory, near Somerset West, is on the point of completion. It is expected to prove an important agent in the reduction of the cost of dynamite in the Transvaal, and to render monopoly prices no longer possible.

A new company was registered on the 8th ult., under the title of the Thames Ammunition Works, Ltd., with a capital of £25,000, to carry on the works of the Thames Ammunition Works at Crayfordness, Kent. There was no initial public issue.

Mr. J. W. Smallman has recently shown us a sample of his patent double-trigger mechanism with the gap formerly left in the trigger-plate in front of the right trigger filled in by a downward extension of the trigger-blade, thereby giving full protection to the interior mechanism against damp.

Messrs. Curtis's & Harvey's comprehensive arrangements for the distribution of their calendars and memorandum books have resulted in their presence all over the country, a result no doubt due to the policy of sharing the advertisement value with the gun trade, names of firms being embossed at the back.

We exceedingly regret to hear that Mr. Henry Greener has been much troubled with impaired power of vision, the cause being attributed to a slight accident in the early part of his career. We feel sure that all who know his single-minded devotedness to the practical side of his business will wish him speedy recovery as a result of the well deserved holiday he will shortly take.

The friends of the late Mr. E. C. Tye recently collected a sum of money for presentation to his widow. The amount having fallen short of what was considered necessary, it has been resolved to hold a day's shooting in Birmingham, the proceeds to be applied to the payment of a further instalment. It is to be hoped that there will be no lack of presented first prizes to make the thing a success.

Mr. James C. Scott, of the firm of Messrs. W. and C. Scott & Son, has produced in pamphlet form a translation of the decrees, statutes and rules, regulations and tables for the proving of fire-arms at the Gun Barrel Proof House, established at Paris under the control and supervision of the Chamber of Commerce of that city. Mr. Scott is to be complimented on the utility and the painstaking character of his translation.

Messrs. Eley Bros., Ltd., have issued their new price list for 1902, containing, as usual, full particulars of the various lines in shot gun, rifle, and pistol ammunition, of which the firm makes a speciality. We note that the .476-18-265 revolver cartridge is now withdrawn as obsolete after a somewhat prolonged survival. A feature of the new list is the inclusion of the standard tables of pressures for use with Eley's shot gun lead crushers, as authorised by a conference of experts

recently held at the offices of the *Field*, and published in these columns.

Among the special prizes given at Bisley by the trade are the following:—Gibbs, Henry and Rigby, for the sporting rifle events at the running deer and man; the Eley revolver prizes, making £30 for each week; seven Smith & Wesson revolvers, presented by the makers; the Webley-Fosbery prizes, value £20, given by Messrs. Webley; a sword and other prizes presented by the Wilkinson Company for a competition with "Wilkinson" service revolvers; a Colt automatic pistol and £5, given by Messrs. Colt; six military target rifles presented by the B. S. A. Company; finally, Messrs. Greener's £40 will be available for contestants in the competition to be shot at 100 yards with the sharpshooter club rifle.

## LECTURES TO YOUNG GUNMAKERS.

### XV.—THE SHOT COUNTER.

AMONG all the troublesome little complications of a gunmaker's business there is probably none which is more liable to produce a crop of petty worries than the correct adjustment of shot sizes. Whenever an exhaustive treatise on shooting is placed before the world, the author gives a neatly tabulated list showing the number of pellets to the ounce which form the theoretical basis of each shot-maker's production. By the time the author has said a few words on the subject of French sizes and German sizes, and probably American sizes as well, the allotted space has been filled up, and the reader is more often than not left to answer for himself the questions that arise day by day, and for which a ready reckoner would be an advantage.

In the present lecture the somewhat ambitious attempt will be made to give more real practical information on shot sizes than has hitherto appeared in print. Such a programme may seem difficult to carry out, but at any rate we have in our favour the fact that there is no intention of wasting valuable space by entering into details that have very little influence upon the quality and behaviour of shot. Whatever may be the particular number of pellets of number five shot that Messrs. Tom, Dick and Harry advertise as contained in each ounce of their shot, the fact remains that the manufacturing variations from hour to hour and from day to day are vastly greater than the slight differences that exist between the nominal standards adopted by the different manufacturers. These really exist chiefly for catalogue circulation, since no shotmaker seems able to guarantee shot true to size at commercial prices. There is no doubt whatever that the Newcastle Chilled Shot Company's sizes have become standard the world over, at least wherever English principles are in vogue, and we all know that in sporting matters our own methods and vocabulary are adopted almost to the exclusion of all others. The chief reason for acknowledging the Newcastle Company's sizes is not because their shot has any exceptional recognition, but merely because their sizes are adopted as the standard for experimental charges, and all shot-counting appliances are regulated according to their figures of classification.

A little illustration, which we show herewith, gives an excellent picture of the Jones shot-counting trowel, which is an appliance in universal favour for experimental, and even for commercial loading. Mr. W. P. Jones has kindly supplied us with the block, he himself being interested in its sale in the

capacity of inventor. The principle of the shot trowel is obvious at a glance. It consists of an ordinary flat pan with 562 regularly formed cavities over all its surface. A covering plate may be slid into place in the manner indicated, for the purpose of covering up all holes above the number of the desired charge. Suppose, for instance, that we wish to test a sample of No. 6 shot. We take the plate marked 270, slip it into the trowel and dig the latter into a mass of shot. Having shaken off the superfluous pellets, the trowel is reversed over a funnel, and the charge is weighed. The usual method is to place an ounce weight in one scale pan, and a charge of shot into the other, adding or taking away pellets until a balance is attained. By that means the number of pellets to the ounce of the sample examined will be obtained, and so the divergence from the theoretical standard may be judged. In the loading of cartridges the appropriate plate to suit the number of pellets required for a given charge of shot should be selected, and the charges so measured may be loaded into the cases by means of a specially shaped funnel. For pattern-taking purposes it is absolutely necessary to make a careful test of the samples of shot supplied, since the value of an experiment is discounted if weight and number fail to agree. While on this point, it would be well to emphasise clearly the fact that for the efficient working of a cartridge the proper weight is more desirable than a correct number of pellets. Hence the shot-counter should only be used when the desire for accuracy extends to the willingness to select a sample of shot true to size.

The sizes of shot which most interest the gunmaker are those lying between three and eight, though it seldom happens that any size larger than four is used except for large bore weapons intended for duck shooting. No. 4 has a great vogue for rabbit shooting, and the other sizes are used extensively by sportsmen according to the shooting of their guns and the class of sport followed. Probably No. 8 is the smallest that interests the practical gunmaker, though even here the reduction of size is somewhat disadvantageous, because it so often happens that the added pellets are more than counterbalanced by a falling off in pattern due to such shot not suiting many guns of ordinary efficiency for game larger than snipe. Anyhow, we find that it is possible to reduce the study of shot sizes to those known as 3, 4, 5, 5½, 6, 6½, 7, and 8. The number that go to the ounce vary from 140 to 450, and it will be seen from the table on page 94 that at and around No. 6 the sizes advance by a very small number of pellets at each stage. In other words, it is among the sizes most used that the greatest variety of choice is allowed, a condition arising, no doubt, from a desire to please the sportsman by humouring his fads, and the manufacturer by giving him plenty of margin for classifying misfits. The number of pellets in any odd weight of a given size of shot is exceedingly easy to calculate. The standard load by which cartridges are tested and guns regulated consists of one and one-eighth ounce of No. 6 shot, and it contains 304 pellets. Similarly, one-sixteenth over the ounce has seventeen pellets less. It happens, however, that in the course of a month's work the figures that one should remember are found to be the first that are forgotten. So as to get over this difficulty we have expressed practically every conceivable combination of charge of shot on the table given, and the number of pellets for each combination can be seen at a glance. In this way it is possible to judge the relative value of many kinds of charge



in which it would be difficult, without a preliminary process of calculation, to know the exact numerical relation. We, therefore, present our little table to the young gunmaker as a useful addition to his stock of information, and he could certainly do a great deal worse than put it away in his pocket-book, so as to be available for future reference.

The careful counting and examination of shot are two things which obtain their own reward when carried out as part and parcel of the inspection processes of a careful loading department. We do not know whether it is due to laxity of conscience, incompetence or inherent impossibility of manufacture, that samples of shot so very seldom agree, except by accident, with the nominal sizes. Only recently the present writer had occasion to send to several of the best known makers for samples of their production, and considering the care that had been taken in bottling and labelling, it was surprising that none appeared to have been exercised in making them up from bags with contents approximating to the printed particulars. As a matter of fact, the sample of No. 6 ran very much closer to  $5\frac{1}{2}$  than in the bottle so marked, while in the same way it was found almost impossible to get hold of anything within 30 pellets of No. 7 size. It was so difficult to match No. 3, that ultimately it was found to be necessary to be satisfied with ten pellets only that were true in the aggregate. Not, however, to be denied, we set patiently to work to make up, with this exception, a set of one-ounce samples exactly true to size. By folding a piece of stiff paper we were able to lay out the pellets along the crease in a neat string, thus rendering the examination of each individual sample quite a simple task. First of all, the shots of obviously irregular size or shape were removed. Then the requisite number were counted by means of the trowel and their weight taken. The number of pellets above or below was duly noted, and the charge was laid out once more in the crease of the folded paper. If the charge was too heavy the large pellets were removed, and their places filled up by smaller pellets selected from the stock in the bottle. The process of adjustment was very easy, since it was quite an ordinary thing to pick out from any sample of shot seven large pellets weighing the same as ten small ones. At any rate, with a little patience we were able to fill a neat row of tubes, each one containing an ounce of shot true to weight, as well as to the number of pellets. The object of this apparently tedious procedure was to take the average diameter of the pellets of shot of each size. These particulars do not appear to be in general circulation, and there are many ways in which they might be useful, among others, for the identification of size by means of the micrometer. This we have done, and the results have been incorporated into the table already referred to. The actual method adopted was to lay out 50 pellets in the crease of a sheet of paper, measure the distance between their extremities and divide by their number. This, as Colonel Journée points out, gives the best possible average diameter, at the same time taking due account of any want of rotundity in the pellets themselves. Having checked our results by the examination of American samples of shot, of which the diameters are published, we can safely state that every reliance may be placed upon the decimal values given. Of course, the slight differences of composition between various makes of shot would create variations of specific

gravity which would destroy somewhat the relation of diameter to weight; but, as a matter of fact, the variations in specific gravity are insufficient to account for a difference of diameter greater than  $\cdot 001$  of an inch, which may safely be treated as a negligible quantity, because all pellets vary in rotundity, many having maximum and minimum diameters for the same pellet varying more than ten times this amount.

It is somewhat difficult to lay down any hard and fast rules

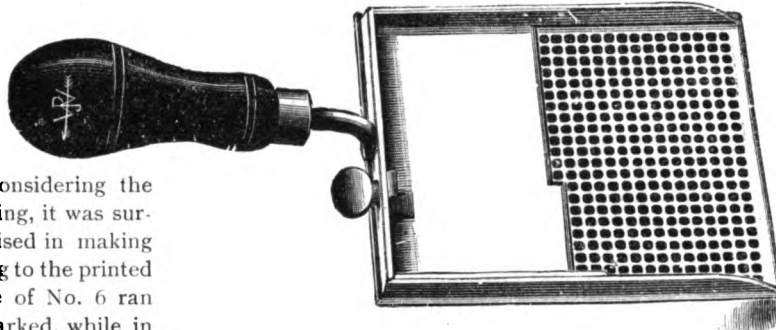


FIG. 22 —THE JONES SHOT COUNTER.

for determining the quality of shot. In any case, however, the young gunmaker should remember that he has a right to insist upon something approximating to the sizes ordered. If he orders No. 6 and gets  $5\frac{1}{2}$ , he has a grievance, and, therefore, the trueness of a charge of shot should be, at least, such as to leave no doubt whatsoever as to what size it is. In practical loading an error of six or eight pellets to the ounce need not be considered, though, of course, the shot maker could work very much closer if he were properly looked after. A great deal of the bad agreement of shot with the nominal size is due to a disproportionate quantity of malformed pellets which ought to have been rejected in the process of classification. Theoretically, the largest shot best maintain their velocity over a given distance of flight, while conversely the small pellets, having the smaller density, lose their velocity more quickly in proportion to the distance of travel. This is of course, quite true in practice as well, though the effect of any given deviation is more difficult to establish. We all know the objections from a sportsman's point of view that apply to a charge of shot which strings out into a long column while flying through the air. This is, of course, what must be expected with a charge containing mixed sizes of shot. On the other hand, the same effect is produced by the deformation of the pellets during the process of expulsion, and on account of the great malformation produced in this way, it would be an over-refinement to ask for a greater regularity in the pellets than is necessary in use or convenient to manufacture.

Concerning the logical aspect of the English shot sizes, a few points of interest may be discussed. In passing the eye along the horizontal line in our table, it will be seen how regular is the progression from one size to another. There is a plentiful selection among the sizes in the region of those in common use, while at the extremes there is a somewhat wider separation between the adjoining numbers. There is really absolutely no reason for recommending a logical table proceeding upon any particular mathematical basis. Certainly where the English ounce is in use, it would be an advantage if the pellets per ounce advanced in sixteens or 32's, because the

pellets for the fractions of an ounce would consist of a definite number of units. This, however, should be reserved until the plans are laid for creating a new planet, for the world is, above all things, conservative in such matters. In Germany the assembled gun-making talent created a table aiming at the ideal, and it has achieved the distinction of being chosen by Journée, a Frenchman, for his researches. It works on the principle that the sizes advance by quarter millimetres in diameter. The result, expressed in pellets to a given weight, is quaint in the extreme. A given variation in diameter produces very little effect on the count in the larger sizes, and a

ing a batch to trickle over inclined plates. The round ones gain an impetus sufficient to enable them to take a flying leap as they pass over the edge; those of unequal shape and size going slower, and failing to reach the receptacle that is placed a suitable distance beyond the edge. To judge by samples of shot on the market, one must needs imagine the leap to be a short one in view of the cripples that seem to have got over. No doubt, an average accuracy in a delivery of shot may be obtained by blending the heavy with the light, but there are objections to making extremes of too pronounced a character to meet. In any case the theoretical disadvantage to irregu-

CHARGE IN OUNCES.	CHARGE IN OZ. GRS.	CHARGE IN GRAINS.	1 pellet = 3'13 grs. 10 = 62'5	1 pellet = 2'54 grs. 20 = 50'9	1 pellet = 2'01 grs. 20 = 41'4	1 pellet = 1'82 grs. 20 = 36'5	1 pellet = 1'69 grs. 20 = 32'4	1 pellet = 1'46 grs. 20 = 29'2	1 pellet = 1'29 grs. 20 = 25'7	1 pellet = 0'97 grs. 20 = 19'4
			<b>3</b> Dia. = '127"	<b>4</b> Dia. = '120"	<b>5</b> Dia. = '109"	<b>5½</b> <i>Med. Game.</i> Dia. = '106"	<b>6</b> Dia. = '102"	<b>6½*</b> Dia. = '099"	<b>7</b> Dia. = '095"	<b>8</b> Dia. = '086"
$\frac{3}{8}$	0 273'4	273'4	88	108	136	150	169	188	213	281
$\frac{1}{4}$	0 328'1	328'1	105	129	164	180	203	225	255	337
$\frac{3}{16}$	0 355'5	355'5	114	140	177	195	219	244	276	366
$\frac{1}{8}$	0 382'8	382'8	123	151	191	210	236	263	298	394
$\frac{3}{16}$	0 410'2	410'2	131	161	204	255	253	281	319	422
<b>ONE</b>	1 0	437'5	<b>140</b>	<b>172</b>	<b>218</b>	<b>240</b>	<b>270</b>	<b>300</b>	<b>340</b>	<b>480</b>
$1\frac{1}{8}$	1 27'3	464'8	149	183	232	255	287	319	361	478
$1\frac{1}{4}$	1 54'7	492'2	158	194	245	270	304	338	383	506
$1\frac{3}{8}$	1 82'0	519'5	166	204	259	285	321	356	404	534
$1\frac{1}{2}$	1 109'4	546'9	175	215	273	300	338	375	425	562
$1\frac{5}{8}$	1 136'7	574'2	184	226	286	315	354	394	446	590
$1\frac{3}{4}$	1 164'1	601'6	193	237	300	330	371	413	468	619
$1\frac{7}{8}$	1 218'8	656'3	210	258	327	360	405	450	510	675
$1\frac{1}{2}$	1 273'4	711'0	228	280	354	390	439	488	553	731
$1\frac{3}{4}$	1 328'1	765'6	245	301	382	420	473	525	595	787
<b>2</b>	2 0	875'0	280	344	436	480	540	600	680	900
$2\frac{1}{4}$	2 109'4	984'4	315	387	491	540	608	675	765	1013

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great deal in the small ones, so that there is excessive variety among the large shot and big jumps from one size to another among the small. In France the leading centres of manufacture have widely different sizes, so that they could do worse than adopt the English scale, the same as is largely done in Belgium. The United States follow the English system of selected sizes, but their chosen standards vary from our own by about half a size, and in some instances more. Furthermore they have nothing that agrees with our size No. 6, their popular sizes appearing to run in the direction of small shot, a condition that may arise from the extensive shooting of such a small object as the clay-bird. Anyhow, among rule-of-thumb tables there is probably none to beat the English.

Altogether we think that there is a great opening for improvement in the manufacture of shot and in the methods of its loading into cartridges. It is at the option of the young gunmaker to cultivate his knowledge and powers of observation in this direction, and then, bit by bit, a change may come to pass. The rejection of untrue pellets is effected by allow-

lar size does exist, and the harder the shot and the less the deformation, the greater is the proportionate effect of such variance. From a careful examination of ordinary commercial specimens, we are firmly of the belief that the quality of our English shot is not what it ought to be, judging, for instance, by the vast improvements which have been made in the United States during the past twenty years. That time ago their shot was remarkable for its bad shape and irregularity, while now the opposite is the case.

If, therefore, a feeling of emulation among shot makers could be established, the gunmaker would find his progress still further advanced towards that happy goal of universal standardization wherein would be found a solution for all the troubles that now perplex his working hours, and dodge with unwelcome visions those that are supposed to be devoted to slumber. Of course, we must qualify our meaning in this way, knowing, as we do, that gunmakers are ever alert and wakeful. At any rate, we trust that the young ones among them will find this article more of a tonic than a sleeping mixture.



## NOTES.

**THE BIRMINGHAM GUN TRADE.**—In moving the adoption of the report of the Guardians of the Birmingham Proof House, the chairman, Mr. J. W. Ward, attributed the decrease in the number of proofs during 1901, to which reference has already been made in our columns, to the interruption caused by the South African war. He hoped, however, from present indications, that matters would be adjusted during the present year. He also drew attention to the great success of the technical education scheme, which already necessitated a duplication of the classes originally agreed upon, while the progress of the pupils had been most satisfactory. Mr. E. W. Wilkinson, in seconding the motion, pointed out that there had been an increase in the proofs of breech-loading small-arms of about 15 per cent. during the year. Mr. W. L. Powell also said that during 1901 the military trade had enjoyed a period of prosperity such as had not been experienced since the Franco-German war. The output had been at the rate of about 2,500 per week. This, however, does not concern the Proof House.

**THE "SWIFTSURE" PROJECTOR.**—In the accompanying illustration we give a view of a new hand-flinger for clay-birds, which has recently been put on the market by Messrs. Cogswell & Harrison, Ltd., and the sale of which is already resembling that of the proverbial hot-cakes. The "hand" is practically a reproduction of that on the well-known "Swiftsure" trap, the swinging limb being controlled by a powerful spring, and furnished at the end with a revol-



ing rubber stud. Over all the projector measures 22½ inches, the "hand" being attached to a wooden handle having a length of 17 inches, so that a good impetus can be imparted to the clay bird with comparatively little exertion, and a firm hold is maintained on the projector by means of a corrugated grip, which, while new, is if anything too non-slipping in its nature. The method of placing clay-birds in the flinger is extremely simple and easy, and a little practice enables the user of the appliance to project them to a distance of from 40 to 60 yards in any desired direction. This hand-thrower is specially adapted for private use under circumstances where a trap installation would be out of place, and it is brought out at a price which should make it a necessary item in the outfit of all sportsmen.

**IMPORTATION OF ARMS INTO INDIA.**—Considerable irritation is felt in the gun trade on account of the very vexatious restrictions placed by the Government of India on the importation of arms and ammunition. The regulations affect not only service arms but all sporting weapons which are of the calibre or are capable of being rebored to the calibre of the military rifle or carbine, which designation includes anything from the '303 Lee-Enfield to the '577 Snider. At the same time, there is a prohibition on no fewer than twenty-six standard types of sporting rifle cartridge. Ammunition of any calibre from '299 to '330 cannot be obtained by any individual, military or civilian, in larger quantities than

200 rounds per annum. According to the authorities responsible for this prohibition, it is only by the adoption of such drastic measures that the illicit traffic in arms and ammunition on the North-West frontier can be stopped. We doubt the efficacy of the remedy altogether. Such results as are likely to be attained could have been equally reached by means that did not bring about a practical stopping of sport throughout the whole country, and establish a boycott on an important trade so far as India is concerned.

**KING'S NORTON METAL CO., LD.**—The directors of this company submit a report showing that the net profit for the year ending March 31st last amounted to £48,851, which, added to the balance brought forward, gives a total of £49,390 available for distribution. Of this amount, it is proposed to appropriate £5,000 to depreciation, £5,000 as an addition to reserve, £2,500 as a provision for new plant, and a further £5,000 to be written off the cost of the Abbey Wood factory. As regards the remainder, the directors recommend the payment of a dividend at the rate of 7 per cent. per annum on the preference shares, and at the rate of £10 per cent. per annum on the ordinary shares of the company, and, in addition, a bonus of £1 per share on the first and second issues of ordinary shares, and 18s. 9d. per share on the 6,000 new fully paid-up shares issued in 1900, which rank for dividend as regards £7 10s. per share for twelve months, and as to £2 10s. per share for nine months. This allocation leaves a balance of £440 to be carried forward.

**SCHULTZE GUNPOWDER CO., LD.**—According to the report and balance sheet submitted to the shareholders of this company for the year ending December 31st last, there has been a substantial increase in the sale of the company's products, though the profit and loss account has not yet felt the benefit of the improved conditions. After setting aside a provision for depreciation and contingencies on the leaseholds, and deducting the superintendent's commission, the balance of profit for the year amounts to £8,223, which, with the amount brought forward, gives a total of £17,217 available for distribution. Of this £7,307 is apportioned to the payment of the preference dividend, £4,000 is carried to reserve, and £3,425 is written off goodwill, leaving a balance of £2,485, which it is proposed to carry forward. Under the circumstances, no dividend can be paid on the ordinary shares of the company. The report draws attention to the disappointing results following the purchase of the business of the Smokeless Powder and Ammunition Co., Ltd., which is mainly due to the fact that the rifle powders of that company failed to satisfy the requirements of the War Office. It is therefore proposed to reduce the expenses of the Smokeless Powder Co. to a minimum whilst awaiting developments, but the directors have reason to hope that the shares both of that concern and of the American E. C. and Schultze Co. will eventually prove assets of considerable value, and on that account they are still retained in the balance sheet at cost. The quality of the Schultze powders issued during the past year is reported as entirely satisfactory, the original Schultze having fully maintained its position, while the new Imperial Schultze is rapidly growing in favour. The cartridge-loading department has done useful work during the last twelve months, and is having its capacity enlarged to meet future requirements. At the general meeting, held on the 23rd ult., the Hon. J. Scott Montague, M.P.,

presided, and in moving the adoption of the report, said that the board frankly admitted that the result of the year's trading was not so good as could have been wished. At the same time, they considered the business in a perfectly sound and satisfactory position, and that circumstances which had impeded its success were on the point of disappearing. After some further remarks and discussion the report was adopted.

### THE SALE OF PISTOLS.

It is somewhat difficult to understand why there seems to be so little demand for pistols in this country. We use the word here to the exclusion of revolvers, for which there is almost an unlimited sale—especially for the variety which sells for a few shillings, and bears a foreign proof-mark. Weapons of the revolver type are, in fact, those against which several Pistols Bills have been framed. According to a certain learned judge, every cyclist carries one. Many Hooligans are armed with them, to say nothing of school-boys; and possibly a considerable percentage of law-abiding householders have one packed away carefully loaded in some corner sufficiently remote to render it inaccessible in case of need, but not secure from the prying eyes and itching fingers of the first small boy who comes along. But these weapons are either carried unlawfully on the one hand, or unused from year to year on the other, and by far the greater proportion are of foreign manufacture. There is, in fact, scarcely any sale of British-made revolvers among civilians, and on that account it comes about that the firms who manufacture that class of fire-arm in this country are limited literally to one or two.

When we consider pistols, either single-shot or of the magazine type, we find that they have no vogue at all among English civilians. The magazine pistol is regarded as a military weapon, while the single-shot pistol has no standing whatever. A reason for all this is, that the pistol, revolving or otherwise, has never been taken seriously as a weapon of precision. Certainly, there are events included in the Bisley programme which seem to give a direct contradiction to this statement, but they are the shining exceptions which go to prove our rule. Beyond the men who compete yearly at Bisley, there are few, in the country who could make anything of a score at twenty-five yards with revolver or pistol. We have, in fact, no institution equivalent to the numerous pistol and revolver shooting clubs which are so actively supported in the United States, and no such standard of efficiency as is attained by members of those clubs.

Yet it is only necessary to see what Mr. Walter Winans and a few others in this country can do with a revolver, and what these American clubmen can do with similar weapons or with some of the fine single-shot target pistols, which seem to be almost exclusively a transatlantic speciality, to realise that a very fine opportunity for sport is lost by this neglect of pistol shooting. Such masters in the art show clearly that the weapons they use will shoot straight if held straight. There is, however, more of the personal element at stake in pistol shooting than in rifle shooting, and, speaking within certain limitations, it may be asserted that it is far more difficult to become even a reasonably good marksman with the shorter arm than to obtain considerable proficiency with the rifle. On the other hand, this very difference should tend to promote an emulation amongst true sportsmen for the pistol as something unusually interesting on account of the difficulty in mastering

it. There is no need to instance any of the automatic or magazine types of pistol, some of which are reputed to give shooting up to 1,000 yards. A little weapon such as the Remington target pistol, which was illustrated in our January issue, will give perfectly accurate shooting within the proper range of the ammunition it is chambered to take, and will provide as good sport as need be wanted, within a limit of area that could be obtained even in a suburban back garden or the home paddock of a country house. This brings us to the point that there is no manufacture of such a beautiful and accurate weapon in this country. Surely this is a case in which supply might stimulate demand. With recent years there has been a large increase in the trade in small-bore rifles shooting miniature ammunition. This was primarily due to American enterprise in providing what was afterwards recognised as almost a necessity, and at the present time probably more American rifles and ammunition of '22 and '25 calibres are sold in this country than similar home manufactures. They have reaped the reward of being first in the field in that speciality. Need we point out the moral with regard to pistols also?

### CORRESPONDENCE.

Re ALEXANDER HENRY.

To THE EDITOR OF *Arms and Explosives*.

SIR,—In the current issue of *Arms and Explosives* my attention has been drawn to a notice which has reference to a change of proprietorship of a firm trading under the name of Alexander Henry & Co., in this town. At the conclusion, your notice animadverts: "It is safe to predict that the old-established reputation of Alexander Henry & Co. will not suffer," etc. The old-established reputation has not the slightest connection with the firm referred to, as they have had but a brief existence. And the individuals who have been and are trading under the above assumed name have no connection with the original business of my late father, which was established in 1852, and of which I, his eldest son, am the sole representative, and have been since his death. I think it only right that attention should be drawn to those facts, to avoid any misapprehension either in or out of the trade, through the medium of your journal.

Evidence (Henry's trustees) was adduced before Lord Pearson in the Court of Session last June, which should have put at rest any supposed right to use a name, and may again shortly be called into requisition.

Beaverbank Works, Yours, etc.,  
Edinburgh, May 23, 1902. ALEXR. HENRY.

[While we insert this letter we may say that we have every confidence in Messrs. Martin's absolutely *bona fide* purchase of the goodwill and trading rights of the Henry business, and their power to carry on the same without interference.—ED.]

### APPLICATIONS FOR PATENTS.

APRIL 14TH—MAY 17TH, 1902.

- 8,655. Magazine Fire-arms. A. J. Boulton (Agent for *Mcuffels Warnant & Co.*)
- 8,668. Machine Guns. W. Sonberg.
- 8,689. Range Finder. L. W. Sterne.
- 8,763. \* Gun Turrets. S. G. B. Cook (Agent for *C. H. Howland-Sherman*).
- 8,776. \* Explosives. C. Duttonhofer.
- 8,820. Manufacture of Explosives. N. C. Brodie.
- 8,882. \* Rock Blasting Apparatus. R. C. Packard.
- 9,043. Explosives. R. Escales.
- 9,052. Small-arms. J. L. Langley.
- 9,187. Smokeless Powder. E. H. Harris, F. E. W. Bowen, and R. H. Milward.

- 9,213. Breech Adaptors. The Wilkinson Sword Co., and H. W. Latham.
- 9,262. Means for Keeping a Rifle Plumb. A. Nicol.
- 9,285.\* Automatic Gun. A. J. Boulton (Agent for *The Victor P. de Knight Gun Co.*)
- 9,371. Covered Rifle Ranges. J. C. Sellars.
- 9,380.\* Electric Blasting. F. Render.
- 9,410. Magazine Rifle. H. W. Holland and W. Mansfield.
- 9,422. Repeating Rifle. W. Salmond (Agent for *W. G. H. Salmond*).
- 9,446. Telescopic Sights. J. Wildsmith.
- 9,480. Explosives. Hudson Maxim.
- 9,481. Explosives. Hudson Maxim.
- 9,510. Small-arms. W. B. Pinching.
- 9,537. Wads. A. Bolton.
- 9,542. Projectiles for Ordnance. C. A. McEvoy.
- 9,711. Pistols. J. Imray (Agent for *Colts' Patent Fire-arms Manufacturing Co.*)
- 9,866. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).
- 9,903. Fire-arms. L. O. Thayer and T. P. Butler.
- 9,909. Sights. S. A. Veals.
- 9,927. Magazine for Small-arms. J. H. Topham and A. W. Brewtnall.
- 9,963.\* Small-arms. L. Hellfritzsch.
- 9,971. Rifle Carrier. G. S. M. Elliott.
- 9,979. Polishing of Gun Stocks. W. Boggis and J. W. Hodgson.
- 10,130. Gun Rest. J. Connor.
- 10,232. Cartridge Carriers. W. Lindsey.
- 10,330. Vent-Sealing Tubes and Fuses. A. T. Dawson and L. Silverman.
- 10,332. Small-arm Projectiles. Sir W. G. Armstrong, Whitworth & Co., Ltd., and A. G. Hadcock.
- 10,345. Automatic Fire-arms. E. Roth.
- 10,555. Sights. H. Greener.
- 10,607.\* Rifle Sights. F. J. Gee and W. J. Chaffer.
- 10,664. Magazine Rifle. H. Kalkschmidt.
- 10,743. Rifle Sights. C. W. Pike.
- 10,776.\* Explosive Shell. C. C. Allen and F. C. Dolby.
- 10,933.\* Projectiles. E. C. Bower.
- 10,945. Blasting Fuses. H. Bonser.
- 11,088. Fire-arms for Cattle Killing. E. Finke.
- 11,113. Cartridge Loading Machine. F. Wood.
- 11,162. Recoil Brakes. A. Reichwald (Agent for *Fried. Krupp*).
- 11,171. Torpedoes. A. H. Valda.
- 11,199. Ordnance. H. H. Greenfell.
- 11,230. Projectiles. A. Gray and H. W. M. Gabbett-Fairfax.
- 11,318.\* Ordnance. G. Ehrhardt.
- 11,325. Explosives. F. Schachtebeck.
- 11,366. Targets. W. D. Trick.
- 11,397.\* Breech Mechanism of Ordnance. G. Ehrhardt.
- \* These Applications were accompanied by Complete Specifications.
- 10,185 (1901) **Rifle Rests**. W. S. Simpson, London. Two collapsible props are pivoted, one to the fore-end of the rifle just in front of the magazine, and the other to the underside of the butt end of the stock. These props may be adjusted to enable a shooter when firing in the prone position to rest the rifle at any height. The props fold up beneath the rifle when not in use. Accepted April 17th, 1902.
- 10,671 (1901) **Frames for Balance Targets**. J. T. Spencer, Reading. A frame for balanced targets, in which the targets are suspended and may easily be raised or lowered. The targets are mounted on a rotating rod which works in ball bearings. The rod is rotated by means of chain wheels and chains. Accepted April 17, 1902.
- 11,242 (1901) **Electric Primers**. Sir W. G. Armstrong, Whitworth & Co., and G. Stuart, Newcastle-on-Tyne. A method of insulating the conductor in an electric primer by means of discs of asbestos threaded on to it and fitting the cylinder running through the primer. Two sets of gas checks are introduced, one set to prevent the rearward escape of gas along the wire through the central holes in the discs, and the other to prevent the gas passing between the circumference of the discs and the wall of the cylinder. Accepted May 1, 1902.
- 11,592A (1901) **Breech of Ordnance**. C. Holmström, Glasgow. A method of providing the entire surface of a breech-block with continuous screw threads, with the exception of a portion equal to the angular distance required for turning the block to lock or unlock it. The breech chamber of the gun is similarly threaded to receive the block. Accepted May 1, 1902.
- 12,847 (1901) **Semi-Automatic Ordnance**. The Hotchkiss Ordnance Co. Ltd. (Agents for *L. V. Benét, France*). Modifications in the mechanism of that type of semi-automatic gun described in Patent No. 22,270, 1899, consisting in rendering the closing spring independent of the length of recoil of the gun; in providing means for opening the breech, loading and closing the breech during recoil and return; and in increasing the rate of fire of such guns having a long recoil on their carriages. Accepted April 17, 1902.
- 15,773 (1901) **Spring Air Guns**. C., J. B. and E. Lane, London. A method of constructing the plunger, the cylinder in which the plunger slides, and the trigger, of an air gun, so that whilst a safe cocking is ensured, a reliable releasing of the plunger is effected by a light and smooth pull upon the trigger. Accepted May 1, 1902.
- 16,963\* (1901) **The Bittiner Single-Trigger Mechanism**. C. Bettiner and F. E. Jaeger, U.S.A.
- 17,039 (1901) **Rifle Range Telephone**. C. R. Crosse, London. A telephone which may be stowed away in its case in a hole in the ground. The instrument may be brought readily into use and adjusted at the proper height through the medium of a telescopic tube which is sunk into the ground beneath the buried case. Accepted May 1, 1902.
- 19,577 (1901) **Cartridge Ejector for Rifles**. W. F. Nuthall and the British and Foreign Lee-Arms Co., Ltd., London. An ejector for the Lee straight-pull type of rifle consisting of a bell-crank lever. During the opening of the breech one arm of this lever is brought into contact with a lug. The other arm is thus caused to strike the base of the cartridge case and to disengage it from the extractor. Accepted May 1, 1902.
- 19,839 (1901) **Automatic Fire-Arms**. G. Roth and C. Krnka, Vienna. In order to obviate a number of difficulties which have been experienced in the construction of an automatic arm with which conoidal cartridge cases are used, an auxiliary firing pin is added to the mechanism, the backward movement of which pin is arrested in such a way as to prevent the cap from being blown out. The cap is also sunk in a recess in the end of the case. Accepted April 10, 1902.
- 23,284 (1901) **An Explosive Compound**. M. Fiedler, Moscow. A safety explosive, the composition of which the following is an example:—Potassium chlorate ( $KClO_3$ ), 70 per cent; Potassium permanganate ( $KMnO_4$ ), 20 per cent; Turpentine phenol oil ( $C_{10}H_{16}$ ), 9 per cent.; and carbolic acid ( $C_6H_6O$ ), 1 per cent. Accepted April 17, 1902.
- 25,585 (1901) **Sights for Ordnance**. L. K. Scott, Farnborough. Improvements in gun sights of the kind described in Patents Nos. 156, 1894, and 7,584, 1898, in which all that need be

## SPECIFICATIONS PUBLISHED.

MAY 1ST—MAY 22ND, 1902.

COMPILED BY H. TARRANT.

- 9,420 (1901) **Stocks of Small-Arms**. J. N. Zoeller, and H. Bauer, U.S.A. The stock of a gun or rifle is constructed in two parts, which are hinged on a transverse pivot situated between the end of the grip and the front of the butt. By means of a key the butt may be shifted in such a manner as to alter the bend of the stock. Accepted April 24, 1902.
- 9,738 (1901) **Sight Mountings**. Sir H. Grubb, Ireland, and A. T. Dawson, London. Sight mountings for guns, by means of which the sighting devices described in Specifications Nos. 1,208, and 22,127, both of 1900, may be supported and elevated in a steadier and more advantageous manner. Accepted April 10, 1902.
- 9,893 (1901) **Gun Mountings**. A. T. Dawson and G. T. Buckingham, London. A method of controlling the velocity with which a gun runs forward after recoil. The invention relates to gun mountings provided with a hydraulic buffer for absorbing the energy of recoil, and with a recuperator for running the gun forward after recoil. The hydraulic buffer and the trunnion bearings of such mountings are also modified. Accepted April 10, 1902.

done when laying the gun is to bring the line of sight upon the object aimed at, no matter what the range, the sight when moved with the gun effecting automatically the adjustment required for range, provided an initial adjustment according to the position of the gun is properly made. Accepted May 1, 1902.

- 921 (1902). **Walking-Stick Revolver.** G. Tresenreter, Germany. A walking-stick revolver arranged in the cross-piece of the T-shaped top of the stick. One half the cross-piece is hinged to the other fixed half, so that it may be lifted in order to load the cylinder. Accepted May 1, 1902.
- 1,560 (1902). **Air-Gun Slugs.** C., J. B., E., and H. W. Lane, London. A slug for air-guns, the nose of which is solid and the rear portion hollow. The hollow part is longitudinally slotted so as to form three wings. When the slug, after discharge, leaves the barrel the wings expand outwards and cause the slugs in passing through the air to rotate, thus enhancing its accuracy of flight. Accepted April 10, 1902.
- 3,929 (1902). **Breech Mechanism of Ordnance.** G. Ehrhardt, Germany. Firing mechanism in which the firing-pin is arranged eccentrically within the breech-block in such a manner as to remain displaced from the centre of the barrel until the locking of the block in the breech is completed. The object of this arrangement is to prevent the firing-pin encountering the percussion cap during the closing of the breech. Accepted April 24, 1902.
- 4,095 (1902). **Machine Gun Feeders.** F. M. Garland, U.S.A. Cartridge carrier mechanism for automatic guns, which is adapted to receive a loaded cartridge, and to place it automatically between the extractor fingers on the breech-block. The carrier is actuated directly by the recoil of the barrel, and not from the breech mechanism. Accepted April 17, 1902.
- 4,344 (1902). **Cleaning Rod.** J. B. Crepean, Haverhill. A cleaning rod for small-arms, which is so arranged to work through a plug fixed tightly into the muzzle of the barrel. A rotary motion is given to the breech on the end of the rod through the Archimedian-drill-like engagement of the spiral rod and the plug in the muzzle. Accepted April 17, 1902.
- 4,776 (1902). **Projectiles.** J. B. Semple, U.S.A. A method of igniting the explosive charge in projectiles consisting in confining a portion of the gases generated by the combustion of the propelling charge within a chamber in the projectile. These gases are at a certain time permitted to expand and thus to shift an igniter. Accepted May 1, 1902.
- 4,781 (1902). **Manufacture of Explosives.** W. C. Quinby, H. B. Sharps, and D. J. Greger, U.S.A. An improvement in the manufacture of explosives, which consists in the application of a liquid product known as maltha as an agent to protect the particles of the metallic salts from dampness, and also to impart the element of safety to the explosive. Accepted April 10, 1902.
- 5,540 (1902). **Torpedoes and Submarine Mines.** F. Bauduin, Holland. The patentee applies a screw blade to fixed or immersed torpedoes or mines for the purpose of utilising the force of the currents to retain the torpedo or mine at a constant degree of immersion in high or low water tides and in currents. Accepted May 1, 1902.

\* This Specification is more fully described under "Selected Patent."

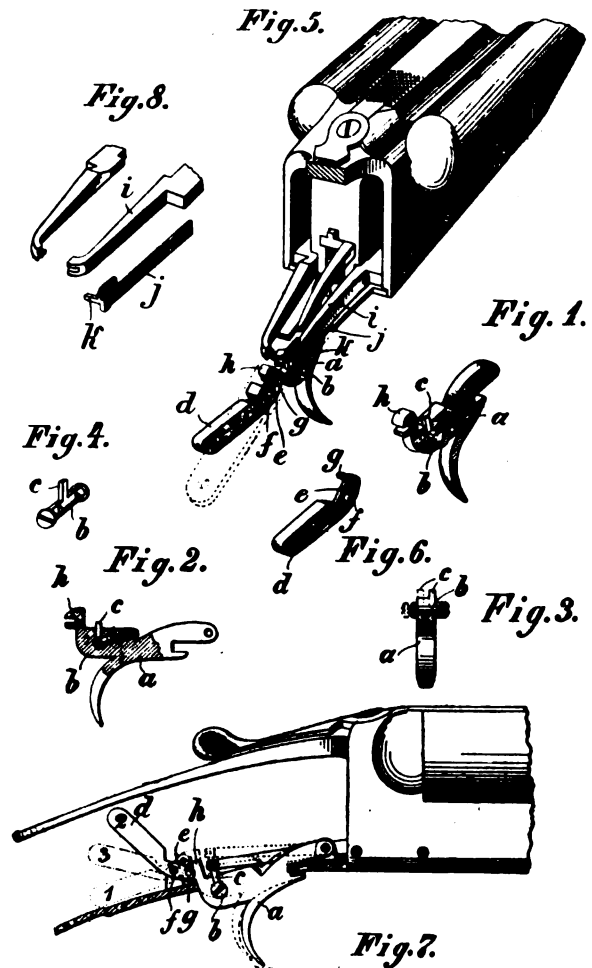
## SELECTED PATENT.

### THE BITTINER SINGLE-TRIGGER MECHANISM.

16,963 (1901). C. Bittiner and F. E. Jaeger, U.S.A. A single-trigger mechanism is described in this patent, which works somewhat on the lines of the trigger mechanism illustrated and fully dealt with in our issue of June, 1901. Patent No. 12,988, 1900, covers the former mechanism, the action of which should be understood in order that the working of the present arrangement might be fully appreciated. A retarding arrangement, designed to prevent the precipitate discharge of the second barrel, due to the involuntary pull, and a movable limb, through which either barrel may be discharged first, are specially defined in the claims of the patentees.

Referring to the appended illustrations, the arrangement of the parts is shown in perspective in Fig. 5. The trigger *a* is adapted to lift the sears through the medium of the plug *b*. This plug works through the trigger, and is capable of a transverse movement (Fig. 3). The upstanding projection *c* on the plug *b* communicates directly with the sears, and it is held beneath either sear by means of the spring locking pin *f*, Fig. 2, the rounded nose of which enters one of the two holes in the plug *b*. The rounded surface of the pin nose and of the holes in the plug permit of the pin being forced out of the indentations as the plug is moved transversely.

At the rear of the trigger *a* the two-armed lever *d e* works around the pivot *f*. The projection *g* on the lever *d e* engages the fork-like



part *h* of the trigger, so that during the lifting and dropping of the trigger the weighted arm *d* of the lever *d e* is caused to assume the positions shown in Fig. 7.

In Fig. 5 the plug *b* is shown in communication with the right-hand sear *i*, which is lifted with the first raising of the trigger. The lifting of the trigger forces the lever *d e* down into the position 1, Fig. 7, and during the time occupied by the trigger in dropping after the first discharge, the involuntary pull occurs, and is rendered inoperative. The dropping of the trigger is retarded by the weighted arm *d* of the lever *d e*, and the involuntary pull takes place during the arm's travel between positions 1 and 2 when the arm is about at position 3. When the trigger regains its normal position the tripper spring *j* through the tripper block *k* effects the coupling with the other sear (as in the former arrangement), and the second deliberate pull of the trigger discharges the second barrel. Accepted May 1, 1902.

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>			
A National Disappointment ... ..	99	ROUND THE TRADE ... ..	107
Trade Prospects ... ..	99	NOTES ... ..	108
Bisley Arrangements ... ..	100	MATCH RIFLE SHOOTING ... ..	110
Inanimate Bird Shooting ... ..	100	APPLICATIONS FOR PATENTS ... ..	111
The late Mr. Charles Eley ... ..	100	SPECIFICATIONS PUBLISHED ... ..	112
33-GRAIN BULK NITROS ... ..	101	SELECTED PATENTS:	
SINGLE TRIGGERS ... ..	102	Sights for Rifles... ..	113
INCIDENTAL JOTTINGS ... ..	104	Automatic Rifle Mechanism ... ..	114

## CURRENT TOPICS.

**A National Disappointment.**—Probably there is nothing quite so difficult to measure up as the entire reversal of a set policy that has occupied months in the process of fruition. At any rate, it is almost impossible to appreciate the far-reaching effects of the trouble and disappointment which befell the whole nation when it was found that the Coronation, and all entailed in its celebration, had been dissipated into fragments by the illness of our King. The relations between Court and society are not more intimate than those between this combination and those who cater for their requirements. Gun-makers will, therefore, find considerable difficulty in realising just how much the national trouble is a matter of special and peculiar interest to themselves. But their first impulse will be to forget self and to join in the national lamentation that so sudden a shock should have been experienced just at a time when things were ripe for a joyous frame of mind. Human nature is admittedly elastic, in that it seems able rapidly to recover its normal state, no matter what calamity may befall. In a very short time it is more than likely that everyday life will have resumed its routine course, and we may be the more sanguine of such a development by reason of the excellent progress that is made by our King in his illness. We have, however, every reason for hoping that a national calamity, such as we at one time feared might befall us, has been replaced by anticipations that we may look forward to a period of thanksgiving for relief from a great anxiety. It is with this feeling uppermost in our mind that we trust that during the current month the worst of our fears will be removed, and that a bright future may once more open up before us. Therefore, the national sentiment, which

finds its echo in a trade closely concerned with the highest in our land, is that the King's illness will give place to a steady convalescence, culminating in a renewal, necessarily on a reduced scale, of the pleasant functions that were to have been celebrated a few days ago.

**Trade Prospects.**—Just how the prospects of business are affected by the events which have been compressed into so short a period of time it is very difficult to say, since anticipations of any kind are dependent upon the turn of events, and no man can affirm with certainty how things will go. Meanwhile there is every indication, that apart from the one great disappointment, and the losses involved in it, other things are rapidly resuming their normal course. No period of marked stagnation seems to have followed the cancellation of the rejoicings that had been laid down by statute. The general sentiment of the nation seems to be one that most nearly corresponds with the wishes of the King, viz., that as little disturbance as possible shall follow from what has happened. The result is that people who had resolved to enjoy themselves in one way, made the best of a bad job by turning to such other amusements as were available. In fact, if all goes well, it may be reckoned that trade will still benefit from the influx to London, which has been the most marked feature of the past fortnight, and that there will be a renewal of activity when the postponed arrangements are confirmed for a fresh day. Thus it may happen that what seemed at one time to be a misfortune characterised by no silver lining of the cloud of blackness, will resolve itself into a far less serious loss than was at first contemplated. Trade will undoubtedly wake up in the autumn, and it will, at any rate, be free from the inevitable after-effects of a surfeit of enjoyment, such as could only have brought in its train a period of slackness. So far as trade prospects are affected by the weather, we fear

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that the greatest optimist amongst us cannot but admit that during the breeding season it has been most unfavourable to the production of a fine head of game. It is possible that the improvement recently established may do much to revive the sickly broods that have withstood the rigours of a cold and wet spring and early summer. Anyhow, we cannot expect a bumper year in the way of sport, and we must, therefore hope that there is plenty of trade activity in view as a result of the purchase of fresh equipment rather than what would follow from an active season on the part of users of the gun.

**Bisley Arrangements.**—The exact relation of the gun trade with the class of shooter who foregathers to the Bisley Meeting is not very easy to gauge. As a general rule, business with volunteers is not considered a very profitable one for gunmakers to take up, though in one or two instances mastermen, who are themselves keen rifle shots, have been able by their experience and special knowledge to carry on a remunerative trade. It must, however, happen that in such an important meeting as the one at Bisley represents, there must be a large number of instances where the gun trade as a whole is more or less intimately brought into relation with patrons of the sport. The match rifle shots, competitors in the sporting events, exponents of pistol shooting, and would-be champions on miniature rifle ranges, all find congenial employment at this great meeting. Many among them are representatives of a class who find in shooting a means of living an existence full of interest, and it is in catering for their special needs that many gunmakers find some reward. No one is quite so appreciative of specialised assistance as the shooter, who would by taking thought add ten points to his aggregate. More than this, he is willing to pay for the assistance he receives, and it is by rendering this assistance in an intelligent spirit of sympathy and appreciation that many gunmakers find among users of rifles and revolvers some of their best customers. Among the shooters there are many who have paid the closest attention to all that appertains to the theory of this sport, and if the gunmaker is to find appreciation among such as these—and they have a large following—he must himself pay some attention to mastering the science of the subject. Thus it happens that a large number of our gunmakers and allied manufacturers are interested in what happens at the meeting. At any rate we are quite certain that there is no gunmaker in the whole country who would not benefit from taking the slight amount of trouble involved in a visit occupying one or more days to a gathering of rifle shots, such as has its equal in no place in the world.

**Inanimate Bird Shooting.**—The month of July has, to some extent, taken the place of June as the time at which interest in inanimate bird shooting reaches its climax. This year the I.B.S.A. Championship Meeting will be held at the grounds of the Middlesex Gun Club, and from the accounts to hand there is reason to believe that the programme submitted for the three days' shooting that has been arranged will be, proportionately to the entries asked, the most liberal on record. In referring to the programme in this manner, it must not be supposed that the sole test of merit is the amount of subsidy paid to the shooters by way of reward for engaging in the competitions. The character of a Championship Meeting programme is an index of the vitality of a sport, and according to whether

the programme is good, bad, or indifferent, so varies the enthusiasm with which shooters foregather from all parts of the country to take part in the contests arranged. The mere fact that clay-bird shooting is not a money-making pursuit, provides evidence in itself that such support as a meeting of this kind receives is an index of the enthusiasm among those who delight to test their skill against that of rival exponents of the art. The meeting has been arranged to take place at Hendon on the three days ending on the 19th inst., and those who desire to obtain full particulars of the arrangements should address Mr. A. H. Gale, at 178, New Bond Street, W. In accordance with the policy laid down by the re-constituted Inanimate Bird Shooting Association, the meeting will be held under the management of the affiliated club referred to, the Association supervising the management and presenting a handsome cheque, as a guarantee to prize-givers that the whole of the arrangements will be carried out upon a practical basis. The meeting already promises to be a great success, since the attractions offered insure an attendance by shooters that is unlikely to be marred even by bad weather, though we must hope that this most important adjunct to success will not be found wanting.

**The Late Mr. Charles Eley.**—The firm of Eley Brothers have, during recent times, merited our sincerest sympathy more often than we care to contemplate. A very short time after the shock caused by the terrible accident that resulted in the death of a valued departmental manager, we heard of the loss of Mr. James Irvine, and now, almost before we have become accustomed to think of one whom we met so frequently as no longer among us, we find that one of the fraternity has disappeared. We say fraternity advisedly, because it so seldom happens that the relationship of two brothers is so intimately connected with commercial success as in the case of the Messrs. Eley. Mr. Charles Eley has for many years relaxed from the more arduous work of his early life, but never at any time could it be said that he had lost interest in the firm that bore his name, and of which he was a most valued adviser as a member of the board. Mr. Charles Eley, besides knowing his business from its technical point of view, knew it also and quite as intimately from its sporting aspects. As a shooter, both at the Gun Club and on his country estate, he was characterised by a thoroughness of grasp that made him an authority whose views were received with the greatest respect. Like all old-fashioned firms, that of Eley is subject to the losses that arise with the decease of the early founders and workers. Fortunately, in the present case, there are among those who remain persons quite capable of doing justice to the important heritage placed in their hands. Death is thus robbed of one of its worst features for those that remain behind, in that there is no interruption in the progress of an organisation, of which the person lost may in his day have been one of the chief sources of motive power. In fact, the loss of a valued collaborator is robbed of much of its sting when it is known that he has lived to see the fruition of his labours and enjoy their results, also to see a younger generation doing justice to what he had helped to build up. The firm of Eley affords an excellent example of the working of this principle; and it is, therefore, with every confidence in the future that, with all respect, we wish this firm a continuance of the prosperity which it has shown itself so capable of enjoying without misuse of any kind.



### 33-GRAIN BULK NITROS.

IN the same way that a certain politician is denied the credit for discovering the British Colonies, and a humbler individual the town of Bristol, so it happens that certain other persons cannot lay claim to have discovered the 33-grain bulk nitros. As a matter of plain fact, we have had this class of powder with us for a trifle of five years, and yet it is only within the past six months that its peculiarities and merits have received anything approaching general recognition. Now the pendulum has swung round with a vengeance, and we are all wondering why we did not appreciate at an earlier date the vast potentialities of the new group of powders that has, so to speak, stolen upon us unawares. Running back a few years, it will be remembered that old Schultze was reckoned the ultimate goal to which powder development could reach. The condensed nitros that made their appearance on the market were regarded as new-fangled fads, that gave more trouble in the loading and igniting than their waterproof and clean-burning properties could compensate for. It was reckoned that the volume of the condensed powders could not, for radical reasons of chemistry, be increased to the standard of a charge of black powder of equal power, and it was equally taken for granted that the bulk powders could not be modified in composition so as to get rid of the obviously disagreeable presence of an undue proportion of barium nitrate. This latter substance made the powder somewhat sensitive to variations in the confinement of the charge, so that a bad turnover or loose wads aggravated the tendency to incomplete combustion with its accompaniment of solid particles of chemical matter liable at all times to cause annoyance, if not positive injury, when blown back into the eyes of the shooter firing against the wind.

Things went on in this way for a long time, and the defect noticed was endured after careful loading had reduced it to a level, past which improvement was impossible. It continued to be an article of faith among powder makers that the large proportion of barium was essential, until the advent of E.C. No. 3 showed that it wasn't. It is possible that some of them had a very good inkling of how the truth lay, but then it must be remembered that while research and enquiry are a necessary adjunct to a manufacturing concern, practical business policy more often than not suggests that the best way to deal with new discoveries is to bottle and store them away in the laboratories, so holding them in reserve until the day arrives when the march of events indicates the need for a change. There can be very little doubt that this explanation largely accounts for the epidemic of improvement that suddenly sweeps over an industry when once a lucky hit has shown the advisability of a general change of methods. Powder makers were doubtless quite satisfied with the trading results that were accomplished by the old 42-grain hardened nitros. They knew full well that the ballistics and water-resisting properties of the condensed powders were, in many cases, superior to that of their own products, and also that when on their good behaviour they were pleasanter to use. But with this knowledge there was also ample realisation of the fact that the 42-grain powders were not difficult to manufacture up to the requisite standard, and that regularity could be obtained by a suitable amount of blending of diverse batches. The condensed powders, that is those having a less

weight for a given production of gas, were known to be far more difficult to deal with, in addition to which they vastly increased the complications of loading.

Therefore, on grounds of commercial hesitancy to take a leap into the dark, the composition of the 42-grain powders was left intact. When once a move was made, and it was found that the difficulties of adjustment could be overcome so as to produce a powder having a regular combustion, with other properties also of a satisfactory nature, combined with the advantages of 33 grains of matter in the three drams of bulk, then active competition was once more established. Those whose business it was closely to study the diverse kinds of powders and their behaviour under varied conditions, found that, while there were obvious difficulties in maintaining the same ballistics that had been current with the older powders there was a cleanness and sharpness in the decomposition of the new ones that made them very effective. Blow-back was practically done away with, and recoil was materially reduced by virtue of the less weight of gaseous products and the lower muzzle pressures. The reduction of recoil, due to the lightening of the charge, does not appear to account for the whole of the benefit experienced, and to their lower muzzle pressures must be ascribed a great part of the credit for the modification noticed in the actual character of the recoil that is by way of a reduction of the kick stage of recoil that follows immediately after the initial push. The reduction of muzzle pressures apparently exerted a further influence upon recoil that is not always taken into account. In the absence of a part of the scattering tendency due to the letting loose of a body of gas immediately to the rear of the shot on its exit from the muzzle, the patterns showed a tendency to greater closeness. This has permitted a slight reduction in the charge of shot, without diminishing the pellets asked for with the 30-inch circle at 40 yards. The reduction of shot by one-sixteenth of an ounce produced its proportionate effect upon the recoil, at the same time that it provided for the milder combustion of the powder, so moderating any tendency to high pressure without affecting the ignition.

Practically speaking, the above brief references to the main characteristics of the 33-grain group of bulk nitros exhaust what we have to say about them as a class. Individual examples among them, besides the one already mentioned, are Imperial Schultze and Nobel's Empire. Others are on the market or in process of introduction. For instance, Henrite is, we believe, of the 33-grain class, while the Walsrode Company are credited with having one almost ready for introduction. Other firms we know of who are similarly interested, but we cannot mention further names at this stage in the absence of special authorisation. From particulars we have been able to gather, we believe there is practically no limit to the range of adjustment to which these powders are capable of responding. In other words, they can be made to deliver up their gases in the manner associated with obtaining the best results. That is to say, they are capable of a sharp response to the detonation of the primer, and the first evolution of gas is yet not so rapid as to create an undue pressure before the movement of the shot has enlarged the chamber containing the gas. The further evolution of gas can be arranged to proceed at a rate that ensures the stage of complete combustion at the earliest moment consistent with low pressures, so that the shot charge shall receive its maximum of propulsive force consistent with safety at each part of its

travel up the barrel. This brief survey of the combustion of smokeless powder is put forward to show what is the limitation of adjustment in the way of harmonising low breech pressures with high velocities and insignificant gas pressure at the moment when the shot leaves the muzzle. Enough gas is evolved by the 33 grains of powder that represent the charge in the nominal 12-bore 2½-inch case, to impart the velocity that is considered standard in relation with the accepted charge of shot and ratio of distribution of pellets.

The powder maker may, therefore, be safely left to take such manufacturing precautions as will result in the production of batches of powder that will comply with the standards that practice has laid down. Among those who have access to the records obtained from an examination by firing tests of cartridges, selected promiscuously from those on the market, it is well known that samples are frequently met with that fall a long way short of what theory suggests is necessary for effective work in the field. Sportsmen do not necessarily complain. A lot of their work is done at ranges that do not call for a full-power cartridge; but, on the other hand, the unduly close pattern that results from low velocities is liable to cause a plastering of the game with a large number of pellets, thus spoiling its condition for the larder. The new nitros are, according to all accounts, a decided advance upon anything that has gone before, but, like all developments of specialised industries, they demand a greater care both in the manufacture and in the after-treatment of loading. As a general consequence, we must expect a steady improvement in the conditions relating to the use of these powders to be brought about by a better appreciation of their properties and the means of showing them off at their best. Like a piece of automatic machinery, or, again, like a highly-bred animal, the results producible are greatly enhanced in quality, but at the expense of a need for more careful attention to the good condition and well-being of every detail. This practically summarises the whole question, and it will be clear therefrom that the new group of powders represents an advance characteristic of the age in which we live, that is, an advance in the direction of a more highly specialised form of perfection.

**WINCHESTER GREASELESS BULLETS.**—We have recently received, through the London agents of the Winchester Repeating Arms Co., a sample consignment of short .22 calibre ammunition loaded with smokeless powder and the Winchester new special greaseless bullets, which are made of an alloy that renders the usual system of lubrication unnecessary. A somewhat extended trial of this ammunition serves to convince us that it seems to reach quite to the standard of merit claimed for it, a series of nearly 100 rounds producing no more fouling of the barrel than was apparently due to the last cartridge fired, while the accuracy of the shooting was well up to the level of ordinary greased ammunition of the same calibre and quality. It was to be expected that these greaseless bullets would cause trouble by leading the barrel, but, so far as can be ascertained by actual trial, this is not so. About 50 rounds fired in rapid succession through a clean well-kept barrel yielded no subsequent traces of lead-fouling, even to the most minute inspection, and it was only by using a neglected rifle, which gives trouble in that respect with any type of bullet, that any signs of metallic fouling were to be discovered. Apart from its non-fouling characteristics, the ammunition possesses the important advantage that it can be carried loose in the waistcoat pocket, if need be, without spoiling the pocket or impairing its own shooting qualities.

## SINGLE TRIGGERS.

THE recrudescence of interest in single-trigger mechanisms which has recently arisen affords an opportunity for going over a few of the old time-worn arguments, and reviewing them in the light of up-to-date experience. At the present time one is quite safe in saying that single-triggers have established themselves in popular favour. A year ago the same remark would not have been quite so true, while two years ago there would have been many who could prove its entire inapplicability to the situation that existed. The development of the single-trigger into popular favour must be ascribed to a variety of causes, chief among which is the withdrawal and sudden death of unworkable mechanisms, and the gradual improvement, both in adjustment and design, of the mechanisms that have established their claims to be considered practical. No longer do we hear of the timing mechanism which had a sort of American alarm-clock in the stock for producing a definite interval of locking for the second barrel after the firing of the first. Similarly a large number of other mechanisms, with unnecessary complication of parts and obvious weaknesses, have gone to the wall. Such a state of affairs was the logical outcome of the craze for single-trigger mechanisms that seemed to pursue every gun-making mechanic. The problem to be solved is essentially easy and obvious in the initial stages. One man uses a slide, another a swinging arm, a third secures his inspiration from the bell crank, and a fourth thinks out an entirely new and original system of patent automatic double-jointed sears.

Bit by bit the real difficulties connected with the involuntary pull come into view, and the unhappy inventor, once he has taken up the yoke, finds it a matter of great difficulty to drop the whole thing and clear his mind of the distraction that threatens the welfare of his business. He goes to bed thinking of involuntary pulls, and wonders whether it is the elastic rebound of the shoulder, or the reflex action of the tendons in the finger, or whether it is due to some hitherto unsuspected jump of the gun, which causes the irritating tendency towards double discharges. In aiming at the creation of a true mental picture of the series of movements that occur, he endeavours to figure out a means of counteracting the tendency to double discharges. Soon a brilliant idea strikes him, and he sets hard to work arranging fulcrums and adjusting spring strengths. His mechanism works, we will suppose, in a perfectly satisfactory manner; but when he gives the action a final overhaul and adjusts the trigger pulls, he discovers that the sweetness of working that he has been educated to regard as a necessity is inconsistent, for some extraordinary reason, with the essential principles of his creation. It would be impossible in the compass of a short article to dwell in detail on the weary path that one inventor after another has struggled along in the hope of some day placing upon the market a mechanism that will satisfy the needs of every sort of shooter. New experience, frequently of a very unpleasant character, is constantly being acquired; and after many weary years of effort, it is more than likely that defeat will so far be admitted that the gunmaker announces himself as one of the number who refuse to recommend single-triggers.

Life is too short to be constantly worrying at a task to which there seems to be no satisfactory finality, and as there is not one among the mechanisms that have established a reputa-

tion that seems adapted to take the position in the trade in single-triggers which the Deeley occupied among ejectors, a gunmaker must choose between his own superfine pluperfect single-trigger, which is as good as the best and better than all the bad ones, or do without one altogether. We believe that a few of Mr. Southgate's mechanisms have been supplied to gunmakers, but, with this exception, the rule holds good. At one time Mr. John Robertson seemed inclined to allow the trade to share the benefits accruing from the sale of the mechanism which has been so conspicuously successful in his hands, but unfortunately difficulties appear to have arisen at some stage or other of the proceedings, and the only way now of getting a Boss mechanism into the gun of another maker seems to be for the customer to pay Mr. Robertson's firm to carry out the process of conversion.

Failing, therefore, a single-trigger available for use by the trade as a whole, it works out in actual practice that the vogue of this useful addition to the conveniences of a gun is mainly limited to good quality weapons sold by London firms. Admittedly, the London gun trade is thoroughly progressive in the matter of price. The firm of Joseph Lang & Son, for instance, have been sufficiently enterprising to place upon the market a single-trigger ejector gun at the price of 25 guineas. In a similar manner, other makers are prepared to fit single-triggers into various grades of gun, but the general substance of our previous remarks remains unaffected, viz., that there is no one mechanism which has anything like general vogue from the point of view of being largely used upon payment of royalty. Probably there is no single-trigger mechanism on the market on account of which more than one licence to manufacture has been granted. In a similar manner we do not know of a single instance where a mechanism is made in quantities for the purpose of sale in a condition ready for fitting to ordinary guns. We admit that Messrs. Westley Richards have some such idea in mind with reference to the American patent which they are pushing so energetically, but it would be premature to say anything under this heading until there has been time to see how the mechanism stands the inspection of experts in the trade, who will, no doubt, be asked in due course to take some sort of interest in it. The principle of the mechanism is undoubtedly one that anticipates with an appropriate remedy practically all the troubles that theory and practice show to exist; but, as with everything else, the real test of applicability for fitting into miscellaneous weapons is whether the adjustments and final titivations can be carried out by the class of mechanic, without special experience of single-triggers, such as is generally employed for every-day work on a gun.

Some weeks ago an article appeared in our contemporary, *The Field*, in which the opinion was put forward that a man would probably not increase the effectiveness of his shooting as a result of using single-triggers. Many gunmakers and shooters of experience have privately expressed opinions the direct opposite of this statement. In fact, the future success of single-triggers is wrapt up in a proof of its inaccuracy. As a matter of fact, there are very few shooters who have acquired such a state of drill-hall mechanical precision in the use of the double-trigger gun as to be sure of never muddling up a shot by mishaps in fingering one or other of the triggers. Then, again, while it is difficult to state with any certainty just how much the use of the second barrel is interfered with by the operation of changing from one trigger to

the other, it has always been admitted that a certain disturbance of aim does take place, and it is equally admitted on all hands that this disturbance is reduced to a minimum in the case of the single-trigger.

In fact, several of the most successful mechanisms work on the principle that one continuous pull discharges the two barrels, the first portion of the pull releasing the right sear, then there is a slight check during the involuntary pull, followed by a short release, the trigger then being free to continue its backward course, and so fire the remaining barrel. Ignoring for the moment the intermediate locking position, it will be clearly understood that in theory nothing could be quite so simple as the successive discharge of two barrels by the continuous travel of one trigger. Therefore, we must admit there is something very definite to attract shooters to the use of single triggers, and the fact that this improvement has been so many years in coming to the front must not be ascribed to the absence of special advantages making towards efficiency in shooting, so much as to the absence of a mechanism available for general use, and of a kind that will satisfy the public demand as to what a single-trigger gun should be capable of doing. The problem presented for elucidation by designers of single-trigger mechanisms is obviously not one where there is an opening for a great number of independent mechanisms. The whole range of mechanics show that, in some peculiar way, a new device ultimately settles down into some particular form which, by a process of selection, is shown to be the most direct means of attaining the required purpose. Anyone who remembers the immense variety that was displayed in the design of electric dynamos when they first came into use, must have noticed how, one by one, certain extreme types have been eliminated, with the result that standard patterns have become general for each class of work, while others, whose chief feature was their novelty of appearance, have dropped out of the running. In the same way there were at one time many kinds of lamp-holders, each self-respecting firm having its own design. Nowadays the Edison bayonet socket-holder is universal, and, although the result may have been helped somewhat by the patent law, the fact remains that its chief recommendation is its obvious simplicity and practical utility. So it is with single-trigger mechanisms, and, although the time is not yet by any means ripe for a further process of elimination, we see, nevertheless, a growing tendency to limit the types of mechanism to a few leading designs, which are subject to a very simple system of classification.

At the commencement of this article we referred to the recent recrudescence of interest in the controversial aspects of single-trigger mechanisms. As far as we can judge, the dispute appears to have arisen in some way or another on account of the use of the term "three-pull," as applied to such mechanism. Certain sportsmen appear to have assumed that these words imply the need for pulling the trigger three times in order to discharge the two barrels in the ordinary course of shooting in the field. Needless almost to say, it has always been well understood that nothing of the kind was the case, and that the descriptive terms "two-pull" and "three-pull" related entirely to the particular form of mechanical movement by which the tendency to double discharges was overcome. To some extent it is quite possible that the term three-pull might, to some minds, convey something in the nature of a reproach; but this should be insufficient as a

reason for condemning a term which serves a very useful descriptive purpose. Those guns in which the recoil produces certain movements necessary for the proper firing of the second barrel are spoken of as having three-pull mechanisms. Conversely, the guns in which the firing of the second barrel can be performed entirely without reference to the nature or extent of the involuntary movements due to recoil are spoken of as having two-pull mechanisms. That is to say, three-pull guns can only be discharged by two voluntary movements of the finger, provided there is a suitable recoil from the first barrel to allow for the requisite intermediate movements. With two-pull mechanisms, on the other hand, the two barrels are discharged with two successive voluntary movements, which are independent for their proper sequence upon what happens as a result of recoil.

In several newspapers an effort has been made to show that all guns are in reality of the three-pull type, in so far that there must always be certain recoil movements due to the firing of the first barrel, and that whether these are neutralised or utilised, they must be treated as an intermediate pull, making up the total to three. This argument was placed in so attractive a form as to render it very difficult to give a logical explanation of the underlying fallacy it contained. A contemporary of ours hit upon a brilliant *reductio ad absurdum* of the argument, which once and for all settles the question. It pointed out that if all single-triggers were three-pull guns, therefore all double-triggers must in every case have four-pulls, since the operation of each trigger must necessarily be followed by the recoil pull due to the resulting discharge. Without wishing to steal any part of the credit that is due to our contemporary, we will still ask permission to make use of the fare provided at this feast of wit. We will do so by appropriating this most convincing principle of argument, viz., that every single-trigger gun must necessarily have a four-pull mechanism. That is to say, the firing of the first barrel consists of the voluntary and the involuntary pull, and in exactly the same way the firing of the second barrel produces the same sequence of operations, so much so, in fact, that were there three barrels the same precautions would have to be taken against simultaneous discharge of the second and third barrels as is now the case in preventing the two barrels from going off at the same time.

Up-to-date, the terms two-pull and three-pull have had a very definite signification, as described above, and any attempt to prove that a two-pull mechanism is in reality one of three pulls, is only going half-way towards the absurd truth that lies concealed beneath the argument, since, to be logical, one must go the whole hog and state that all guns have four pulls. Mixed up among all this controversy is the underlying fact that a certain amount of business feeling must necessarily exist where there is so much strife upon apparently academic questions. The only strife that is known to the commercial man is for orders, and, therefore, the evident signs of a desire to prove one side or another of an argument where commerce is concerned, is proof positive that there is a buying public to be humoured and catered for. This sign is one which we hope will be appreciated to the full by all traders in guns, who should profit at this time of day by the experience which has been gained over many years of work in single-trigger experimentation and design, and hold themselves ready to satisfy what promises any day to become a wide-spread demand.

## INCIDENTAL JOTTINGS.

Every one will miss Major Douglas from **THIS ONE WILL BE MISSED.** his post as Superintendent of the Royal Laboratory, Woolwich. It was no easy task for him to succeed such an able and popular officer as Colonel Bainbridge, his predecessor, and the war strain being most heavy on this department his office has been no sinecure. Just as it is a matter of regret that some incompetent officers get a renewal of their posts time after time, it is equally so that an efficient and valuable man, such as the gallant Major, should not get an extension of time, when so much of national importance as regards change of war stores, especially laboratory stores, is being dealt with on the result of South African war experience. The new superintendent is well known and liked, having been assistant to the Chief Superintendent of Ordnance Factories. The name of Barlow has for many years been an honoured tradition of the Royal Laboratory, though I am not aware if there is any relationship between Major Barlow and the Colonel who held the same office for so many years.

Some months ago I had the courage of my **A CAP BY ANY OTHER NAME, ETC.** opinions to agree with the Inspectors of Explosives in their preference for percussion caps with a disc of tinfoil, in lieu of, or in addition to, varnish on the surface of the composition, which is the usual trade practice. I disagreed with a remark in a contemporary journal that it was "grandmotherly legislation." Since that time I have been the unhappy recipient of numerous and sundry views all round the trade which convince me that I was entirely mistaken in thinking that the advantages are greatly to the commercial benefit of the community, or that the foiled caps give greater immunity from explosive risks than the unfoiled. Statistics, I am told, go to prove that (from finished caps) more lives have been lost with the tinfoiled caps than the varnished. To effect an explosion *en masse* the only way appears to be to bake them in a closed vessel, and the most lamentable accident of recent years was by an explosion of foiled caps under these circumstances. I strongly suggest that, as the feeling in this matter is so pronounced, experiments should be undertaken by makers of unfoiled caps to show under varying circumstances the behaviour of each system, and the Government Factories, who do not tinfoil, would doubtless assist in allaying the Home Office fear of this poor little harmless "detonator." Why not call it a percussionator with an accent on the "cuss"?

### ACCIDENTS AND INCIDENTS.

Of all our national custodians there are none who do better work than the administrators of the Explosives Act, and they must feel very proud year after year as they issue the report of their work. It is, therefore, the more difficult to disagree with those who merit so much commendation, though it only proves the "human" rule, that when they sometimes appear to be mistaken in their views, we must recognise that no amount of precaution will give

absolute immunity from accidents, which it seems must occur, and in most cases give no definite clue as to the promoting cause, whereby it is rendered difficult to guard against a repetition. This is nowhere more exemplified than in the Inspectors' reports on individual accidents, which are sometimes terribly laboured so as to show some cause or reason where nothing specific can be found in evidence. I remember once reading one of these reports in a railway carriage, and whilst wondering how such accidents could occur, I was startled by my opposite neighbour opening fire without warning, and, with a highly propulsive sneeze, discharging a half charge of false teeth with such percussive force as almost to gnaw the buttons off the opposite cushion. I could not help thinking, as I moved out of range, that if the cushion had been a detonating composition, it would defy the wit of even a Home Office inspector to explain the cause of our dessicated condition with any approach to accuracy.

**I'VE GOT HIM ON THE LIST.** The new composition buildings are at last completed at Woolwich Arsenal, and the oratory folk have gone into possession. Of all the eyrie buildings ever erected by military amateurs these would be hard to beat. Fancy any private firm putting the floor level of one-storey sheds eight or ten or more feet above the ground, with unprotected platforms of similar height connecting them. I suppose the idea was that if one of them exploded it would be sufficiently high to allow the débris to be blown all over the Arsenal. I am not quite sure if one would not be better blown up than suffer a fall from the platform. What this unique form of a factory cost one cannot tell, but it is an outrage on common sense, and calls for urgent reform in that department that designed it. I am quite aware that it is built on ground below Trinity high-water mark. So is half London, and there is no more danger of this land being flooded than the rest of the Arsenal and adjacent towns and villages, all of which are protected by the same river bank. Neither can it be to protect the river bank, which is sufficiently far off to withstand any explosion, and if not, mounding with earth-works would have been cheaper, more effective and safer.

**CORONATION BISLEY.** This year's Bisley ought to be a memorable one after all the efforts to rouse enthusiasm and interest in rifle shooting. There should be a lot of new blood, and doubtless there are many men who have acquired passable skill after all the practice and urging they have had from their volunteer officers and instructors. Add to this the testimony of the Commandant of the Hythe School of Musketry, that the volunteer officers are keener and more intelligent than the regulars under instruction, which he stated before the committee on Education and Training Officers of the Army, and this should stimulate the volunteers to put into evidence the practical justification of the good opinion which the British public and responsible army officials have had of the auxiliary service. The ammunition will doubtless be of the best, not being made against time, as was that of last year, when the war was absorbing so much. Given good weather and plenty of Coronation visitors from the colonies, this year there should be an exceedingly brilliant gathering.

**BISLEY MEMORIES.**

There is not so much technical education to be picked up as in the days when all the various powder "ites" had their shows at Bisley. These have yearly been fewer and fewer. There is, however, always a superfluity of advice going; but it is like the Bisley whisky, you have to know the man or place to get it from, or you will be landed with a blend of concocted stuff very much "under proof." But the Bisley yarns are magnificent, no fisherman can get a footing in the camp, for truth is a revered idol which is generally put in some safe place where it cannot get damaged. Many happy hours have we all spent listening to these oratorical warriors after the heat of the day, sitting round the tents or huts, burning our evening sacrifice in our favourite briars. By the way, why don't the N.R.A. protest against the Pirbright Camp starting firing at daybreak or thereabouts. One is hardly in the prone position, after the exciting and wakeful stories of the evening, when these wretched guns start work and spoil all one's beauty sleep.

**MILITARY EDUCATION AND ECONOMICS.**

The Committee on Military Education have published their report, and it is no exaggeration to say that such a severe criticism of the present system has staggered even the most sanguine reformers. The bungling methods hitherto adopted have been commonly known, but committees, as a rule, never get such information as the average man in the street can pick up. When the officer who supervises military education only gets £800 per annum, you can't expect much, and one is not surprised to hear that the education of cadets and officers comes to 15 per cent. of the army estimates. We could hardly run our school boards on such a trivial sum. The committee look, therefore, to other sources to provide technical military education without unduly inflating the estimates. Good for the committee. It is agreed that the officers, as a rule, are deficient in education, due to their early training. Their mathematics are acquired by cramming, without fundamental tuition, which does not matter much for Sandhurst, but Woolwich demands a more intimate knowledge. The cadet of the future will be compelled to take English mathematics, a modern language and either Latin or experimental science. This will give him an enormous pull over his predecessors.

**ANTECEDENT EDUCATION OF CANDIDATES.**

The antecedent education of the Army candidates seems to perplex the Committee, and various suggestions are held out. Though the evils of cramming are dwelt upon, the view receives favour that a simultaneous examination for Woolwich, Sandhurst, militia and yeomanry should be held, and the number of marks should qualify for entrance in the order shown. If the Government want a plentiful supply of officers, and desire to be relieved of the cost of initial expenses of examination, etc., why not adopt the Whitworth scholarship procedure, so that anyone possessing certificates in the subjects required can join as a cadet at once? Let the certificates be for elementary, advanced and honours, only one grade to be taken in one year. This would do away with the cramming evil, and these examinations would be taken as part of the school curriculum at the student's expense. The mathematics, geometry, science, English and languages, could be the ordinary science and art department

examinations with a military nominee or two on the examining board to see that the papers are representative for the army candidature. Nothing could be cheaper or better.

**THE INTER-MEDIATE TRAINING.**

The combined output of Woolwich and Sandhurst produces a maximum of 510 officers annually, whilst the normal requirements are 800, and even at this there is only a course of from one to two years, and as the Committee recommend the extension of the period of training, the combined output on the present arrangements would fall to 410, leaving 390 to be obtained from outside. The enlargement of the military schools would follow as a matter of course, but it would be impossible to pass all the militia and yeomanry officers through that course, so that there is evidently a desire to keep the numbers down from these sources, which is a great mistake. The man that is wanted for the scientific regiments is not what is required for the cavalry and line. The engineer officer is best trained outside at the Universities, and a short course at Woolwich and Chatham would soon give him the finishing touches he requires, whereas the artilleryman requires a longer training at Woolwich and a better knowledge of the ordnance factories, where he may some day gain an appointment, and where the public service will suffer whilst he is learning what he should have known years before. This policy of "do nothing but put the brake on" is not the poor officer's fault entirely. It is the natural result of his training.

**AN UNLIKELY COMBINATION.**

The cavalry and line regiments want the young country gentleman. He is to be wise and enthusiastic; he is to have commercial intelligence, and live mostly on his own money. He is not to fritter it away in regimental polo hunting or coaching clubs, but just to make as big a splash as he can possibly do. This seems to be aspiring to the impossible. A man with his income of £200 or £300 per annum invests it in the army to become a sort of sleeping partner. There are not three in a dozen of these young men who do not fall back upon the army as providing some sort of employment, which is respectable and does not entail much vigorous effort or interfere with social engagements. If these officers were the industrious, energetic businesslike men the Committee want them to be, they would not choose a military life in a cavalry or line regiment, unless for very sentimental reasons. Every man that fails at his "little go" at the Varsities, or is a dunce at school, is an inevitable candidate for the army; and these gentlemanly loafers are not bad fellows, but you cannot expect very great things from them, especially in these days when there are so many roads in civil life to honour and distinction, especially with the aid of a little capital. The army offers undoubted advantages to men of an indolent disposition, but promotion by merit and stringent examination will weed out all these men who would be otherwise attracted.

**BIRDS OF PASSAGE.**

Therefore it seems that the best officer would be the "bird of passage" through the militia or yeomanry, who are really fond of the army, and work their way through, utilising their civil employment as a training far superior to anything that can be gained by the military inocu-

lation at Sandhurst. Lord Raglan's evidence certainly showed the scope for developing this class of men, but he seems to think they have fallen short for want of secondary education. This seems to be more the fault of the men themselves than of the army officials, as every town has its educational opportunities, if only there is a demand, particularly if South Kensington would embrace the theoretical subjects necessary to military requirements. There is no doubt that these men are keener, and their commercial training enables them to grasp at once the details which the text-book fails to show. The late committee on the War Office showed what a deplorable ignorance of detail officers in the highest positions have on commercial and business matters so intensely vital and imperative for the administration of their own departments. This was entirely due to their military training, and also to the military instructors, whose salaries are insufficient to tempt men of the necessary capacity to qualify for such posts. The intermediate training of the young officer may be summed up as being totally inefficient, due to the starvation by mistaken economies, and it is pitiful reading the general criticisms applied to Sandhurst, where much of our wonderment of the general incapacity of military officers is explained.

**A FEW QUOTATIONS ABOUT SANDHURST.**

It is certainly time that Sandhurst, as a Military School, should be shown in its true light. It is no news to those who move in military circles, and it will be a great relief to hear that it has a chance of reorganization. The Committee report that "the place is untidy," "that the instructors regard the instruction appointments as a shelf upon which an officer may spend a few comfortable years." "They are not taught military exercises, except by non-commissioned officers;" "the riding instruction consists of 39 hours per annum (the length of the course at Sandhurst) for either infantry or cavalry;" "they are not taught the elements of stable management or horsemanship," "neither are they instructed in musketry or revolver shooting;" but they are allowed to subscribe to a local rifle club if they choose (fee £1). "They are not instructed in drilling a squad or company, nor in the duties of the several grades of non-commissioned officers;" "they are obliged to pipe-clay their own belts, but their rifles are cleaned for them." "In military topography and engineering they are crammed with theoretical problems, which they would never be called upon to solve in practice;" whilst "the practical work in the field is neglected." Finally, "there is no inducement to work, nor are those who fail to reach the low qualifying standard excluded from the army." "There is reason to fear those cadets who fail have been commissioned none the less." This certainly accounts for the rumours we have all heard from South Africa.

**A LEFT-HANDED WELCOME TO THE UNIVERSITIES.**

It seems that the Committee and the University authorities do not quite run on parallel lines. The Universities, Cambridge in particular, have far greater facilities for turning out men suited for the scientific requirements of the positions they are intended to fill, but this is not what the Committee want. They are afraid the superior attractions of the University might cause Woolwich to suffer, and they,



therefore, reserve the Royal Engineers as a monopoly for the Royal Military Academy, and offer a few chances for the Garrison Artillery. They fondly hope to be able to tap the Universities as a source of supply for the cavalry and line regiments, but in this, I fear, they will be doomed to disappointment. The brilliant men want the best or nothing, and the War Office would not lose by letting a few commissions in the Royal Engineers be open to 'Varsity men, giving them the same examination. This would induce a little healthy competition, and the Service would secure officers who would have a superior knowledge of engineering, which would be more easily adapted to Service requirements. The Woolwich-trained engineer is very much like a dispenser who can make up prescriptions from labelled bottles, but has no knowledge of the drugs he is using. A course of actual practical work in the ordnance factories would make all the difference, and be of inestimable value.

**OFFICERS  
TO DATE.** The military training of the young officer after his intermediate education comes in for censure, and much emphasis is put upon a proposal for promotion by merit. There is an honest endeavour to reduce his expenses, and the Committee are of opinion that the charges made for sons of private gentlemen at Woolwich are excessive, and that the accommodation does not justify the charges now made. This is good news, particularly the minimising of the expenses for young officers who have not a healthy banking account. Later on perhaps we shall hear that his clothes will be made in the Pimlico factory at a fractional cost, and their servants will be permitted to wait on them in uniform, and so save the expense of plain clothes, which falls upon his master, that barrack furniture will be provided *à la* furnished apartments, and that the mess bill will be taxed by the commanding officer, who will be empowered to satisfy himself as to the income of any of his juniors. Or, better still, let all the officer's pay include *en pension* terms in barracks, and an allowance when married and living out only.

CYCLOPS.

### LIONEL WATSON v HARMER.

The case of Lionel Watson *v.* Harmer was heard before Mr. Justice Grantham and a special jury, in the King's Bench Division. The plaintiff sued the defendant, who trades as James R. Watson & Co., for £500 damages for detaining certain papers to which plaintiff alleged he had a right as agent of the Cooppal Powder Co. Mr. Rufus Isaacs, K.C., and Mr. Francis Watt (instructed by Messrs. Milliken and Co.), were counsel for the plaintiff, and Mr. Rawlinson, K.C., and Mr. Clavell Salter (instructed by Mr. Edwin Cobbing) were counsel for the defendant. At the suggestion of the Judge, and after consultation between counsel, the case was stopped, a juror being withdrawn, the Judge expressing his sense of the wisdom exercised by the parties in agreeing to the course adopted. He further expressed the opinion that the relative positions of the parties could not very well have been settled without reference to a court of law. As a result of the proceedings, their positions had been defined, and that was an end once and for all to the dispute. From the remarks made by his lordship, there appears to be no doubt that the agency for Cooppal Smokeless Powder has been, and still rests, with the firm of J. R. Watson & Co., of which Mr. Harmer is part proprietor under the trusteeship created by the will of the late J. R. Watson.

### ROUND THE TRADE.

It appears from an American contemporary of ours that air rifles are in great demand just now.

The All-Ireland Army Rifle Meeting will be held at the Curragh Camp from August 4 to 9.

The affairs of Messrs. Wilkes Bros., gunmakers, of Leeds, have been dealt with by means of a registered deed.

A serious explosion occurred on June 5th at Messrs. Pain & Sons' firework factory, Mitcham, which resulted in the loss of two lives.

A monkey holding a rifle is the device over which the Arms and Ammunition Co., Ltd., wish to exercise exclusive rights as a mark for ammunition.

The Annual Meeting of the Field Sports Protection and Encouragement Association took place on the 13th ult., with Lord Westbury in the chair.

One of the latest promised additions to the list of 33-grain bulk nitro powders is the Universal Walsrode, put upon the market by Messrs. Beutner & Co.

The merits of hand flingers for clay-birds seem to be gaining appreciation in France, to judge by the fact that specimens of native make are being advertised.

The J. Stevens Arm and Tool Co., of Chicopee Falls, Mass., U.S.A., announce that its New York office is removed from 318, Broadway to 80, Chambers Street.

Mr. W. Matthews, who was for several years gun attendant at pigeon shooting meetings for a well-known maker of pigeon guns, died rather suddenly a few days ago.

Mr. R. J. Harmer, trading as James R. Watson & Co., has registered the device of two cocks fighting and the words "The Challenge" underneath, for all explosive substances included in Class 20.

We understand that the firm known as Mr. W. W. Darlow, Midland Road, Bedford, has changed its style to Darlow, Ltd., the Company having a capital of £5,000, in £5 shares. There was no initial public issue.

Messrs. Kynoch Ltd., have registered the device of a shield bearing the words "Kynoch, Limited," and three cartridges formed to represent the letter "K," for arms, ammunition, and stores included in Class 19.

In the new U. M. C. catalogue of sporting and metallic cartridge cases, particulars are given of special loads used in shot guns for trap-shooting contests by some of the leading exponents of that specialised form of sport.

Messrs. L. Le Persoone & Co. inform us that they are the sole agents in this country for the supply of actions fitted with the Bittiner single-trigger mechanism, which was described in the Patents column of our last issue.

The clay-bird shooting meeting held in Birmingham on the 14th ult., as a memorial to the late Mr. E. C. Tye, produced a net profit of £35, which it is hoped will be raised to £50 as a result of the further meeting due on the 12th inst.

The device of a stork, and the word "Stork" underneath, has been registered for arms, ammunition, and stores included in Class 19, and for explosive substances in Class 20, by Mr. Douglas Vaughan Johnstone and Messrs. F. Joyce & Co., Ltd.

The Defiance Machine Works, of Defiance, Ohio, U.S.A., have recently opened London premises at 71, Queen Street, E.C., and we notice that they make a very effective window display of their specialities, including gun stocks cut out by their machines.

Messrs. Bentley and Playfair, of Birmingham and London, have produced an excellently illustrated price list, showing the various classes of guns, parts, and accessories which they supply at wholesale prices to the trade. The firm makes a speciality of repairs.

Gunmakers who cater for Bisley competitors will do well to take careful note of the view marks described on pp. 97 to 100 of this year's programme, as it is evident that it is intended

to enforce the rule that all service rifle competitions shall be exclusively confined to Government viewed weapons.

The Chamberlain Cartridge and Target Co., of Cleveland, Ohio, are the introducers of a hand clay-bird flinger, known as the "Ping Pong Trap." They are also interested in a single-trigger mechanism, by name "Fulford's," which they will be prepared to supply in quantities by September next.

Captain J. H. Thomson, H.M. Chief Inspector of Explosives, has issued his report on the accident in the drying house of the Blenheim Engineering Co., Ltd., which he attributes to abnormal sensitiveness of the chlorate of potash in the Very and rocket stars, of which stock was being taken at the time.

Those who have reason to use the Great Eastern Railway cannot fail to notice the magnificent range of new buildings that are approaching completion at Messrs. Eley's Angel Road factory. It is said that no expense is being spared that will make it one of the best equipped ammunition factories in the world.

Messrs. Eley Bros., Ltd., have issued as show cards for office desks two coloured photographic reproductions in green frames of their well-known show cases of rifle and shot-gun ammunition, which are quite artistic, besides being realistic representations of the ammunition they are intended to illustrate.

Extensive alterations are being made in the testing department of the Remington Arm Company's works at Ilion, N.Y. In future the department will be equipped with all the modern facilities for determining the accuracy and power of rifles, revolvers, pistols, and the pattern of shot guns at the usual trial distances.

The will of the late Mr. Thomas Bentley, gunmaker, of Birmingham, has been proved at £49,724 gross, the nett personality being £48,151. After allotting £1,000 for charitable bequests, the remainder of the estate is divided among the family, his son Mr. T. C. Bentley and two daughters being the beneficiaries.

Messrs. F. Joyce and Co., Ltd., have forwarded for our inspection a copy of their catalogue of ammunition and accessories for the coming season, and we are happy to congratulate them upon the clearness with which they have presented the mass of detailed information rendered necessary by the nature of their business.

Mr. Ernest J. Vickers has ceased to act for Messrs. Eley as officer in charge of their proofs and testing. He has six years experience in this important work to his record, and in addition 14 with the Chilworth Company, so that there can be little doubt that his highly practical experience will soon enable him to find congenial employment.

We are informed that Messrs. William Ainslie and Bros., Ltd., of Durham, are retiring from the explosives business, and have, therefore, given up the agency they have held on behalf of the National Explosives Co., Ltd., in that district. The National Explosives Co., Ltd., are now represented in Durham by Mr. Winfred Raine, Inglewild, Pity Me, Durham.

The Webley and Scott Revolver and Arms Co., Ltd., have recently received a new order from the Government for the supply of Mark IV. service revolvers, which will keep them busy on that class of work until March, 1903. During the past 12 years the Company have made upwards of 100,000 revolvers for the Government, from Mark I onwards.

Quebec, Canada, has, according to the *Sporting Goods Dealer*, been selected as the location for Sir Charles Ross's small-arms factory, which will be established on a scale calculated to give regular employment to 300 hands. The Dominion Government agrees to purchase all of the Ross rifles produced, and has signed a preliminary contract for its requirements.

The National Rifle Association have decided to enter a team of eight marksmen, representing Great Britain and Ireland, for the International Match for the Palma Centennial Trophy, to be shot for this year at the Canadian Dominion Rifle Meeting in the last week in August. Major the Hon. T. F. Freemantle, 1st Bucks. Rifles, has been appointed captain of the British team.

The Hazard Powder Co., of New York, have announced their willingness to post free to any applicant two paper targets with 30, 24 and 12-inch circles, divided into sections for the more convenient counting of pellets, so that all may know the shooting given by any combination of gun cartridge. The idea is not new, but it has not to our knowledge been used on this side of the water.

The Browning Bros. Company have sent us all the way from Ogden, Utah, their comprehensive retail catalogue of arms, ammunition, and general sporting requisites. The concern has its special interest due to the fact that a member of the firm is responsible for the automatic pistol bearing the same name, and of which the Colt and Francotte Companies have acquired exclusive rights.

The Marlin Fire-arms Co., of New Haven, Connecticut, U.S.A., have favoured most of the English sporting and technical press with a long letter, with option to publish it, in which they inform all and sundry that they have adopted a high velocity cartridge with nickel jacketed bullet for use in their rifles. The breathless excitement with which this announcement has been received can only be appreciated to the full when it is realised that this type of cartridge has been in regular use among British sportsmen for many years.

## NOTES.

303 AMMUNITION.—When so much rifle ammunition is in use for practice at the butts, it may be interesting to refer to a few of the conditions that distinguish between what is good and what is inferior. A long treatise might be written explaining the conditions that have to be met in the production of a first-class military rifle cartridge. The brass must be uniform in texture, properly drawn to the required size, so as to be free from all creases, cracks or other flaws, and it must at the same time be strictly true to gauge in every particular. The cordite which it contains must be true to the Government specification, which includes a test for ballistics and stability. The charge measured off must be of a high degree of exactitude, and the cap must be of the required sensitiveness, both as regards the hardness and thickness of its metal, and the quality and chemical correctness of the priming composition. The bullet is of course the completing feature of the entire cartridge, and a great deal of care must be exercised in its manufacture. The chief point of quality rests with the nickel jacket, which must be a homogeneous mixture of copper and nickel, and in the correct physical condition as regards hardness, ductility and general freedom from flaws. The shape of the bullet must of course exactly correspond to the dimensions laid down, so that it shall make an accurate fit with the lead and the rifling.

In order to carry out the above programme, which appears to be very simple on the face of it, a vast number of mechanical and chemical precautions must be taken in the course of manufacture. Probably one of the most urgent of the manufacturing processes connected with the cartridge case is the care that must be taken in the annealing processes that alternate with the gradual drawing out of the brass disc by successive stages that ultimately result in the finished case. If, by any chance, the annealing is carried on at too high a temperature, or conversely if the heat is not sufficient to soften the metal, the resulting cartridge case is liable to be defective. Similarly the drawing out processes that are carried out subsequently to the last annealing must be such

as will harden up the brass to the required amount for the finished case.

**DYNAMITE IN THE TRANSVAAL.**—It is now a matter of years since we dismissed the dynamite question in the Transvaal, and awaited the arbitrament of war as to the disputes with the then Transvaal Government, of which the dynamite question was only one. With the settlement of the war and the resumption of normal trade activity the question of dynamite supplies has once more come to the front. As a matter of fact, the future of dynamite seems to have settled itself in a peaceful way without stirring up active ill-feeling between the various conflicting interests. The arrangements for the future seem to be of a fairly simple and comprehensive character. There is every reason to believe that the very Dutch name of the monopoly company will shortly give place to a very simple and obvious English translation implying the same thing. That is to say, the South African Explosives Company will become as British as the territory in which it has its home. The staff is gradually acquiring a British, not to say a Scottish, preponderance, and the national principle of free trade will largely apply to its methods of business. Every effort will be made by efficiency of methods to establish a virtual monopoly of trade, in place of the legally ratified one which previously existed. There will be plenty of competition, but then Messrs. Nobel, who will take over the working of the concern, know full well how to study their customers in a manner that causes their customers to support them in return. There is certainly a trouble in regard to the large capital with which the Company is saddled, but against this it must be remembered that the Transvaal represents one of the finest mining centres in the world, and it is such a magnificent country that its management under the new *régime* will account for an unprecedented activity that can hardly be over-estimated. Altogether the dynamite question in the Transvaal promises to settle itself in the most practical way possible; that is, free trade and free competition, all trying by careful study of local conditions to make the most possible out of the opportunities that arise. Some years ago the opinion was expressed that it was inappropriate to manufacture explosives in climates such as that which prevails in these southern latitudes, but the decision, some years ago, of the De Beers Company to equip an immense factory, calculated to enter into competition for the Transvaal trade as well as that of Cape Colony, is evidence from an independent quarter that the conditions are not so unfavourable as many would like to make them out to be.

**DETONATORS.**—Mr. H. Bigg-Wither recently read a paper before the Institution of Mining Engineers on the subject of "Detonators," in the course of which he gave the results of some practical experiments made with detonators of different strengths and conditions. As is well known, since August, 1897, when H.M. Inspectors of Explosives drew attention to the insufficient strength of many detonators then in use, the standard charge has consisted of at least 80 per cent. of fulminate of mercury, and 20 per cent. of chlorate of potash, and Mr. Bigg-Wither's researches have been carried out with specimens varying from that minimum to 95 per cent. of fulminate of mercury and 5 per cent. of chlorate of potash. He found that the absorption of moisture is a quite sufficient cause for the failure of detonators as regards their explosive effects, the tests being conducted by exploding them against

leaden plates, which recorded, with almost photographic exactness, the behaviour of the various batches of detonators. He mentioned that Mr. W. J. Orsman had experimented as to the absorption of moisture as conveyed by damp sawdust, which is often used by contractors' men as packing for detonators in course of transit from store to works, and found that a 40 hours' exposure to damp sawdust was enough to cause absolute failure on the part of the detonators to explode the charge. Mr. Bigg-Wither, therefore, pointed out that it is useless for the manufacturer to take elaborate precautions to ensure delivery of an explosive in perfect condition, if the mine officials do not take proper measures to ensure dry storage and use within reasonable limits of time.

**AN ARTISTIC SHOW-CARD.**—Messrs. Nobel's Explosives Co., Ltd., have brought out a new show-card which is so artistic that we make no scruple in reproducing a portion of it in the accompanying illustration as a example of what be done in the way of wedding high art to stern commerce. The card



itself measures  $23\frac{1}{2}$  by  $18\frac{1}{4}$  in., and the portion selected for reproduction occupies the major part of the area, so that the picture of the grouse wounded in mid air is well-nigh life-size, and in the original is very accurately coloured, while the actual drawing of the subject is distinctly spirited. At one time, the idea of a show-card's or poster's functions was that it should attract attention by any method, preferably by a conglomeration of glaring colours and violent contrasts. That was the age of the bludgeon and of shock tactics. Nowadays, it is recognised that the tickling of a feather, a grouse's feather for choice, applied to the artistic sense of the person to be attracted, will equally arrest attention, and this change of policy, of which the show-card in question is an apt example, certainly adds to the pleasure of existence. Messrs. Nobels deserve an increased sale for Ballistite and their new Imperial, if for no better reason than the adoption of this choice style of advertisement.

**INFRINGEMENT OF THE EXPLOSIVES ACT.**—Messrs. Kynoch, Ltd., were summoned at Arklow Petty Sessions, on June 12th, at the instance of Captain Lloyd,

H.M. Inspector of Explosives, for having stored, in April last, a greater quantity of explosives in two of their magazines at Arklow than the law allowed under the licence. The excess amounted altogether to 23,000 lbs., and consisted of Cordite which had been returned from Woolwich by the War Office. For the defence there was no contradiction as regards facts, but a plea was entered of confession and avoidance. It was shown that the War Office had refused to accept delivery of 50 tons of Cordite, and the explosive had been gradually removed to the Company's storage in Essex and at Arklow, where it was disposed of as rapidly as possible. H.M. Inspector of Explosives did not press for the extreme fine from day to day during the existence of the infringement, nor for the forfeiture of the excess amount, which was valued at £2,350, and accordingly the magistrates inflicted a penalty of £50, but refused to order the forfeiture of the ten tons of Cordite in question, and also refused costs.

KYNOCH, LD.—According to the report of the directors of this company, there was a net profit on the year's trading up to March 31st, 1902, of £100,065, to which must be added the balance, £23,510, brought forward, which gives a total of £123,575 available for distribution. Of this total part had already been allocated in December last to the payment of an interim dividend of 2½ per cent. on the preference shares, and the directors now recommend that a final dividend of 2½ per cent. be paid on the preference shares, making 5 per cent. for the year, and that a dividend of 10 per cent. be paid on the ordinary shares. The directors' fees absorb £5,000, and there remains a balance of £61,650 to carry forward to next year's account. In addition to the usual extensions and developments, the following new properties have been acquired by the company during the year under review:—Hadley & Short-house, Ltd.; the Kynoch Estate Co., Ltd.; Accles, Ltd. (in liquidation); and the Inchicore Paper Mills, near Dublin. These four involved the issue of 19,169 fully-paid £10 preference shares, thus increasing the preference capital of the company to £486,690, leaving 1,331 preference shares unallotted. Of course, these companies have been too recently acquired to add to the year's profits. The property and plant of the company is now valued at £818,471, and the reserve fund stands at £107,725.

NOBEL DYNAMITE TRUST CO., LD.—The net profit of this company, according to the directors' report presented at the sixteenth ordinary general meeting, amounted to £205,544 for the 12 months ending April 30th last, to which must be added £3,359 brought forward, there thus being a total of £208,904 available for distribution. Of this, the directors recommended that £205,686 be allocated to the payment of a dividend at the rate of 9 per cent. per annum, leaving £3,218 to be carried forward. The net profit is lower than in any year since 1894-5, and the dividend to be declared is less than since 1891-2. This falling-off is undoubtedly to be traced to the effect produced by the recent war in South Africa on the various subsidiary companies, and now that peace is established there should shortly be a distinct upward movement. On the motion of the chairman, Col. J. L. du Plat Taylor, a resolution was passed at the meeting authorising the directors to issue the whole or any part of the 71,460 new shares still unissued, as preference shares, thereby

conferring on the holders the right to a fixed cumulative preference dividend at the rate of 5 per cent. per annum on the paid-up value at any period.

DUTY ON ALCOHOL.—Acting on behalf of the Explosives Committee, whose operations seem to be hampered by the existence of the duty on pure alcohol, Mr. Haldane moved for the insertion of a clause in the Finance Bill giving power to the Excise authorities to permit the use of duty-free undenatured spirit in certain industries, and of spirit denatured according to the purpose for which it is required in other industries. In consideration of the indispensable use of alcohol as a solvent in the preparation of nitro-cellulose and similar products, an amendment in the present law of the nature indicated would have the effect of placing this country on a level with her competitors in the explosives industry, and of stimulating and facilitating research, thereby improving the condition and fostering the development of all industries. It is, therefore, satisfactory to note that the Chancellor of the Exchequer approved of the insertion of the clause in question, and he hoped that, on further inquiry, it might also be possible to remove the duties on sulphuric ether, acetic ether, and other re-agents which were of the greatest importance in the arts and manufactures of this country.

## MATCH RIFLE SHOOTING.

At a time when all kinds of game shooting is suspended in the interests of a renewal of stock, a certain proportion of our shooting men take up sport with the rifle as a congenial form of enjoyment for the summer months. On the range they have all the advantages of a fine open stretch of country, the very fact of shooting forcing them to study the sky and the elements, so that with a form of sport which has many attractions of its own there is the incidental advantage of an open-air existence at a time when our climate is inclined to be at its best. A day at the seaside involves all kinds of inconveniences, so that the few hours actually spent by the rolling waters are apt to pale into insignificance and disappointment by the side of the irritating experiences of getting there. A day in the country is likewise frequently associated with a number of other minor disadvantages, such as are nothing much in themselves, but still interfere with the whole-hearted enjoyment of a few hours taken from business life.

In the country again one has not always the advantage of a definite occupation. The mere fact of walking is liable to lose its invigorating freshness as fatigue takes possession of the system. Few among town-dwellers are naturalists enough to be able to fill up a few hours by botanical or entomological studies in the open. Geology and all the other open-air sciences have been studied by very few of us, and yet there is probably no one who does not feel some kind of affinity for nature which finds its most congenial expression when there is some form of light occupation, such as will allow the impressions gained in the presence of a sun-clad atmosphere to flow quietly into the mind. All the poets and writers who have written about fishing have spoken of it as the contemplative man's amusement, in so far that while the mind is mildly cogitating upon the possibilities of fetching a fish out of

a given hole in the river, the whole system is in reality mainly occupied in subconsciously absorbing the beautiful scenes that lie displayed around. Very much the same emotions appeal to the shooting man, but, as a rule, the season for killing game is one at which nature is not seen at its best, while, in addition to that, the pace is faster, so that a certain degree of excitement is created that interferes with the natural processes of the mind.

Now, with rifle shooting all these things are different. The time taken between the shots affords plentiful opportunity for drinking in the sounds that fill the air, and for absorbing all the other impressions that come from lying in a space of open country, with sufficient occupation for the mind to disperse *ennui* and at the same time enable all matters of business to be temporarily shelved. It must certainly be due to some such cause as this that many persons who have wealth sufficient to command every kind of amusement select from among the things available a life in the country, where they can indulge in one form and another the love of shooting at a target. Year by year they try fresh rifles, new ammunition, and sundry variations of sighting, always endeavouring to produce a mechanically perfect result on the target. Against them are the physical disabilities of an unsteady body, and an atmosphere whose every mood represents the need for some fresh adjustment or allowance, and yet they get their pleasure in the strife for an ideal. It is very difficult to express in writing the exact sensation that makes match rifle shooting so pleasant an amusement. The mere physical existence that is incidental to following it must necessarily account for a great portion of the charm, but its real virtue must be ascribed to the particular kind of mind occupation that has such a fine frame-work in the way of open-air surroundings. The study of each flicker of wind, the bearing in mind of one's past experience as to bulls and outers when similar conditions existed, and the introduction into each shot of such theoretical knowledge of the rifle as has been acquired over a period of years, all conduce to make the time pass unnoticed. At the end of so many hours the shooting is over, and there is no particular impression on the mind beyond one of complete absence of disquiet, in other words, thoroughly keen enjoyment. It is this which is open to every town-dweller or other worker, who takes his pleasure by practice at the ranges for so many hours per week.

By the help of these influences club rifle shooting promises to become more than a mere patriotic effort on the part of carpenters and bricklayers to take their place in the system of our national defence. The sixty or seventy individuals who represent the true match rifle shots of the country—that is, the rich gentlemen who specialize in long-range shooting with elaborate methods of sighting—are admittedly a very limited class; but, on the other hand, we do not admit their right to a monopoly of the term which we have selected as a heading for this article. Every man who aims at bettering his knowledge of the rifle, and who keeps a careful record of his performances, is, in our opinion, a match rifle shot. Bisley definitions may disagree with our own statement of the case; but our justification is that we have used the term in a generic sense, and thereby include the large and ever-increasing class who endeavour by every means in their power to cultivate personal relations with their rifle, whether it be in shooting over one hundred yards or over a thousand. The small ranges which have been erected all over the country bring the advantages

of an afternoon's shooting in the open air within reach of a large proportion of our populace which has hitherto been denied such enjoyment; and there is plentiful evidence that the peculiarly enjoyable conditions of rifle shooting in the open air, during the weather that favours us at about this time of the year, appeal to a much larger class than the frequenters of the go butt at Bisley, and the crack marksmen of the various corps of volunteers.

The humble individual unattached to any military organisation can now find enjoyment of a kind that has hitherto been available only upon expending a disproportionate sum out of pocket. In taking his pleasure at the range he is incidentally doing his country a vast amount of good. It might be argued that many of the persons who engage in club shooting are never likely to be called upon for service, but, on the other hand, it must be remembered that many of them are the fathers of families, and in other ways able to convey to a generation not yet in its teens an appreciation of rifle shooting sufficient to promote an early introduction to its practical exponents. The pale-faced city clerk would have been physically as capable as anybody else of utilising his youth in the pursuit of field sports, and his intervals of leisure would have amply sufficed for acquiring a passable degree of skill; but with a lack of opportunity there are no such accomplishments to show as a proof that leisure hours of youth and middle age have been wisely and appropriately spent. With match rifle shooting on the club system there is every possibility of creating facilities for the acquisition of skill in something more important than a mere game that has a great deal to recommend it on national grounds, at the same time that it opens up a means of recreation which will appeal to many who have hitherto found something wanting in the available means for employing a half-holiday. As a result of this brief consideration of our subject we come to the conclusion that match rifle shooting is likely to occupy a very important position in the future. The system of club working has enabled it to acquire a definite and practical form, so that while, ten years ago, it was almost impossible for the ordinary person to let off a shot, except surreptitiously in his back garden to the danger and annoyance of his neighbours, at the present time the facilities are so far increased that a very large number of persons can shoot to their heart's content, though of course it will be some time before the proportion becomes anything like a practical one in relation with the able-bodied members of the race. Meanwhile, however, we must take comfort in the fact that those who really possess the instincts of the shooter will find far less difficulty than in the past in attaining the summit of their desires.

## APPLICATIONS FOR PATENTS.

MAY 20—JUNE 21, 1902.

- 11,504.\* Range Finders. J. Neilson.
- 11,675.\* Cartridge Cases. The Miner's Safety Explosive Co., Ltd., and W. Levett.
- 11,697.\* Gun for firing Signal Rockets. E. Finke.
- 11,739. Machine Gun. W. H. Fitzgerald.
- 11,741.\* Cartridge Loading Machine. T. and W. H. Nichol (Date applied for in U. S. A. October 10, 1901)
- 11,889.\* Electric Mine Firer. W. Norres.
- 11,922. Sight Corrector. G. Hilhouse.
- 12,043. Breech Mechanism for Ordnance. H. McGloin.
- 12,098. Range Finder. C. A. Trotter.
- 12,119. Targets. H. W. Smith-Rewse.

- 12,180. Rifle Back Sight. A. H. Silver and A. Butterworth.  
 12,228 Gun Rest. C. Dixon and W. Lightwood  
 12,249. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 12,317. Quick-Firing Guns, The Hotchkiss Ordnance Co., Ltd. (Agents for *L. V. Benét and H. A. Meriç*).  
 12,433.\* Ordnance. C. D. Abel (Agent for *Rheinische Metalwaren und Maschinenfabrik*).  
 12,437.\* Ordnance. C. D. Abel (Agent for *Rheinische Metalwaren und Maschinenfabrik*).  
 12,467. Sighting of Ordnance. A. T. Dawson and L. Silverman.  
 12,555.\* Ammunition Shell. C. D. Abel (Agent for *Rheinische Metalwaren und Maschinenfabrik*).  
 12,591. Projectile Fuse. G. E. Fiedler.  
 12,658. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 12,677.\* Single-Trigger Mechanism. E. D. Fulford.  
 12,696.\* Small Arms. R. M. Basilone.  
 12,728. Rifle Ranges. J. MacNaughton.  
 12,760.\* Projectile Fuse. C. M. Broderick. (Date applied for in U. S. A., June 19, 1901).  
 12,799.\* Automatic Small Arms. T. C. Johnson. (Date applied for in U. S. A., September 16, 1901.)  
 12,804. Gun Barrel Straightener. The Birmingham Small Arms Co., Ltd., A. H. M. Driver, and G. Norman.  
 12,860.\* Projectiles. J. B. Semple.  
 12,972.\* Cartridge Boxes. G. Migliandi. (Date applied for in U. S. A., December 9, 1901).  
 13,044. Projectiles. E. R. Calthorp.  
 13,065. Torpedo Propulsion. F. W. Dodd.  
 13,073. Small Arms. J. B. Thorneycroft.  
 13,111. Explosives. J. M. Az.  
 13,337. Ordnance. A. Reichwald (Agent for *Fried. Krupp*).  
 13,348. Detonators. F. M. Hale and G. W. Bell.  
 13,415. Miniature Rifle Range. G. E. Goddard.  
 13,431. Shooting Practice. S. M. Edmund.  
 13,479. Loader for Revolvers. The Webley & Scott Revolver and Arms Co., Ltd., and W. J. Whiting.  
 13,514. Sights for Small Arms. A. A. Common.  
 13,714. Automatic Rifles. T. R. R. Ashton.  
 13,756. Single-Trigger Mechanism. H. W. Holland and T. Woodward.  
 13,758.\* Powder Granulating Machine. P. A. Newton (Agent for the *Lafin and Rand Powder Co.*)  
 13,845. Detonators. F. Hess.  
 13,864. Projectiles. C. C. Atha.  
 14,010. Sporting Cartridges. T. Page-Wood.  
 14,038. Ordnance. E. J. J. Britton (Agent for *W. E. Donohue*).  
 \* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

MAY 29TH—JUNE 19TH, 1902.

COMPILED BY H. TARRANT.

- 3,172 (1901). **Range Finders.** A. Barr, Glasgow, and W. Stroud, Leeds. Improvements in single observer range-finders of the same general type as those described in previous patents, No. 9,520, 1888, and 13,507, 1893. The improvements consist in providing new optical arrangements designed to eliminate inaccuracies, due either to the bending of the frame in which the optical parts are mounted, or to movement of the optical parts relative to the frame or tube. Accepted May 14, 1902.  
 7,952\* (1901). **Automatic Rifle Mechanism.** J. Schouboe, Denmark.  
 11,003 (1901). **Mine Firing Apparatus.** Dr. G. F. R. Blockmann, and C. E. Bishel, Germany. An electric ray telegraph apparatus, which may be adjusted for firing mines at a distance, without affecting others in the vicinity. The apparatus consists of several chambers, each of which is fitted with a generator from which the electric rays are emitted, to be transmitted in a definite direction by adjustable lense-shaped bodies made of resin or wax. Accepted May 8, 1902.  
 11,558 (1901). **Inanimate Birds.** D. Haines, J. F. Pike and C. W. Pike, Birmingham. In order that broken clay birds shall not lie upon the surface of a field for any length of time, the patentees construct a bird composed of a mixture of resin-gum and fertilizing materials, so proportioned as to set hard when dry, but to crumble away by exposure to the atmosphere. Accepted May 29, 1902.  
 11,962 (1901). **Cartridge Adapter.** T. J. Jones, Chelsea. This invention consists of a tubular bushing adapted to be held tightly in the chamber of a rifle. The interior of the bushing is chambered to take a miniature cartridge. A flange projecting from the ordinary rifle extractor serves to extract the miniature cartridge from the bushing. Accepted May 15, 1902.  
 12,643 (1901). **Breech Mechanism for Ordnance.** J. E. Bousfield (Agent for *P. Nordenfelt and F. Ternström, France*). A breech block for ordnance, which is formed longitudinally with a series of steps, each of which steps is formed with screw-threaded segments of different radii. The breech is formed in a corresponding manner, so that when the block is inserted each segment will enter a part of the breech of slightly greater radius, and will, by a partial rotation, be caused to engage with the corresponding threads of the same radius. Accepted May 8, 1902.  
 12,700 (1901). **Automatic Guns.** A. Vickers, and Vickers, Sons and Maxim, Ltd., London. A method of so improving the construction of the feed block in automatic guns as to enable all its parts to be detached or assembled by the aid of the fingers alone. The lifting levers in the lock are also constructed to act in conjunction with stops for limiting the extent of the downward movement of the cartridge carrier. Accepted May 8, 1902.  
 12,757 (1901). **Military Rifle Carriers.** G. B. Gabbitass, Conisborough. A method of enabling a rifle to be carried in a bucket without having to be held in position by the hand or arm of the rider. A broad band runs up from the bucket to the saddle. At the top of the band a clip is fixed to take and hold the barrel of the rifle. Accepted May 29, 1902.  
 12,784 (1901). **Ordnance.** A. T. Dawson, London, and J. Horne, Barrow-in-Furness. This specification deals with mountings by which four guns are arranged in two superposed pairs on two platforms of a turntable, within a barbette wall. The guns are adapted to be elevated all together, one with another, or each individually. Below the turntable a chamber is constructed, wherein are hoists for supplying ammunition to the two gun platforms. Accepted May 29, 1902.  
 13,026 (1901). **Metal Cartridge Cases.** J. Y. Johnson (Agent for *R. W. Scott, U.S.A.*). This patent relates to metallic cartridge cases of that type in which the neck is of smaller diameter than the powder chamber. In order to prevent weakness at the neck, caused by compression to obtain the smaller diameter, two drawn sheet metal tubes, one forming the neck, and the other the powder chamber, are fitted together and securely fixed one to the other. Accepted May 15, 1902.  
 13,027 (1901). **Multi-shot Rifles.** J. Y. Johnson (Agent for *R. W. Scott, U.S.A.*). In the neck of a cartridge case, elongated for the purpose, a number of projectiles are placed one in front of the other. Between each is either a barrier of elastic fluid or a layer of explosive material. The explosive charges between the projectiles are fired as the main charge moves the projectiles up the barrel. Accepted May 15, 1902.  
 13,094 (1901). **Cartridge Belts.** P. A. Martin, Birmingham. A belt so constructed that no matter what may be the size of the wearer's waist, the adjustment of the belt does not alter the position of the cartridge-containing pouches in relation to the hips. The belt is constructed in three parts—a back piece, which lies across the wearer's back, and two adjustable side pieces, which carry the cartridge pouches. Accepted May 22, 1902.  
 13,235 (1901). **Magazines for Rifles.** H. W. Holland, London. A cartridge magazine for rifles, in which the lever arm used for raising or lowering the cartridge-lifting platform turns on a pin at the bottom of the front end of the magazine box. An extension of the arm passes through a slot at that point in a downwardly inclined direction, so that the platform may be lowered to the bottom of the magazine box, and the cartridges dropped in. Accepted May 29, 1902.  
 13,345\* (1901). **Sights for Rifles.** E. H. Parsons and L. B. Taylor, Birmingham.  
 14,092 (1901). **Loading Apparatus for Guns.** F. Bacon, Earlstone. Feed mechanism for shot guns, consisting of two laterally swinging cartridge carriers, which are so arranged that when the barrels are turned down to open the breech the carriers are liberated, and, after the ejection of the spent cartridges, are turned over and are caused to drop the cartridges they contain into the chambers. Accepted May 22, 1902.



- 14,370 (1901). **Projectiles.** C. McKay, Wandsworth. In order to increase the range of a gun a projectile of smaller bore than the gun is discharged by the standard amount of explosive. The projectile is imbedded in the front of a piece of wood, which takes the rifling, and is left behind when the two reach the air. Accepted May 29, 1902.
- 14,476 (1901). **Rammers for Ordnance.** A. Riechwald (Agent for *Fried. Krupp, Germany*). This patent relates to the provision of a valve gear for rammers, which enables the cartridge to be rammed automatically at a lower rate of speed and with a shorter stroke than that employed to ram in the projectile. The improvement relates to rammers operated by air or liquids under pressure, such as are employed to ram divided ammunition. Accepted May 8, 1902.
- 14,792 (1901). **Gun Carriages.** A. Reichwald (Agent for *Fried. Krupp, Germany*). A method of constructing the axle seats of wheeled gun carriages, such as are used for field guns, in such a manner as to enable the seats to be utilised as shields. Each seat consists of plates hinged together, which may be locked either in a position to form seats or in an extended position to form a shield. Accepted May 15, 1902.
- 14,805 (1901). **Firing Mechanism for Ordnance.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and Sir A. Noble, Newcastle-on-Tyne. Improvements in firing mechanism for ordnance, in which the breech block is mounted on a carrier at the end of an arm, which at its opposite end is pivoted at one side of the gun, as described in Patent No. 9,989, 1892. The mechanism is self-cocking, and a sliding bolt prevents the firing lever being turned unless the breech is closed. Accepted May 29, 1902.
- 15,123 (1901). **Gun Carriages.** A. Reichwald (Agent for *Fried. Krupp, Germany*). This patent relates to the construction of wheeled ordnance of the type upon which the gun barrel recoils. By means of a special intermediate slide, the length of which so much exceeds that of the gun barrel that the slide covers the whole race of the cradle, a long recoil is provided for, and the race is protected from injury. Accepted May 15, 1902.
- 15,672 (1901). **Breech Mechanism for Ordnance.** A. T. Dawson and G. T. Buckham, London. Improvement in the mechanism for opening and closing the breech of ordnance, such as is described in Patent No. 19,026, 1895, consisting in an improved method of mounting the hand lever. The cartridge extractor is so arranged in combination with the carrier hinge that it operates first to prize the cartridge from the chamber and then to strike and eject it. Accepted May 29, 1902.
- 16,048 (1901). **Recoil Brakes for Ordnance.** A. Reichwald (Agent for *Fried. Krupp, Germany*). A recoil brake for wheeled ordnance with a long-barrel recoil, in which a helical return spring is so arranged that whilst not being longer than the gun itself, it affords sufficient space between its coils to allow of its being compressed when the gun is fired at least to an amount equal to 12 times the calibre of the barrel. Accepted May 29, 1902.
- 25,762 (1901). **Cartridge Clips.** F. R. von Mannlicher, Austria. Improvements in cartridge clips, in which the cartridges are not held by a spring acting upon their bottoms, but in which the two end cartridges are held fast by an elastic grip acting upon the rear of the clip. The improvements consist in the provision of a spring at the back of the clip, in an extension of this spring for facilitating emptying of the clip, and in a device for preventing overbending or breaking of the spring. Accepted May 15th, 1902.
- 346 (1902). **Rifle-carrying Clip.** T. N. Harwood, Hounslow, and T. S. Rose, Uxbridge. By means of a curved D-shaped groove and a movable piece of metal, a clip is constructed in which the rifle barrel is inserted. The heavier the rifle, the more the grip of the clip increases. Accepted May 29, 1902.
- 5,592 (1902). **Self-Registering Target.** W. G. Williams, and H. H. Edwards, Australia. An electric self-registering target, the face of which is constructed of concentric rings arranged one behind the other, each ring overlapping the edge of the successive one. The rings are composed of segmental parts, each alternate segment overlapping the adjacent one. By this method of construction joints and their disadvantages are avoided. Accepted May 29, 1902.
- 5,748 (1902). **Sights for Rifles.** C. Bolté (Agent for *H. Schlaegel, Germany*). A method of electrically illuminating a bead sight to provide for easy aiming in the dark, without the position of the shooter whilst aiming being betrayed. The light is arranged to be switched on by the forward hand, and is so capped that the illumination is shut off both from the enemy

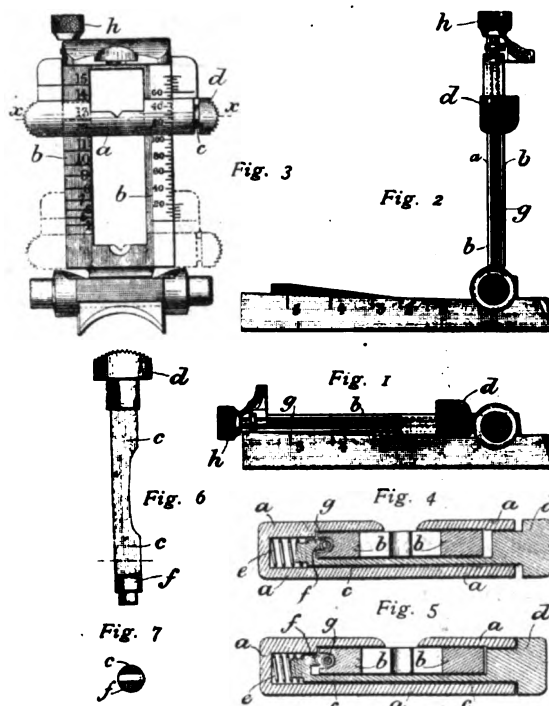
- as well as from the shooter, a small light only being directed upon the bead. Accepted May 15, 1902.
- 6,426 (1902). **Gun Carriages.** J. E. Bousfield (Agent for *P. Nordenfelt and E. Ternström, France*). A method of allowing a relatively long recoil of short guns with respect to the carriage where the gun is provided with hydraulic checking mechanism. The gun is properly supported and guided in its long recoil by a slide which is movable both with relation to the gun and with respect to the cradle, so that the overhanging part of the gun is supported both by the slide and by the cradle. Accepted May 22, 1902.
- 8,776 (1902). **Explosives.** C. Duttonhofer, Germany. A method of producing an explosive consisting in gelatinising nitrocellulose by the aid of ether-alcohol, acetone, or other solvent. The gelatinised mass is made into shapes, which are put into hot water. The rapid volatilisation due to the heat causes the shaped masses to be blown out in the form of bubbles, which are cut up into any desired length of strip. Accepted May 29, 1902.

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

## SELECTED PATENTS.

### SIGHTS FOR RIFLES.

13,345 (1901). E. H. Parsons and L. B. Taylor, Birmingham. The backsight for rifles described in this specification is so designed that a quick, and at the same time a fine, adjustment of the cross-



bar is easily obtained. The fine adjustment is obtained by means of a screw which is arranged within the side of the leaf in order to prevent a chance blow damaging it, and so rendering the sight inoperative.

Referring to the accompanying illustrations, the cross-bar *a* works up and down the hinged leaf *b*, and is capable of adjustment to any required height. Working through the cross-bar is a part *c*, which terminates at its exposed end in a milled head *d*, shown clearly in the sections (Figs. 4 and 5), across *x-x* (Fig. 3). The spring *e* (Figs. 4 and 5) is so arranged as to tend always to force the part *c* outwards until the screw-threaded inner surface of the head *f* is brought up against the screw *g* running through the side of the leaf *b*. The screw *g* is capable only of a rotary motion, so that when it is turned through

the medium of its exposed milled head *h*, the engagement of the screw threads upon the head *f* with the threads on the screw *g* cause the leaf to be either raised or lowered according to the direction in which the screw is turned. When the part *c* is pressed inwards against the resistance of the spring *e* the two screw-threaded surfaces are disengaged, and the leaf may be raised or lowered with the ease and despatch of the ordinary military sight. On the release of the slide *a* at about the position on the leaf required, the screw-threaded surfaces are again brought into contact, and the final and fine adjustment is easily obtained by turning the screw head *h*. Accepted May 15, 1902.

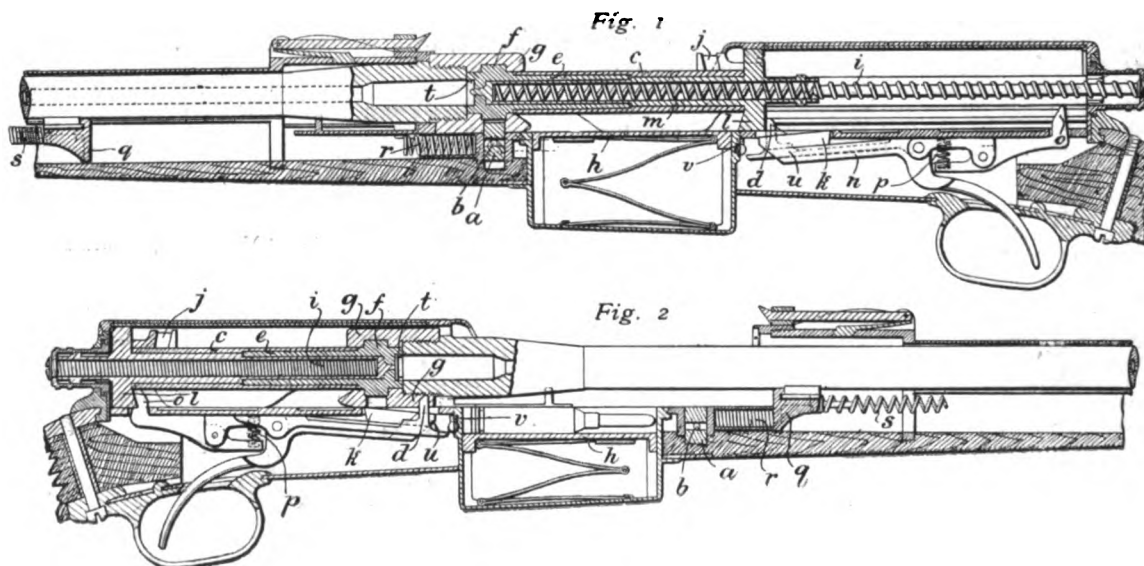
#### AUTOMATIC RIFLE MECHANISM.

7,952 (1901). J. Schouboe, Denmark. This specification contains a description of rifle mechanism which is automatically actuated in the extracting of the empty shell and the introduction of a fresh cartridge into the barrel by the energy of recoil. By means of a locking part the rifle may be used as an ordinary single loader.

The action of the rifle, so far as it is understood from the description in the patent specification, is as follows:—In Fig. 1 the parts are illustrated in the positions they occupy immediately after

breech head and handle piece have been drawn back sufficiently far the spring-lifted cartridge platform *h* is lifted into the open breech, and prevents the spring *t* forcing the breech parts forward. A clip containing a loading of cartridges is introduced into the slot *j*, and the cartridges are pressed down into the magazine. The empty clip is removed with a jerk, and the breech parts fly forward, taking a cartridge into the chamber of the barrel during their travel. The breech is locked through the engagement of the projections upon the inside of the handle piece and the spiral grooves upon the breech head, as described in the unlocking operation. When the trigger is pulled the sear *k* is removed from the nose of the part *l* attached to the guiding piece *m*. At the same time a lug on the trigger arm *n* causes the projection *d* to be lowered, so that the backward travel of the breech parts is not obstructed, and hooks *o* are forced by the spring *p* into the position illustrated in the drawings. The downward movement of the sear allows the spring *q* to force the striker forward, and so to discharge the cartridge.

Before the trigger is released the recoil throws the breech parts locked to the barrel backward to the position shown in Fig. 1. The hooks *o* are caused by the spring *p* to enter grooves cut in the underside of the handle piece. The block *q*, attached to the underside of



firing, and before the recoil has started to move the breech backwards. It is necessary to understand at this point that the block *a* is shown in Fig. 1 in its locking position, *i.e.*, in such a position that it prevents the breech being forced backwards by the recoil. In Fig. 2 this block is illustrated in its inoperative position, to which it is shifted by means of an eccentric plug *b*, turned by a lever on the outside of the rifle. In that illustration (Fig. 2) the breech parts and barrel are shown in their extreme backward position to which they have been driven by the recoil.

When the mechanism is in its normal position (not illustrated) the breech is opened, in order to load the magazine by a direct backward pull of a bolt handle attached to the handle piece *c*. Before the breech block can move backward it is necessary that the trigger should be pressed, in order to remove the upstanding projection *d* from the path of an extension upon the handle piece *c*. The backward movement of the handle piece causes projections upon its inside circumference to slide through spiral grooves cut upon the surface of the back part of the breech head *e*. By this means the head is turned until a certain moment, when the turning is stopped by locking blocks, and the closing blocks *f* may be drawn backwards out of engagement with the breech piece *g*. When the

the barrel, is brought up against the spring *r*, which acts as a buffer. The backward movement of the barrel draws out the spring *s*, which, after the backward movement is stopped by the buffer, draws the barrel forward. The handle piece *c* is held against forward movement by the hooks *o*, and the return movement of the barrel takes the breech head *e* a certain distance with it until the described rotary motion automatically unlocks the head and the breech piece *g*. The barrel and breech piece *g* are allowed to assume their normal forward position, leaving the rim of the spent cartridge engaged by the extractor *t*. An ejector at the back of the breech strikes the base of the cartridge-case and throws it out of the breech. When the trigger is released the hooks *o* are forced downwards, and the breech parts are returned, taking a cartridge into the chamber during the forward travel. Supposing the trigger is released before the barrel is fully returned, the stops *u* on the trigger arm hold the breech against forward movement until it is. The sear holds the striker in the cocked position, and the rifle is ready again to be discharged. If it is necessary to withdraw a loaded cartridge from the barrel, the projection *d* is lowered without pulling the trigger by means of part *v*, which is turned by a lever working on the outside of the breech casing. Accepted May 8, 1902.

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE
<b>CURRENT TOPICS:</b>			
The New Service Rifle ... ..	115	THE BISLEY MEETING ... ..	123
Rifle Pressures ... ..	115	NOBEL'S NEW LOADING SHOP ... ..	125
Grouse Shooting Opens ... ..	115	A RAPID LOADING BAG ... ..	125
Vagaries of Local Inspectors ... ..	116	ROUND THE TRADE ... ..	126
Bisley Impressions ... ..	116	NOTES ... ..	127
I. B. S. A. Meeting ... ..	116	<b>CORRESPONDENCE:</b>	
Quality in Trade Catalogues ... ..	116	The Swiftsure Projector ... ..	128
EXPLOSIVES REPORT FOR 1901 ... ..	117	APPLICATIONS FOR PATENTS ... ..	128
TARGETS TRUE TO LIFE ... ..	119	SPECIFICATIONS PUBLISHED ... ..	128
INCIDENTAL JOTTINGS ... ..	120	<b>SELECTED PATENTS:</b>	
WET GUN COTTON AS AN EXPLOSIVE ... ..	122	Smokeless Gunpowder ... ..	129
THE GUNMAKERS' ASSOCIATION ... ..	122	The Webley Falling-Block Rifle ... ..	130

## CURRENT TOPICS.

**The New Service Rifle.**—A correspondent wrote to *The Field* from Bisley Camp, stating that an effort had been made to gain the permission of the War Office to allow specimens of the proposed new pattern of Service rifle to be submitted for informal examination and trial. It seems that the reply was an unqualified refusal, based upon the grounds that the rifle is still in an experimental stage. The correspondent pointed out that it is by such behaviour as this that our War Office has made so many blunders in the past. They refuse to allow anyone to see anything until it is out of the experimental stage, and then it is found to be so full of faults that it once more reverts to the experimental stage, Government officials and others having meanwhile an opportunity to take out patents for remedying defects that have no right to exist. Considering how the design and construction of modern military rifles have been reduced to so simple a state, it is remarkable that we should still be labouring to improve so unpromising a weapon as the Lee-Enfield. Although Lord Roberts refers to it upon suitable opportunities as an excellent weapon, we fear that even the distinguished consideration which his remarks, as a rule, receive, cannot hide from view the many and obvious mechanical defects which make this rifle one of the worst in existence.

**Rifle Pressures.**—The gun and ammunition trade have been greatly interested in the articles and correspondence which have appeared in a contemporary relative to the influence of tropical temperatures upon modern Cordite express cartridges. The whole question turns upon the safe load that may be placed upon the fastenings and barrel of a well-made rifle. Beyond a certain limit, it is, of course, impossible to go, because the tenacity of the metal is a finite quantity. As a

general rule, gunmakers have constructed these rifles realising the necessity for great elaboration of strength; but, in spite of all precautions, there have been several incidents which have pointed to the existence of pressures beyond what was contemplated. Now that it has been made manifest that a cartridge, of which the Service pressure was stated to be 16 tons, is liable to give 20 tons and upwards when heated to a tropical temperature, gunmakers will be able to take their own measures. These will consist, either in reducing the charges so as to lessen the strain upon the rifles, or else in taking means to strengthen the barrel and fastenings so as to make the weapons indifferent to these very high pressures. When allowance is made for the overplus of pressure demanded by the Proof Houses, it is difficult to see how any rifle can be built to stand a reasonable proof pressure, if such is based upon a Service charge taken under conditions of temperature such as exist where the rifles are intended to be used.

**Grouse Shooting Opens.**—On the twelfth of the present month the active period for gunmakers again comes into full swing. Many of them have already felt the revival of interest in shooting coming along, but there is never any doubt about the 12th of August, because the rush to get all guns into the customers' hands overwhelms the staff for the time being. Although grouse come into season earlier than any other game birds, the partridge follows along very shortly afterwards, and then comes the pheasant. It is very difficult to picture the exact condition of affairs in Scotland. The complaints of disease have been singularly few, and yet it is extremely difficult to say for the time being whether this is as favourable a sign as it seems to be at first sight. It is certain that the weather during the nesting season was about as bad as it could possibly be, but whether the broods or the survivors among them have been able to

get through in spite of the untoward circumstances, it will be almost impossible to say until the records of the bags made reach London. Meanwhile, we fear that all hopes of a good season with the pheasants must be dismissed. Never in living memory have there been so many reports of disease as during the present year. Enteric seems to have waged a successful battle in almost every part of the country, although the results are patchy, since in adjoining preserves the experiences of owners may be the reverse of one another. Partridges have also shown a greater tendency to disease than for many years back, but fortunately it is only in certain districts that this experience has been encountered. We must hope for the best so long as the result remains an uncertainty. A good grouse season may compensate for a certain amount of trouble in the south, but it is quite possible even now that things may not be quite as bad as reports appear to indicate.

**Yagaris of Local Inspectors.**—A firm of gumakers having a shooting ground were recently favoured with a visit from an inspector acting for the local authority, and, as far as we can understand, this good gentleman very energetically pursued the routine of his office, at any rate, according to his own interpretation of how the thing should be done. It seems that the ground man was instructed in detail upon the liabilities that attach to the charge of registered premises, and a certain number of ideas concerning the relations between Mode A and Mode B storage were conveyed in a manner which, though they did not throw much light upon the bewildered listener, left him with the impression that he had done some grievous evil. This impression was strengthened by the subsequent procedure of the inspector, but we cannot give the conclusion, since at the time of writing things have not reached their fruition. The humour of the situation, however, consists in the fact that nothing but cartridges were stored on the premises in question, so that any reference to Mode A storage was quite out of place, and had nothing to do with the case in point. As far as we know, the gun trade have such a high reputation as careful storsers of explosives that complaints are practically never now made against them. The card of instructions issued by the Gunmakers' Association has done its work, and the only kind of complaint that now exists is, as a rule, of the kind to which we have made reference, viz., want of appreciation of the clauses of the Act by the persons entrusted with its administration.

**Bisley Impressions.**—It is difficult in the compass of a few short sentences to describe one's views and impressions as a result of a fortnight's residence in Bisley Camp. The gun trade who are to be met with on the spot, appear to be in thoroughly good touch with the work they have in hand. In fact, practically every representative of the craft who occupies a tent in the bazaar or on the site facing the revolver ranges is a practical expert, and very frequently a capable exponent of the art of shooting. Therefore, such members of the gun trade as make a yearly pilgrimage to the Meeting for the purpose of serving their customers, are highly respected by every class of shooter. They are fully capable of dealing with the little incidents that arise from time to time, and their advice upon practical questions is sought by the most experienced among the competitors. Altogether, the gun trade has good reason to be proud of those of its representatives who interest themselves in the doings at Bisley. Such a man as Major Gibbs stands out from the rest of his contemporaries

as a king among rifle shots, and one of the most painstaking enthusiasts in the workshop, where he fashions many of the barrels that ultimately win victory on the range. Mr. John Rigby, again, has shown how work on the range may be utilised as a guide towards perfection of manufacturing methods, and thus it happens that his record as a shooter is only equalled by the recognition that is accorded to his merits by the trade, of which he is recognised as the father, though not exactly the patriarch. Among the younger men at Bisley many could be selected for special mention, but we will conclude by a reference to Mr. J. E. Martin and his brother, Mr. F. R. Martin, who, as Alexander Martin, are already recognised as leaders in the rifle trade in Scotland. By the acquisition of the fine old house of Henry, a fresh corner-stone has been added to the edifice that is being raised upon high by the energy of these two brothers, and while one of them stayed at home attending to the strict routine of business, the other went out to the war, and gained experience of many things that are denied to those who have perforce relied upon impressions gained at second hand. At any rate, in spite of the injury inflicted by one bullet that caused seven wounds, he still seems to be as hale and hearty as ever, and to have a plentiful reserve of energy for attending to the new business which has been placed under his special care.

**I. B. S. A. Meeting.**—The tenth Championship Meeting of the Inanimate Bird Shooting Association came to a close on the 19th ult., and from reports that have come to hand there seems reason to believe that not only has it been a financial success, but the amount of shooting and the class of competitor represented on the ground have both been of an encouraging and satisfactory nature. Altogether the shooting occupied three days, every hour of which was taken up with competitions of an interesting kind. Bearing in mind the great facilities for throwing the birds which are afforded at the modern shooting club, it will not surprise anybody to hear that the number of birds trapped, fully equalled the records for previous meetings, which occupied five days. The principle of holding tournaments at club grounds has proved highly satisfactory from the point of view of encouraging the sport, and now that this is generally admitted, it will be open to the Association to divide its sympathy, so that several clubs may benefit from the holding of these important meetings, in place of one, as heretofore. While the meeting held at Hendon stands very high in the regard of sportsmen with plenty of money, and who have a taste for shooting for large stakes, the less skilful class of shot, who does not care to pay high entries, has been to some extent neglected. In due course it should be possible to run a supplementary meeting with a more modest scale of prizes, having entries and other needful expenses reduced to a proportionate extent. Then those shots who regard a tournament more as a pleasant three-days shooting than as a means for contesting championship honours, will find a gathering after their own heart.

**Quality in Trade Catalogues.**—The immense advances that have of late years been made in the art of printing have not been without their due influence on the trade catalogue. Year by year a certain amount of improvement is registered, both in design and in the display of the necessary text. Recently, moreover, there has been an effort to advance the quality of the illustrations to a degree rendered possible by

the modern process block, with its effective contrasts when printed on a highly-enamelled surface of paper. Although it would be invidious to make comparisons, we still believe that no one could object to our making a passing reference to the beautiful production which Messrs. Kynoch have recently issued in illustration and description of their various cartridge specialities. Possibly, no particular detail is exactly extraordinary as a specimen of its class, the chief merit of the production consisting in its all-round effectiveness for the end in view. The quotation only of such information as is needful, the giving of explicit details upon all points of interest, the accurate representation of the objects illustrated, and the whole mounted in a tasteful form that appeals to the eye, combine together to make up a catalogue that might well be accepted as a model by those desirous of gaining instruction upon so important an item in the conduct of a business. The whole art of a satisfactory catalogue is to interest and instruct the probable customer, and where translations are not published to express the particulars in sufficiently simple and brief language to be capable of easy understanding by an intelligent foreigner. All these things should be borne in mind by those who wish to cultivate trade relations with new firms. Old and defective blocks should be discarded in favour of new and up-to-date ones. All things considered, the manufacturer who would bring out a good catalogue should study the art of the printer, at the same time going in for a little amateur editing, so as to do adequate justice to the subject-matter to be dealt with.

## EXPLOSIVES REPORT FOR 1901.

THE twenty-sixth Annual Report of H.M. Inspectors of Explosives, which is to hand within little more than six months of the close of the period with which it deals, shows that the general conditions affecting the growth of the explosives industry undergo little change from year to year, and, indeed, some of the expressions used in the Report have by now become quite stereotyped through constant repetition in succeeding years. Thus, for instance, the growth of trade in explosives continues to make fairly steady progress, and the condition and management of the various factories and magazines show a proper maintenance of suitable care and precaution in the conduct of their business, though it cannot be admitted that this result is due to any conspicuous degree to the administration of the Act by the local authorities. The number of deaths from accidents by fire or explosion in the manufacture of explosives still keeps higher than the average, being 10 in 1901, as against 9 in 1900, and as against an average of 5.4 per annum for the previous decade. On the other hand, having in view the number of persons employed in the trade, this total can scarcely be said to be excessive, there being upwards of 11,000 persons altogether engaged in the manufacture of explosives in the United Kingdom. While the Explosives Act of 1875 has had the effect of largely reducing the death-roll as regards manufacture, it will be found that the number of fatal accidents which occur under conditions to which the Act does not apply appears to increase in almost direct proportion to the extension of trade.

**MANUFACTURE.**—The total number of factories under continuing certificate or licence is 150, exclusive of "small firework" or "toy firework" factories, which come under a separate category. The number remains the same as in

1900, seven new factories having been licensed, and an equal number having become extinct. At the close of the year four applications for licences were still outstanding, and against these four factories were under notice of temporary disuse. Of the total of 150 above mentioned, 36 factories are under continuing certificates, of an original total of 55, and 114 are under licence, of an aggregate of 150 licensed during the 26 years since the Act first came into operation.

During the year 69 amending licences were applied for, together with six which were outstanding from 1900. Of these one was withdrawn, and three were still outstanding last December, the number confirmed being 71, as against 59 in the previous twelvemonths.

There have been 20 additions to and two removals from the list of authorised explosives, and two additions to the authorisable list. In addition, there has been one alteration in the name of an explosive on the list, and five alterations in definition.

Altogether, H.M. Inspectors paid during the year 249 visits to the 150 factories under licence, all but one having been visited once, and more than one-half having been inspected a second time. These visitations resulted in proceedings being taken in a few cases, and in four seizures.

The total number of accidents which occurred during the year in factories for explosives was 76, resulting in ten deaths, as already mentioned, and in 38 cases of injury, some of which, however, were very slight. Many of the accidents were of an unimportant character, though the Act requires them to be reported.

**STORAGE.**—It is satisfactory to note that the number of magazines under continuing certificate and licence had recovered ground, the total being 393, or eight more than in 1900. Of these 120 are under continuing certificate, and 273 under licence. Altogether nine new magazines were licensed, and eight were still under consideration at the close of the year, but as against these one had already become extinct, and ten were under notice of disuse. During the year 20 amending licences were confirmed, and three were left over. As was mentioned in last year's report, the number of amending licences is likely to diminish, since the majority of magazines are now licensed to store all authorised explosives of Classes I. to IV. H. M. Inspectors paid 462 visits to magazines during the year, and found but few serious defects or irregularities, none of which called for legal proceedings. There was no case of accident by fire or explosion in connection with a magazine during the twelve months. Visits were also paid to 162 stores out of the total of 2,463 in England, Scotland, and Wales, and to 542 out of the 31,695 registered premises. As regards the latter, H.M. Inspectors consider that the supervision instituted by the local authorities is far from satisfactory, a matter which is gone into in some detail in a section of the Report dealing specially with the subject.

**PACKING AND CONVEYANCE.**—The only modification in the law relating to packing and conveyance concerns electric detonators, which, by a Special Order, are now allowed to be packed to the number of 3,000 in one outer package, or to the number of 5,000 if the package be provided with handles for carrying. This change was brought about by representations from the trade to the effect that the former limit of 50 lbs. was unduly restrictive when the electric detonators were attached to considerable lengths of wire.

During the year 1901 H.M. Inspectors issued 29 special authorities for packing explosives, as against 16 in 1900. Several of these were necessitated by the requirements of War Department contracts, some for the use of non-waterproof packages for gelatine explosives, and the remainder covered the packing of small quantities of explosive for conveyance to the Home Office Testing Station.

Since the issue of the last Report, a test has been devised for proving the required strength of inner packages for gunpowder barrels, which provides that a bag containing gunpowder, and forming the inner packages of a barrel, shall only be considered "substantial" if, when filled with gunpowder and choked, it will endure a fall to the ground of 1½ ft. for a 100 lb. bag, 2 ft. for a 50 lb. bag, 3 ft. for a 25 lb. bag, and 4 ft. for smaller bags, without getting into such a condition as to allow gunpowder to escape.

At the instance of the London County Council, H.M. Inspectors also issued a circular to the manufacturers concerned pointing out that some of the packages containing 100 safety cartridges, of the type usually issued to the gun trade and other customers, were of too frail a build, and liable to breakage in transit. They urged, therefore, the adoption of boxes of a more substantial character. There were, however, no accidents in conveyance during the year.

IMPORTATION.—The number of importation licences, available for six months, issued during the year, was 127, as compared with 121 in 1900, 108 in 1899, 114 in 1898, 92 in 1897, and 102 in 1896. We give below a comparative table of the importations of nitroglycerin compounds during the last two completed years:—

	1900		1901.
Blasting gelatine ...	15,900 lbs.	...	126,200 lbs.
Carbonite ...	292,450 "	...	384,000 "
Dynamite ...	63,000 "	...	28,250 "
Gelatine dynamite .	564,680 "	...	887,500 "
Matagnite gelatine	62,000 "	...	48,000 "

There were also importations of blasting explosives which do not contain nitroglycerin in the following quantities:—

	1900.		1901.
Guncotton ...	22,680 lbs.	...	50,900 lbs.
Thunderite ...	20 "	...	72,000 "
Westfalite ...	107,050 "	...	20,000 "

Despite the existence of nine factories in the United Kingdom for the production of detonators, a large quantity of these indispensable adjuncts to the use of high explosives continue to be imported, and while there was a considerable drop in 1900, the figures for 1901, viz., 13,666,570 detonators and 65 cases, are again nearly at high-water mark. Similarly, imported fireworks are showing a decided increase, 476 tons in 1901, as against 398 tons in 1900, and 463 tons in 1899. It should be mentioned that these are "short" tons of 2,000 lbs. each. It is difficult to ascertain how much of these imported explosives is destined for home consumption and how much is re-shipped.

CHEMICAL REPORT.—The chemical work of the Department is still conducted by Dr. A. Dupré, F.R.S., who as usual has prepared a very interesting report of the work he has undertaken during the year. Altogether, he was called upon to test 427 samples of various articles for their chemical properties, in addition to 46 samples which were submitted for examination as regards their physical conditions only. Under the heading of licensed explosives and materials used in their

manufacture, 379 samples were examined, of which 335 passed the required tests, and 44 were rejected. Of articles bearing a somewhat more miscellaneous character, but including di-nitro-toluene, rockets, repeating torpedoes, and saloon-rifle caps, 24 samples were submitted, and a similar number of samples of explosives were examined in connection with the Woolwich Testing Station.

As regards the introduction of new explosives, considerable activity is still noticeable among inventors, but there has not been that amount of development in the production of chlorate mixtures which seemed to be promised. One of the most striking features in connection with the composition of explosives is the increasing use of oxalate of ammonium as an ingredient for lowering the temperature of explosion, and the deduction may readily be drawn that in time this salt will replace all others that have from time to time been proposed for effecting the purpose mentioned. There were, during 1901, samples of 11 new explosives submitted for examination, of which one only was a chlorate mixture, and four additions to explosives were also submitted, of which three were sanctioned. No special investigations of interest to the trade were conducted during the year, but Dr. Dupré refers to the constant work requiring to be done in order to keep analytical methods fairly abreast of requirements. This is largely due to the increased complication in the composition of modern explosives, some of which have as many as eight constituents. The correct analysis of such explosives, therefore, becomes proportionately difficult, and at the same time of greater and greater importance.

ACCIDENTS.—The number of accidents by fire or explosion of which the Department had cognisance during 1901 was 394, and these involved 59 deaths and 421 cases of injury. There is a great disparity between this total of accidents and the average of 1871 for the previous ten years, and the number of deaths is also 17.9 above the average for a similar period, but the most conspicuous feature is in the matter of personal injuries, 421 as against an average in the last decade of 190.8. It must be pointed out, however, that since 1895 accidents have been reported to the Department which previously did not come under its notice. Altogether, there were only 83 accidents under conditions to which the Act applies, and of these 48 were unattended with personal injury, while the remaining 35 caused 13 deaths and 52 cases of injury. Of the 311 accidents occurring in the use of explosives, on the other hand, under conditions to which the Act does not apply, only one was entirely free from personal consequences.

This brief review should serve to show that H.M. Inspectors have exercised their usual care and elaborate pains in the compilation of their twenty-sixth Annual Report, which, with its various appendices and a really valuable index, makes a volume of some 230 pages. As a yearly record of the state of the explosives industry from the point of view of the working of the Act of 1875, these annual reports constitute a most valuable reference library. The fact of being able so well to carry on the work that was inaugurated by the late Sir Vivian Majendie must indeed be a source of satisfaction to Capt. Thomson and his colleagues. At one time many, no doubt, thought that the place of the master would be impossible to fill; but recent experience has shown that the foundations he laid so well have provided the necessary guidance for his successors, whose own abilities have had no small share in the success that has been registered.



## TARGETS TRUE TO LIFE.

LORD ROBERTS' remarks at the close of the Bisley Meeting, and an article by Lieut. Garwood, which appears in the current number of the *Journal of the Royal United Service Institution*, strike a singularly consonant note. Lieut. Garwood states that in his advocacy of training marksmen by quick shooting at short ranges, he has probably against him the whole body of military opinion, and in his favour only Mr. W. A. Baillie-Grohman. He evidently did not know at the time of writing how soon this isolation would cease. In discussing his subject he says that skill in shooting consists of three elements: First, steadiness; second, good eyesight; and third, good judgment of range, light, and wind. He points out that the first can be acquired, and the second improved by training as well with a rook rifle and cheap ammunition as with the expensive attributes connected with shooting the service rifle. In fact, he states as the two leading fallacies of most of the advocates for the extension of national rifle shooting, first, the idea that a man who is to shoot with the service rifle can only learn to shoot by using a service rifle, and, second, the notion that he must learn to shoot on a range on which he can use service ammunition. As regards musketry training and fire discipline, he is of opinion that shooting at short ranges provides a useful medium of education for the first, and that blank ammunition is quite sufficient to provide for the second. In other words, an idea that has been put forward in connection with the teaching of rifle shooting, and which at first gained the reception that is the usual lot of unpopular ideas, has, upon further examination, proved to be a sound one. Lord Roberts was no less clear in his denunciation of the present methods of rifle shooting, but it was evident that he wished the change towards a more practical line of work to proceed slowly, for fear of running the risk of appearing to threaten the sporting side of rifle shooting, which has been one of the most important factors in promoting its close study among members of our regular and volunteer forces.

The whole question of efficiency in rifle shooting resolves itself into the relative merits of a certain number of shots fired with the care and deliberation that are usual on the range, and double or treble that number fired with approximate accuracy. As Lieut. Garwood points out, the range shooter can only hit a 3-ft. bull at 1,000 yards when the distance is measured out for him beforehand, and when there is a man in the pit to signal the value of each shot. In actual practical shooting under conditions of warfare, these aids do not exist, and the shooter is obliged to make such a rough guess at the range, that the allowance of anything from 10 to 30 feet by way of wind adjustment is not likely to affect the efficiency of the shot. So many skilled marksmen have gone out to the war determined to do well for their country, and have come back after a period of hard service without seeing a single one of the enemy—when acting as such—that the idea of aiming at individuals at long ranges must be regarded as an exploded fallacy. What appears to be wanted is the capacity to direct a rapid succession of shots at any given distant point with a sufficient approximation of accuracy to make that portion of the country decidedly uncomfortable for the enemy. Under such conditions of shooting it is quite sufficient if a bullet falls anywhere within a square of say 100 yards, efficiency consist-

ing in delivering as many shots in that space in a given time as possible. The number of shots so delivered by one individual, multiplied by the number of shooters in action, represents effective warfare on the modern principle. Therefore, only such refinements of shooting at the long ranges should be indulged in as will enable the individual to study his rifle and its trajectory, and, at the same time, so far interest him as to make the exercise a pleasure.

However cautious the enemy may be, there is always the chance that an occasion may arise when he may be visible at short range. There may be a rush, a party may be surprised, or two forces may be in close touch with one another, the one entrenched, the other advancing over rough ground, and taking all possible advantage of available cover. Under these circumstances, the particular skill in shooting which is most useful is the capacity to pick out one's target from the neutral-tinted background, and to deliver a bullet thereat with the greatest dispatch and accuracy. The range must be estimated as closely as possible, and, more often than not, when firing beyond the so-called point blank range, the allowance must be made by aiming above the object. As Lord Roberts says, the great need is for quick and accurate snap shooting. That is to say, to learn to do with the rifle exactly what the game shot does every day with the shot gun. Quite recently the present writer remembers making a trial of a new form of miniature ammunition adapted for use in the service rifle. When the ordinary tests had been made, and shooting was conducted against a target representing a proportionate reduction of a squad of men, it was found so easy to hit them that a fresh condition was introduced, viz., to present the rifle in the manner of a shot gun and let off the trigger the moment the rifle was up to the shoulder; in fact, to shoot at one of the figures in the same way as though it were a rabbit suddenly appearing in covert, and likely to disappear with equal suddenness. The extraordinary result of five shots at 20 yards was that the whole lot fell within a space that could have been covered with a penny. Such a performance could be repeated sufficiently closely for practical purposes by almost any exponent of the shot gun; and that the rifle may be used with great effect in this way can be shown by the excellent shooting that is frequently made on the running-man range at Bisley.

The Commander-in-Chief's prize at the above meeting illustrates in a great measure the line upon which he would desire to see rifle-shooting carried on. A number of men are placed within a short range of a row of targets, and an interval of four seconds is allowed for them to raise their heads above a shelter, shoot at the target and immediately afterwards take shelter. A similar competition, which has an immense amount to recommend it, is the Martin's Cup, which is also shot for at Bisley. The conditions consist in firing ten shots at 200 yards, with cartridges loaded from the magazine, within the space of one minute. As a matter of fact, to make moderately good shooting on these lines is not an extraordinarily difficult feat, and yet the absolute badness of most of the scores made at the third class target, which is four feet square, with a seven-inch bull, is a marvel, considering the class of competitors who engage in the competition. Careful watching of trained shots, many of whom have been recognised as marksmen from their youth upwards, demonstrates their incompetence for rapid and effective snap shooting with the rifle. The signals that recorded the results of the shots

seemed to be mostly zero, or low figures for bulls, nearly as bad for inners, and it was not until the magpie and outer portions of the target were reached that the records began to show where the shots had struck. As a matter of fact, we believe that it is in extending competitions of this kind that an effort will be made to teach soldiers the drill that is necessary for the accomplishment of quick shooting. The suddenly appearing target which drops down after a short exposure, soon accustoms them to the habit of a rapid present and fire, and as such tuition can be carried on most effectively with miniature ammunition at barrack-yard distances, it is likely that the requisite amount of skill could be very rapidly attained. In game shooting it is reckoned that the first lesson to be learnt is the handling of one's gun. In rifle shooting it looks as though the handling of the weapon as an item of education is generally left to chance, the whole of the tuition being expended in showing the man how to take long spells at steadily holding the rifle on to the bull as a preliminary to pulling the trigger. Therefore we would say that when a soldier has learnt to fire at disappearing targets and simple forms of moving objects at short range, he is ready for a further course of tuition upon the same principle at 100 or 200 yards. Following upon that, he should be taken into unknown country and taught to pick out his own target from its partial concealment amid a landscape not fitted up in the manner of the ordinary rifle range.

It is in the last-named connection that Lieut. Garwood's paper should be most carefully studied by all who desire to put into practical effect the views expressed by our Commander-in-Chief. Labour in the army is not at a premium, and there should be plenty of opportunity for rigging up the kind of target which is so ably described by the above writer. He takes an ordinary wooden frame some two feet square, and pivots it in the centre, in the manner of a looking glass. He then by a system of weights and strings, arranges that upon the pulling of a lever or some suitable movement, the target shall swing from the horizontal to the vertical position, thereby becoming visible to the shooters. The target itself should consist of a lithographed picture, showing the form of a man as he would appear when partly concealed by rough cover. Such targets would need a good deal of finding by soldiers themselves advancing in a military fashion, and the number of hits registered should thereby afford a much truer index of military shooting efficiency than the number of bullseyes signalled from an ordinary target at 500 yards. Lieut. Garwood has shown how a certain amount of ingenuity may be applied to the improving of such targets, whereby the efficiency of this system of shooting instruction is greatly increased. By means of Bickford time fuses and strands of cotton that are burnt after a certain interval of exposure, targets may be automatically exposed and withdrawn from sight in the most unexpected places, the expense incurred being quite small in comparison with the results produced. We have always urged the importance of miniature shooting with some cadet form of rifle as a means of teaching the most important rudiments of shooting, and we really believe that the views so clearly expressed by the highest authority in our army, and emphasized in detail by the writer we have quoted, accentuate the need for going a step further in the direction of officially recognizing the need for a cadet type of rifle, such as would suffice for a large part of the work here outlined, and which would at the same time overcome many of the

objections incidental to the use of our service rifle in its two extreme forms, that is with the full power ammunition on the one hand, and the feeble Morris tube cartridge on the other.

## INCIDENTAL JOTTINGS.

**ADVANCE AUSTRALIA!** As I anticipated, this year's Bisley Meeting has been a notable one. The ammunition is some of the best the Ordnance factories have ever made, and consequently some of the shooting records have been remarkable. We are all glad to be able to congratulate the Cornstalks on their well-fought victory for the Kolapore Cup. It is not the first time they have held it, and may it not be the last! Certainly, these Australian warriors get more practice than the average volunteer, but Tommy is more at home on the range, and has always more or less of an audience, who either "rag" or discourse with him all the time he practises, so that he acquires confidence which helps him to "pull off" without indecision. Both at the range and at the wicket these sportsmen have wiped the Mother country. Where will they stop, I wonder!

London with its millions of inhabitants **"TOO MUCH JOHNSON"** (FOR specimen, and Lieut. Johnson, L.R.B., is **THE OTHERS**). the proud idol of the moment. For many years the country lads have taken the golden medal, badge and guineas, north and west. I will not minimise the feat by references to sand storms and five pounds of wind pressure. The 1st V.B. Gordon Highlanders travelled all night to be in time to do the musical honours, "See the Conquering Hero comes," but, oh! the anguish of it—whilst their fingers played the air, they hugged another 5 lbs. of convulsive wind pressure of "lament" within those lambskins, for the irony of fate had decreed that the Highlander would pipe the tune the Saxon should dance to. Lieut. Johnson smokes, drinks, goes to war without seeing the enemy, and appears to be quite ordinary in his method of existence, even to joining the rough riders' corps after being plucked for riding with the C.I.V.'s. But I'm glad anyway that the King's Prize has been won by one of our heroes from the front.

With bated breath we watched the veteran **A MATTER OF "BOBS!"** Major Gibbs fire his thirty consecutive bulls; we gazed with reverence at his match rifle, his wind gauges, orthoptics, and all the stock-in-trade of an up-to-date crack shot, and congratulated ourselves upon being a fellow-countryman of this 20th century master. Later on comes our Commander-in-Chief, and tells us we are not up-to date, and that the class of shooting as encouraged at these meetings is not best suited for modern warfare. Snap-shooting is the order of the day! Fire more rounds at closer range. Come, gather round ye ammunition makers, whilst we propound a new event. Let the modern rifleman start on a clean target at 500 yards, let him fire without intermission till his rifle stock begins to blaze, and then count up his hits—never mind the misses. Time should be the only limit, and the man who fires the most

cartridges has the most chances. It will be a sorry day for the enemy when he meets our Enoch or Kyley "benefit cup" holder! At present, the number of rounds expended during the recent campaign would average approximately about one ton of bullets per man killed. Can we not raise this standard? It is so ignominious to contemplate that the bullet value of a dead man at this rate only works out at about £140.

What about the Navy League and their "TERRIBLE" objects? Surely a better subject for **SHOOTING AND STINGINESS.** pending their funds upon could not be found than the gallant gunner on H.M.S.

*Terrible*, who has proved himself to be the best shot in the Navy, and for which he gains in official prize-money the noble sum of six shillings, to say nothing of the pence. Just now we are all full of the army shooting and prowess, but if a naval war should come, everyone will be in a fever of anxiety to know what our gunners are like, upon whom all would depend. The Navy League should open a special prize fund for naval gunners. Many would be delighted to subscribe, and also take an interest in the men, guns and munitions they would not otherwise have. Everyone would then learn that these magnificent guns on the *Terrible* are electrically trained, and that, with the exception of the *Powerful*, are the only electric mountings of that pattern in the Navy, and, in spite of the results, the Admiralty are not following it up. I believe Sir George Clarke was the designer: he pressed the button. Why don't the Admiralty do the rest?

**WHAT,  
NEVER?**

The Navy never seem to rush at anything in a hurry, unless it is obvious by a doubtful hazard. We are all waiting to see those 7.5 quick-firing guns we have heard so much about, whose range is so superior in comparison with the 6-inch. Where are those automatic self-obturator driving bands for the shells which are to save the wear of the guns—oh! many hundreds per cent.? and where are the caps for the noses of the armour-piercing shells, which enable them to pierce armour-plate when struck at an angle? I hope, too, that when these are all forthcoming the old brass cartridge-case will not be replaced by these wretched rag-bag cartridges, which in the short lengths can be rammed up the chamber out of reach and alignment of the primer and the igniter, and thus cause these lamentable accidents, which would be impossible with the brass case, so long as the gun mechanism is correct.

**A DISSIPATED  
FORTUNE.**

Ob, what a dust somebody is stirring up, Brass dust and ashes this time. To think that all this dust has been sold at 3s. 4d. per pound, when it is so badly wanted to cast in the eyes of the Paul Pry's who hang about the War Office accounts. Upon whose sacred head shall we pour these ashes? Ashes which have been sold (without prejudice) for £7 7s. 6d. were formerly cast upon the roads to fill up the hollows, which now echo with metallic grit. (I thought Woolwich Arsenal was paved with globular paving stones, old cannon balls and pig iron. Where are these restful pavements paved with gold?) The waste of a quarter of a million is about as mythical as the police astuteness in finding it out. But surely somebody will have to be grilled over these ashes. It won't be the superintendents, as they cannot be supposed

to know anything of this, nor can you expect the departmental managers and foremen to know what goes on outside in these matters of bye products. They are under strict military discipline, and kept within the confines of the factory and to the special work, and it is not anybody's business to teach the central office how to run the Ordnance Factories on "commercial lines," for which purpose it exists solely.

**THE  
COMMERCIAL  
BASIS.**

Nobody would for a moment point at the Chief Superintendent of Ordnance Factories as being in any way responsible for this. He was probably told that 3s. 4d. per ton for ashes was a good price; and so it is, were it not for the metal, and this is a matter which the responsible officials should have pointed out. His civilian predecessor, a distinguished engineer, brought up in works management all his life, did not appreciate the value of these products. How, then, could anyone expect a man whose training is entirely a Woolwich training to guess its commercial value. It certainly appears that the mechanical advisers to the chief superintendent are responsible. Rightly or wrongly, these advisers are supposed to be skilled and trained civilian engineers, and the chief of that department is credited by the ordinary public as having a mandate to discover and report these irregularities, and, being a highly-paid official, is naturally looked upon as a man who would be *au fait* with matters of this sort, which are the most elementary considerations in a private commercial brass foundry, and which would effect a much greater saving to the Ordnance factories than the universal extension of automatic machinery where it may be neither applicable nor economical.

**AUTOMATICS  
AND  
EVOLUTION.**

I do not presume to question the comparative value to the Ordnance factories of many of these automatic machines, as it depends upon the wages previously paid, but certainly if the foundry wastes metal in the ashes, what must be the loss of some of these automatic machines. I have seen a three-inch bar of yellow metal, worth about 9d. per pound, cut into articles whose ultimate form, after turning, would waste about 50 per cent. of the metal, which would then be worth about 3d. per pound. Add to this the time taken to produce these in the automatic machines, the enormous powder expended, the wages of skilled labour to watch it, the delay of the whole work, as each operation requires re-adjustment, and, *finally, the finishing off in a hand machine*, and it would puzzle a genius to see where the economy comes in. For some articles the employment of automatic machinery is indispensable, and the managers and foremen are the best judges undoubtedly. It would pay the Ordnance factories over and over again if they adopted the India Office practice of sending these practical men for tours round the works of contemporary private firms. They might not learn all the manufacturing secrets, but they would gain a good broad view from the different aspects and conditions with which things are represented to them. Such an evolution would have incomparable advantages over the employment of an individual who may turn out a faddist, or whose previous training may have been specialised to the exclusion of the necessary qualifications to deal with an enormous field, such as the Royal Ordnance Factories.

CYCLOPS,

## WET GUNCOTTON AS AN EXPLOSIVE.

[COMMUNICATED.]

It has long been recognised that, but for certain inherent difficulties in practice, wet guncotton is, in its wet state, an almost ideal explosive for use as the bursting charge for shells. Perfectly safe, unflammable, and inert in the absence of a detonating force, it is specially well adapted for the varying conditions encountered in the British Services, since it can be stored almost indefinitely in any climate, and can be conveyed in transit without the need of any special precautions. As compared with Lyddite, it possesses certain distinct advantages, conspicuous among which are the facts that, while displaying less local violence than the well-known picric acid compound, it has a greater disruptive action, and that whereas Lyddite has not proved too successful in shells of small calibre, owing to the uncertainty of its detonation in small quantities, wet guncotton seems to give a uniform certainty of detonation irrespective of bulk. The only drawback to its general adoption as the Service explosive for bursting charges hitherto has undoubtedly been the difficulty in securing a suitable means of detonation. A primer of dry guncotton, and a fulminate of mercury detonator, such as have so far appeared necessary for this purpose, form a conjunction so sensitive to premature ignition by friction, concussion, or heat, as to place a bar against their use under the conditions of shell firing in these days of high pressures and great velocities, as regards artillery, though they are adopted with success for the detonation of torpedoes.

Great credit is, therefore, due to the New Explosives Co., Ltd., for the production, after several years of experiment and research, of a new safety exploder which will detonate wet guncotton with certainty, and under the safest conditions. This composition contains neither dry guncotton nor fulminate of mercury, and cannot be ignited either by friction or shock, nor will it detonate at any temperature below 360 degs. Cent. At the same time it can be detonated readily by an ordinary detonating pellet, such as is in general service nowadays in all percussion and time fuses, and produces complete combustion of the charge of wet guncotton. Exhaustive tests have been made of the composition, which has proved itself remarkably stable, and capable of standing a rigorous heat test; it is also unaffected by climatic variation, and lastly, is cheaper to manufacture than guncotton. More than this cannot discreetly be said of the new safety exploder for the present.

Reference was made in our May issue to official trials which had been conducted with this exploder, and which resulted in complete success. These took place on the Ridsdale Range of Messrs. Armstrong, Whitworth & Co., Ltd., before representatives of the Explosives Committee of the War Office and a number of foreign attachés, the New Explosives Co., Ltd., being represented by its genial general manager, Mr. F. Marten Hale, and the works manager of the Guncotton Department, Mr. G. W. Bell. The bursting charges employed during the course of the trial were made by the Company's new method of forming and compressing wet guncotton, which was originally described at length in our issue of August, 1899, whereby it is possible to produce charges of any required

dimensions in a solid block, mechanically true and of uniform density throughout. This system is intended to replace the older and usual method of building up charges from a number of discs and segments of guncotton, and for the production of these solid charges the New Explosives Co., Ltd., have recently installed a magnificent new plant at Stowmarket, which embodies the most advanced developments of science as applied to this class of machinery.

Reverting to the actual trials, the first experiment consisted of the firing of a series of ten rounds from a 6-pr. Q.-F. gun, the shells being fitted with the ordinary Hotchkiss fuse, Mark IV., and charged with 100 grammes of wet guncotton and 9 grammes of the new safety exploder. The firing was so arranged that it was possible to recover practically all the fragments of shell after each round, and as regards the 5th round, which was quite typical of the series, of a total weight of charged shell of 5 lbs. 10½ ozs., there were in this particular round recovered 170 pieces, comprising portions of shell, brass, and gas check, weighing 4 lbs. 4½ ozs., the largest piece weighing only 6½ ozs. Thus, complete fragmentation of the shell took place to a very remarkable extent. In the series of 10 rounds, the portions recovered ranged from 81 pieces to 231 pieces, and the total weight of the recovered pieces varied between 3 lbs. 9½ ozs. and 4 lbs. 5½ oz.

Following this experiment came that of bursting a 6-inch shell at rest. Here, again, the fragments were collected so far as was possible, and the assembled parts mustered 2,122 in number. They weighed 65½ lbs. out of a total for the unexploded shell of 119½ lbs. In this shell the wet guncotton charge weighed 6 lbs. 9 ozs., and the explosive compound in the safety exploder weighed 300 grammes. The fuse employed was fired electrically, and was of the ordinary Service direct-acting pattern.

From the foregoing brief description it may be gathered that the New Explosives Co., Ltd., has arrived at a very satisfactory and practical solution of the problem as to obtaining the full use of the advantages to be derived from the employment of wet guncotton for bursting charges.

## THE GUNMAKERS' ASSOCIATION.

A GENERAL MEETING of the Gunmakers' Association was held at Effingham House, Arundel Street, Strand, W.C., on Thursday, July 24th, at 3 o'clock in the afternoon, and there were present: Messrs. H. J. Blanch (in the chair), C. E. Greener, J. T. Musgrave, and R. T. Woulfe (solicitor).

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

MESSAGES OF REGRET—Messages of regret for non-attendance were received from Messrs. H. W. Holland, G. E. Lewis, and H. A. A. Thorn.

ELECTION OF NEW MEMBER.—The application of Mr. Frederick Robert Martin, of the firm of Messrs. Alexander Henry & Co., 16, Frederick Street, Edinburgh, to become a member of the Gunmakers' Association, proposed by Mr. T. W. Webley, seconded by Mr. H. A. A. Thorn, came up for consideration, and Mr. Martin was duly elected.

CONCLUSION OF MEETING.—There was no other business before the meeting, which concluded with the usual vote of thanks to the chairman for presiding.

## THE BISLEY MEETING.

ONCE more a Bisley Meeting has come to an end. The annual functions which most chiefly concern us, act as milestones in the progress of our lives. For a certain class of shooter the Bisley Meeting serves this interesting purpose, and the gathering which has just come to a close is in no wise different from its predecessors, in that there are many incidents connected with it that may with advantage be borne in mind. Probably the most striking feature of the whole meeting was the violent gale, which blew throughout the shooting for the final in the King's Prize. During the previous night there had been a certain amount of rain, and when this cleared off in the morning there was evidence of a steadily increasing breeze, which became stronger hour by hour until, at the time allotted for the commencement of the shooting, it had attained quite a hurricane force. It blew right across the range from left to right, and the allowance made by the shooters, in order to strike their own target, seldom amounted to less than 30 feet at the 1,000 yards range, while it was only a little less violent during the morning shooting at the shorter distances. As the scores go, they will probably stand out as the worst ever registered for the final in the chief event of the Meeting. Considering that the King's hundred is a picked body of marksmen, selected by a process of exhaustion from a large number of competitors, themselves the best of their kind, it is curious to see that there were many scores of less than 20 out of a possible 50 over 1,000 yards, and there were three cases where less than ten points were registered. This goes to show how extraordinary were the conditions that faced the competitors, evidence of which was afforded by the Steward ventometer, which registered a wind velocity of thirty miles an hour for minutes at a time, with an average of twenty-four miles an hour for the entire day. After having blown down the large bell tent, and caused a certain amount of mischief in other parts of the camp, it subsided during the night, so giving the impression of having been called up for the special purpose of adding a novel feature to the final of the King's. The earlier part of the meeting ran with a wonderful amount of smoothness. The weather was perfect throughout, the extreme heat of the first two or three days giving place to cool air and mild breezes for the rest of the time. In this way the meeting was, both from a shooting and spectacular point of view, of the pleasantest possible kind, the large amount of high scoring proving the correctness of this observation.

Apart from the volunteer shooting with service rifles, and match shooting with rifles having delicate wind-gauge sights, the interest of the Meeting centres upon the running deer, revolver, and miniature ranges. At the last-named a pleasant little contest, which reduced itself to competitive diagram-making, was in progress throughout the two weeks. The Greener club rifle seems to have sealed its reputation as a close-shooting miniature weapon. What we said about it in our issue of March last seems to have been proved in every respect. The amazing consistency of its shooting in the competitions at Bisley has shown that it can, to quote our previous remarks, always be relied upon to make a good string of shots. In one instance a competitor made some fifty odd consecutive bulls, consisting of the original score and a series of tie shots. As the rules state that a competitor shall go on shooting in the ties until he misses, this display of patience was

called into being. After a time, however, it became apparent that the Greener could not miss a four-inch bull at 100 yards, and the shooter responsible for the score gave up the attempt. This is an actual fact, and while it reflects great credit on the staying power of the shooter, it none the less goes to show that the rifle he used was capable of very fine work. This is the general experience of those who have used the Greener sharpshooter, and the fact that so many fine scores were made with it in the course of the competition at Bisley provides effective proof of the assertion. The highest score made in the competition consisted of nine shots in the two-inch central and one outside it, counting as a bull. Two shooters were successful in making this score, and it represents an advance of one point on last year's record, the winner, after shooting the tie, being Mr. Sowerby, as before. The Martin-Smith competition, which is still shot at a three-inch bull with a two-inch central, notwithstanding the adoption of the four-inch bull (with the same size central as the standard fourth-class target), was to some extent overshadowed by its more popular rival, the Greener. None the less, some very fine scores were made, though the seven shots for this competition, as distinguished from the ten in the Greener, make it less of a test on the rifle.

The cartridge making the inevitable possible was Kynoch's .32-40, which is an American type of ammunition, having a 186-grain bullet, the explosive charge consisting of 16 grains of chopped rifle cordite. This is a decidedly powerful cartridge, and it is at least satisfactory to notice that it is all British, the cordite charge and other details having been worked out independently on this side of the water. The Martin-Smith, being essentially intended as a test for sporting rifles, it is fortunate that the winning cartridge is of a permissible sporting type. Obviously more powerful cartridges would not be popular for competition work of this character, owing to their excessive noise and recoil, so that the rifles used are, as a rule, of only moderate dimensions as regards bore and cartridges used. In the miniature competition there were a few kinds of rifle in use, but nothing in the nature of a competitive display of arms falling within the limit price of £3 10s. Although the limit price of the ammunition has been raised so as to include cartridges costing not more than 5s. per hundred retail, the .25 Stevens rim still occupies a position indicating great popularity. The eligibility of the Greener rifle has, however, given the home country a better chance than it previously had, so that when it comes to a matter of small-bore shooting at short ranges, it is no longer a question of American monopoly, because there is now a thoroughly sound British competitor that is fully able to take its place against all comers. If the miniature competition at Bisley has done no more than to encourage and bring into prominence such a rifle as the Greener, it cannot be said to have been started in vain. At the time of its initiation there were plenty of persons willing to affirm that English manufacturers could not possibly compete in point of price and quality against American rifles, and yet the impossible has been accomplished by the enterprise of Messrs. Greener. Therefore, in taking a gun-trade view of the Bisley Meeting, we cannot help feeling that the position attained by the Greener in an open competition like the miniature is something for us all to be proud of, bearing in mind the very recent growth of demand for such a weapon.

On the revolver ranges the shooting progressed very actively, but it is impossible to expect to find any large number of

shooters engaged at these competitions. The power of making possibles on a 2-inch bull at 20 yards is given to very few of us, and those who do possess it are well known, and correspondingly feared, by the ordinary every-day shooter. The man who makes only passably good scores is not likely to get much encouragement at the revolver ranges. The number of possibles that are made is increasing every year, and on the present occasion the crop has been more plentiful than ever. Even in the competition firing twelve shots, six from each hand, no less than five possibles were made with the left hand, two shooters accompanying this score by only dropping one point when shooting the companion series with the right hand. Of course, such scoring as this is necessarily limited to a very few persons, but it is a curious feature about the Bisley Meeting that some shooter or another is always in remarkable form. As a result, the scores that come into the prize list are exceedingly high. The good shooting that is met with is not by any means a question of numerous entries. It is more a question of the attainment of a high and almost extraordinary degree of skill, which causes the putting up of high scores to be almost a matter of second nature. At any rate Mr. Blood, to whom the leading honours fall, seems to have acquired this position. When in good shooting form he knows it at once by the steadiness of his holding, and the bulls come along at a great rate. The accuracy of a well-made target revolver at 20 yards is much beyond what is ordinarily supposed. Practically, its shooting falls within the one-inch circle, so that to get within two inches is mainly a question of cultivating steady holding and pulling of the trigger. Of course, this does not apply to all the competitions. In the Webley Fosbery, for instance, the conditions contain a time limit of 12 seconds for the firing of six shots. Last year the winner made 36 points out of a possible 42. This time the same score has been put up, and, although Mr. Blood made persistent efforts and a large number of good scores in attempting to go one better than 35, he was obliged to be satisfied with the second place, which was practically his only falling off in the revolver competition. Anyhow, the scores made represent a very fine exhibition of rapid shooting, and they go to prove the smooth working of an automatic mechanism which is successfully applied to a weapon shooting the Service cartridge. Altogether, Messrs. Webley should be well pleased with the success their new model of pistol has attained, and as the system is extended to other models and calibres, we have no doubt that they will benefit in a like manner, due to the advantageous reduction in the number of manual operations involved in firing a series of rounds.

Among actual target revolvers, the Colt appears to occupy a position of unchallenged supremacy. The type of revolver termed the New Service Model seems to be well-balanced and to suit the needs of the shooter. The Smith and Wesson shows signs of growing into favour by virtue of its excellent finish and many good qualities. With the Service revolver, on the other hand, the particular pattern which has been adopted by our Government as the official model does not seem, when modified to the target pattern, to have quite the grip and balance that the competitor class of revolver-shot seems to demand. For our own part, we cannot speak with any absolute experience of this factor, but it has on several occasions been put forward as an explanation why the target model of our Service pistol is not so much used as it might be. The same thing is to be met with in the case of the

match rifle, the English model, for reasons of strength and class of ammunition, not proving so useful for competitive work as the Mannlicher. Of course, the distinction drawn has not necessarily any relation with the practical advantages of a weapon for Service use. It is a question solely concerned with the adaptability of a weapon for the refinements of shooting that are met with in work at the range.

Among the military rifle-shooting competitions, those with telescopic sights must necessarily occupy a foremost position of interest. The specification of a military telescope still remains the same, and this means that an inordinately large field of view has to be provided at the expense of the other useful properties in a telescope. While some people seem anxious to abolish all restrictions whatsoever, those who have the interests of developing a really useful implement at heart must admit that a certain amount of restriction is a useful thing. It is impossible to judge the military efficiency of a telescope by shooting alone. No finer alignment at 1,000 yards' target than can be obtained by ordinary match sights is necessary. The system adopted at Bisley is to paint the target a dull neutral colour, which harmonises with the background, so as to be extremely difficult to distinguish with ordinary sights. When this target is viewed through a telescope, its outline at least becomes fairly well defined, and the shooter has no difficulty in crossing the hairs upon its centre, so obtaining as good an alignment as if he were using ordinary sights on a white and black target. All this goes to show that something more than mere scoring is necessary to determine a successful telescope. The N.R.A. Committee has constituted itself an authority upon these sights, and it demands that certain conditions of construction shall be complied with, which, in their opinion, are the qualifying factors of a military telescope. Most of these are quite sound, and are likely to hasten progress as compared with the alternative course of allowing free selection, which would be bound to bring us back to the long tubes that represent a very un-military-looking appendage to a Service rifle. Practically, the telescopes which have now been introduced as a response to the invitation of the N.R.A. show many advances upon what previously existed. At present, all that is needed is a system of mechanically remedying such weak spots as may display themselves in practical use, so that the device as a whole shall gradually acquire the form enabling it best to serve the demands made upon it. Meanwhile, a serious factor working against this development is the rule demanding six degrees in the field of view, whereas three would be quite sufficient for all military purposes, and would give great opening for increasing the solidity of the tubes as a remedy for the lightness of construction that is now rendered necessary.

Those of our readers who have read of the hyposcope competition will no doubt have noticed that the idea of a reflecting tube, providing for the concealment of shooter behind the mound over which he is to shoot, has been extremely well received by writers in the newspapers. This favoured treatment by the gentlemen of the press must be attributed more to the attractiveness of the idea than to its practicability. Nothing could be more difficult in ordinary rough country than to find suitable places for holding a rifle in the extraordinary position that is demanded. Furthermore, the taking of the recoil and the steady holding of the weapon present almost insuperable difficulties. At any rate it is unlikely, in the opinion of the present writer, who has paid some attention to



the device, that it will ever be used—except when there is a premium by way of prizes to encourage one to make the experiment. Various other optical devices have been in evidence at the Meeting. The most interesting is Dr Common's magnifying glass, which is fitted at the muzzle, but we were not able to notice any extraordinary advantage resulting from its use, though possibly this hastily-formed opinion may be open to revision. It at least has the advantage of portability, in that the whole outfit is contained in a leather case about three inches long, and the glass may be fitted to the muzzle in a very simple fashion.

### NOBEL'S NEW LOADING SHOP.

MESSRS. NOBEL'S EXPLOSIVES Co., LD., have recently taken some premises at 32, Union Street, London, W., for the purpose of a loading shop. They occupy a large area on the ground floor and in the basement of a huge block of buildings built to London County Council plans, which seems to be well fitted for the object in view, having excellent light at back and front, and extensive floor space. On the occasion of our visit, the shop was rapidly getting into shape under the management of Messrs. Nobel's foreman-in-charge, Mr. J. C. Hamilton, and the work of loading ammunition was proceeding apace. The two specialties, Ballistite and Empire, are loaded in separate rooms, in order to avoid any confusion, each compartment being duly isolated and provided with its own Erskine loading machine. In connection with these machines Mr. Hamilton has devised a special hopper for feeding the powder so as to get the same density in one row of the charging holes as in another, it being obvious that in the usual method adopted there is a risk that the holes first receiving their charge will be more closely packed than those which occupy a more distant position. This hopper seems to act perfectly. Apart from this measure by bulk, the aggregate of powder for each 100 cartridges is weighed before loading, and from time to time a specimen cartridge is withdrawn and separately tested. Shot loading is accomplished by means of a Dixon machine.

At the time of our visit, only one turnover lathe was in position. It is driven at the rate of 1,400 revolutions per minute, by means of a  $\frac{1}{4}$ -h.-p. gas engine working in the basement below, the turnover being done by hand-pressure. Mr. Hamilton is in favour of hand work in this respect, as being both quicker and more adaptable to different conditions of cartridge cases. He himself can turn over 4,000 cartridges per hour in such a machine, and he claims that when a case has not been properly dried before being loaded there is less danger of crinkling the cardboard in the hand-press than where the action is automatic.

For the rest, bins are already erected capable of storing some 300,000 cartridge cases ready for immediate use, and storage will shortly be provided in the basement for as many more, though, for the matter of that, the question of storage is not one to cause much disquiet, since there is plenty of room still remaining, without encroaching on the space required for the necessary loading operations. Obviously, the shop is still far from approaching completion, having only recently been taken over; but matters are already in a sufficiently advanced state to allow of a considerable output, with capacity for a

rapid increase as time goes on. This capability of expansion is the more to be insisted on since the new Empire Smokeless powder seems to be rivalling its brother-in-arms, Sporting Ballistite, in popularity, even at this early stage of its career.

### A RAPID LOADING BAG.

MESSRS. BOSS & Co. have recently undertaken the introduction of a new cartridge bag, which is likely to prove a great boon to shooters occupying a warm corner with driven game. This bag, which is the invention of a private sportsman, chiefly differs from others in that it is fitted with a



THE NEW CENTURY "RAPID" LOADING BAG.

wooden tray or platform, which can be swung outwards in the manner shown in the accompanying illustration, in which position it will hold two dozen cartridges bottom upwards, ready to the hand. The tray consists of a double platform, the upper one of which is suitably pierced with holes to accommodate the cartridges, and these can be filled during moments of leisure ready for the time when birds fly fast overhead and the mind has some other work to do than to superintend the fingers in picking cartridges right end upwards out of a deep bag. Below the tray there is ample room in the bag to carry at least as much ammunition as any ordinary man would care to expend in a day's shooting at game, and when not in use the tray hinges over vertically to the shape of the bag, so that, with the side pieces and covering flap in place, there is practically no difference to be observed between the outward appearance of this and any other bag. From the illustration it will be seen that there is nothing lumbering or unsightly about the device when in operation, while its convenience and utility scarcely require demonstration to anyone who realises what it means to have cartridges absolutely ready to the hand at any moment. We understand that in addition to meeting the requirements of their own customers, Messrs. Boss & Co. are prepared to supply the New Century "Rapid" Loading Bag to the trade on favourable terms.

## ROUND THE TRADE.

Mr. F. W. Jones, of Barwick, will shortly join Messrs. Eley.

The employees of Mr. H. Atkin had their annual outing on the 19th ult.

We regret to notice the failure of Messrs. D. McCririck and Sons, gunmakers, of Kilmarnock, N.B.

Major Rich has been appointed secretary to the Chief Superintendent of Ordnance Factories.

The annual benefit shoot for the gun loaders employed at the Gun Club at Hurlingham takes place on the 16th inst.

Mr. James Howe, ironmonger, of Colchester, has registered the word "Meteor" for cartridges included in Class 20.

The firm of E. I DuPont de Nemours & Co., celebrated its 100th anniversary at Wilmington, Delaware, U.S.A., on "Independence Day," July 4th.

The directors of the Roburite Explosives Co., Ltd., have declared an interim dividend of 5 per cent. on the preference shares, payable on the 12th inst.

On Monday, the 28th ult., a distinguished company, including a number of colonial premiers, visited the works of Messrs. Nobel at Ardeer, near Stevenston.

The business of gunsmith and locksmith, until recently carried on by Mr. G. H. Wilson, at 9, Market Place, Horn-castle, has been acquired by Mr. A. Hill.

The firm of Miles, Daniel & Co., Ltd., was registered on the 18th ult., with a capital of £2,000 in one pound shares, to carry on, among other businesses, that of gunsmiths.

Major J. W. W. Barlow, late secretary to the Chief Superintendent of Ordnance Factories, has been appointed Superintendent of the Royal Laboratory, Woolwich.

The net value of the personalty of the late Mr. Charles Eley, chairman of Messrs. Eley Bros., Ltd., whose death we had to chronicle in last month's issue, has been declared at £119,594.

Our sympathy is given to Messrs. S. Grant & Sons in the loss they have sustained by the sudden death of Mr. Brittain, who for some time had been in their employ as loader and general foreman.

It is reported that the Mexican Government has ordered from the Waffenfabrik Mauser, as a first instalment, 40,000 rifles, and 10,000 pistols of the same patterns as those used in the German army.

A company, by name "Land and Water (1902), Limited," was registered on the 14th ult. with a capital of £40,000, to take over an agreement for the acquisition of the newspaper property mentioned.

Lieut.-Col. Battersby, Deputy-Assistant Director-General of Ordnance, has been approved for Assistant Director-General, to succeed Col. C. G. Jeans, who is to be appointed Ordnance Officer, First Class.

The Arms & Ammunition Co., of Southwark Street, appear to have gone into the retail trade, to judge by their advertisements of sporting cartridges, which, it will be seen, are being quoted at very low rates per 100.

Messrs. L. Le Personne & Co. write to inform us that it is La Fabrique Nationale d'Armes de Guerre, and not Messrs. Auguste Francotte & Co., which has acquired exclusive rights to make the Browning Automatic Pistol.

We are pleased to learn that Mr. S. Edwards, the well-known shop manager at Messrs. Charles Osborne & Co.'s London establishment, is progressing favourably after the operation he was recently forced to undergo.

A new smokeless powder, the invention of an artillery officer of the general staff, has been lately adopted for

all small-arms in the Portuguese army. It is claimed that temperatures up to 80 deg. Centigrade fail to affect the powder.

We have to record the death, at his home in Hartford, Conn., U.S.A., of Mr. John H. Hall, President of the Colt's Patent Fire-Arms Manufacturing Co. Mr. Hall was born at Portland, Conn., in 1849, and took over the management of the Colt company in 1888.

Major Douglas, late Superintendent Royal Laboratory, Woolwich, has retired from the service, and has joined the veteran firm of Armstrong, where, we understand, he will devote special attention to the fuse department. We congratulate the Elswick firm.

"Country Life" reports in its issue of the 26th ult. that a remarkable automatic pistol has been brought to their notice. It seems, however, that it is our old friend the Mars, the particulars given concerning it being those which were widely published in the autumn of last year.

We have received a copy of the 14th edition of Messrs. Lightwood & Son's catalogue of gun, rifle, and pistol implements, which, as usual, is full of suggestive items well worthy of the close attention of every gunmaker who aspires to be up-to-date in his stock of sporting accessories.

By quite a remarkable double error we conveyed the information that Mr. W. Matthews, well-known at pigeon shooting meetings, was dead. Mr. Matthews is, we are glad to learn, alive and well, despite this obituary notice. We should have written that Mr. W. Young had died rather suddenly.

The Kynoch Company have forwarded for our inspection a copy of the new edition of their catalogue. A careful inspection is necessary in order to appreciate in full the care that has been lavished upon its production, both as a handy book of reference and as an interesting specimen of enterprise in the printing line.

His Highness, Ras Makonnen, accredited representative of the Negus Menelik of Shoa for the Coronation, recently paid a visit to Birmingham, and inspected the factories of Messrs. Kynoch, Ltd., and the Birmingham Small Arms Co., Ltd. The reputed heir to the throne of Abyssinia was evidently impressed with the progress shown in the manufacture of small-arms and ammunition.

According to the Board of Trade returns, the exports of small fire-arms during the first six months of the year numbered 48,800, as against 66,629 and 43,667 in the corresponding periods of 1901 and 1900 respectively. In the same six months 24,900 cwts. of gunpowder were shipped abroad, as against 24,584 cwts. and 28,225 cwts. in the corresponding halves of 1901 and 1900.

It is reported that a petition against the granting of a protective duty on explosives in the Transvaal has been lodged with the Colonial Secretary by the National Explosives Company, the Cotton Powder Company, the New Explosives Company, and Messrs. Curtis's and Harvey, Ltd. It is also reported that Messrs. Kynoch have made much stronger representations on the same lines.

Referring to our notice of their new catalogue in last month's issue, Messrs. Bentley and Playfair write a postcard as follows:—"We beg to note in *Arms and Explosives* that you make our firm a big depôt for repairs. We thank you for the information." In consideration of the fact that we stated nothing of the kind, we are somewhat at a loss to understand the gratitude of the firm for information we were not in a position to give.

Messrs. Kynoch have issued, through the medium of their organ, the *Kynoch Journal*, a reprint from a recent article entitled "The Storage of Explosives." The author is well known to us as probably the most practical exponent of the Explosives Act in regard to the clauses and orders dealing with storage. Therefore his illustrations of model stores and magazines will be found most useful to those who have not had the same opportunities for acquiring detailed knowledge.

## NOTES.

**A SUCCESSFUL BLAST.**—A blast of unusual magnitude took place at Mossrigg, one of the Green Slate Quarries of Messrs. Stephenson & Co., at Tilberthwaite, on Friday, July 11th. The purpose in view was the removal of no less than 40,000 tons of rock. The blast had been carefully arranged under the direction of the manager, Mr. J. J. Thomas. In all, twenty-one bore-holes were drilled into the rock, varying from 13 to 18 feet in length. It was supposed that the main body of the rock rested upon a narrow pillar, which extended to the lower floor of the quarry, and it was decided that this pillar should first be blown away; the other holes to be fired shortly afterwards. For this purpose a series of seven holes were bored into the pillar, and were charged with a preparation of nitro-glycerin and specially-prepared gun-powder. It was arranged that the blast should be fired by means of instantaneous fuse, supplied by Messrs. Bickford, Smith & Co., Ltd., the patentees and manufacturers. The time fuse, working in connection with the instantaneous fuse, was lighted by means of the patent safety fuse lighters, which are also the patent of Messrs. Bickford, Smith & Co., Ltd. Exactly seven minutes after the fuse had been lit, the shot in the seven holes situated at the base of the rock exploded, throwing the whole of that portion into the bottom of the quarry. Then, two minutes later, the remaining holes in the upper portion of the rock went off, and cleared away the whole mass, estimated at about 40,000 tons, precipitating it into the bottom of the quarry.

**THOMSON'S PATENT.**—Mr. James Coultred Thompson, of Brockley, has been successful in his application for the prolongation of the terms of letters patent granted to him in 1888 for 14 years in respect of an invention of "a mechanical fuse for causing the explosion of shells and indicating the number of revolutions performed and distances traversed by projectiles." It was stated by the petitioner that the invention had been taken up by the Maxim-Nordenfelt Company, whose successors, Messrs. Vickers, Son and Maxim, Ltd., were still carrying out costly experiments to prove its value. At present he had received no return, the arrangement being that the Maxim-Nordenfelt Co. had agreed to give the inventor a royalty on all sales effected. It was only now, when he was on the eve of producing a reliable mechanical fuse, that he could begin to look forward to some return for the amount of thought and labour which he had for many years devoted to the subject. In the end, the judges intimated that they would report that, in their opinion, the patent should be prolonged for a term of seven years.

**RIFLES IN SAFES.**—What appears to be the final act in the comedy relating to the rifles and ammunition which were reported to be shipped by Birmingham manufacturers for the use of our brother Boer—for so the earlier rumours of the ha'penny papers interpreted—was played in the West Ham Police Court, where the Birmingham Safe Co., Ltd., were fined £20 for causing to be sent to the Victoria Docks certain goods of dangerous quality—to wit, detonators—without distinctly marking or stating the nature of the goods on the outside of the package, or without otherwise giving notice in writing to the superintendent of the docks at the time of

sending the goods to the docks. The summons was brought at the instance of the Dock Company, and since, in respect to the discovery of obsolete Austrian and Roumanian rifles shipped in the linings of the safes, there had been a Government prosecution, and the defendants had also been fined £100 under the Explosives Act in regard to the detonators similarly concealed, it is to be assumed that for the future people who wish to send this sort of curio to the Persian Gulf or elsewhere will be content to ship them in the ordinary and legitimate manner, or not at all, according to the regulations governing importation at the other end of the journey. The affair of the detonators was certainly of sufficient gravity to merit the heavy penalties inflicted.

**THE MIDDLESEX GUN CLUB.**—According to the balance-sheet and the report of the Hon. Secretary of the Club, there is a profit on the year's working up to June 30th last of nearly £41. We regret to learn, however, that this surplus is entirely due to the one item of the 9th Championship Meeting, without which there would have been a loss of £2 10s., since this meeting yielded the club a profit of rather more than £43. The membership roll of the club has declined somewhat, the present muster being 106, or 8 less than in the preceding year; on the other hand, there have been more shooting meetings during the season 1901-2 than in the preceding twelve months, but without resulting in a greater destruction of clay-birds. It seems that the sport of clay-bird shooting requires a slight fillip at the present time, and it is to be hoped that this stimulus will have been provided by the 10th Championship Meeting of the I.B.S.A., which took place on the attractive grounds of the Middlesex Gun Club on the 17th, 18th, and 19th ult., under most favourable climatic conditions.

**DYNAMITE ON THE RAND.**—Considerable perturbation is expressed in some circles by the announcement that the Executive Committee of the Transvaal Chamber of Mines recommends the imposition of an import duty at the coast from 5s. to 7s. 6d. per case on dynamite. The proposal seems to run entirely counter to the recommendations of the Concessions Committee, which were to the effect that the local factory was to receive no favour in competition with imported dynamite. It must be remembered, however, that the proposed measure does not constitute a monopoly for the Modderfontein factory, as was the case under the late Transvaal Government. According to the terms stated, the advantages of protective tariffs would be afforded to all South African manufacturers of explosives, and at the present time even this includes a most formidable rival to the Modderfontein establishment in the new De Beers factory. Apart from other considerations, the object intended to be reached by the adoption of a protective duty is undoubtedly that of giving encouragement to the local manufacturing industries, which are expected to pay their share of the War Bill. Whether the advantages and disadvantages of the measure are for the greatest good of the greatest number or not, the proposal seems at first sight too nearly on the lines obtaining under the Kruger régime for it to meet with the enthusiastic support of manufacturers of explosives who have no interests in the South African factories now existing.

**BOYD v. SAFETY EXPLOSIVES CO., LD.**—Mr. Harold Boyd, an engineer and inventor of explosives, brought

an action in the King's Bench Division, on the 14th ult., against the Safety Explosives Co., Ltd, claiming £90 for arrears of salary as consulting engineer, and £1,200 for wrongful dismissal. In 1897 Mr. Boyd had been appointed manager of the Company formed to acquire Fumelessite, which was subsequently taken over by the defendant company. On July 30th, 1901, a written contract was entered into by the defendants with Mr. Boyd, whereby he became their consulting engineer, and it was claimed for the defence that Mr. Boyd did not comply with the terms of the agreement. In the end, however, the jury found for the plaintiff for the salary claimed, together with £150 damages for wrongful dismissal, £240 in all, and judgment was given accordingly.

## CORRESPONDENCE.

### THE "SWIFTSURE PROJECTOR."

TO THE EDITOR OF *Arms and Explosives*.

DEAR SIR,—Our attention has been drawn to the notice in your last issue of the "Swiftsure Projector," introduced by Messrs. Cogswell & Harrison, which you term a new hand-flinger for clay-birds, and you state that this firm are being repaid for their enterprise in introducing this instrument.

As the inventors of the "All-angle Bird Flinger," made by Westley Richards & Co., Ltd., we object to the projector being even called a new type of our hand device.

In our original experiments, before we drew up our patent specification, we found that the attachment of the ordinary trap-holder to a handle, which is now introduced as a new idea by the firm in question, to be too clumsy and heavy, and we rejected it on that account, and eventually designed our patent wire-holder in connection with the handle, which, we think, experience has proved to be the best means of projecting birds by hand.

We trust that you will publish this letter, as otherwise your notices might lead many people to suppose that the "Swiftsure Projector" was an original device, instead of being an inferior imitation of our patent.

Yours faithfully,

Moor Street, Birmingham,  
July 9th, 1902.

C. & F. PIKE.

[We publish this communication, while deploring the spirit actuating its authors. We expressly dissent from the statement that the "Swiftsure" is an inferior imitation of the Pike patent, and we see no reason whatever to modify in any degree the remarks made in our June issue in reference to Messrs. Cogswell & Harrison's new Hand-Flinger.—EDITOR A. & E.]

## APPLICATIONS FOR PATENTS.

JUNE 23—JULY 26, 1902.

- 14,189. Automatic Pistols. T. K. North.  
14,190. Charger for Revolvers. H. L. Samuel.  
14,298. Gun Carriages. A. T. Dawson and G. T. Buckham.  
14,440.\* Ordnance. W. L. Wise (Agent for *K. Birkeland*).  
14,458. Small-Arms. T. W. Webley (Agent for *F. I. Murray*).  
14,585. Blasting Explosive. J. Wetter (Agent for *Westfälisch-Anhaltische Spreng- u. Actiengesellschaft*).  
14,663. Gun Cleaning Preparation. G. P. Busbridge.

- 14,681. Cartridge Cases. A. Barrallon.  
14,697. Cartridge Cases. The Metals Corporation, Ltd., and S. Cowper-Coles.  
14,708. Naval Ordnance. A. G. Bloxam (Agent for *A. von Péchy and V. Rea*).  
14,838.\* Cartridge Cases. A. T. Duncan.  
14,840. Range Finder. G. Brown and J. J. Hicks.  
15,058. Cartridge Wads. F. Garrett.  
15,147.\* Range Finder and Sight. W. L. Wise (Agent for *The Bethlehem Steel Company*).  
15,251.\* Sight for Small-Arms. C. F. P. Stendebach.  
15,259.\* Explosives. R. W. Scott.  
15,267. Collodion. E. J. Bevan.  
15,285. Projectiles. A. Grey and H. W. M. Gabbett-Fairfax.  
15,307. Single-Trigger Mechanism. E. C. Green.  
15,414.\* Projectiles. C. F. P. Stendebach.  
15,480. Ordnance and Small-Arms. A. M. Jacobsen.  
15,493. Explosive. A. Fischer.  
15,504.\* Gun Carriages. C. D. Abel (Agent for *Rheinische Metallwaren und Maschinenfabrik*).  
15,525. Aid in Aiming. J. Cohen.  
15,605.\* Ordnance. H. Ehrhardt.  
15,648.\* Ordnance. C. A. Sloane.  
15,676. Sighting of Ordnance. A. T. Dawson and J. Horne.  
15,686. Targets. J. A. Dickie.  
15,712. Air Guns. F. S. Cox.  
15,830. Machine Guns. W. G. Potter.  
15,894. Projectiles. S. Stückgold.  
15,903. Detonators. F. G. Beutner.  
15,962. Ordnance. A. T. Dawson and G. T. Buckham.  
15,975. Ordnance. A. T. Dawson and G. T. Buckham.  
15,980. Projectiles. P. Bergna.  
15,998. Range-Finding. W. L. White.  
16,141. Drop-Down Guns. W. Baker.  
16,211.\* Blasting Cartridges. J. Reinelt and J. Nowarra.  
16,329.\* Automatic Fire-arm. T. Bergmann.  
16,437. Torpedoes. J. Whitehead.  
16,456. Recoil Brakes. E. J. Mead.  
16,477. Single-Trigger Mechanism. H. W. Holland and T. Woodward.  
16,582.\* Rifle Mechanism. C. Francotte.  
16,583.\* Rifle Mechanism. C. Francotte.

\* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

JUNE 28—JULY 24, 1902.

COMPILED BY H. TARRANT.

- 6,172 (1901). **Rammers for Ordnance.** A. T. Dawson, London, and J. Horne, Barrow-in-Furness. Improvements in rammers consisting in the provision of apparatus whereby the rammer may be adjusted accurately to the proper loading position relatively to the gun at any usual angle of elevation. Accepted June 23, 1902.  
8,821 (1901). **Ammonia Explosives.** F. Volpert, Germany. A method of employing roots containing resin or starch, or both, in the manufacture of an explosive, the base of which is nitrate of ammonia. The use of these roots imparts to the mixture a property of ensuring a certain incoherence of the explosive, despite all pressing or stamping into the blast-hole. Accepted June 25th, 1902.  
13,005 (1901). **Rifle Sights.** J. McNaughton, Edinburgh. A method of allowing for wind on a rifle back-sight consisting in actuating a sliding part by means of a rack and pinion. A milled-edged metal button is the medium through which the rack is shifted. Accepted June 5, 1902.  
13,045 (1901). **Automatic Fire-Arms.** E. R. S. J. Hallé and Marguerite E. Ribbentrop, Kensington. Mechanism of the semi-automatic type suitable either for small-arms or machine-guns. A strong spiral spring does all the work, whilst undergoing only a compression of about three-quarters of an inch. Accepted June 25, 1902.  
13,382 (1901). **Recoil-Operated Small-Arms.** E. Harrison and J. V. Bonel, London. Recoil-operated mechanism for small-arms, in the operation of which the backward movement of the barrel is sufficient only to unlock the bolt. The object of the small movement is to allow an extended travel to the bolt, so that sufficient space is provided for the re-loading and cocking operation. Accepted June 5, 1902.

- 13,394 (1901). **Recoil-Operated Small-Arms.** A. W. Schwarlose, Germany. A toggle joint breech-closing device for automatic arms, so arranged that the return of the breech bolt is effected in two unequal movements, the last part of the movement being checked by the jointed connection instead of increased. Accepted June 19, 1902.
- 14,231\* (1901). **Smokeless Gunpowder.** C. O. Lundholm, Stevenston, and Nobel's Explosives Co., Ltd., Glasgow.
- 14,982 (1901). **Projectile Fuses.** A. T. Dawson and G. T. Buckham, London. A combined time and percussion fuse in which a setting ring governs the amount of time that will be occupied by the burning of the firing composition, which is arranged in concentric grooves. Accepted June 19, 1902.
- 15,067 (1901). **Automatic Small-Arms.** R. Frommer, Hungary. In order to prevent the recoil involuntarily discharging the whole of the cartridges in an automatic rifle, the sear is returned to a position ready to hold the hammer at cock, no matter whether the trigger is released or not. Accepted June 5, 1902.
- 15,364 (1901). **Firing Mechanism of Ordnance.** C. Holström, G. A. Kohler, and A. E. Mascal, Glasgow. This patent relates to firing mechanism of ordnance, and describes safety devices for preventing premature discharge. The mechanism is adapted either for electric or percussive firing, and is so arranged that until the block is locked in the breech the gun cannot be fired. Accepted June 5, 1902.
- 15,514 (1901). **Electrical Primers.** H. T. Ashton, Woolwich. In electrical primers the soldering of the wire bridge is dispensed with, the bridge being disposed between two plugs of soft metal held apart by distance pieces of insulating material. Accepted June 25, 1902.
- 15,830 (1901). **Machine Guns.** J. J. Keattch, Erith. A machine gun which is so constructed that it may be used either in actual warfare or for theatrical purposes, in which a cylinder is provided with a circle of cartridge chambers. The cylinder is rotated about a central pin, and is so worked that as each chamber is rotated to the breech of the barrel the firing bolt is released and the cartridge discharged. Accepted June 12, 1902.
- 16,160 (1901). **Pockets for Cartridge Belts.** A. J. Boulton (Agent for A. Mills, U.S.A.). A pocket, adapted to contain a first-aid package for the wounded, which is woven in one with a flap which serves as a cover. The pocket is attached to a cartridge belt. Accepted July 3, 1902.
- 16,612 (1901). **Telescopic Sights.** A. König, Germany. A prismatic sighting telescope, in which the eye-piece axis and the object-glass axis incline towards one another in such a way as to be more distant from each other behind the eye-piece than before the object-glass. Accepted June 19, 1902.
- 16,647 (1901). **Range Finding.** A. H. Marindin, Droitwich. A cheap instrument, constructed after that form of range-finder in which two prisms or mirrors, mounted near the ends of a tube or support, reflect half images through central prisms into an eye-piece, one of the end prisms being capable of adjustment by means of a micrometer screw. Accepted June 19, 1902.
- 17,179 (1901). **Small-Arm Cartridge Clip.** Sir W. G. Armstrong Whitworth & Co., Ltd., and J. W. G. Simonds, Newcastle-on-Tyne. A clip designed to hold a charge of cartridges ready for insertion in the magazine of a Lee-Netford. The magazine of the rifle is, by the use of this clip, loaded rapidly, and the cut-off is closed over the last cartridge. Accepted July 3, 1902.
- 17,336 (1901). **Gun Mountings.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and R. T. Brankston, Newcastle-on-Tyne. This patent relates to the provision of a convenient method whereby a high angle of elevation may be obtained, whilst at the same time allowing of the gun being mounted low down in order that the centre of gravity may be as low as possible when travelling. Accepted July 3, 1902.
- 17,472 (1901). **Gunnery Instruction.** E. Rosensvärd and N. Telander, Sweden. A platform which is movable in such a manner as to admit of imitation of the movements of a vessel at sea. The platform is used on land for the instruction of seamen in gunnery. Accepted June 25, 1902.
- 17,926 (1901). **Gun Carriages.** A. Reichwald (Agent for Fried. Krupp, Germany). The patent relates to that type of apparatus described in a former Patent, No. 23,345, 1897, for regulating the recoil and return of guns provided with an automatic return device. The apparatus is simplified without detracting from its efficiency of working to any appreciable extent. Accepted July 3, 1902.
- 18,973 (1901). **Safety Device for Small-Arms.** J. Tambour and C. Colbert, Austin. A locking device for small-arms consisting of a lever, the nose of which engages the hammer-locking mechanism and only permits of the release of the hammer when the hand completely embraces the grip and so presses the lever inwards. Accepted July 3, 1902.
- 19,253 (1901). **Report Destroyer for Fire-arms.** R. St. George Kerke, Woolwich. (This specification is a secret document).
- 20,019 (1901). **Electric Fuses.** H. and H. Tirman, Austria. A machine by means of which a number of electric fuses may be uniformly adjusted or set up so that the corresponding conducting wires can be uniformly held during each operation, so as to maintain their positions in the insulating material of the fuses. Accepted June 25, 1902.
- 5,254 (1902). **Cartridges.** C. A. Henry and J. von Lengerke, U.S.A. A method of producing a cheap and simple cartridge consisting broadly in a flanged head, a tube, and a breech-piece, having a portion of its periphery embedded in the tube, the breech part being forced into the flange of the head. This method of construction leaves no possible chance of the head becoming detached from the tube when extracting the case from the chamber of a fire-arm. Accepted July 3, 1902.
- 6,365\* (1902). **Falling Block Rifles.** The Webley and Scott Revolver and Arms Co., Ltd., and T. W. Webley, Birmingham.
- 6,925 (1902). **Blasting Cartridges.** T. F. Durham, U.S.A. A method of producing a blasting cartridge at a small cost. The cartridge is one of that class in which the blasting material is contained within an inner receptacle, which is inserted within an outer casing filled with a fire-extinguishing agent, so that the charge is entirely surrounded by a material adapted to smother the flame arising from the explosion. Accepted June 12, 1902.
- 7,143 (1902). **Ordnance.** K. Haussner, Germany. In order to reduce the weight of the return spring in ordnance to a minimum, the device described in this patent is used to attain, upon the advance of the gun, a constant, or almost constant, exertion of power by a spring or air accumulator. Accepted June 5, 1902.
- 7,144 (1902). **Gun Carriages.** K. Haussner, Germany. By means of an arrangement of the brake cylinder, which guides the gun barrel, and the barrel, and the barrel carrier, with a vertical pivot, an adjustable elevation is produced in a light gun carriage without the aid of complicated mechanism. Accepted June 5, 1902.
- 10,607 (1902). **Sights for Fire-arms.** F. J. Gee and W. J. Chuffer, India. A back sight for rifles, in which the bar is movable from side to side for the purpose of allowing for wind. The bar is worked up and down the leaf for elevation by means of a fine screw. Accepted June 25, 1902.
- 11,318 (1902). **Ordnance.** G. Ehrhardt, Germany. This patent relates to a further form of construction of the means for locking the pivot gudgeon to the axle in pivoting guns described in a former Patent, No. 25,294, 1901. Accepted June 25, 1902.

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

## SELECTED PATENTS.

### SMOKELESS GUNPOWDER.

14,231 (1901). C. O. Lundholm, Stevenston, and Nobel's Explosives Co., Ltd., Glasgow. In order to lessen the erosion caused in a gun-barrel by the gases of combustion, and, at the same time, to maintain the requisite chemical and physical stability and ballistic properties in a smokeless gunpowder, the patentees mix di-amylphthalate with the active ingredients of the powder. It has been discovered that the addition of this mixture in varying quantities to an active powder brings about a great reduction in the erosion, whilst the ballistic properties of the explosive are maintained.

The quantity added, of course, depends upon the nature of the powder required, and it may be used not only with a powder consisting solely of active ingredients, but also with one containing a certain amount of moderating ingredients, provided that they are

not by themselves of a nature to interfere with the physical and chemical stability of the powder. The following are some samples of compositions embodying this substance:—

		1	2	3	4	5	6	7
Nitrocellulose	Soluble	..	—	60	60	—	—	90
	Insoluble	..	60	60	—	97.5	90	—
Nitroglycerin	..	..	30	30	30	30	—	—
Di-amyl-phthalate	..	..	10	5	10	5	2.5	10
Mineral Jelly	..	..	—	5	—	5	—	—

Of soluble nitrocellulose the patentees have tried both pyrocollodion and lower degree of nitration. Accepted June 25, 1902.

#### THE WEBLEY FALLING-BLOCK RIFLE.

6,365 (1902). The Webley and Scott Revolver and Arms Co., Ltd., and T. W. Webley, Birmingham.—In this patent a rifle of the falling-block type is described, in which the whole of the hammer and cocking mechanism is mounted upon the lever, by means of which the falling-block is raised and lowered. By this means accommodation is provided for a longer mainspring than is usual, and a greater throw is imparted to the hammer. Accidental discharge, due to the sliding of the block over the base of a live cartridge, is prevented by such an arrangement of the block within the shoe that the downward movement of the block is combined with a slight rearward movement when lowered to open the breech.

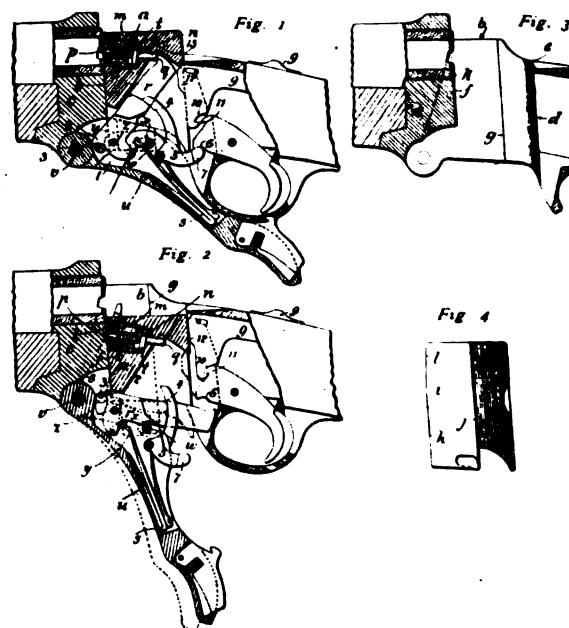
Referring to the appended illustrations, it will be seen that the falling-block *a* works in a guide *b*, cut in the shoe *c*. This guide is at open both top and bottom, and the back wall *d* is cut away at *e* in order to allow of the introduction or withdrawal of a cartridge into or from the chamber when the block is lowered, as in Fig. 2. The face *f* (Fig. 3) of the front wall of the shoe slopes slightly rearwards from top to bottom; and upon its sides the ribs *g* are arranged, which are also sloped from top to bottom, so that they are parallel with the inclined face *f*. A part *h* of the face *i* of the falling-block (Fig. 4) is inclined, to correspond to the inclination of the shoe face *f*, against which it works, whilst the opposite sides of the block have inclined shoulders *j*, corresponding with, and adapted to slide upon, the guide shoulders *g* of the shoe. It will be readily understood that through this construction a slightly oblique course is assumed by the block during its rise and fall. The face *k* of the barrel is, however, set exactly in a vertical plane, as also is the upper part *l* of the front face of the block. When the breech is closed, the opposed vertical faces *k* and *l* are in close contact.

An inclined plug *m*, carrying the striker *n*, is screwed into the front of the block, as is illustrated. A spring *o* is provided, which tends always to hold the striker in the position shown in Fig. 2, with its nose *p* flush with the face of the plug, and with its end *q* protruding into the clearance at the back of the block. The hammer *r* swings into this clearance when released by the pulling of the trigger, and is forced by the mainspring *s* against the end *q* of the striker. The nose *p* of the striker is chamfered, in order to ensure that it shall lie flush with the face of the plug when the striker is fully withdrawn by its spring. The striker is prevented from turning in the plug by the collar *t*, which is of irregular shape, and slides in a recess of corresponding form.

When the block is in its raised position, the vertical surface *l* is in close contact with the vertical end *k* of the barrel, and bears against the head of the cartridge in the chamber. When the hand lever *u* is turned downwards, in order to lower the block and expose the breech, the sliding movement of the inclined surface of the block upon the corresponding fixed incline of the shoe causes the vertical

face of the block to leave the flat end of the barrel and to move out of contact with the head and cap of the cartridge by a rearward movement. The sliding of the block over the cap is thus prevented, and the risk of accidental discharge due to the rubbing movement of the block over an undischarged cartridge is obviated. Before the descent of the block, the hammer is also disengaged from the striker end by the first part of the movement of the lever *u*, so that the nose of the striker is fully withdrawn.

The lever *u* is pivoted at *v* to the forward end of the underside of the shoe *c*, and it is connected with the falling-block by the engagement of the pin *w* with the horizontal slots *x* in the block extensions *y*. The hammer *r* is pivoted at its lower end to a pin *z* disposed across the longitudinal recess *1* cut in the top of the lever. In this recess the whole of the lock mechanism is mounted. The toe *2* on the forward edge of the hammer is so engaged by a fixed pin *3*, that when the lever is turned down the hammer is forced round upon its



pivot until it is caught and held by the bent *4* cut upon the sear *5*. The arrangement of the sear, mainspring, and hammer in relation one to another will be clearly understood upon examination of Figs. 1 and 2. When the trigger is pulled, its forward edge *6* is caused to press against the arm *7* of the sear, and so to disengage the bent *4* from the hammer. This disengagement frees the hammer, which is impelled forward by the mainspring, and is caused to impinge against the striker.

When the block has been lowered to its full extent, the lever is allowed a little extra movement (as indicated by the dotted lines in Fig. 2) through the slot and pin connection between the lever and block. This further movement acts upon the extractor *8*, and causes it to jerk the spent cartridge out of the barrel. The lever slightly compresses the mainspring during this additional movement, and when the cartridge is extracted the lever is carried back by the spring to the position shown in full lines in Fig. 2.

The safety slide *9* is so arranged that a hook *10* thereon is adapted to engage a hook *11* upon the trigger when in the position illustrated in Fig. 2. The slide is automatically pushed back into the locking position every time the block is lowered by means of the cam *12* upon its forward edge, which is wiped during the block's descent by an incline arranged at the back of the block. The slide is taken into its forward position as in Fig. 1 by the thumb-piece *9* on the top of the grip. Accepted June 5, 1902.



# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>ROUND THE TRADE ...</b>	<b>140</b>
Ordnance Administration ...	131	<b>REVIEW:</b>	
A Lecture on Cartridge Cases ...	131	The American Rifleman's Encyclopedia ...	141
The Shooting Season ...	132	<b>STANDARD MINIMUM CHAMBER SIZES ...</b>	<b>142</b>
The late Mr. R. G. Joyce ...	132	<b>APPLICATIONS FOR PATENTS ...</b>	<b>143</b>
<b>THE NEWEST CHAMBER SIZES ...</b>	<b>132</b>	<b>SPECIFICATIONS PUBLISHED ...</b>	<b>143</b>
NOTES ...	132	<b>SELECTED PATENTS:</b>	
<b>ARMS IN THE TRANSVAAL ...</b>	<b>134</b>	Gun Sighting Apparatus ...	145
MR. F. W. JONES ...	135	Baker's Selective Single-trigger Mechanism ...	146
<b>A NITRO POWDER CHART ...</b>	<b>137</b>	A New Explosive ...	146
<b>LECTURES TO YOUNG GUNMAKERS, XVI.—CARTRIDGE CASES ...</b>	<b>138</b>		

## CURRENT TOPICS.

**Ordnance Administration.**—Our friend "Cyclops" frequently finds material for his own particular kind of humorous commentary in the doings of our War Office. An acquaintance of ours recently pointed out an anomaly which encourages us to enter into rivalry with him on this occasion. He was discussing the importance and the far-reaching consequences involved in the decisions of the Ordnance Committee, which is, of course, the best body of experts that our War Department can bring together for dealing with a certain class of specialised work. Now it appears that the Under Secretary of State for War is *ex officio* Chairman of this Committee, and hence the value of their deliberations is largely affected by the manner in which this official supervises the debates. Bearing in mind the extremely technical character of the Committee's work, the Chairman is placed at a very serious disadvantage, since he is appointed to his high office from political motives rather than on account of inherent capacity for appreciating the merits of rival views on ordnance problems. Of course, it only happens once in a way that the Under Secretary knows as much about ordnance as Lord Raglan did. It was by accident that he had taken a close interest in the practical work that was done at the factory where Cannonite Smokeless Powder was originally made. This, added to the special study which he devoted to the behaviour of Cordite, enabled him to know a great deal more than can be expected from the ordinary run of Under Secretaries. Now that Lord Raglan has been appointed Governor of the Isle of Man, his successor will take over the chairmanship duties with regard to this and other committees, which will uselessly occupy a large proportion of his time

that would be better devoted to pursuits more within the range of intellect of a man who has not had time to specialise in the bye-paths of scientific knowledge.

**A Lecture on Cartridge Cases.**—Our lecture this month takes up a subject which cannot avoid being of interest at a time of year when cartridge loading is very nearly at its busiest. The different forms of case issued by the various manufacturers run in a series of grades, each grade marking the change of quality from the adjoining one on the list. By recognising what the constructional differences really are, and applying the observations so made to the examination of cartridge cases offered for sale, the gunmaker will be able to appreciate probably better than before wherein lies the differences that have such a marked effect upon prices. In a similar manner we shall hope to deal in future with the various grades of wadding, where there is, of course, a far greater margin of difference, and much more important opportunities for making such selection as will ensure the best results, commensurate with the prices for which cartridges have to be put together. If the young gunmaker has taken our advice by equipping himself with the various measuring instruments which have been described in previous lectures, he will be able to bring to bear in the examination of wadding the power for close examination that will greatly enlarge the range of his information. In fact, it is by following on a reduced scale the scientific methods adopted in the large factories, that the small loader will be able to keep pace with the demand for a greater exactitude of work than was in evidence a few years back. The large variety of nitro powders now on the market increases the necessity for close attention to this department of business, since the gunmaker

who would maintain an efficient loading shop must produce equally as sound a cartridge as is turned out from those factories which devote individual attention to a much smaller range of nitros.

**The Shooting Season.**—Previous to the commencement of grouse shooting in Scotland, the papers were filled with the most gloomy anticipations of the quality of the sport to be expected. The prophets were all agreed that sport would be of the worst possible description, and they quoted in favour of their arguments the disastrous weather that had reigned supreme during the breeding season. In this they certainly had *prima facie* reasons for anticipating the worst, and they did not fail to make use of the opportunity it afforded for crying pessimism. As a matter of fact, there is probably nothing that is quite so difficult to estimate in advance as the quality of shooting that will be met with on a moor on the 12th of August. The birds are not in evidence until they are put on the wing by the dogs, and hence whether there is a large stock or a small one cannot well be foretold in advance. There was, however, one gleam of hope which seemed generally to be lost sight of, though it found mention in our own columns. It was the absence of reports of disease practically throughout the moors. Our contemporary, *The County Gentleman*, which is usually very well informed on these points, explained that the stock of birds left on the moors last year was an exceptionally fine one, and it pointed out that if the rearing season had been in any wise favourable, the present year would have been the record one of the generation. Unfortunately, this did not come about as was hoped, so that there were two reasons favouring a good stock of young birds, and one very much against it. Things have turned out to be not nearly so bad as was anticipated. The bags have certainly ruled some 20 per cent. less than last year, though the actual figures are very near the average over a more extended period. Under these circumstances there is an opening for congratulation, because when one expects the worst there is a great deal of comfort in finding things much better than the forecasts led one to anticipate. We must hope that a similar state of affairs will prevail in regard to the other classes of game that are now coming into season, though unfortunately orders for cartridges, which are a fine index of what is doing, show a tendency to stagnation that is much to be deplored. This, again, may only be an after result of the bad accounts that have been prevalent, so that there is still an opening for hope that partridges and pheasants will show very much the same tendency to improve on forecasts as grouse have up to date been able to do.

**The Late Mr. R. G. Joyce.**—We regret to record the death of Mr. R. G. Joyce, whose connection with the well-known firm of ammunition manufacturers dates back over a great number of years. It was about fifty years ago that he succeeded to his father, and carried on the business in partnership with his brother, and things so continued until the year 1878, when the brother was killed in an accident at the firm's factory at Waltham Cross. Subsequently to that sad occurrence, the business was carried on by Mr. R. G. Joyce as chief partner until the year 1888. A company was then formed, and the subject of our present notice became one of the directors, a position he retained until his retirement in the year 1897. This all too brief summary of his career at least gives some

indication of the very practical touch which Mr. Joyce retained with the work of a business for which he was so long the person chiefly responsible. Those who are in any wise familiar with the vast amount of detail that is involved in the manufacture of the varied assortment of cartridges, such as the firm of Joyce have always listed in their catalogue, will realise the responsibility involved. Admittedly he had the benefit of valuable co-operation from the officers and staff under him, but the fact remains that he never shirked responsibility, and was always able to take the lead where his guidance and ripe experience were needed. His worldly career ended by his death on August 23rd, at his residence, "Clareville," situated in that beautiful part of Surrey known as Caterham Valley. He was 72 years of age.

## THE NEWEST CHAMBER SIZES.

FROM A CORRESPONDENT.

The issue during the past few days by the Gunmakers' Association of a revised set of chamber sizes will doubtless be received with interest by the trade; but at the same time it must not be forgotten that gunmakers have, by now become accustomed to the issue of notices upon this important question. It is not as yet certain what reception will be accorded to the latest arrival in the way of concrete dimensions. Admittedly, the principle of a uniform cone for the walls of all chambers will confer an untold benefit upon the gun trade, and in a similar manner the establishment of some sort of relation between the various dimensions of the case will simplify practical working. In fact, it is to some extent a remarkable incident that the need for at least a uniform cone was not previously recognised in a suitable manner. The maintenance of specified diameters for the rear and forward ends of 12-bore chambers irrespectively of their length, introduced a source of complication which ought, when these things were originally under discussion, to have been appraised at its proper value. Further satisfaction is to be found in the establishment of sizes for all the other calibres in general use, apart from the 12, 16 and 20-bore sizes which were dealt with as a first instalment.

On the other hand, we believe we are right in saying that no one can view otherwise than with regret the significant omission of the names of the ammunition manufacturers, as compared with the previous card, in which their concurrence with the then published sizes was publicly announced. As far as we can understand, this omission has arisen mainly from a disagreement concerning the length of the nominal  $2\frac{1}{4}$  in. case, which is frequently spoken of as 2 and 9-16ths of an inch long in recognition of its excess over the nominal size. Now, as a matter of fact, the reduction in length of this cartridge from 2.56 ins. to 2.5 will probably introduce as much error as the settlement of the sizes in other directions should in the course of time remove. So long as existing guns are chambered for the old length of case, and so long as the present length of cartridge continues to be observed, the published sizes of the Gunmakers' Association will carry their own evidence as to want of harmony with the practice of the trade.

Under these untoward circumstances, we think that the effort to force a change which can never be made is unfor-

tunate in the extreme, and it will tend materially to retard the advance which has been earned by the earnest work of the Association in other directions. No one can afford to lay out money in gauges so long as this important point remains unsettled by mutual agreement. That it cannot be settled in favour of the Gunmakers' Association we believe to be the case, because the whole science and practice of cartridge loading has been built up around a size of case which necessitates for its satisfactory working the greater length which has so long been customary. As we speak to a practical audience, we will not labour the necessity for strict conformity between the length of the chamber and the length of the cartridge, since variance in this respect is one of the most pregnant causes of unsatisfactory behaviour in a gun by ammunition which would be quite satisfactory were the conditions right.

Granting, as one must, this most obvious truth, we can only deplore an act which tends to disqualify the tens of thousands of guns that have been chambered to the proper length as hitherto recognised. We must, of course, credit the Gunmakers' Association with a proper power of recognition of the importance of a correct agreement as between the length of the cartridge and the chamber; because to assume that they consider a divergence of .060 of an inch to be immaterial, is to abandon most of their arguments in favour of standardising the sizes of gun chambers and cartridges. This note is written from an entirely detached standpoint, and, if it appears to mark a strong disagreement with the action of a body which in these columns has hitherto received cordial support, the apparent change of attitude must be ascribed to an intention to deal in a spirit of complete independence with all subjects that come up for treatment.

## NOTES.

**AN OFFER TO RIFLE CLUBS.**—Mr. W. W. Greener has set a noteworthy example to his brother gunmakers by making a very handsome offer of a standing prize of £5 to all members of rifle clubs who, shooting with the Greener "Sharpshooter" Rifle, may make scores equal to the winning scores at Bisley in the "Greener" competition, under similar conditions. The scores must, of course, be duly verified, but the fact remains that it is open to any member of a rifle club to win the sum named provided he complies with the conditions referred to, and can shoot straight. The effect of this offer will undoubtedly be to encourage rifle-shooting, and it is to be hoped that Mr. Greener will reap his reward for this mingling of generosity, patriotism and sound commercial enterprise, in the shape of an increased sale of the already popular "Sharpshooter Club" rifle.

**THE MARLIN CATALOGUE.**—If there is one particular in which Americans are pre-eminently remarkable in their business methods, it is in regard to their mastery of detail and the painstaking thoroughness with which they place every item of interest in connection with the goods they have to sell before the prospective purchaser. This fact is brought prominently to notice at the moment by an inspection of the latest catalogue issued by the Marlin Fire-Arms Co., of New-haven, Conn., which consists of some 120 pages of close matter. The subject is divided into three parts, the first 50

pages being devoted to lists and full descriptions of each model of Marlin rifle or shot gun on the market. Not only are there detailed drawings of each separate part of the mechanism of each model, and particulars of the price for each variation of accessories in each model, but the ammunition, tools, sights and other fittings, and even different styles of engraving for the breech shoe, to the number of well over a score, and the different checkings adopted for the stock and fore end, are elaborately illustrated and described. The second part deals with the manufacture of these well-known arms, with every type of ammunition they are adapted to shoot, and with a wonderful list of bullets that may be tried by those experts, chiefly American, who like to do their own loading and reloading. Part III. deals with the care of rifles, and at the end are tables for the use of those who do their own loading.

**THE JARVIS MILITARY SADDLE.**—We have received from the inventor, Mr. J. Jarvis, of 42, New Broad Street, E.C., a pamphlet descriptive of a very handy-looking form of rifle clip for use by military cyclists. Our illustration shows the position in which the rifle is held, but the interesting feature is the manner of its attachment. The cycle saddle is made in two parts, with a hinge attachment; and the rifle is pushed through the seat, being there held by a closing action of the saddle, whereby the rifle is firmly gripped in two places about ten inches apart, so that it rides nicely and is easily accessible.



**TECHNICAL INSTRUCTION IN THE GUN TRADE.**—It appears that the technical classes for young gunmakers which were established in connection with the Birmingham Proof House are not receiving an adequate measure of support. Mr. A. A. Bonehill has written pointing out the shortcomings of the system, and suggesting certain practical improvements with a view to increasing the usefulness of the school. He writes: "As was anticipated, the attendance has fallen off, owing, no doubt, to the disinclination of youths to start work again after the fatigue of their ordinary day's labour. I would, therefore, suggest that the classes should be so arranged that the time spent at them should practically come out of the ordinary day's working time, and I would appeal to masters to allow students to leave work, say, at 4 p.m., so as to arrive at their classes at 5 o'clock, and work until 8." Mr. Bonehill has recently inspected the Technical School at Liège, where a day school for the training of young gunsmiths has been established. The school opens at 8 a.m., and continues until 4 p.m. in the summer, the time for beginning in winter being half an hour later than in summer. Each pupil receives remuneration at the rate of about 2½d. per day. Reverting to the Birmingham School, he points out that it is absurd to expect that a school of a dozen or two of lads can supply sufficient workmen for the requirements of the gun trade. In Belgium, the cost of the school is defrayed

jointly by the gunmakers, the Proof House, and the State, and he urges that some similar arrangement should be made in this country if the English gun trade is to maintain its position. Recent figures with regard to the barrels passing through the Proof Houses in Birmingham and at Liège seem to give point to Mr. Bonehill's appeal.

**AUTOMATIC RIFLES.**—The dawn of the day when automatic rifles shall be the practicable armament of every civilised military power seems almost at hand. Hitherto the application of the automatic action to shoulder arms has appeared to present exceptional difficulties, due in large measure to the length and weight of barrel, and shape of ammunition, more or less common to all such weapons, as well as to the necessity for keeping the recoil-operated mechanism within reasonable limitations of space and weight for handling and balance. For several years past, however, numerous inventors have been at work on the problems involved, and at the present time it would be hard to name any first-class Power, except perhaps our own, which is not engaged in considering and testing one or more patterns of automatic rifle. Thus Germany is experimenting with a rifle invented by one of the employés of the small-arms factory at Spandau, while Austria looks, and probably not in vain, to Herr von Mannlicher for a self-loading arm that shall stand well abreast of all rivals. It is rumoured that the delay in providing an up-to-date successor of the Lebel rifle is due to trials now being conducted with an automatic rifle by the troops in Algeria. At the same time, the invention of the Mexican military attaché is undergoing secret tests in Paris. Italy has at least two different types of self-operating shoulder-arms under observation. Meanwhile, our own authorities seem to be contented with the mental effort required in the latest "improving" of the Lee-Enfield. One thing at least is certain, that private enterprise in this country has little inducement offered it to produce an automatic rifle suitable for the Services. Were it otherwise, we fancy that both Sir Hiram Maxim and Sir Charles Ross, to name only two likely inventors, have something up their sleeves in this line.

**DOUBLE-EYED ALIGNMENT.**—The famous astronomer, Dr. A. A. Common, has in recent years turned some considerable proportion of his inventive genius in the direction of improving the sighting of guns and small-arms, and few months pass without our having to record in our "Patent" records some new device of his having that end in view. An inspection of the present issue, under the heading of "Specifications Published" and "Selected Patents," shows that his energy and fertility of resource are unflagging in this respect; but there is one of his many apparatus to which we wish to attract special notice, since it deals with an aspect of shooting to which we called attention some three years ago at least. The device in question consists of what may for convenience be called a closed telescopic sight, capable of adjustment for varying ranges, which may be applied to rifle, shot-gun, or pistol with equal success, though preferably the sighting would be more delicate for rifles. The right eye of the shooter looks into this sight and sees the enlarged image of a fiducial mark, which may consist of a dot, diamond or other convenient shape. The left eye meanwhile is fixed upon the object to be aimed at, and the marksman has only to bring the image of

the mark seen by the right eye into superposition on the object seen with the left eye to ensure correct alignment of his weapon. An adaptation of the same principle to telescopic sights is equally provided for. In this case the apparatus would consist of a binocular, or even of a telescope adjusted to be parallel with and to move with the sighting appliance. Suitable provision is made for elevation and for corrections for wind or drift. We devote special notice to this invention, since we believe that it is the first sighting appliance that has recognised and utilised in a practical manner the undoubted advantages of double-eyed alignment, at the same time that it eliminates any confusion that might arise as to which of the sportsman's eyes is the master of the other.

## ARMS IN THE TRANSVAAL.

AN ordinance has been published with reference to the possession of arms and ammunition in the Transvaal Colony which calls for attention. The ordinance directs that within two months all arms and ammunition for which no licence has been issued are to be deposited with a magistrate. Officials will be appointed for the purpose of issuing licences to fit and proper white persons, the fees charged being 10s. for rifles and 5s. for other arms, and the holder of a rifle licence will be entitled to keep a maximum of 200 rounds of ammunition. Licences will expire on June 30th of each year, and every rifle issued will be stamped, none being allowed to be issued except with the concurrence of the chief constabulary officer of the district. Further clauses provide penalties for the possession of unlicensed arms, as well as for the revocation of licences for rifles, for prohibiting the sale of arms to unlicensed persons, for the registration of permits for the transportation of arms, and for compensation to the owners of arms delivered up. Permits for the importation of shot guns, rifles and ball ammunition will be reserved exclusively by the Government, who will sell these articles only to such as are provided with a licence. Holders of rifle licences will, however, be allowed to import sporting rifles and the necessary ammunition. Dealers in arms and ammunition are also to be licensed, and the main supplies of gunpowder possessed by such dealers are to be stored in Government magazines, 50 lbs. of explosive being the maximum that can be stored on the premises of dealers, who will furthermore have to render accounts biennially of the stock of gunpowder in their possession. The Governor has power, under this ordinance, to prohibit the issue of ammunition at any time. So far as natives are concerned, the Commissioner for Native Affairs is empowered to grant licences to native chiefs or headmen to possess fire-arms, but the sale of arms to unlicensed natives is prohibited under heavy penalties. It will be seen from the foregoing brief abstract that the ordinance is of a somewhat drastic nature. On the other hand, in view of the recent cessation of hostilities, the restrictions that are thus put on legitimate sport could scarcely be avoided, and the more so since there is nowadays so thin a dividing line between rifles and ammunition as used for the two diverse purposes of sport and war. To attempt to classify them would be to repeat the remarkable conditions of the Indian Arms Act, compared with which the necessary restrictions herewith imposed on the Transvaal Colony are trifles light as air.

## MR. F. W. JONES.

THE announcement that Mr. F. W. Jones would shortly join Messrs. Eley Bros. was received with great interest by those who come into contact with the parties concerned. It is no light task to undertake the research and investigation department of a firm whose manufactures cover such a wide and intricate field as do those of the well-known Eley firm. Modern methods of manufacture have necessitated greater precision than was necessary years ago. The extension into general use of electrical appliances has made possible a form of investigation that was denied to our forefathers, who were perforce obliged to work out the way to salvation by straying into difficulties, and gradually learning the paths to pursue in order to avoid them. Nowadays the extension of technical education and the bringing of it into closer touch with practical operations, have made it possible to develop a newer and more economical method. The things that seem right at the first guess may be examined in the light of well-informed theory, and as a result they may either be subjected to a further course of examination upon a comprehensive experimental basis, or they may be dismissed as impracticable without wasting time upon them. This power of impartial analysis, first as a preliminary to experiments, and then as a means of examining experimental results, is not given to all of us. To be efficient at it involves special aptitude and a specialised early training. In matters connected with guns, rifles, ammunition, powder and caps, Mr. Jones is gradually becoming the recognised exponent of this method of developing our knowledge and applying what is so obtained to practical ends, though it should be understood that in saying this we mean that his knowledge of the first two is mainly concerned with the points that arise in exhaustively dealing with the two last named.

His career opened in the usual uneventful way some five-and-thirty years ago. When a very young man his inclinations turned in the direction of science, and he was fortunately able to commence a course of serious study. He spent four years at the Nottingham University College, concluding his course there in the year 1887. During that period he engaged in a large variety of studies, and was awarded the Associateship of the College, and also obtained the Ossington Scholarship and a National Scholarship, the latter qualifying the recipient for free tuition at the Royal College of Science, and

carrying a cash payment of £60 per annum. The National Scholarship was at that time awarded on successes at the usual Government examinations, and those he obtained showed him to possess a comprehensiveness of mind which few of us can boast. Out of the 28 subjects of the department, he obtained successes in 19, and these included not only higher mathematics, chemistry and physics, but also those of natural history and such subjects as hygiene and agriculture.

Having got thus far, after the first two years at the Royal College of Science, Mr. Jones felt that his time would be better employed if he could get along with some practical work. He itched to be at it, and sacrificed his third year's tuition, and with it the certainty of an Associateship, in order to take over the duties of chemist to the Smokeless Powder Company. The manager died about sixteen months later, and Mr. Jones was elected in his place. In this way it happened that in his early twenties he became responsible for the working of a very intricate explosives factory with a variety of products to be turned out, whose very composition had hardly been determined.

Naturally, throughout his connection with the Company his own career has been more or less affected by its alternations of fortune, though from the point of view of gaining knowledge nothing could have suited him better than the constant need to enquire into the possibilities of new developments. When the Company first went into business the battle of the rifle nitros was still unsettled, and for various reasons the Company adhered to the guncotton class of explosives, and refused to entertain those containing nitro-glycerin. In order, therefore, to establish a position, it was necessary to manufacture a great variety of powders so as to create the turnover essential to put the concern on a paying footing. With this in view Mr. Jones was called upon to produce rifle powders suited respectively to the Lee-Metford and the Martini types of rifles, to say nothing of revolver powders, and those suitable for use in rook rifles. In addition there was a sporting powder to be turned out in accordance with the demands of the market. It will be seen that such a programme involved close study of a great variety of guns and rifles in connection with the design of appropriate powders and systems of loading. While it is almost impos-



sible to go into detail concerning what this really meant, it will at least be readily appreciated that a successful result could only be obtained by working on scientific lines. That is to say, that in a new class of manufacture with no precedents to follow, a man must work out first principles in order to arrive at a practical result. Mr. Jones's training peculiarly fitted him for the task, and it must be remembered to his credit how far he got at such a comparatively early period in the development of nitro powders for rifles. It should also be remembered that the real turn in the career of the Company came about on account of entirely outside circumstances. Litigation on Cordite had been going along for some time, and the Nobel Trust had failed to make out its case according to English law. Whether or not it was connected with the claims against the Government, the fact remains that the Nobel Trust sought to uphold an almost forgotten patent claiming the manufacture of rifle powders by the use of completely gelatinized nitrocellulose. The very year that the Smokeless Powder Company had declared its first dividend, notice was served upon it for infringement of a ten-year old patent that probably no one had before heard of. The Smokeless Powder Company successfully resisted this claim, but at a cost that it could ill afford.

It was in connection with this litigation that the knowledge which had been acquired by years of patient work first became manifest. After the plaintiffs had stated their case, the Court was thrown into a hubbub of laughter when Mr. Fletcher Moulton explained that so far from completely gelatinising their powder, the defendants carefully avoided such a course, and left a large amount of the original fibre mixed up among the part that had become dissolved. Amusement gave place to serious attention when this truth was demonstrated in Court by the use of the microscope; and subsequently it became known that Mr. Jones had been able to bring forward overwhelming proof of his contention. Bearing in mind the many branches of science that were put under contribution to prove this case, it may be pronounced a veritable triumph for Mr. Jones, though in such a connection it would be ungenerous to omit mention of his colleague, Mr. Duff Grant, who took charge, on behalf of the Company, of the general direction of the case. Since that time the work of the Company has progressed, but it has never attained full activity, so that the announcement of the early closing down of the factory did not come as a surprise.

The fact that Mr. Jones will join Messrs. Eley, and that the firm will erect a new laboratory calculated to do justice to the work that it will be called upon to perform, will go far to show that the coming years of his life will not be spent in idleness. It would be a highly improper proceeding on our part were we to endeavour to formulate the particular line of work that will be pursued. Obviously, such a firm could, in the regulation of its supplies and manufactures, keep a well-equipped laboratory employed all the year round. The systematising of the tests and examinations that have proved necessary in past years, and the introduction of fresh checks upon manufacture, are obviously among the tasks that such a department under such supervision would undertake. But of greater interest to our readers than the particular methods by which Messrs. Eley maintain the high standard of quality for which their cartridges are noted, is the considerable interest which the firm has shown of late years in applying its resources to the improving of our methods of testing.

Their crusher plugs have already attained world-wide eminence, and in the future it is likely that a larger amount of Mr. Jones's time will be devoted to the standardisation of coppers for every class of pressure observation.

When we look back about six years, and bear in mind the comparative state of ignorance that existed in most things connected with pressure-taking in rifles and shot guns, and when we compare with it the widely-spread appreciation of the more difficult points that now exists, we must recognise the work of a reformer. In our opinion, that reformer has been Mr. Jones. His work on the Eley, Schultze and Smokeless rifle experiments, his "Lectures to Young Gunmakers" in our own columns, and his work on the Pressure Committee of the *Field*, are only examples of the manner in which his knowledge has been made available for the use of others. Mr. Jones is himself a modest man, and we will, therefore, avoid any appearance of speaking on his account with too much enthusiastic appreciation. He has tackled a number of problems of the gun and rifle in a sound and consistent fashion. He has acquainted himself with all available data, published and otherwise, and he has then put forward his own systematised conclusions with a modesty that shows his chief aim to have been the advancement of our common stock of knowledge. That his qualities have received such distinguished appreciation, and that his future work will be carried on with the unexampled facilities that the firm of Eley are able to afford, will thus be known with pleasure among those who have worked with him in the past, or have benefited by his researches.

Meanwhile his time is fully occupied with the work for the two Proof Houses. For years it has been the complaint of the gun trade that in the proof of guns and rifles the testing stress was, in many instances, put on at the wrong place, and was at the same time incorrect in quantity. That the two Proof Houses have jointly appointed Mr. Griffith and Mr. Jones to test pressures, and to advise as to proof charges, affords a hope that a long-standing difficulty will be removed. If, therefore, it turns out, as we confidently believe it will, that the new proof rules will get rid of the anomalies of proof-testing that have hitherto existed, then in assigning the credit to those who make the experiments, we are at the same time showing the indebtedness of gunmakers to those who pursue their researches towards the true estimation of powder pressures. It is in this spirit that our best wishes go out to one who is among the more consistent workers in the science of ballistics, a science the development of which is closely concerned with the prosperity of the gun trade.

While the manufacture of explosives may not of necessity strike the fancy as being particularly prolific in patentable ideas, Mr. Jones has, during the course of his career up to date, taken his due share in distinct and tangible inventions. He was the first practical scientist to attack in serious fashion the rifle powder problem, and in 1890 he introduced, as the outcome of much research and experiment, the well-known S.R., S.K., S.V., and Rifleite 303. About two years later he replaced the granulated large-bore-rifle powders by gelatinised Rifleites, such as .450, .250, revolver and blank. In 1897 he took out a patent, having for its object to make this class of powder as bulky as black powder, thereby preventing local packing and local or violent pressures. Other inventors had aimed at this end by adopting a system of granulation. Mr. Jones effected his purpose by chemical means. The following



year he took out a patent for regulating the pressures of small-bore and artillery powders by a process of coating. Furthermore, in 1901, Mr. Jones protected by patent a new kind of nitro glycerin rifle powder, for which considerable advantages are claimed. It will be seen from the foregoing brief biography that Mr. Jones has made his mark both in the theoretical and in the practical departments of the explosives industry, and, were he less modest, might claim to have achieved far more than some of the distinguished scientists whose names bulk large in the literature of the subject.

## A NITRO POWDER CHART.

THE editor of our bright and intelligent contemporary, the *Sporting Goods Review*, has forwarded for our consideration and notice a copy of this season's edition of their well-known loading card. The utility of this card to the trade at large has been so frequently admitted in these columns that there is no necessity for us to spend time and space in repeating the old terms of praise. Rather would we pay attention to certain novel features of interest which are well worthy of careful consideration. It will be remembered that when *The Field* recently called attention to an extraordinary system of loading adopted by a gunmaker in Birmingham, and explained how its objectionable features were demonstrated by tests of pressure and velocity, it printed a table of comparative values showing the method objected to, and the standard system of loading by means of a series of length measurements, starting with the base of the case as zero, and recording the distance from this surface to the different sets of wadding, so demonstrating their position in the case, and how the available 2.56 ins. of maximum length was utilised for the material of the base, the powder, the various wads, the shot, and finally the turnover. The same plan was adopted by ourselves by describing in our June issue the loading of the Schultze cartridge, and a chart was given showing graphically the working out of the principle.

From various indications that have come to our notice, we believe that this system of standardising and examining cartridge loading will become widely adopted. We have seen, for instance, a series of figures compiled by Mr. Griffiths, in which he shows, for the benefit of his Company's loading department, the height of the *Field* card above the base with various cases. He states, for instance, that in Eley's pegamoid case this height is 1.02 in., in Eley's cheap orange E.B. nitro and Joyce's and Kynoch's cheap cases, 1.04 in.; while in Eley's and Kynoch's best cases and Kynoch's grouse cases the value is 1.05 in.; while in Eley's ejector it is 1.055 in. All these measurements include the *Field* card, so that the height of the powder face when properly compressed is about .08 of an inch less. Starting with this value as zero, and deducting it from the average length of the sample of the case to be loaded, the amount of space available for the remaining items of the load is easily obtained by subtraction. The working out of a load upon this system is of such advantage that we hope to be in a position to say something more about it in our next issue in connection with a special appliance which is being manufactured in accordance to our own design, and we believe that for the adjustment of wad rammers it will show results that will demonstrate its practical utility.

In the meantime we are very pleased to see that the details now incorporated in our contemporary's loading card for the first time this year, will tend to facilitate the carrying out upon these lines of the powder maker's instructions. In previous years the lists of wadding given for each charge in most cases left the loader to find out for himself the various thicknesses of wadding to be employed, in order to make a properly filled case. Now, however, the thickness of the wadding is in practically every case supplied, and the various card wads are specified upon the same system. In the past the thick card, the 3-32nd card and the .94 in. card were spoken of as though they were different things, whereas these three forms of description represented various ways of describing the same thing. Similarly, the thin card is now taken at half the thickness of the thick card, the medium being something in between. This seems fairly to express the custom of the trade in this matter, though it must not be forgotten that in the United States the cards are dealt with on a more systematic basis, the "A" thickness being .072 of an inch, the "B" thickness .040, and the "C" thickness .028, which it, will be seen, compare with our own measurements of .094 and .050 for the thick and thin respectively, with some undetermined intermediate value for the medium card, which is generally one-sixteenth thick, which is equivalent to .063 of an inch.

As regards the gauge of wadding, this again is more systematically stated than ever before, though nothing in the nature of specific dimensions appears to be given. According to the Proof House definition of .729 in. for a 12-bore and .751 in. for an 11-bore, the 11½ gauge wad should measure .740, and the 11¼ .734 or .735 of an inch. Now, bearing in mind that the internal bore of a cartridge is on the average not less than .735 of an inch, naturally an ordinary close-fitting 12-bore wad should not be less than, say, .740 of an inch. Treating this as the diameter of a 12-bore wad, that of an 11¼-bore should present an extra thickness. As a matter of fact, we find upon measurement that what is known as an 11½-bore wad generally gauges .740 of an inch, which follows very closely the Proof House figures, though in many cartridge cases we have examined it obtains very little grip upon the interior of the tube. Under these circumstances we think that, before claims can be established to the effect that exactitude in cartridge loading has been achieved, the diameter of wads should be more systematically standardised, and, as a general rule, we think the safest plan would be to work upon decimal dimensions, and ignore the number of the bore, except to indicate the gauge of cartridge for which the wad is intended. By so doing it would be possible to recognise in a suitable manner the fact that the interior of a 12-bore cartridge is about .006 greater than the nominal bore, and, therefore, that a wad having the diameter that corresponds with the nominal gauge is likely to have too slight a grip.

All these things combine to make us appreciate the important advances which have been registered by our contemporary, and there can be no doubt that when a further year's experience has operated upon the knowledge now available, there will be an opening for a still greater entry into detail. We believe it to be an experimentally-proved fact that it is more important for the gauge of card wadding to be proportioned to the diameter of the case than to the bore of the barrel, because it is while the powder gases are in course of

ignition that the amount of confinement regulates the behaviour of the cartridge, while once the charge has been started in motion the wadding which has sufficed for good work while in the cartridge will be effective during the passage of the shot up the barrel, though, of course, it must be understood that the gauge of the barrel should closely approximate to the nominal dimensions. As usual this year's card is issued at the price of 6d., which means that no one should be without such a valuable source of reference.

## LECTURES TO YOUNG GUNMAKERS.

### XVI.—CARTRIDGE CASES.

IN selecting subject-matter for our lectures to young gunmakers, we have endeavoured that our choice shall fall upon those subjects most closely allied with the every-day work of the gun shop and the cartridge department. By pointing out distinctions that have not before been apparent, our object has been achieved provided the observant faculties are as a consequence increased, so that the student gunmaker shall learn the better to distinguish the various grades of quality and finish. In dealing with cartridge cases, it may be thought that we have elected to speak about something in a

Our first drawing (Fig. 23) shows the cheapest form of green foreign case, which is loaded with black powder. The head extends only 5 mm. (.197 in.) from the base, and considering that they can be bought for 12s. 6d. per 1,000 or less, it is not surprising that the tube is made gas-tight with the brass head, solely by the expansive grip of the paste-board caulk or wad in the base. It will also be noticed that the anvil is in one piece with the cap-chamber, communication with the powder being made by means of two holes on either side, instead of in the centre as is done in English cases. With the second of our series (Fig. 24) we come to a case of home manufacture. It is Eley's cheap brown case, without lining, but having a head rather deeper than the first on the list. The brass comes 7 mm. from the base, that is .276 of an inch, or rather more than a quarter inch. It will be noticed in the two cases just described that the absence of a lining is partly compensated by the extension of the paper-base upwards, so supporting the sides of the case and helping to prevent the gases from getting between the tube and the base. Altogether, it must be reckoned that this form of base is of material advantage in cartridge cases that are without any kind of iron lining. The third cartridge (Fig. 25) has the same construction as the preceding one, except that the thin iron lining is added. It reaches well up the tube, as these linings do and serves as an important strengthening medium. It will be seen that there are, in reality, two linings—the one that supplements the base, the other that supports the tube.

Note should be taken of the fact that most of the cases up

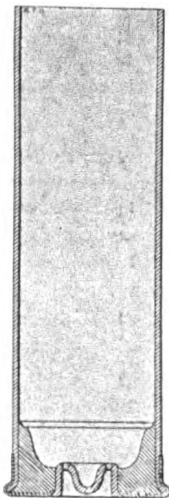


FIG. 23.—CHEAP FOREIGN BLACK POWDER CASE.

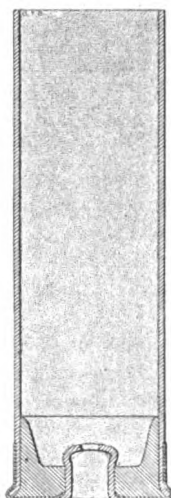


FIG. 24.—CHEAP ENGLISH CASE.

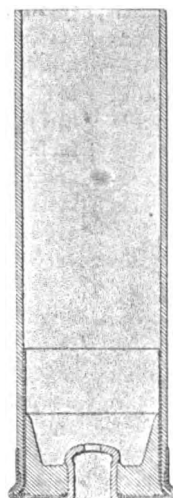


FIG. 25.—CHEAP LINED ENGLISH CASE.

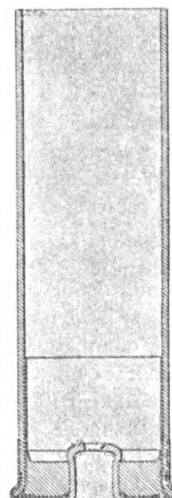


FIG. 26.—ELEY'S "E.B. NITRO" CASE.

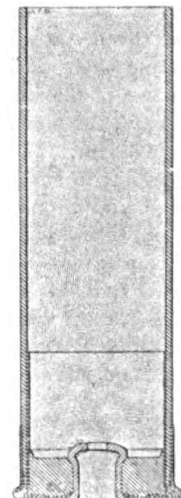


FIG. 27.—ELEY'S "GAS TIGHT."

general way, of which all the general facts are known. In reality, however, there are very few persons who could say off-hand how the various stages of quality run in cartridge cases, and by what details of construction those differences are manifest. More than this, there are probably still fewer persons who have taken the trouble to sectionise a series of cartridge cases in order to lay bare their inmost secrets of construction. All these things we have done in the interests of the young gunmaker, whose attention is invited to the accompanying illustrations, which show in a graphical form what meets the eye in a cartridge case which has been severed from end to end with a sharp saw.

to this point have no marking on the tube, this being an operation involving extra expense in various ways, which is, therefore, not incurred where considerations of price are predominant. The fact that no mention has been made as to the colour of the cases is due to the fact that coloured tubes are now practically universal, the process of rolling with a coloured paper throughout being no more costly than the manufacture of the brown paper tube, which, while looking worse, is really no cheaper. Fig. 26 shows a case that is well-nigh universal as a medium-quality production, giving thoroughly good shooting results, and being well up to the standard of construction demanded by the powder-makers. In fact,

Eley's "E.B. Nitro" case is the one most used for experimental work, because it is a thoroughly good example of what the sportsman receives from his gunmaker, yet at the same time not so lavishly constructed with a view to strength as to conceal any violence of the powder. Its chief characteristics are that it has a flat base, is iron-lined, and is printed on the tube.

That the grades of quality advance very gradually will be apparent by a reference to Fig. 27, which shows the construction of the "gas-tight" cartridge. The brass extends some 11 mm. (.433 in.) from the base, and it is trimmed off so as to present a regular edge; the previously-described cartridge

the powder, on account of its reduced bulk, as compared with the nitros that are regulated to the same standard as black powder. As a result, therefore, of the cone, the upper face of a correctly-measured charge of condensed powder reaches to about the same level as when bulk powders are used in flat base cases. This device is generally recognised as preferable to filling up unoccupied space with wadding, the cone being considered to have the extra advantage of improving the ignition.

It is, of course, impossible to exhaust the whole of the varieties of English cartridges in the limited series of classifications we have adopted. For instance, the material of the



FIG. 28.—THE "E.B.L." OR HALF-BRASS CASE.



FIG. 29.—THE "EJECTOR" CASE.



FIG. 30.—A CONE BASE CASE.



FIG. 31.—CONTINENTAL STYLE OF CASE.



FIG. 32.—THE "U.M.C. TRAP" CASE.

cases having the brass terminate, as a rule, at an irregular distance, according to the flow of the metal in the forming dies. The "E.B.L.," or half-brass, cartridge (Fig. 28) presents a quite novel system of construction. The whole of the inside of the case is of paper, while the strengthening metal is without. That is to say, the ordinary base is supplemented by a brass cap inside, which, however, comes to the outside when the base brass ceases, and forms the outside of the cartridge-tube up to a point at a little less than one-half its length. There is no iron-lining of any kind, so that the case has an uninterrupted interior. The construction of the "Ejector" cartridge (Fig. 29) is similar to that of the last-named, except that the brass extends to the top of the case, leaving only a sufficient amount of projecting paper-tube to suffice for the turnover. This concludes the series of cartridges ordinarily met with, except the "Perfect," which is an all-brass cartridge, in demand among those who, going abroad, wish to be able to reload their spent shells when remote from civilisation. The fact that the interior of the cartridge is of a greater diameter than the nominal bore, renders it specially suitable for guns that are over-large in the barrels. When, however, they are used in guns of correct calibre, the felt-wadding should be very soft, or, better still, granular wadding should be used. Before dismissing the series of typical English cartridges, we should point out that they are adaptable for the condensed class of nitros, such as "Ballistite," "Walsrode," and "Normal," when constructed with cone bases, of which we illustrate an example in Fig. 30. The effect of the extra base is to fill up the space not occupied by

tube has an important influence on the quality of the case. Eley's Pegamoid, Kynoid, and in foreign cartridges paraffin-waxed tubes, are all more waterproof than the ordinary paper, and eject so much the more freely on wet days that many gunmakers recommend exclusively such cartridges as an alternative to the all-brass patterns.

Of foreign cartridge cases we have not space to say very much. The Belgian and French form of construction (Fig. 31) was widely used in this country, or something very similar, ten years ago, under the name of Bayley's Patent, Messrs. Joyce being the manufacturers. Now it is met with over here in Mullerite cartridges, the appended illustration being taken from a sample left at this office. It will be seen that the cap is entirely covered by a dome, and that it has to be operated through an external wall of brass, the anvil being peculiarly formed in consequence of the general construction. One of the flash holes is shown in the side of the anvil-piece.

We complete the series with Figs. 32, 33 and 34, which show alternative forms of United States cartridges. They are selected haphazard from samples of the cartridges used by the American team of clay-bird shooters who visited this country last year. The first is the "U. M. C. Trap," and it will be seen to conform closely to our English half-brass case. The "U. M. C. Nitro," a very popular and successful case, is, however, quite different. The cap chamber and base are formed all in one, while the tube is fastened to the base entirely without the use of iron linings, the caulk being the sole connecting and supporting medium. The brass is of a rather thicker gauge than is used over here, so that a solid good-looking

cartridge results, though it will be seen from the size of the cap chamber that it would not take the English medium cap, which is the one that is regulated to the English nitros. Fig. 34 shows the "Winchester Leader," with the characteristic crimped walls to the tube. It is also notable for a self contained cap chamber, cap, anvil and flash-hole. We should have liked to analyse the various types of foreign cartridge further, but when it is realised that each drawing contains some 400 separate strokes, and that in order to reproduce the necessary detail the original pictures have to be made showing the case enlarged to 10 ins., it will be apparent that there are limits to the number of separate cartridges that can be dealt with. These few words must suffice to explain why many characteristic types of foreign case have been omitted, including the kind that is fitted with the long-legged anvil.

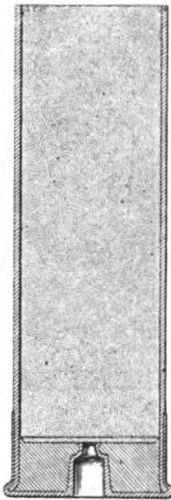


FIG. 33.—THE  
"U.M.C. NITRO" CASE.

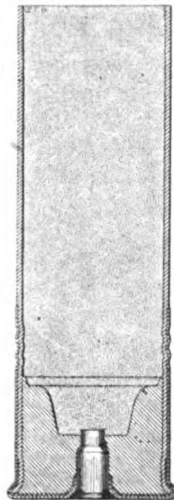


FIG. 34.—THE  
"WINCHESTER LEADER" CASE.

In conclusion to this somewhat exhaustive analysis of constructional details of cartridge cases, we must offer a few remarks as to their quality. It is a safe rule that while quality follows price, at the same time by attention to detail a medium quality case can be loaded so as to give results challenging what are given by superior grades when not so intelligently handled. Much of the correct treatment of a cartridge case is concerned with loading it, but besides this it must be true to gauge, and it must be stored at an equable temperature, so as to preserve the characteristics of the paper tube and maintain the cap in a proper condition to do its work. The rest is mainly a question of careful observation and consistent attention to the details of loading, since by such a line of conduct the behaviour of the case becomes the subject of consistent study. Finally, the gunmaker should be enough of a sportsman to know well the particular grades of cartridge to put before his different customers, thus best meeting their wants by recommending what will most nearly suit each man's particular way of going about his sport. When recommending the superior qualities of case, it is essential, when desiring to use a convincing argument, to know wherein lie the differences of construction that cause an increased gas-tightness of case, and better extraction, as a result of more elastic walls, having a high resisting power against the effects of moisture.

## ROUND THE TRADE.

A compulsory winding-up order was made in respect to the Safety Explosives Co., Ltd., on the 5th ult.

The result of the "Ernest C. Tye Memorial Shoot" has been that the Committee were able to place £50 in the hands of Mrs. Tye.

An explosion occurred on the 7th ult. at the premises in Pimlico occupied by the Anglo-Walsrode Smokeless and Waterproof Gunpowder Co.

Mr. Charles Hellis, of Edgware Road, has, we understand, taken his two sons into partnership, and is now trading as Charles Hellis & Sons, at the old address.

The Ballistic agency of Messrs. Nobel have pointed out that we omitted to include their name in the advertisement of their powders that appeared in our last issue.

The Savage Arms Company have recently placed on the market a micrometer wind gauge rifle sight, which, it is claimed, can be adjusted to the greatest nicety.

Sir Charles Ross has arranged for a series of competitions at the forthcoming Canadian Rifle Meeting, in which the merits of various magazine rifles may be demonstrated.

We are pleased to learn that the Mr. William Garden, of Aberdeen, who was involved in the fatal accident on the Wetterhorn recently, was not Mr. W. Garden, the Aberdeen gunmaker.

Messrs. Boss & Co. are now on the telephone, their number being 4,811 Gerrard. The usual outing of the firm and its employes took place on the 23rd ult., the venue being Hastings.

According to a notice published in the *London Gazette*, the "Mars" Automatic Fire-arms Syndicate will be dissolved unless cause to the contrary be shown within a period of three months.

Under date of July 26th an Explosives in Coal Mines Order has been issued, amending the order of October 1st, 1900, in respect to Roburite and Amvis, and adding Geloxite to the list of Permitted Explosives.

Mr. Paul Lewis has left Messrs. Kynoch, and it has been decided that the firm's journal shall in future be edited by a committee, which will no doubt conduct its work around the festive board after the manner of *Punch*.

Mr. J. H. Steward has recently issued, at the price of 6d., a varnished cloth chart for showing at a glance the wind allowance appropriate for target shooting with the Service rifle, according to the state of wind observed.

The Schultze Company have now completed the extensions to their loading shop, by which the department dealing with standard loading is worked with separate appliances from that employed for special charges and filling.

The London Armoury Company now announce their mode of business as "wholesale only," this being the sign adopted on the wire blinds that conceal the display of goods previously decorating their window in Queen Victoria Street, E.C.

The directors of the National Explosives Co., Ltd., have declared an interim dividend, at the rate of 6 per cent. per annum on the preference shares, and 5 per cent. per annum on the ordinary shares, for the half-year ending June 30th last.

The directors of Messrs. Vickers, Sons & Maxim, Ltd., have declared the following interim dividends:—2½ per cent., less income tax, on the preferred 5 per cent. stock, 2½ per cent., less income tax, on the 5 per cent. preference shares of £1, all paid, and 1s. per share, free of income tax, on the 3,700,000 ordinary shares of £1 each, all paid.

Mr. T. R. Bayliss is announced as a director of Messrs. Eley, to fill one of the vacancies recently caused by death.



In speaking of the King's Norton Metal Company's exhibit at Paris, we made mention of Mr. Bayliss's altogether exceptional knowledge of bronze alloys, which is among the many special qualifications he brings to his new undertaking.

The Schultze Gunpowder Co., Ltd., have adopted a novel and acceptable form of advertisement in the shape of a pack of cards printed in De La Rue's best style, the backs being decorated with a reproduction of the firm's well-known show card displaying a sportsman having a good time at the rocketters from a vantage point at the edge of the covert.

Mr. Geoffrey W. A. Norton, of Glenonldyon, Marpool Hill, Exmouth, Devon, sends us a copy of a circular letter he is addressing to the trade to the effect that he is building a sailing vessel to carry 30 or 70 tons of explosives, and especially constructed for this class of work. He hopes thereby to get into touch with firms requiring this class of carriage, so that by knowing something of the demand to be anticipated, he may arrange the details of the boat so as best to suit the purpose in view.

The shareholders of "De Zuid Afrikaansche Fabrieken voor Ontplofbare Stoffen Beperkt," otherwise known as the Transvaal Dynamite Co., have consented to the transformation of the undertaking into an English Company under the title of the British South African Explosives Co., Ltd., with a capital of £1,100,000 in £1 shares, and offices in London and Johannesburg. Of the total number, 29,604 shares are reserved by subscription by the Nobel Dynamite Trust Company or its associated enterprises.

Mr. A. Spencer, of the London County Council, is as usual down on the gunmaker in his dealings with the question of storing explosives. He treats the 50 lbs. of powder that may be stored on registered premises as a public danger, and suggests that one-tenth of the amount now allowed would be sufficient. If he would read the reports of H.M. Inspectors of Explosives he would learn that the chief need is for efficient inspection by the local authorities, and that gunmakers as a class are quite remarkable for their strict observance of the rules. It seems a pity to pad a report with alarmist writings of the kind indulged in.

We have received from the Fairbanks Co., well-known in connection with weighing machines, steam fittings and other engineering supplies, a little pamphlet containing details of their specialities, inter-paged with a copyright table or ready-reckoner for the conversion of American moneys into English £ s. d. The table ranges from 1 c. up to 5,000 dols., rising cent. by cent. up to 1 dol., thence by progressives of 5 c. up to 20 dols., by single dollars thence to 100 dols., and by 5 dols. at a time up to 1,000 dols. Thence the rise is more rapid. There are also brief notes on the metric system, which are commendable on the score of simplicity.

## REVIEW.

*The American Rifleman's Encyclopedia.* Compiled by A. C. Gould. Published by the Peters Cartridge Co., Cincinnati, Ohio, U.S.A.

It is probable that a need exists in every calling for the production of a glossary devoted entirely to the technical terms peculiar to that calling, many of which will never find their way into any standard dictionary. This need has been supplied in quite a number of instances, though rarely in its most complete form by the inclusion of words of absolutely technical character, which are in common use only among a very limited class, say, manufacturers or users of a particular article. In the gun trade, for instance, there are a large number of terms employed exclusively by gunmakers which are unknown to shooters, and yet an acquaintance with

which would go far to increase the sportsman's knowledge of the intricacies and properties of the weapon he handles, and to that extent be of profit. Writers on the gun or rifle have occasionally added to their published works a glossary of terms which for the most part had been conspicuous for what it omitted rather than for its wealth of detail, and at the present time there is not in publication in this country any such glossary that by most generous allowance could be considered as even skirting the subject.

As regards Transatlantic sportsmen, however, Mr. A. C. Gould, the well-known editor of our interesting contemporary, *Shooting and Fishing*, has compiled, and the Peters Cartridge Co. have published, a little work entitled "The American Rifleman's Encyclopedia," which is intended to supply the deficiency. It may be said at once that this little book of 137 pages by no means completely exhausts the subject, and that its definitions are not always of the happiest character. To a certain extent these defects are what might be looked for in a first edition. The original "Johnson's Dictionary" was distinctly incomplete and faulty in its definitions, and even now one can scarcely glance through half-a-dozen pages of any standard dictionary without feeling a desire to reconstitute some of the meanings or elaborate some of the explanations. In considering Mr. Gould's compilation, two or three factors must be considered. He has worked for the benefit of Americans, and of riflemen, only. The former condition is at once evident when we come across such terms as "clop of a bullet," "crack-a-jack," "freezing-up," "goose egg" (which compares with our "duck's egg"), "primer," and "trombone motion." Americans differentiate between the "cap" which is used on a muzzle-loading rifle or gun and the "primer" which is inserted at the base of a rifle or shot-gun cartridge "shell." "Trombone motion" refers to the action which causes a shot-gun similarly constructed to be denominated a "pump-gun."

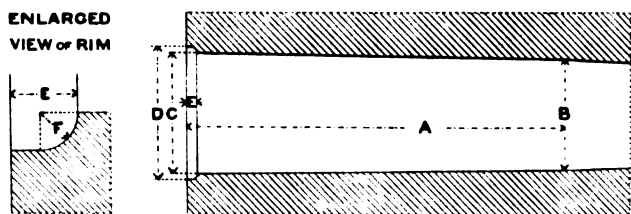
A restriction of the subject-matter to that intended for riflemen only, narrows down the scope considerably. In any event, Mr. Gould does not dive very deeply into the terminology of the gunmaker, and in such rare excursions as he makes we are surprised to find some definitions of curious import. It cannot be admitted that a happy definition of "cast off" is—"A term used by sportsmen to indicate a peculiar shape of a rifle-stock; to correct certain imperfections in vision or other anatomical peculiarities." An "Express Rifle" he explains as "a rifle shooting a large charge of powder and a light bullet." Surely this would have been rendered more accurately had it read, "and a relatively light bullet." Nor are we altogether pleased with the explanation that a "Pistol" is a rifle of such size and shape that it can be conveniently shot by holding in one hand with extended arm." In the first place, a pistol is not necessarily rifled, while the other qualification depends largely on the personal factor. But the most terrible example to be found in the whole book in the way of "derangement of epitaphs," is the description of a "sear" as "a notch in the hammer of a rifle-lock into which the spring falls when the rifle is cocked." We must confess to having spent some valuable time in considering this definition, without finally arriving at any conception of what Mr. Gould intended it to mean.

Taking the little book as a whole, however, it is full of interesting matter, not the least so being the very full scores of

International Rifle Matches, and various record scores with different arms. Mr. Gould also gives the rules and bye-laws of the National Rifle Association of America, the trophies that are to be won by the expert rifle shot, and similar items of interest to the Transatlantic sportsman. We shall look to seeing a subsequent edition of the work, freed from the sundry blemishes that mar this first issue, and with the matter greatly amplified. With this present publication as a basis to work from, the production of a more nearly perfect second edition should prove comparatively easy.

### THE STANDARD MINIMUM CHAMBER SIZES.

FOLLOWING up the article on this subject which appeared in a recent issue, we are now in a position to give full details of the new dimensions for minimum shot-gun chambers, which were recently formulated by the Gunmakers' Association, and which are adopted by the Birmingham and Provincial Gunmakers' Association. It was found, during the process of endeavouring to standardise already existing



practice, that, taking the 12-bore 2½-inch chamber as a basis, there was a possibility of formulating a set of rules for the building up of all bores of shot-guns which, without exhibiting any marked departure from that existing practice, would result in the production of far more satisfactory cartridges and chambers than are made at present, notably in respect to

from two ruling dimensions—the length of the chamber and the diameter of the front end. A most important feature of the new rules is that dealing with a uniform taper for all chambers, irrespective of length or diameter. The other rules are practically self-explanatory, except, perhaps, in those particulars where *minima* are fixed for the diameter and depth of rim. These *minima* will only affect the 32-bore and 410 and 360 calibres, the relatively disproportionate length of which, as compared with their diameters, would, by too close adherence to the rules, defeat the very purpose for which the rules were formulated. A difficulty in these small sizes has always been to obtain efficient extraction.

#### RULES FOR DETERMINING THE DIMENSIONS OF MINIMUM GUN CHAMBERS.

- 1.—That the length of the chamber (A) shall equal the nominal length of the case for which it is constructed.
- 2.—That the front end of the chamber (B) be a constant dimension in all chambers of the same nominal gauge.
- 3.—That all shot-gun chambers shall have a uniform taper of .005-in. in every inch of length.
- 4.—That the diameter of rim (D) shall be one-ninth greater than the diameter of the front end of the chamber (B), with a minimum difference between (C) and (D) of .050-in. ( $D = B + \frac{B}{9}$ )
- 5.—That the depth of rim recess (E) shall equal one-twelfth of the diameter of the front end of the chamber (B) with a minimum depth of .050 in. ( $E = \frac{B}{12}$ )
- 6.—That the wall of the rim recess and the wall of the chamber be joined by an arc of a circle (F) having a radius equal to one-half the difference between the diameter of the rim (D) and of the chamber under the rim (C). ( $F = \frac{D - C}{2}$ )

As regards the tabulated set of dimensions, it should be pointed out that only those picked out in bold figures are arbitrary and exactly defined. The others are built up from

BORE	5 <small>.976</small>	8 <small>.835</small>	10 <small>.775</small>	10 <small>.775</small>	12 <small>.729</small>	12 <small>.729</small>	12 <small>.729</small>	14 <small>.693</small>	16 <small>.662</small>	20 <small>.615</small>	24 <small>.579</small>	28 <small>.550</small>	32 <small>.525</small>	410	360
<b>A</b>	4.000	3.260	3.260	2.875	3.000	2.750	2.500	2.500	2.500	2.500	2.500	2.500	2.500	2.000	1.760
<b>B</b>	1.060	.914	.841	.841	.798	.798	.798	.760	.732	.685	.660	.614	.560	.462	.420
<b>C</b>	1.080	.930	.857	.855	.813	.812	.811	.773	.745	.698	.663	.627	.573	.472	.429
<b>D</b>	1.177	1.015	.934	.934	.886	.886	.886	.844	.813	.761	.722	.682	.623	.522	.479
<b>E</b>	.088	.076	.070	.070	.067	.067	.067	.063	.061	.057	.054	.051	.050	.050	.050
<b>F</b>	.049	.043	.039	.040	.037	.037	.038	.036	.034	.032	.030	.028	.025	.025	.025

rim dimensions, which in some particular sizes have been altogether disproportionate, not to say inadequate.

The subjoined particulars, which are taken from the card now in process of distribution by the Gunmakers' Association, show very clearly the method of determining the dimensions of minimum gun chambers to the new standard. It will be seen that the completed chamber for each bore is built up

these and the rules, and are not necessarily accurate beyond the nearest .001 in., being, in fact, given here only for purposes of comparison with existing practice. It may be noted that the figures inserted immediately below the denomination of bore are those accepted for proof purposes. One other feature in the table requires explanation. It will be seen that there is a 5-bore, but no 4-bore. As a matter of fact, this 5-bore



approximates, as nearly as the rules permit, with what has hitherto been known as the 4-bore, and is intended to replace that somewhat anomalous specimen of ammunition, which in process of development departed long since from even approximate correspondence with the bore by whose number it was known.

We believe that the leading gunmakers of the Continent have been awaiting the publication of these figures with considerable interest, and that it is the intention to adopt them in Germany, France and Belgium. If this proves to be true, a great cause of anxiety and annoyance will be removed from the shoulders of the British gunmaker, who has hitherto endeavoured, with but indifferent success, to supply a certain number of guns which could take either British or foreign ammunition. At present, a gun chambered to take French cartridges would not close on an ordinary English case, owing to the difference of rim dimensions, while many guns chambered to English dimensions are returned from abroad as unsatisfactory, because the cartridges used with them "rattle" if the gun is shaken. The Gunmakers' Association will have reason to congratulate themselves if, in putting forward these new standard dimensions for the British trade, they have brought within measurable distance a universal agreement of standardisation.

THE HARRIS RIFLE MAGAZINE, LD.—A notice is advertised in the daily press to the effect that a petition, dated the 21st ult., for the winding-up of this Company, will be heard by Mr. Justice Byrne, on October 28th next, the petitioners being Messrs. W. P. Thompson & Co., patent agents and creditors of the Company. The notice contains the usual announcement to the effect that persons wishing to appear at the hearing as interested parties represented by counsel, must give due notice to that effect to the plaintiffs' solicitors, Messrs. W. W. Young, Son, and Ward.

## APPLICATIONS FOR PATENTS.

JULY 28—AUGUST 16, 1902.

- 16,658. Bulleting Machine. G. J. Smith.
- 16,673. Sights for Guns. G. D. MacDonald
- 16,728.\* Range Finder. J. P. Sörenson.
- 16,737.\* Gun Rest, Ramrod and Bayonet. J. Wheeler.
- 16,768. Sighting of Rifles. J. Armstrong.
- 16,881. Rifle Range. G. W. Edwards.
- 16,930.\* Ordnance. M. Darmancier and A. Dalzon.
- 17,045. Sights for Small-Arms. E. H. D. Lloyd.
- 17,080. Brakes for Ordnance. H. Ehrhardt.
- 17,092.\* Gun Carriages. H. Ehrhardt.
- 17,123. Cartridge Clip. J. B. Thornycroft.
- 17,209.\* Range-Keeping Telescope. T. Y. Baker.
- 17,221.\* Apparatus for Rifle Practice. C. A. Sporrang.
- 17,270. Bandoliers. G. W. Smart.
- 17,284. Targets. P. O'Carroll.
- 17,321. Telescopic Sights. A. A. Common.
- 17,544. Ammunition Carrier. F. W. Marshall and F. Van Neck.
- 17,564. Machine Gun. H. Haycock and H. Horne.
- 17,578. Rifle Carrier and Bandolier. E. H. B. Laing.
- 17,610. Ammunition Hoists. Sir W. G. Armstrong, Whitworth & Co., Ltd., and E. W. Lloyd.
- 17,789.\* Targets. G. Lebender.
- 17,804. Projectiles. W. E. Hayner.
- 17,864. Sight Protector. A. Blaikley.
- 17,877.\* Automatic Fire-Arms. J. T. S. Schouboe.
- 17,987. Shrapnell Shell. R. A. Clark.
- 18,030. Practice Weapons. W. Blackband.
- 18,072.\* Ordnance. G. Ehrhardt.
- 18,073.\* Ordnance. G. Ehrhardt.

\* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

JULY 31—AUGUST 21, 1902.

COMPILED BY H. TARRANT.

- 14,425 (1901). **Targets.** J. W. Y. Motta, Spain. A target consisting of a plate which when struck is caused to oscillate, and so make a number of electrical contacts according to the strength of impact. The part of the target struck is by this means communicated to the shooter. Accepted July 15, 1902.
- 14,640 (1901). **Magazine Mechanism.** H. Harris, Boscombe. A modification of the cartridge-platform lowering apparatus, described in Patent No. 10,239, 1900. The operating thumb-lever is reversed in direction, and may be placed upon either side of a rifle. Accepted July 17, 1902.
- 14,661 (1901). **Automatic Fire-Arms.** C. A. T. Sjogren, Sweden. In automatic arms one or more weights, movable in the longitudinal direction of the gun, are connected to the locking mechanism of the breech-block. These weights move forward when the gun recoils, thereby unlocking and opening the breech-block, at the same time compressing springs, which throw them backwards and relock the breech after the force of the recoil is spent. Accepted July 18, 1902.
- 14,676 (1901). **Explosive Compound.** E. Steele, C. J. Bower, and H. E. Foehlman, U.S.A. An explosive, powerful in its effects, and designed to keep without deteriorating in quality, which is produced by mixing powdered nitro-phthalic acid with flour and two to four times its weight of finely pulverised potassium chlorate. Accepted July 18, 1902.
- 14,871 (1901). **Targets.** J. Paterson, London, and W. G. Paterson, Glasgow. A target with which is combined a cinematographic apparatus. Animated views or pictures may be projected on to the target to be fired at. Accepted July 17, 1902.
- 15,141 (1901). **Smokeless Powder.** C. F. Hengst, London. A smokeless powder, cheap to produce and of greater efficiency when in use, consisting of two substances separately prepared. The first is formed by any suitable vegetable fibre, which is free; and the second by an admixture of nitrated starch, potassium nitrate, sulphate of zinc, wood charcoal, nitroglycerin, and acetone. Accepted July 24, 1902.
- 15,365 (1901). **Sporting Guns.** P. Fauriaud, France. Instead of the barrels dropping down upon a pivot, as in the ordinary sporting gun, the standing breech with the trigger plate and lock mechanism is adapted to rotate about a pivot in order to expose the chambers of the barrels. A bolt fastens the breech to the barrels, which are rigidly connected with the stock. Accepted July 24, 1902.
- 15,590 (1901). **Rifle Sights.** A. A. Common, Ealing. A combination of sights for rifles, the front of which consists of a single lens with a fiducial mark thereon, having a focal length greater than the distance of the eye from the lens. A peep-hole back-sight limits the size of the pencil ray entering the eye, the sighting power of the sights being in this way increased. Accepted July 31, 1902.
- 15,670 (1901). **Ordnance.** A. T. Dawson and G. T. Buckham, London. A number of improvements in the firing mechanism of ordnance of the type described in Patent No. 16,606, 1896. The description deals with the mounting of the firing mechanism upon a sliding frame; the prevention of premature firing due to breech slamming; and to the provision of either percussive or electric firing to guns, removable in one piece when fixed ammunition is used. Accepted July 17, 1902.
- 15,838 (1901). **Lock-Mechanism of Small-Arms.** A. Frank, Germany. Lock mechanism for small-arms, in which the hammer is fully cocked only by the pulling of the trigger. Involuntary discharges, such as are due to jarring, are by this arrangement avoided. Accepted July 17, 1902.
- 16,694 (1901). **Fuses for Projectiles.** Sir H. S. Maxim, London. A delayed action fuse for armour-piercing projectiles in which the parts are held by three pins. The first is bent and another is sheared when the gun is discharged. On impact the bent pin is sheared to permit of the independent

- advance of the fuse; and on the sudden stoppage of the fuse the third pin is sheared to liberate the detonating striker. Accepted July 24, 1902.
- 17,181\* (1901). **Gun-Sighting Apparatus.** A. A. Common, London.
- 17,429\* (1901). **Gun-Sighting Apparatus.** A. A. Common, London.
- 17,636 (1901). **Multi-Shot Cartridges.** R. W. Scott, U.S.A. Improvements upon the multi-shot cartridges described in Patent No. 13,027, 1901, consisting in arranging a series of two or more full-calibre projectiles one before the other in front of a single projecting charge. The projectiles are of different sectional character. Accepted July 17, 1902.
- 17,722 (1901). **Loading Apparatus for Ordnance.** Sir G. S. S. Clarke. This Specification is a Secret Document.
- 17,723 (1901). **Sighting of Ordnance.** Sir G. S. S. Clarke. This Specification is a Secret Document.
- 17,860 (1901). **Electrical Primers.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and G. Stuart, Newcastle-on-Tyne. A primer consisting of a body of solid drawn metal, in the end of which is a cavity. Fitting inside the cavity is a capsule through which the conductor is led axially. The conductor is insulated by means of discs of asbestos threaded into it and fitting the cavity. The bridge is soldered to the end of the capsule. Accepted July 10, 1902.
- 17,939 (1901). **Apparatus for Sighting Guns.** A. A. Common, Ealing. Sighting apparatus for sporting guns or revolvers in which both eyes are used—the left to view the object, and the right to view a fiducial mark in the sight. The mark is superposed upon the object. Accepted July 31, 1902.
- 18,161\* (1901). **A New Explosive.** F. W. Jones, Barwick.
- 18,313 (1901). **Rifle-Carrier for Cycles.** C. Solomon, and C. Ewence, Bradford-on-Avon. By means of a shoe and a swivelling-fork a rifle may be carried upon a cycle without interfering with the steering. The rifle may also be removed without unscrewing any parts. Accepted July 17, 1902.
- 18,400 (1901). **Rammers for Ordnance.** A. Reichwald, London. (Agent for *Fried. Krupp, Germany*). The provision of controlling mechanism for rammers which are driven by electric-motors, whereby the rammer may be automatically arrested at the proper moments during its two movements. Accepted July 10, 1902.
- 18,486 (1901). **Double-Action Projectile Fuses.** J. Wetter, London. (Agent for *Maschinenfabrik Oerlikon, and Colonel Rubin, Switzerland*). A double-action or combined time and percussion fuse for shells, in which the parts are especially arranged in order that the shell, during transport, shall be safe against accidental explosion due to shock. Accepted July 17, 1902.
- 19,055 (1901). **Targets.** X. Reichlin, Switzerland. A device located behind a target, which is adapted to reduce the speed of bullets and to direct them towards a collector after they have passed through the target. Accepted July 24, 1902.
- 19,430\* (1901). **Single-Trigger Mechanism.** W. Baker, Birmingham.
- 19,712 (1901). **Small-Arm Barrels.** N. Pieper, Belgium. In order to strengthen the lump connection with the barrels of a sporting gun, the lumps are made to form part of a solid cylindrical breech piece. The interior of this breech piece is screwed to take the screwed end of the barrel. Accepted July 24, 1902.
- 23,780 (1901). **Automatic Pistol.** H. Skerrett, Birmingham. (Agent for *V. Hamal, Belgium*). Automatic pistol mechanism, in which the usual rotary locking and unlocking movements of the bolt are displaced by a rectilinear motion. A rocking key-piece is carried laterally across the bolt and so fastens it to the barrel. Accepted July 17, 1902.
- 24,259 (1901). **Pigeon Traps.** T. H. Nuttall, Crewe. By means of an arrangement of spring rollers with cords, apparatus is produced by means of which one of a series of traps containing pigeons may be opened from a given point, uncertainty existing as to which trap is opened until the bird is actually released. Accepted July 10, 1902.
- 25,761 (1901). **Target Practice.** A. Mandl, Austria. A practice tube for fire-arms, consisting of a regular cartridge adapted to receive at one end a small case containing powder, and provided at the other end with a reduced part for the reception of a recessed bullet. Accepted July 24, 1902.
- 1,776 (1902). **Telescopic Sights.** A. Watson, Mansfield. In order to enable a telescopic sight to be attached quickly to a rifle, the patentee uses a spring clip, which is supported by a standard. The standard is folded down with the telescope in the clip when not in use. Accepted July 10, 1902.
- 3,726 (1902). **Time Fuses for Projectiles.** C. Röstel, Germany. A method of setting a time fuse by rotating the cartridge whilst it is lying in its bed in the limber-box. Time is by this means saved and tools are dispensed with. Accepted July 17, 1902.
- 4,565 (1902). **Targets.** F. M. Gaudet, Canada. A method of reproducing almost exactly the conditions of ordinary shooting on a miniature scale, consisting in the provision of an aiming target and a scoring target, the vertical distance between the centres of which is equal to the distance between the line of sight and the trajectory at their intersection with the plane of the target. Accepted July 24, 1902.
- 9,963 (1902). **Automatic Small-Arms.** L. Hellfritzsich, Germany. This patent relates to an automatic gun having a sliding barrel. The weapon described is a modified form of that dealt with in Patent No. 19,448, 1899. Accepted July 10, 1902.
- 10,345 (1902). **Trigger Mechanism for Automatic Arms.** E. Roth, Austria. Self-cocking trigger mechanism for automatic small-arms, which is adapted to be cocked by means of a pull upon the trigger should a cartridge misfire. Accepted July 10, 1902.
- 11,397 (1902). **Breech Mechanism of Ordnance.** G. Ehrhardt, Germany. Breech mechanism for ordnance, in which the breech block, upon the block-handle being moved at a uniform speed, receives a movement, the velocity of which decreases as it approaches the locking position. This mechanism provides also for the opening of the breech by means of one single turning movement of the handle. Accepted July 24, 1902.
- 11,504 (1902). **Range Finders.** J. Neilson, U.S.A. A range-finder consisting roughly of two telescopes, one fixed and the other movable, at a determinate angle to each other. A method is described of reflecting or refracting the rays of light passing through the movable telescope into coincidence with the direct rays passing through the fixed telescope. Accepted July 17, 1902.
- 11,675 (1902). **Blasting Cartridges.** The Miners' Safety Explosives Co., Ltd., London, and W. Levett, Stanford-le-Hope. A method of so arranging the necks of blasting cartridges, that if more than one is used in one boring, the necks may be removed so as not to penetrate the end of the cartridge in front. Accepted July 31, 1902.
- 11,889 (1902). **Electrical Mine Firer.** W. Norres, Germany. An arrangement by means of which the circuit is closed in an electric mine firer by spring-operated mechanism. The current produced is checked for a time by clockwork, but is again released, so that ignition takes place only after a given time from the starting of the apparatus. Accepted July 24, 1902.
- 12,555 (1902). **Explosive Shell.** C. D. Abel, London. (Agent for *Rheinische Metallwaren- und Maschinenfabrik, Germany*). A shell containing only a limited amount of explosive, which is arranged in the shape of a cylinder, and which, when exploded, produces only a small scattering angle but great penetration. A smoke-producing charge is also included within the shell. Accepted July 10, 1902.
- 12,591 (1902). **Projectile Fuses.** G. E. Feidler, Germany. A double projectile fuse, on which the lower setting portion may be adjusted without the aid of a tool. An easy-fitting ring is driven into a conical space upon the discharge of the shell, and is caused to hold the setting parts tightly pressed one against another, secure against rotation. Accepted July 24, 1902.
- 12,760 (1902). **Base Fuse for Projectiles.** C. M. Broderick, U.S.A. A simple and strong base fuse, consisting of a hollow body, one end of which is closed by a primer cap. In the body is a movable sleeve, a plunger bearing a firing-pin, and a split ring arranged to fasten the sleeve and the plunger together when the shell is discharged. Accepted July 10, 1902.
- 12,860 (1902). **Projectiles.** J. B. Semple, U.S.A. Means whereby the path of a projectile is made visible, consisting in combining with fuse mechanism a pyrotechnic compound, which is ignited by the fuse at the moment of discharge or at any time after. Accepted July 24, 1902.

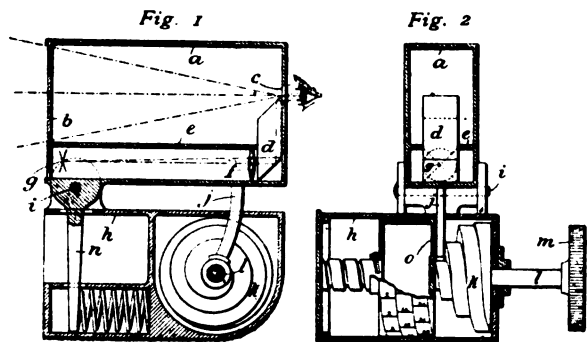
\* These Specifications are described under "Selected Patents."

SELECTED PATENTS.

GUN SIGHTING APPARATUS.

17,181 (1901). A. A. Common, Ealing. This invention consists in a method of sighting guns of all kinds by means of an optical combination, whereby one half of the eye sees the image of a fiducial mark, preferably the usual cross-wires, which keeps a constant position with regard to the instrument, while the other half of the eye sees the object aimed at. Means are also provided for adjusting the apparatus to different elevations for range, and when such adjustments have been made, and the training of the gun is so effected as to superpose the image of the mark or cross-wires on the object aimed at, the act of sighting is accomplished.

The accompanying illustrations (Figs. 1 and 2) show respectively



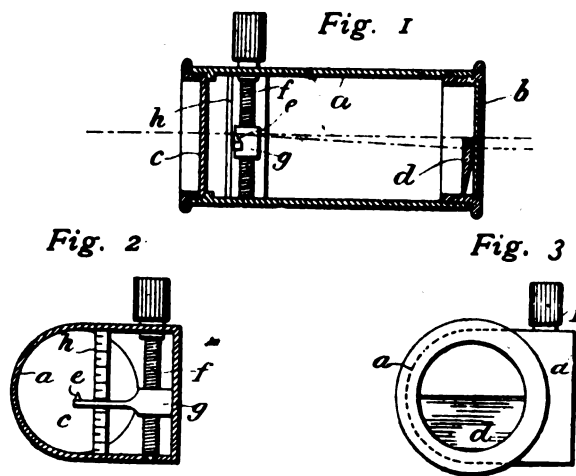
longitudinal and cross sections of the complete apparatus, which, as can be seen, consist of two portions capable of relative adjustment, this adjustment forming one of the features of the patent. In respect to the sighting device, it consists primarily of a suitable casing *a*, the front end of which is closed by a plate of clear glass *b*. At the rear end, the casing is covered over in any suitable manner so as to provide a sight-hole *c*. The upper part of this sight-hole allows of a clear and direct view through the front plate *b* at any object to be aimed at. As regards its lower part, however, direct vision is intercepted by means of a square prism of glass *d*, which is mounted vertically within the casing, and which has its ends cut parallel one with the other at an angle of 45 degs. and polished. This prism extends through a longitudinal, horizontal partition *e*, dividing the casing *a* into two compartments, the lower division containing a lens *f* mounted with its axis parallel with the line of sight, immediately in front of the lower part of the prism, and a fiducial mark *g*, which may consist of cross-hairs or a spot on the glass front of the casing. It will be understood that the light from the lens is reflected by the two angular faces of the prism in strict parallel, and when using the apparatus it will be so held that one-half of the eye sees the object aimed at, over the top of the prism, while the other half of the eye will see the mark *g* by means of the prism.

To provide for requisite variations of elevation, the sighting device is mounted on a second casing *h*, which in turn is attached to the gun in any suitable manner. The connection between the two parts is established by the pivot *i* in such a manner as to allow of a tilting movement being given to the sighting device. At the rear end of the upper casing is provided a bar *j*, which projects into the lower casing and bears upon a multiple or spiral cam *k*, which is fitted on a transverse spindle *l*, and is rotated by means of the exterior thumb-screw *m*. Projecting from the hinge-joint of the upper casing *a* is a tail-piece *n*, which bears against a spiral spring suitably disposed in the lower casing. From the foregoing details it is clear that a right-handed movement of the thumb-screw will tilt the rear of the sighting device upwards relatively to the lower casing, and that a left-handed turn, in conjunction with

the pressure of the spring on the tail-piece *n*, will serve to bring it back towards a parallel position. On the same spindle, and connected with the spiral cam, is a drum *o*, the face of which is graduated in series, corresponding to the faces of the spiral cam. It will be noted, also, that at the side of the drum furthest from the cam is a spirally-grooved sleeve attached to the casing, on which a small screw projecting from the drum travels, thereby traversing both drum and cam across the casing so as to cause the convolutions of the cam to adjust themselves to the bar *j*. The graduations on the drum are marked to correspond with definite elevations and ranges, the number corresponding to a given range being shown through a little window at the side of the casing *h*. Thus, 1 would correspond to 100 yards, 15 to 1,500 yards, 30 to 3,000 yards, and so on. Accepted July 24, 1902.

17,429 (1901). A. A. Common, Ealing. This invention relates to another method of sighting guns by means of an image of a mark or cross wires produced by one-half of a convex lens, so arranged that the image may be seen by one-half of the eye, whilst the object can be seen by the other half. The image thus produced can then be brought into contact with or partly superposed upon the object. The apparatus may be fixed to a gun by any suitable means, the correction for elevation or azimuth being preferably effected by moving the lens or mark, rather than by adjusting the whole apparatus. In small-arms it may be attached rigidly, but in guns with a large recoil mounting on a slide is advisable.

Referring to the accompanying illustrations, Figs. 1 and 2 are respectively longitudinal and cross sections of the appliance, while Fig. 3 gives an end elevation. It will be seen that *a* is a tubular casing, the rear end of which may be closed by a plain glass disc *b*, or with an obscured disc having a suitable sight-hole about the size of the pupil of the eye. The front end is provided with a plain glass disc *c*. Immediately in front of the rear plate, within the tube, is a half segment of a convex lens *d*, so arranged as to extend



over, say, the lower half of the sight-hole. At the forward end of the tube is provided a pointer *e*, which may be of any desirable shape. This is adjusted for different elevations by means of its carrier extension *g*, travelling on the vertical screw *f*, which is turned by the milled head shown, the scale *h* allowing of speedy adjustment to any desired range.

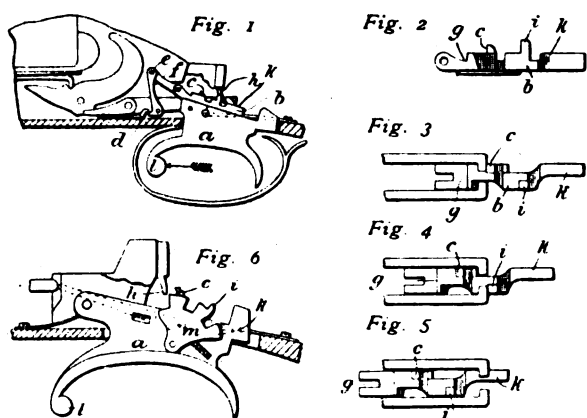
In use the marksman will with one half of his eye look over the top of the lens at the object aimed at, while with the other half of the eye he will look at the pointer *e*, which will show in an enlarged form through the lens. When the gun has been moved to such a position that the pointer is superposed on the object aimed at, the sighting of the weapon will be correct. For aiming at dark objects

in conditions where it may be difficult to see the pointer, a mirror or prism is employed to throw a ray of light on the pointer, allowance being made for varying the angle of the mirror to suit different elevations of the pointer. Accepted July 24, 1902.

#### BAKER'S SELECTIVE SINGLE-TRIGGER MECHANISM.

19,430 (1901). William Baker, Birmingham. This patent relates to improvements in single-trigger double-barrel guns of what is known as the two-pull type, and particularly with regard to the inventor's former patent, No. 2650 (1900), the object being to provide means whereby, when the selective mechanism is brought into play so as to fire the left barrel before the right, the trigger action shall be brought automatically into position for firing the right barrel in succession.

Of the accompanying illustrations, Fig. 1 shows the main features of the mechanism in a general view, in the special position allowed for by the patented device. It will be seen that attached to the upper surface of the trigger-blade *a* is a slide *b*, which is capable of a longitudinal motion only. This slide, which is shown separately



in side elevation in Fig. 2, and in plan in the three positions indicated in Figs. 3, 4, and 5, has upon it various recesses, catches, or lugs which engage with the right and left sears and with a special intercepting piece in due rotation. Thus, when the gun has been opened and closed, the slide is pushed backwards until the catch *c* engages behind the right sear-tail, thereby preventing the action of the spring *d* operating on the bell crank *e* and link *f* from bringing the slide to the end of its forward travel. As the slide is in direct connection with the trigger-blade *a*, the pulling of the latter releases the sear out of bent, and the subsequent release of the trigger clears the catch from the sear tail. During the pull of the trigger, however, the slide is prevented from moving forward by the recess *g* engaging with the intercepting stop *h*. The involuntary pull is absorbed by the slide being again lifted before the catch *c* has got past the intercepting stop *h*, thus checking the movement of the slide, after which the slide moves forward under the influence of the spring and lever already mentioned, until again brought to rest by the second catch *i* engaging with the left sear-tail, when a further pull of the trigger fires the left barrel. This is practically the whole of the mechanism as embodied in the inventor's earlier patent.

In the patent under notice, however, the slide is provided with an extension to the rear of the portion necessary for the firing of the left barrel, consisting principally of a flat surface *k*, which is adapted to come under the right sear-tail when permitted to move sufficiently forward. To get the benefit of the selective action forming the subject of this improved patent, the inventor provides, as in his previous invention, a forward extension of the trigger *l*, whereby the rear end of the trigger blade can be depressed by a

simple forward pressure of the trigger-finger. This lowering of the trigger-blade and the attached slide causes the catch *c* on the latter to pass underneath the right sear-tail, and the slide is thereupon permitted to move forward bodily until the second catch *i* is in engagement with the left sear-tail. This movement provides for the firing of the left barrel first. On this being done, the operations already explained follow in due course, with the difference that the further movement of the slide places the part *k* below the right sear-tail, so that the second pull of the trigger fires the right barrel. Fig. 1 shows the mechanism in position for the release of the right sear-tail, while the progress of the slide is more clearly illustrated by Figs. 3, 4, and 5, which show in plan the successive forward movements of the slide; Fig. 3 shows its position on closing the gun; Fig. 4 shows it in engagement with the left sear-tail, a position it would occupy equally after firing the right barrel, or after pressing the forward extension of the trigger so as to bring the selective action into play. Fig. 5 shows the final position occupied by the slide, with the surface *k*, below the right sear-tail, where it would be brought to rest, whether the right barrel were fired first in order or after the left.

A modification of the principles above mentioned is embodied in the design shown in Fig. 6. It will be seen that in place of the slide there is a swinging piece *m* pivoted on the trigger-blade, and similarly provided with catches and recesses. It is suitably provided with controlling springs, and, as in the former case, is set at each closing of the gun, by means of a bolt operated by the top lever. The action of this swinging piece or cam, as regards the two sear-tails, is practically identical with that of the slide in the former example. Accepted July 31, 1902.

#### A NEW EXPLOSIVE.

18,161 (1901). F. W. Jones, Barwick. Described in this specification is the composition and manufacture of a new powder for small-arms or artillery. Ordinary gelatinized gunpowders, consisting mainly of nitrocellulose and nitroglycerin, possess great heating properties, which cause erosion in the gun barrel. In order to lessen this heat "moderators" are incorporated with the mixture of nitroglycerin and nitrocellulose, such moderators consisting generally of vaseline, oil, or resins. The employment of these substances possesses some disadvantages, and the patentee has discovered that the use of dinitrotoluene as a moderator is attended with very good results.

Dinitrotoluene, having a melting point of less than 40 degs. C., is selected, which, when mixed with an equal weight of nitroglycerin, will remain liquid at a temperature of 15 degs. C. Dinitrotoluene of this description is selected because other varieties of high melting point are only slightly soluble in nitroglycerin, and it is not possible to add more than half the weight of nitroglycerin without the dinitrotoluene crystallising out on the surface of the explosive grain during storage.

In the manufacture of the explosive the liquid mixture of nitroglycerin and dinitrotoluene is added to nitrocellulose of any degree of solubility—preferably, however, ordinary insoluble guncotton. The whole is gelatinized and shaped by any well-known method.

The advantages following the use of dinitrotoluene are several. The dangers of manufacture are lessened, owing to the dinitrotoluene being added to the nitroglycerin at an early stage in its washing and purification. The liquid ingredients in the explosive are increased, making it easier to get rid of the solvent. The physical properties of the grains are improved, and the liability to exudation thus lessened. The dinitrotoluene being dissolved in the nitroglycerin, there is not any untamed nitroglycerin present in the explosive; and the use of low-melting point dinitrotoluene enables comparatively large quantities of the latter to be mixed, so as to produce a gunpowder of low heat of combustion, and consequently small erosive action. Accepted July 10, 1902

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>THE WEST LONDON SHOOTING CLUB ...</b>	153
Trade Prospects ... ..	147	<b>DYNAMITE IN THE TRANSVAAL ...</b>	154
A Wonderful Explosive ... ..	147	<b>ROUND THE TRADE ...</b>	155
Our Lecture on Wads ... ..	148	<b>THE MANNLICHER AUTOMATIC PISTOL, M/1902 ...</b>	156
Musketry Training in the Army ... ..	148	<b>LECTURES TO YOUNG GUNMAKERS, XVII.—WADS ...</b>	158
Automatic Rifles ... ..	148	<b>APPLICATIONS FOR PATENTS ...</b>	160
The late Sir Frederick Abel ... ..	148	<b>SPECIFICATIONS PUBLISHED ...</b>	160
<b>THE STATUS OF THE BIRMINGHAM GUN TRADE ...</b>	149	<b>SELECTED PATENTS:</b>	
<b>NOTES ...</b>	151	The Fulford Single-trigger Mechanism ... ..	161
<b>SAFETY EXPLOSIVES, LD....</b>	152	Loading Clip for Revolvers ... ..	162

## CURRENT TOPICS.

**Trade Prospects.**—As the season advances one finds that the cartridge trade has not equalled the records of previous years, the partridges seeming to be a variable factor in most parts of the country, with an inclination on the less satisfactory side. Still, as one looks around, there are plentiful evidences that there is nothing in the nature of despondency. Many gun-makers announce their stock of weapons to be in an exhausted condition, rifles, in addition to the ordinary trade in shot-guns, having been extensively purchased on account of the many foreign notabilities who have visited our shores. The general lifting of the depression which has marked the two previous years, and the return of a large number of sportsmen who were engaged at the war, have resulted in a marked improvement in the general tendency of the trade. It is, of course, unfortunate that the many fine country-house parties which will assemble for the autumn shooting will not find a better stock of game ready to hand than anticipations lead one to expect; but still, so long as there is a general tendency towards activity, the trade as a whole is bound to benefit in one way or another. Birmingham, as usual, continues to manufacture and to debate upon the future, though it is just a question whether public discussion serves any useful purpose. This question is, however, dealt with in another column, the welfare of the Birmingham trade being governed by other factors than the scarcity or otherwise of game.

**A Wonderful Explosive.**—From time to time our columns have contained evidences of the fertile inventive powers of the present generation of novelty hatches, and in our small way

we endeavour to do justice to the novel conceptions that are, as a rule, introduced to our notice by the newspaper press. Unfortunately the newspaper writers are apt to overreach themselves when describing the properties of a new explosive, though, of course, it is only charitable to assume that this is done on their own responsibility. For instance, we have before us a notice of a powder into which lighted matches can be thrown, which can be pounded on an anvil, and which is insensitive to the impact of bullets. It, however, seems that once we apply to it at the same instant "the two elements of concussion and fire," the results are tremendous. It is rather a descent from the ideal to every-day life when it is explained that it is the percussion cap, such as is in common use for such purposes, that inspires this wonderful explosive with the capacity to produce the tremendous results referred to. It seems that the explosive, when unconfined, was able to destroy a piece of iron on which it lay; and that when a charge was exploded in the centre of a cake of ice, the shattering effect was so great as to produce a miniature snow storm. Under these circumstances we are not surprised to hear that it is expected that the United States Government will adopt this explosive for army and navy purposes. We greatly admire the reservation contained in the word "expected," because it admits the odd chance that the conservative officers who have a say in these matters may not rise to the occasion. We are not quite certain for what purpose the explosive has been invented, whether for guns, explosive charges, or as a material for rifle butts and earth works. Possibly there may be some novel military evolution which might be aided by the artificial production of miniature snow storms; but even so, it is just as well to be on the safe side, and specify merely army and navy purposes, which commits no one. It is not certain that the

blessings which are supposed to fall on persons with modest expectations have been earned in the present instance.

**Our Lecture on Wads.**—Probably there is nothing quite so difficult to insure as a satisfactory, let alone a perfect, cartridge. One may weigh the charges, insert standard wads the specified distances, count the charges of shot, and make a turnover that the best informed experimentalist would commend, and yet the shooting of the cartridge may leave a great deal to be desired. Another cartridge may be taken from stock, and its shooting may comply in every particular with the requirements of the sportsman as laid down by the laboratory expert. Wads and turnover are, however, the chief cause of variable shooting in the cartridges which one comes across in a casual way; and we have endeavoured this month to lay down some of the general laws that seem to have a direct bearing on the wadding used in cartridge loading. No single code of instructions can protect the careful loader from all the errors to which his products are liable. For instance, only recently we came across a case where a batch of cartridges had been indubitably proved to be violent. The charges employed were somewhat in error, but the excess of strength was not thereby accounted for. A reloading of the powder into standard cases showed that, with materially reduced charges, there was still a tendency to high pressure; so that there was fairly clear evidence that an over-powerful batch of explosive had got upon the market unawares. Still, if the gunmaker will carefully study his wadding, he will open the way for a consistency of result that would never be possible if this very important factor in cartridge loading were ignored. With this in mind, we commend to the careful attention of gunmakers, whether they be old or young, our lecture on wads.

**Musketry Training in the Army.**—The issue by Lord Roberts of a special army order relating to musketry training is a practical outcome of recent campaigning experiences. The full text of the order was published in the daily newspapers of the 20th ult., and every officer and other person interested in the training of marksmen should be in possession of it. In the first place, it is explained that success or failure in musketry training depends entirely upon the interest taken by officers in this branch of military work; and Lord Roberts does not mince his words when he deals with the cursory attention which officers are inclined to give to the training of the soldiers under their immediate care. So as to provide an inducement for improvement in this respect, it is stated that in future every officer will be expected to acquaint himself with the details of musketry work, and that promotion will largely depend upon the interest taken and the results shown. The rules that are put forward for guiding the work to be done are brief and thoroughly to the point. The subjects cover—(a) care of arms; (b) instruction in aiming; (c) the firing exercises, both in drill order and field-service order; (d) instruction and practice in judging distance; (e) instruction in firing from behind cover and in snap shooting; (f) instruction in the theory, powers and mechanism of the rifle and its ammunition; (g) a course of lectures and examinations on the whole of the above subjects. It will be seen that the essentials of efficiency in the care and handling of rifles is fully covered by these headings. Everything there-

after must, therefore, depend upon the seriousness with which officers adopt this new rendering of their duties. Among some of them it may not be popular; but the fact that our officers are, as a rule, very fine shots with the sporting rifle should go a long way to encourage them to impart some of that knowledge to the men placed under their care.

**Automatic Rifles.**—Bearing in mind the fallacious prophecies which so well-informed a writer as the late Mr. W. Greener put forward concerning probable developments in fire-arms, it is dangerous to risk one's reputation on the same dangerous path. Under these circumstances, one must maintain an open mind in regard to such developments as the automatic working of hand rifles. One cannot assert that, because the system has been adapted to pistols, it is necessarily appropriate for rifles. The whole question is one of relative gain on the one hand, and added complication of parts on the other. A recent article concerning an automatic rifle invented by Major Woodgate brings these thoughts uppermost in our minds. Personally, our own tendency is to be conservative, taking refuge in the assertion that the rate of fire allowed by the modern magazine rifle is sufficient for military needs. On the other hand, we find Lord Roberts saying that the best tactics may fail if, when the climax of the struggle is reached, a superiority of fire cannot be established. While, of course, he is mainly concerned in the instance quoted with accuracy of fire, the advocates of the automatic system of loading might claim that effectiveness is more likely to follow with simplified conditions of loading, than in cases where more complicated movements are necessary. When the automatic rifle does come, that is taking the favourable view of the system, there is no doubt that it will be introduced in a form well within the capacity of the soldier under competent supervision to keep in reliable working order. We, therefore, await with interest all promised developments, though we must admit in our own mind that some time must pass before the necessary movements can be expressed in a satisfactory mechanical form.

**The Late Sir Frederick Abel.**—Probably no one concerned in the disputes that waged around the origin of Cordite went through the ordeal with quite the same unruffled exterior as Sir Frederick Abel. His death, on the 6th ult., brings to a close a very active career, which embraces a record of many fine scientific achievements. As a general rule, people are inclined to belittle the doings of scientists whose work tends in the direction of commercial developments. It must, however, be recognised that, whatever a theoretical inventor may have produced in the way of an abstract conception, the science that adapts that conception to the needs of everyday life is necessarily of a kind that carries with it the appreciation of contemporaries. What Sir Frederick Abel did in perfecting the methods of guncotton production must ever stand to his credit, while in a similar way his grasp of explosives as a whole enabled him to see wherein lay a possible practical outcome for the work of the Explosives Committee. All the bad blood that arose in connection with the illiberal treatment that was meted out to Alfred Nobel and Sir Hiram Maxim does not alter the fact that the most extraordinary feature of the cordite of to-day is that it is precisely the same material that was "arrived at," to use a historical phrase, by the Explosives Committee some ten years or so ago. In the



same way, although there are many critics of the heat test for explosives, it cannot be denied that it is still the accepted method of examining chemical stability. In summarising the career of Sir Frederick Abel, it is possible to speak with enthusiasm of his very practical achievements, without feeling any need for making detailed reservations in regard to those incidents in which public opinion is agreed that the appreciation in which his services were held would not have been any less had he been more ready to allow others a more liberal share of the credit involved.

### THE STATUS OF THE BIRMINGHAM GUN TRADE.

THE newspapers of Birmingham reflect the very lively interest which is taken by the inhabitants in the welfare and doings of the local gun trade. The masters have frequent opportunities of meeting one another when engaged in the transaction of the business of the Proof House, while a number of other problems, not falling under the heading of proof, are dealt with by the able business men who conduct the affairs of the Birmingham Gunmakers' Association. The workmen, on the other hand, have also organised, and are closely concerning themselves with the political aspects of their calling. As a matter of fact, the trade in guns occupies a peculiar position as compared with other industries. For some extraordinary reason the selling of guns all over the country is a purely personal business, and the dealer who does no more than vend applies his name to the guns that he sells, and the Birmingham maker is consequently relieved of any responsibility to the public that may attach to his productions, and he is also deprived of such credit as may be his due when the work done is of a sound and satisfactory character.

The conditions of gun manufacture follow a rule which is met with in many of our British industries, though it is seldom carried out quite so far as in the case under consideration. A man may be a *bona fide* gunmaker, and yet have only a very nominal number of hands. The garret-workers of the city, who are all specialists in some branch or other of the business, do the real work; so that the gunmakers' own premises are frequently little more than a warehouse, in which weapons in course of manufacture find a temporary home during the intervals between the various stages of their development. One man works on tubes, another is chiefly employed in the filing of furniture, another specialises in ejector work, a fourth in actioning, a fifth in stocking, a sixth in engraving, and a seventh and eighth, right away up to the twentieth and thirtieth, all do their own particular kind of work, even to the making of the screws that hold the gun together. Larger manufacturers perform more operations than the small ones, and there are a few who do nearly everything; but the general tendency is towards division of labour, by which the needful operations are performed, even on behalf of the smallest makers, by men who occupy their time in one exclusive branch, so producing an efficient result at an economical cost. One would suppose that these facilities would enable many local retail gunmakers to produce weapons having a

high standard of value for the price asked, such as would induce sportsmen to purchase weapons of Birmingham origin and marking in preference to others sold in competition with them. The fact must, however, be faced that the Birmingham retail gunmakers, unless they have properly organised retail premises in London or the provinces, are, with one exception, of very small account; and the few who endeavour to get a trade by means of advertisements seem to find so little profit in selling their guns, that a material proportion of the space they pay for is occupied with particulars of American and Belgian rifles, such as any hosier or outfitter may sell upon equally advantageous terms.

The larger manufacturer is of course in a much better position to help himself. He is able to negotiate for the large amount of trade that comes regularly through the hardware merchants working from Birmingham and London, and he probably has in addition a large *clientèle* among provincial dealers. But Birmingham gunmakers as such are not known to the sportsman; and any effort to get them to advertise goods bearing their own names is met by blank refusal, based on an unwillingness to offend their customers in the trade. It would appear from many of the arguments put forward at conversations of this kind that the moment a Birmingham gunmaker makes any show of developing a trade on his own reputation, he brings upon his head a number of threats and protests which force him back into the old groove. It will be remembered, for instance, that the fine old firm of Scott, now a partner in the Webley combination, reserved its American trade for the sale of guns bearing the true mark of origin; and, as a consequence, the firm attained a reputation and standing on the American market which was a valuable asset, at the same time reflecting the greatest credit upon the quality of workmanship that had earned so high a reward. But Messrs. Scott were not allowed, or at any rate, they felt that it would not do to put their magic name upon guns sent for sale to home dealers in country towns and elsewhere. The virtual closing of the American market by the working of the tariff, to some extent deprived the firm of a useful asset; so that after many years in business it has not obtained any definite grip upon the affections of the sportsman it has indirectly served so well. This is to a great extent a misfortune for the gun trade as a whole. When sportsmen are well served they elect to continue in the old paths; but where they have no guidance they are apt to place their orders according to their most recent fancy, the result being that the next man who gets the order is perhaps a dealer who has learnt the secret of getting the material parts of a gun from Belgium, having it fitted and finished in English style, and so selling it. Once a definite reputation for a staple article has been established, orders cannot help but increase, the manufacturer being placed in the happy position of being able year by year, as his turnover increases, to improve the quality of his several grades of production, by applying machine operations on an extending scale, and devoting the money so saved to more skilful and painstaking fitting where the need for such is apparent.

Now it is just a question whether the Birmingham gunmaker is helping his customer by withholding his name from the goods supplied. The absence of responsibility is only one of the evils that the practice develops. The country gunmaker has been fighting against the most serious odds,

the general tendency of late years having been for the buyer of a good gun to go to the retailers who have established a world-wide reputation, while the more modest class of purchaser, the farmer and the small shooting tenant, may satisfy themselves with the guns exhibited by the stores and other dealers in sundries, who are so widely distributed throughout the country. The country gunmaker is at a disadvantage when endeavouring to convince the local gentry that his own best gun is every bit as good as what can be bought in the metropolis. There is only his own reputation to back up the statement; and not carrying on a large business he is, as a rule, unable to endorse his claims with that most useful of aids, persistent advertising. In consequence he is bound to pitch his note a little lower, and this is where the reputation of a good Birmingham name on guns of his selling would be useful. Supposing that, in addition to the ordinary troubles of commerce, he has been obliged to run up accounts, his power of refusing inferior deliveries is greatly restricted, and here again a standard quality would come to his aid. While we grant the very valuable check which a competent retail gunmaker can exercise on goods sent to him by the manufacturer, we must deny its effectiveness in practice if guns are sold without examination, or where a firm attitude might invite reprisals. Frequently the name of a weakling retailer is the cloak under which bad work, frequently of foreign origin, is foisted on the market.

As a remedy for these evils, and in order to safeguard the interests of the Birmingham manufacturer, which carries with it the prosperity of the whole trade throughout the country, it has, in our opinion, wisely been suggested that the proprietary gun should be introduced. That is to say, that a given firm should introduce a grade of weapon to which it can do full justice, and that it should be sold throughout the country under its own name by various dealers. Suppose, for instance, that a twelve-guinea hammerless gun were selected as an example. Such a weapon could be manufactured so as to be quite effective for the class of shooter who fires from 500 to 1,000 cartridges in the course of the year. There would be no need for the refinements of manufacture that are necessary in the case of the more ambitious sportsman. A sound gun of this class would stand many years of hard work, and the gradual growth of trade therein should in time justify a gradual extension of the machinery employed, so that the various working parts would be able to gain an enhanced reputation for not going wrong. Such a gun could be bought at the present time from almost any Birmingham maker of guns at a price that would leave a reasonable margin of profit for the retail vendor, but as regards quality it would be more of a gamble than a gun, put together under a serious scheme for the sale of many duplicates of the same pattern. A better class of weapon could be built for about £16, which is a price that many young sportsmen are quite prepared to spend when first taking up shooting in a serious manner. A twenty-guinea gun might represent a further advance in quality, and carry with it the additional convenience of a reliable system of ejector, while another sovereign or two might enable a single-trigger to be fitted. Such guns as this could be made upon a system that would guarantee to the shooter handiness of balance and effectiveness of action, and they would certainly be a great advance on the cheap guns that are now sold at large profits by pawnbrokers and other dealers, among whom flash get-up

is reckoned a legitimate means of deluding the would-be shooter. There may be nothing new in the idea of a gun representing the most effective combination of finish and efficiency for the price paid. But in practice that combination is very seldom met with, because the manufacturer who submits a certain grade of goods to the uninformed dealer is more often than not asked to attach fifteen-guinea finish to ten-guinea quality for some intermediate value in cash. He is obliged to give way, although he knows that in effectiveness it will not be proportionate to the cost of the finished weapon. On the other hand, with a fixed sum to work to, and the sportsman to please, it is more than likely that the most harmonious balancing of the needful features of excellence will be arrived at.

Existing trade would be very little interfered with if this policy were initiated. In the same way that the gunmaker advertises factory-loaded cartridges at a reduced cost, so as to compete with the cheap grades on the market, so he can maintain his own specialities, while selling in competition with outside houses a selection of proprietary guns, the makers of which are responsible, first, for finding a market, and second, for keeping it by attention to detail. It will be seen that the carrying out of such a policy is a matter quite independent of trade organisations and Proof House regulations. It is only necessary for a single firm to take the lead. Jealousy would undoubtedly prevent a recognised retailer from obtaining a satisfactory amount of success; but with any firm which has consistently carried on a wholesale business it should be possible to market one or more types on the lines laid down, without interference with existing connections among firms whose names are attached to the goods supplied. In fact, it should not be difficult to get these very firms to form the nucleus of the system of distribution that would need to be organised. Technical schools, and all kinds of other organisations, satisfy a definite purpose, but no amount of joint working will replace the elementary requirement that each man shall be capable of running his own business at a profit: and the more there are of such, and the greater the number of their imitators, the greater will be the all-round prosperity of the trade.

The recent visit of the Birmingham operatives to Belgium called forth a very common-sense note in our contemporary *The Engineer*. It points out that technical education has become a catch-word, and that it is put forward as the one and only panacea for all the complaints from which British trade is, or is supposed to be, suffering. It further points out that the Belgians have secured a place on the market by supplying what is wanted, and by push and industry in selling. It then goes on to say: "They come to this country with a cheap gun and sell it by working hard. Probably their travellers never enjoyed the advantages of technical education; but they know how to sell, and they have the tact, resourcefulness, and push which secures for them a footing. Moreover, there are traitors in the trade. Certain English gunmakers have actually purchased Belgian guns and allowed their travellers to sell them. They have even, we are informed, gone so far as to stamp their names upon them. With what result? That the Belgian merchants have found no difficulty in selling the same article to the same purchaser at a lower price. No amount of technical education will cure that sort of thing. A little moral education, and a great deal of commercial education might have pre-

"vented it." The words quoted will no doubt cut very deeply, but they have the germs, in fact the essentials, of truth within them, and they contain a recommendation which is more practical than teaching youngsters to file and stock in their spare time. Anyone who is connected with sporting newspapers will be aware that a large proportion of the enquiries that are addressed to the editors take the form of asking for guidance in the purchase of a gun. Those writing name their price, but they are at an absolute loss to know where they can get value for their money. They obtain but little help from the gunmaker, because hearing much the same story from all, they cannot decide where to place their orders. What they want, in many cases, is to know of a grade of weapon which will represent as definite a value as is to be met with in a Webley revolver or a Greener sharp-shooter rifle. Not, however, finding it, they never seem certain whether to be satisfied or not, so that confidence is of slow growth, even after the weapon has been procured. To such as these the existence of standard value for money would be a godsend, and many purchasers would be protected from the disillusionment that comes when disappointment follows from the purchase that has been made.

The country gunmaker, the Londoner, and the men who carry on business in such large centres at Liverpool, Manchester, Glasgow and Edinburgh, to say nothing of Dublin, Bristol, Aberdeen, and many other places that come to the mind, all work for a connection among individual sportsmen, and this is an asset that the newly-proposed policy would be unlikely to destroy. It is the unattached buyer that swears allegiance to no gunmaker who now helps to build up the resources of the foreign maker; for among the guns that such persons generally get hold of, there is a large proportion originating from abroad. If the Birmingham trade, by the action of several of the more enterprising individual manufacturers, create a market among these unattached buyers, the whole of the trade so done will come to Birmingham; and the man who is open to buy an article of standard quality could, by going to the local gunmaker, put a sovereign or so in his pocket, which the chances are against his obtaining under the present methods of working.

It is, of course, possible that country gunmakers would be hostile to such a development, though it is to be hoped that they have learned wisdom from the very unfortunate experience in endeavouring to kill the proprietary trade in loaded cartridges. When Schultze and E.C. ceased to have a monopoly in the powder trade, the gunmaker endeavoured to prevent the new comers from getting a foothold by refusing to have anything to do with the travellers who called upon him offering the various other "ites" that had come into being. The traveller, fresh from a snub from the gunmaker, called upon the grocer on the other side of the way, and in due course advertisements appeared in the local press asking:—"Why buy cartridges from so-called gun-makers, when you can get so-and-so's best loading for so much a hundred less?" It is no secret that the wholesale firms paid for most of these advertisements, and were rewarded by the establishment of a nice little consumption of their goods in the neighbourhood. Had the gunmaker risen to the occasion, by stocking in cartridge form, on the best terms available, the various new powders that were first offered to him, he would not have encountered the bitter experience of hearing sportsmen recommend to one another the goods sold by the general

dealer which they had so short-sightedly spurned. In the same way it is to be hoped that the country trader will see no evil in exposing for sale guns bearing names different from his own, which are submitted as proprietary articles, and that he will at least let them have as good a show as he is now in the habit of giving to Stevens and Winchester rifles, to say nothing of such things as Quackenbush and Flobert '22-bores, and German air-guns. If he does this, the trade will be working within its own limits towards a more prosperous state of affairs; for we must all admit that with prices at a common level, the sportsman would prefer to buy his guns and accessories according to the expert recommendations of the local gunmaker, who, as a general rule, is well versed in the numerous technicalities of his calling.

## NOTES.

**THE WINCHESTER '35-CAL. CARTRIDGE.**—In view of the interest now shown in high-velocity rifles and ammunition, attention may be drawn to the Winchester '35-cal. combination, which seems to give the *desiderata* of high velocity with consequent low trajectory, combined with great energy and striking power. The rifle is an adaptation of the well-known Winchester model with box magazine introduced in 1895, and weighs, with 24-in. nickel steel barrels, about 8½ lbs. The cartridge is loaded with special smokeless powder and a 250-grain soft-nosed metal-jacketed bullet. A muzzle velocity of 2,200 ft. per second is acquired, developing a muzzle energy of 2,685 ft.-lbs., the penetration at 15 ft. from the muzzle being 15¼ one-inch pine boards. It will be seen that this is a very powerful and hard-hitting cartridge, its striking energy at 200 yards being equal to the muzzle energy of the '45/70, hitherto considered a *beau-ideal* among American sportsmen. It is found that these '35-cal. soft-nose bullets mushroom very satisfactorily.

**THE MAUSER AUTOMATIC PISTOL.**—Professor Cranz and Koch, of the Technical High School at Stuttgart, have recently been making exhaustive experiments, by the aid of photography, into the behaviour of the Mauser automatic pistol during the action of firing. No fewer than fourteen separate photographs were taken in the time elapsing between the fall of the hammer and the arrival of the projectile at a point 78 inches in advance of the muzzle, and from these photographs the learned professors have obtained data which may prove of some assistance to designers of automatic arms. It was discovered that at the moment when the base of the bullet was clear of the muzzle there was an escape of powder gas at the rear end of the barrel. This could not arise from the opening of the breech-block, since at that moment the recoil of barrel and breech backwards was only '033 ins., whereas the unlocking of barrel and breech-block does not take place until they have recoiled about '1875 ins. It would, in fact, be due to incomplete obturation, and would not necessarily be dangerous or practically detrimental to the ballistics of the weapon. The muzzle velocity of the Mauser is 1,400 f.-s., and these photographs demonstrated that the backward motion of the breech-block in recoil is about 19'7 f.-s., the entire distance travelled being about 2½ ins., of which all but the first ⅞ ins. is made after the separation of barrel and breech. The return movement is at the rate of

75 f.s. until the breech-block encounters the new cartridge, when it, of course, diminishes in rapid gradation. It was found that the actual time elapsing from the beginning of the recoil until the breech-block was at rest again, ready for the second shot, was only from '046 to '069 of a second, altogether beyond the utmost capabilities of a marksman to respond with a trigger-pull. In addition to showing the behaviour of the pistol, these photographs revealed some phenomena which took place after the bullet left the muzzle. Among others, there was an escape of powder gases past the bullet before it filled the grooves of the rifling, and the photographs further showed that after leaving the pistol the bullet was overtaken and surrounded by the powder gases until it had travelled 15 inches. This phenomenon is already well known, and was reported on several years ago. Other data with regard to the ejecta, in the shape of unconsumed powder, were also to be gleaned from the experiments, which seem to have been of a most painstaking and interesting nature.

**THE HYDRAULIC MINING CARTRIDGE.**—Mr. James Tonge, Jr., F.G.S., M.I.M.E., has recently been awarded the Benjamin Shaw prize by the Council of the Society of Arts, for the Tonge hydraulic mining cartridge, which is an appliance invented to break down coal in mines without the use of explosives. This cartridge consists of a steel cylinder, provided with eight radial duplex rams, operated by a hydraulic pump, the pressure in the standard size now made reaching 3 tons per square inch, or a total pressure over the mass of coal affected of upwards of 60 tons. The cartridge is inserted into a drill-hole, much in the same manner as is usual in shot-firing, and the coal is broken off by direct outward pressure on the part of the radial rams acting on suitable liners. A comparison of cost in getting 300 tons of coal per week shows a difference, from the data given by the inventor, of £15 per week, or £750 per annum, in favour of explosives; but it is claimed that in practice the hydraulic cartridge would bring down more coal per hole than the explosive, and that it would also give an advantage of 10 per cent. in the getting of "round," as opposed to small, coal. The invention has already been in daily use in two collieries for a couple of years, and has entirely done away with shot-firing. Indeed, the object of the new method is frankly stated as being the abolition of explosives in mines.

### SAFETY EXPLOSIVES, LIMITED.

UPON the petition of a creditor, presented on July 22nd, a compulsory winding-up order was made against this company on August 5th, as was duly chronicled in our last issue. On September 8th, a third step was taken in the process of dissolution, when the usual meeting of creditors and shareholders was held under the presidency of Mr. H. M. Wineals, Assistant Official Receiver. On July 31st, Mr. John Gordon, of Leeds, was appointed provisional liquidator pending the hearing of the winding-up petition, and since the date of the winding-up order Mr. Gordon has provided the funds necessary to enable the Official Receiver to protect the assets. At the meeting held on the 8th ult., resolutions were passed confirming the appointment of Mr. Gordon as liquidator, besides which a committee of inspection was nominated.

It must be admitted that the past history of the Safety Explosives, Ltd., is interesting, if not also instructive. Some

time prior to 1892, Mr. Harold Boyd invented an explosive, to which was given the expressive name of Ripp-lene. This was a mechanical mixture containing nitrate of potassium, nitrate of barium, sulphur, oxide of iron, saw-dust, and bituminous shale, provided that such shale shall be free from pyrites. According to a pamphlet which was subsequently circulated, this explosive had earned the high encomiums of various experts, chiefly Indian and Colonial journalists, and a sprinkling of mine managers. In September, 1897, a company, entitled Fumelessite, Ltd., was incorporated, with a nominal capital of £17,500, to purchase from Mr. Harold Boyd, for £10,000, in fully-paid shares, certain inventions and patents for explosives. Mr. H. E. Winter promoted this company, the subscribed capital of which amounted to about £3,700, which sum was expended in taking out patents and demonstrating with samples. The particular explosive then exploited was Fumelessite, concerning which, and its relations to Ripp-lene, we wrote at length in our issue of August, 1899, in connection with the publication of a second pamphlet of testimonials and reports. Apparently, the demonstrations already referred to were so satisfactory as to induce Mr. Winter to form a larger company, and the Safety Explosives, Ltd., was floated, on April 23rd, 1901, with a capital of £75,000, of which £35,000 was to be allotted as fully paid to Fumelessite, Ltd., in accordance with a contract entered into on May 1st, 1901. The original directors of this new company were Dr. A. Fischer, Mr. J. M. Macmorran, Mr. H. E. Winter, and Major J. A. Winter. On May 3rd, Major Ricarde-Leaver joined the board, but Mr. Winter resigned in December of the same year, and his co-directors of the original board resigned after a year of office. Major Ricarde-Leaver was then joined by Lord Lurgan, Mr. Bramstein, and Mr. Ernest Hall, the two first-named resigning within about a month of their appointment.

At the outset of its career, in May, 1901, the company purchased about 30 acres of land at Herodsfoot and Trago, with factories, mills, magazines, cottages, &c., from Messrs. Curtis's and Harvey, Ltd., as we duly noted at the time, for the sum of £7,000. Apparently, the manufacturer of Fumelessite proceeded apace, for at the first annual general meeting, held on July 12th last, a balance-sheet was presented to the shareholders, showing the transactions of the company down to June 30th, from which was to be gathered that the whole of the company's working capital of £20,000 had been expended, except some £84, while they incurred liabilities amounting to £2,486. A committee of investigation was then appointed, which reported on July 23rd to the effect that the Boyd explosive was commercially valueless. Notwithstanding this, however, the company's chemist continued to make experiments, and he had recently written to the Official Receiver, stating that he had overcome all the difficulties.

The Assistant Official Receiver, therefore, told the meeting that it would be necessary for the liquidator and committee of inspection to consider whether the assets should be sold as a going concern, or whether a scheme of reconstruction should be resolved upon. This is really a shareholders' liquidation, as the creditors of the company can be paid in full. The unsecured liabilities, as shown in a statement of affairs submitted by the secretary of the company, are returned at £2,710, and the assets at £7,139. The deficiency, as regards the shareholders, is given as £7,413. It remains, then, to see what decision the liquidator and the committee arrive at.

## THE WEST LONDON SHOOTING SCHOOL.

As we have announced in previous issues, Messrs. Joseph Lang & Son, Ltd., opened, at the beginning of the summer season, a new shooting ground, to which the somewhat ambitious name of the West London Shooting School has been given. Bearing in mind the fact that things as often as not fail to live up to their names, we recently paid a visit to Messrs. Lang's new ground, prepared beforehand to be just a little disappointed, and it must be admitted that disappointed we were—but agreeably so. There can be no doubt that the ground is in West London, and that it is by way of being a very practical shooting school. This latter qualification is doubly assured by the enterprise of the proprietors in securing the services of Mr. Richmond Watson to superintend the ground, Mr. Watson being an expert rifle shot and a keen sportsman with the shot-gun with all classes of game, apart from which he also knows more than a little about the handling and training of dogs.

The ground is, considering its proximity to London, exceptionally well placed. Within about a mile and a quarter of West Ealing station, on the Great Western Railway, and a mile and three-quarters away from the Ealing Broadway stations of the Great Western and Metropolitan District Railways respectively, it lies in the little parish of Perivale, which in its confines comprises only five houses and thirty-four inhabitants. This muster roll includes the house now erected at the shooting school for Mr. Watson. The shooting ground is enclosed in a ring fence, and has an area of about twenty acres, with the option of ranging over some sixty acres beyond, and it is secured from the encroachments of the enterprising builder by being further enclosed within two railway embankments converging towards the north, the third side of the triangle being formed by a high road, with a farm intervening. Thus ample privacy is insured, and it is also a noteworthy fact that, whether owing to the railway banks or other natural causes, the sound of gun-shots is barely perceptible on the high road at a distance of a few hundred yards, whereas the shooting of a gun club at Southall, nearly two miles away, can be heard distinctly at the same spot.

Though admittedly not yet completed, the West London Shooting School even now presents a sufficiently attractive appearance; it is, however, so extensive that only by going over it in detail can all the features be discovered. Along one side, about midway down, is a very large screen for the plating of shot-guns, which is also provided with travelling birds for right and left shots. In the centre is another bird, which rises from the ground behind a little bush, and travels with remarkable imitation of flushed game straight away from the shooter. This is particularly useful for fitting a customer, as the plate records at once where the mass of pellets strikes, and adjustments may be made accordingly. Behind the plate are kennels for sporting dogs, of which Mr. Watson has several now in training. Moving down the same side of the enclosure, we reach a tower, some 75 ft. high, provided for the throwing of overhead "birds," or live pigeons. There is ample platform space for the fitting of several traps having different angles, and the sportsman below takes his stand on

either side of a small clump of trees, which gives a very close approximation to the real thing. Beyond the tower Mr. Watson is laying out a 100 yds. rifle range, which, when completed, will be one of the few safety ranges available for Londoners. The shooter will stand in a pit at one end of a 3 ft. trench, 100 yds. long, and a system of mantlets and screens is being erected which will prevent any possibility of a shot getting away into the open. As a matter of fact, this is almost a refinement of precaution, since, glancing down the range towards the target, a railway bank stands high above it some three or four hundred yards away, and behind that is the wooded slope of Horsenden Hill, the summit of which rises to 278 ft. As occasion may require, this range is capable of extension backwards to at least 600 yards.

Close at hand is a "butt," in which the sportsman may take his stand and have his game driven up to him in the shape of clay-birds projected from hidden traps. There are several of these secreted behind screens, which are calculated to give the shooter opportunity for doing all he knows in the way of marking and "killing," as the clays fly all around him, overhead, right and left, high and low. Turning now to the centre of the ground, we come to a miniature rabbit warren, with bushes disposed so as to give in one place an open space, and in another a narrow ride. Across these spaces running rabbits, formed of two clay-birds held together at the flanges, go hustling in fine imitation of the genuine bunny's scuttle to cover, and need all the quickness of hand and eye that the sportsman can muster if they are to be "killed." Finally, we are taken for a walk round two sides of the twenty-acre enclosure, plentifully dotted with bushes and trees, with keepers behind us, to load if needs be, to pick up the game—really to pull the wires of hidden traps. As we walk, a clay rabbit suddenly scuttles down the ride in front. Off goes a clay-bird from a bush to the left, followed by another across to the right. Plenty of game, at least plenty of sport, is afforded by this stroll. As the keepers follow they pull concealed wires and release traps ahead, dotted about in the cover and throwing at every conceivable angle, and the man who can bag the twenty or thirty head of game that rise during the round deserves to receive a special diploma of merit. Apart from that, this section of the school is admirably adapted to instruct the novice in the etiquette and practice of game shooting, and even practised hands may benefit from the beats, especially as the position and direction of the concealed traps are always subject to alteration from time to time.

In the centre of the ground is a neat little pavilion, where the sportsman may find shelter, rest and refreshment. Now Mr. Watson's house is completed, arrangements can be made for the supply of luncheons and similar "fixings," so that there will be no need to consider the proximity or otherwise of the ground to restaurants and grill-rooms. Before closing this account of a singularly complete and practical shooting school, mention should be made of the fact that Messrs. Joseph Lang & Son, Ltd., are manufacturing their own clay-birds and running rabbits on the spot, and claim that they will thus be entirely independent of American sources of supply, and from the annoyance and expense of finding half a barrel load of cracked "birds." The process of manufacture is now in active progress in a corner of the ground, and the "clays" produced seem to be excellent in quality and are sold at a cheap rate.

## DYNAMITE IN THE TRANSVAAL.

THE recommendation of the Johannesburg Chamber of Mines, put forward on July 1st last, and duly chronicled in our August issue, to the effect that a coast duty of from 5s. to 7s. 6d. per case should be put upon all explosives entering into South Africa, has naturally enough raised a strong protest on the part of manufacturers of explosives in this country, who see in this proposal what is very like a concession granted to the factories already established in the South African colonies. It must, moreover, be admitted that the imposition of such a duty would, on the face of it, appear to go entirely counter to the spirit of the recommendations of the Transvaal Concessions Commission, as published in the form of a Blue Book, on April 19th of last year, the closing sentences of whose report on the South African Explosives Co.'s Concession read as follows:—"We therefore recommend that his Majesty's Government should decline to recognise this concession. The Company, in our opinion, should have no advantages in the competition for the manufacture of and trade in explosives in the Transvaal other than those it has secured by the establishment there of its factories, and its first occupation of the field of industry." That recommendation would seem to mean, if it means anything at all, that the company should be left to compete on even terms with all comers, and not merely with other factories situated in South African colonies.

Looking at the matter from a broad political point of view, there are two factors to be considered. The imposition of the proposed coast duty would tend to enhance considerably the taxable value of the two huge explosives establishments already in being in South Africa, apart from achieving the equally desirable result of fostering local industry. On the other hand, turning from the producer to the consumer, this duty would have the effect of keeping the prices of explosives at a higher figure than would be maintained in the face of outside competition, and to that extent the revenues of the mines, another taxpaying community, would be diminished. Taking the present annual consumption of 300,000 cases as a basis, at a price of about 40s. per case, it is evident that an increase of, say, 5s. per case will represent a considerable difference in mining profits. It will be seen that so far the balance is pretty evenly established as between producer and consumer on general lines, but in reality this artificial enhancement of prices would fall heavily upon the large investing public who have subscribed to the mining companies on the Rand, and would in many cases make the difference between profit and loss at a time when this particular industry is endeavouring to recover from the effects of the compulsory close-down due to the protracted war. There remains, from the political aspect of State revenue, a consideration of what will accrue to the Treasury in the way of duty due to the proposed coast-dues. According to the statements made in a pamphlet issued under the authority of some leading explosives manufacturers in this country, the imposition of such a duty will defeat its own ends by so handicapping importers as to render importations impossible. Obviously, if this statement be correct, no revenue will accrue from duty if there are no imports passed through the Customs.

This pamphlet to which we have referred is issued by the National Explosives Co., Ltd., the New Explosives Co., Ltd., and the Cotton Powder Co., Ltd., and is entitled "A Protest against the Attempt to Establish a New Dynamite Monopoly in South Africa." It is, of course, written in a distinctly party spirit, and contains various matters in connection with affairs at the Cape which we have no intention of touching upon here, leaving the title of the brochure to explain itself to those who can read between the lines. We can, however, quote in detail the passage dealing with the effect which the signatories claim would result from the imposition of the proposed import duty. On this bearing of the situation the pamphlet reads as follows:—"This brings us to the recommendation of the Executive Committee for the Chamber of Mines for the imposition of a coast duty working out at, say, £15 per ton. The late Mr. Cecil Rhodes, and others in a position to know, have stated that explosives can be manufactured as cheaply in South Africa as in Europe, in which case the local industry is in no need of adventitious support derived from a protective duty such as that now proposed. Allowing that the permanence of this possibility of cheap production is in some degree contingent on the state of the labour market, the manufacture in Cape Colony has always in his favour the saving in the cost of supply of nitrate direct from South America, and of pyrites, in unlimited quantities, from South Africa. Added to this, he has already a protection to the extent of some £7 or £8 per ton, as against the shipper from Europe, in the special rates of freight which the latter has to pay. Whereas, the raw components of dynamite can be delivered in the Colony from Europe at a freight of some 12s. or 13s. per ton, the manufactured article commands a special freight charge ranging up to £8 or £10 per ton. It will be seen, then, that when to this disadvantage is added a coast duty of £15 per ton, the manufacturer on the spot will have a margin of, say, £22 per ton with which to fight his European competitor. The petition recently lodged with the Secretary of State for the Colonies by certain companies manufacturing explosives in England, and having a combined capital of upwards of £1,500,000 sterling, expresses the conviction that the effect of a duty amounting to from £10 to £15 per ton must inevitably be to exclude from our new colonies all explosives manufactured in Great Britain or elsewhere in Europe, the producers of which could not hope, under such a burden, to compete with the local factories."

The pamphlet goes on to say that the petitioners "have expressed their willingness to submit readily to any reasonable taxation of explosives which may be required for the purpose of raising revenue, so long as the incidence of such taxation affects all manufacturers on equal terms, whether within or without South Africa. The form of tax now proposed would make it impossible to import explosives with any hope of success, and, therefore, the Revenue would not benefit by it." So far as the English manufacturers of explosives are concerned, this statement, as quoted, seems to put the matter into a nutshell. It remains to be seen what weight the recommendation of the Johannesburg Chamber of Mines carries in respect to bringing the proposed duty on explosives into operation. In the meantime, the Colonial Office is the master of the situation, and the amount of reason which is brought to bear on that department from either side involved in the controversy will undoubtedly prove the deciding factor in arriving at a decision.



## ROUND THE TRADE.

With this issue *Arms & Explosives* enters upon its eleventh year of existence.

Messrs. Holland & Holland, Ltd., have declared an interim dividend at the rate of 8 per cent. on the ordinary shares.

The authorities at Bow Street have given notice as to the theft of a Greener Hammerless Top Lever Ejector, No. 41,820.

A report by Major Cooper-Key relates to an accident which occurred at the Patent Electric Shot-Firing works in Lancashire.

Mr. H. M. Savage has resigned his position as secretary of the Nobel Trust, and Mr. E. A. Brayley Hodgetts has been appointed to the vacant position.

Messrs. Eley Bros. are in a position to manufacture nickel-base bullets of the kind that have become popular for use with miniature rifles firing Cordite.

A half-million of condemned cartridges, stored at the United States arsenal at Frankford, met a tragic fate, being exploded *en masse* by a lightning stroke.

The world of engineering has suffered a loss in the death of Mr. H. O. Rendell, till lately head of one of the departments of Messrs. Armstrong, of Elswick.

The new additional buildings to Messrs. Nobel's factory at Linlithgow are completed, and were recently opened by Sir Charles Tennant, chairman of the company.

The Midland Gun Company have removed from their former address in Bath Street, to more commodious premises at the Demon Gun Works, Vesey Street, Birmingham.

In giving the telephone number of Messrs. Boss & Co. in last month's issue, we made the mistake of a figure. The number is "4,711 Gerrard," not 4,811, as we then stated.

The accounts of the Abingdon Works Company disclose a profit of £2,668, which allows for the payment of 6 per cent. on the preference shares, and 2½ per cent. on the ordinary shares.

The British South African Explosives Co., Ltd., was duly registered on the 3rd ult., with a capital of £1,100,000, in £1 shares, in accordance with the agreement referred to in our last month's issue.

A curious fact is brought out by recent inquiries relating to the conditions of the gun trade in Belgium, breech-loading shot guns being quoted as low as 8s., superior qualities running as high as 20s. and 25s.

We understand that several important conferences have taken place between Mr. Webley and Messrs. Eley and Kynoch, having in view the settlement of standard chamber sizes of Cordite express rifles.

The *Pall Mall Gazette* is the most recent among newspapers to retell the arguments about the "hyposcope," as exhibited at Bisley. No doubt this is by way of jogging the Small-Arms Committee, whose line of duty is plainly indicated.

A regrettable accident occurred to one of the nitroglycerin hands at Messrs. Curtis's & Harvey's Cliffe factory, the man having inhaled nitric acid fumes, keeping it a secret till too late, his wish being not to disclose the fact of having spilt some.

During the annual conference recently held in Birmingham, under the auspices of the Institute of Journalists, visits were paid to Messrs. Kynoch's ammunition factory at Witton, and to the Birmingham Small-Arms Manufactory, at Small Heath.

We have reprinted, on behalf of the Schultze Gunpowder Company, the article on the loading of their powders which appeared in our June issue, the intention being to distribute it widely as a means of enlightenment on up-to-date cartridge loading.

It was agreed at the recent monthly meeting of the Cattle-water Harbour Commissioners that no steps be taken to oppose the erection of magazines for explosives in the neighbourhood

of Pomphlete and Plymstock, as proposed by Messrs Curtis's & Harvey, Ltd.

The London Armoury Co., Ltd., have moved from their premises at 114, Queen Victoria Street, E.C., and have taken fresh quarters at 1, Laurence Pountney Hill, E.C., whence they will conduct, as hitherto, the agency of the Winchester Repeating Arms Company.

The Laffin and Rand Powder Works at Wayne, N.J., U.S.A., was the scene of what might have been a very serious disaster on August 12th. Two tons of powder exploded, but luckily the workmen, warned in time by the sulphurous fumes, were able to escape before the explosion came.

The directors of Messrs. Armstrong, Whitworth & Co., Ltd., recommend the payment of dividends for the year ending June 30th last, of 15 per cent. on the ordinary shares, and 4 per cent. on the preference shares. The balance of £92,449 is carried forward to the next year's account.

The Hazard Powder Company have notified us that for administrative reasons they have closed their New York office, and that they intend transacting their business in future for Wilmington, Del., Messrs. Lequin and Lentilhon, of 46, Cedar Street, N.Y., having been appointed Eastern sales agents.

A limited liability company has been registered, with a capital of £6,000, consisting of 450 six per cent. preference shares, and 150 ordinary shares of £10 each, to acquire the business of Messrs. Hunter & Warren, of Glasgow, and to carry on the business of commission agents and dealers in explosives.

In America they seem to have received with good-natured interest the idea mooted by an English patentee to make clay-birds of land-fertilising materials, calculated to convert the present fragments that bestrew the ground into a boon and a blessing. We can imagine the reception that Mr. Paul North would accord to the proposal.

Captain Desborough's report on the fatal accident at Messrs. Pain's firework factory at Mitcham has been published. H.M. Inspector of Explosives attributes the mishap to some act of the deceased manager, Mr. Craig, but is unable to form any opinion as to the nature of the explosive, or as to how it came to be in a building reserved for non-explosive ingredients.

The Blenheim Engineering Works—that is to say, the Henry Barrel Company, of Eagle Wharf Road—will, by order of Mr. Justice Buckley, be sold up on Tuesday, the 28th inst. The sale is in the hands of Messrs. Fuller, Horsey, Sons, and Cassell, and among the items catalogued is a large assortment of boring, rifling, stocking, and other special gun and rifle machinery.

We learn from our contemporary, *L'Armurerie Liégeoise*, that a committee is in process of formation, under the sanction of the Liège Proof House, for the purpose of testing the pressure of sporting cartridges, with a view to the prevention of accidents arising from defective methods of loading. It is to be hoped that their apparatus no longer shows muzzle pressures equal to those registered at the breech.

According to the recommendation of the directors of the Birmingham Small-Arms Co., Ltd., dividends will be paid for the half-year ending July 31st last, of 5s. per share on the ordinary shares, together with a bonus of 10s. per share, free of income tax, and of 2s. 6d. per share on the preference shares. This will make a total dividend for the year of 10 per cent. on the ordinary shares, in addition to the bonus, and of 5 per cent. on the preference shares.

Mr. Charles Playfair Robb, of Aberdeen, was recently fined £3 5s., with £1 1s. costs, for having on his registered premises 65 lbs. in excess of the amount of loose powder permitted under the Explosives Act. Owing to the closing of one of the public Powder Magazines, and the fact that the other is opened only twice a week, this large quantity had been taken in during Mr. Robb's absence, with the intention of making it up into cartridges forthwith. Had that been done, and the powder been loaded into the 5,200 cartridges it would supply, Mr. Robb would have been well within the law, as at the time he had only 30,000 cartridges in stock, as compared with a permitted total of 100,000.

## THE MANNLICHER AUTOMATIC PISTOL, M/1902.

IN the accompanying half-page illustration we show the leading features of the automatic pistol invented by Herr von Mannlicher, a specimen of which has been submitted for our inspection. It will be seen at once from Fig. 1 that the pistol is of remarkably neat external appearance, and presents none of the excrescences so noticeable in some other types of magazine arm. Speaking in a general way, it strikes one as more essentially a weapon suited for civilian use for purposes of self-protection rather than a military arm, its ballistics being distinctly lower than those of some of the other automatic arms, while its exceptional handiness gives points in its favour as compared with any revolving or magazine pistol of equal calibre with which we are acquainted. The Mannlicher pistol seems, in fact, a direct answer to the brief note which appeared in our June issue, in which we criticised all such automatic pistols as had so far been placed upon the English market as of too severely military a pattern to find favour among civilian users. Despite its .301 calibre, it has for its extreme measurements, length,  $8\frac{1}{2}$  ins.; depth,  $5\frac{3}{8}$  ins.; and width,  $1\frac{1}{8}$  ins.; and weighs, with eight cartridges in the magazine, only 1 lb. 15 ozs.; these figures showing a marked difference from those usually attained by magazine arms. It balances well, and is as easy to handle as a single-shot pistol.

Throughout the details of its design and construction are constant evidences of that practical ingenuity which has always been associated with the name of its illustrious progenitor. Turning to more particular features, the illustrations we give show so clearly the principal component parts of the pistol that not very much in the way of verbal description is required. The Mannlicher differs from other automatic pistols in that it has a fixed barrel, which is screwed into the upper part of the body of the arm. In Figs. 2 and 3 this body is shown in detail, with the lock action in place, the breech-block, lock-plate covers and wooden hand-grips being all removed, so as to show the construction. It will be noticed that receiver, magazine, trigger-guard, lock-plates and handle or stock are all comprised in one single stamping. Recoil and the subsequent automatic action are taken up entirely by a sliding breech-block, shown separately in Fig. 4 in elevation, plan and section. The manner in which this fits the body of the pistol is shown most clearly in Figs. 1, 6 and 7, the two first-named illustrating its external and sectional appearance, and Fig. 7 showing it retracted nearly to the extent of its travel for the purpose of filling the magazine. It is controlled to a certain well-defined backward and forward movement, in line with the axis of the barrel, by means of two slides *a* on either side of the body just above the lock-action, and by its forward end being forced to travel between the lower side of the barrel and an extension of the double lock-plate cover, shown separately in Fig. 5. Normally, it is held in its forward position with the breech closed, and returned to that position after the firing of each shot, by the action of the powerful spiral spring, shown in Fig. 6, lying underneath the barrel of the pistol; and it is furthermore assisted in maintaining that position by the pressure of the hammer on the striker and by a detent on the little lever *b*,

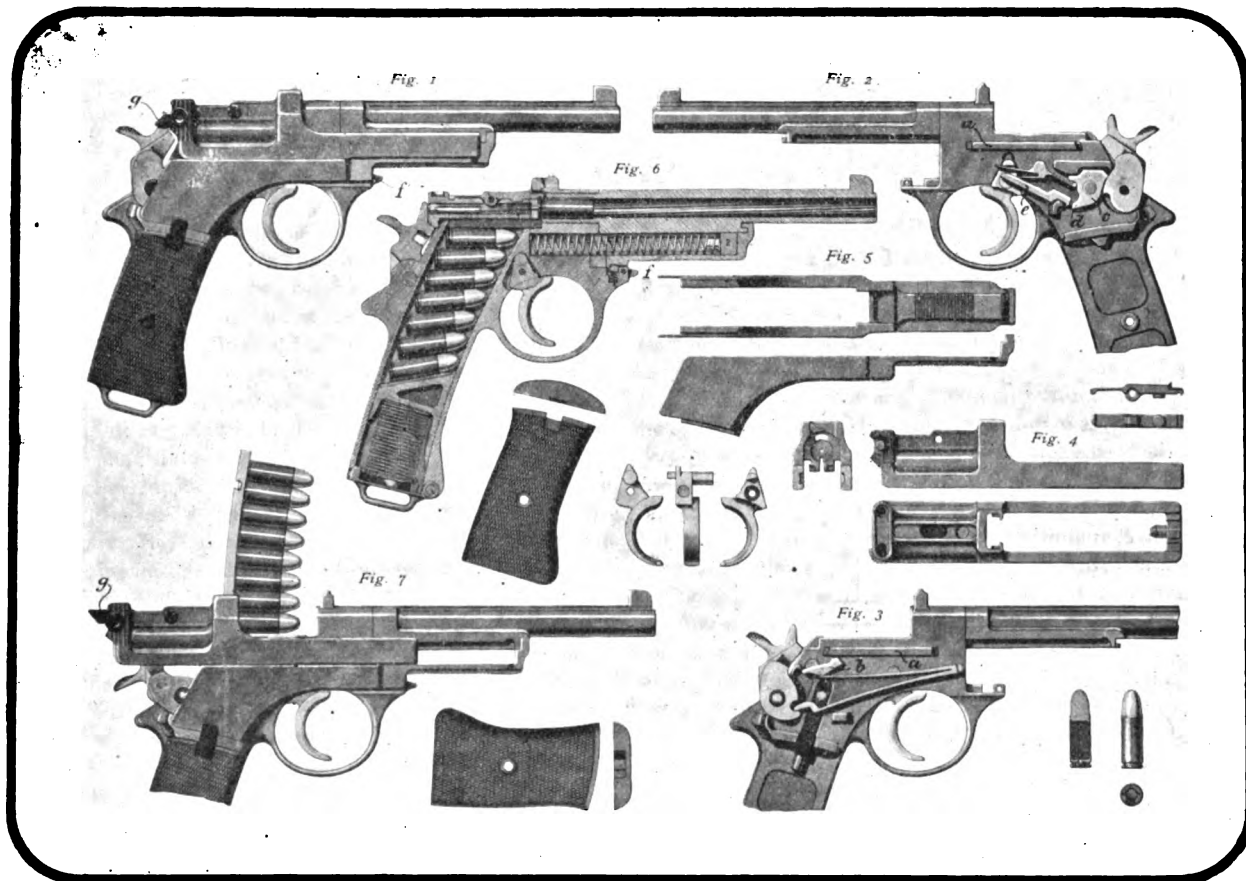
shown in the right-hand lock action as operated by the main-spring, which fits into a notch on the underside of the breech-block on that side of the receiver. It is necessary now to examine the left-hand side of the lock for an understanding of what takes place during the action of firing. The hammer is held at cock by a curiously shaped tumbler or sear *c*, which has a projecting arm *d* on its lower part towards the front. The trigger does not directly actuate this sear, but has upon it a hinged lever or bolt *e*, which, as the trigger is pulled, presses backwards against the projection of the sear already referred to until the hammer is released. The relation of this lever or bolt and the sear is such, however, that the moment after the hammer is released the lever slips upwards from engagement with the projection *d* on the sear, and rests instead in the hollowed-out space immediately above, where it is ineffective so far as any movement of the sear is concerned, and it is not until the shooter has entirely released his pressure upon the trigger that the limb comes into engagement again with the end of the sear. An understanding of this action is necessary in order to see that by this means the shooter has absolute control over the rapidity of fire of the pistol. It is, in effect, a single-shot pistol capable of firing eight shots in succession, in response to as many distinct pulls of the trigger, but there must be a definite and complete release of the trigger before the firing of each successive shot.

The manipulation of this pistol is of the simplest possible nature. As a preliminary to loading, the breech-block is retracted by hand until the detented lever *b* on the right lock-plate, already mentioned, which springs into a suitable notch in the breech-block, and the uprising platform of the magazine in conjunction, hold it in the position shown in Fig. 7. It will be seen that the eight cartridges forming the charge for the magazine are held in a clip, which is placed vertically in two grooves at the back of the receiver, much after the manner adopted in loading the Mauser pistol and the later patterns of Mauser and Mannlicher rifles. The clip here employed, however, is of an improved pattern, the Mannlicher-Pieper patent, the cartridges being securely held in it, not only by the usual frictional grip, but by the ends of the spring-clip being turned up at right angles, so that it is practically impossible for them to slip out. During the process of loading, however, the lower stop of the clip is actuated by inclined surfaces in the grooves of the receiver in such a way as to give free passage to the cartridges, and a simple pressure on the upper one of the eight suffices to push them down the slide into the magazine of the pistol. To close the breech, it is now necessary to release the block from the restraint of the detent already referred to, which is accomplished simply enough by giving a slight over-draught to the hammer, when the butt of the main-spring is brought up against the free end of the lever *b*, so depressing the detent from its engagement with the breech-block. The block at once travels forward under the influence of the strong spiral spring provided under the barrel for that purpose, and thereby carries the uppermost cartridge into the chamber of the pistol.

A pull of the trigger releases the hammer in the manner already described, and fires the cartridge. The recoil drives back the breech-block against the pressure of the coiled spring, to which is added the pressure of the main-spring acting through the hammer and the further restraint of the

detent on the little lever *b*, which fits into a notch in the lower side of the breech-block, as previously noted. The extent of this backward travel carries the breech-block somewhat to the rear of the loading position shown in Fig. 7, and it takes place with such rapidity that the detent has not time to engage in the second of the two notches. In the same action, the extractor, shown separately between Figs. 2 and 4, withdraws the fired cartridge from the chamber of the pistol, and ejects it, and the forward movement of the breech-block carries the next cartridge into position in the chamber, leaving the

bodily. At this point the pistol is in the condition shown in Figs. 2 and 3, and every member of the lock action can be removed by the fingers only. The magazine spring and platform having previously been removed through the butt-plate, it will be seen that the weapon is completely stripped. The only screws requiring the use of a screw-driver are those holding down the extractor spring, on top of the breech-block, and of the safety-catch *g*, at the rear of the block, in addition to those securing the wooden hand-grips and the butt-plate cover, these three last-mentioned being unnecessary to remove in



hammer ready cocked for the next shot. Naturally, this double action is almost instantaneous, so that by the time the shooter has released his pressure on the trigger in readiness for a second shot, the mechanism of the pistol is in position. It is said, though we have not personally tested this point, that, including the time occupied in recharging the magazine, no fewer than 40 cartridges can be discharged in the short space of half a minute, of course without aiming.

A personal trial has convinced us that this pistol is a thoroughly practical arm, with distinct advantages in its favour as viewed from the civilian standpoint. It possesses also the marked feature of being capable of being taken apart for cleaning purposes without recourse to that destructive weapon the screw-driver. A thumb pressure on the little projection *f* allows the double lock-plate cover, shown separately in Fig. 5, to be pushed forward until it is detached from the arm. The withdrawal of the spiral spring below the barrel is easily accomplished, and then the breech-block can be removed

stripping the pistol. A feature that has not so far been mentioned is the slide for emptying the magazine. A projecting thumb-piece is shown on the right side of the pistol, between the wooden grip and the lock-plate cover, the depression of which, when the breech-block has been retracted, allows any cartridges in the magazine to be ejected at will. The pistol, therefore, need never be loaded except during the actual time when it is in use, though the use of the safety-catch makes assurance doubly sure.

Having described the pistol at length, we give herewith the leading particulars of its dimensions, for purposes of reference:—Calibre (between lands), '301-in.; length of barrel, 5'51-in., or 18'3 calibres; length of part rifled, 4'7-in., and of path of bullet through the barrel, 4'94-in.; total length of pistol, 8'72-in.; height, 5'37-in.; width, 1'18-in.; rifling, number of grooves, 4; depth, '0059-in.; width, '1153-in.; width of lands, '1212-in.; right-hand twist, angle 5° 16' 45"; maximum diameter of barrel at chamber, '609-in.; diameter

of chamber, .348-in.; weight of pistol, empty, 28.57 oz.; with magazine full, 31.04 oz.; number of parts in pistol, 36. Length of complete cartridge, 1.122-in.; weight, 136½ grs. Length of bullet, .551-in.; maximum diameter, .308-in.; weight, 85½ grs.; sectional density,  $\frac{W}{d^2} = 129$ ;  $\frac{d}{W} = 7.76$ ; grains per sq. in. = 1,150. Charge, 3.4 grs. of Schwab smokeless powder; ratio to weight of bullet, 1:25; length of cartridge case, .8268-in.; weight, empty with cap, 47.84 grs.; weight of clip, empty, 14 grs. Muzzle velocity, 984 foot-seconds; muzzle energy, 184 ft.-lbs.; penetration of pine boards at short range, 5.9-in.; mean variation of shots at 50 paces, height, 5.157-in.; breadth, 2.795-in.

## LECTURES TO YOUNG GUNMAKERS.

### XVII.—WADS.

THE question of devising and selecting suitable wadding for use in cartridge cases is one that perplexes cartridge loaders from the time when they first take up the work. Many of them adopt the course of using standard wads as recommended by the powder maker. Others endeavour to arrive at novel combinations that enable better results to be obtained. As a general rule, it may be laid down that it is a futile proceeding to devise a novel form of wadding on a mere supposition that it will be more successful than what has gone before, since it can only be tested by the person responsible for its design by an examination of pattern and penetration. To arrive at a true estimate of the behaviour of a cartridge, it is necessary to test in an exhaustive manner the velocity, pressure, and rate of ignition that occurs with the wadding under consideration when combined with standard loading in other respects.

A man who is guided by pattern alone will be able to produce the closest shooting by a combination of powder and wads that results in low velocities; while, in a similar way, by blindly increasing the resisting power of the wads, the velocity is frequently enhanced at a cost in increased pressure, which is liable to cause distress to weak guns, and spoil the patterns. Therefore, the general rule which should be observed is to pay great attention to the wadding employed, not with a view to finding some special variety promising a theoretical standard of perfection, but rather to examine the various deliveries, so that they shall comply as closely as possible with the standards that experience and the recommendations of the powder makers show to be desirable.

In the ordinary 12-bore cartridge the powder charge reaches to a certain height, and the wads that occupy the space between it and the shot have many important functions to fulfil. The wads do not act as a mere piston for conveying the pressure of the gas to the pellets comprising the shot charge. They have to exert a resistance against the expansion of the powder gases in the early stages of ignition that will cause a delay sufficient to enable the powder gases to get well alight. Condensed powders and the 33-grain nitros are perhaps less in need of this assistance than the 42-grain bulk powders. The 42-grain nitros, if not properly ignited at the start, are apt to acquire only partial combustion, resulting in reduced velocities, greatly increased smoke, and the blowing

from the muzzle of the gun of a large number of unburnt particles, which are apt, when shooting against the wind, to come back into the shooter's eyes. So marked is this defect of a loose cartridge, unsuitably wadded and with a weak turnover, that experts can tell by the greasy smell of the powder gases that there has been a bad ignition.

It is difficult to lay down the exact property that felt possesses which enables it to retain its place while the combustion of the powder is getting under way. Certainly, when squeezing a wad in a vice there is evidence of a large side expansion, and it is fairly clear that by this means a grip is established upon the walls of the case which adds greatly to the resistance set up against the expansion of the powder gases. The analogy of the vice is useful in that it shows that to compress a wad it must be squeezed at both ends. Since the powder gases act upon one side only of the felt wad, it is evident that the other face of the wad must be so supported as to allow effective compression to take place. In order that this shall occur, the turnover of the cartridge case must be suitably formed. That is to say, the length allowed for turnover should not be less than .025 of an inch, nor more than .030. The actual shape of the turnover should be such as to retain the top wad to the required extent, and in this respect vast differences are met with according to the loading shop from which the various cartridges emanate. In the better organised establishments the turnover is effected with mathematical precision by power-driven lathes, and the best results are undoubtedly obtained under such conditions. When the work of loading is badly organised, the turnover is likely to be the first item that is neglected. In fact, the present writer has actually come across instances where, for trade purposes, cartridges are turned over with small hand machines, such as are listed in the implement maker's catalogue at a few shillings apiece. It is exceedingly difficult to obtain good results with these tools, and bad shooting almost of necessity follows, due to the loss of velocity resulting from an insufficient retention of the shot, and by inference of the top face of the felt wad.

In dealing with wadding for cartridges, it must always be remembered that the powder is regulated for sharpness of ignition and other properties, so as to suit the system of loading that is commonly adopted in the trade. This consists in bringing the various wads between powder and shot, so that the over felt wad is a given distance from the mouth of the case, so leaving a suitable space for the accommodation of the standard charge of 1¼ oz. of shot, and for the needful top wad and turnover. If, therefore, by unduly ramming the wads, or by not pressing them down far enough, the amount left for the turnover is not right, the efficiency of the cartridge suffers. Possibly powder makers might manufacture an explosive that would give standard results with weak turnovers, but the fact remains that they do not, their powders being adjusted to give the requisite velocity when the wads and turnover perform their service in the recognised manner. Similarly, they take precautions to insure that the pressures shall remain at a safe point, so as to avoid injury to the gun, and undue compression of the shot pellets such as would interfere with pattern.

The late Dr. J. H. Walsh was probably the first to analyse in a systematic fashion the effects of the various kinds of wadding. The difficulty he encountered at the start was that the powders of his day erred on the weak side, and he applied an effective remedy by introducing the "Field" cloth wad, which consisted of a one-tenth-inch tight-fitting cloth wad,

with a grease-proof face on one side, and a pink piece of paper on the other. The popularity attained by this wad was unquestionably a testimonial as to its effectiveness for the end in view; so that sportsmen insisted on the "Field" system of loading. Later on, nitro powders and caps were so improved that the expensive "Field" wad was no longer necessary; in fact, the card wad did the work better for the powders that came subsequently into use. To overcome this difficulty, the firm of Eley invented the "Field" card wad, which was an ordinary tight card with grease-proof paper on one side, and the familiar pink surface on the other. There can be little question that this wad was introduced purely to overcome the prejudice against a return to the ordinary card wad, the application of the special name, "Field," satisfying sportsmen notwithstanding the absence of the real characteristic of the original brand of wad. At the present time it seems to represent an inconvenient survival from the past, because a wad which must be put into the case one way up creates a loss of time in loading. Anyhow, admitting existing facts, the "Field" card is generally the first wad that is placed over the powder. Many firms use in its place a card with grease-proof surfaces on either side, though we believe it would be difficult to prove that any grease would get from the felt through an ordinary card, and so cause deterioration of the powder, in the same way that we believe that the grease-proof card has no special effect by way of maintaining the percentage of moisture in the powder intact under storage. Still, the need for some kind of wad between the powder and the felt is universally admitted. Some firms use thick wads, others use thin ones; and, again, we come across instances where cloth is used with several layers of paper supporting the outside surfaces. The variety in gauge is also a noticeable item, though the general practice tends towards a tight-fitting wad that will prove a suitable check against escape of powder gas.

Among felt wads an immense amount of variety is encountered. We have in qualities—the best felt, which consists of highly bleached wool; the medium quality felt, which is equally good wool, but is not quite equal in whiteness; and the brown felt, which is also quite suitable for the required purpose, notwithstanding the fact that colour effects have not been studied. Then, again, as regards hardness, there are many graduations. The soft spongy felt wad has the effect of greatly increasing the resistance to the expansion of the powder gases, while the hard felt has a much reduced lateral expansion, and consequently is suited more particularly for quick-burning powders, whose rate of combustion is less controlled by initial resistance. The wads of medium hardness, of which Eley's special or second quality variety may be taken as an example, are those generally used in the trade; and the behaviour of the powders when shot in combination therewith is taken as a test of their efficiency under ordinary conditions of loading. The required hardness of wadding is provided for by selection of the wool, steeping the sheets of wool from which they are punched in a suitable preparation of glue or size, or other similar materials, so that a certain amount of the softness and natural pliability is got rid of. The hardness, however, should not depend entirely on the binding material.

According to the hardness of a wad, so it is regular in shape and sharp at the edges, or the reverse; the hard felts being solid and resisting to the touch, while the softer ones are of a more irregular shape, and can be made

more readily to exude their grease under pressure. The greasing of wads is effected by machinery, which causes them to roll over a greased surface, so that the red-coloured Russian tallow is applied at the edges and does not reach the centre. There is not very much to say in regard to the proportion of grease, beyond the fact that when prices are cut, grease being cheaper than hair, and felt wads being sold by weight, an undue proportion of tallow is to be guarded against.

Among substitutes, or so-called substitutes, for wool wadding, feltine and hair wads are the most used. Neither of these has the power of lateral expansion that is absolutely necessary for good shooting. Therefore, any cartridge which contains feltine or paper-covered hair wads to the exclusion of felt may be promptly condemned. The utility of these light non-expanding waddings is that they enable the loader to fill up space within the cartridge that is not required for shot or powder. If, for instance, a shooter wishes to use game charges in a pigeon case, the surplus of length may be filled with feltine wads, in addition, of course, to the usual felt. Sometimes a portion of the unused space is filled by the use of hollow cone wads, which occupy the base of the case. This system is very satisfactory on theoretical grounds, in that it avoids unnecessary and useless additions to the wadding between powder and shot; but it has the defect that loose or even glued cones may be unseated by the explosion, and be left in the barrel after firing, and so cause bulges or bursts. In connection, for instance, with the 33-grain nitros, even the ordinary  $\frac{1}{2}$ -inch case contains a surplus space when shot charges of 1 oz. and  $1\frac{1}{8}$  oz. are used. In place, therefore, of one of the ordinary card wads a three-sixteenth-inch feltine may be employed. It is usual to place the feltine wad over the felt and next to the shot, since if it is placed on the powder it is apt to be blown into flake-like fragments, which fill the air immediately after the discharge. It is open to argument that the feltine wad is a little too soft to be placed next to the shot, but if this objection is considered serious it may be met by adding a thin card, though an examination of feltine wads recovered after firing seems to show that they do not unduly mould themselves to the shape of the pellets. The wad over the felt is thus not a very material factor in the behaviour of the cartridge. We have even seen Continental cases in which a thick cloth wad is so used, but in a general way it does not seem to matter whether this wad is thick or thin, so long as the case is suitably filled and the compression of the powder allowed for in the published instructions of the powder maker is observed.

The over-shot wad, on the other hand, seems to have a material effect on the shooting. Many firms use a thin wad, but nearly as many instances could be quoted where a stout one is preferred. For instance, with Schultze the top wad recommended is a thick one, while with Ballistite, Amberite, E. C. No. 3, and many others, the thin one is preferred. The general effect of a thick wad over the shot is to increase the resistance and so raise the velocities, but, on the other hand, the pattern is not so close, so that whichever is used the result is likely to be a compromise. In judging the thickness of card wads, the best way is to place a number together until one inch of length is made up. If this test is applied to Eley's thin top wads, it will be found that as many as 22 are necessary to make up the inch—this corresponding with an individual thickness of .046 of an inch. Medium cards, on the

other hand, run about 15 to the inch, which give a thickness of .067 in.; while thick cards run 10 or 11 to the inch, making a thickness of about .094 in., which is the ordinarily accepted three-thirty-seconds-inch thickness.

Altogether it will be seen that the various wads that are available for the selection of the loader present many varieties and contrasts. So long, however, as they are a nice fit in the case, and the all-important felt wad is of the kind needed for the particular powder used, the other wads employed do not very much matter. The idea that a three-eighth felt must necessarily occupy three-eighths of an inch when pressed into the case need not be taken too literally. The powder maker is responsible for regulating his production to suit what is ordinarily accepted as a three-eighth felt wad, and it is unnecessary to improve on his work by using needlessly thick wads. If the two cards and the felt wad have the recommended aggregate thickness, and are brought down to a suitable position so as to allow, say, 1.10 in. to 1.05 in. for the 1½ cz. of shot, top wad and turnover, all will be well. If, on the other hand, the remainder of the charge does not occupy this space by reason of an altered charge of shot or an unusual size, the difference should be made up by the use of feltine or other suitable form of wad, giving the extra thickness needed. The powder, when receiving the compression represented by the position of the over felt wad, may be left to do its work; and any effort to improve matters by the use of spring pistons, or other means of affording a specified compression on the wads, may be discarded as unpractical, since they open the way for that most objectionable of faults, irregularity of turnover. The great need in cartridge loading will be seen to lie in adjusting the wads to suit the shot and turnover, and when these have been duly allowed for, and the powder charge is loaded according to the approved standard, a cartridge as good as the loader can be expected to turn out is assured. For further improvements the small loader should be content to wait until those having the needful appliances are able to guarantee an advance upon pre-existing methods.

## APPLICATIONS FOR PATENTS.

AUGUST 18—SEPTEMBER 20, 1902.

- 18,161. Torpedo Gear. A. H. Atteridge.  
 18,204. Projectiles. S. E. Page (Agent for *H Binney*).  
 18,235. Small-Arm Sights. A. H. Silver and A. Butterworth.  
 18,239. Small-Arms. T. Atkinson.  
 18,273. Range-Finder. A. Barr and W. Stroud.  
 18,276. Repeating Rifle. R. C. Stevenson.  
 18,293. Wads for Fire-Arms. T. W. Smith.  
 18,354. Sights for Small-Arms. J. J. Mason.  
 18,410. Shell. J. P. Hughes.  
 18,492. Trunnion Bearings. Sir W. G. Armstrong, Whitworth & Co., Ltd., and R. T. Frankston.  
 18,557. Machine Gun Carriage. C. H. Jardine.  
 18,598. Blasting. T. Warsop.  
 18,713. Projectiles. S. E. Page (Agent for *H Binney*).  
 18,778. Field Guns. H. H. Lake (Agent for *H Ehrhardt*).  
 18,806. Explosives. L. Davies.  
 18,840. Ordnance. A. T. Dawson and G. T. Buckham.  
 18,886. Mine Firer. L. Gans.  
 18,929. Sighting of Small-Arms. R. Watson.  
 18,939. Projectiles. E. Engels.  
 18,941. Projectiles. W. S. Simpson.  
 18,957. Ordnance. C. P. E. Schneider.  
 18,986. Sight and Range-Finder. A. R. Bastick.  
 19,017. Projectile Fuses. Sir H. S. Maxim.  
 19,085. Cartridge Carrier. G. C. Swayne.

- 19,265. Fire-Arms. W. J. Turnbull and W. H. Bofinger.  
 19,303. Pneumatic Gun. J. Picken.  
 19,349. Range-Finder. B. R. H. Taylor.  
 19,359. Telescopic Sights. A. A. Common.  
 19,509. Absorption of Recoil. J. J. Mason.  
 19,516. Ammunition. G. C. Baker.  
 19,518. Moving Targets. J. W. Porter.  
 19,528. Torpedoes. F. W. Dodd.  
 19,600. Shot Box for Mines. T. Straker.  
 19,638. Range-Finder. W. Wilson.  
 19,673. Rifle Mechanism. W. J., W. (Jnr.), and A. S. Ison.  
 19,729. Small-Arms. L. T. Hamal.  
 19,730. Blank Cartridges. O. Schütte.  
 19,742. Semi-Automatic Guns. R. H. Kjellman.  
 19,955. Torpedo-Firing Apparatus. S. Lake.  
 19,958. Automatic Fire-Arms. A. Hauff.  
 20,115. Ordnance Adjustment. A. Reichwald (Agent for *Fried. Krupp*).  
 20,128. Position Arranger for Guns when Game Shooting. H. F. L. Aumont.  
 20,143. Targets. H. G. Dee.  
 20,214. Smokeless Powder. J. A. Denton and J. H. Preas. (Date applied for in U.S.A., March 8, 1902).  
 20,248. Time Fuses. P. S. Tasker.  
 20,269. Rifle Sights. M. E. Sutherland.  
 20,307. Small-Arm Safety Appliance. J. Tambour.  
 20,321. Telescopic Sights. C. P. Goerz.  
 20,390. Range-Finder. A. A. Common.  
 20,406. Light Ordnance Mounts. The Hotchkiss Ordnance Co., Ltd. (Agent for *L. V. Benét*).  
 20,430. Revolvers. The Webley & Scott Revolver & Arms Co., Ltd., and W. J. Whiting.  
 20,467. Safety for Fuses. H. W. W. Barlow.  
 \* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

AUGUST 28—SEPTEMBER 18, 1902.

COMPILED BY H. TARRANT.

- 9,488 (1901). **Aiming of Naval Guns.** C. J. A. Dick, Norway. An instrument for recording accurately the direction of a gun at the moment of supposed firing, and the direction of movement of the gun caused by the rolling of a ship. The instrument is used principally to determine whether the gunner has aimed correctly, and whether the mark would have been hit if the gun had actually been fired. Accepted August 7, 1902.  
 14,346 (1901). **Sighting Apparatus for Rifles.** H. D. Taylor, York. A method of reducing the bulk of a telescopic sight to a minimum by using a Galilean telescope. The image of cross lines or other fiducial marks is made to appear as if actually upon, and at the same distance away as the distant object aimed at. Accepted August 15, 1902.  
 14,622 (1901). **Construction of Rifles.** J. B. Thorneycroft, Ayrshire. A rifle in which the barrel is carried rearwards into proximity with the butt end of the stock, the length of the weapon being thus shortened, whilst the length of the barrel and the effective range due to such length are retained. Accepted August 18, 1902.  
 18,259 (1901). **Magazines for Rifles.** J. E. Bousfield (Agent for *Sir C. H. A. F. L. Ross, U.S.A.*) A device employed in conjunction with a specially-constructed magazine for rifles and machine guns, by means of which the magazine may be latched out of section and the cartridges therein held in reserve while the rifle is loaded singly. Accepted August 7, 1902.  
 18,294 (1901). **Loading Clip for Revolvers.** The Webley & Scott Revolver and Arms Co., Ltd., and W. J. Whiting, Birmingham.  
 20,526 (1901). **Locking Appliance for Small-Arms.** J. Tambour, Austria. A locking device for small-arms, by means of which unintentional firing is prevented by a simultaneous locking of the hammer, the sear, and the trigger. The safety is released by a part which is pressed when the stock is gripped. A bolt, which has to be released before firing, holds the pressing piece against movement. Accepted Aug. 14, 1902.



- 20,559 (1901). **Air Guns.** J. Mayer, Austria. A tilting device for the barrels of air guns, consisting of a pivoted lever, which, in its position of rest, holds the barrel locked; but on being depressed releases the barrel and forces it into the tilted position. A safety is also described. Accepted August 14, 1902.
- 20,560 (1901). **Air Pistols.** J. Mayer, Austria. In order to obviate the comparatively expensive process of boring the barrels of air pistols cast in one piece, a pistol is cast hollow, and an auxiliary barrel or tube is inserted and is screwed or soldered therein. Accepted August 14, 1902.
- 20,644 (1901). **Cartridge Platform for Rifle Magazines.** Sir C. H. A. F. L. Ross, Ross-shire. An oscillating cartridge-lifting platform for magazines, into which rimmed cartridges of the taper type are loaded, the axis of oscillation of which is located approximately at the intersection of the converging lines of the cartridges lying in the magazine. Accepted August 28, 1902.
- 20,645 (1901). **Trigger Mechanism for Rifles.** Sir C. H. A. F. L. Ross, Ross-shire. Trigger and sear arrangements for rifles designed to ensure safe and positive operation, to form an auxiliary lock for supplementing the main recoil abutments of the bolt in the case of heavy recoil, to ensure certain engagement of the sear in cocking, to prevent the release of the firing pin until the bolt is safely closed, and to prevent accidental opening of the breech during the firing operation. Accepted August 28, 1902.
- 21,373 (1901). **Rifle Magazine Mechanism.** H. W. Holland and W. Mansfield, London. Rifle magazine mechanism, by means of which the cartridge-lifting platform is automatically forced and held down during the operation of turning the bolt to open the breech. The magazine may then be filled by simply dropping the cartridges into it. Accepted August 28, 1902.
- 21,374 (1901). **Submerged Torpedo Tubes.** Sir W. G. Armstrong Whitworth & Co., Ltd., and E. W. Lloyd, Newcastle-on-Tyne. In that class of apparatus in which there is a fixed outer tube and a movable inner tube carrying the torpedo, an air valve is fitted in the outer tube in order to admit air which is compressed and forms a cushion when the inner tube returns after its outward movement. Accepted August 28, 1902.
- 21,712 (1901). **Gun Mountings.** C. Holmström and A. Brömberg, Glasgow. This patent relates to the construction of mounting for ordnance. The training, the dismounting, and the housing of the gun are facilitated, and the mounting is provided with a hydraulic recoil apparatus which will act more efficiently than those used heretofore. Accepted August 28, 1902.
- 22,657 (1901). **Locks of Small-Arms.** J. Tambour, Austria. A locking device for the hammers of small-arms, consisting of a hook-shaped part, which is formed in one with the hammer-releasing limb. When the hammer is at half-cock the releasing device and the hammer mutually lock each other, whilst when the hammer is at full-cock the locking device is disengaged only when the stock is grasped to pull the trigger. Accepted August 28, 1902.
- 23,889 (1901). **Priming Composition.** M. Bielsfeldt, Germany. A priming composition consisting of from 70 to 85 per cent. of trinitronaphthalene with 15 to 30 per cent. of potassium chlorate. This mixture is produced more cheaply, and is safer to manufacture, than fulminate of mercury. Accepted August 28, 1902.
- 6,348 (1902). **Gun Carriage.** H. P. Osborn, U.S.A. A shield-protected motor-propelled gun-carriage, the wheels of which are wide, hollow, and tub-shaped. The wheel protects both the propelling machinery and the gunners. Accepted August 14, 1902.
- 7,605 (1902). **Bandoliers.** T. G. Wilson, Junr., Canada. A bandolier consisting of a strip of leather, which is folded to form three adjacent layers, the two outer of which fold over the cartridge-carrying central strip, and are secured together by means of buttons. Accepted August 28, 1902.
- 12,677\* (1902). **The Fulford Single-Trigger Mechanism.** E. D. Fulford, U.S.A.
- 14,440 (1902). **Ordnance and Projectiles.** W. L. Wise, London (Agent for *K. Bergheland, Norway*). Improvements in ordnance of the type referred to in Provisional Patent No. 20,935, 1901, in which is described a projectile propelled by means of the magnetic suction of colenoids which are energised for very short periods of time. The projectile described in the present patent is composed of a series of coils instead of iron. Accepted August 7, 1902.
- 14,838 (1902). **Sporting Cartridge Cases.** A. T. Duncan, U.S.A. A removable cone for use in metal cartridge cases. The cone is composed of paper, is lined with metal, and has a funnel-shaped powder-receiving cavity, a hole being bored in its base to receive the cap chamber. The cone may be removed and renewed. Accepted August 21, 1902.
- 15,259 (1902). **Explosive Charges for Guns.** R. W. Scott, U.S.A. An explosive charge for guns composed of specially-shaped grains designed to generate gas under moderate pressure at the beginning of combustion, and then to increase the volume of the gas, so that high velocity is imparted to a projectile with a low chamber pressure. Accepted August 14, 1902.
- 15,504 (1902). **Trail for Gun Carriages.** C. D. Abel, London (Agent for *Rheinische Metallwaren Maschinenfabrik, Germany*). A trail for wheeled gun-carriages designed to combine strength with lightness. Its cross-section, which has a form of a  $\square$ , has a high moment of resistance with comparatively little material. The trail is a seamless hollow body, being made without any welding or riveting. Accepted August 14, 1902.
- 15,605 (1902). **Recoil Brakes for Ordnance.** H. Ehrhardt, Germany. A method of relieving the carriage of the strain due to the recoil-braking action, consisting in fixing the brake rod, whilst the braking appliance is connected and displaced with the barrel of the gun. Accepted August 14, 1902.
- 16,582 (1902). **Breech-Block for "Martini."** C. Francotte, Belgium. A breech-block for Martini fire-arms, which is bored out longitudinally through its entire length, the boring containing a striker and spring. The hole is closed at its front by a screwed plug. The milling of the block is simplified and the mounting facilitated by means of this arrangement. Accepted August 28, 1902.

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

## SELECTED PATENTS.

### THE FULFORD SINGLE-TRIGGER MECHANISM.

12,677 (1902). E. D. Fulford, U.S.A. A selective single-trigger mechanism is described in this patent. The involuntary pull occurs during the re-arrangement of the parts after the first discharge, this re-arrangement being retarded by a piston and cylinder. A slide beneath the trigger-plate governs the position of a "rocker," and thus determines which sear shall be the first to be lifted.

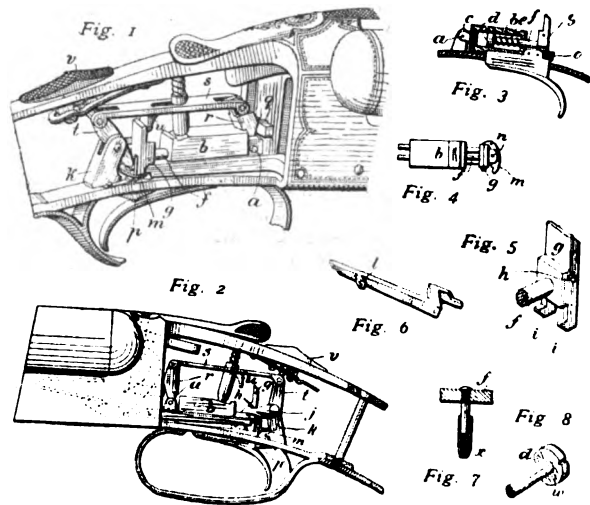
In the appended drawings the mechanism is illustrated in perspective in Fig. 1, showing the parts in the "safe" position ready to discharge the right-hand barrel. The same parts with the "safe off," as seen from the opposite side, are shown in Fig. 2; and several parts in detail are illustrated in Figs. 3, 4, 5, 6, 7 and 8.

The trigger-blade with its attached parts is shown in Fig. 3. It is pivoted in the usual manner at *a*, and consists mainly of the cylinder *b*, closed at one end by the plug *c*, and the piston *d*, which the spring *e* tends always to force towards the plug *c*. The piston head is provided with a small notch *w* to allow of a limited air passage. At the end of the piston-rod *f* is an upstanding part *g*, upon which the projection *h* and the hooks *i* are arranged (Fig. 5). The projection *h* on the side of this part *g* is adapted to engage with the spring-operated catch *j*, pivoted to the post *k*, and so to hold the piston in its rearward or cocked position against the pressure of the spring *e*; and the hooks *i* are provided to engage, when the piston is in its forward position, with the projections *l* on the sears (Fig. 6).

Upon the rear end of the trigger-blade a rocking-part *m* is pivoted

at *n* in the transverse slot *o*. This rocker is adapted to engage with the tail of either one of the sears and its position is controlled by the slide *p*. A friction spring prevents the inadvertent movement of the slide.

The parts are cocked or reset during the turning of the top lever by the bar *q*, the end of which forces the lever *r* round on the pivot *a*. The movement of this lever *r* is communicated through the bar *s*, which is pivoted at its top, to the rocking-lever *t*. The lever *t* is pivoted at the rearward end of the connecting-bar *s*, and also on the common pivot with the spring-operated catch *j*. The rearward movement of the bar *s* causes its projection *u* to engage with the top of the part *g*, and so to draw the piston rearwards against the



action of the spring *e* until it is held by the engagement of the projection *d* and the catch *j*. The rocking-lever *t* also acts as a safety, its lower end being adapted to engage the rear end of the trigger, whilst its upper end is coupled to the external safety-slide *v*.

After the parts are so cocked the safety-slide is pushed forward in order to free the trigger, and the parts assume the position illustrated in Fig. 2. The first pulling of the trigger then lifts the sear beneath which the rocker *m* is situated, and discharges the corresponding barrel. During the upward movement of the trigger the projection *h* is taken out of engagement with its catch, and the spring *e* is free to exert its influence to force the piston forwards towards the plug *c*. The strength of the spring *e*, the fit of the piston within the cylinder, and the size of the air passage *w*, regulate the forward movement of the parts, the speed of this movement allowing sufficient time to elapse between the first pull and the engagement of the hook *i* with the second sear for the involuntary pull to occur, and so to be rendered inoperative. The part *g*, with its dependent hooks *i*, is carried forward with the piston, and one hook is taken into engagement with the part *l* of the sear corresponding with the undischarged barrel. It should be mentioned that both hammers are cammed, so that when they are uncocked the sear tails are thrown slightly up. Therefore, it will be understood that only one of the hooks *i* is engaged with its corresponding sear after the first discharge, and the second pull is as heavy only as the first. Should the trigger fail entirely to be depressed before engaging the projection *l*, the hook *i* may find engagement with the intermediate shoulder cut upon this projection, the range of movement of the trigger being sufficient to operate the sear as it would if the better hold on the under-side of the projection were obtained. The spring-operated sheath *x* acts as a trigger spring. Accepted August 7, 1902.

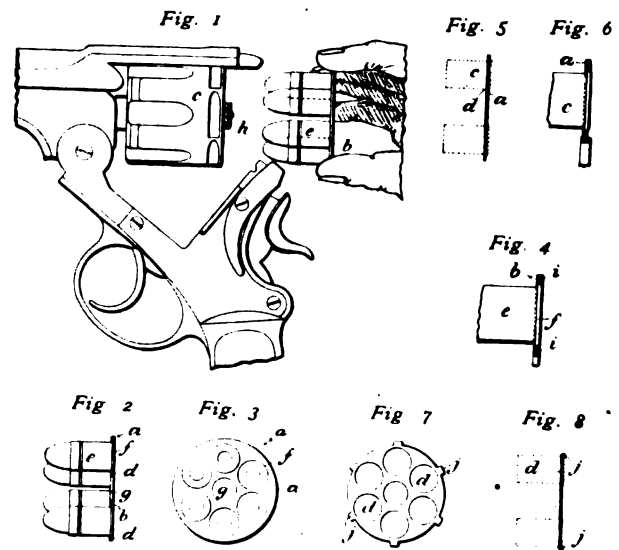
LOADING CLIP FOR REVOLVERS

18,294 (1901) The Webley and Scott Revolver and Arms Co.,

Ld., and W. J. Whiting, Birmingham. In order to facilitate the loading of cartridges into revolver cylinders, the above patentees have invented a clip consisting of a thin disc of metal, which, in a variety of forms, is described in this specification. The disc is simple in design, and is cheaply produced. It is pierced with a circular ring of holes, corresponding in number and position with the chambers in the cylinder of the revolver to be charged, thus allowing of a whole loading of cartridges to be dropped into their places as quickly as a single cartridge.

The disc *a* is illustrated in the appended drawings, and consists of a thin flat plate *b* of brass, steel or other suitable metal. It is of less diameter than the cylinder *c*, and is pierced with the circular ring of holes *d*, the holes being of such diameter that the bodies of cartridges fit fairly tightly therein. The metal surrounding the holes is annularly recessed in order to allow of the rims *f* of the cartridges lying flush within the disc. A central opening *g* is formed in the disc, through which the back end *h* of the extractor pin projects when the cartridges are seated within the chambers. The disc is of such thin material that when the cartridges are pressed fully home it lies closely against the back end of the cylinder, and does not interfere with the closing of the revolver. When the revolver is opened the extractor slide acts against the disc and withdraws the spent cartridges collectively—disc and cartridges being bodily ejected together.

Various forms of the disc are illustrated. In Figs. 2 and 3 the cartridges are retained in the disc only by reason of the tightness with which their bodies fit into the holes. Provision is thus made for separately extracting any individual cartridge, or for their collective ejecting. In Fig. 4 the metal at the outer circumferential edges of the holes is turned over at *i* to a slight extent on to the edges of the rims, so securely affixing the cartridges to the disc and



allowing only of collective extraction. In Fig. 5 the holes in the disc illustrated are not recessed, the rims of the cartridges lying against the back of the disc. A coupler, consisting of two plates, between which the rims of the cartridges are secured, is illustrated in Fig. 6; and in Fig. 7 the lips *j* are adapted to be turned over on to the rims of the cartridge, as shown in Fig. 8.

A clip with open-topped recesses for rimless cartridges of the Mauser type is illustrated in the specification. The cartridges are introduced laterally, and are secured by a band of elastic, or by a wire. In another form of clip, applicable either for headed or rimless cartridges, the cap retains the cartridges in their seatings. Accepted August 7, 1902.

# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		THE 7.65 MM. BROWNING AUTOMATIC PISTOL ...	171
The Palma Trophy ... ..	163	ROUND THE TRADE ... ..	172
Fire-Arms in Ireland ... ..	163	ORGANIZATION OF ORDNANCE EXPERTS ... ..	173
Messrs. Webley's Good Example ... ..	164	THE BIRMINGHAM SMALL-ARMS CO., LD. ... ..	174
The Proprietary Gun ... ..	164	THE SPRINGFIELD MAGAZINE RIFLE ... ..	175
A Clay-Bird Dinner ... ..	164	"ANSWERS TO CORRESPONDENTS" ... ..	175
INCIDENTAL JOTTINGS ... ..	165	APPLICATIONS FOR PATENTS ... ..	176
NOTES ... ..	166	SPECIFICATIONS PUBLISHED ... ..	176
MINIATURE AND CLUB RIFLE AMMUNITION ... ..	167	SELECTED PATENTS:	
MR. T. R. BAYLISS ... ..	169	The Tighe Single-Trigger Mechanism ... ..	177
THE COUNTY COUNCIL AND EXPLOSIVES ... ..	170	Inanimate Bird Thrower ... ..	178

## CURRENT TOPICS.

**The Palma Trophy.**—The delivery of this interesting trophy to the Lord Mayor was the occasion for some agreeable speechifying on the subject of international rifle shooting. It is certainly a very creditable proceeding on the part of those who went out to Canada to contest in the triangular duel that arose through Canada removing the trophy from the United States last year. Major Freemantle is one of the bulwarks of rifle shooting in this country. As an authority on the technical science of the subject, as a practical exponent of shooting, and finally as one versified in the rules and general organisation of the sport, his services to the cause cannot but be regarded with grateful appreciation by his fellow countrymen. It is, of course, well known that in the United States rifle shooting at the long distances popular in this country is not much followed up, so that an English team stands a better chance than if the shooting were of a more specialised American nature. There is something really pleasant in the change from the bad beating which the English team received when shooting at the Hague some years ago to the success achieved in the recent venture, and it is a tribute to Major Freemantle's sporting instincts that he had the pluck to engage in a fresh international contest with rifles. Fortunately, the terms of the last match related to a strictly military class of shooting, which gave the English team a better chance. There is no doubt, however, that the ideals of the National Rifle Association are not entirely in accord with those of the Commander-in-Chief, so that we shall expect, in due course, to see an increase of shooting at the shorter distances, the premium to be on the shooters who fire with rapidity as well as precision.

**Fire-Arms in Ireland.**—The proclamation of certain districts of Ireland, in accordance with the Peace Act of 1881, has led to police activity in the direction of regulating the trade in fire-arms. The restrictions laid down are of a kind calculated to prevent undesirable persons from becoming possessed of arms and ammunition. The restrictions are also of a nature to cause inconvenience to those carrying on a legitimate trade. The fact that quantities greater than 500 sporting cartridges, or 5 lbs. of sporting powder, cannot be sent even to duly licensed persons by an ammunition manufacturer in Great Britain, without being subject to a large number of complicated restrictions, will give some idea of the troubles to be met. Even in these cases such consignments must bear the printed name of the consigning firm of ammunition dealers, as well as the name of the consignee, and the quantity and description of the ammunition must be stated. A circular, sent out among the Birmingham gunmakers from the Chief Constable's office, calls their attention to the provisions of the Act which comes into force as a result of the proclamation. Among other things, they are enjoined not to supply arms or ammunition to any unlicensed person in the proclaimed area. As is pointed out in the local press of Birmingham, it is an impossible matter for gunmakers to know whether a person who orders a weapon is licensed or not; and they seem to resent this attempt to place so unsuitable a responsibility on their shoulders. Such an attitude seems a highly reasonable one to adopt, and certainly at the very outside the trader's responsibility should be no more than is involved in properly marking all packages that are sent to the proclaimed areas, and advising the Customs' authorities thereon. We notice the attitude is sometimes adopted that gunmakers should not be restricted in the carrying on of their business. Such arguments cannot help the

trade. In fire-arms there is a great potentiality for evil, and hence it would be ridiculous to expect that where the evil is greater than the resulting trading benefits, the former should be allowed to pass in the interests of the latter. However badly fire-arms restrictions may touch the pockets of the trade, the more sensible among gunmakers must recognise that, when petitioning for non-interference with legitimate business, they must not prejudice their case by arguments implying that their real object is to trade without restriction, irrespective of consequences.

**Messrs. Webley's Good Example.**—We cannot help congratulating Messrs. Webley on the way they have turned the tables on local prophets of evil. It is very easy to lament the downfall of an industry; and the process seems to come easiest to those who are most busily engaged in buying from abroad, and dishing the material up as though it were of exclusively English origin. It would be a shock to most sportsmen to hear that the much vaunted falling-block single-barrel express rifle, which is so notable an item in the sportsman's equipment, is made in its essential parts in Belgium. The firm of Webley are certainly independent manufacturers of falling-block rifles; but we believe them to be the only English example, at any rate, taking respectable outputs into consideration. Now it is fairly certain that, among those who have so much to say about the decadence of the Birmingham gun trade, there must be a great many whose chief business enterprise is devoted to the sale of Belgian or mostly-Belgian guns and rifles. Now if these people would set about making an all-round English equivalent, there would be evidence of a desire to meet the trouble in a practical spirit; but they do not seem to have much stomach for the anxieties of the manufacturing. The first move towards a better state of affairs is to accept frankly what is known to be the truth. The firm of Webley is one among the not very large number of genuine gun and rifle manufacturing concerns in Birmingham. Plenty of firms issue catalogues; but the real test is the amount spent on Birmingham workmanship in comparison with total turnover. The Webley firm, by making most things themselves to the best of their ability, are attracting an ever-increasing amount of business to their doors. That good work and sound machine methods pay in gunmaking, as in everything else, is proved by the fact that the Webley gun machining processes can be worked in effective partnership with the highly-finished hand labour of M. Courally's establishment. Our main wish, therefore, when desiring well for Birmingham, is that it will develop its manufacturing facilities so as to compete, as Webley's seem able to do, with the world's largest producers in the fire-arms business.

**The Proprietary Gun.**—One cannot help being struck by the clever letter which has appeared in the columns of our contemporary, the *County Gentleman*, and which deals with the much-discussed proprietary gun. We, of course, brush on one side as untenable the writer's presumption that he is a mere sportsman who has studied the question from a detached standpoint. His personality is, however, not of so great an interest as the material for which he is responsible. In a lucid and comprehensive fashion, he lays down the general outline or specification of a sound proprietary gun, such as could be sold for a matter of £20 or so. He elects for a

hammerless Anson and Delley action gun without interceptors, but, of course, with the usual trigger-blocking safety. He takes the exceedingly sensible view of advocating that the fastening of the breech shall be by the lumps alone, and he shows the absurdity of the treble grip when the quality of the gun does not allow for its proper fitting. He is safe in taking this line, since many of the best guns that are made have only the two grips for fastening the breech. In taking the other features of his gun he shows one by one the points that demand the most careful treatment. He does not expect a London *chef d'œuvre* for £20; but he is quite clear as to what he considered that sum capable of purchasing if the problem of production is effectively tackled. He condemns as unsuitable at the price all ornamentation. He demands that the whole value shall be expressed in good sound workmanship in the action and the barrels, the design being directed more especially to the production of a nice handling weapon of good general formation, such, in fact, as the practised shot could use without feeling it to be no better than the proverbial shooting-iron, rather than to one with ornate engraving and generally poor finish. Gunmakers cannot do better than read the original letter, because, whatever its origin, it shows, in a manner which we never remember before to have seen, just what nine out of ten of the less wealthy class of sportsmen require, without, however, having the ability of "L.C." to state it in writing. When nice balance and substantial working-parts are guaranteed, the remaining point requiring attention is the barrel. If such a thing as a proprietary gun is ever to exist, it must have a standard barrel, and the sporting world should be educated to appreciate the value of a really standard boring. Then bit by bit other guns would follow the same line, and the efficiency of the sporting cartridge would be greater than ever before. Therefore, we welcome every step that promises to lead to the standardisation of those portions of a gun which should be standardised. There is plenty of opening in a gun for individuality, but we cannot admit that any such opening exists in the matter of the essential details of gun chambering and boring.

**A Clay Bird Dinner.**—The members of the Middlesex Gun Club assembled to the enjoyment of an excellent repast at the Monico Restaurant. Two long tables, joined by a semicircle for the accommodation of the chairman and his friends, were well filled by a characteristic company of sportsmen, no less than ninety odd sitting down. The chair was occupied by Sir John Maxwell, the President of the Club, and he was supported on the right by Mr. J. C. Irvine, Vice-President, and on the left by Mr. Denis O'Connor, this year's champion. The vice-chair was occupied by the popular and well-known Secretary of the Club, Mr. A. H. Gale, the remaining place of honour at the foot of the second table being appropriately filled by Mr. W. Williams, who is, we believe, the senior shooting member of the Club, and certainly one who is liked by all. A very pleasant spirit animated the whole of the proceedings, the members being well pleased to meet one another in celebration of the close of a highly successful season. The finances of the Club are in a thoroughly sound condition, and the ground never looked better than at the present moment, the turf being in good order, and all the other appointments of a kind appropriate to the large gatherings that attend the weekly shoots. In the course of replying to the toast of the

evening, Mr. Gale explained that the whole secret of the Club's financial success lay in the fact that they were not obliged to show a profit to any purveyor. The Club bought its own birds and cartridges, sold them to members for a price, the resulting profits being credited to the Club's funds, so making it an easy matter to cover the costs of administration, and still leave plenty of margin for the purchase of a fine array of prizes. When it is remembered that Mr. Gale is able for one guinea a year subscription to find shooting for 110 members on a ground within twenty minutes' journey of King's Cross, and having all the comforts of a well-organised club, there can be no question as to his practical knowledge of the work. Members have various other advantages not to be enumerated in a short reference of this kind. For instance, their guns are retained at the caretaker's house between whiles, where they are cleaned, kept in good order, and insured against fire.

### INCIDENTAL JOTTINGS.

**THE NOVEMBER ISSUE.** In the school at which I was brought up it was considered that conversational elegance should always be approached through some subject upon which everyone was interested, and which would hold the attention of those listening. The weather topic engrosses everyone, and its vagaries are such that no one ever suggests that truth is forgotten as you recite the prophecies which have come off within recent times. Following so honoured a precedent, I purpose referring to the weather—the abundance of red berries, the early migration of the birds, the poor wool crop, and the price of coal, all point to a very bitter winter, doubtless attended with long periods of fog. I am writing this to cheer a friend of mine who is a manufacturer of fog signals. The war being over, the War Office have put up a bill in the contracts window: "Closed for alterations and repairs," and so the mechanism of war must be applied to the subtleties of peace. Heaven must, therefore, send us the fogs to turn the death-bang of the rifle into the joyous halt bang on our suburban railways. Those who come to the city daily will echo this sentiment.

**WAGNER, SET TO THUNDER.** When giving the matter logical consideration, it is apparent how much the opportunities of the fog signal have been neglected. In its construction there is very little of developed art. Two bits of tin, a pinch of powder, and a few percussion caps, form its integral components, with a strip of lead tape, and solder and paint, the whole having the elegant appearance of an undeveloped oyster shell. It might have been of well stamped brass, about the size and beauty of a locket, and of form to attract attention. Then it would be possible to devise opportunities for the extended use of such fascinating bombs. For instance, one hears every time on entering the club the motor men discussing their blessed motors to the exclusion of all other subjects (unless perchance there happens to be a majority of golfing men), and their one grievance is that folk will not get out of their way, in spite of their bells, horns and "hooters." Why not the merry fog signal? A magazine loaded with

these, capable of feeding them under the wheel down a tube, as required, would certainly be a novelty, and doubtless cause a good deal of effect. The same applied to all the 'buses, cabs, and trams, would soon wake London up, and give the fog-signal trade a good turn. A peal of fog signals in the parish church steeple might arouse the hardened sinner, where the mellow music of the bells would promote his iniquitous slumber.

**"ALL IS NOT GOLD THAT GLITTERS."** It was not to be expected that the War Office would succeed right away in their new artillery equipment, but, on the whole, it seems to come fully up to expectations, and with a few alterations will do all that is desired. I have constantly expressed my preference for the brass cartridge case, and am glad to hear that it is to be adopted for artillery work; but I trust the Government will be wise and not purchase in the cheapest market. In cartridge cases the best is always the dearest, and those with the thin bases, as in the new case, are the most difficult to turn out. The worst of brass is that although it may be full of latent strains, these do not, as a rule, develop for some time. But in due course spilly and bad metal displays its characteristics, and I am glad to hear that at last the Government are recognising this fact. The more attention they devote to the subject the more convinced they will be that it is a "penny wise, pound foolish" policy to order any but what they know to be sound metal. I fear that many of the troubles that arise are due to want of metallurgical knowledge in the Inspection Department, but it is hardly to be expected that a military man should possess those qualifications, which take a life-time to acquire, to the exclusion of all others except allied subjects.

**THE LAW AND THE "PASS."** Discussing the recent prosecution by the County Council of an ammunition company for carting percussion caps across the new ferry at Woolwich, some very amusing yarns about the Council and their methods were contributed by numbers of the party. One story was of a certain carman who went through the Blackwall Tunnel with safety cartridges. Having safely made the passage, he was leaving the approach road for the highway, when the inspector spied his cargo. The carman pleaded ignorance, but was told—"You know you've no right to bring explosives or other dangerous goods through this tunnel. Back you go, and over the Tower Bridge. I shall report you if you attempt to pass." So the poor carman had to turn back with his dangerous (*sic*) cargo, and, in the interests of safety, traverse the tunnel from end to end a second time. This is Simple Simon up to date.

**RIFLES AND MAKERS.** Within the last few weeks we have heard of the decay of our rifle works and of the great success of another. There are really only two firms now who have orders from the Government for rifles, the "Birmingham" and the "London" Small-arms Co's. If so be the new rifle is to replace the present weapon, there ought to be plenty of room for more competition in this line; but one fears that the best gunmakers are too dear, and the others too cheap for taking up the military weapons. It is quite a trade in itself, and if rumours are correct, the Sparkbrook factory will not be

passed over so lightly, and its old glories are to be revived by a good share of work. The Belgians seem to have quite monopolised the cheap gun trade in this country, which is a great pity. If current gossip is reliable, Belgian assistance is frequently enlisted in gun work that is by no means of the cheap grade: machine work in rifles is a Belgian speciality. The great difficulty which besets the aspirant for Government orders is that you must have a plant of machinery before you get orders, and then it is not certain if you ever get continuous orders sufficient to pay interest on capital. The Fabrique Nationale in Belgium have the plant, and the gun trade combine to keep it going when Government work is slack, and it is even stated that England is by no means its smallest customer. Why don't English gunmakers have their own Fabrique Nationale?

CYCLOPS.

## NOTES.

**ELECTRICITY IN MINES.**—The Home Secretary has recently appointed a committee to inquire into the use of electricity in mines, and to report as to what means should be adopted in the interests of safety by the establishment of special rules or otherwise. As constituted, the committee consists of Mr. H. S. S. Cunyngham, C.B., Legal Assistant Under-Secretary of State for the Home Department, who is the appointed chairman; Mr. Charles Fenwick, M.P.; Mr. Archibald Hood, Past President of the Mining Association of Great Britain; Mr. James Swinburne, President of the Institute of Electrical Engineers; and Mr. W. N. Atkinson and Mr. A. H. Stokes, H.M. Inspectors of Mines. The Secretary of the Committee is Captain A. P. H. Desborough, well known as one of H.M. Inspectors of Explosives of the Home Office. It will be noticed that the committee is fairly representative of the interests involved, though the manufacturers of explosives appear to have no direct voice in the forthcoming deliberations.

**PRIZE FIRING ON THE CHINA STATION.**—Reports now to hand show that the vessels out on the China station have this year maintained the high average in gunnery which has distinguished that squadron during recent years. There has not, however, been any very marked improvement on previous records, doubtless owing to the changes that have taken place in the constitution of the squadron and the replacement of such practical gun-crews as those of H.M.S. *Barfleur* by others less perfectly trained. Four vessels only have secured a mean percentage of hits to rounds fired exceeding 50 per cent., the separate details ranging from H.M.S. *Ocean*, with a mean percentage of 68.88 down to H.M.S. *Rosario*, with only 20 per cent. of hits. The *Ocean* heads the list with both 12 ins. and 6 ins. guns, with percentages respectively of 68 and 71.77. Strangely enough, the *Terrible* has not maintained its reputation with either 9.2 ins. or 6 ins. armaments, the *Blenheim* heading the list, as regards the larger cruiser gun, with 52.91 per cent. of hits, and the *Ocean* with the smaller, as already mentioned. With the 4.7 ins. gun, the *Talbot* came out top of the class with 63 per cent. of hits; and with the converted wire 4 ins. gun, the *Bramble* headed the list with 48 per cent. Speaking generally, the battle ships show decidedly the best results, the least success-

ful being the *Albion*, with a mean percentage of only 42.63. Of the large cruisers, the *Cressy* is distinctly disappointing with 32.7 mean percentage, the best scores having been made with the 9.2 ins. guns, 34.8 per cent., as compared with 29.35 per cent. for the 6 ins. armament. It is satisfactory to learn, however, that there is a healthy rivalry in competition for the trophy offered by Admiral Sir E. A. Seymour when he relinquished command of the China station.

“MADE IN GERMANY.”—A story is going the rounds that General Botha, in addition to the other apocryphal statements that he and his brother-generals have been detailing for the benefit of their Continental sympathisers, has sought to win further contributions to the fund they are collecting by delicate forms of flattery. For example, the gallant Boer told his German friends that the best weapons that were used during the late struggle were those of Teutonic origin. There was nothing which could approach in quality the Mauser rifles and the German big guns, and in regard to these latter he related a tale of tragic import. “Once,” said the General, “I was obliged to destroy some cannons. I filled a Krupp gun up to the muzzle with dynamite and applied the match; but it would not burst. I exclaimed angrily, ‘Made in Germany!’” That is the tale, which probably owes something to its reporter. Assuming, however, that General Botha applied scientific methods to the destruction of his guns, and was unsuccessful, he merely proves himself to be less fortunate than Sir Archibald Hunter and others of our officers, who, on more than one occasion, and by much less expensive methods than that indicated, contrived to burst Krupp guns as necessity arose. Possibly, General Botha did not make the application of his petulant remark quite plain to his hearers. It may be that he was apostrophising the dynamite as having been made in Germany.

**NEW BULLET FOR THE KRAG-JORGENSEN RIFLE.**—As is common knowledge, the Krag-Jorgensen rifle of .300 calibre, which has for some time past been the Service weapon of the United States army, has not proved conspicuously successful in long-range shooting, and at the present time, as is explained elsewhere in this issue, a new rifle manufactured at the Government factory at Springfield is undergoing exhaustive tests with a view to its replacing the existing Service arm. In the meantime, Mr. Thomas, of the Union Metallic Cartridge Co., has introduced a new bullet for the Krag-Jorgensen, specially adapted to the rifling of that arm, which is somewhat less rapid in twist than that of most military arms. This improved bullet seems to have produced better shooting, and is, in fact, pronounced by experts to be an unqualified success for target work. Whether, however, its introduction will have the effect of causing the rifle to be granted a further lease of life as the U.S. Service weapon for Army and Navy remains to be seen.

**THE IDEAL CATALOGUE, No. 15.**—We must congratulate Mr. J. H. Barlow, of the Ideal Manufacturing Co., on the production of a new edition of the hand-book of his firm, which contains all the features of interest that have earned commendation in previous issues, and has been brought up to date by the inclusion of recent developments. It is, of course, common knowledge that the relations between sportsmen and ammunition manufacturers are on a totally



different footing in America from those which obtain on this side, due largely to the fact that so many transatlantic shooters have a preference for loading their own cartridges, whether for guns or rifles, and on that account it may be urged that for a British firm to produce a hand-book of this nature would argue a want of acquaintance with business requirements. On the other hand, the Ideal book, though ostensibly a catalogue of the specialities of a particular firm, is a treatise on ammunition and shooting of a far more practical character than some of the works supposed to deal exclusively with the subject from the sportsman's point of view. To all those interested especially in rifle shooting it is well-nigh indispensable, on account of the sound knowledge of the subject displayed throughout its 140 pages; and even in this country, where the methods therein treated of are scarcely capable of adoption, members of the gun trade, equally with their customers, may derive considerable profit from a careful perusal of the wealth of interesting information placed at their disposal in this manner.

EXIT THE SWORD!—As the new Commander of the Canadian Militia, Lord Dundonald, who is well known in other connections as a practical soldier, has definitely pronounced the doom of the sword, so far as the Dominion cavalry are concerned. He has issued an order to the troops abolishing the sword as a cavalry weapon, except for parade purposes, though even that is a concession to existing prejudices in favour of the white arm which may speedily be withdrawn. Lord Dundonald points out in his order that "wire fencing, enclosures, smokeless powder, the increased range and accuracy of arms of precision, all tend to diminish the power of men who depend upon shock action for success. On the other hand, the mobile rifleman is of more importance than ever. The new cavalry soldier should learn from the infantry soldier and the engineer all that is useful to him, while, above all things, retaining the dash and "go" of the old cavalry soldier, and maintaining to the full the name and spirit of his old regiment." The consequence of this new order will be that the carbine will be discarded by cavalry in favour of the rifle, to which may possibly be added a light sword-bayonet, capable of being utilised as a hand-weapon in emergencies; but the rifle will be the chief arm of the mounted man. It is not at all unlikely that Lord Dundonald's business-like recognition of changed conditions may have some effect on the War Office at home, though that is a body which carries to excess the motto of "*Festina lente*."

AMERICAN SHOOTING.—Some wag once gave as an illustration of the three degrees of comparison, "liars, d—d liars, and fishermen." Recently there has been a tendency to substitute for the superlative degree those romancists who frequent the links, but at the present time there is a class of American sportsmen who seem equally qualified to meet the requirements. For example, a few weeks ago someone started a report that President Roosevelt and General Snyman had been having a friendly match at target-shooting with the revolver, and that the chief citizen of the United States had come out on top with a score of five bulls at 50 yards, all the bullets entering one hole in the target. This would have been "tack-driving" with a vengeance, but, unfortunately, the President has since given away the story by explaining that, to begin with, the match was not with revolver or pistol, but

with a rifle. Moreover, he fired eight shots and made only five bull's-eyes. Thus perishes another record. But there is a performance recorded in the *American Field* which runs the Roosevelt myth out of sight. A Mr. Sutherland claims that he possesses a 400-dollars Smith gun which will put the whole charge of No. 8 shot in a thirty-inch circle at sixty yards. That means, that at sixty yards his "pattern" would be from 450 to 511, according to whether he used  $1\frac{1}{8}$  or  $1\frac{1}{4}$  oz. charges. It must have been Mr. Sutherland's ancestor, armed with a 400-dollars Smith gun, to whom the coon detected on the tree remarked, "Don't shoot, Colonel, I'll come down." Mr. Sutherland's is certainly the tallest story we have read in our American sporting contemporaries for a long time, which is saying much.

### MINIATURE AND CLUB RIFLE AMMUNITION.

THE tabular list on the next page contains the leading particulars of a number of cartridges which come within the limits of the above title, and which are adapted in their different degrees for the requirements of rifle clubs that have to suit their practice to something often considerably short of the Service arm and full-sized ranges. On this account the specimens of cartridges here tabulated show a marked breadth of scope to suit any distance from 25 yards upwards, and with an almost commensurate variation of price, though it is not to be inferred for one moment that the further ranging and more expensive ammunition is one whit better suited for its purpose and its distance than is the less powerful and cheaper cartridge for its own particular range.

Thus, for example, it is generally admitted that for distances from 25 up to 50 yards there is no better ammunition than the .22-cal. short rim-fire cartridge, which gives remarkable accuracy up to the extreme range mentioned. This is the cheapest cartridge on the list, and it possesses the further qualities of comparative safety and noiselessness. When loaded with smokeless powder the report is no louder than that of many air-guns. One of the chief disadvantages of this ammunition for training purposes lies in the fact that there is practically no recoil, and that so few rifles are made to this calibre which are of sufficient weight to promote steady holding. The long cartridge of the same calibre presents no features of advantage as compared with the short. It has a heavier charge of powder with a bullet of the same weight, giving slightly increased velocity without any greater accuracy. The .22-cal. long rifle cartridge, on the other hand, has not only a stronger charge of powder, but a heavier bullet with increased sectional density, and on that account its effective range is distinctly increased; but, on the other hand, this increase of range brings it into competition with other ammunition which outclasses it in every respect, including accuracy. Moreover, the long rifle rim-fire cartridge is not easily obtainable in this country, being peculiarly an American production. The other rim-fire cartridge in the list is the .25-cal. Stevens, which is a much more powerful affair, having a bullet of high sectional density propelled by a considerably increased charge of powder. This cartridge provides good practice at 100 yards, and has the merit of being cheap. Reverting to the smaller calibre, the .22-cal. Winchester central-fire is in reality a miniature express car-

tridge possessing a high velocity to drive a comparatively heavy bullet, giving a low trajectory and, under favourable circumstances, a fair degree of accuracy. The weight and calibre of bullet, however, restrict its efficiency on an out-door range to about 100 yards, so far as accuracy is concerned, while its capacity for actually carrying to a much greater distance renders it somewhat dangerous to use on a restricted ground. As regards the .297/.230 Morris Tube cartridges, short and long, their effective range is limited to about 25 and 100 yards respectively, at which they show no conspicuous merit in the matter of accuracy.

For ranges of from 100 yards upwards there is an excellent

latter a straight taper, while the .32/40 straight taper Winchester, with its 185-grain bullet and 1,440 f.s. velocity, can scarcely be included under the heading of miniature ammunition, as it is practically almost an express cartridge.

Of the others, the .300 Target presents an excellent example of a cartridge designed primarily for target work. It has a nickel-based bullet weighing 110 grains, and is specially adapted to any .295 or .300 cal. rook-rifle having a fairly quick twist of rifling. It will be noted that in all the foregoing types of ammunition there has been no mention of any special rifle for which they are supplied to the exclusion of all others. They represent, in fact, standard sizes to which

MINIATURE AND CLUB RIFLE AMMUNITION.

	LENGTH OF CARTRIDGE	LENGTH OF CASE	DIAMETER OF BULLET	WEIGHT OF BULLET	WEIGHT OF POWDER	MUZZLE VELOCITY	MUZZLE ENERGY	W d <sup>2</sup>	d <sup>2</sup> W	GRAINS PER SQ. INCH.
	ins.	ins.	grs.	grs.	grs.	ft.-secs.	ft.-lbs.			grs.
.22 Short (Rim Fire) ...	.700	.427	.225	30	3 B.	900	54	.088	11.29	780
.22 Long (Rim Fire) ...	.885	.610	.225	30	4 B.	1,050	74	.088	11.29	789
.22 Long Rifle (Rim Fire)...	—	.610	.225	40	5 B.	1,200	129	.118	8.47	1,053
.22 Winchester (Central Fire) ...	1.690	1.400	.228	45	13 B.	1,550	241	.133	7.53	1,184
.297/230 Morris Tube ...	.840	.580	.224	38	3 B.	850	51	.103	9.74	915
.297/230 Morris Tube (Long) ...	1.080	.800	.224	38	5 B.	1,170	115	.103	9.74	915
.25 Stevens (Rim Fire) ...	1.390	1.125	.256	65	11 B.	1,250	227	.149	6.73	1,326
.297/250 Rook Rifle { Cordite	1.105	.800	.250	56	C.	1,150	164	.128	7.81	1,143
	1.180	.875				1,090	147			
.25/20 Marlin & Winchester	1.700	1.300	.257	86	20 B.	1,420	383	.196	5.01	1,755
						1,300	324			
.255 K. ...	1.500	1.180	.257	66	C.	1,200	211	.145	6.89	1,294
						1,100	177			
.295 } Straight Taper ...	1.450	1.180	.300	80	C.	1,150	235	.127	7.87	1,133
						1,090	211			
.300 Target ...	1.600	1.180	.300	110	5 1/2 C.	1,330	431	.175	5.73	1,558
.300 Sherwood ...	1.940	1.550	.300	140	7 C.	1,400	608	.222	4.50	1,983
.305 K. ...	1.450	1.180	.308	80	4 1/2 C.	1,150	235	.123	8.14	1,096
.310 Cadet (Greener) ...	1.600	1.090	.323	120	5 1/2 C.	1,320	462	.178	5.61	1,591
						1,050	196			
.320 Long ...	1.235	.810	.317	80	8 B.	900	143	.113	8.84	995
						1,240	391			
.32/20 ...	1.600	1.320	.311	115	20 B.	1,300	434	.161	6.23	1,430
						1,440	851			
.32/40 Winchester ...	2.650	2.125	.320	185	40 B.	1,450	868	.262	3.82	2,301
						1,050	328			
.360 No. 5 ...	1.450	1.050	.360	134	14 B.	900	241	.148	6.77	1,317
						1,050	303			
.380 Long ...	1.375	.945	.373	124	14 B.	900	222	.124	8.04	1,093

selection of ammunition. At 50 to 100 yards the well-known .297/250 rook-rifle cartridge has lost its reliability. It will be noticed that this and the .295 or .300 rook-rifle cartridge are similar in sectional density and velocity, but the large calibre has a decided advantage over the smaller at distances beyond 100 yards, when there is a wind blowing across the range. The .255 K is a bottle-neck cartridge introduced by Messrs. Kynoch for Cordite, and is really a somewhat more powerful edition of the .297/250, having a heavier bullet and increased velocity, while the .305 K is a straight taper cartridge, not very dissimilar from the .300. The .320 long, .360 No. 5, and .380 long cartridges are all familiar as rook-rifle and Kangaroo ammunition, and are rather intended for sporting purposes than for target work. On the other hand, the .25/20 Marlin and .32/20 Winchester ammunition are well adapted for use at the target, the former having a long bottle-neck and the

rifles are commonly bored and chambered. There remain however, two cartridges on the list which are peculiarly associated with proprietary arms, namely, the Greener "Sharpshooter Club" and the Westley Richards' "Sherwood" rifles respectively. We have already on previous occasions referred in terms of warm admiration to the wonderful shooting that is to be obtained from the .310 Greener, and which seems to be due to a strong bond of sympathy existing between rifle and ammunition. With the scores made in the recent Bisley Meeting still fresh in memory, there is no need to dwell upon the subject. The Westley Richards' "Sherwood" is also a proprietary rifle, specially designed for use in rifle clubs. It is only by such sympathy that the best results are to be obtained, as is amply shown by the success which has already attended the career of some of the types of miniature ammunition here passed briefly in review.

## MR. T. R. BAYLISS.

A RECENT visit to Birmingham afforded us an opportunity to call on Mr. T. R. Bayliss, in the hope that we might be able to gather some particulars concerning his recently announced connection with the firm of Eley. The special point upon which we were curious related to the particular kind of expert knowledge which had made Mr. Bayliss's presence on the Eley directorate so advantageous a development for this firm. We, of course, knew already that he had a more than ordinary acquaintance with brass and other soft metal alloys, such as bronze and cupro-nickel. This, however, did not carry us very far. We wanted to know more of the technicalities of brass manufacture and of the advantages that are gained when there is a certainty that a good quality of metal will be forthcoming.

Our visit having been duly advised in advance, the works of the King's Norton Metal Company were thrown open for our inspection, without formality or delay, and the opportunity thus arose for examining in detail the methods of manufacturing brass of the kind that is suitable for the complicated operations of cartridge case, drawing, etc. What we saw proved a valuable object-lesson as tending to elucidate the points upon which we were in doubt. We must confess that it is a very easy matter to go over a brass works of this kind without noticing appreciable differences, or at any rate differences of principle, by comparison with what is done at any other of the large brass casting shops that serve the metal industries of Birmingham. It must be remembered, however, that there is a radical difference between the brass of which a set of fire-irons is made and that which is used in cartridges. The demarcation between the two consists in the fact that slight impurities that would spoil the brass for cartridge work would not necessarily cause a pair of tongs to be thrown aside as defective. In other words cartridge brass must be of undoubted strength and purity, being made of an unvarying quality of copper and of pure spelter.

We all know that a well-made brass cartridge case can be expanded by hydraulic pressure in the same manner that a glass tube will give way to blowing when raised to a red heat. On the other hand, those of us who are in the habit of dealing with large quantities of rifle cartridges know full well that many instances could be quoted where the brass cases have burst through incapacity to expand to the dimensions of the cartridge chamber. There will again be many persons who have kept metallic ammunition by them for a period of years. The present writer has in his possession literally dozens of

military cartridges, the walls of which have split at the mouth by sheer fatigue from holding the bullet. Good brass would, therefore, seem to be a material that will first of all stand the drawing-out processes incidental to making it into a cartridge case; second, that will be hard enough to resist such expansion at the base of the cartridge as would let the cap blow back; and, finally, which will retain its original good properties over a number of years.

Mr. Bayliss has studied, in the manufacturer's sense of the term, the behaviour of brass at all stages of its production and subsequent career, if the word may be so used. He has learnt to check the quality of the various deliveries of copper and spelter, so as to insure complete purity. He has learnt to know good spelter from bad, and in the course of years he has trained up a loyal staff of workers, who know just the right way to combine these two ingredients, and who are skilled in the after manipulation. As we have said before, the stranger can pass through the works and inspect the foundry department without being aware of anything more than a well-ordered organisation around him, especially on realising that some 1,200 men are engaged around him.

A gang, consisting of a caster, his assistant, and a labourer, have charge of a set of ovens. They receive carefully weighed lumps of copper, plates of spelter, and the permissible proportion of old metal to be worked up into the intended alloy; and they will go ahead all day long boiling up these materials in the furnaces. The resulting slabs of brass show every sign of perfect quality, such as clean surfaces, freedom from impurities, and a general air of homogeneity. These slabs then pass to the rolling mills, where they are reduced in thickness by progressive rolling and annealings. The ordinary cartridge case making operations then follow in the routine which is familiar to all who have visited such an establishment as the Woolwich Arsenal. In closely studying the rolling operations it becomes apparent that visual inspection is chiefly devoted to insuring that during the various stages of rolling, no spills, flaws or other defects, shall be allowed to remain on the surface of the brass. It is well known that in all rolling and drawing operations a single grain of impurity is so elongated or spread so as to interfere with the soundness of a large piece of metal of the finished size. If, therefore, any such traces of fault are met with at King's Norton, they are removed in good time, so that the metal which passes forward to the next rolling process is bound to contain brass and brass



alone, a proportion of the finished strips receiving their final examination under the microscope.

A life-time devoted to the daily purchase, manufacture and working up of large quantities of metal, and the financial ability that takes advantage of every possible device that ensures economy and efficiency, have led to the creation of this great manufacturing works, whose principle from start to finish has been to attain efficiency with the assurance that its cost will be covered by the superior results achieved. The greater part of the metal produced at King's Norton is used for the manufacture of cartridge cases for the English and other Governments, whether they be for small-arms, naval gun aiming tubes, or quick-firing ordnance. Generally speaking, the particular qualities demanded from the brass used for cartridge cases are alike, the alloyage being such as is suited to withstand the subsequent drawing processes and the explosive pressures experienced in the gun. While the Government usually fix the several alloys, the manufacturer has full scope in dealing with the various stages of rolling, annealing and pickling in acid. It is here, and also in the avoidance of impurities, even in quantities that a chemist could barely isolate in a test tube, also in looking after the physical properties of the metals, that the special experience of Mr. Bayliss and his colleagues at King's Norton has borne fruit.

As Mr. Bayliss puts it, the only difference that the new position makes is that he has two babies to nurse instead of one. That his first charge will not be neglected is quite certain; and he also seems clear in his own mind that the technical assistance he will be able to give to the firm of Eley will ensure in their brass cartridge work the highest grade of quality. Everyone is well aware that Eley's are already no amateurs in cartridge-making, so that anything Mr. Bayliss can accomplish in the way of new developments will go to the improvement of work already well done. Eley's as a manufacturing concern in London cannot, however, enjoy the same facilities for the manufacture of brass that are available to those working in the neighbourhood of the colliery districts. Therefore, they have always been large buyers of brass; and the fact that the production of their future supplies will be personally supervised by Mr. Bayliss goes a long way to ensure a complete absence of those occasional bad deliveries of metal which cause a certain amount of ever-present anxiety to those carrying on the inspectional processes, the reason being that brass often takes time to develop its defects.

The opportunity afforded us of a conversation with Mr. Bayliss brought us face to face with a vigorous personality. Born in Birmingham in 1838, and having worked the whole of his life as an engineer and a metallurgist, he has still been able to avoid any appearance of having been subjected to the grime and sulphurous fumes of Birmingham. Residing well outside the city, Mr. Bayliss has maintained his keenness and activity to a surprising extent, judging by the years he has been in harness. He is as alert as many a man of thirty years his junior; and while discussing technical subjects with him it is a pleasure to find how quickly he grasps one's meaning, and supplies the appropriate explanation. Outside business he is by no means a sluggard, as may be judged by the fact that he is an Associate Member of the Institute of Civil Engineers; a member of *La Société des Ingénieurs Civils de France*, and of the Institute of Mechanical Engineers; a Member of the Iron and Steel Institute; a Fellow of the

Imperial Institute; a Member of the American Academy of Political and Social Science, Philadelphia, U.S.A.; a Justice of the Peace for the county of Worcester; a Member of the Worcester County Council; has been connected with the local government of Northfield continuously since 1883; and he is a Guardian of the Poor for the King's Norton Union. We may now add that the fact of being a member of the board of Eley Bros. is not the least among his many claims to distinction.

Mr. T. A. Bayliss, jun., has also a firm grasp of the business, and is joint managing-director with his father of these works. The Abbey Wood Ammunition Works, belonging to the Company, is now in full working order. Being the latest built loading factory in the country, one is not far wrong in quoting it as the best in its own particular line.

## THE COUNTY COUNCIL AND EXPLOSIVES.

FROM A CORRESPONDENT.

HEARING that the London County Council had summoned the King's Norton Metal Company for carrying explosives across the Free Ferry at Woolwich—to wit, "two cases of percussion caps"—I decided that the opportunity for an amusing hour was not to be resisted. The case for the County Council was taken by a member of the Solicitors' Department at Spring Gardens, and Mr. Corrie Grant, M.P., appeared as counsel for the King's Norton Metal Company.

The prosecutors opened their case by referring to the bye-laws of the Council, as handed down to them from the old Metropolitan Board of Works, the Explosives Act of 1875 seeming in their mind to occupy a secondary position. Their bye-laws distinctly stated that "No Gunpowder, Dynamite, Nitro Glycerine, Guncotton, Nobel's Explosive, or other similar explosive, may be carried," etc., and it was contended that percussion caps were similar to these. In support of this, they produced their inspector of explosives of twenty-four years' experience, who informed the court that percussion caps were made of fulminate of mercury, "the most deadly explosive known." But in cross-examination as to similarity of explosives, as defined by Act of Parliament, he did not even know what class or division percussion caps were in. He admitted safety cartridges were all right, but declared that a percussion cap was a "dangerous explosive."

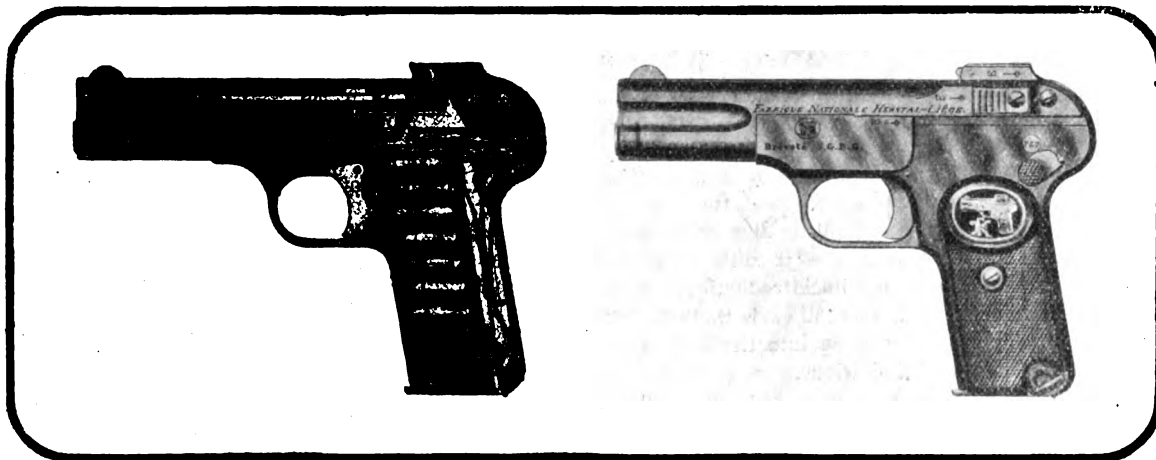
The defence was that the Explosives Act exempts "percussion caps" from all the obligations applying to other explosives, provided they are properly packed and the cases marked as to their contents. The cross-examination was amusing. Can you imagine a certain managing director of one of the largest cartridge companies in London being asked:—"If you struck these percussion caps on the 'detonator' (*sic*), what would happen?" It was a beautiful smile. Then his imagination was taxed by another question:—"Suppose in a box containing (closely packed) a quarter of a million caps something were to strike every cap simultaneously and at the same instant in such a manner as to fire each, what would happen?" A little more of this concluded the proceedings, and the summons was dismissed.

## THE 7.65 M/M. BROWNING AUTOMATIC PISTOL.

IN the accompanying illustration are shown respectively a sectional view and the external elevation of the 1900 model of the Browning 7-shot automatic repeating pistol, 7.65 mm. calibre, manufactured by the Fabrique Nationale d'Armes de Guerre, at Herstal-Liège, Belgium. This weapon possesses a special interest, owing to the fact that it has been adopted for the use of the Belgian Army in place of the revolver, and that it is also the official arm of the Belgian police, as also of the civil forces of Berlin and other German cities. That it has obtained this convincing recognition as a practical arm of offence and defence is due to very exhaustive trials by the different authorities concerned.

As can be seen, this pistol is a smaller and somewhat modified edition of the Colt Automatic Pistol (Browning's patent) which is on sale in this country, and which we illustrated and described at length some two years ago. It has a calibre of 7.65 mm. (.301-in.) only, in place of the .38-calibre of the Colt pattern, and while still having a magazine capacity for seven cartridges, these are of much less ballistic force,

part of the magazine chamber, and the three flat steel springs regulating the trigger, sear, magazine catch and safety catch are situated in the hand-grip at the back of the magazine. The magazine itself is of the box-slide pattern, containing a zig-zag spring and platform to raise the cartridges in succession to the chamber of the pistol, and it is perforated at the sides with holes so placed as to show how many cartridges are within at any time. It is held in place by a spring-catch lever, having an end projecting through the butt-plate. An important feature of the pistol consists in the provision of the safety-catch fitted on the left side of the frame, as shown in the external view, and which is operated by the shooter's thumb to cover at will the words "Feu" or "Sur" stamped on the frame. With this catch at safety, the pistol is absolutely secured, with the breech-block and trigger mechanism locked, the former being either closed or withdrawn to the limit of its backward travel, as may be desired, before the safety catch is applied. The introduction of this safety arrangement, which is of a kind easy to operate only "when you know the



the bullet weighing slightly over 74-grs., and the powder charge being 3-grs. All the same, this ammunition gives a penetration at 15 yards of five pine boards, each  $\frac{3}{4}$ -in. thick, and at 250 yards the bullet will still penetrate two such boards.

The sectional view of the arm shows all the leading features of the mechanism, which is extremely simple and compact. It will be noticed that the barrel is of the fixed or rigid order, being screwed into the body of the pistol, and that the recoil is utilised to operate the mechanism through a sliding breech-block, which also contains the firing pin. Attached to this breech-block is a slide, which projects forward to the muzzle of the pistol and completely encloses the barrel in its normal position, and which contains within it a strong spiral spring that performs the dual functions of taking up the recoil, with the correlative duty of closing the breech after each shot, and of operating the firing-pin. The sear, which engages with a detent on the under-side of the firing-pin in the usual manner, is connected with the trigger by means of an intermediate stirrup, the two sides of which enclose the upper

way," and which is practically incapable of being shifted from one position to the other except by the will of the holder, renders it possible to carry the pistol about in the pocket without any fear of accidental discharge, and the weapon may also be left lying about, with its magazine ready charged, without the risk of a child or other irresponsible person providing an unofficial corpse, so long as the safety-catch is in operation.

A feature of the pistol is the ease with which it can be stripped and cleaned. So far as wiping the barrel after firing is concerned, all that requires to be done is to withdraw the breech-block and slide to the full extent of backward travel and put on the safety-catch, which locks them in that position. The barrel can then be wiped out thoroughly from the muzzle. To strip the weapon, the two screws shown at the side of the breech-block are withdrawn, separating the breech-block and slide, and the latter is then withdrawn forwards until it comes clear of the barrel, while the breech-block is removed backwards after disengaging the spring from its stop, which is done by hand. The frame then contains nothing

but the trigger mechanism, which can easily enough be withdrawn if necessary. The assembling is equally simple, no tool being required except the screw-driver supplied with each pistol, together with a spare magazine and a cleaning-rod. An inspection of the stripped weapon shows the parts to be strong and apparently well-proportioned to the work they are respectively called upon to do, while the balance and handling of the pistol seem to be well-nigh perfect. The sighting is plain and well defined, as befits the uses to which the arm is destined. It may be noted that when the breech is closed and the firing-pin pressed home, the back-sight is obscured by an extension of the connecting-rod lever, so that the shooter can at once see whether the striker is cocked or not.

The leading particulars of this little arm are given below:—Length of pistol, 6.42 ins. closed; depth from back-sight to butt-plate, 4.02 ins.; thickness over hand-grips, 1.26 ins.; backward travel of breech-block, 1.22 ins.; length of barrel, 4.02 ins.; calibre, .301 ins. (7.65 mm.); number of grooves, 5; distance between sights, 5.2 ins.; weight of pistol with magazine empty, 1 lb. 6 ozs.; weight of pistol with seven cartridges, 1 lb. 8 ozs.; length of cartridge, .984 ins.; weight of cartridge, 118.8 grs.; length of cartridge case, .669 ins.; length of bullet, .460 ins., diameter of bullet, .309 ins.; weight of bullet, 74.07 grs.; weight of powder, 3.09 grs.; sectional density of bullet,  $\frac{W}{d^2} = .114 \cdot \frac{d^2}{W} = 8.80$ ; grains per sq. inch, 796; muzzle velocity, 886 feet per second; muzzle energy, 127 ft.-lbs. In reviewing the pistol here illustrated, the thought must inevitably occur that it is a pity that a similarly reduced model of the Colt pattern of Browning automatic pistol cannot be bought in this country to meet the requirements of those who desire something rather less formidable in bulk, weight, and ballistics than the .38-calibre weapon which we described at the time of its introduction. That such a reduced model would obtain a ready sale there can be little doubt by anyone who has gone into the matter of automatic pistols, their use and limitations.

## ROUND THE TRADE.

Mr. W. Wotherspoon, of the Nobel Ballistite Agency, M.A. (Cantab), as the *Times* advertisement describes him, was married last month.

Mr. H. McGowan, who has been with Nobel's Explosives Company for thirteen years, has been appointed deputy-assistant manager to the company.

Messrs. P. Orr and Sons, of Madras, have appointed Mr. Johnstone, late of the London Armoury Company, to a responsible position at their Rangoon branch.

The Morris Aiming Tube and Ammunition Co., Ltd., have moved from Haymarket to 17, Charing Cross Road, which makes them very close neighbours of the N.R.A.

Mr. B. A. Firth, of Messrs. Thomas Firth & Sons, Ltd., has contradicted the rumour that an agreement had been entered into between his company and Messrs. John Brown & Co., Ltd.

Messrs. Kynoch, Ltd., have taken over the business of the Forward Engineering Co., which will be carried on in a new factory at Witton and Holford, under the management of Mr. H. B. Braham.

The device of a martin, and the words "The Martin," have been registered as a trade-mark by Messrs. Martins, Birmingham, Ltd., under Class 19, for arms, ammunition and stores not included under Class 20.

We understand that the Colonial Ammunition Co., Ltd., has been doing well of late, its recently issued accounts showing such a profit as to allow for a 10 per cent. dividend, and for a large sum to be carried forward.

Exports of arms, ammunition, and military stores during the nine completed months of the current year show a decrease in amount and value as compared with the corresponding periods of 1901 and 1900.

Although it happened some while ago, it does not seem to be generally known that Mr. Herbert White, the very capable manager of Messrs. Joseph Lang & Son, Ltd., has been elected a member of the company's board.

We learn that the Miami Powder Co. has been incorporated at New Jersey, U.S.A., with the intention of merging into a trust some of the powder companies of the country. Xenia will still be the head-quarters of the company.

Apropos of the recent visit of delegates from the Birmingham gun trade to Liège, our contemporary, *l'Armurerie Liégeoise*, refers to an exhibition which is to be held in that city in 1905, in which the local industry will be well represented.

The King Powder Co. and Peters Cartridge Co., of Cincinnati, O., U.S.A., have forwarded us the thirteenth edition of their "Handy Book for Trap Shooters and Sportsmen," together with other booklets descriptive of their specialities, which, as usual, contain a variety of matter interesting to sportsmen.

Mr. Robert George Joyce, J.P., of Clareville, Caterham Valley, who died on August 23rd last, at the age of 72, has left personalty of the net value of £130,008, the gross value of the whole estate being £143,429. His interest in the premises at Upper Thames Street is bequeathed to his nephew, Mr. Henry Rayment.

We have received from the Aetna Powder Co., of Chicago, copies of two pamphlets issued by them, dealing respectively with "Aetna Dynamite" and "Blasting by Electricity," which contain interesting information of the company's specialities and their uses, produced in a style of printing and illustration that is well nigh perfection.

We regret to hear that Messrs. J. Brown & Co., of Wellington Street, Glasgow, dealers in explosives, were fined £25 and costs for having a 50 per cent. surplus of explosive in a magazine licensed for 10,000 lbs. In view of Mr. Brown's explanation as to the exceptional circumstances of the case, and the general good character the firm possessed in the books of H.M. Inspectors of Explosives, the bench avoided the imposition of a larger fine.

The directors of Messrs. J. & E. Hall, Ltd., are to be congratulated on a most successful year's trading, the accounts to the 31st of July last showing a profit of £29,364, which is arrived at after deducting the expenses of management, and writing off the whole of the balance of preliminary expenses, £588. With the carry-forward included, the directors have a disposable balance of £30,326, which it is proposed shall be allocated as follows: viz., 6 per cent. on the preference share capital, £9,000; 12½ per cent. on the ordinary shares, £12,500; special reserve fund, £5,000; and carry forward, £3,826.

The Sprengstoff A.-G. Carbonit, of Hamburg, manufacturers of the safety explosive, Carbonite, have secured premier honours at the Dusseldorf Exhibition. In addition to carrying off the State Gold Medal, they have also been awarded the Exhibition Gold Medal for the excellence of their exhibits, and in recognition of their scientific researches in the domain of safety and other explosives. The Carbonite Syndicate, Ltd., 220, Winchester House, Old Broad Street, London, E.C., are the British representatives for Carbonite and Thunderite Safety Explosives, extensively used in the principal coal-fields of this country.

The explosives business ranks, as usual, as the most dangerous occupation a man can follow. The past month's troubles include a blow up at Ardeer, involving the death of one man, and explosions at Hounslow, Middlesex, where fortunately no one was injured. The Explosives Committee at Woolwich have been unfortunate in the loss of one of their chemists,



while preparing a Trauzel block to test cap mixture. He was not, we believe, actually killed, but the injuries sustained represent permanent incapacitation, which is terrible luck on a promising young man. To add to the general rattling of nerves, one of the tropical magazines went off the same day, from causes unknown. The only consolation is to remember that the tragic side of explosives mishaps causes their details to be better known than is the case with other departments of manufacture, where employes are terribly mauled by belt-driven machinery.

"*Société Continentale pour la Fabrication des Armes à Feu Webley Libeau-Courally.*" Such is the name of a newly-registered company in Liège. Boiled down, it amounts to this:—While deputations are trying to find out why the Birmingham gun trade is in a bad way, those among them who know their business are developing their manufacturing resources. Among such is the firm of Webley. Their machine processes for bodies and barrels are so markedly superior to Belgian methods that M. Courally will in the future work up Birmingham material in his own unexampled fashion for continental consumption. The forward policy of the Webley concern is a better object-lesson than four columns of the *Birmingham Gazette* devoted to a discussion of the technical education of the youths of that city, as a corrective for Belgian competition. The directors of the new combine, besides M. Courally, are Mr. T. W. Webley and Mr. Frank T. Murray.

## ORGANISATION OF ORDNANCE EXPERTS.\*

THE European armies do not depend upon a specially trained corps of commissioned officers to develop their types of ordnance. All the prominent nations maintain a large force of ordnance experts, whose status, except in the matter of the military authority exercised by them, is similar to that of our ordnance officers. All of them recognise the fact that technical work of this nature can be done well only by men whose life-work it is.

As a general rule, the function of this purely military officer is one of selection only. England, Germany, France, and Austria, the countries visited by me, depend more upon the large corporations, such as Armstrong, Vickers-Maxim, Krupp, Schneider-Canét, St. Chamond, and Skoda, for new inventions and experimental development of war material, than upon their own factories, and they encourage the development of these corporations in every way possible. They appreciate the fact that the task of keeping a nation's armament modern requires resources in proportion to the great work to be accomplished. The cost of necessary experimental work is extremely great. When a large corporation is kept busy on orders received from countries that do not manufacture their own war material, it is readily seen that these countries are paying tribute to the nation that fosters the corporation, for the full energy of the corporation is constantly employed in developing new models, which are naturally offered first to the home government. Take, for instance, the development of a rapid-fire field artillery carriage. For at least ten years no less than eight large corporations in Europe have had their dozens of expert designers busy inventing, and their large plants—any one of which employs more men than all our arsenals—available to construct and test experimental models. Under these circumstances it does not pay the European nations to main-

tain an ordnance department such as ours. It is far cheaper to let the corporations do this work, and the smaller nations pay for it.

All of them operate their own factories, which are under the control of officers whose service at the factory is more or less temporary. Of the three great powers—England, Germany, and France—the number of such officers who become permanently connected with the work of manufacturing is greatest in France, and least in Germany. The development of all of Germany's types, so far as I was able to learn, is credited to her private manufacturers. The French field carriage is credited to Colonel Dupont, and the English to Sir George Clark, who, although an officer of the Royal Engineers, has been the English specialist on carriage construction for at least eight years. He told me in conversation that their ordnance organisation was unsatisfactory, and predicted that something very similar to ours would be adopted.

Recognising the necessity for technical training and ability in the men who control the large Government plant at Woolwich, and recognising also that these qualities are not secured by temporary details of line officers, they tried some years ago the plan of placing their control in the hands of their civilian ordnance experts. This plan was soon abandoned, on account of the friction that developed between them and the military officers. At present four of their ordnance officers of high rank are permanently assigned to this kind of duty. The other details are temporary, but the officers are selected from those who have passed through the Ordnance College at Woolwich. If Sir George Clark's predictions prove true, the number of permanent assignments will be increased.

In France, at least two of the officers in each of the Government plants are permanently assigned, and known as "Captains of the Shop," but it is always possible for these officers to return to the line by their own application when they think that their chances of special promotion will be increased.

In Austria, the officers of the reserves are used largely for permanent assignment to ordnance duty, and the real ordnance experts, instead of being classed as civilian employes, are known as "officials," and wear the uniform of the regular commissioned officers, with some minor modifications to show that they do not exercise military authority.

Our ordnance organisation has been criticised by many of our best officers of the line, who think we should follow the general European practice in regard to temporary details. It is suggested that our main disadvantage lies far deeper than our ordnance organisation. As a nation we devote little energy to the manufacture of war material. Our private corporations are infant industries in this line, unable to compete successfully in the world's market with their great European rivals, and our home demand has not been sufficient to develop them. In the skilful manufacture of iron and steel, railroad material, locomotives, machinery, &c., for which our home demand is large, we are acknowledged in Europe to lead all nations, and in every plant of importance there it will be found that many of the best machines are of American manufacture.

In ordnance manufacture we are deficient in the energy applied, in the dollars invested, and in the number of experts employed. Calling those experts by a different name, or replacing them by men who are not experts, will not make the conditions easier for us. If we join the small nations (and in

\* Extract from Report submitted to U.S. Ordnance Board, by Captain B. W. Dunn, U.S. Army.

the size of our military establishment, as well as in our demand for ordnance material, we are a small nation), and purchase our material abroad, we pay tribute to the other great Powers, as described, and insure that they will always lead us. The conditions being essentially different, it is thought unsafe to assume that the best practice in Europe would be the best practice for us. If we could make our private manufacturers the equals of Krupp, Vickers-Maxim, Schneider-Canét, &c., so that they could be supported largely by the world's custom, and yet be available for our exclusive use when wanted, it would pay us to do so. The question is how to do this. We have no manufacturer possessing the plant and the experience that would justify us in giving him large orders with the confidence in his product that Germany has in Herr Krupp.

Our Ordnance Department must do the difficult work, evolve the design, conduct the necessary experimental work, determine the best methods of manufacture, and draw up the specifications to include the most minute details. When the German Emperor decided to re-arm his field artillery, about 1897, it is commonly reported in Europe that he gave the order to Krupp for the necessary number of guns in about the same way that he would have ordered a number of suits of clothes from his tailor, in whose ability to furnish satisfactory style and fit he had perfect confidence. If Germany had no Krupp, or, even with him, if she had to furnish all the orders and funds required to support his plant, she might find our precedent a good one for the organisation of her ordnance experts.

I cannot recommend too highly the practice of sending ordnance officers to Europe to enable them to learn what the foreign practice is in their own specialties. It is unreasonable to expect the average line officer, acting as military attaché, to furnish the information desired. Even an ordnance officer will find that he is at a disadvantage, and that he is probably losing many fine points, when he visits a factory that is not in the line of his own speciality. This was the case with me in shops similar to those at Springfield Armoury and Watervliet and Rock Island Arsenals. My duties have never required me even to visit any of these arsenals, and I could not, therefore, tell whether the foreign shops were better or not.

In my own specialties of fuses and shrapnel, as well as other Frankford Arsenal work, small-arm ammunition, &c., I was able to thoroughly appreciate the advantages and disadvantages of the differences in designs and methods. If it were possible to concentrate all our arsenal plants and work at one point, such as Rock Island Arsenal, as the English do at Woolwich, it is thought that the results, from a manufacturer's standpoint, would be very beneficial. Under the present arrangement, our officers are more or less ignorant of the work and methods at other arsenals, and it is impossible to prevent this by changes of station, for progress is so rapid at all points that an officer's knowledge of any one speciality will become obsolete long before he could return to it. A great advantage of such a concentration would be the curtailment of routine duties, reports, &c. At all our arsenals at present will be found young officers who are kept almost entirely at their desks by their duties as quartermaster, commissary, storekeeper, paymaster, &c., when they should be in the machine shop undergoing a rigorous course of training to fit them for their technical duties.

The technical staff at any one of our arsenals is strikingly small when compared with that of a foreign plant of corresponding magnitude.

## THE BIRMINGHAM SMALL-ARMS CO., LD.

THE annual meeting of this company was held in Birmingham on the 7th ult., with Mr. Herbert Chamberlain presiding, and the report presented to the shareholders showed a very satisfactory trading profit for the year of £93,049. In moving the adoption of the report, the chairman pointed out that they had begun the year without any reserve fund, and that the proposition was to create a new reserve of £25,000. He had seen the reserve fund used up several times in the same way—by being distributed to the shareholders. Turning to the figures of the balance-sheet, the capital of the company consists of 40,630 preference shares of £5 each, and 60,945 ordinary shares of £5 each, the latter showing an increase of 50 per cent. over the previous year's total. Sundry creditors amount to £51,982, as against £47,500 in 1901. As to the profit and loss account, there is a divisible profit of £99,485, compared with £90,896 last year. On the asset side, the buildings and fittings are valued at £154,800, and engines, boilers and machinery at £194,700, while sundry stores, tools, &c., stand at £50,900, these figures in the aggregate nearly balancing the corresponding items of 1901. There is considerably less charged to account of work finished and in progress, £38,700 only, as compared with last year's total of £77,900. Altogether, the amount standing for assets is £468,600, as against the previous amount of £508,000, sundry debtors yielding a total of £35,787, compared with £33,259, and the investments remaining at the previous year's total of £55,150. The bank balance is most satisfactory, there being a credit balance of £79,679 to contrast with a deficit balance of £12,000 in 1901.

Mr. Chamberlain pointed out that the works in both cycle and gun departments had been continuously and profitably employed, as indeed the foregoing figures abundantly prove. For the Government year, ending March 31st last, the company had produced upwards of 100,000 Service rifles, which was the largest number ever made in one year in the history of the company. During the time the order was in hand, right up to July 1st, the works had been fully occupied night and day. Since the termination of that contract, a new contract had been entered into with the Government, which will keep the works employed for some months to come. With regard to the matter of a new Service rifle, the chairman disclaimed any official knowledge of the results so far arrived at by the Small-Arms Committee, and professed entire ignorance as to whether they had so far made up their minds in the direction of a modified Lee-Enfield, or an entirely new arm. He had no doubt, however, that when the decision was made the Birmingham Small-Arms Co. would obtain a fair proportion of the Government work.

Among other interesting matters dealt with in the chairman's speech, he mentioned that they were substituting electricity for steam-power in the gun department, and hoped by next year to be in a position to drive the whole of the gun works by electric power. The fact was also incidentally brought out that the cycle branch of the business was responsible for a considerable proportion of the total profit for the year. It is satisfactory to learn that the company has dealt generously with the wives and families of those of their employés who were in the Army Reserve.

The report as submitted was duly adopted, and, as was foreshadowed in our last issue, dividends of 10 per cent. are to be paid on the ordinary shares of the company, with a bonus of 10s. per share in addition, and of 5 per cent. on the preference shares. The creation of the new reserve fund of £25,000 was also agreed to.

## THE SPRINGFIELD MAGAZINE RIFLE.

It may be remembered that in our March issue of the current year we gave particulars of the new military rifles ordered by General Crozier, Chief of Ordnance, U.S.A., to be manufactured at Springfield Armoury for experimental purposes. This type of rifle, of which 5,000 were put in hand, is a clip-loading magazine rifle, embodying features of the Mauser equally with the Krag-Jorgensen weapons, the bolt being furnished with front locking lugs, as in the former arm, while it retains the safety rib and the firing-pin mechanism of the existing U.S. Service rifle. The magazine is of the box type, and projects from the wood of the fore-end in front of the trigger-guard, the guard, indeed, forming part of its structure. It is furnished with a cut-off, very similar to that of the Lee-Enfield. A board of Ordnance officers, appointed to examine and test this new rifle, have reported the following as its advantages when compared with the Krag-Jorgensen—that it is considerably stronger than the Service arm, since, while retaining the safety rib, the bolt is provided with the two forward locking lugs already referred to, and the barrel is heavier over the chamber. Also the firing-pin mechanism is as strong and simple as that of the Service arm, while by means of a sleeve the striker is held more securely in place. As regards simplicity, the new rifle possesses fewer parts, and would be somewhat cheaper to make than the Service arm. The cam surfaces for extraction and for final compression of the main spring are larger and less liable to wear.

As regards the other side of the question, the board points out that the magazine projects considerably below the stock, and, besides being unsightly, is thereby liable to damage. The cut-off is not satisfactory, and the magazine cannot be loaded with the cut-off in use. It is suggested to substitute a form of magazine similar to that of the Spanish Mauser, having the cartridges disposed in zig-zag fashion within the limits of the woodwork of the stock, and with an arrangement for lowering it to secure the cut-off, as in the Schmidt system. The board also recommend the substitution of a cannellured cartridge for the pattern with projecting rim, which is difficult to carry in a clip, and liable to jam in action owing to the rim of one cartridge engaging with that of the one below it. These points were brought out by a series of exhaustive tests which were made at the close of the year 1900, and which are now published in the Report of the War Department, 1902, Chief of Ordnance. The tests were of the usual complete character enforced by the U.S. Ordnance Board, and at the close the conclusion arrived at was that the arm had successfully passed the test to which it had been submitted, the minor difficulties which were experienced being only such as might reasonably be expected in the case of a new rifle which had not been previously tested.

## “ANSWERS TO CORRESPONDENTS.”

As a delicate hint of the manner in which the column bearing the above heading is attended to in some sporting papers, our transatlantic contemporary, *Forest and Stream*, supplies the following questions and replies.

*Question.*—I am a rising shooter. How can I, as a shooter, quickest distinguish myself? *Answer.*—By mistaking a man for a deer. Some men do it by not knowing that the gun was loaded.

*Quest.*—Can some men shoot better than others? *Ans.*—No. It is all in the ammunition. The shooter is simply an animated gun carriage.

*Quest.*—I have a shoulder which is light and weak. Can you tell me of a load for my gun that will ensure that there will be not the slightest kick? *Ans.*—Load with buttermilk, well wadded with pork rind, and there will be a minimum of recoil.

*Quest.*—Of what material are the best gun barrels made? *Ans.*—Iron.

*Quest.*—In case of a right-quartering blue pigeon from No. 5 trap, have you any idea of the best place to hold? *Ans.*—Yes.

*Quest.*—Is the English blue rock faster than the American pigeon, or *vice versa*? *Ans.*—Certainly.

*Quest.*—What is the speed of a white corn-fed pigeon at ten yards from the trap? *Ans.*—It depends on whether the pigeon is flying or sitting.

*Quest.*—How is chilled shot manufactured? *Ans.*—It is hand-made. After being whittled out into small globules and filed into perfect spheres, which are polished with buckskin, it is heated to a bright red, then set on ice, which chills it.

*Quest.*—The shooter goes to the score and calls “Pull,” then shoots one barrel after the other, but claims that he meant to shoot both barrels simultaneously. What should be the decision? *Ans.*—You failed to mention your handicap.

*Quest.*—My gun weighs over eight pounds. What will lighten it? *Ans.*—Cut it in two.

*Quest.*—How many different kinds of loads are “best,” and can there be more than one best? *Ans.*—No notice taken of anonymous communications.

*Quest.*—If a man leans his head over so as to be inside the mark assigned to him, is it not just as much a violation of his handicap as if he put his foot inside the mark? *Ans.*—It would be a violation if he stood on his head and shot with his feet.

*Quest.*—Who is the best trap shot in America? *Ans.*—There are about 100 men who are too modest to proclaim what they know about the best trap shot.

*Quest.*—How is it that some shooters have so much more hard luck than others? *Ans.*—Skill accounts for what they do do, and hard luck for what they don't do.

*Quest.*—Do professionals and amateurs shoot for fun or profit? *Ans.*—It is strenuously maintained by some that the amateur, on the one hand, who shoots under certain conventional conditions, has certain actuations and purposes which, when compared with those of the expert, are noted for certain differences; while, on the other hand, there are those who

are equally strenuous in maintaining that the inherent interests of the competition, and the usages established by the first discoverers of professionalism, place the unearned increment in jeopardy from all points of the compass.

*Quest.*—If a target starts at a speed of 200 feet the first second of time, and a load of shot, at the moment of the target's starting, starts after it with a velocity of 900 feet, gun and trap being 16 yards apart, at what distance from the trap will the shot overtake the target? *Ans.*—You failed to mention the make of powder.

## APPLICATIONS FOR PATENTS.

SEPTEMBER 22—OCTOBER 18, 1902.

- 20,690. Sights for Fire-arms. T. Gilbert-Russell.  
 20,692. Sights for Fire-arms. W. W. Kenworthy  
 20,723. Aim Instructor. J. W. D. Johnson (Agent for N. H. Johnson).  
 20,752. Magazine Arms. A. J. Boulton (Agent for A. Mills).  
 20,796. Self-Recording Targets. R. M. Painter.  
 20,799. Targets. T. B. Ralston.  
 20,817. Field Gun Carriages. F. T. Fisher and F. W. C. Dean.  
 20,818. Field Gun Carriages. F. T. Fisher and F. W. C. Dean.  
 20,819. Gun Carriage Brake. F. T. Fisher and F. W. C. Dean.  
 20,820. Gun Carriage Spades. F. T. Fisher and F. W. C. Dean.  
 20,821. Field Gun Carriages. F. T. Fisher and F. W. C. Dean.  
 20,822. Field Gun Carriages. F. T. Fisher and F. W. C. Dean.  
 20,823. Field Gun Carriages. F. T. Fisher and F. W. C. Dean.  
 20,852. Projectiles. C. V. Schou.  
 20,951. Locomotive Gun Batteries. P. R. DE F. D'Humy.  
 20,953. Targets. J. Peters.  
 20,992. Range Finders. A. A. Common.  
 21,019. Torpedoes. H. Wilson.  
 21,043. Telaramic Target. T. Scully.  
 21,080. Explosives. F. von Schaller, E. Pfeatoff, and J. E. Gillon.  
 21,086. Rifles. J. Schlager.  
 21,161. Gun Sights. A. A. Common.  
 21,171. Explosives. A. Hough.  
 21,189. Blasting Explosive. H. Poetter.  
 21,195. Torpedoes. A. J. Body.  
 21,235. Air Guns. G. Harrison (Agent for J. M. Espensheid).  
 21,260. Automatic Arms. H. H. Lake (Agent for J. M. Browning).  
 21,261. Targets. O. von Kleszky.  
 21,276. Firing Mechanism. V. C. Tasker.  
 21,288. Projectiles. M. Weiss.  
 21,319. Detonator Cylinders. J. Sharp.  
 21,358. Small-arms. J. D. Thompson.  
 21,472. Sights for Hand Small-arms. J. Neumann.  
 21,630. Automatic Small-arms. R. H. Kjellman.  
 21,645. Projectile Casting. F. Wicks.  
 21,651. Moving Targets. P. Risley.  
 21,681. Torpedoes. H. Middleton.  
 21,699. Ordnance. A. Reichwald (Agent for Fried Krupp).  
 21,711. Cartridge Loader. N. Ceipek.  
 21,780. Torpedoes. J. E. Howard.  
 21,788. Small-Arms. H. H. Lake (Agent for Winchester Repeating Arms Co.).  
 22,003. Small-Arms. P. T. Godsall.  
 22,010. Machine Guns. T. K. North.  
 22,022. Cartridges. J. R. Fraser.  
 22,048. Magazine for Rifles. S. T. Lea.  
 22,088. Gun Carriages. A. T. Dawson and D. P. Donovan.  
 22,110. Fuse Matches. J. von der Bosch.  
 22,168. Bolt Rifles. T. R. R. Ashton.  
 22,184. Signalling Apparatus for Artillery. P. K. Lewes and K. St. G. Mackay.  
 22,264. Range Finder. I. W. Sterne.  
 22,324. Catapult Guns. H. Schuamm and L. Schmidt.  
 22,327. Range Finder. W. Stewart.  
 22,328. Machine Guns. T. M. Morgan.  
 22,354. Primers. A. T. Dawson and G. T. Buckham.  
 22,365. Torpedoes. J. Børresen. (Date of Application, March 14, 1902).  
 22,435. Projectiles. R. L. York.  
 22,540. Blasting Explosive. J. W. Weston.  
 22,554. Air Guns. W. R. Benjamin.  
 22,619. Rifle Butts. Gertrude A. Enerby.

- 22,641. Shells. C. D. Abel (Agent for Rheinische Metallwaren und Maschinenfabrik).  
 22,645. Explosive. F. Schaehtebeck

\* These Applications were accompanied by Complete Specifications.

## SPECIFICATIONS PUBLISHED.

SEPTEMBER 25th—OCTOBER 23rd, 1902.

COMPILED BY H. TARRANT.

- 11,592 (1901). **Breech Mechanism of Ordnance.** C. Holmström, Glasgow. An obturator pad, having very little or no taper, is employed in ordnance, provided with a "de Bange" obturator, and the breech block is so mounted in its swinging carrier that without cutting away the threads of either block or breech chamber, the block may be withdrawn from, or inserted in, the chamber by the swinging movement of the carrier. The shot guide is also arranged so that it automatically assumes its protective position as the breech is opened. Accepted Sept. 6, 1902.
- 13,213\* (1901). **Single-trigger Mechanism.** M. A. Tighe (Major I.S.C.), Buckingham.
- 14,000 (1901). **Gun Carriages.** A. T. Dawson and G. T. Buckham, London. A gun carriage for guns of the lighter quick-firing class. The carriage is two-wheeled, is adapted to carry gun and ammunition, and is drawn either by three or four horses. Its frame is of steel, built up of main girders and angle bars suitably connected. Its trail is composed of two parallel telescopic tubes, braced and strengthened by transverse pieces. Accepted Sept. 9, 1902.
- 15,151 (1901). **Fore-sight for Rifles.** C. F. P. Standebach, Germany. A gently curving part is built up around the fore-sight of a small-arm. The surface of this part is covered with white pyramidal formations, which are adapted to catch light coming from any direction, and to transmit it to the eye of the shooter. The sight is by this means rendered perfectly visible in any light. Accepted Sept. 4, 1902.
- 17,870 (1901). **Small-arm Magazine Mechanism.** H. Harris, Boscombe. A modification of the magazine mechanism described in Patents Nos. 10,239 and 16,284, 1900, and 14,640, 1901, consisting in substituting for the thumb lever, by which the cartridge-lifting platform was lowered, a spring-operated push piece. Accepted Sept. 6, 1902.
- 18,339 (1901). **Magazine Small-arms.** H. Sefton-Jones, London (Agent for The Aktieselskab Schwartze-Fidjelands Genesyn-dicat, Norway). A shallow magazine is so designed as not to extend below the level of the stock of a military rifle. A clip containing a number of cartridges is dropped into the magazine, the cartridges being pushed through the clip by a narrow platform attached to the hinged bottom of the magazine. Accepted Sept. 11, 1902.
- 18,955 (1901). **Aim Recorder.** C. J. A. Dick, Norway. A method of employing photography to record the direction of the aim of naval guns at the moment of actual or supposed firing. The motion of the ship is recorded in order to show whether the ship was moving upwards or downwards at the moment of discharge. Accepted Sept. 11, 1902.
- 19,025 (1901). **Inanimate Bird Throwing Machine.** H. C. Lord, U.S.A. A machine of the "autotrap" type, in which the delivery of the birds to the holder is facilitated. The direction and elevation of the flight of the birds thrown are varied by means of special mechanism, as are their initial velocities. Accepted Sept. 24, 1902.
- 20,098 (1901). **Cartridge Belts.** W. Lindsey, London. A modification in the arrangement of a cartridge belt, consisting in providing simple devices for connecting its two parts and for adjusting its length. Loops are fitted at both ends of each of these devices to allow of the attachment of shoulder straps, or of a knapsack, or for suspension of articles from the belt. Accepted Sept. 17, 1902.
- 20,301 (1901). **Fore-sight Protector for Rifles.** C. Katcliffe, Isle of Wight. A combined fore-sight protector and barrel cap for rifles, consisting of a tubular body of metal with an enlargement to cover the fore-sight and a hinged lid fitted to its forward end to cover the nose of the barrel. The lid is acted upon by a blade spring, which keeps it either in an open or closed position. Accepted Sept. 11, 1902.

- 20,935 (1901). **Ordnance.** W. L. Wise, London (Agent for *K. Bergheland, Norway*). A gun adapted to propel a projectile by electro-magnetism produced by means of a solenoidal winding containing the bore of the gun. The winding comprises a number of solenoids, which are simultaneously or successively energised for short periods of time, and are successively cut out as the projectile passes from breech to muzzle of the gun. Accepted Sept. 25, 1902.
- 21,621 (1901). **Explosive.** Safety Explosives, Ltd., and H. A. Thiersch, London. A method of utilising the great heat evolved in the explosion of picric acid and the consequent extreme pressure of the resultant gases, to obtain more than ordinarily rapid combustion, and a greater volume of active gases from ordinary gunpowder. The explosive is composed of the usual component parts of gunpowder with 5 to 20 per cent. of picric acid. Accepted Oct. 2, 1902.
- 21,953 (1901). **Breech Mechanism of Ordnance.** H. G. Dunstan, Newport. In the gun described in this specification, the breech block is mounted upon a slide. When the block is unfastened from the chamber it is carried in a rearward direction by the slide until a hinge is exposed upon the slide, when the block is swung to one side at right angles with the bore. Accepted Sept. 11, 1902.
- 22,140 (1901). **Projectile Fuses.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and G. Stuart, Newcastle-on-Tyne. Safety arrangements for projectile fuses by which the ordinary safety pin, and in some cases the shearing pin, may be done away with. The hammer of an ordinary fuse with a single composition ring is adapted to be supported by a pin. When the fuse is being set, the hammer passes from above the pin, and is then supported only by the shearing wire. If, after setting, the fuse is not required, the turning of the composition ring returns the hammer to its former position of safety above the pin. Accepted Sept. 25, 1902.
- 22,377 (1901). **Rifle Carrier for Cycles.** J. Jarvis, London. In order to enable a rifle to be carried centrally upon a bicycle, a longitudinally divided saddle is provided with clips at either end. The expansion of the back clip automatically divides the saddle in order that the rifle may be taken out. Accepted Sept. 25, 1902.
- 22,653 (1901). **Detachable Stocks.** W. P. Thompson, Liverpool (Agent for *The Ideal Holster Co., U.S.A.*). A method of producing an absolutely rigid connection between a detachable stock and a gun. A fixed and a movable jaw on the stock engage with shouldered seats on the butt of the fire-arm. The movable jaw is locked against its corresponding shoulder on the arm by means of a lever and locking block. Accepted Sept. 25, 1902.
- 22,859 (1901). **Automatic Guns.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and Sir A. Noble, Newcastle-on-Tyne. Improvements in the feed mechanism of automatic guns of the type described in Patent No. 9,517, 1901. The cartridges are fed from a hopper to the injector by lowering and retaining arms pivoted to the hopper and operated by a groove on the gun. Accepted Sept. 25, 1902.
- 23,118 (1901). **Trigger Mechanism of Small-arms.** W. H. Watts, and H. Everest, London. In order that the distance between the trigger or triggers and the butt end of a small-arm may be varied to suit the length of the arm of the shooter, the finger part of the trigger is made horizontally adjustable upon, or with relation to, the trigger blade. Accepted Oct. 2, 1902.
- 23,298 (1901). **Gun Turrets.** R. Geelhaar (Major), Switzerland. Armoured gun turrets, in which the gun casing may be rotated vertically as well as horizontally, so that the turret may be located on such places as mountain slopes, where firing at great angles is required. At the same time the turret offers a small target to the enemy. Accepted Oct. 2, 1902.
- 23,781 (1901). **Bandollers.** P. A. Martin, Birmingham. A junction fitting, cast in one piece, for shoulder belts, which is so arranged that between the angle formed by the buckle cast in one with the loop—the buckle and loop joining the two ends of the belt—is a horizontal middle loop, from which a strap depends and supports the waist belt. Accepted Oct. 2, 1902.
- 865 (1902). **Projectiles.** O. P. Hoskin, Plymouth. A projectile, solid at the nose, designed to contain any explosive charge. The percussion cap is not connected with the shell until just previous to firing. A needle running through the centre of the projectile explodes the cap and ignites the bursting charge upon the striking of the shell. Accepted Sept. 25, 1902.
- 1,614 (1902). **Rifle Sights.** O. Lodder, Kingston-on-Thames. By means of a disc lying beneath a rifle back-sight of ordinary construction, the sight may be bodily moved in a lateral direction in order to counteract any disturbing influence such as wind pressure. Accepted Sept. 25, 1902.
- 2,678 (1902). **Machine Guns.** F. W. Noss, Germany. A machine gun, in which the breech mechanism is operated by a crank turned by hand or by a rotating pulley. The cartridges are fed out of a revolving circular magazine into the barrel, the empty cases being expelled during the return movement of the breech. Accepted Sept. 11, 1902.
- 4,148 (1902). **Automatic Small-arms.** H. H. Lake, London (Agent for *T. Thorsen, U.S.A.*). An automatic shoulder-arm, in which the mechanism is concealed. It operates entirely within the confines of the breech and casing, the return spring running back through the stock to the end of the grip. The magazine is cylindrical. Accepted Sept. 11, 1902.
- 12,972 (1902). **Cartridge Carrier.** G. Migliardi, U.S.A. A cartridge box so designed that the cartridges are held therein securely. The soldier, for whose use it is primarily intended, may very quickly open it with one hand and extract a clip of cartridges therefrom. The box automatically closes and locks itself. Accepted Sept. 18, 1902.
- 15,648 (1902). **Disabling Lock for Ordnance.** C. A. Sloane, U.S.A. Permutation lock mechanism is applied to the breech of ordnance to lock the breech in place. The breech can only be unlocked by those possessing the key or combination, and therefore the gun is rendered useless in the hands of an enemy. Accepted Sept. 4, 1902.
- 16,311\* (1902). **Inanimate Bird Thrower.** E. Edwards, London (Agent for *H. S. Mitchell, U.S.A.*)
- 16,583 (1902). **"Martini Francotte" Arms.** C. Francotte, Belgium. A method of connecting and holding the trigger guard in the breech box of a Martini-Francotte arm, consisting in replacing the old notch and tenon connection by a simple circular pin, which is adapted to lie between the two surfaces of the body and guard in a circular hole formed by a semi-circular bedding cut in both of them. Accepted Sept. 11, 1902.
- 17,092 (1902). **Gun Carriage.** H. Ehrhardt, Germany. A gun-carriage top, or superstructure for guns with recoiling barrels, in which the clutches of the barrel embraced by the gun-carriage top from outside are made to move along a horizontal intermediate wall. A strong and efficient igniting device is in this way provided. Accepted Oct. 2, 1902.
- 17,221 (1902). **Shooting Instruction.** C. A. Sporrang, Sweden. A method of teaching aiming without waste of ammunition. A gun is mounted on a movable rest. When thought to be aimed correctly the trigger is pulled. A part is actuated which locks the gun in its place, and causes a pointer to indicate exactly where the barrel is pointing in relation to the bull's-eye. Accepted Sept. 25, 1902.
- 17,789 (1902). **Targets.** G. Lebender, Germany. A square hole is cut in the centre of an ordinary ringed target, so that a figure target may quickly be fixed over its face by means of a nut and bolt, should the aim exercise need to be altered. Accepted Sept. 25, 1902.
- 18,037 (1902). **Ordnance Recoiling Apparatus.** G. Ehrhardt, Germany. In recoil apparatus for guns in which the barrel after recoiling is returned by a spring, a method of so arranging the spring as to enable it to be removed or replaced without necessitating the displacement of the brake cylinder. Accepted Oct. 2, 1902.

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

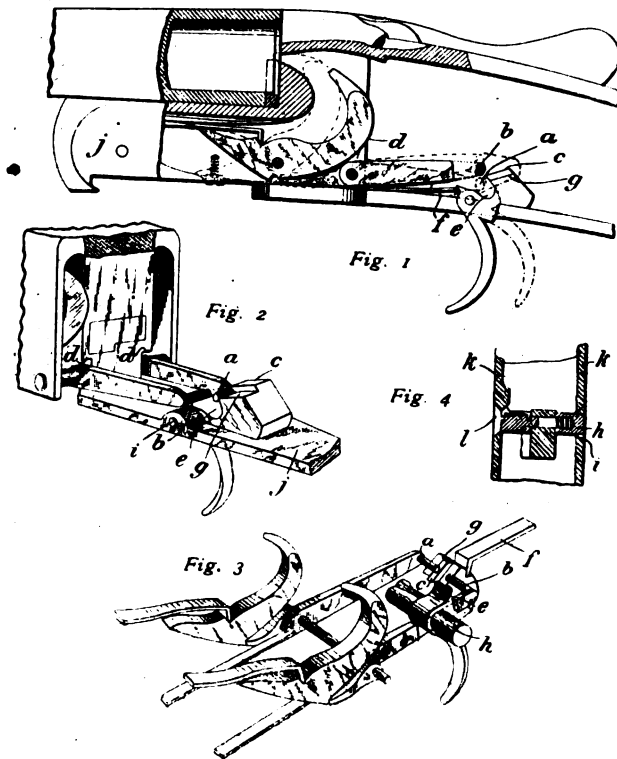
## SELECTED PATENTS.

### THE TIGHE SINGLE-TRIGGER MECHANISM.

13,213 (1901). M. A. Tighe (Major), Buckingham. A single-trigger mechanism is described in this patent. Simplicity is claimed for it, the number of parts and the amount of the stock cut away to accommodate the parts being reduced as compared

with contemporary devices. The mechanism is "selective," the trigger itself being shifted from side to side of the plate in order to place its "first-discharge" part beneath either one sear or the other. The involuntary pull is not taken into consideration in the subject-matter of the specification.

Referring to the accompanying drawings, Figs. 1 and 2 illustrate the parts so arranged as only to be capable of discharging the barrels in one order—right first and then left. The selective arrangement is illustrated in Figs. 3 and 4. The sears and hammers are of ordinary design, except that the tails *a* and *b* of the sears incline towards each other, a little clearance being allowed between their ends. The parts when cocked assume the positions shown in full lines in Fig. 1. When the trigger is pulled



the raised part *c* on the trigger-head is brought into contact with the sear-tail *a*. The right-hand hammer is thus released, and the first barrel discharged. The upward movement caused by this first pulling of the trigger is limited by the engagement of the top of the sear-tail *a* and the part *d* of the action body. Thus the trigger cannot, until it is fully released to allow the sear-tail to drop into the recess *e*, engage the tail *a* of the second sear. When, after the trigger is returned to its normal position by the spring *f*, the trigger is again pulled, the second sear is raised through the lower part *g* of the trigger-head engaging the second sear-tail. During this second pull the first sear is accommodated in the above-mentioned undercut recess *e*. The trigger pull is thus longer when discharging the second barrel.

The head of the trigger is cut in a different fashion in the selective mechanism illustrated in Figs. 3 and 4. It is provided with a central-head *c* adapted to engage either one or other of the sears, and two lower shoulders *g*, one of which engages the second sear-tail. The trigger is also capable of a lateral movement, the pin *h* working in bearings *i* in the trigger-plate *j*. The friction-spring *k* holds the trigger in either one position or the other. The shifting of the trigger from side to side is effected by pressing on either end

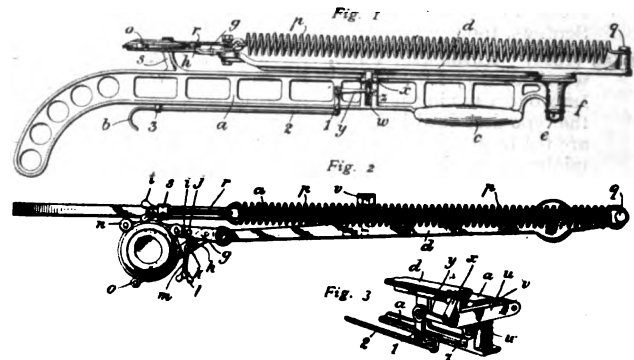
of the pin *h* with the finger, and in order that the pin shall not project beyond either surface of the side-plates, the plates are countersunk as at *l*. The action of the parts of the selective mechanism during the firing operation is identical with that which has been described above. Accepted September 27, 1902.

#### INANIMATE BIRD THROWER.

16,311 (1902). E. Edwards, London (Agent for H. S. Mitchell, U.S.A.). An inanimate bird thrower, supported and operated by hand, is described in this specification. The thrower is constructed and works on the same principle as the ordinary fixed ground trap, the only dissimilarity consisting in the displacement of the base of the ground trap in favour of a bar-shaped body so built as to enable it to be held in the hands of the operator.

A glance at the appended illustrations will suggest the general form of the device. The frame bar or body *a* is at its rear end shaped like the butt of a revolver, so that the hand may grasp it and allow the finger to reach the arm releasing trigger *b*. At its forward end the bar is provided with a rounded enlargement *c*, adapted to be grasped by the other hand. The arm *d* carries a pin *e*, which is pivotally supported in the socket termination *f* of the frame *a*. To the other end of the arm *d* is pivoted a bird-holder or hand, consisting of the fingers *g* and *h*. These fingers are adjustably connected in the known manner by means of the rod *i*, which is fixed to the pin *j*, and works through the pin *k*. The fly nut *l* on the end of the rod regulates the tension of the spring *m*, and thus the grip of the fingers on the bird, which is held within their grasp by means of the holding discs *n* and the roller *o*. The spiral spring *p* is connected at one end with the upstanding projection *q* on the arm *d*, and at its other with an adjusting screw *r*. The screw *r* works through a projection *s* rising from the frame *a*, and is held by the fly nut *t*, which nut regulates the tension of the spring *p*.

A slotted opening is provided about the middle of the body *a*, and through this opening a transverse catch bar *u* works (Fig. 3). One end of the catch is pivoted to the extension *v* on the body, and the spring *w* is arranged so that the other end of the catch carrying the



upturned hook *x* is always held up in the position illustrated. The end of the upper arm of a bell-crank lever *y* projects into an eye-piece *z*, projecting downwards from the catch *u*. The lower arm *1* of the bell-crank lever is connected with a trigger-rod *2*, which extends rearwardly, running through a keeper *3* on the underside of the body *a*. The rod *2* terminates in a finger hook *b* already mentioned.

The action of the trap is exactly similar to that of a ground trap. It is cocked, and assumes the position illustrated in Fig. 1, being held by the catch *u*. When the trigger is pulled the catch releases the arm, to which is imparted a sudden rapid forward and swinging movement through the spring *p*. The bird contained in the holder is thus flung out, and sails away through the air in the direction in which the appliance is held. Accepted Sept. 4, 1902.



# Arms & Explosives

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## CONTENTS.

	PAGE.		PAGE.
<b>CURRENT TOPICS:</b>		<b>EXPLOSIVES REPORT FOR VICTORIA</b> ... ..	184
The Late Herr Krupp ... ..	179	<b>THE UNITED STATES ORDNANCE REPORT, 1901</b> ... ..	185
Musketry Instruction in the Army... ..	179	<b>LECTURES TO YOUNG GUNMAKERS:</b>	
The Late Sir Roberts-Austin ... ..	180	XVIII. The Loading Density of Shot ... ..	186
Our Lecture on Shot Densities ... ..	180	<b>ROUND THE TRADE</b> ... ..	189
A New Machine Rifle ... ..	180	<b>APPLICATIONS FOR PATENTS</b> ... ..	189
Our Tenth Volume ... ..	181	<b>SPECIFICATIONS PUBLISHED</b> ... ..	190
<b>RULES FOR KEEPING, STORING, AND PACKING MIXED</b>		<b>SELECTED PATENTS:</b>	
<b>EXPLOSIVES</b> ... ..	181	Colt's Automatic Pistol Mechanism ... ..	191
<b>NOTES</b> ... ..	182	Magazine Rifle Mechanism ... ..	192

## CURRENT TOPICS.

**The late Herr Krupp.**—The announcement that Herr Krupp died on the 22nd ult. was naturally received with a good deal of astonishment, bearing in mind the fact that he had not attained his fiftieth year. It seems, however, that his health has never been of the best, and that recently he has suffered considerably on account of attacks made on him by an unscrupulous class of politicians. The origin of the immense business, which was dominated by the man who is now dead, was humble as such things generally are, the grandfather and father having created a heritage which has been still further increased by the late Herr Krupp. Of course it was his father who really gave to the concern the immense influence and standing it has of late years possessed, though that influence has vastly grown during the sixteen or so years that it has been under the control of the proprietor who is now deceased. Industrial Germany is typified by the Krupp firm, for we see in it the embodiment of that thoroughness and exactitude of principle which are considered the most important among German characteristics when the profession of science and engineering is involved. The name of Krupp has a world-wide significance, and is related to everything that is effective and powerful among war munitions. Practically every Government is a customer to the firm, and no greater testimony could be given of the all-prevailing excellence of their specialised class of manufacture. The death of the proprietor leaves the firm without a chief, in so far that the only successors are the widow and two daughters, so that its administration will be conducted by a sort of committee of trustees.

**Musketry Instruction in the Army.**—The circular issued by the Commander-in-Chief as an army order is receiv-

ing the attention that its emphatic language demanded. In some instances there have been criticisms as to its possible effectiveness in actual practice, generally on the grounds that it is one thing to state that the promotion and favourable treatment of an officer shall largely depend upon the interest he has shown in musketry instruction, and quite another thing to see that the principle is adopted in actual practice. However, there is bound to be a great increase of activity at the various military centres throughout the country. The classified headings according to which the instruction is to proceed will probably turn out to be the most useful part of the original army order. This seems to be the case, because the actual points upon which instruction must be given are specifically stated. The care of arms, instruction in aiming, distance judging, snap shooting, and the various other items enumerated, are all of a kind that lend themselves for a course of instruction, and officers have in the musketry regulations a handbook or code that will enable them to learn up the subject beforehand, so as to be qualified to take charge of the work of instruction. The soldier is in very few instances an adept with his hands, and, therefore, it would be the more difficult to instil into his mind the fact that a rifle needs very much the same kind of delicate attention and care as any other scientific instrument. About the last thing that really appeals to the ambitions of a soldier, at any rate at the period of enlistment, is the likelihood of becoming the crackshot of his regiment; and when firing exercises are conducted by a sometimes not very intelligent instructor, the work is likely to pall; and the shooting ambitions of the regiment are often likely to extend merely to the stage technically known as "marksmanship." It needs, therefore, more than ordinary interest among superiors to instil into the men a desire to study the niceties of rifle shooting, which, under previous army conditions, could, as a rule, only be carried on against fairly

considerable difficulties. It is to be hoped that the new order, and the driving power behind it, will in the course of time create a better feeling in the army towards rifle shooting, especially of the useful kind.

**The late Sir Roberts-Austin.**—An immense amount of regret will have accompanied the announcement that Sir William Roberts-Austin, Chemist and Assayer to the Royal Mint, has just died. Everyone who has anything to do with the engineering or metal trades will at once associate him with a splendid series of researches with the microscope concerning the characteristics of various metals. Few realised, till he made the matter so clear, that the structure and quality of a body of metal could be examined in an exact fashion by means of micro-photographs of highly polished sections. In gunnery it is of the greatest importance to know how the modern forging and casting processes have done their work; and it seems as though there is no more infallible index to the arrangement of the fibres and crystals as by means of the perfected methods of microscopic analysis as demonstrated by Sir William Roberts-Austin. That his influence has extended in many directions is clearly shown by the large number of experts who have frequently sought his guidance and advice in the course of their researches. By repeating his methods, and by applying the knowledge so gained to their own special experience, the principles laid down in a general way have had their effect on many branches of manufacture. Even in cartridge-making manufacturers realise more than they did previously, to the work of this scientist, the great value of examining the flow that the metal has taken during the processes of drawing out the cartridge. Most cartridge factories are provided with an efficient microscope, and it is a portion of the regular work of the laboratory to examine highly polished sections of cartridges, of which the grain has been brought into prominence by the action of acid. In the same way it will be remembered that in our reference to the career of Mr. T. R. Bayliss we laid special emphasis on the fact that the high quality of brass, with which his name has so long been connected, has been largely brought about by the intelligent use of the microscope. We must, therefore, all regret the loss of one who has done so much to increase contemporary knowledge of metals.

**Our Lecture on Shot Densities.**—Upon the occasion of a recent visit to a cartridge-loading shop, we found the manager very much worried and perplexed by the introduction of decimals into cartridge-loading. He condemned "scientific cartridge-loading" with a hearty vituperation, and he said that the business was difficult enough without introducing into it needlessly elaborate technicalities. We found, however, upon going into some of the details that there was an undoubted need for decimals for determining the method of loading and the selection of suitable waddings. In fact, the more we have seen of cartridge-loading the more we are convinced that it can only be carried out in a really satisfactory manner if the responsible director or supervisor of the work is encouraged to study the matter with a nice appreciation of the more technical considerations. It is at any time difficult to load a cartridge with a certainty that it will do its work well in the field, and the absence in most cases of proper facilities for testing makes it necessary to take

all possible precautions so as to avoid every chance of bringing about abnormal results. If, therefore, cartridge-loaders would keep in constant touch with the makers of the powders that they daily handle, and submit from time to time samples of their work for examination and report, they would no doubt find substantial benefits arise. The purpose of our lecture this month has been to explain the differences of space occupied by different charges of shot, the idea being that by taking these into suitable account the loader shall interfere as little as possible with the intended conditions of the powder and cartridge. Some of the existing ideas on this subject are rather vague, and it is just as well that some of the more important considerations should receive detailed attention.

**A New Machine Rifle.**—The British newspaper press has favoured us of late with a number of detailed references to a new Danish machine rifle, for which a very high rate of fire has been claimed. It seems that the rifle is practically an automatic machine gun of such portability that it can be carried about in mountainous and hilly country by a single man, being in fact not more than double or treble the weight of an ordinary military rifle. In the descriptions which have been published, we cannot see that the rifle is vastly different from a 20-lb. automatic shoulder rifle which Mr. Maxim exhibited as much as eight years ago. It must, of course, be remembered that while the public may be attracted by claims that a light rifle can fire some hundreds of shots per minute, experts are not so easily satisfied. Anyone who has seen the firing of fifty shots from a military rifle as quickly as the mechanism can be worked, will know the immense amount of heat that is generated; so much is it, in fact, that before long the air is full of smoke from the burning woodwork of the stock. Now, before a light portable arm can be adapted to fulfil a portion of the work of a machine gun, it is necessary to devise means for getting rid of the heat that is generated. The Maxim gun seems to work on the most satisfactory system; that is by the evaporation of water, which is suitably jacketed around the barrel. The Colt and Hotchkiss automatic guns have been designed with the idea of absorbing the heat into a considerable mass of metal, and getting rid of it by radiation, though, of course, mass means weight. Whether it be water or whether it be metal, the fact remains that neither means is open for enabling a large number of shots to be fired in rapid succession in a light-weight gun, such as the Danish one that is described. It must, therefore, be assumed that this weapon is little more than a highly developed automatic magazine arm, having such extra weight and stability as will enable it to fire, say, as many shots as four, five, or perhaps even more, individual marksmen. Everything turns on the question of endurance, and therefore such a gun can only be judged by the number of shots it will fire in a given period without injury to its mechanism.

**Our Tenth Volume.**—With the current issue we bring to a close our tenth volume of *Arms and Explosives*, the period of our existence being a little over ten years, due to one of the volumes containing three extra months' issues, so that those bound in one cover should thereafter run from January to December. In the course of all these years it has been our pleasant lot to study what is probably one of the most interesting businesses in existence; and we have had the happy fortune of making many good friends in the process.

In looking over a selection of back numbers, it is fairly clear that the earlier editions were marked by a certain amount of crudeness that required a large measure of indulgence from our readers. Of late years, with increasing intimacy with the subjects dealt with, and benefiting from the aid of the many friends who have helped us from time to time, we have been able to keep more closely in touch with the practical developments of the business. We are conscious, however, of many defects still remaining, it being always a difficult matter to present month by month, whether there has been any history to relate or not, a record of progress or development such as will in time to come properly represent the current state of affairs and knowledge. Of course, it is among the characteristics of the business with which we are allied that its turnover and scope cannot compare with many of the other productive industries. Consequently, we have maintained the compact size, which, while enabling us to do what is necessary for our subject, has at the same time made it possible to do things on a sound commercial basis. The postal regulations make it difficult to extend the size of monthly periodicals as one would wish. Hence we have strived as far as possible to make up in quality for what may be missing in quantity, and though we are conscious of many failures to live up to this ideal, we still feel that there is a future that provides opportunities for the exercise of further effort. Therefore, with these few words, we complete our tenth volume, thanking our many supporters and friends for the confidence they have bestowed upon us, and which we hope to deserve to an increasing extent in the future.

The Ideal Manufacturing Company, of U.S.A., have sent us a booklet entitled "Hints on Loading and Reloading Shot-Gun Shells," which embodies in a handy form those parts of their larger hand-book which deal with the subject-matter of the heading.

It is noteworthy that not a single British firm tendered for the supply of quick-firing guns to the order of the Danish War Department. The order has been given to Herr Krupp, and comprises 128 quick-firing guns of 3-in. calibre, to cost about £822 apiece, with 198 tumbrils, all to be delivered by April, 1904.

Mr. F. C. Borer has been appointed, on behalf of the Schultze-Company, to carry on the duties for which Mr. V. T. Mitchell was responsible during the many years he has been at Gresham Street. Mr. Borer is probably the most popular man in the gun trade, so that he has every opportunity of becoming an even more important mainstay for the success of his company than ever before.

With reference to the paragraph in our last issue respecting the estate of the late Mr. Robert George Joyce, Mr. Harry Rayment writes to us as follows:—"Knowing, as I do, how anxious you always are that nothing should appear in your paper except the truth, I beg to inform you that I have no brother and Mr. Joyce had no nephew of the name of 'Henry' Rayment, and that my own name is Harry, and, moreover, the property in question was not bequeathed to me." Among Mr. Joyce's bequests were several for charities, among which may be noted £3,000 to the London Hospital, and £500 each to six benevolent institutions, together with £1,000 for the benefit of the poor of Caterham Valley who do not receive parochial relief.

## RULES FOR KEEPING, STORING AND PACKING MIXED EXPLOSIVES.

THE Gunmakers' Association is about to send out a revised edition of the card which was issued some few years ago by the same body, and which contained in brief and easily understood form a digest of the Regulations in the Explosives Act referring to the keeping of black and smokeless powder (mixed explosives) on registered premises. As originally compiled, the card was circulated among gunmakers and others interested, and its influence may best be estimated from the totally spontaneous tribute paid to it by H.M. Inspectors of Explosives in their Annual Report for 1899, page 23, which reads as follows:—"It is right here to mention the good work which has been done by the Gunmakers' Association, who, after consultation with this Department, issued to each of their members a printed card of rules, with a request that it should be placed in a prominent position on the member's premises. This card contains a clear and concise abstract of the law as it affects gunmakers occupying registered premises. The beneficial effect of the issue of these rules is very marked in many of the places which we have visited, so much so, that in certain towns where registered premises are on the whole indifferently kept, the premises of gunmakers belonging to the Association stand out in marked contrast to the rest." This excellent testimonial has been repeated in each succeeding Annual Report of H.M. Inspectors, and they have individually and informally repeated their appreciation of the good results of this publication on various occasions, and in no stinted manner.

As the original issue of these cards has recently become exhausted, and inquiries are still being made for them, the Gunmakers' Association has carefully revised the matter contained in the tabular form and made sundry amplifications, with the unofficial sanction of H.M. Inspectors, and the new series of cards will shortly be in stock at the offices of the Association, whence they will be obtainable on payment of the nominal fee of one shilling, which just covers the cost of production. Judging by the constantly reported cases of infringement of the Explosives Act, as regards quantities kept and manner of storage, it is evident that there are still a number of traders in mixed explosives who are not cognisant of the law, and to whom this concrete abstract of rules would be of service in avoiding breaches of the regulations, and it is to be hoped that such as do not possess a copy of the original card, especially, will take advantage of this opportunity to obtain one of those about to be issued.

The new card contains all the matter to be found in the first issue, together with much that is new, and the whole has been carefully revised. No good object would be served by reprinting the card *in extenso* in our columns, since the card itself will be in existence almost by the time this appears in print; but it may not be out of place to give a brief summary of its contents. For example, under the heading of "Amount of Powder and Cartridges" which may be kept, the conditions of Mode A and Mode B are clearly set forth. Mode A deals with a building or fire-proof safe detached from a dwelling-house, public highway, &c., and under the conditions speci-

fied it is permissible to keep 200 lbs. of powder, black or smokeless, and in addition loaded cartridges containing no more than 500 lbs. of powder. To save trouble, the card points out that 500 lbs. of powder is the quantity required to load up the following number of 12-bore cartridges, according to the charge:—41,000 with 85-grain charges; 83,000 with 42-grain charges; and 106,000 with the new 33-grain charges. Under Mode B, which refers to keeping powder in premises connected with or inside a dwelling-house, &c., the amount of loose powder that may be kept is restricted to 50 lbs., in addition to 500 lbs. loaded in cartridges, which cartridges, however, must not be kept in the same receptacle with the loose powder, nor in a fire-proof safe. The "Manner of Storage" is dealt with at greater length under a separate heading, as regards Modes A and B, and the points that are common to both manners of storage; and full details are given of the nature of the receptacles in which the powder may be stored, and the quantities allowable in one package. It should be clearly understood that it is illegal to open on registered premises any package or canister containing more than 5 lbs. of powder, from which it follows that larger amounts than 5 lbs. should be made up of canisters, &c., which individually do not exceed that limit of weight.

The "Loading Room Instructions" have undergone slight revision in order to make the provisions rather more clear. From cases that are reported from time to time in the press, it is not universally known that in every instance where a loading room is to be used notice must be given to the local authority. It is now made clear on the card that a separate apartment should be set aside for powdering cases and seating the first wad, as a cartridge does not comply with the conditions laid down for safety cartridges until the first wad is seated. The powdering room is, of course, a "danger" apartment, and as such every precaution taken in danger buildings should be rigidly enforced. Moreover, no work unconnected with the manufacture of cartridges shall be carried on at the same time and in the same place as the filling of cartridges.

A new feature of the card under notice is a special addition of rules relating to the packing of explosives for transport. We learn that explosives, if not exceeding 5 lbs. in weight, shall be contained in a substantial receptacle, made and closed so as to prevent the explosive from escaping, and of such strength as to provide ample security in transit. If the explosive exceeds 5 lbs. in weight, it must be contained in a double package, and the limit of weight permitted in any package is—100 lbs. for gunpowder or nitrate mixtures; 50 lbs. for nitro-compounds. Explosives containing nitroglycerin, or any other liquid nitro-compound, must be packed in water-proof inner and outer packages, and the inner package must not contain more than 10 lbs. Safety cartridges must be packed in a case of sufficient strength to withstand the risks of transit.

The interior of every package, whether single or double, shall be kept quite free from grit or dirt, and shall not contain any substance but the explosive, and only one description of explosive, except in the case of gunpowder and small-arm nitro-compounds, which may be packed together in one outer package. Safety cartridges are, however, exempt from these conditions. No iron or steel must be used in the construction of any package, unless the metal is efficiently protected. On the outer package shall be affixed conspicuously the name and address of the owner or sender, the word "Explosive," with

the name of the explosive, followed by words showing the class and division to which the explosive belongs.

Of course, it is not pretended for a moment that their card of rules exhausts the provisions of the Explosives Act. The abstract thus tabulated is, however, sufficiently explicit to cover all ordinary conditions under which the gunmaker may find himself as a storer, loader, or transmitter of explosives. For such details as the registration of premises, the list of authorised explosives and other matters, reference must naturally be made to the Act itself, or to that very excellent little "Guide Book to the Explosives Act," originated by the late Colonel Sir Vivian Majendie. Moreover, it is expressly pointed out that, while the Gunmakers' Association have taken every possible precaution to avoid omissions and mistakes, they cannot be responsible for any errors that gunmakers may fall into in seeking to carry out these instructions. That is a saving clause that merely carries the meaning that the card is not issued with the absolute official sanction of the Home Office, but enough has already been quoted to show the value attributed to it by the authorities.

## NOTES.

THE BROWNING AUTOMATIC PISTOL.—Mr. John M. Browning, the well-known inventor of the automatic pistol bearing his name, which is also as frequently referred to as the Colt automatic pistol, has recently introduced into that arm two important modifications which are likely to enhance its popularity, already sufficiently assured. One modification consists in the provision of means whereby the pistol may be taken apart without the use of any tools whatever. It must be admitted that the previous model required no other tool but the pin of commerce for its disassembling, but even this is now dispensed with by the introduction of an external plug, which can be operated by the fingers alone, and to that extent the manipulation of the pistol is simplified. The other improvement relates to a device fitted at the side of the frame to the rear of the trigger, whereby after the firing of the last cartridge in the magazine the breech-block is retained in its rearward position after recoil, thus indicating at once that the weapon is out of action pending the reloading of the magazine. These are features which bring the pistol well up to date. As is well-known, the Colt Patent Fire-arms Co., Ltd., are the agents in this country for the Browning Patent Automatic Pistol. The improvements above referred to are to be found set out in detail on another page of this issue, under the heading of "Selected Patents."

A SUCCESSFUL BLAST.—At the close of the Carnarvonshire Assizes, Mr. Justice Bucknill, accompanied by a distinguished company, proceeded to the Cilgyn Slate Quarry at Nantlle, where another of the large blasts which are now frequent amongst the North Wales quarries had been prepared. In a chamber at the bottom of a shaft, 23 ft. deep, reached by a tunnel 51 ft. long, had been placed 30 cwt. of blasting gelatine. The fuse attached to the charge had to traverse the whole length of this tunnel, and as so great a length of an ordinary time safety fuse would have taken about half-an-hour or more to burn, it was arranged in this case, as in other recent large blasts, to attach a length of Bickford's

Instantaneous Fuse to the charge, while reaching to the mouth of the tunnel was a length of Bickford's Time Safety Fuse. Immediately the time fuse could communicate with the instantaneous fuse, the whole charge would be exploded. At twenty minutes past four Mr. Justice Bucknill fired the fuse, and nine minutes later, which was the interval allowed by the time fuse, a great area of the upper part of the rock suddenly sprang forwards, and fell down the almost perpendicular side of the quarry. It is estimated that about 300,000 to 400,000 tons were thus displaced.

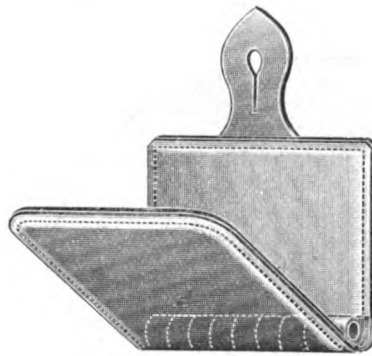
A NOBEL PAMPHLET.—We have received from Nobel's Explosives Co., Ltd., a handsome 36-page pamphlet, in which particulars are given of the visit to the Company's factory this year of the Colonial Premiers. Those who were favoured with copies of a previous pamphlet issued by Messrs. Nobel will by now have become accustomed to the artistic grace with which they set out to arrange these interesting little mementoes. Judging by the pamphlet before us, the Colonial Premiers seem to have been very actively shadowed by some ubiquitous snap-shotter. In fact, one really feels inclined to wonder whether there was not some motive for this exceptional diligence, because had an accident of any kind happened we should at least have been assured of the most graphic particulars. Naturally, however, Messrs. Nobel are past masters in the art of stage managing these little excursions, and there is little doubt that the visitors were as safe as the proverbial railway traveller with his million-to-one chances against anything happening. Anyhow, the visit seems to have been a decided success, judging by the number of ladies who were present, and the fine array of guests, whose presence at the luncheon hall is, among other things, duly recorded in a pictorial form. The context of the pamphlet, besides containing the names of the various guests, explains in a brief manner the general characteristics of the factory and the materials there turned out. This, together with the speeches made during toast time after the luncheon, provides an effective background for the interesting series of pictures, the pamphlet concluding with a few references to the Company, comprising a list of agents, and also the terms of Mr. Alfred Nobel's famous will

MESSRS. J. & E. HALL, LD.—In presiding over the third annual meeting of this company, Mr. Everard Hesketh was able to point to very satisfactory results, particulars of which were foreshadowed by the reference to the company's balance-sheet contained in our last issue. The profit of £29,364 was, however, almost entirely due to the enterprise shown in the manufacture of refrigerating machinery, which is now so largely a necessity on board ocean steamships, and the development of which has been so consistently promoted by this firm during the last 12 or 13 years.

SMOKE SHELLS.—It appears that after a series of exhaustive experiments made at Okehampton, the War Office experts have given an adverse decision with regard to the loading of artillery shells with smoke-producing ingredients. The experiments were carried out with a new German explosive loaded in shrapnel shells, which, on bursting, were

intended to emit dense volumes of smoke. The purpose of this was twofold: to locate the point of impact of each shell, and to obstruct the view of the enemy by a temporary veil of dense volumes of smoke. In practice, however, while the shells seem to have fulfilled some part of the programme admirably, they are voted a failure, partly owing to their very success, since the smoke screen would enable the enemy to shift his guns or troops unobserved—a feature of the case which apparently did not occur to the inventor of the smoke-producing compound.

THE "READY" REST.—We have received from Messrs. Lightwood & Son, of Partridge Works, Price Street, Birmingham, samples and particulars of an ingenious rest, which they are inviting the gun trade to take up and sell.

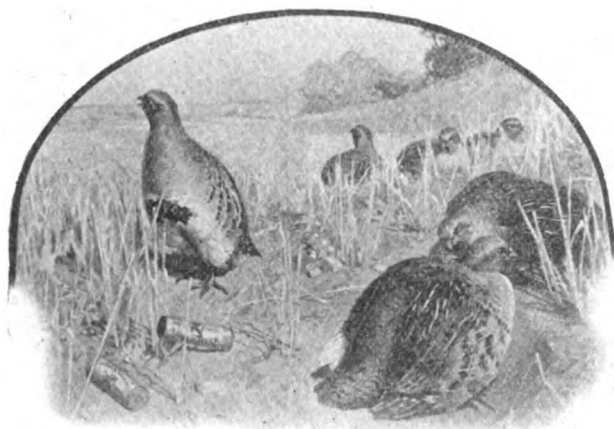


Its object is to provide a rest for the butt of the gun, whereby its weight may be relieved somewhat during the intervals of shooting. It consists of a neat leather arrangement in the form of a hinge—and it is sold in two forms. One of them, that illustrated, may be attached to a button on the shooter's clo-

thing, while the other has a loop at the back, allowing it to be threaded over a waist strap or cartridge belt. In either case, the clip satisfies the welcome purpose of a projection which nicely retains the weight of the gun with a minimum of strain on the arm muscles to the shooter. The position of holding the gun to which the rest lends itself, is one, as our second illustration will show, that enables the sportsman to be instantly ready for a shot, while at the same time there can be no question of danger to persons in the immediate neighbourhood. Probably there is no sportsman who has not experienced the terrible strain of carrying a gun throughout a long day, the arms being held most of the time in the somewhat cramped position due to a slight constant bend of the elbow. It must have occurred to many persons that there is a need for some way of holding a gun between whiles that will satisfy the conditions of safety and immediate readiness for further action. From our illustration of the practical working of the appliance many of our readers will recognise Mr. Dixon, Messrs. Kynoch's well-known expert and representative at Bisley. As one who delights in the use of the gun in field and covert, he has experienced the difficulties we have alluded to; and we understand that he is responsible for the invention of the very practical remedy here put forward. Gunmakers and dealers would do well to secure samples, together with a supply of the excellent leaflets Messrs. Lightwood have prepared for distribution.



**THE "AMBERITE" PICTURE.**—We always have pleasure in illustrating, for the benefit of our readers in general, the efforts of advertisers to rise above the ordinary level of mere commercial announcements, and to blend something of the artistic with the absolute requirements of bringing the article to be advertised into suitable prominence. This desired end has, we think, been very successfully attained by Messrs. Curtis's & Harvey, Ltd., in their latest "show-card," which consists in reality of the picture, a portion of which we reproduce here, mounted in a handsome gold frame. The oil-print itself measures some 19 ins. by 13½ ins., and shows a country hill-side, with a covey of partridges in the foreground, and there is nothing in the way of advertisement that is immediately apparent sufficiently obvious to prevent the picture from forming a suitable adjunct to any room or office. Its "only mark of origin," in fact, consists in the presence of



two fired "Amberite" cartridges lying among the stubble, which, while not too obtrusive, are none the less effective on that account as indicating the excellence of that brand of ammunition. Messrs. Curtis's & Harvey are to be congratulated on the really artistic result achieved and the good taste displayed in this attractive advertisement, which, by its very moderation, is calculated to produce more lasting good than a more glaring method of seeking publicity.

**A NEW PUBLICATION.** It is just a question whether the issue of sporting serials has not been a little overdone of late years. What with the volumes of the Badminton Library and that alphabetical treatise, the *Encyclopædia of Sport*, we are quite sufficiently equipped with the opinions of those writers whose names are, as a rule, put forward as a draw for the sporting public. Under these circumstances it is open to doubt whether *The Sports of the World* is likely to excite the jaded palate for the omnivorous reader of sporting literature. It tells us, we notice, that:—"At a time when a man's honour was supposed to depend upon a few inches of cold steel inserted—or not inserted—in a special manner, the art of fencing was so weighed down with encyclopædic tomes of industrious pedantry, that no one save a fencing master past his prime could hope to understand it." Very likely he couldn't. The shooting matter does not suffer in the same way, because, having been similarly instructed so often before, the reader will find little difficulty in getting at the meaning.

**THE GUNMAKER'S ASSOCIATION.**—A general meeting of this Association was held at Effingham House, on Thursday, November 20th, at which there were present:—Mr. H. J. Blanch (in the chair), Mr. C. E. Greener, Mr. E. Harrison, and Mr. J. T. Musgrave. The minutes of the previous meeting were read and confirmed, and messages of regret for non-attendance were read from Mr. G. E. Lewis, Mr. J. V. Pape, Mr. W. Richards, Mr. H. A. A. Thorn, and Mr. J. Tisdall. The application for membership of the Association made by Mr. James Moodie Kerr, managing director of the London Armoury Co., Ltd., of 114, Queen Victoria Street, London, E.C., who was proposed by Mr. H. J. Blanch, seconded by Mr. E. Harrison, was considered, and Mr. Kerr was declared duly elected. The secretary was instructed to send letters of condolence to Mr. Thorn and Mr. E. J. Churchill, respecting the bereavements they had recently sustained. It was proposed by Mr. Greener, seconded by Mr. Musgrave, and carried, that a special circular be sent to the members of the Association, inviting suggestions for matters to be brought to the notice of the Association that might usefully be dealt with to the advantage of the members generally. The meeting concluded with the usual vote of thanks to the chairman for presiding.

### EXPLOSIVES REPORT FOR VICTORIA, 1901.

THE annual report for 1901 made by Mr. C. Napier Hake, Chief Inspector of Explosives for Victoria, seems considerably less bulky than on previous occasions, owing, no doubt, to the absence of the familiar blue cover; but it is satisfactory to note that this apparent condensation of matter is not commensurate with a decline in the explosives industry in the colony. It is to be noted that the administration of the Act is now transferred to a State Department of the Australian Commonwealth, which accounts, among other things, for the robing of the report in white. This change of control has rendered necessary no modification of the law, and the efficiency of the existing state of affairs is made manifest by the fact that once again Mr. Hake is able to present a clean sheet as regards accidents.

Only 180 licences to import explosives were issued during 1901, as against 210 in the preceding 12 months, but these figures are no indication of business done, since the year under review has shown a marked improvement in quantities and values, as compared with 1900, our usual table of figures being given on the succeeding page to point the comparison.

It will be seen that the increase in amount is considerable, and the total values show a difference of £5,621 in favour of 1901. These figures, as in former years, are exclusive of all importations of explosives made directly on account of the Government. Particulars of other explosives imported are not given with any detail, except for the statement that no amorces were imported, and that the safety fuse complied with the requirements of the Act. Of the blasting gelatine 4,000 lbs. were condemned on account of low trial tests, and was sent to the local factory for repairs. Owing to exudation, 15,000 lbs. of gelatine dynamite were destroyed, and the same



failing was responsible for no less than 73,000 lbs. of gelignite being condemned. About 75 per cent. of this, however, was allowed to be passed into consumption on condition that the explosive was used up within a fixed period.

EXPLOSIVE.	1901. lbs.	1900. lbs.	Increase. lbs.	Decrease. lbs.	Value for 1901.
Dynamite ..	—	2,750	—	2,750	—
Gelatine Dyna- mite ..	984,800	813,250	171,550	—	61,328
Blasting Gela- tine ..	123,400	109,300	14,100	—	8,639
Blasting Powder	268,750	305,200	—	36,450	5,211
Sporting Powder	121,190	107,604	13,586	—	9,084
Total ..	1,498,140	1,338,104	160,036	—	84,262

Eight factories were under licence during the year, and 36 Rack-a-rock manufacturing licences were also issued. There was a considerable increase in the number of magazines under licence, 152 as against 124 in the preceding 12 months. These are exclusive of 21 Government magazines. As regards licensed premises, only 18 persons were proceeded against for breaches of the Act, which is well below the average for recent years. As has already been mentioned, no accidents by fire or explosion occurred during the year in the manufacture, transport, or storage of explosives, while as regards use, only eight accidents in mines were reported to the Department, involving three deaths and eight cases of injury. During the year 716 samples of explosives or their components were submitted for examination, of which 613 passed the tests, and 103 were rejected. In addition, 746 samples of other substances came under examination by the Department. Altogether, Mr. Hake's report seems to be of a satisfactory character.

### THE UNITED STATES ORDNANCE REPORT, 1901.

WE are indebted to the courtesy of the Military Attaché at the American Embassy for an opportunity of glancing through the "Report of the War Department, 1901, Chief of Ordnance," which is the latest annual publication of the United States War Department dealing with arms and explosives. As usual, this is a most compendious volume, consisting of some 800 pages of letter-press and a vast number of diagrams, drawings and full-page plates. The first thought that strikes one on looking into this book is the consummate system of painstaking on the part of the U.S. officials which leads to the publication of so exhaustive a *resumé* of a year's work. Roughly speaking, the work of the Ordnance Board is distributed over only half-a-dozen centres—the arsenals at Watervliet, Watertown, Frankford and Rock Island, the proving ground at Sandy Hook, and the Armoury at Springfield; and the operations, experiments and tests conducted at those leading centres furnish by far the greatest proportion of the matter for report. There are only 59 officers in the

Ordnance Department, and on these energetic officers, assisted by a comparatively modest clerical staff, the whole work of the department falls.

In our last month's issue we were enabled to publish an instructive report, made by officers appointed to examine into the subject, on the question of "The Organisation of Ordnance Experts," and we also gave a condensed account of the new Springfield magazine rifle. It would, of course, occupy too much space to pass in anything like adequate review the work of the Ordnance Board as chronicled in this comprehensive report, and we must, therefore, content ourselves with supplementing last month's extracts by a few notes culled at random from the general body of the report, which are given below just as they were abstracted.

The present Service rifle has met with approval by the army at large. The sights for it as first issued were not satisfactory. They have been changed to meet the needs of accurate individual firing. The sword bayonet with which it is equipped is considered by the Chief of Ordnance as imperfect and antiquated. It is a heavy and, with its scabbard, a costly part of the soldier's equipment, and is a needless impediment to his freedom of action and comfort on the march, and as an entrenching tool it is a poor substitute. The bayonet is now only very rarely used, and may well be dispensed with, relieving the soldier of considerable weight and inconvenience, and saving the very considerable cost. To provide for the rare occasion when a bayonet is needed, and at the same time provide a rod ("rainrod"), which is still used and deemed necessary, a "rod bayonet" was devised for the calibre .45 Springfield rifle, and, after exhaustive tests and improvements to meet results of trial in the field, was satisfactorily perfected and approved by the Secretary of War (Mr. Proctor) for all manufactures of the Springfield calibre .45 rifle until replaced by another arm; 66,851 of these arms have been made. This "rod bayonet" is equally applicable to the calibre .30 rifle, as was exhibited in a calibre .30 Springfield rifle submitted to the Small-arms Board that recommended the adoption of the present Service rifle.

The tests of a new sample rifle, embodying all the merits of the present Service arm, were recorded in our last issue. Further tests have been made, but not published. On the recommendation of the Commanding-General of the Army, 10,000 Winchester magazine rifles and bayonet scabbards were purchased in 1898, at a cost of 207,000 dols. This purchase was not approved by the Ordnance Department, and the result of trials made with one hundred of the weapons served out to troops in Manila was that the present Krag rifle was reported to be superior to the Winchester, as regards facility in loading magazine, assembling, strength of mechanism, and endurance.

At the Springfield Armoury the plant has been increased until the output is now 250 guns and 600 new sights (model 1901) per day, together with the usual output of bayonets, scabbards, officers' swords, &c. During the year 6,000 model 1892 guns have been altered to model 1896; 7,000 Springfield rifles, model 1894, have been converted into cadet rifles; 21,000 rifles and carbines cleaned and repaired; 59,400 rifles and carbines, calibre .30, have been manufactured; also 202 officers' swords and sabres; 32,000 bayonet scabbards, calibre .30; 73,286 small-arm oilers, and various other work has been done. The manufacture of the new model 1901 sight has been delayed by difficulty of graduating, owing to

varying velocities of cartridges, conditions of light, wind and personal equation of different marksmen. These difficulties, however, have been finally overcome, and the manufacture of the sight is now being carried on.

Experiments to determine the drift of rifle and carbine have been continued during the year. As the drift of the rifle was always to the left, up to 1,100 yards, and that of the carbine to the right, it was supposed that there was some length of barrel between the 30 and the 22-inch length which would shoot more nearly in the direction of the line of fire. Experiments were made with a barrel cut off an inch at a time until the carbine length was reached. These experiments showed the drift of the rifle still to the left.

Tests on the penetration of rifle bullets in sand, loam and steel, showed that the penetration into sand and loam at 50 feet does not exceed 6 inches; at 500 yards, 13½ inches; and at 1,000 yards, 16½ inches. At the short range of 50 feet the velocity is so high that before the displacement the bullets are completely destroyed, the lead is fused, and the steel casing torn into ribbons.

At Frankford Arsenal the present capacity of output of the cartridge plant is 87,000 cartridges per day of eight hours, which it is intended to increase to 192,000. A board of officers, which was called to investigate and report the cause of splitting and rupture at neck and shoulder of cartridge cases, reported from the field, and upon misfires and other defects in the cartridges, recommend in their final report that the reduction of the case in the formation of the neck and shoulder be accomplished in four operations of reduction, with three annealings. This method of manufacture has been adopted with satisfactory results. It is a question, however, whether the defects sought to be remedied were due to the method of manufacture or to the quality of the metal. As recommended by the board, the jacket of the bullet is now made of cupro-nickel, the use of nickel steel having been discontinued. The cartridges are thoroughly waterproof, and about 3,000,000 of former manufacture, with the single cannellured bullet, have been made waterproof by shellac applied to the joint of the bullet and case.

A stouter form of paper box for the packing of rifle and revolver ball cartridge has been introduced, which seems to prove satisfactory. Two new methods of passage for quick distribution in the field have been instituted; one being a system of bandoleer, holding five boxes, to go over the shoulder, and the other containing the five boxes in one compact mass, also on a shoulder strap.

The Ordnance Board experimented, among other things, with the high explosive Thorite, and reported it as not suitable as a filler for shells, owing to the uncertainty of detonation and lack of keeping qualities. After long series of tests, the Board has finally selected for siege and sea-coast shell two explosives, Maximite and Explosive D, and two for the field shell, Rendrock No. 400 and picric acid.

As has already been stated, these extracts are quite random collections, and deal mostly with small-arms. The researches and experiments of the Board in respect to powders, and artillery with its accessories, form no small part in the building up of the yearly volume, and contain matter well worth the attention of those particularly interested in those departments. One thing at least is certain, that whatever the United States Ordnance Board undertakes to do, it does with consistent thoroughness.

## LECTURES TO YOUNG GUNMAKERS.

### XVIII.—THE LOADING DENSITY OF SHOT.

In previous lectures a good many of the more scientific aspects of cartridge loading have been described, of which the end in view has been to educate the young gunmaker to observe more exact methods in this portion of his work. We have shown that the ordinary pair of scales, as sold by the implement maker, is an obsolete and inaccurate instrument, and that a cheap form of chemical balance is the only possible way of reliably estimating the weights of powder charges. Then, again, we have shown that, although powdering machines have a wonderful power of repetition when once they are accurately set, it is very easy for serious mistakes to arise unless the action of these machines is constantly checked by reference to the chemical balance. Similarly, in our lecture on wads we have shown that it is necessary to select the wadding, not only with a view to its influence on the combustion of the powder, but also in relation to the space it must occupy in the cartridge. It has been shown that various charges of powder occupy a proportionate amount of space in the cartridges of the different calibres, and that any alteration in the powder, the shot, or the wads must be duly taken into account in settling the specification to be observed in the loading shop.

So far, nothing has been said in a detailed sense concerning the space occupied by the different charges of shot. In our lecture on shot we showed the number of pellets per ounce that agree with the various standard sizes, and we made it clear that quite considerable divergences are to be met with among successive deliveries from the same factory. Our remarks showed that, granted a fair amount of regularity between pellet and pellet, a slight difference from the nominal count was not of very great importance if the charge was true as a whole to the weight laid down. We, however, made it quite clear that if accurate loading is carried on for the purpose of experiments, and the charges are measured by means of the shot-counting trowel, there must be an agreement within a pellet or so between the number of shots and their proper weight. The table which was reproduced with the lecture referred to was well worthy of detailed attention and constant reference, since it showed the exact relation between weight and number of pellets for every practical charge of shot.

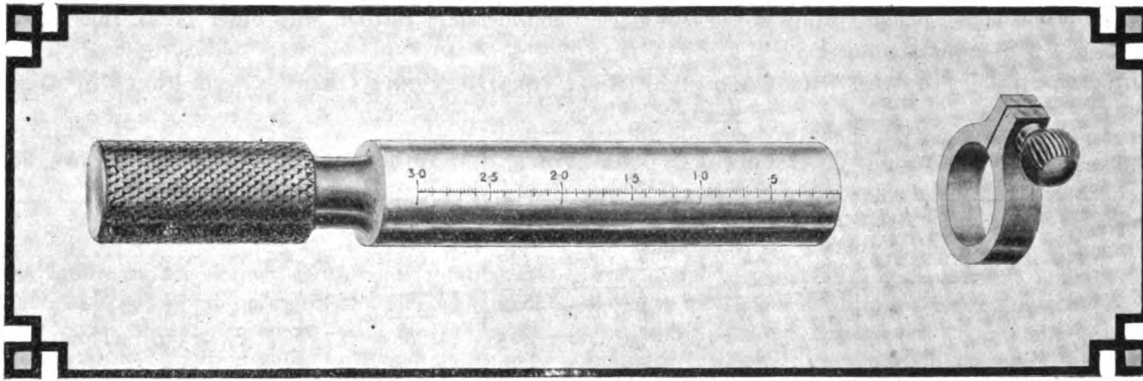
The object of the present lecture is to add to the information already available concerning the space occupied by the various items comprising the contents of a cartridge case. So as to make our lesson the more clear, we have illustrated a graduated plug, which has been made to our own design for the purpose of regulating and standardising the loading of 12-bore cartridges. It consists of a brass plug .729 in. diameter at the cylindrical portion, which is rather more than three inches long. The scale marked upon the plug starts with the nose end as zero, and is graduated in inches, tenths and quarter-tenths, or fortieths. Those young gunmakers who have read our remarks concerning the vast importance of adopting the decimal divisions of an inch will at once appreciate the utility of the scale marks on this plug. The fortieth of an inch is generally accepted as the smallest length that can be conveniently read by direct measurement. Practically, all micro-

meters adopt this value, the finer measurements being taken by the rotation of a screw, having forty threads to the inch, or else by means of vernier divisions. Anyhow, the fortieth of an inch was adopted for our plug as representing the finest measurement of practical importance in cartridge loading. It is easily expressed in decimals of an inch, since one-fortieth equals  $\cdot 025$ ; two-fortieths  $\cdot 050$ ; three-fortieths  $\cdot 075$ ; and four-fortieths, of course,  $\cdot 1$ . Thus it happens that the first place of

no more than a practical margin which can be taken into suitable account in the everyday work of the loading shop.

The final test is, of course, to be made by placing the over-shot wad in the cartridge, ramming it home with the plug, and then carefully noting whether the amount remaining for the turnover is just bare of  $\cdot 3$  of an inch.

If all cartridge loading were made with strictly standard charges, the need for such a lecture as this would not be so great



decimals is reserved for the number of whole tenths, and the remaining two places for stating the number of odd fortieths of an inch, as here described.

Now, the practical working of our plug gauge should be fairly obvious. It exactly fits the tube of a 12-bore cartridge, and its distance of entry can be directly read from the scale. The loading of a standard cartridge may be described in order to explain the practical working of the plug. With Schultze powder, for instance, the charge is 42 grains, which amount may be weighed and inserted into a cartridge case. The recommended waddings are a Field card, a  $\frac{3}{8}$ -in. felt, and a thin card. No mention is made in the usual loading instructions as to the distance of entry. It is said that one should firmly seat the wads upon the powder, which, when analysed, will be found to mean nothing at all. It is, however, clear that if the remainder of the case is to hold  $1\frac{1}{4}$  oz. of shot and a thick over-shot wad (still leaving room for turning over, say,  $\cdot 025$  to  $\cdot 300$  in. of the tube), then the upper face of the thin card wad must be a definite distance from the mouth of the cartridge. For the best loading this is generally taken at  $1\cdot 1$  in., and we can endorse the substantial correctness of this amount. It will thus be seen that firmly seating the wads hardly explains the process of seating the top wad exactly  $1\cdot 1$  of an inch from the mouth of the case for the standard loading we have dealt with. In cutting open a cartridge and making a series of careful measurements, it will be found that  $1\frac{1}{4}$  oz. of shot occupies  $\cdot 725$  in., the stout card  $\cdot 060$  in., after which there remains  $\cdot 315$  in. for the turnover. This shows a little more than the  $\cdot 300$  in. already suggested as a maximum, and consequently the  $1\cdot 1$  in. should be rather on the fine side. It will be found, however, that certain very slight allowances are advisable according to the size of shot used. The small sizes pack tighter and more regularly in the cartridge case than the large ones. The latter are less dense, and at the same time, having fewer points of contact with the walls of the case, they are the more liable to show on the outside if the turnover is pulled up at all tightly. Therefore, we would say that the slight discrepancy of  $\cdot 015$  or so of an inch represents

as we know it to be under existing conditions. Many sportsmen prefer short charges of shot, and the loader is left to his own devices how he will allow for the difference. In some experiments made by *The Field* a few years ago with varying charges of powder and shot, they got over the difficulty of inadequate materials to fill the cartridge case by cutting away the surplus length from the mouth of the tube. This, however, is a purely laboratory device, which has nothing to recommend it for practical work. The length of the ordinary cartridge is fixed at  $2\cdot 56$ , and there it must remain. If, therefore, a shooter requires  $1\frac{1}{4}$  oz. of shot, there will be  $\cdot 025$  extra space to be absorbed somewhere. It would be fatal to add it to the turnover, the latter already being fixed at a maximum value, and it would probably unfavourably affect the combustion of the powder if the over-powder wad were left that much further out. Therefore, the only alternative that remains is to add to the wadding. With Schultze powder the thin card over felt provides a very suitable opportunity for getting over the difficulty. If a thick card were put in its place, the difference would just represent the reduced bulk of the shot charge. It would have the additional advantage of adding to the resisting power of the wads just about as much as is necessary to compensate for that of the missing pellets of shot. With other waddings, such as those in which the card over the felt is already of the stout variety, and the recommended over-shot wad is a thin one, the loader cannot very well double the thickness of the latter, as the effect on the shooting would be too great. He, therefore, has the option of replacing the stout card over the felt either with a thicker card, or preferably with a one-tenth inch feltine, which will about make up the required bulk.

According to the method of loading above described, the powder charge is guaranteed as far as possible the amount of space in the cartridge for which it is regulated by the manufacturer, and it must be remembered that there is no more prolific cause of bad shooting cartridges than interference with this important factor. Some cartridge loaders in their innocence advertise as a proof of excellence in their ammuni-

tion that every wad is seated with a uniformly adjusted spring pressure. Either this absurd notion is only an advertising dodge, or else by some peculiarity in the application of the principle the spring power is supplemented whenever necessary by some additional movement that brings the wads down to the same level. It is so well known that the variations from wad to wad, from cartridge case to cartridge case, and from day to day, are such that the grip of the wads on the cartridge tube is a constantly varying quality. Hence the power that would one moment compress the explosive too much

tically every conceivable charge of shot in all the leading bores. It will be seen therefrom that 1 oz. of shot in a 12-bore occupies .650 in.,  $1\frac{1}{8}$  oz. .700 in.,  $1\frac{1}{4}$  oz., .725 in.,  $1\frac{3}{8}$  oz. .775 in., and  $1\frac{1}{2}$  oz. .800 in. Admittedly, the order of development is not strictly proportionate in one of the values quoted, but this is simply the result of working to the nearest .025 in., this unit being considered fine enough, for the reasons already advanced. Taking  $1\frac{1}{4}$  oz. shot as occupying .725 in. of the length of the cartridge, this standard length may be considered in relation with other bores, thus showing that

TABLE SHOWING THE LENGTH OF THE COLUMN OF SHOT FOR DIFFERENT CHARGES AND BORES OF CARTRIDGE.

8-bore.		10-bore.		12-bore.		14-bore.		16-bore.		20-bore. 24-bore. 28-bore.			
ins.		ins.		ins.		ins.		ins.		ins.	ins.	ins.	
$1\frac{3}{8}$ oz. =	.850	$1\frac{1}{8}$ oz. =	.650	$\frac{7}{8}$ oz. =	.575	$\frac{3}{4}$ oz. =	.525	$\frac{5}{8}$ oz. =	.475	$\frac{1}{2}$ oz. =	.450	.600	.575
$1\frac{7}{8}$ „ =	.925	$1\frac{3}{8}$ „ =	.675	$1\frac{5}{8}$ „ =	.625	$1\frac{3}{8}$ „ =	.575	$1\frac{1}{8}$ „ =	.525	$\frac{9}{8}$ „ =	.500	.650	.650
2 „ =	.975	$1\frac{1}{4}$ „ =	.725	1 „ =	.650	$\frac{7}{8}$ „ =	.625	$\frac{3}{4}$ „ =	.575	$\frac{5}{8}$ „ =	.550	.700	.700
$2\frac{1}{8}$ „ =	1.050	$1\frac{5}{8}$ „ =	.750	$1\frac{1}{8}$ „ =	.700	$1\frac{5}{8}$ „ =	.675	$1\frac{3}{8}$ „ =	.625	$1\frac{1}{8}$ „ =	.625	.750	.775
$2\frac{1}{4}$ „ =	1.100	$1\frac{3}{4}$ „ =	.800	$1\frac{1}{4}$ „ =	.725	1 „ =	.725	$\frac{7}{8}$ „ =	.675	$\frac{3}{4}$ „ =	.675	.800	.850
$2\frac{3}{8}$ „ =	1.175	$1\frac{7}{8}$ „ =	.825	$1\frac{3}{8}$ „ =	.775	$1\frac{1}{8}$ „ =	.750	$1\frac{5}{8}$ „ =	.725	$1\frac{3}{8}$ „ =	.725	.850	—
$2\frac{1}{2}$ „ =	1.250	$1\frac{1}{2}$ „ =	.850	$1\frac{1}{2}$ „ =	.800	$1\frac{1}{4}$ „ =	.800	1 „ =	.775	$\frac{7}{8}$ „ =	.775	.900	—
$2\frac{5}{8}$ „ =	1.300	$1\frac{9}{8}$ „ =	.900	$1\frac{5}{8}$ „ =	.850	$1\frac{3}{8}$ „ =	.850	$1\frac{1}{8}$ „ =	.825	$1\frac{5}{8}$ „ =	.850	—	—
$2\frac{3}{4}$ „ =	1.375	$1\frac{3}{4}$ „ =	.925	$1\frac{3}{4}$ „ =	.900	$1\frac{1}{4}$ „ =	.900	$1\frac{1}{4}$ „ =	.875	1 „ =	.900	—	—

would the next be fully resisted by the wads alone, so that the powder would receive an insufficient amount of compression, and there would be a constantly varying space for the accommodation of the shot, carrying in its train that worst fault of all, uneven turnover. As the really vital point, after suitable wadding has been selected, is to ensure for the powder a space of unvarying cubical capacity, it must follow that the only reliable method of loading is to seat the three wads to their final position by the action of a plunger operating on the over-felt wad, and pressing it a given distance into the case. Then the sole variation that can occur will be due to the slight differences in the felt wadding or variable tightness of *The Field* card, neither of which, with ordinary good wadding, is likely to have any material effect on the behaviour of the cartridge. With the over-felt wad seated to the required distance, the remainder of the loading is very easy to carry out, and needs no detailed exposition in the present connection. The plug gauge, which we here illustrate, is admirably adapted for measuring the amount of entry of the over-felt wad, this distance being adjusted according to the shot charge which is to follow.

We generally present to our readers, when asking them to improve their methods of working, some ready-reckoner table that may be constantly available for reference purposes. On the present occasion we have taken an altogether exceptional amount of trouble to present to them something which we think will be really novel and useful, and at the same time have a practical bearing on the subject-matter of the lecture. The accompanying table shows in the decimal values already described the distance occupied in the cartridge case by prac-

1 oz. in a 16-bore represents a disproportionately long column of shot, while  $1\frac{3}{8}$  oz. seems to be the appropriate charge for a 20-bore, all these values of course relating to nominal  $2\frac{1}{4}$ -inch cartridge cases.

The method of arriving at the values in the table may be briefly described. A wad was firmly seated in the base of a 12-bore cartridge, and a succession of charges of shot were weighed, and their height in the case was duly noted. Then other sizes of shot were similarly dealt with, and after a number of these little experiments had been made, it was found that for all practical purposes it might be accepted that each ounce of shot loaded into a cartridge occupies a capacity of about .265 of a cubic inch. By this means we were able to get at the length of the column of shot in two ways, the one by actual trial, the other by calculation, each serving as a check upon the other, the results being more consistent than would be possible if only one method had been employed. The areas of the various bores were next calculated from the nominal calibres published in the Proof House rules, the results of which are herewith given:—

Calibre	Diameter by Calculation.	Area.
8-bore	.835 inches	= .548 sq. inches
10 „	.775 „	= .472 „
12 „	.729 „	= .417 „
14 „	.693 „	= .377 „
16 „	.662 „	= .344 „
20 „	.615 „	= .297 „
42 „	.579 „	= .263 „
28 „	.550 „	= .238 „

After that the space occupied by every charge of shot from

$\frac{1}{8}$  oz. to 2 ozs. was then worked out, the results being as follows:—

Weight of Shot.	Space occupied	Weight of Shot.	Space occupied.
$\frac{1}{8}$ oz. ...	'133 cub. in.	$1\frac{3}{8}$ oz.	'364 cub. in.
$\frac{1}{8}$ " ...	'149 "	$1\frac{7}{8}$ " "	'381 "
$\frac{1}{8}$ " ...	'166 "	$1\frac{1}{2}$ " "	'397 "
$\frac{1}{8}$ " ...	'182 "	$1\frac{5}{8}$ " "	'414 "
$\frac{1}{8}$ " ...	'199 "	$1\frac{3}{4}$ " "	'431 "
$\frac{1}{8}$ " ...	'215 "	$1\frac{1}{4}$ " "	'447 "
$\frac{1}{8}$ " ...	'232 "	$1\frac{1}{2}$ " "	'464 "
$\frac{1}{8}$ " ...	'248 "	$1\frac{1}{2}$ " "	'497 "
$\frac{1}{8}$ " ...	'265 "	2 " "	'530 "
$1\frac{1}{8}$ " ...	'282 "	$2\frac{1}{8}$ " "	'563 "
$1\frac{1}{4}$ " ...	'298 "	$2\frac{1}{4}$ " "	'596 "
$1\frac{3}{8}$ " ...	'315 "	$2\frac{3}{8}$ " "	'629 "
$1\frac{1}{2}$ " ...	'331 "	$2\frac{1}{2}$ " "	'662 "
$1\frac{7}{8}$ " ...	'348 "		

With the information contained in these two tables, the means of obtaining the length occupied by a given charge of shot in any given bore of cartridge was fairly obvious. Taking, for instance,  $1\frac{1}{8}$  oz. of shot, we found it occupied '298 of a cubic inch. The capacity of a hollow cylinder being represented by the product of its length and its sectional area, it was clear at once that by dividing the cubic capacity of a given shot charge by the area of the mouth of the cartridge, the answer would be the length of the column of shot. Thus, '298 (the capacity of the above shot charge)  $\div$  '417 (the area of a 12-bore) = '715 (the length in decimals of an inch of the column of shot), which is nearer '725 than '700. With every bore the calculations were carefully checked by accurate weighings and measurements, so that any fault in the one or the other was promptly discovered and investigated. Then the progression of the measurements from the largest to the smallest charges of the different bores was carefully examined, so as to ensure as regular a development of length for the increasing charges as the unit adopted would allow. Thus it happens that we are able to place before our young gunmakers a table of lengths of shot charges which will vastly increase their power of considering the various loads met with in everyday work, and at the same time show them with a minimum of trouble how best to arrange any given loads of powder and shot.

We hope eventually to become possessed of a complete set of plugs for all the different bores, graduated on the same system as the one here illustrated. In some ways it would be preferable if the plug were made of steel and properly hardened and lapped, so that it would be less subject to loss of accuracy from constant use. The graduations would then be marked by acid etching, though, as we have no details as to the cost or practicability of the procedure, we will not speculate further. Anyhow, our best thanks are due to Messrs. Elliott Bros., the well-known instrument makers, for the great care they have taken in the carrying out of our design. The plug, with the collar complete, fitted in a substantial wooden box, cost rather less than £2, and should be well worth the money to all who reckon to pay proper attention to the loading department of their business. The attachable collar is a very useful accessory to the plug, since it enables a stop to be placed at the required spot should the plug be used for experimentally seating wads a given distance. The advantage which we claim for the tool is that it serves as an

excellent plug gauge to test the diameter of the cartridge case, while at the same time the inch scale marked thereon enables the careful loader to adjust his ramming machines to definite distances in inches and fractions, which is surely better than to be guided by the ill-formed nicks or scratches one makes on the ordinary wooden wad-seating plugs which are supplied by the implement makers.

The length of this lecture would become excessive were we to attempt to give one-half of the distances and measurements that can be standardised by the use of this plug, while to do so would be to fall into the error of too minutely entering into the everyday work of the cartridge loader. Therefore, putting forward the plug, explaining its operation, and issuing a table by which all the requisite values can be examined at a glance, we think we have done enough to put one of the aspects of cartridge loading on a better foundation than it has hitherto occupied. We, therefore, commend to our readers our latest effort in the way of systematising the work of the cartridge-loading department, and thereby enabling it to advance according to the progressive ideas of the age, which demand greater and greater effectiveness in the manufactured goods that are daily placed in the hands of the consumer.

### ROUND THE TRADE.

Mr. T. R. Bayliss has been appointed chairman of Eley's Board of Directors.

Mr. H. E. Churchill, son of the well-known gunmaker, recently died while quite a young man, after a trying illness.

Mr. Charles H. Maleham, gunmaker, of Sheffield, has registered the word "Wizard" as a trade-mark for cartridges under Class 20.

Mr. Jones starts with Messrs. Eley on the first of this month, so that his unexampled knowledge will henceforward be at the disposal of that firm's clients.

We omitted to mention in our last issue that Messrs. Walkers Parker had acquired the goodwill and property of the Newcastle Chilled Shot Co., Ltd.

Messrs. Curtis's & Harvey, Ltd., with their usual enterprise and promptitude, have arranged in booklet form a compendium of recent successes and other achievements of that popular nitro, Amberite. The most noted characteristic of the powder is, of course, its splendid velocity, accompanied by moderate pressure, under the variety of conditions of loading to which all bulk powders are liable.

### APPLICATIONS FOR PATENTS.

OCTOBER 20—NOVEMBER 22, 1902.

- 22,905. Pressure Brakes for Ordnance. A. Reichwald (Agent for *Fried. Krupp*).
- 22,907. Spitfire Gun. E. G. Phelps.
- 23,000. Safety Rifle Range. J. Crawford and A. Guthrie.
- 23,097.\* Sword Attachment for Gun. H. W. Aulhorn.
- 23,167. Machine Gun. A. T. Dawson and L. S. Silverman.
- 23,228. Range Indicators for Ordnance. H. H. Grenfell.
- 23,249. Small-Arm Report and Smoke Destroyer. H. Egli and F. Lieber.
- 23,419.\* Rifle Sights. R. B. Ransford (Agent for the *Peddie Rifle Sight Co., Ltd.*).
- 23,521. Transportation of Heavy Ordnance. A. Reichwald (Agent for *Fried. Krupp*).
- 23,532. Field Gun Sighting. A. T. Dawson and G. T. Buckham.
- 23,546. Small-Arm Sights. W. H. M. Grimshaw.
- 23,566. Sights. B. B. Hill.

- 23,576. Small-Arms. T. R. Ashton.  
 23,577. Machine Guns. H. T. Ashton.  
 23,615. Shrapnel Shot. A. Reichwald (Agent for *Fried. Krupp*).  
 23,645. Breech Mechanism of Ordnance. A. T. Dawson and L. Silverman.  
 23,739.\* Cartridge Ejector for Small-Arms. M. Doziu.  
 23,846. Explosives. C. E. Bichel.  
 23,900. Automatic Small-Arms. E. H. Clive and J. A. Timmis.  
 24,103. Air-Guns. E. E. Bailey.  
 24,150. Ordnance Sighting. R. C. Barnes and R. Bauld.  
 24,246. Automatic Gun Ejector Tubes. Vickers, Son & Maxim, Ltd. (Agents for *Deutsche Waffen und Munitions Fabriken*).  
 24,290. Sighting of Ordnance. L. K. Scott.  
 24,318. Gun Wads. S. T. Bailey (Agent for *A. C. Whitney*).  
 24,324.\* Shooting Instructor. J. M. Campion (Agent for *F. H. J. Birch*).  
 24,632. Bolt Rifles. T. R. R. Ashton.  
 24,633. Priming Composition. J. Wetter (Agent for *Westfälisch Anhaltische Sprengstoff-A.-G.*).  
 24,812.\* Detonating Composition. J. Führer.  
 24,924. Projectiles. J. F. C. Farquhar.  
 24,934. Explosives. T. R. Curtis, A. C. Pearcy, J. Metcalfe, C. L. W. Smith, and A. F. Hargreaves.  
 24,963. Falling Targets. E. Henkels.  
 25,019. Gun Case. T. B. M. and J. M. Ward.  
 25,025. Blasting Apparatus. W. O. Wood and H. Knudsen.  
 25,061. Miniature Targets. C. J. McCoan.  
 25,170. Practice Cartridges. M. Mullineux.  
 25,317. Gun Mounting. H. Brunlees.  
 25,325. Cartridge Magazines. H. Brunlees.  
 25,412. Percussion Fuses. F. M. Hale and J. B. Reavil.  
 25,464. Movable Targets. W. L. White.  
 25,518.\* Automatic Small-Arms. P. Mauser.  
 25,540. Explosives. J. B. Wetter (Agent for *Westfälisch Anhaltische Sprengstoff-A.-G.*).  
 25,626. Bullets. S. Danks (Agent for *J. P. Millington*).
- \* These applications were accompanied by complete Specifications.

## SPECIFICATIONS PUBLISHED.

OCTOBER 30—NOVEMBER 20, 1902.

COMPILED BY H. TARRANT.

- 18,760 (1901). **Range Finder.** G. N. Saegmuller, and G. M. Searle, U.S.A. By means of fixed and movable prisms the image of a spirit-level is reflected through the body of the finder to the eye, and is brought into parallelism with the image of the object by adjustment of the movable prism. The range is then read off a scale at the point of intersection of the central line of an indicating arm and the central line of the scale. Accepted Oct. 18, 1902.
- 20,533 (1901). **Automatic Rifle Mechanism.** C. Höffmann, Germany. Automatic rifle mechanism in which the reversing of a bolt changes the rifle into an ordinary single-loader. The breech and barrel are locked together a sufficient length of time after discharge to enable the bullet to reach the muzzle, so preventing premature escape of gas. The breech mechanism is sunk in the rear part of the breech casing. Accepted Oct. 14, 1902.
- 21,347\* (1901). **Magazine Rifle Mechanism.** J. Hylard, Australia, and G. H. Bingham (Col. R. A.), Sevenoaks.
- 22,528 (1901). **Loading of Ordnance.** Sir W. G. Armstrong, Whitworth & Co., Ltd., and R. T. Brankston, Newcastle-on-Tyne. Loading apparatus for ordnance in which a short stroke cylinder is fixed to a loading dray, preferably of the revolving type. The cylinder is supplied with air, or with gas produced by the charge of an explosive sufficient in strength to send only one projectile home. Accepted Oct. 16, 1902.
- 22,654 (1901). **Detachable Stock and Holster.** W. P. Thompson, Liverpool (Agent for the *Ideal Holster Co., Ltd., U.S.A.*). A holster for hand weapons, which is adapted also to be used as a stock to enable the arm to be used for long range work. The stock is attached rigidly to the butt of the revolver or pistol by means of fixed and movable hook-like jaws, which are inserted and held firmly in seatings in the butt. Accepted Oct. 9, 1902.
- 22,876 (1901). **Fuses for Projectiles.** C. Puff, Germany. A device adapted for application to a percussion fuse, by means of which the firing of the explosive in the projectile is brought about either immediately upon impact or after the body struck has been penetrated to a certain depth. The fire of the primer either reaches the charge directly, or it is delayed by a slow-burning composition of gunpowder inserted into the fuse in the form of a pellet. Accepted Oct. 23, 1902.
- 22,965 (1901). **Smokeless Powder.** A. T. Cocking and Kynoch, Ltd., Birmingham. A method of applying the solvent in the hardening of nitro powders by spraying liquid solvent into a revolving chamber containing the powder, the chamber being kept at such a temperature by means of a steam jacket as to effect vaporization of the solvent. Accepted Oct. 16, 1902.
- 24,917 (1901). **Cartridge-Loading Machinery.** W. H. Greenwood and W. Breakspear, Birmingham. Machinery for loading cases with stranded explosive—such as cordite—in which the movable and fixed cordite grips work in conjunction with a combined front tubular guide and a supplementary fixed grip, against the front face of which the cut-off device works. The various motions of the several parts are obtained from a shaft having a continuous rotary movement. The shaft is provided with cams. Accepted Oct. 9, 1902.
- 4,213 (1902). **Tumbler Safety-Sear Mechanism.** R. Bloomer, Temple Balsall. Arranged in connection with the tumbler of a small-arm lock in a pair of separate or independent sears, so disposed relatively to the tumbler, which has two bents, that the main or firing sear is always in bent when the tumbler is cocked, whilst the second or intercepting sear lies just clear of, but in the path of, the second or back bent. The tumbler can only be released by the motion of the secondary sear, which motion is communicated to the main sear, and takes its nose out of bent. Both sears are worked by a single tail, which is lifted by the trigger. This tail is carried by the interceptor. Should the main sear be jarred out of bent, the tumbler is arrested after only a slight movement by the nose of the interceptor which engages the second bent. Accepted Oct. 30, 1902.
- 9,711\* (1902). **Colt Automatic Pistol.** J. Imray, London (Agent for *Colt's Patent Fire-Arms Manufacturing Co., U.S.A.*).
- 12,799 (1902). **Automatic Rifle Mechanism.** T. C. Johnson, U.S.A. The mechanism described in this specification is a modification of that described in Patent No. 17,167, 1901. Particular attention has, in the present type of box magazine automatic arm, been paid to effectiveness, durability, convenience, and fewness of parts. Accepted Oct. 23, 1902.
- 15,414 (1902). **Projectiles.** C. F. P. Standebach, Germany. A projectile for rifled or smooth bore weapons, the head of which is flat, whilst the body tapers very considerably to the full calibred flange at its base. Around the tapered part are arranged stays, so that four fan-like compartments are formed on the sides of the projectile. This design, it is claimed, ensures great accuracy of flight. Accepted Oct. 9, 1902.
- 16,211 (1902). **Firing of Blasting Charges.** J. Reinelt and J. Nowarra, Germany. Apparatus for firing blasting charges, in which the firing pin is so arranged that after release it is cocked again either automatically by the pressure of the gases of combustion, or, in the case of a missfire, by a pull upon a chain or cord worked from a sheltered position. Accepted Oct. 23, 1902.
- 18,778 (1902). **Brake Apparatus for Field Guns.** H. H. Lake, London (Agent for *H. Ehrhardt, Germany*). Brake apparatus for field guns, in which the cheeks are pressed against the brake cylinder with more or less firmness by means of wedges or screws according to the angle of inclination of the gun barrel. Thus, when the barrel is in such a position that its weight assists the recoil, the brake action is enhanced. Accepted Oct. 30, 1902.
- 18,957 (1902). **Sighting of Ordnance.** C. P. E. Schneider, France. Apparatus designed automatically to compensate the variations in the inclination of the trunnion axis in ordnance. Such inclination is rendered necessary in order to correct the drift of the projectile. This automatic device may be combined either with training mechanism with an independent line of sight, or with training mechanism having an independent range-finder. Accepted Oct. 23, 1902.
- 19,730 (1902). **Blank Cartridges.** O. Schütte, Germany. A blank cartridge designed to have the same detonating force and the same recoil as a cartridge containing shot, the danger



zone being only about 10 metres. The powder is covered by a felt wad, which lies partly in the neck and partly in the body of the cartridge case. The mouth of the case is closed by a plate composed of cork and elder pith. The felt wad and the plate are destroyed upon combustion. Accepted Oct. 16, 1902.

19,742 (1902). **Semi-Automatic Ordnance.** R. H. Kjellman, Sweden. A method of obviating the use of a special spring for returning the opened breech block to its closed position after the forward movement following recoil in semi-automatic ordnance. The recoil spring is connected with the forked lever arm operating the breech block in such a manner that the recoil spring is adapted to return the breech block into its closed position. Accepted Oct. 23, 1902.

20,214 (1902). **Smokeless Powder.** J. A. Denton and J. H. Preas, U.S.A. A smokeless powder produced by grinding chlorate of potash and mixing with boiled linseed oil. This mixture is incorporated with wheat flour and water of about the consistency of bread dough. The resultant mass is dried and granulated. The proportion in which the ingredients are mixed is about—chlorate of potash, two ounces; wheat flour, one ounce; boiled linseed oil, one-fourth of an ounce; and chrome yellow, one dram. The yellow powder is used as a colouring agent. Accepted Oct. 30, 1902.

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

### SELECTED PATENTS.

#### COLT AUTOMATIC PISTOL MECHANISM.

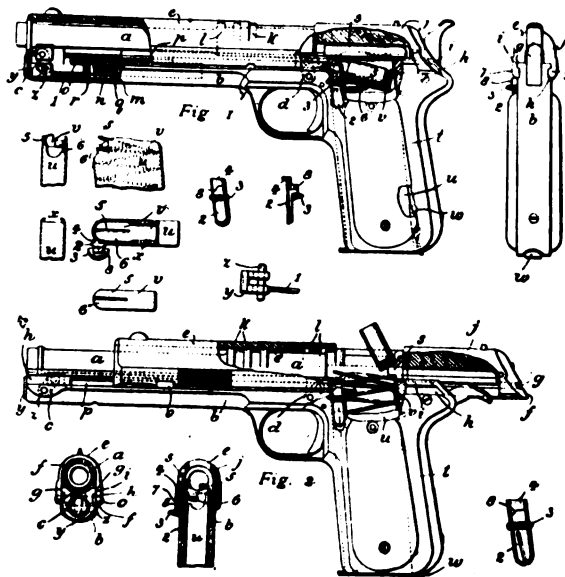
9,711 (1902). J. Inray, London (Agent for *Colt's Patent Fire-Arms Manufacturing Co., U.S.A.*) This specification describes several modifications in the mechanism of the Colt automatic pistol. The new parts are so arranged as to allow of the removal of the breech-block without the aid of tools; to provide positive means for indicating when the supply of cartridges is exhausted, and for facilitating a fresh supply without requiring any operation of the breech mechanism. Interruption of continuous firing is thus considerably reduced.

In order that the modifications should be understood, it is necessary that the mechanism of the pistol, which was fully set forth in Patent No. 9,871, 1897, should be here briefly described. Referring, therefore, to the illustrations, the barrel *a* of the pistol, it will be seen, is attached to the frame *b* by the two links *c* and *d*. The breech-slide *e* is provided with ribs and grooves *f* and *g*, which so engage corresponding ribs and grooves *h* and *i* on the frame *b* as to allow of a backward and forward sliding movement of the breech-slide. The back part *j* of the slide closes over the breech and chamber, and the forward part forms a half tube enclosing the barrel. The barrel is provided with the locking ribs *k*, which are adapted to engage with corresponding recesses *l*, so interlocking the barrel and breech-slide when the parts are in the forward firing position (Fig. 1). When the barrel and breech are thrown backwards by the recoil, the barrel swings downwards upon the links, so unlocking the ribs *k* from the recesses *l*, arresting any further movement of the barrel, and allowing the breech and slide to continue their rearward travel.

Beneath the barrel the frame *b* forms a longitudinal chamber *m*, wherein lies the return or reaction spring *n*. A transverse key *o* is inserted through rectangular recesses in the sides of the breech-slide. It passes transversely through the chamber *m*, projecting slightly from each side of the breech-slide. A longitudinal slot *p* in the frame allows the key to travel freely therein, and its rear end forms an abutment for the key to stop the rearward movement of the breech-slide, and positively prevents the slide from flying back from the frame. The key also forms the abutment upon which the spring *n* acts to urge the breech-slide and bolt from the position illustrated in Fig. 2 to that shown in Fig. 1. The forward end of the spring *n* is fitted with a piston *q*, the head *r* of which bears

against the key *o*. The key is slightly recessed to receive the piston head, so that the key is held by this head against any accidental transverse displacement. The rear end of the spring bears against the rear end of the chamber *m*.

The frame *b* at the rear of the barrel forms the receiver, and has an opening at the top through which the spent cartridges are ejected. The breech-bolt is provided with a firing-pin and an extractor of usual construction, while an ejector *s* is fitted to the receiver. Within the butt *t*, and extending upwards through it to the receiver, is arranged a chamber for the reception of the cartridge-holder *u*. This holder consists of a sheet-metal tube, in which the cartridges are laid one upon the other, a spring-follower *v* tending to force them upwards towards the barrel breech. The holder *u* is retained in the butt by the latch *w*. At the upper end of the holder the rear portions of the side walls are turned inwards to form ears *x*, which engage the rear portion of the uppermost cartridge, and prevent its escape from the holder except when it is pushed forward by the return movement of the breech bolt.



One of the improvements covered by this patent consists in a modification of the method of withdrawing the key *o* in order to release the breech-slide and bolt. Heretofore, the key was removed only by the aid of a separate pin, which was inserted through a hole in the bottom of the spring-chamber *m*, in order to arrest the spring and so to free the key. By the present construction the key may be removed without the use of any tool and without the necessity of any attendant operations. The front end of the chamber *m* is closed by a plug *y*, held in place by a transverse pin *z*, which pin also serves to attach the lower end of the link *c* to the frame. The plug *y* is allowed a slight longitudinal movement in the chamber *m* by slotting the hole in the plug through which the pin passes. To the inside of the plug is fixed a small rod *l*, which extends beneath the key *o* towards the front of the head *r* of the piston *q*. The rod does not touch the head when the parts are in their normal position. The front of the plug is made slightly concave to receive the pressure of a finger. When it is desired to release the key *o* it is only necessary to push the plug *y* inwards, so that the rod *l* moves the piston back against the pressure of the spring, and so out of engagement with the recess in the key. The key may then easily be withdrawn. It is replaced in the same manner.

Another modification dealt with in this specification consists in a

catch designed to hold the breech open after the discharge of the last cartridge delivered from the holder. The catch consists of a small slide 2, which works in a slot shaped to receive it. On the outside of the catch is a thumb-piece 3, and on the inside is a projection 4. The projection 4 extends inwards into a notch cut in the top of the magazine, far enough to stand in the path of the follower *v*, but not far enough to interfere with the free upward and forward passage of the cartridges from the magazine to the receiver.

The platform of the follower *v* is so shaped that one half 5 is adapted to lift the cartridges, whilst the other half 6 is bent downwards, and, when the magazine is empty, engages the lip 4 upon the catch 2. When the lip 4 and the part 6 are thus brought into engagement, the catch 2 is lifted into the path of the breech-slide. Hence, when the notch 7 is brought over the spring-lifted catch during the opening movement of the breech after the discharge of the last cartridge from the magazine, the nose 8 is forced into it and the breech is held open ready for loading the first of a fresh supply of cartridges into the barrel. The upward movement of the slide is limited by the ejector *s*, which is situated upon the top of the receiver over the slide. When the magazine is recharged the nose of the slide is taken out of engagement with the notch 7 by means of the thumb-piece 3. The breech is thus released, and during its forward travel the barrel is loaded in the ordinary way.

Whilst a cartridge remains in the magazine the catch is inoperative, its weight being sufficient to keep it in its lower position. In order that the slide shall not shift upwards when the pistol is held upright during firing, its lower part is divided by a fine cut. The two divisions of the slide thus formed are wedged a little apart, and are spring-tempered, so that the slide is held in its slot by frictional pressure. By means of these various modifications the pistol need not leave the firing-hand during the substitution of a loaded for an empty magazine, the exchange being wholly effected by the other hand. Accepted October 9th, 1902.

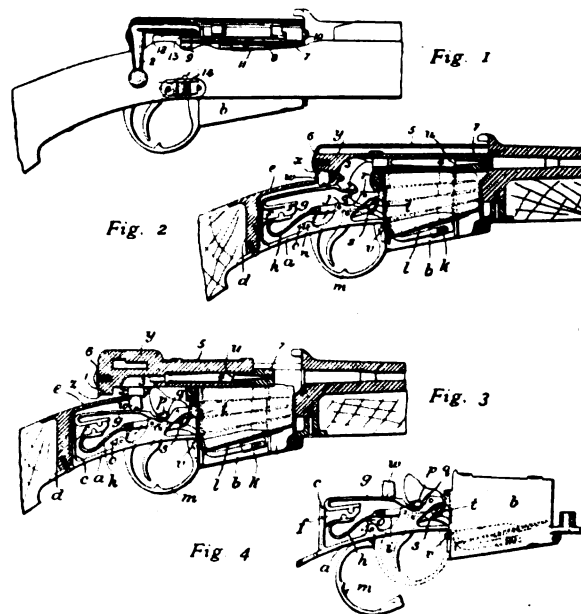
#### MAGAZINE RIFLE MECHANISM.

21,347 (1901). J. Hyland, Australia, and E. G. N. Bingham (Maj.-Gen., R.A.), Sevenoaks. In the bolt rifle described in this specification, the lock and magazine mechanism is all arranged upon the trigger guard, and by the removal of two screws it may be bodily disconnected from the rifle. The bolt is so constructed that until it is properly locked after loading the trigger is rendered inoperative. The mechanism of the rifle is, as a whole, an improved type of that described in Patents Nos. 21,840, 1898, and 19,333, 1900. The patents were both briefly dealt with in our issues of December, 1899, and July, 1901.

Referring to the accompanying illustrations, the breech body-frame or plate *a* carries the whole of the lock mechanism; and this, together with the magazine *b*, which forms part of the mechanism (Fig. 4), may be detached from the rifle by the removal of a couple of screws. The rear part of the plate *a* carries an upright piece *c*, which is held by a dovetail joint (shown in broken lines) in the downward extension *d* of the strap *e*. From the upright *c* projects an arm *f*, upon which are mounted, by means of circular dovetail joints, two springs *g* and *h*. The spring *h* is connected with the rear end of a lever *i*. This lever is pivoted at *j*. Its forward end extends through a slot in the back of the magazine *b*, and the extremity *k* of the lever is connected with the cartridge-lifting platform *l* by means of a channel-shaped strap and cross pin. The trigger-guard *m* is pivoted at *n*, and is adapted to swing down to the position shown in Fig. 4. When in this position the projection *o* of the guard is caused to press the spring *h* upwards, and thus the forward end of the lever *i* downwards. In this way the platform is lowered to the bottom of the magazine in order to facilitate loose loading.

The other spring *g* is the mainspring. Its extremity *p* is adapted

to engage a notch *q* in the hammer. The hammer works around the pivot *r*, whilst the trigger nose engages the bent *s* when the hammer is in the cocked position. The trigger is held up by its spring *t*. Another limb *u* of this spring is so formed at its lower end *v* that it acts as a latch for holding the trigger-guard in its closed position. Pivotaly mounted upon the top of the mainspring is a block *w*, which, when the hammer is cocked and the mainspring is depressed, is caused to engage the strap *e* through the notch *x*. When in this position the mainspring is held so that should the trigger be pulled the spring cannot throw the hammer. This position of the parts only occurs when the bolt *y* is unlocked, because when the bolt is turned in order to lock it to the breech, the flange *z* on its rear, during the final turning movement of the bolt, pushes the oscillating block forward, so disengaging it from the strap and freeing the spring and hammer. After firing, the hammer is cocked



through the block *w*, which is caused to depress the mainspring and so to cock the hammer by the cam-shaped back 1 of the breech bolt; when the bolt handle 2 is turned to open the breech, the part 1 is caused to press the block and mainspring downwards, and so to force the hammer around on its pivot through the engagement of the notch *q* and the end *p* of the mainspring.

A sloping recess 3 is formed in the rear end of the bolt *y*. In this recess the hammer works, and should by chance the bolt be not turned absolutely home, the hammer acts upon the sides of the recess when falling, and completes the turning movement before the firing pin 4 is struck. The dust guard 5 is locked in position over the bolt by means of a rotatable latch 6. The bolt head 7 projects laterally and engages a flange 8, running along the edge of the breech opening. By moving aside a slidable piece 9, a gap is formed in the flange 8, so enabling the bolt head to be disengaged from the rib and the bolt removed. The part 9 is retained in its place by a spring. The bolt-head 7 is screwed into the front end of the bolt *u*, and carries the extractor 10 and imprisons the firing pin 1. The cut-off 11 is so arranged that it requires an upward movement to shift it either way. The sloping cam-shaped surfaces 12 and 13 engage corresponding surfaces on the breech frame-body, the breech block when closed being thus securely held against backward movement. An optional safety 14 is also provided. This safety may be moved into position to engage the forward end of the trigger and so to prevent it being pulled. Accepted Oct. 23, 1902.

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The action of this pistol is automatic except that the trigger is pulled for firing each shot. The arm can be discharged at the rate of 5 shots per second, the cartridges being automatically supplied from a detachable magazine inserted in the handle of the pistol.

Capacity of magazine, 7 shots. Length of barrel, 6 inches; length of pistol over all, 9 inches; weight of pistol, 33 ounces.

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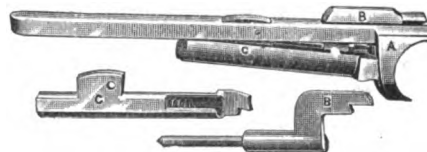
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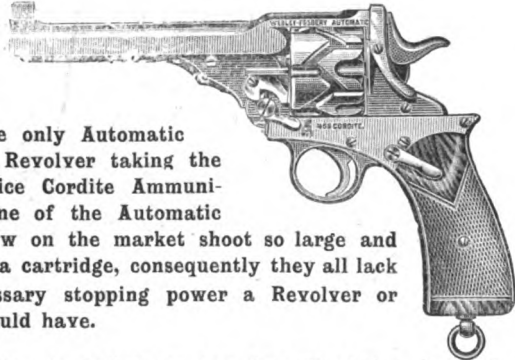
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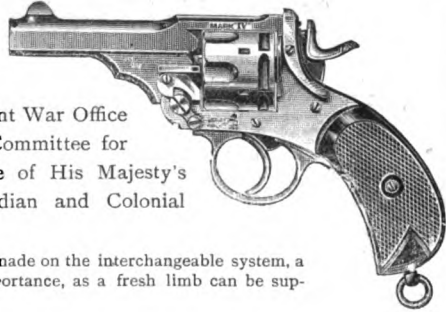


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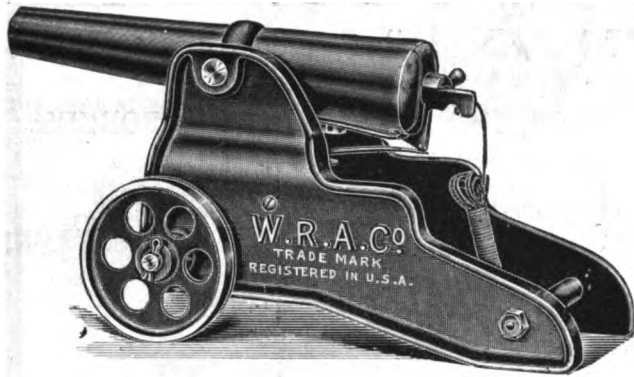
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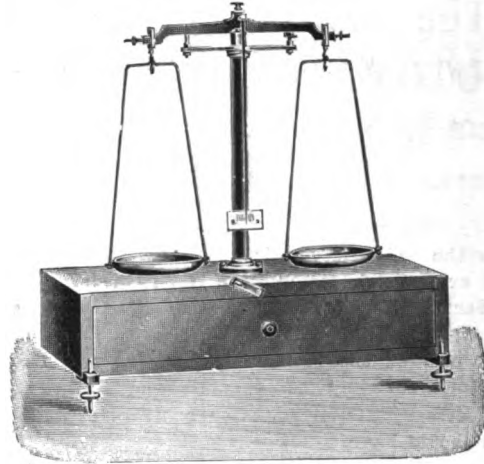
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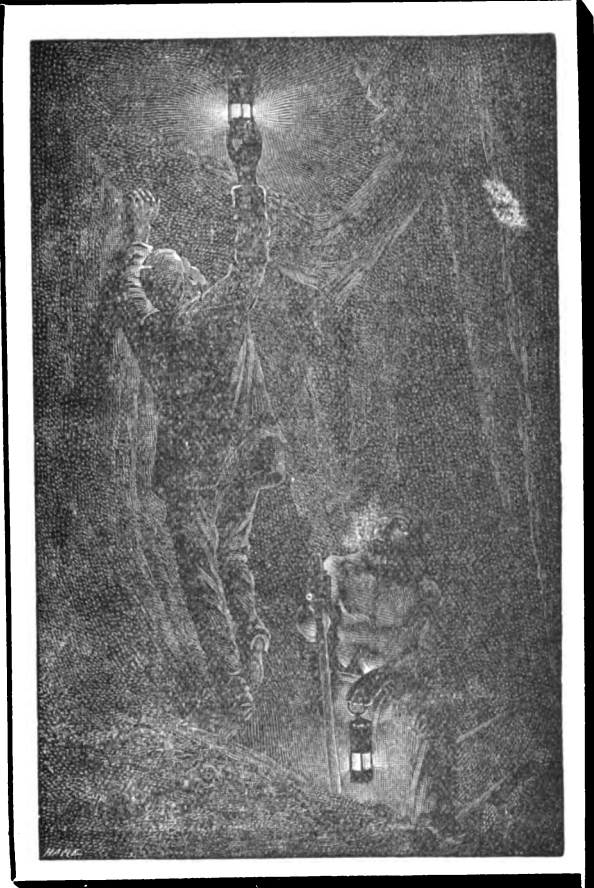


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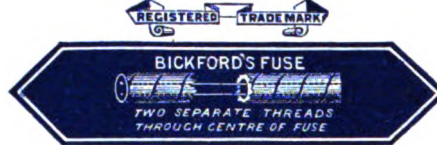
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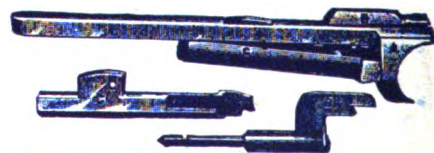
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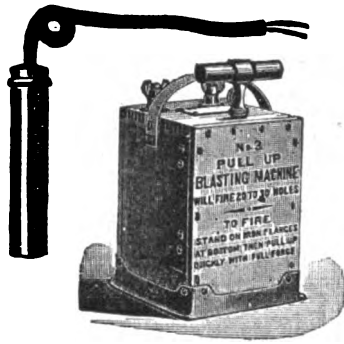
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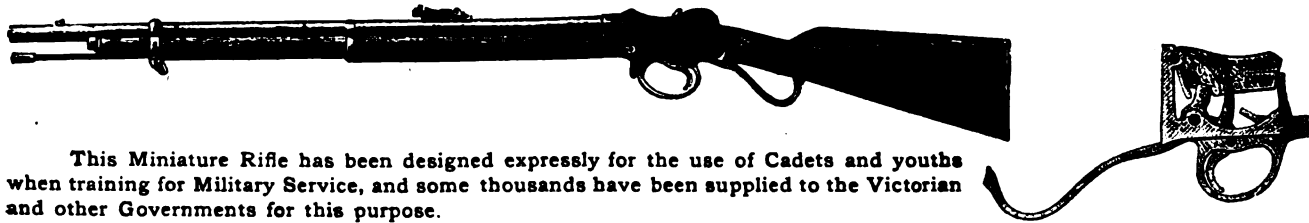
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