Research Press
Journal

Issue 4 | Autumn 2018

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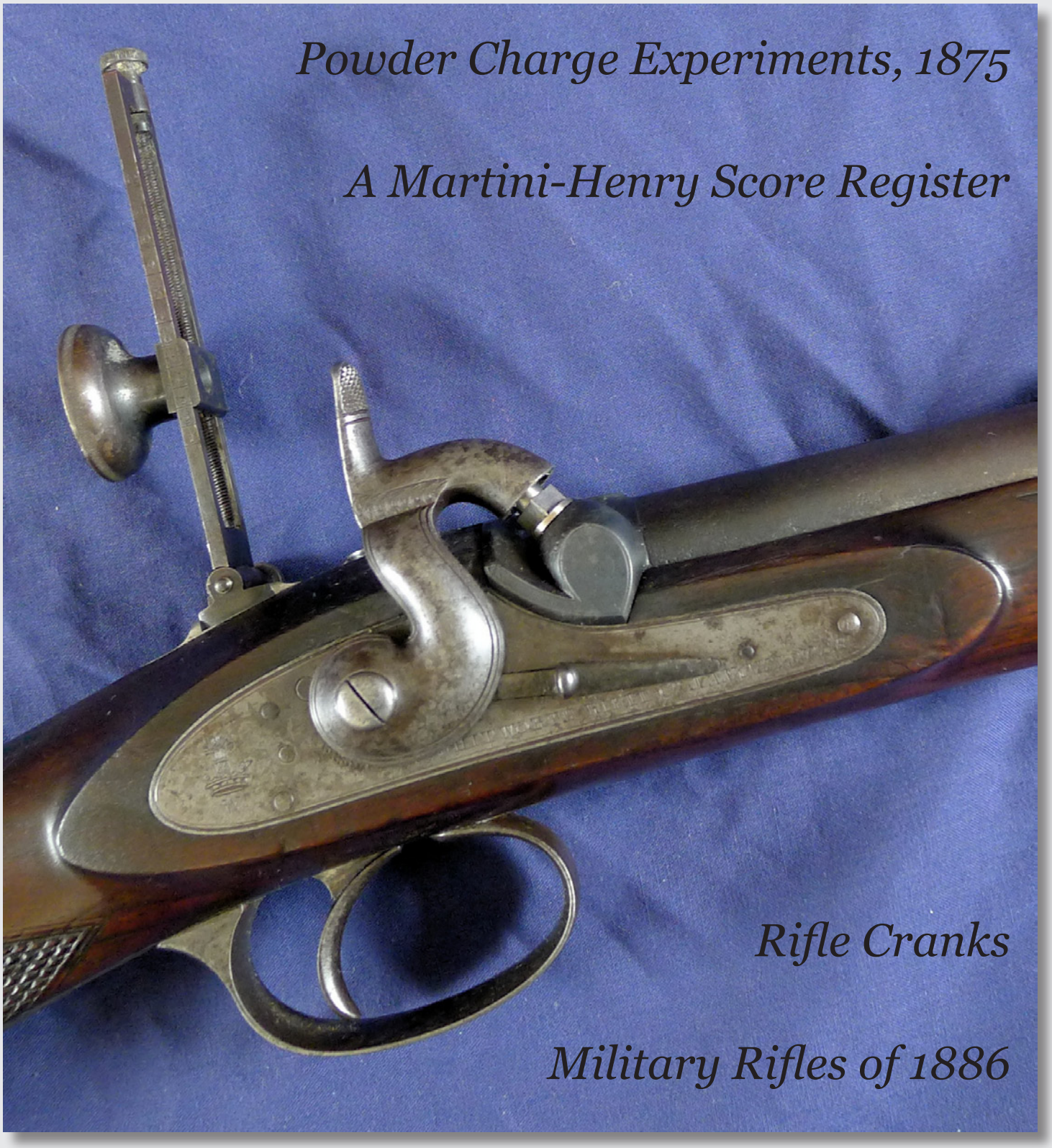

Research Press Journal

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Firearms

- Long range rifle fire. Long range target rifles. British military longarms. Small arms trials. Ammunition. Accessories. Gunmakers.

Marksmanship

- Military marksmanship. The art of shooting. Long range muzzle loading. National Rifle Association. Creedmoor and the international matches.

19thC Riflemen

- Those who pioneered the sport of target rifle shooting from the muzzle loading and into the black powder breech loading era. Biography.

Rifle Volunteers

- The Volunteer Force was established in 1859. From 1881 territorial regiments included regular, militia and volunteer battalions.

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On The Cover

Whitworth Rifle Co. Manchetser

Research Press Library

Research Press has a library of free downloadable reference texts for students of firearms, target shooting and associated history.

English and Welsh Gunsmiths and Gunmakers, 1550 – 1850

- This document contain a list of English and Welsh gunsmiths and gunmakers from around 1550 to about 1850, but excluding London gunsmiths/ gunmakers. The list has been compiled from free on-line sources such as County Record and Archive Offices and The National Archives, but it must not be considered a definitive list, as new information is added from time to time.

The Crossed Sceptres & Crown Mark

- Proof marks on English firearms made outside London and the developments which led to the establishment of the Birmingham Proof House in 1813, with its familiar "V" and "BPC" marks under crossed sceptres.

Why The Tombstone?

- Some arms proved in Birmingham after 1813 show additional stamps which take the form of "tombstone" shaped impressions with a variety of numbers and symbols enclosed therein.

English Provincial Makers' Marks

- Provincial makers' marks, i.e., those struck by gunmakers who were not members of the London Gunmakers Company. The fundamental question is whether these marks were struck merely to identify the maker of the piece, or whether they also signified that the item had actually passed a proof test successfully.

The Gunmakers of Oxford

- The development and growth of the gun trade in Oxford during the 17th and 18th centuries. Features: William Upton, John Nicholes, William Hawkes, William Emms, John Collis, Martin Brown (Browne), Samuel Sykes, Thomas Beckley, John & James Forrest, William Dupe, Frederick Rudolph Beckhusan, John Venables, Field, Pether, George Webb.

Ketland Guns in America

- A fresh look at the family of English industrialists who dominated the early American firearms trade.

A Pair of Early Samuel Nock Detonating Pistols

- This article documents a previously unknown and very rare pair of early detonating pistols by Samuel Nock. The pistols are designed to be fired by an early form and variant of the percussion system, known by collectors today as a pellet-lock, which uses a round detonating wafer. Samuel was the nephew of the celebrated London gunmaker Henry Nock. He was apprenticed to his uncle in 1791 and he opened a shop at 180 Fleet Street in 1806. In 1823 Samuel moved his business to the more upmarket and fashionable Regent Circus where he remained until his death in 1852.

The Probin Gunmakers of 18th Century Birmingham

- This article attempts to trace the fortunes of the Probins, a family (indeed, one might say, a dynasty) of Birmingham gunmakers.

John Townson and His Pistol

- The small flintlock pocket pistol that features in this article was once part of the collection of the late John Cooper, an authority on 17th century English pistols. The pistol is a magnificent example of the quintessentially English pistols that were produced during the middle decades of the 17th century and of which very few have survived. It was made by John Townson of London during the 1660s, a period when London was embroiled in a succession of the most dramatic and life changing events.

The English Snaphance Lock

- The English snaphance is not only one of the most innovative "flint-locks" but is probably one of the rarest gun mechanisms to have survived. Recent research has found that only about 80 English snaphance muskets, pistols and detached locks have survived worldwide, although this does not include excavated, converted or incomplete locks. Modern tests by the author have proved it to be a fast and reliable mechanism and it must have been a serious challenger to the matchlock and wheellock in the 16th century. This article looks at the history of the lock and examines two examples.

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Priming

News, Events, People & Places

Metford Trophy

The weekend of 4/5 August 2018 saw members of the *Long Range Rifles Branch* of the Muzzle Loaders Association of Great Britain from the UK, France, Holland and Jersey competing at Bisley for the coveted Metford Trophy. This is a demanding match comprising the aggregate of 15 shots fired at each distance, 1000, 1100 and 1200 yards, with muzzle loading match rifles. It has been in the Branch programme since 1992.

Whilst many will have been enjoying the hot dry summer, for the long range shooters it brought its own difficulties. Besides the discomfort of shooting in such weather, conditions were challenging. Once in a while there would be some uniformity in the wind flags on the range, but for much of the time each appeared to have a mind-of-its-own! Watching the mirage in light wind conditions can help, being more responsive to rapidly changing conditions than wind flags. However, with mirage boiling, running left-to-right, then reversing, conditions became a battle of attrition!

Despite the conditions there was some excellent shooting. David Minshall took a strong lead at 1000 yards on the Saturday (this stage being fired concurrently with the MLAGB National 1000 yard Rifle Championship). The following day at 1100 yards Alan Beck fought back and significantly reduced David's lead. At 1200 yards Gary Evans (*pictured*) was top scorer for which he will gain a bar to go with the special Hepsworth Medal he has won previously. Alan again shot well and finished with an aggregate of 113.3; David meanwhile had kept a steady days shooting and finished on 115 to win the Trophy. Bernard Collot had a good day at 1100 and 1200 yards, and was rewarded with third place on a score of 104.

The Branch competitions will conclude on 27 October with the 600 yards Rigby and Whitworth Cup matches, followed by the Branch Annual Dinner and Prize Giving.

Metford Trophy Results

Name	*1000*	*1100*	*1200*	*Agg*
D.Minshall	52	39	24	115
A.Beck	27.1	56.1	30.1	113.3
B.Collot	28	45	31	104
H.Van Koot	45.1	31.1	21	97.2
J.Whittaker	40	37	17	94
G.Evans	28	29	32.1	89.1
C.Goed	33	28	25	86
P.Cornelissen	30	31	23	84
P.Hendy	29	30.1	22	81.1
D.Craven	18	34.1	23	75.1
F.Brouwer	24.1	25.1	19.1	68.3
A.Whiffin	38.1	22.1	3	63.2
M.Hall	28.1	26	3	57.1
J.Womble	20	25	7	52
M.Alexandre	DNS	19.1	14	33.1
L.Jackson	11	19	DNS	30
T.Van der Vlist	18	DNS	DNS	18

DNS did not shoot

Hepsworth Medal

(Highest Score at 1200 yards)

G.Evans 32.1

www.longrangerifles.co.uk

The Hepsworth Medal

American rifleman Joe Hepsworth was a great ambassador for the sport of long range muzzle loading. He was a member of the United States International Muzzle Loading Team, also both the Muzzle Loaders Association of Great Britain (MLAGB) and the Long Range Rifles (LRR) Branch. He was a regular competitor with the MLAGB and LRR at Bisley.

Joe passed away in 2010 and his family wished to perpetuate in some manner the firm bond of friendship that had been established between Joe and his family with their MLAGB shooting friends, in particular those members of the Long Range Rifles Branch.

Joe Hepsworth shooting his MLAGB Long Range Rifles Branch 1200 yard record score at Bisley in August 2006

With the full agreement of The Hepsworth Family a discretionary trust fund in perpetuity was established under the title of "*The Hepsworth Medal*". (See back cover).

Each year, since 2011, the Long Range Rifles awards a "Hepsworth Medal" to the competitor achieving the highest score at the longest range of an approved competition organised by them. Generally, this will be contemporaneous with the LRR Metford Trophy Match during which the longest range shot at is 1200 yards. Joe's score at this distance is still the Branch record at 51 out of 75 which he achieved in 2006.

The exclusivity and desirability of winning a medal is heightened by the fact that it can only be won once. Should competitors excel themselves by achieving top score more than once they are awarded a Bar to add to the ribbon on their medal. It really is as prestigious in muzzle loading match rifle shooting as winning the Queens Prize in target rifle.

Members of the LRR had great respect for Joe Hepsworth who they always perceived as a traditionalist who did his utmost to abide by the spirit of what is meant by the "spirit of the original" in muzzle loading match rifle shooting. Joe strongly believed that this spirit was exemplified in the objectives of the Long Range Rifles.

Joe Hepsworth Memorial Match 2018, USA

The 2018 National Muzzle Loading Rifle Association (NMLRA) *Hepsworth Long Range Black Powder Target Rifle Match* will be held at Camp Atterbury, in central Indiana, on 6-7 October 2018.

Shooting is at 1000, 1100 and 1200 yards, with 10 shots for score at each distance. Permitted rifles: Any safe original or reproduction traditional muzzle loading style of firearms fired from the shoulder in the mid - late 1800's era of International Rifle Matches or breech loading single shot rifle chambered in an original black powder cartridge.

This year, it has been announced that in addition to the awards presented, every participant will receive a very nice certificate, worthy of framing, showing that they competed 1,000, 1,100, and 1,200 yards.

Details of the 2018 match are available via:
www.researchpress.co.uk/index.php/news/2018-nmlra-hepsworth-long-range-match

If you missed this years match, use the above details to contact the match organiser and ask that your name be added to the circulation list for 2019.

The Woe's of Corporal Peake

David Minshall

Whitworth Cartridges, the Queen's Prize lost and Putney under fire!

The National Rifle Association (NRA) was established in 1859 "for the encouragement of Volunteer Rifle Corps and the promotion of rifle shooting throughout Great Britain." When the NRA planned their inaugural Rifle Meeting in 1860, royal patronage came from Queen Victoria who offered encouragement by founding an annual prize that Volunteers competed for in two stages; the first at 300, 500 and 600 yards, and the second at 800, 900 and 1000 yards. Prize money was £250. From 1861, 200 yards replaced the 300 yards range.

For the first stage the long Enfield was used by competitors. The Enfield was however deemed of insufficient accuracy for the second stage and annual gunmakers trials were established to select a suitable rifle for issue to those reaching the second stage. Mr. Whitworth and a deputation of Birmingham gun makers contested the trials in 1860, with the Whitworth rifle being the clear winner. With the exception of 1865 when the trials were won by a Rigby rifle, the Whitworth prevailed winning each of the trails until the last, that was held for the Queen's Prize of 1866. The NRA subsequently obtained a supply of Whitworth rifles to be used by Queen's Prize finalists until 1871, when for the first time the match was shot throughout with breech-loaders. The Snider replaced the Enfield in the first stage, and the War Office made a special issue of Martini-Henry's for the second stage.

During the trials held in 1863, and while shooting at 500 yards, Mr. Whitworth breached one of the Regulations governing them. The Regulation required that "No cleaning out after trial shots, or during the 20 recorded shots, shall be allowed." His breach was the use of a mechanically fitting ramrod constructed so as to push the lubricator wad down on the powder, and in doing so drive the fouling of the rifle down also, leaving a clean bore for the bullet. It was considered that this infringed the rule that no cleaning rod be used. The recorded shots were ordered to be cancelled, and the shots fired anew. In the end though there was only slight difference between the recorded targets and the Whitworth rifle emerged the winner.

Not to be out done by the regulations, Mr. Whitworth later transferred the scraper from the end of the rod to the base of the bullet itself, the whole contained within a cartridge. This idea was developed and improved upon by making the scraper double, and by introducing between the metal plates a thin layer of lubricating substance. Pictured is a Whitworth cartridge, which although missing an outer wrapper does permit sight of the scraping discs and lubricating wad.

The year 1868 saw Corporal Peake of the 6th Lancashire finish 30th in the First Stage of the Queen's Prize. This was enough to secure Peake £15 in prize money and advancement to the Second Stage where the top sixty riflemen were issued with Whitworth rifles to compete for the honour of the Queen's Prize and its £250 prize money.

The competition took place on Tuesday 21 July, during which Peake fired the then highest recorded score in the event. When news of his winning achievement spread he was carried off accompanied by a band and feted by his fellow Volunteers. The celebrations were however short lived, a protest being lodged later that day that he had tampered with the supplied ammunition. Some press reports erroneously suggested that Peake had loaded from a powder flask.

In order that all competitors should load and fire under equal conditions the following was to have been complied with: "Competitors in the second stage of the Queen's are to shoot with the made-up cartridges as issued on the ground from the tent of the armourer of the National Rifle Association."

It seems it was an exceptionally hot at Wimbledon that year with temperatures reaching 128 deg.F in the sun and 101 deg.F in the shade! The suggestion was that in these extreme temperatures the lubricating properties of the Whitworth wad were poor, as the great heat tended to dry and harden the wad between the two pieces of metal. Witnesses alleged that Peake had replaced the wad with one giving better lubricating properties.

The NRA Council met to inquire into the circumstances of the allegation and after considering the evidence produced by both Peake and other witnesses issued the following statement:

Queen's Prize (Second Stage)

The Council having inquired into an allegation made that Corporal Peak, of the 6th Lancashire Rifle Volunteers, a competitor for the Queen's Prize, has in shooting for the second stage yesterday used a wad other than that prescribed by the regulations for the same, have decide that Corporal Peake has not complied with the regulations, and is therefore disqualified as a competitor for the prize; and that the Queen's Prize be awarded to the competitor making the next highest score.

By order,

E. St. J. Mildmay

July 22, 1868

The gold medal and £250 prize were awarded to Lieut. J.B. Carslake of the 5th Somerset Rifle Volunteers.

Peake denied using anything other than the issued ammunition, although he did admit to having separated the bullet and wad in some instances, ramming them down individually rather than together. A later Court of Inquiry by the 1st Manchester Rifle Volunteers cleared Peake of using anything other than the issue wad, and concluded "It is, therefore, of opinion that Corporal Peake's character for honourable dealing is in no way impugned by his conduct during the competition."

It seems Corporal Peake's troubles did not finish in 1868. The following year while practising in his tent with the loading and discharge of a breech loader and what he thought were "dummy" cartridges one happened to fire! Despite the bullet passing through several tents, through a wooden hoarding and heading in the direction of Putney, by some miracle, no one was injured. Peake reported the incident to the NRA and he was barred from further competitions in the meeting. Earlier in the week he had won the Prince of Wales' prize valued at £100 which distinction he retained.

Whitworth cartridge photographs, courtesy of Terry White

Volunteers' Club-Room at Wimbledon, (Penny Illustrated Paper, 25 July 1868)

There was likely much to discuss!

Firearms

Charles Hibbs

Firearm Manufacture – Barrel-Making – The Proof Test – Machine-Made Interchangeable Rifles

*This article was found in '***Great Industries of Great Britain***' published by Cassell, Petter, Galpin & Co. (London, Paris & New York) c1877-1880. As part of coverage of the Iron and Steel Industry, the volume devotes a series of articles to firearms. They provide the reader with an interesting history of firearms and eventually discuss the then 'state of the art' facilities at the Royal Smallarms Factory, Enfield. This is the third part.*

Few operations in iron-working are more interesting and curious than the making of a first-rate gun-barrel. Greener says: "Improvements in the manufacture of a very superior iron may, we believe, be placed to the credit of the gun-making profession exclusively, no other body or class of men having ever yet deemed it worth their trouble to endeavour to obtain anything of a better description than bar-iron suitable to make steel from." The highest achievements of the scientific iron-worker have indeed been in that direction, but the gunmaker's object has been generally to make the most of iron as iron - to improve to the uttermost its own special and wonderful properties. The ultimate capabilities of this most useful and improvable of all metals have not, Mr. Greener thinks, as yet been ascertained; but the gunmaker has gone farther than any other in the discovery. His problem has been to make a tube, as light and elegant as might be, that should be capable of bearing a strain more severe than iron under any other circumstances could ever possibly be subjected to. The expansive force of gunpowder is enormous, and the heat generated by its explosion intense.* A gun-barrel has to withstand, not an equable continuous pressure, but a succession of disintegrating shocks, such as no ordinary metal could bear. The gunmaker, therefore, has to obtain a material the most tough and fibrous possible, and to arrange those fibres so as to oppose lateral strain.

We will first describe the manufacture of barrels for the highest class of sporting firearms, as it is in them that the art is displayed in the greatest perfection. (It has not been possible for us to follow step by step the improvements in these arms, as we have done in the case of military weapons: suffice it to say that the progress of invention in this branch has fully kept pace with that in the other, and that the handy and tasteful sporting breechloader of the present day is perhaps as much in advance of the justly celebrated Joe Manton as the Martini-Henry is of the old Brown Bess.) Most persons will have observed the delicate markings upon the barrels of guns of this type. These show the quality and variety in the mode of working, of the iron of which they are made. A favourite variety for many years was that known as stub-twist. This iron was made of old horse-nails welded up together, originally after a most primitive fashion. The nails were packed into a hoop as tightly as possible, heated to the welding point, and beaten into a mass on the anvil by repeated hammerings. The reason for choosing horse-nails as the material was because these were made of the toughest iron procurable, and had been further tempered and toughened by cold hammering. Why old horse-nails were chosen is not quite so clear. A notion – it may have been merely a superstition – prevailed that the iron derived some virtue from the horse's hoof; but probably the real virtue lay in the fact that the nails had been proved, by using, to be of the genuine quality. The better and more modern way of making horse-nail stub is as follows: The nails are cleansed of rust and other impurities by being ground together in a revolving barrel till they come out bright and clean; they are then fused into a bloom on the bed of an air-furnace. By this means the iron is kept free from all foreign particles – dirt, coal-dust, charcoal, and the like – which not only cause specks to appear in the iron when finished, but which produce sponginess in it during the processes of working up. The bloom is, of course, hammered and re-hammered until the cohesion is perfect; yet, strange to say, if the now solid lump of iron is brightened and

** The volume of gas generated by the explosion of gunpowder has been estimated at two thousand times that of the explosive solid.*

pickled, the position of the nails in the mass can be distinctly traced. This is the foundation of the figure that is to appear upon the barrel when finished. After several workings, the iron is drawn down to a ribbon of a certain width and thickness, and it is then ready for the *barrel welder*. In the estimation of some makers, the metal is improved by the admixture of particles of steel. Old files are taken for the purpose, cleansed, hardened to excess, and then broken up and pounded in a mortar to the size of No. 5 shot; which particles being fused with the stubs on the bed of the air-furnace, produce a variety called stub-damascus.

Fig. 1 - Bar of Wire-Twist Iron

The very best barrels nowadays are made of about equal proportions of iron and steel. The beautiful variety called wire-twist is thus produced : Short lengths of rod iron and steel are made into a pile, say six wide and deep, steel lying upon iron and iron upon steel throughout; this is then welded into one body or bar. While in this stage, if brightened and pickled, it would present the appearance shown in Fig. 1. The bar is then rolled down to a ribbon as before. Damascus iron is an elaboration of this. The rod or bar, as above, is heated to redness, and twisted in a machine in the same way that a laundress would wring a sheet. By this process the bar is reduced to one-half its length, while its thickness is doubled. Three such bars are then placed together, their twists in opposite directions, and welded into one, which is afterwards drawn down by hammering and rolling into the barrel-welder's ribbon. Fig. 2 shows how this would appear when brightened and pickled. In all these processes one principle governs – that the more the iron is beaten and worked, the better it is. The barrel-maker therefore taxes his ingenuity to work and re-work the metal in all possible ways, so as to get at the same time the toughest material and the most intricate figure.

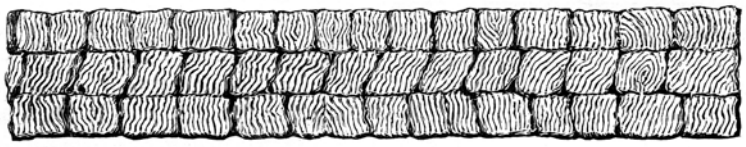


Fig. 2 Ribbon of Damascus Iron

The ribbon has now to be made into a barrel, and for this purpose it is first moderately heated, and wound in a spiral direction round a mandril, either by means of a windlass, or, which is better, by careful bending over on the anvil with a hammer (Fig. 3). The barrel-welder's work then properly commences; and simple as it appears, it requires considerable skill and experience. The fire must be tempered – i.e., must have acquired the requisite glow by being used for some hours, which the welder avails himself of to make common and inferior barrels: it is desirable, also, that the coal used should contain as little sulphuret of iron as possible. He heats the coil to whiteness, jumps it up by striking the end on the side of his anvil, welds the joints, re-heats it, jumps it up and welds it again, joins on another length of coil, and repeats the process till the barrel is of proper length; then finishes by inserting the rod or mandril which is to determine its calibre, and beating it well over in the groove of the anvil. His skill appears, when the barrel is finished, in the perfection of the joinings, which, where one length has been joined to another, should show no break in

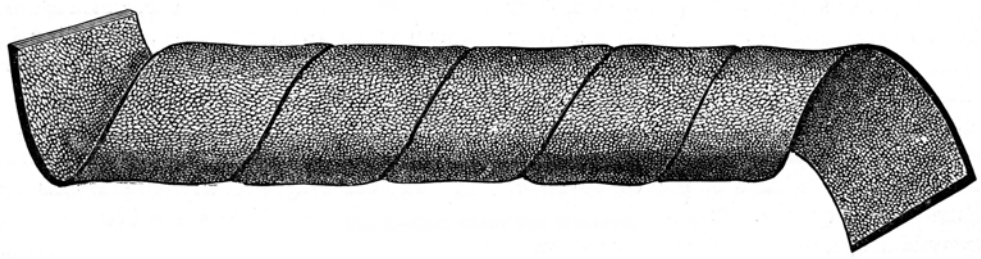


Fig. 3 Coil Ready For Welding

the figure, and where the edges of the coil have been welded together should show a clean and regular spiral line. The barrel will now be much improved by being beaten almost cold with light hammers for about half an hour.

Military barrels are made of plain iron, by a different process, which requires a somewhat extensive plant of machinery. The iron is the best that can be got – the make of two or three firms only, who prepare it specially for the purpose. It is first cut into slabs, about twelve inches long, six inches wide, and half an inch thick, which are heated, and passed through a series of grooved rolls until each becomes a barrel. The first rolling bends or doubles the slab, the second turns the edges over, and the third makes them meet. Another heat is taken, and the tube is drawn down to the requisite length and shape on a mandril, the exact form of the barrel being cut on the final pair of rolls. Latterly steel has come extensively into use for rifle-barrels. In this case the barrel is forged solid, and the bore afterwards drilled out. Strength, lightness, and clearness, the three great desiderata in a gun-barrel, are perhaps more nearly attained by this method than by any other.

The next operation is the boring; and here again the process looks more simple than it really is; the fact being that the very highest skill and care are required. Government barrels must be bored to a very great nicety, the difference in size between the trial plug and the rejection plug being only 3/1000 of an inch. The barrel is fixed on a sort of carriage, and is made to travel towards the boring-bit, which is a square rod of steel, revolving in the headstock of a lathe. A stream of water plays upon the barrel as the bit passes through. The process is repeated with bits of larger size, till the final gauge is approached, when the *fine* boring begins. The workman packs the bit with pieces of wood, leather, &c, treated with grease and with emery, and in the end with a polishing powder until the inside of the barrel is of dazzling brightness. It is a nice art to set the boring tools to perfect straight-ness after they have been hardened and tempered.

The outside of the barrel has now to be finished. Formerly (even now, with regard to common barrels) the surface was ground down by stones revolving at a high speed. The grinder held the barrel transversely, and had a knack of allowing it to turn in his hands at half the speed of the stone, grinding the metal off evenly all round, and getting a tolerably true shape. The best barrels are now (in England) turned in a self-acting lathe with perfect accuracy. French makers have a method of planing them down to size, which they consider superior.

Being turned, floated, finished at the two ends, and a breech-piece fixed, the barrel is ready for first proof. All guns made in England must bear the proof marks of one of the two incorporated proof-houses – viz., those of London and Birmingham; except Government arms, which are proved by Government officers at the Tower and elsewhere. No other proof mark, except that of Belgium, is current in this country, and any maker or vendor selling a gun without one of these proof marks is liable to a penalty of £20. By an Act passed in 1855, most descriptions of guns are required to be proved twice; once in the stage of barrel manufacture, the point we have reached in our description, and again when the barrel has been joined on to the other fittings of the gun; and, in the case of a rifle, has been rifled. This last is called definitive proof; and to reduce the barrel or to tamper with it after that is a penal offence. The severity of the proof test will be apparent from the following statement:

	Grains
Ordinary charge of powder for a rifle of .577-inch, bore	68
Provisional proof charge for the same	205
Definitive proof charge	137
Ordinary weight of bullet	536
Weight of bullet for provisional proof	715
Ordinary charge of powder for double gun of 12-inch bore	82
Provisional proof charge for the same	350
Definitive proof charge	219

Hardly though these tests may seem to bear upon the maker, they are not too hard for the security of the user. Mr. Greener points out that from various causes a gun may sometimes have to bear a strain far greater than ordinary. An extra charge of shot lying on the powder,

or the barrel fouled, will greatly increase the chances of bursting. He says that "no barrel is safe whose power of resistance is not more than double the strength of a charge for general shooting." Notwithstanding the severity of the proof, very few of the best barrels fail to pass it. The proportion of Government arms which fail to pass is not more than two in a thousand; but the common barrels for African muskets, and those for the cheaper sorts of sporting-guns, which are proved in batches at the Birmingham proof-house, frequently come out with a large percentage of them blown to ragged ribbons.

The barrel now passes on to be incorporated with the other parts of the gun, and we meet with it again at subsequent stages, which we proceed to describe. One operation, curious from its simplicity, is that of testing for straightness. Obviously, nothing short of absolute perfection is required in this respect, and it has never been found possible to detect minute faults by any mechanical contrivance. A Birmingham barrel borer, it is said, discovered the method now in use, and, careless or ignorant of its value, sold the secret for a small sum of money and a quart of ale. Be that as it may, he hit upon a truly scientific discovery, that would have conferred distinction on a Newton or a Watt. We have said that the inside of a good barrel is polished to almost dazzling brightness. The workman takes up each barrel singly, holds it up to the light, and looks through it, at the same time moving it slowly, so that the shadow from the top of the window-frame shall travel down the tube. If there is the least crook, the even outline of the shadow will be broken; and knowing from long practice the exact position of the fault, he proceeds to correct it by setting the barrel, i.e., straightening it on a hollowed block by well-directed blows of a wooden mallet. Two or three minutes amply suffice for the operation.

Rifling is effected by machines of various types, but all on the same principle – that of grinding out the grooves or sides with toothed cutters, fastened to the end of a steel rod which passes up and down the barrel. In old-fashioned machines, the rod, which is squared, is twisted to correspond with the intended pitch of the rifling, and working through a square hole in a rigid block, is made to turn in its passage. The same object may be obtained by an arrangement of wheels, or the barrel itself may be made to turn. A plug of lead, cast in a rifled barrel and treated with emery, serves as the final polishing tool.

When the fitting up of the gun has been completed, the barrel receives a final smoothing, and is browned. This means simply that an artificial rust is produced upon it by means of chemicals, which, in the case of a twisted barrel, act upon its component parts with different degrees of intensity, and bring out the figure. The rust must be produced, and rubbed down with a wire brush, many times before the requisite depth of colour can be obtained, and then it is fixed by immersion in a scalding bath. It will not easily rub off, nor will it penetrate further into the metal after it is fixed.

We have not space to go into every detail of gun manufacture, nor is it necessary to describe that which is purely a matter of skilled workmanship, such as the making of best locks, furniture, &c. Every branch is a distinct trade, and not only employs special workmen, but is in many cases the business of a special manufacturer. There are barrel-makers, lock-makers, implement-makers, and so forth; and the *gunmaker* so called is the person who "sets up" these materials, and turns out the complete gun. In the Birmingham gun trade, there are from forty to fifty different branches, some of them employing many hundreds of men, and some only a few, and it is very seldom that a man follows more than one branch. Mechanical skill and ability of a very high order are required in many branches; the true gunmaker is an artist-workman, and loves his craft.

During the last twenty years a revolution has taken place in the manufacture of military firearms, as striking as that which has been effected in their principle. We allude to the making of interchangeable arms by machinery, a system introduced into this country from America about the close of the Crimean war. Before that time, the various parts of service guns had been so nicely viewed and gauged as to be in all essential particulars nearly interchangeable; and certainly no nation in the world had better-made weapons than those supplied to the War Department by the private trade; but it was thought that it would be advantageous to have the parts made to such perfect identity of pattern that any part, taken at random, would be sure to fit in its proper place upon any gun, as was the case with the guns made at the Springfield armoury, Massachusetts. A commission, sent by our Government to visit that armoury, reported

that they had chosen ten guns, each made in a different year, and caused them to be taken to pieces, the parts being thrown indiscriminately together; and that, on the same pieces being re-assembled at hazard, ten guns of perfect fit and finish were produced. These inquiries resulted in the establishment of the great Government gun factory at Enfield, capable of turning out 2,000 rifles per week, made entirely by machinery, and absolutely interchangeable throughout. The machinery has been often described, and though apparently complex, its general principle is easily understood. A perfect standard copy of each part of the gun is made in hardened steel, and this copy, being fixed in the machine, is followed by a dumb tracer, while the cutting-tool, describing exactly the same motions, is shaping the real limb. About 600 processes were required for the Enfield rifle. Only the last finishing touches, such as browning the barrel, blueing the iron-work, and polishing the stock, require to be done by hand; and then the parts, being assorted in stacks or heaps, are ready for the assembler, who takes a stock from one heap, a barrel from another, and so on, and builds up a perfect gun in about five or six minutes. The Enfield factory has now many rivals. Three large factories in Birmingham have sprung up on the same principle, and all the large States of Europe have their own armouries, making rifles by the thousand with the precision of clockwork. ☙

Old English and Modern Foreign Rifles

First published in 'The Engineer', 20 August 1886

The idea or rifling a musket barrel to improve the accuracy of fire by giving the bullet a spin or rotation is no new one, although the first rifle barrels had straight grooves, with the supposed object of decreasing the bad effects of fouling, and causing the bullet to take a straight course down the barrel, instead of impinging from side to side, as in smooth bores. The invention has been attributed to Zoller of Vienna at the end of the fifteenth century, but Koster of Nuremberg is supposed to have adopted the spiral form about 1520. Rifles were not, however, used for military purposes until the next century, and then to a very limited extent. The fact is that the very imperfect state of mechanical science prevented the principle from being applied with advantage. The first instance of their employment in the British army we meet with was the issue in 1680 of eight rifled carbines to each troop of Life Guards, but it was not until 1800 that a hole regiment was armed with rifles, when "Baker's Rifle" was supplied to the old 95th Regiment, now the Rifle Brigade. The details of this weapon are given in ***Table A*** (page 19); the bullet was spherical and wrapped in a grease patch, which caused the operation of loading to be so difficult that a wooden mallet was supplied to hammer down the ball. The rifle carried a sword-bayonet.

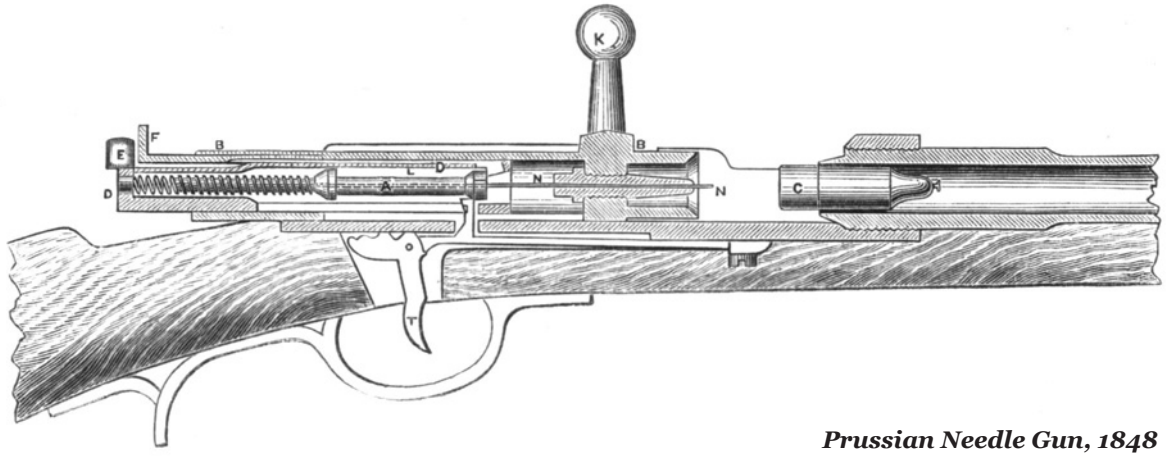
In France, experiments were carried on continuously with the object of discovering some mode of making the bullet take the rifling; a powder chamber with sharp edges and also a "tige," or cylindrical pin of steel were tried against which the leaden bullet was forced with a rammer so as to expand it into the grooves. Although easy loading and very improved accuracy were the results there were considerable defects in both these methods.

About the year 1836 the Brunswick rifle, with two grooves and firing a belted ball, was introduced for rifle regiments [*The Brunswick rifle was actually approved in January 1837, with production commencing early in 1838*. Editor]; it was the first arm in our service fitted with a percussion lock, which was not applied to the smooth bore muskets until 1842. The ball was used with a grease patch, which added to the difficulty of placing the belt properly in the grooves, and caused much

delay in loading; fouling was also very great and the shooting bad beyond 400 yards. In 1851 the Minié rifle was introduced, and marked a great advance, being the first really practical application of the elongated bullet, the principle of which had been patented by Delvigne, ten years before. An iron cup fitting into a hollow in the base of the bullet expanded the latter into the grooves; the grease patch was discontinued, and the bullet was wrapped in paper lubricated with a mixture of tallow and beeswax. As the Table A will show, this arm, as also its ammunition, was very heavy, and the large bore - 0.703in. - made the retardation very great, and experiments were soon instituted by the late Lord Hardinge, then Master-General of the Ordnance, which in 1853 resulted in the introduction of the first Enfield rifle.

The bore was reduced to 0.577in., and the weight of the rifle was nearly 1lb. less than that of the Minié, while the shooting was far more accurate; in fact, it was the most efficient firearm ever put into the soldier's hands at the time of its issue to the army in 1855, when it was used, in the Crimea, replacing both the Minié rifle and the old percussion musket of 1842. This position it, maintained until the general introduction of breech-loading arms, when it was converted in 1864 into a breech-loader on the Snider principle, having a block hinged on the right side of the shoe. The cartridge, the determination of which gave great trouble, had the Boxer composite coiled case, with a percussion-cap fixed in its base, which was exploded by means of a pin or striker passing obliquely through the block, and actuated by an ordinary hammer and percussion lock; a light spiral spring drew back the striker after firing. The Snider was merely intended to utilise the large stock of Enfield muzzle-loading rifles, and also to provide a substitute until the best description of breech-loading rifle could be determined.

Table A (page 19) gives the particulars of the successive rifled firearms in use in our army and navy.



Prussian Needle Gun, 1848

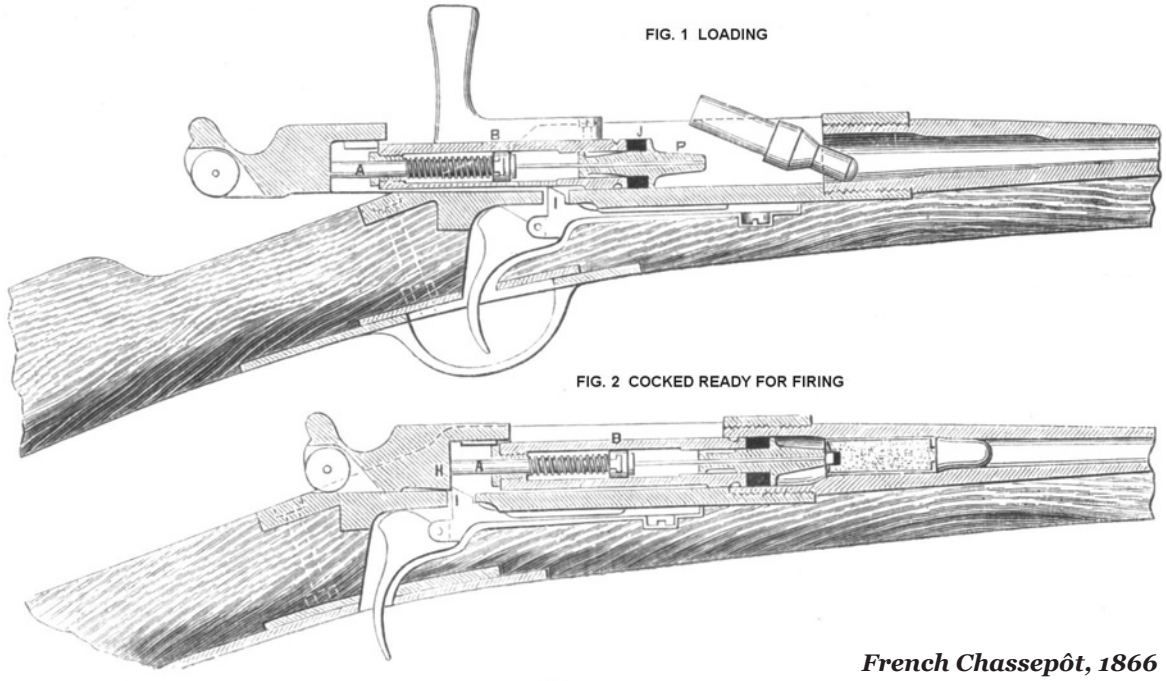
Breech-loading rifles of foreign Powers, like all breech-loaders, may be arranged under two heads, according to the system of breech-closing mechanism adopted – (1) bolt; (2) block.

Bolt Systems

Prussian needle gun – Of the first system, the original Prussian needle gun was the prototype. In it the breech was closed by a bolt resembling an ordinary door bolt, passing between guides, and containing within it the lock or striking arrangement to fire the cartridge. To open the breech, strike up the handle K to the left till rather past the vertical, and draw back the bolt B in a line with the barrel; to close the breech,

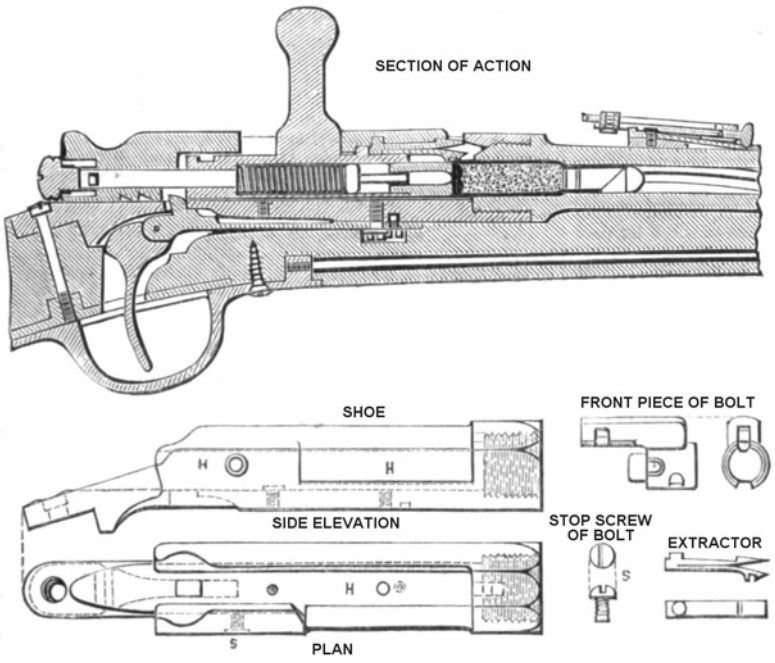
reverse this process. The front end of the bolt forms a conical cup which fits on a corresponding cone at the end of the barrel, and closes the breech when pressed home by turning the handle to the right into an inclined catch. The explosion of the cartridge C is effected by a steel needle N, which is driven forwards by a spiral spring, and – piercing the base of the paper cartridge – passes through the powder and strikes the fulminate inside a cap placed immediately behind the bullet. The base of the bullet is fitted into a sabot made of compressed paper, which is forced into the grooves of the rifle by the discharge, and causes the bullet to rotate with it. The spiral spring and needle carrier A are contained in a tube D, which slides within another tube B, and this outer tube has also an independent longitudinal sliding movement, forming the bolt with knob handle K, as described above. The needle can be withdrawn from the barrel after firing by means of the thumb-piece E at rear of bolt, pressing down at the same time on the spring catch F, which requires releasing. The arm is cocked by pushing in this thumb-piece to its original position, where it is retained by the spring catch; this compresses the spiral spring as the shoulder of the needle-carrier A is caught and held fast by the trigger nose I, which allows it to pass backwards when the sliding bolt is withdrawn.

Chassepôt – The French Chassepôt – used in the Franco German War – was an improved needle gun; the action simpler and the bore smaller; the thumb-piece and the internal sliding tube are dispensed with, as the main spring is compressed by the first motion of pulling back the bolt. The breech is closed by a cylindrical plug P, with a packaging of india-rubber J, which is pushed into the barrel, and compressed and bulged out laterally by the back pressure of the explosion. It was found, however, that this elastic packing was liable to injury by use, and by the heat of long continued firing, and that it failed to prevent the escape of gas, which caused great inconvenience to firer; this was also the case in the needle gun. The paper cartridge was supposed to be consumed, but a residue was often left which made loading difficult. The Gras, Mauser, and Beaumont-Holland rifles have breech actions, which are modifications of the Chassepot, differing only from one another in minor details. In each the bolt is made up of three external pieces, viz., the rear piece, or hammer, the centre piece with lever or handle, and the front piece carrying the extractor, which consists of a spring capable of hooking and drawing out the empty cartridge case. The hammer and front piece can only move longitudinally; the centre piece can both move longitudinally and rotate a quarter circle. There

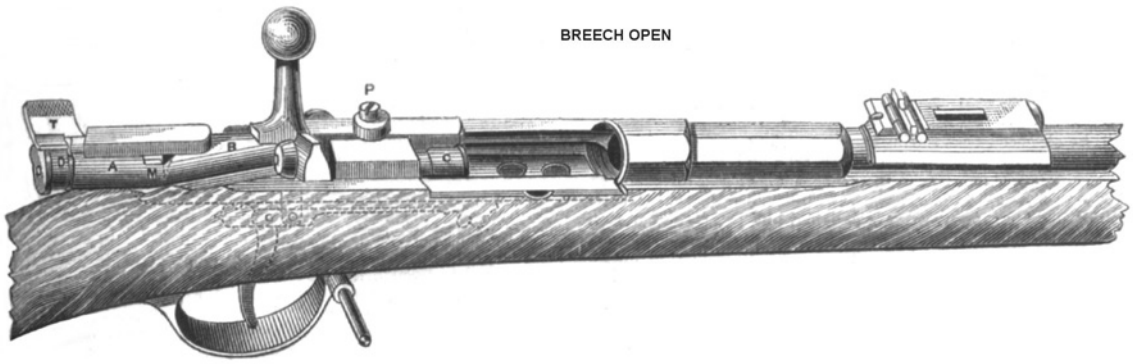


French Chassepôt, 1866

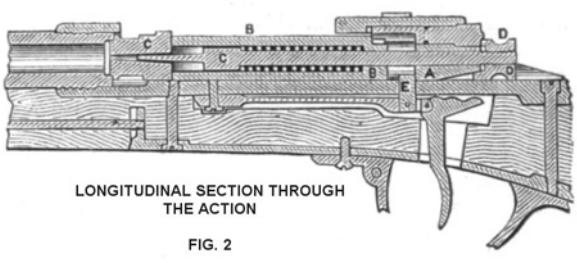
is an arrangement consisting of a helix or curved inclined portion cut out of the centre-piece, into which a corresponding projection on the hammer fits; by this means, when the handle is turned vertical, the hammer and centre-piece are separated as far as is necessary and the main spring compressed. The entire bolt can then be drawn to the rear into the loading position, opening the breech, and at the same time extracting the empty cartridge case, which is removed by hand. When the fresh cartridge is inserted, and the bolt is being pushed forward, the hammer is caught and retained by the projecting trigger nose, thus cocking the rifle. Turning the handle to the right into the recess of the shoe has the effect of slightly moving forward the centre-piece as well as the front-piece, thus slowly pressing the cartridge into the chamber, and reducing the risk of premature explosion.



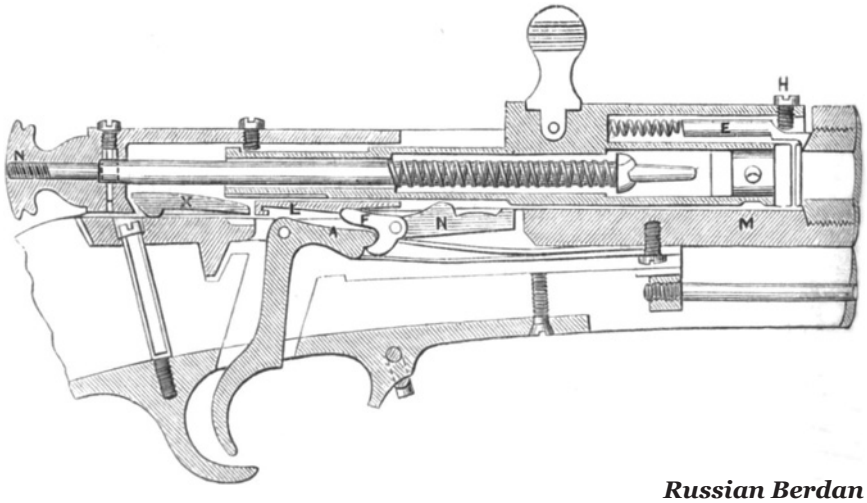
French Gras Chassepôt



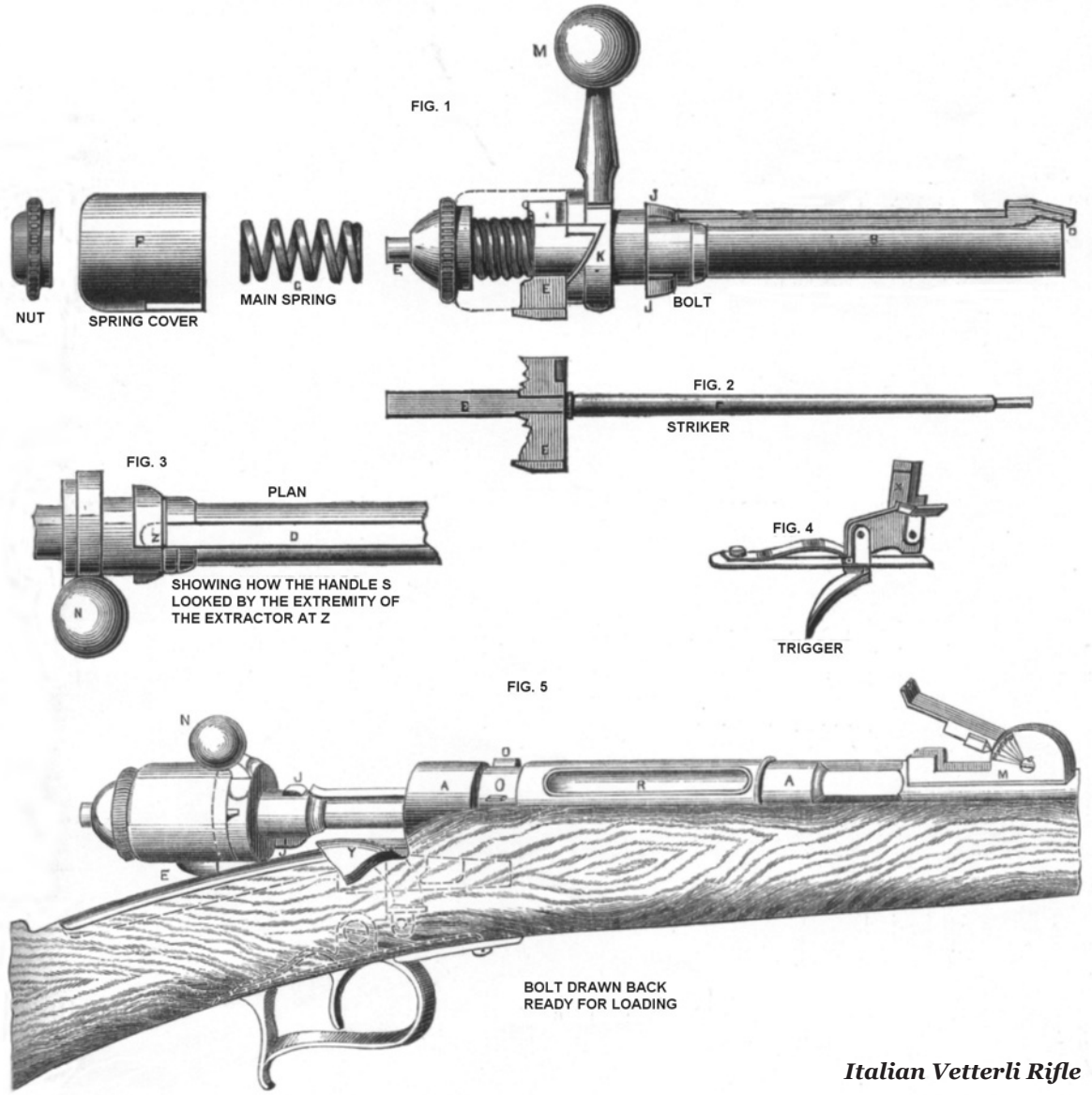
Mauser, Germany



In the Berdan rifle – Russia – the principle is much the same, the bolt being in three pieces, but the main spring is compressed wholly by the operation of pushing forward the bolt after loading. The extractor E is peculiar; it is on by a small spiral spring which pushes it out, and by screw H, which keeps it up to its work but allows it some play. Being attached to the centre piece of the bolt, it must rotate with it a quarter circle round the rim of the base of the of cartridge.



Russian Berdan

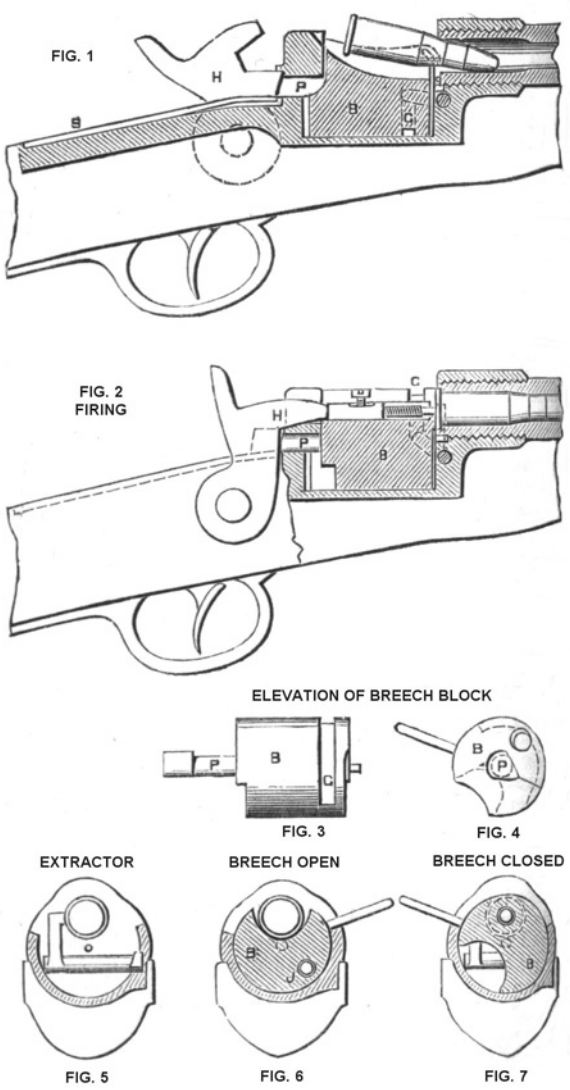


Italian Vetterli Rifle

The Vetterli rifle – Italy – has a bolt B with projections J, which fit corresponding grooves cut in the inside of the shoe A – see Fig. 1. To load, raise the handle N vertical; this causes the striker E within the bolt to run up the inclined plane K, at the same time drawing the striker back and compressing the main spring G. The bolt can now be drawn back until the forward end of the extractor D strikes a small quoin at O – Fig. 5 – which stops it. The rear end of the extractor as soon as it is free from the shoe being a spring, catches and locks the handle by entering a recess at Z – Fig. 3 – and ensures the main spring being kept compressed. On pushing forward the bolt after loading, the rear end of the extractor comes against the quoin at O, which unlocks the handle N, and allows it to be turned down to the right, thus sending the bolt quite home. The projection on the striker E – Fig. 5 – is at the same time caught by the trigger nose, which retains it and keeps the main spring at tension; the arm is now ready for firing.

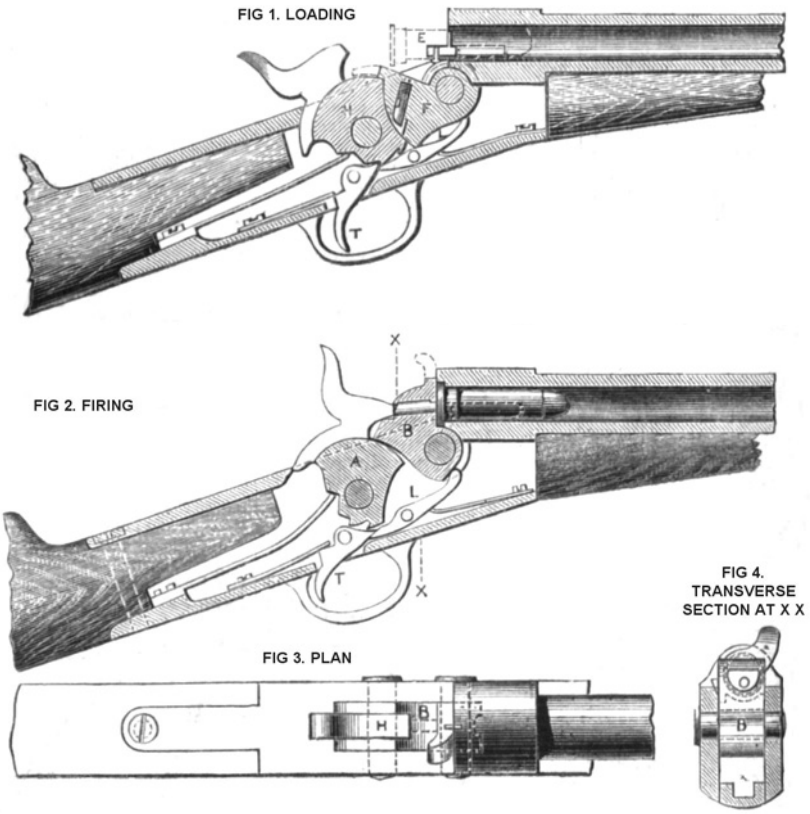
Block Systems

Werndl rifle – Austria – This arm has a rotating breech block, a horizontal cylinder B, which turns one quarter round upon a centre pin P, just below the axis of the barrel. A cylindrical groove is cut out along one side of the block, and when this groove is turned opposite the barrel the breech is open for loading; a reverse turn closes the breech. In either position the breech block is held by spring S, which bears against the projecting end of its centre pin, which has two inclined flat sides for this purpose – Fig. 4. A striker J passes obliquely through the block, and is acted on by the hammer H of an ordinary percussion lock. The breech block has a slightly spiral face at the rear end – Fig. 3 – by which it is driven home against the end of the barrel. The extractor is carried on a transverse pin just below the barrel, and on the other end of the pin is a horizontal arm which works in a groove G, cut with a slight spiral on the block – Fig. 3 – the rotation of which depresses the arm of the extractor enough to withdraw the cartridge partly from the chamber, as shown in Fig. 1. The extractor is the weak part of this rifle.



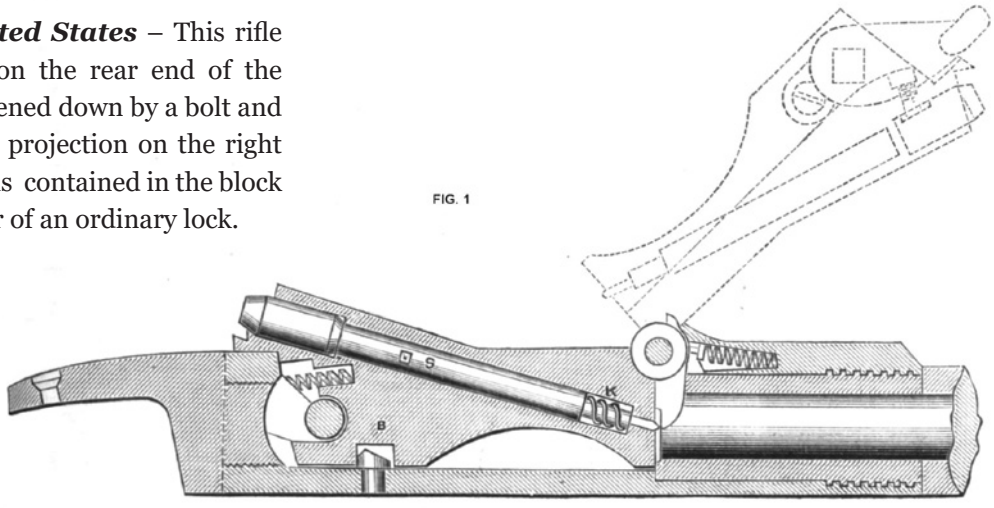
Werndl, Austria

Remington Rifle – Spain, Denmark, Egypt; also Norway and Sweden - The breech is closed by a block B shaped like the sector of a circle, which turns down backwards to open the barrel H revolving upon a trans-verse pin, and when closing the barrel, it is held up against the breech by a second sector-shaped block H, turning on another transverse pin behind the breech-block; the two sectors mutually detain and slip past one another alternately – Figs. 1 and 2. The front sector has a square notch in it which fits close to the end of the barrel; the back sector H carries the hammer which strikes a firing-pin in the breech-block. When the breech-block is open the trigger cannot move. The extractor is a horizontal slide laying hold of the cartridge base-flange. A projecting nose on its under side is caught and drawn back a short distance by the breech-block when opening, so that the empty case can be drawn out by hand.



Remington – Spain, Norway, Sweden, Denmark, Egypt

Springfield Rifle – United States – This rifle has a breech-block pivotted on the rear end of the barrel, and when closed is fastened down by a bolt and spring, worked by means of a projection on the right side of the action. The strike *S* is contained in the block and is impelled by the hammer of an ordinary lock.



Springfield, United States

The ***Tables B and C*** (pages 20 and 21) show the values of the foregoing arms for military purposes. It will be noticed that most of the European powers prefer the "bolt" system, which seems best adapted for a magazine rifle. On the other hand its disadvantages are:- (a) It takes up a considerable length of the barrel; (b) the handle is liable to catch in objects; (c) there is no leverage to extract a jammed cartridge; (d) it would seem more dangerous in case of a defective cartridge, the bolt being on a level with the eye; (e) more likely to explode in closing the breech, owing to a projecting cap, &c, than in the block systems.

We have to express our indebtedness to the superintendent and officers of the Royal Small Arms Factory for most readily placing every information at our command; also to Lieutenant-Colonel Bond's Handbook of Military Small Arms.

Description of arm	**Baker (c.1800)**	**Brunswick (Patt. 1836)**	**Minié (Patt. 1851)**	**Enfield long (Patt. 1853)**
Without Bayonet				
Weight	8lb 9oz	9lb 6 1/2oz	9lb 13oz	8lb 14 1/4oz
Length	3ft 9 3/4in	3ft 10in	4ft 7in	4ft 6 1/8in
Barrel				
Weight	3lb 14 1/2oz	3lb 13 3/4oz	4lb 13 1/4oz	4lb 4 1/4oz
Length	2ft 6in	2ft 6 1/4in	3ft 3in	3ft 3in
Bore diameter	.705in	.620in	.703in	.577in
No. of grooves	7	2	3	3
Twist of rifling	1 in 136	1 in 28	1 in 64	1 in 78
Sighted up to	-	-	1000 yards	900 yards
Bayonet				
Weight	0lb 15oz	2lb 0 1/2oz	1lb 0 1/4oz	0lb 13 1/2oz
Length beyond muzzle	1ft 6 5/8in	1ft 9 1/4in	1ft 5 7/8in	1ft 5 1/2in
Ammunition				
Charge of powder	-	2 1/2drs	2 1/2drs	2 1/2drs
Weight of Bullet	-	557grs	680grs	535grs
Lubricator	Grease patch	Grease patch	Tallow and beeswax on paper	Tallow and beeswax on paper

Description of arm	**Enfield short (Patt. 1860)**	**Snider (Patt. 1864)**	**Martini-Henry Mark III (Patt. 1871)**	**Enfield-Martini (Patt. 1886)**
Without Bayonet				
Weight	8lb 11 3/4oz	9lb 5oz	9lb 0oz	9lb 3 3/4oz
Length	4ft 0 3/4in	4ft 7 3/8in	4ft 1 3/8in	4ft 1 3/8in
Barrel				
Weight	4lb 1 1/2oz	4lb 12 1/2oz	3lb 5 3/4oz	3lb 13oz
Length	2ft 9in	3ft 3in	2ft 9 1/4in	2ft 9 1/4in
Bore diameter	.577in	.577in	.450in	.402in
No. of grooves	5	3	7	7
Twist of rifling	1 in 48	1 in 78	1 in 22	1 in 15
Sighted up to	1200 yards	950 yards	1300 yards	2000 yards
Bayonet				
Weight	1lb 11 1/2oz	0lb 13 1/2oz	1lb 1oz	1lb 7 1/4oz
Length beyond muzzle	1ft 10 3/4in	1ft 5 1/2in	1ft 10in	1ft 6in
Ammunition				
Charge of powder	2 1/2drs	70grs	85grs	85grs
Weight of Bullet	535grs	480grs	480grs	384grs
Lubricator	Tallow and beeswax on paper	3 cannelures with wax	Wax paper round bullet and beeswax wad	Cardboard & beeswax wad

Table A – List of Rifles in the British Service from 1800 to present date

Country	**Austria**	**France**	**Germany**	**Italy**	**Norway & Sweden***
System	**Werndl**	**Gras**	**Mauser**	**Vetterli**	**Jarman** (magazine)
Weight					
Without Bayonet	9lb 13 1/2oz	9lb 4oz	10lb 4oz	9lb 9oz	10lb 1 1/2oz
With Bayonet	11lb 8 1/2oz	10lb 7 1/2oz	11lb 12oz	10lb 14 1/2oz	-
Length					
Without Bayonet	4ft 2in	4ft 3 1/4in	4ft 4 3/4in	4ft 5 1/2in	4ft 4 1/2in
With Bayonet	6ft 0 5/8in	6ft 0 3/4in	6ft 0 1/2in	6ft 2in	-
Barrel					
Calibre	0.433in	0.433in	0.433in	0.408in	0.397in
Length	33in	32 1/4in	33 5/8in	33 7/8in	32in
No. of grooves	6	4	4	4	4
Twist of rifling	1 in 28	1 in 22	1 in 22	1 in 26	1 in 22
Charge					
Powder	77grs	80grs	75grs	62grs	77grs
Bullet	370grs	386grs	380grs	310grs	337grs
Mode of					
Breech-closing	Revolving block	Bolt	Bolt	Bolt	Bold

Country	**Russia**	**Spain, Denmark, & Egypt**	**United States**	**England**	
System	**Berdan**	**Remington**	**Springfield**	**Martini-Henry**	**Enfield-Martini**
Weight					
Without Bayonet	9lb 12 1/2oz	9lb 5 1/2oz	9lb 5 1/4oz	9lb 0oz	9lb 6oz
With Bayonet	10lb 12 3/4in	10lb 13 1/2oz	10lb 1oz	10lb 0oz	10lb 4oz
Length					
Without Bayonet	4ft 5 1/4in	4ft 2 1/4in	4ft 3 1/2in	4ft 1 1/2in	4ft 1 1/2in
With Bayonet	6ft 1 1/4in	6ft 1in	5ft 9 1/2in	5ft 11 1/2in	5ft 7 1/2in
Barrel					
Calibre	0.42in	0.433in	0.45in	0.45in	0.402in
Length	32 3/4in	35 3/6in	32 1/2in	33 3/16in	33 3/16in
No. of grooves	6	5	3	7	7
Twist of rifling	1 in 21	1 in 20	1 in 22	1 in 22	1 in 15
Charge					
Powder	77grs	75grs	70grs	85grs	85grs
Bullet	370grs	400grs	500grs	480grs	384grs
Mode of					
Breech-closing	Bolt	Sectorial block	Turnover block	Falling hinged block	Falling hinged block

** Norway and Sweden also have the Remington Rifle*

Table B – Military Rifles; Description of Arm

Country	**Austria**	**France**	**Germany**	**Italy**	**Norway & Sweden***
System	**Werndl**	**Gras**	**Mauser**	**Vetterli**	**Jarman** (magazine)
Velocities at	f.s.	f.s.	f.s.	f.s.	f.s.
Muzzle	1439	1489	1430	1430	1536
500yds	854	878	859	835	908
1000yds	620	643	629	595	675
1500yds	449	471	459	422	504
2000yds	328	348	338	304	377
Height of trajectories	feet	feet	feet	feet	feet
500yds	8.252	7.769	8.249	8.527	7.235
1000yds	49.41	46.6	48.68	52.17	42.97
1500yds	162.6	151.8	159.2	176.3	137.6
2000yds	426.0	389.9	411.1	469.9	348.5
Value of D^2/W	3.547	3.416	3.453	3.759	3.222

Country	**Russia**	**Spain, Denmark, & Egypt**	**United States**	**England**	
System	**Berdan**	**Remington**	**Springfield**	**Martini-Henry**	**Enfield-Martini**
Velocities at	f.s.	f.s.	f.s.	f.s.	f.s.
Muzzle	1444	1340	1301	1315	1570
500yds	873	849	875	869	947
1000yds	645	631	676	664	719
1500yds	476	468	523	508	553
2000yds	353	350	404	389	424
Height of trajectories	feet	feet	feet	feet	feet
500yds	7.995	8.539	8.574	8.594	6.704
1000yds	47.01	50.42	46.88	47.90	39.00
1500yds	151.7	160.3	142.3	147.1	122.0
2000yds	388.7	403.1	343.0	357.85	298.47
Value of D^2/W	3.336	3.281	2.834	2.953	2.917

** Norway and Sweden also have the Remington Rifle*

Table C – Military Rifles – Velocities, Greatest Height of Trajectories, and Comparative Retardation

Rifle Cranks

originally published in the Boston Rifle, *1888*

Although written 130 years ago, this article is sure to resonate with readers. Many will likely be able to attribute some of the traits to fellow riflemen, and with an honest look recognise (at least in part) themselves! [I did... Editor]

"Rifle-Cranks" forms the subject of a very readable paper in a recent issue of the Boston *Rifle*. After remarking on the somewhat slow development of the rifle crank, our contemporary says: "With some the critical time comes when they have made, perhaps, their first three or four consecutive bull's-eyes; then they must be off and try some new make or bore of rifle, the most improved bullet-mould and swage; while with others the time arrives when they have been struggling for long weeks with adverse hope to better a certain score, which to them seems already high, though in the estimation of an expert it is but a starting-point; at last the favourable time comes, and the score that for so long seemed unattainable is reached and passed by a few points; then the long pent-up fever breaks forth, and they are for shooting all the time. Some new rifle must be procured - the old one is not good enough. Perhaps the enthusiast may ask the advice of an older and wiser shooter, who will counsel the young shooter to wait, to hold fast to that which he has; but he, like many another, though he listen to advice, seldom follows it, and prefers to learn for himself. Again, how often we know of persons running up high scores with a rush, and in a few weeks, or even days, reach a point which others have been years in attaining! Filled with pride and excitement, they are sure that in a few more days they will have reached the highest possible score, which older and more experienced scholars have spent long years to reach, and if told that the goal is a long way off, they laugh and shake their heads with an 'I know better' air; but when they find it is truth, indeed, they yield to discouragement and fall out by the way."

The genuine crank is the one who must have a rifle of just such a length of barrel, and weight of rifle, just such a bend and length of stock, and, should the rifle have a Swiss butt and check-piece, that must be just such size and shape; the comb of stock must be just so high, and, above all, the bore must be of a size that a bullet of just so many thousandths of an inch may be used in the rifle. To all this must be added a certain make of powder, primers, and of shell, and nothing else will do. The ways of the crank "are peculiar." Some are always looking for something new and never buying anything. Again, some are always buying and never keeping a rifle, asserting with positiveness that "the rifle will not shoot; they have lots of friends, who are the best shots in ten counties, who have tried it. Can't shoot myself? Well, I guess I can, and as good as the best." Should it be suggested that they may not have loaded properly, did not have the right size bullet, or any of the many things that might cause a rifle to shoot poorly, they are sure to know more than the dealers themselves. If, after much persuasion, they consent to having the rifle tried, and it is proved to be all right, they are sure some alteration has been made.

Another "crank" in the category of our contemporary, is he who is always seeking after new bullets, trying different thicknesses of patches, this one being too thin or that too thick, this bullet too hard or that too soft, forgetting or not knowing that a bullet may work well in winter with a certain grain of powder which will not do as well in warm weather; and the powder and the alloy must be changed with the change of season. Certain conditions of the atmosphere also make certain changes imperative; but of these the crank does not think, and lays all the blame on the rifle, and none to himself. There is the crank who has read the latest books, and has talked with friends on the same subject until he becomes the worst of the whole list of cranks. "Last and not least are the men who are in advance of the times, either in the matter of bores, twists of rifles, powder charges, sights, and so forth, men who have the courage of their convictions, and the time and money to devote to such things. Riflemen, as a rule, are slow to accept anything that is a radical change, and it is fortunate that we have such rifle-cranks, who will depart from the old, well-beaten paths, and strike out for themselves in a new and untried field. All honour to such men; and for the rifle-crank of all kinds let us have a kind word, and think how much we, as riflemen, owe to some of the boldest for the many new things we now enjoy."

From: *Volunteer Service Gazette, 12 May 1888*

Report of Experiments

General Alexander Shaler

In the Annual Report of the National Rifle Association for 1875, General Alexander Shaler (President 1875-1877) reported on experiments with powder charges for long range shooting.

The experiments commenced during the summer 1875 and were concluded that December. The aim was to determine the proper charge of powder to use in long range shooting in the Remington Creedmoor Rifle. Swaged bullets weighing 550 grains were used, and made of a hard alloy composed of fifteen parts lead and one of tin. [Editor]

New York, December 20, 1875.

To the Directors of the National Rifle Association:

Gentlemen – The experiments commenced during the last Summer, to determine the proper charge of powder to use in long range shooting in the Remington Creedmoor Rifle with a swedged bullet, composed of fifteen parts lead and one of tin, weighing 550 grains, have been continued since with considerable regularity, and completed within the past few days.

The results are herewith submitted for the information of the members of the Association.

The practice was at 500, 800, 900 and 1,000 yards.

At 500 yards, seven kinds of ammunition were used, viz.: 90, 100 and 105 grains with a lubricant, and 100, 105, 110, and 115 grains without a lubricant.

At 800, 900 and 1,000 yards, eight kinds of ammunition were used, viz.: 90, 95, 100 and 105 grains with a lubricant, and 105, 110, 115 and 120 grains without a lubricant.

Fifty shots of each kind were fired at each of the distances, except that there were but thirty and forty shots of the 120 grains cartridges fired at 800 and 900 yards respectively.

About half of the 90 grains ammunition were factory made. All the rest were made by the undersigned. The powder used was the same in all cases (Hazard F. G). The shells were all new (of the long kind), none being reloaded. All the balls except a few first used were carefully weighed, and those used in the same score never varied as much as one grain. The powder was also carefully weighed in all cases, and never varied one quarter of a grain to a charge. Generally, the scores were made of ten shots each, after the correct elevation had been obtained.

To ensure accuracy of aim all the shots were fired over a camp stool. The shooting was continued without regard to weather, some times in heavy rain, and some times in very high winds, shelter having been provided for the purpose.

For locating the hits with precision, the targets for most of the shooting were lined off with one vertical line, marking the centre of the length of the target, and three horizontal lines one foot apart, the centre one marking the centre of the width or height of the target.

At no time was the wind gauge very carefully manipulated for the purpose of making large scores, but the elevations of the hits were noted with great care, as the relative merits of the different ammunition could be correctly determined only by a comparison of the deviations of the hits from a horizontal line. At the end of each day's shooting the distance of each hit from the centre horizontal line was measured, and the average distance per shot of each score computed and recorded on a table prepared for the purpose. When the fifty shots of a particular kind of ammunition had been fired at a given distance, an average of the deviations of all the hits was computed and recorded.

Table 1 is the result of the practice at 500 yards, with the different kinds of ammunition, placed in the order of their merit, as determined by the above plan.

It will be noticed that the deviations in the four kinds of ammunition first named vary but little, there being but 64-100 of an inch between the highest and the lowest. It would seem, therefore, that for 500 yards shooting there is not much choice between 100 and 105 grains, with or without lubricant. Indeed, it is reasonable to suppose that a repetition of the test might bring either of them at the head of the list.

Although the scores made cannot be used as a test of merit, it may be added, that the average value per shot of three of the four kinds of ammunition first named were the highest obtained at 500 yards, according to Creedmoor system of counting. In this practice *twenty-one* consecutive bull's-eyes were made with 100 grains without lubricant, followed by *eleven* with 105 grains without lubricant, under a fresh easterly wind.

Table 2 shows the results for 800 yards.

As in the 500 yards practice, this shows but a slight difference between the deviations of the four kinds of ammunition first named, there being but 1 4-100 inches between the highest and the lowest. It may also be said that the scores made by the four first named were the four highest out of eight.

At 900 yards the results are shown in ***Table 3***.

This table shows a difference of 2 50-100 inches in the deviations of the two kinds of ammunition first named, but a remarkable uniformity in the deviations of the 2nd, 3rd and 4th named, and between the 1st and the 4th, a difference of only 2 88-100 inches. As at 800 yards, the scores made by the four first named were the four highest out of eight.

At 1,000 yards the results are shown in ***Table 4***.

In this record there is a striking similarity to that of the 900 yards, in the difference between the deviations of the two kinds of ammunition first named, and the uniformity in the deviations of the 2nd, 3rd and 4th. In fact, the entire tables closely resemble each other, the principal difference being found in the leap made by the 110 grains from seventh position in the 800 and 900 yard tables to that of third in the 1,000 yard table, and an equal retrograde movement on the part of the 105 grains without lubricant.

It will be noticed that throughout these tests, up to 1,000 yds., the 105 grains ammunition, both with and without lubricant, has shown great merit. In the four ranges the 105 lubricated stands second three times, and third once. The 105 without lubricant stands first once and fourth twice, only at the longest range dropping back to seventh position.

It will also be noticed that while the lighter ammunition produced the best results at 500 yards, it gradually gave way in falling back to longer distances to the heavier, thus the three first positions in the 500 yard table are filled by 100 and 105 grains; in the 800 yard table, by 105 and 115 grains; in the 900 yard table, by 115, 120 and 105 grains, and in the 1,000 yard table, by 115, 105 and 110 grains. Also, that the 115 grains ammunition stands sixth on the 500 yard table, third on 800 yard table, and first on both the 900 and 1,000 yard tables; and that in both the latter distances its average deviation from a horizontal is considerable less than the ammunition holding the second place.

From this it may be reasoned that the longer the range the more powder should be used, and so far as these experiments show such reasoning would be sound; but the general opinion is that the increase in the powder charge which may be made to an advantage is very limited. Indeed, until recently, it was thought that the limit had been reached at 100 grains. These experiments have, however, satisfied the undersigned at least that as high as 115 grains, and possibly 120, may be used to advantage at 800, 900 and 1,000 yards. It is also thought that that charge of powder will produce improved scores at the longer ranges of 1100 and 1200 yards. This opinion is sustained by the fact that in all these tests the elevations were lowered in proportion to the increase in the powder charge.

Had the weather permitted, these experiments would have been continued to the longest distances, and it is hoped that when the Spring opens some other member of the Association will undertake to devote some time to this fascinating study, and by careful experiments determine the advantage or otherways of increased charges at the extreme ranges of 1100 and 1200 yards. If it can be shown that a ball weighing 550 grains can be thrown 1200 yards with tolerable accuracy, a new sensation will be created, calculated to enhance the growing interest in long range shooting.

Some 2,250 shots were fired in connection with these experiments, and the information to be derived from the tables, compiled from the records kept, would be exceedingly interesting to the Amateur Rifleman, but time will not permit, at present, of giving anything more than the exhibit herein made of the relative merits of the different kinds of ammunition, tested at the four ranges named; but an effort will be made to lay before the members of the Association, before next Spring, a number of facts relating to atmospheric and other influences which affect the flight of the ball, which it is believed will prove not only interesting but instructive.

All the records of these experiments have been kept by our enthusiastic friend Mr. Carrick, to whom the long range shooters, and the President in particular, are greatly indebted for his voluntary services upon the Range during the past two years.

Respectfully submitted.

ALEXANDER SHALER,
President

100	Grains	without lubricant, average deviation from Horizontal				4 30-100 in.
105	"	with	"		"	4 66-100 in.
100	"	"	"		"	4 92-100 in.
105	"	without	"		"	4 94-100 in.
110	"	"	"		"	5 49-100 in.
115	"	"	"		"	6 44-100 in.
90	"	with	"		"	7 36-100 in.

***Table 1**: 500 yard practice*

105	Grains	without lubricant, average deviation from Horizontal				7 96-100 in.
105	"	with	"		"	8 18-100 in.
115	"	without	"		"	8 86-100 in.
100	"	with	"		"	9 00-000 in.
120	"	without	"	(30 shots.)	"	10 00-000 in.
95	"	with	"		"	12 00-000 in.
110	"	without	"		"	12 74-100 in.
90	"	with	"		"	16 68-100 in.

***Table 2**: 800 yard practice*

115	Grains,	without lubricant, average deviation from Horizontal				8 80-100 in.
120	"	"	"	(40 shots.)	"	11 30-100 in.
105	"	with	"		"	11 64-100 in.
105	"	without	"		"	11 68-100 in.
90	"	with	"		"	13 00-000 in.
100	"	with	"		"	13 54-100 in.
110	"	without	"		"	14 38-100 in.
95	"	with	"		"	16 04-100 in.

***Table 3**: 900 yard practice*

115	Grains	without lubricant, average deviation from Horizontal				12 20-100 in.
105	"	with	"		"	14 62-100 in.
110	"	without	"		"	14 66-100 in.
120	"	"	"		"	14 87-100 in.
100	"	with	"		"	15 64-100 in.
95	"	"	"		"	16 30-100 in.
105	"	without	"		"	18 00-000 in.
90	"	with	"		"	18 02-100 in.

***Table 4**: 1000 yard practice*

Pressing Business!

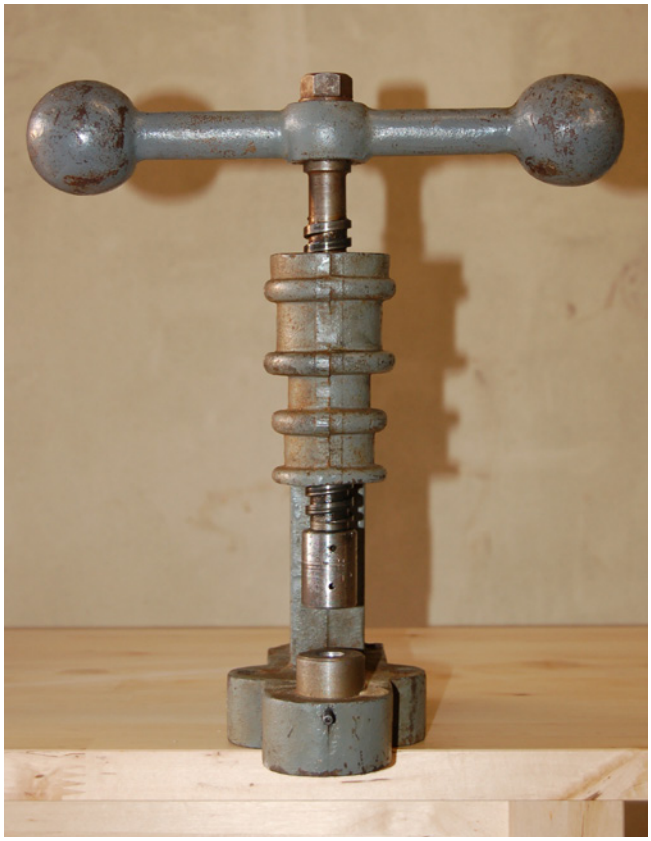
George Arnold

I was sitting in my cabin on the slow boat back to Jersey, considering methods of making hexagonal Whitworth bullets. Casting is the usual and most obvious method; but changes to bullet design usually call for a new mould. Not too many volunteers for that! A swage comprising punch, nose and body dies is more flexible; but each bullet will require finishing. Whitworth's method of extruding rifled lead wire, cutting to length, then turning nose and tail, allows any changes to shape or weight; but is slow and involves considerable tooling investment. No easy solution presented itself so brain had been disengaged and I was just sitting, empty mind (and full glass). Then an idea struck me so hard I nearly spilt my drink! I would take a plain cylindrical bullet, with a larger diameter than .440" and push it, nose first, through a hexagon rifled die. If there was enough resistance, the punch would form the base cavity; and I had a length of .440" AF Whitworth barrel. Now all those who have tried, know that if you push a long lead bullet into a substantially smaller die with a short lead, it will expand too much or collapse. The cunning plan which had just presented itself was to provide a die to contain the expansion of the blank until it had passed into the rifled die. There were some questions:

a) What diameter (ø) blank?
b) What diameter (bore) the blank containing die?
c) How would the base cavity turn out?
d) What type of press?
e) Could it be made to work?

a) I had an old pot mould .462" ø which sounded like a good starting point.
b) The rifled die was .470" across corners so .472" ø seemed a good guess.
d) All the toggle presses (the system usual in reloading and some swaging presses) failed as pressure has to be extended over about 2" stroke. Fly, screw, arbour or hydraulic presses all work so long as there is >4½" daylight.

The blank is cast with the required nose shape in a plain mould at least .462" ø around 1.4" long with a flat base. The weight and nose shape will not be altered by the presses. Shorter and harder bullets will need larger diameters; but lapping or boring this type of mould is simple work.



The operation is as follows (see illustration page 28):

The blank die (3) and the extrusion die (4) are fitted in the die holder (5). The extrusion die (4) has a 10° included angle lead to marry up to the blank die (3) which also has a lead for the punches (1) and (2). Ideally the die holder is then clamped under the ram using one of the punches fitted in the ram (6) for position. If there is not enough daylight the die holder can be used loose or on a swing arm, but at some risk of misalignment.

A lightly lubricated blank is then placed nose first in the blank die (3) and is pressed into the extrusion die (4) by the forming punch (1) which is made of steel. The ⅝ ø shoulder on the punch (1) prevents the punch entering the extrusion die (4). The forming punch (1) is then withdrawn, and replaced by the ejector punch (2) which is made of brass to avoid damage to the extrusion die. The ejector punch (2) pushes the blank (now bullet) out of the extrusion die (4). A bore mop may then be used to clean any lead flash from the dies. As the ejector punch is a round peg in a hexagon hole there will be some flash on the base of the bullet. The best way I have found to remove same is to roll the bullet base along about a 3" x ¼" sharpened plate as shown.

The pressure required to form the bullet is usually sufficient to form a base cavity. Pressure can be increased by using a longer or larger ø blank.

Yes, it worked, or I would be keeping quite! And for those interested, last time I looked the inch/metric exchange rate was unchanged at 25.4 mm to the inch.

This article was first published in the Summer 2006 edition of Black Powder *magazine, and is reproduced courtesy of the Muzzle Loaders Association of Great Britain.*
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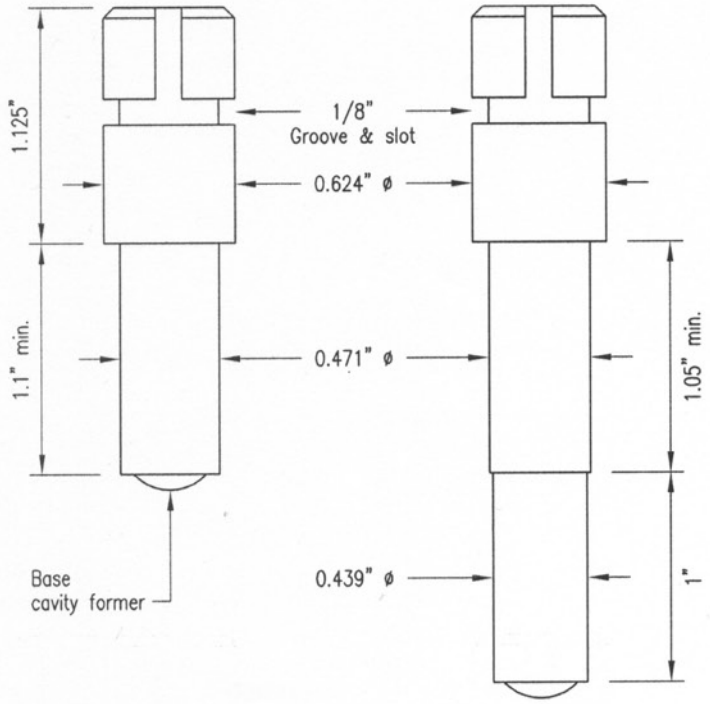
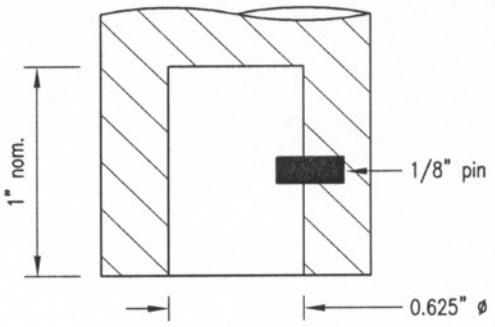
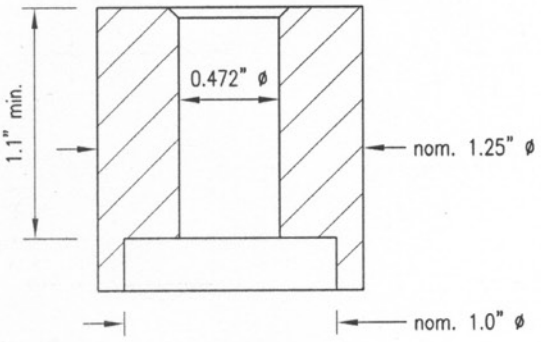


1. Forming Punch

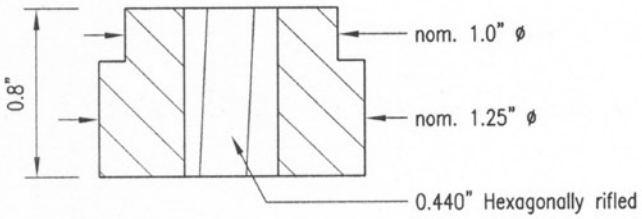
2. Ejector Punch



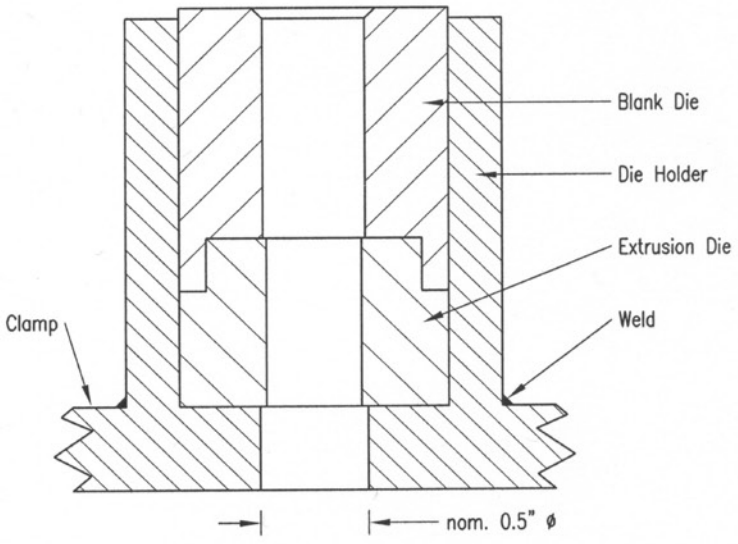
6. Section Through
Press Ram Register



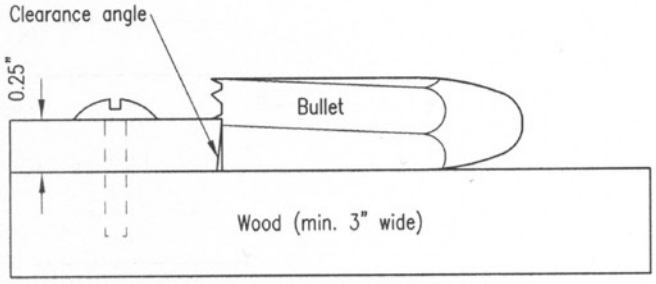
3. Section Through
Blank Die



4. Section Through
Extrusion Die



5. Section Through
Die Assembly

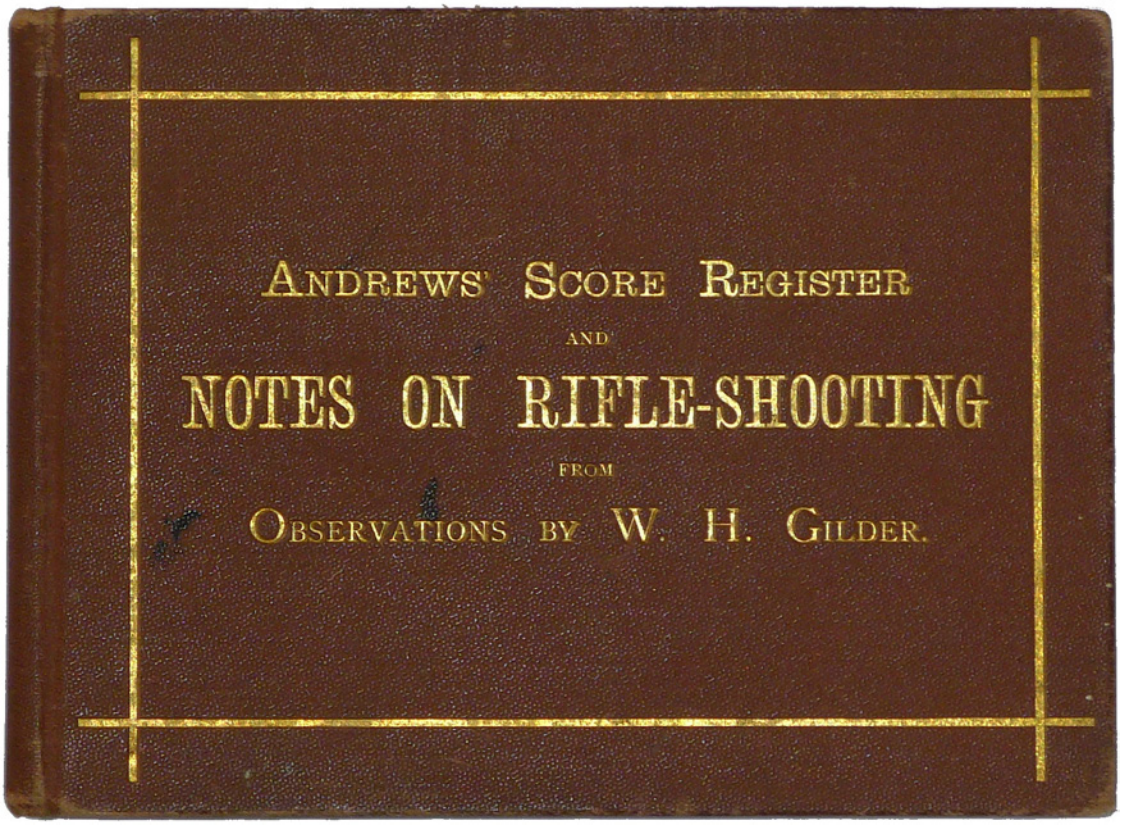


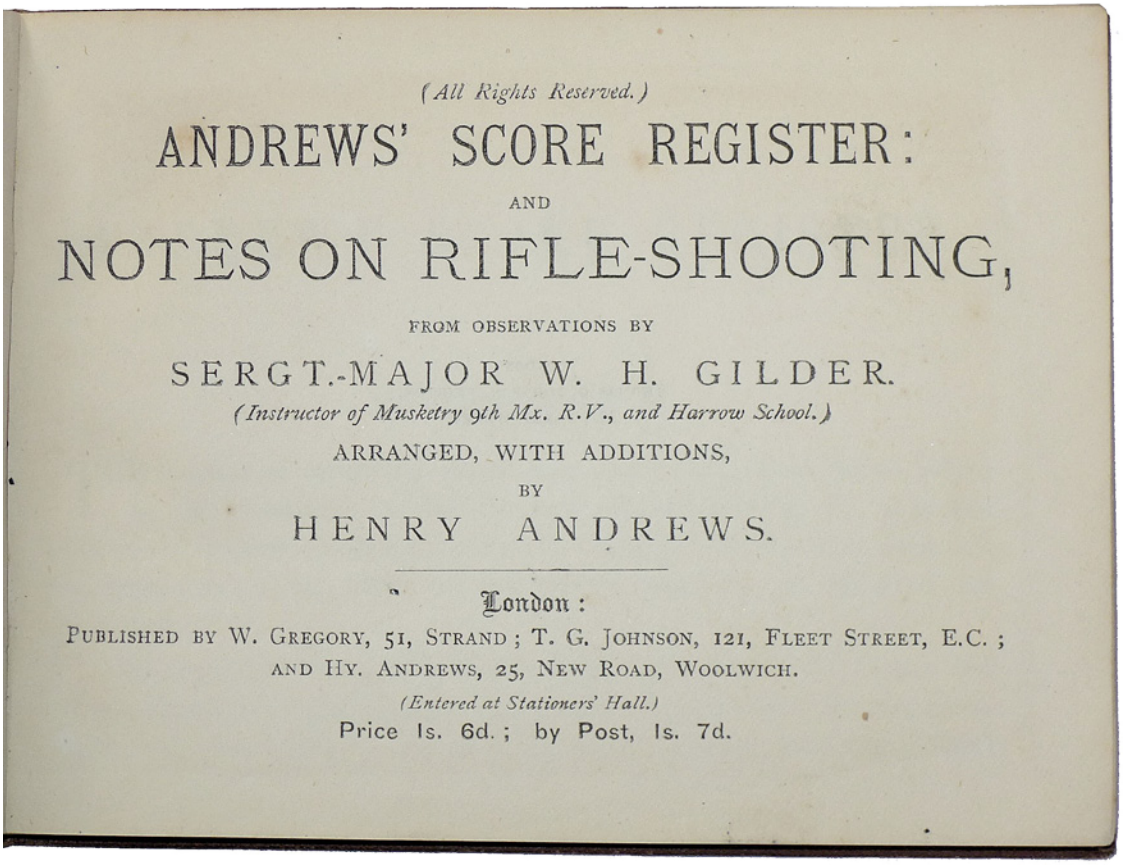
7. Rag Remover

A Martini-Henry Score Register

David Minshall

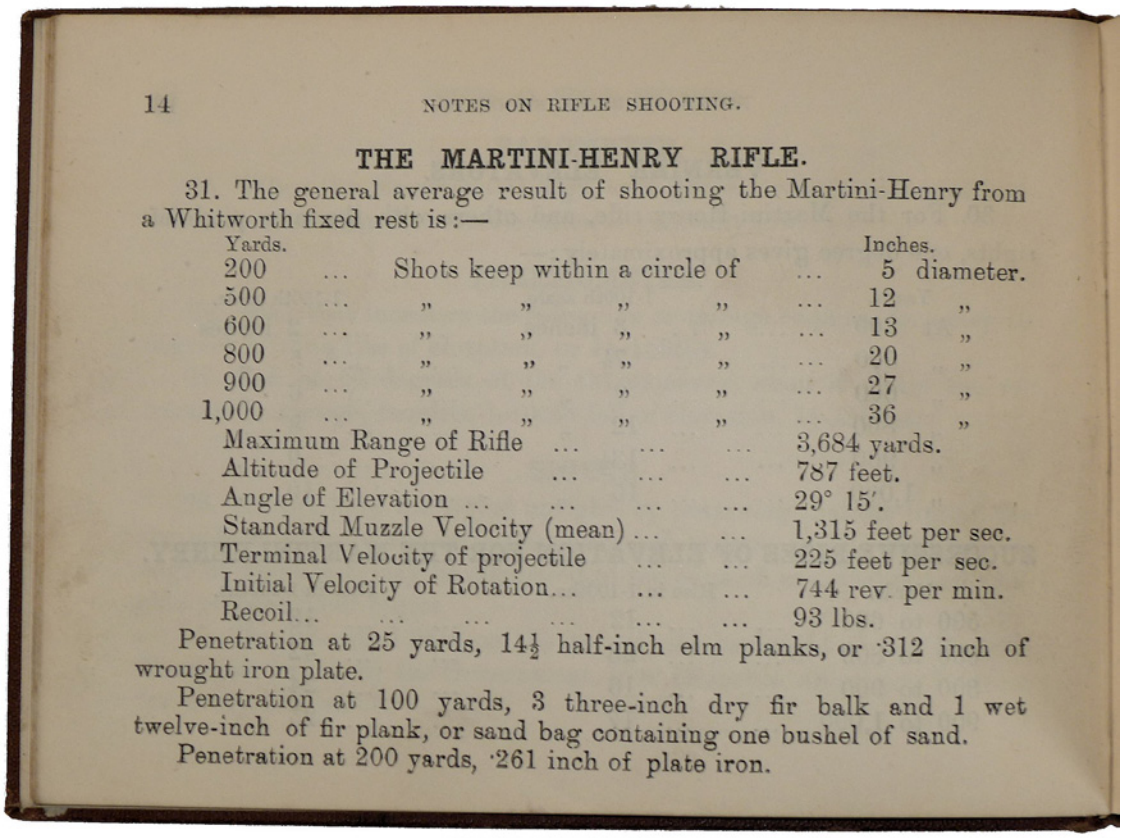
Established for home defence of Great Britain in 1859, the Volunteer Force saw an immediate rush of Volunteering. The subsequent formation of the National Rifle Association did much to secure the long-term prospects of the movement. By 1888 there were over 220,000 efficient Volunteers. Great Volunteer reviews before large crowds of spectators, and sometimes royalty, were held throughout the country where the men demonstrated their skill at drill and skirmishing.





Rifle shooting was an integral and popular part of Volunteering and local and regional rifle matches become commonplace. In 1860 the National Rifle Association held their inaugural Rifle Meeting on Wimbledon Common, where it remained until 1889, after which it moved to Bisley (where it continues today).

Through the 1860s, 70s and 80s the Volunteers were armed progressively with the muzzle loading Pattern



14 NOTES ON RIFLE SHOOTING.

THE MARTINI-HENRY RIFLE.

31. The general average result of shooting the Martini-Henry from a Whitworth fixed rest is:—

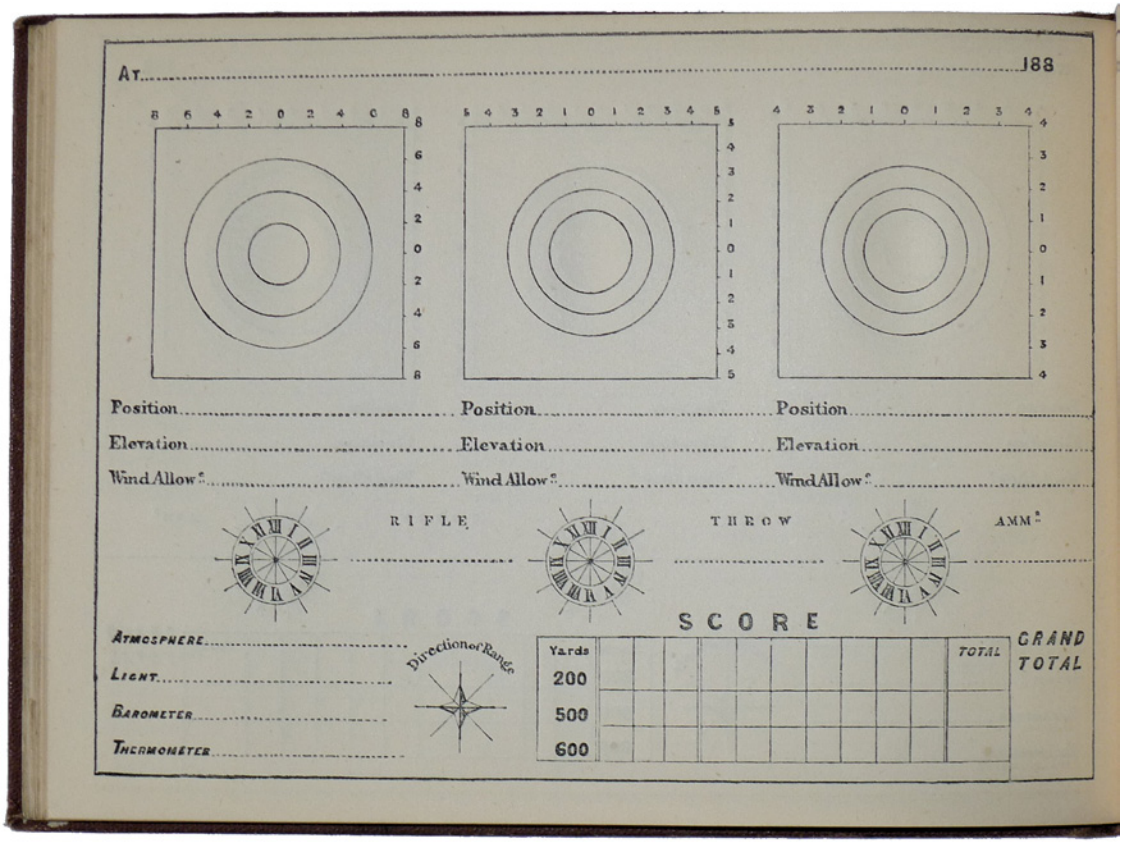
Yards.			Inches.
200	... Shots keep within a circle of	...	5 diameter.
500	... " " " "	...	12 "
600	... " " " "	...	13 "
800	... " " " "	...	20 "
900	... " " " "	...	27 "
1,000	... " " " "	...	36 "

Maximum Range of Rifle	3,684 yards.
Altitude of Projectile	787 feet.
Angle of Elevation	29° 15′.
Standard Muzzle Velocity (mean)	1,315 feet per sec.
Terminal Velocity of projectile	225 feet per sec.
Initial Velocity of Rotation...	744 rev. per min.
Recoil...	93 lbs.

Penetration at 25 yards, 14½ half-inch elm planks, or ·312 inch of wrought iron plate.

Penetration at 100 yards, 3 three-inch dry fir balk and 1 wet twelve-inch of fir plank, or sand bag containing one bushel of sand.

Penetration at 200 yards, ·261 inch of plate iron.



1853 Enfield rifle, its successor, the Snider (a breech loading conversion of the Enfield), then the Martini-Henry. The aspirant marksman himself became a target for, and ready consumer of, a variety of tools and equipment to aid him.

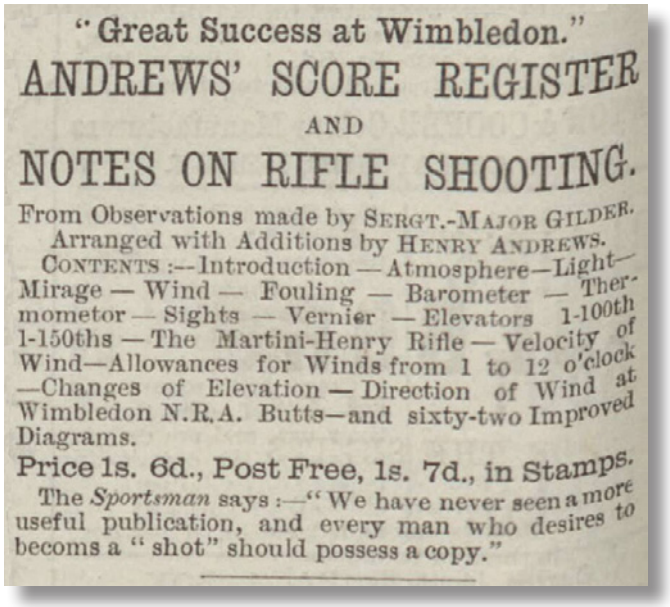
Record keeping is an essential part of marksmanship. Plotting shots fired, recording rifle and ammunition, sight settings, wind strength and direction, light and atmospheric conditions build into an invaluable reference. Score registers were marketed for such purposes, one being '*Andrews Score Register*,' which appears to have been first published in 1885.

The example illustrated has several entries dated 1887.

The Register opens with an introduction by the publisher, Henry Andrews. There follows 'Notes on Rifle Shooting' by William Gilder, a noted rifleman of his day. Aspects addressed by Gilder are: Atmosphere, Light, Mirage, Wind, Fouling, Barometer, Thermometer, Sights, Vernier Elevators, Elevations for the Martini-Henry, the Martini-Henry Rifle, Velocity of Wind, Allowances for Winds of Different Force and Angles, and Direction of the Wind at N.R.A. Butts. Following this are pages for recording shooting.

The author of the 'Notes', William Henry Gilder (1834-1916) was reserve for the Great Britain rifle team to Creedmoor in 1877. The New York Herald of 26 August 1877 published this brief biography of Gilder:

> Sergeant W. H. Gilder (*pictured right*) is an old soldier, of a hardy and weather worn appearance, having served Her Majesty in all quarters of the globe for twenty-one years in the Forty-third and Eleventh foot and Fifth fusiliers. Receiving the medal for long and meritorious service. He is now musketry instructor to the boys of the famous Harrow School, and by his excellent tuition and valuable example has turned out many excellent young shots. He has had very great success all over Great Britain, numbering the celebrated Dudley[1] prize among his honours. He is now forty-three years old and a native of Slough, Buckinghamshire. He was fourteen years musketry instructor at Hythe[2]. In addition to being musketry instructor at Harrow he is sergeant major of the Eighteenth Middlesex Rifle Volunteers of the same place.



"Great Success at Wimbledon."

ANDREWS' SCORE REGISTER

AND

NOTES ON RIFLE SHOOTING.

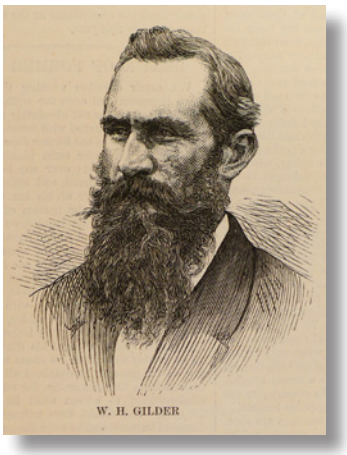
From Observations made by SERGT.-MAJOR GILDER.
Arranged with Additions by HENRY ANDREWS.

CONTENTS :--Introduction — Atmosphere—Light—Mirage — Wind — Fouling — Barometer — Thermometor — Sights — Vernier — Elevators 1-100th 1-150ths — The Martini-Henry Rifle — Velocity of Wind—Allowances for Winds from 1 to 12 o'clock —Changes of Elevation — Direction of Wind at Wimbledon N.R.A. Butts—and sixty-two Improved Diagrams.

Price 1s. 6d., Post Free, 1s. 7d., in Stamps.

The *Sportsman* says :—"We have never seen a more useful publication, and every man who desires to becoms a "shot" should possess a copy."

Volunteer Service Gazette, 1 August 1885



W. H. GILDER

Notes

1. The Earl of Dudley's prize at the NRA Annual Rifle Meeting comprised 10 shots at 1000 yards with 'Any Rifle'. Only those who had won other 'Any Rifle' matches during the meeting were eligible to compete, thus the 'Dudley' prize was competed for by the top riflemen.

2. Hythe is situated in southern England, on the Kent coast. Existing barracks and miles of shingle beaches for ranges made it a suitable location for the establishment of a school of musketry. The School's first Commandant, Colonel Hay, arrived there in June 1853 and established the "Corps of Instructors in Musketry". The institution opened on 18 April 1854. The object of the establishment was the training of officers and non-commissioned officers so that they might become Instructors. In 1861 its title was changed to the "School of Musketry."

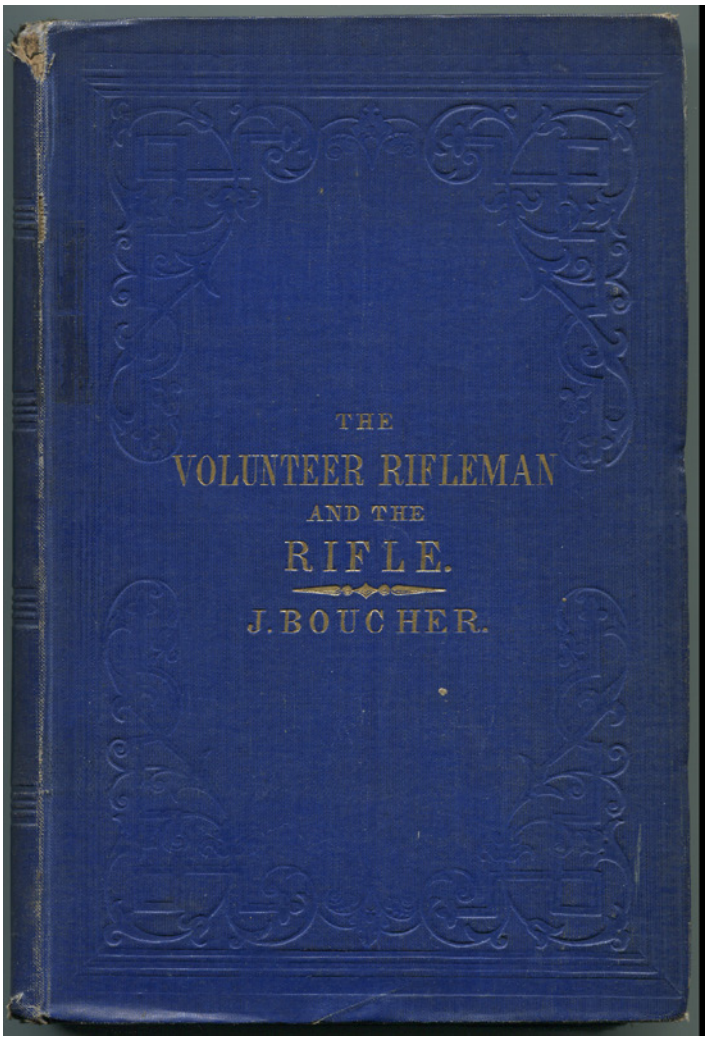
The Literature of The Volunteers of 1859 (Part 2)

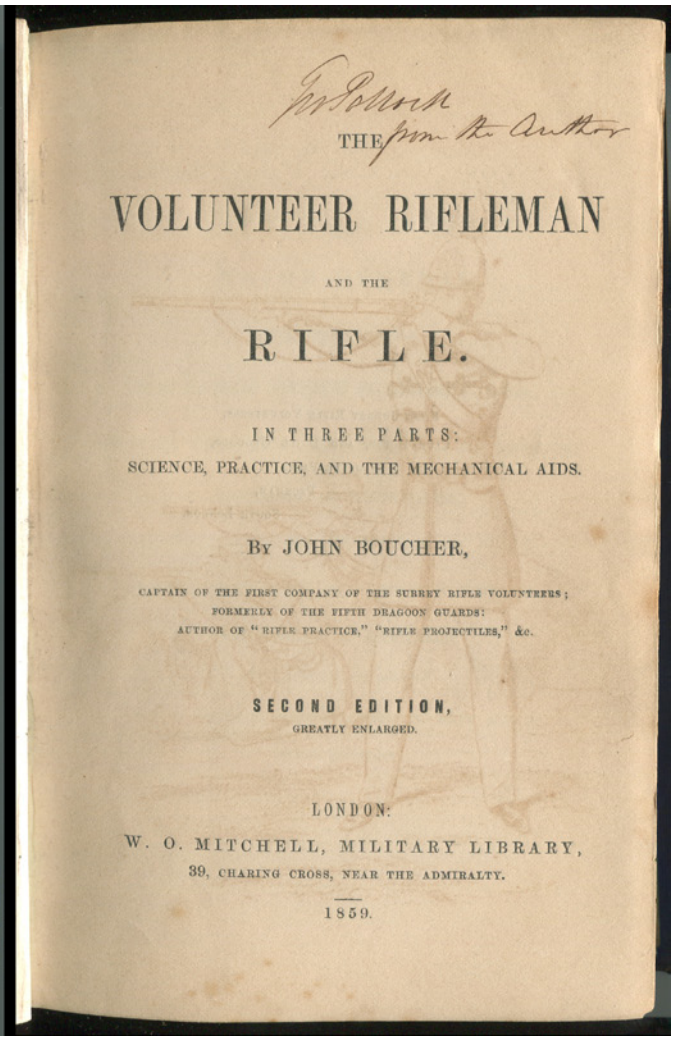
The Volunteers Take Shape

W.S. Curtis

In 1853 a Militia officer, Captain Thomas James Thackeray of the 2nd Somerset Regiment of Militia delivered a series of lectures at the Guildhall in Bath. These were published by Parker, Furnivall, & Parker of the Military Library, Whitehall and dedicated to Lord Palmerston, at that time Home Secretary. The book was entitled **THREE LECTURES DELIVERED AT THE GUILDHALL, BATH ON THE PRACTICE OF RIFLE FIRING AT VARIOUS DISTANCES** (Riling 640). There are only 43 pages and five plates but this is an important work in that Thackeray is addressing directly the ordinary citizen concerned with the defence of his home against the threat of foreign invasion. The lectures encompass in simple form the theory of ballistics, judging distance and simple tactics. These echo the methods of training being established by Colonel Hay at the School of Musketry, Hythe, just then being brought into existence, although it did not open officially until the following year. Thackeray expanded this work into **THE SOLDIER'S MANUAL OF RIFLE FIRING, AT VARIOUS DISTANCES** (Riling 704) which he produced in 1858.

1853 also saw the first of what became a positive stream, or perhaps river would be a better description, of output from the pen of John Boucher, of Surrey Villas, Camberwell. Boucher, an ex-officer of the 5th Dragoon Guards, was a compulsive writer, designer

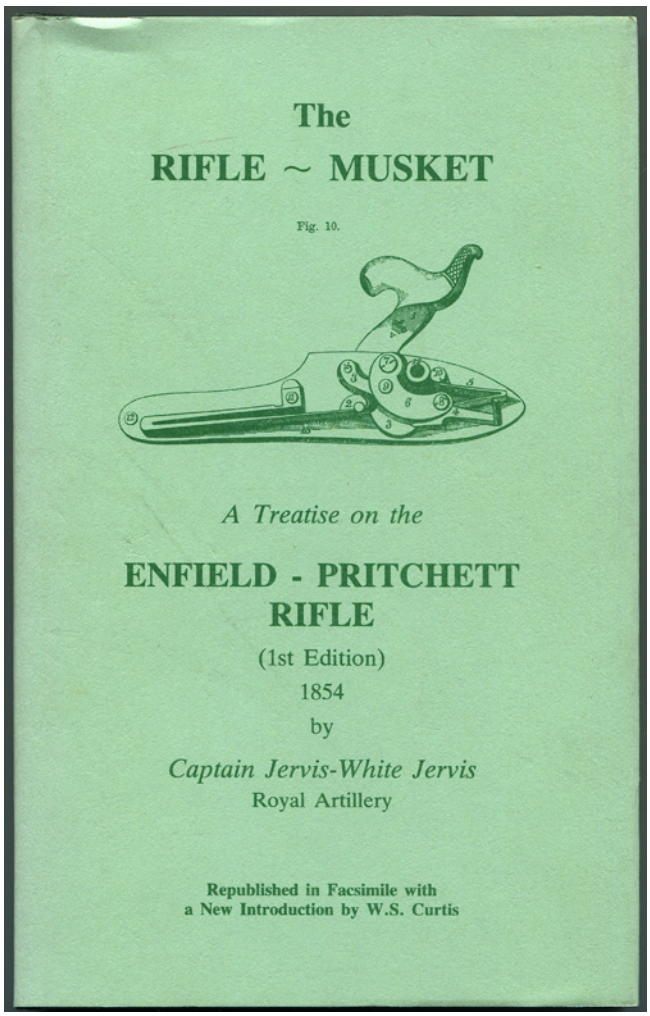



THE
VOLUNTEER RIFLEMAN
AND THE
RIFLE.
IN THREE PARTS:
SCIENCE, PRACTICE, AND THE MECHANICAL AIDS.
By JOHN BOUCHER,
CAPTAIN OF THE FIRST COMPANY OF THE SURREY RIFLE VOLUNTEERS;
FORMERLY OF THE FIFTH DRAGOON GUARDS:
AUTHOR OF "RIFLE PRACTICE," "RIFLE PROJECTILES," &c.
SECOND EDITION,
GREATLY ENLARGED.
LONDON:
W. O. MITCHELL, MILITARY LIBRARY,
39, CHARING CROSS, NEAR THE ADMIRALTY.
1859.

and later Captain of the First Company of the Surrey Rifle Volunteers. His name will crop up in the areas of books, rifle design and later in virtually every edition of the weekly **VOLUNTEER SERVICES GAZETTE** from its first appearance in October 1859. It is the opinion of a number of specialists working in the late 20th Century that John Boucher was basically unsound in his theories but should be given ten marks for sheer persistence and verbosity. His 1853 work was **THE VOLUNTEER RIFLEMAN AND THE RIFLE** (Riling 631). The first edition deals soundly enough with drill, training, ballistic theory, dress and even such esoteric arts as bullet casting (Second edition above). His **A TREATISE ON RIFLE PROJECTILES: &c., &c.**, (Riling 669) of 1856 dealt with a variety of subjects and is a catalogue of condemnation of virtually every new principle. He especially dislikes the Minie which he describes as a "fallacy" and a "delusion". Nevertheless, Boucher's voice will continue to be heard for a great many years and gunmakers such as F. T. Baker made rifles to his design.

The arrival on the scene of the new Rifle-Musket Pattern 1853 was greeted with enthusiasm and although supplies of it did not reach the Army in the Crimea until 1855, its comparative qualities were being widely discussed in 1854. Captain Jervis-White Jervis, R.A., wrote **THE RIFLE-MUSKET: A PRACTICAL TREATISE ON THE ENFIELD PRITCHETT RIFLE, RECENTLY ADOPTED IN THE BRITISH SERVICE** (Riling 649). This valuable work not only describes the rifle but goes at length into its manufacture with pictures of the barrel rolling and rifling machines. The work went into a Second Edition in 1859 but the First Edition has been reprinted (right) in facsimile in both 1984 and 1993.

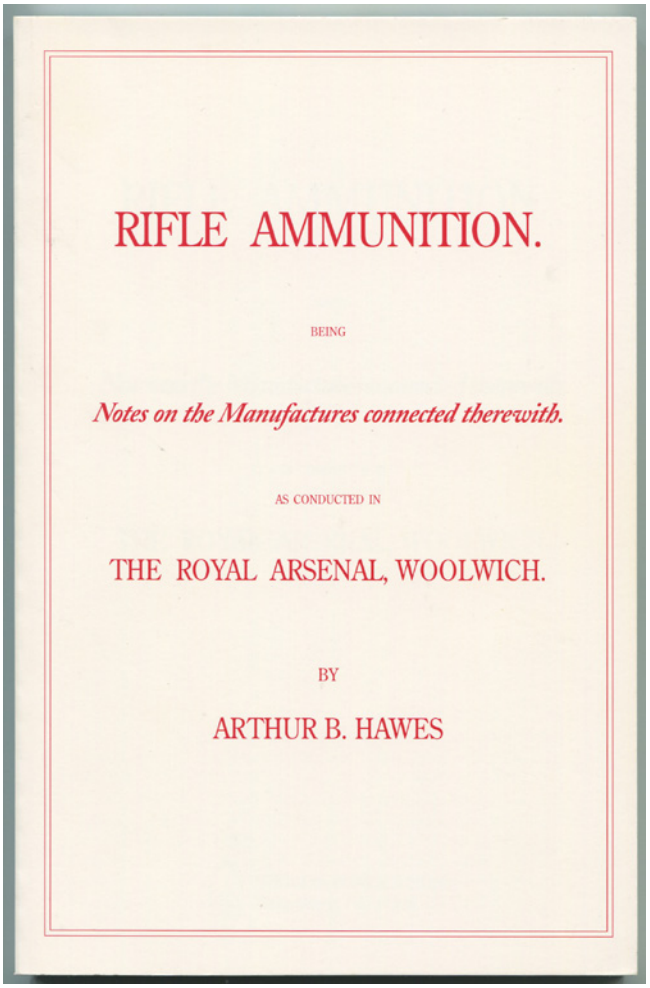
The Second Edition was extensively modified and lengthened to accommodate the numerous changes which practical experience had forced upon the Enfield. Another little book to greet the Enfield in 1855 was the now extremely rare **A COMPANION TO THE NEW RIFLE MUSKET COMPRISING INFORMATION ON THE CLEANING AND MANAGEMENT OF ARMS, AND ON THE MAKING OF CARTRIDGES**. This is not in Riling. It includes numerous plates of the parts of the Enfield enhanced by colour tinting. Although the author was anonymous, he later produced an 1859 edition, presumably to cater for the new Volunteer demand. The new edition discloses his name, S. Bertram Browne, formerly First Class Instructor of Musketry of Hythe and author of **THE ILLUSTRATED POSITION DRILL**. The tinted plates are replaced in the 2nd edition by shaded ones as tinting was an expensive hand operation.



The Assistant Commandant and Chief Instructor at the Hythe School of Musketry, Colonel E. C. Wilford, was another whose duties involved him in lecturing to numerous audiences. His lecture of 10th July 1859 to the United Services Institution is the first of **THREE LECTURES UPON THE RIFLE** (Riling 750) published in 1859 by John W. Parker and Son, West Strand. The second lecture in the book is that of 28th May 1859 to the same audience and the final lecture was that given to one of the early Volunteer training

courses at Hythe on 1st November. Leaders of the movement towards the creation of the Volunteers had taken the Hythe Course in July and August 1859 and it was then that a group of them decided to establish the National Rifle Association. These **LECTURES** are very well written and readable and would have provided excellent source material for Volunteer Officers lecturing to their own troops. The book is attractively but inexpensively bound in blue cloth laid down upon thin board, embossed and gilt, but with simple cut edges. This was a common binding method for cheap books during the mid 19th Century.

For those whose interest lay in the technicalities of the weapons and ammunition (and today's gun collectors), these books must have been fascinating and one other must be mentioned in this connection. **RIFLE AMMUNITION, BEING NOTES ON THE MANUFACTURES CONNECTED THEREWITH AS CONDUCTED IN THE ROYAL ARSENAL,**


RIFLE AMMUNITION.

BEING

Notes on the Manufactures connected therewith.

AS CONDUCTED IN

THE ROYAL ARSENAL, WOOLWICH.

BY

ARTHUR B. HAWES

WOOLWICH (Riling 718) by Captain Arthur B. Hawes, a retired half pay officer of the Bengal Army, was published in July 1859. This is probably the best account there is of the processes involved in the manufacture of the paper cartridge for the Pattern 1853 Enfield Rifle in its developed form. The book appeared with the approval of Boxer, and was intended for the use of the Army of India, but the War Office considered it to be so good that it requested Hawes to proceed by giving him an order for 200 copies for the Army generally in addition to those he could sell privately. This is an excellent Treatise and covers every aspect of the cartridge from the manufacture of the paper to the making of the barrels to store it in. It is impossible in this article to describe the contents in detail but the main headings are The Bullet, The Plug, The Cartridge, Metallic Tubes (for storage in damp conditions), Lubrication, The Cap, Ammunition Barrels, Rifle-Practice Targets, Experimental Targets, Mantelets, Rifle Rests, The Micrometer, Penetration of Rifle Bullets, Experimental Practice and The Vernier. There are 95 pages and 15 illustrations of which three are large folding plates stored in a pocket in the binding. Anderson's machinery for swaging bullets from lead wire as well as that for extruding the wire is described in detail. Other machinery described includes the automatic lathe for making the box wood plugs (this is prior to the baked clay plug) and those for filling and lubricating. The new blank cartridge was especially noted. Prior to this period, blanks were very simple tubes of paper which did not give the soldier any practice in the technique of loading live rounds. The new blank was a facsimile of the ball cartridge which used a dummy bullet of papier-mache filled with powder. The soldier could now go through the exact loading procedure for the Enfield on every occasion. Hawes' work is essential for any one studying the Enfield Cartridge and would have been popular with the technically minded Volunteer.

William H. Russell, the famous ***TIMES*** Special Correspondent, whose reports of the maladministration from the Crimea had such great influence on military reorganisation, brought his considerable powers of expression to bear in **RIFLE CLUBS AND VOLUNTEER CORPS** (Riling 724) which was published in 1859 by Routledge, Warne, and Routledge,

London and New York. In his Preface to the book he closes by stating: "National instincts seldom err. We feel the danger in the air, and he is a fool who does not prepare for its coming." Russell cites the dangers to our extended and wealthy coast line and its numerous ports and seaside towns from sudden raids by fast steam vessels carrying small bodies of troops that could land and wreak havoc before the central military authorities had time to react. He backs his assertion of the need for local volunteers by detailing cases where British ships during the Crimean Campaign had gone aground and been captured by small parties of Cossack Riflemen and Light Field Artillery before their crews had the time to get them off. Russell does not claim to be an expert in the subject of the rifle but he recommends his readers to the work of Hans Busk.

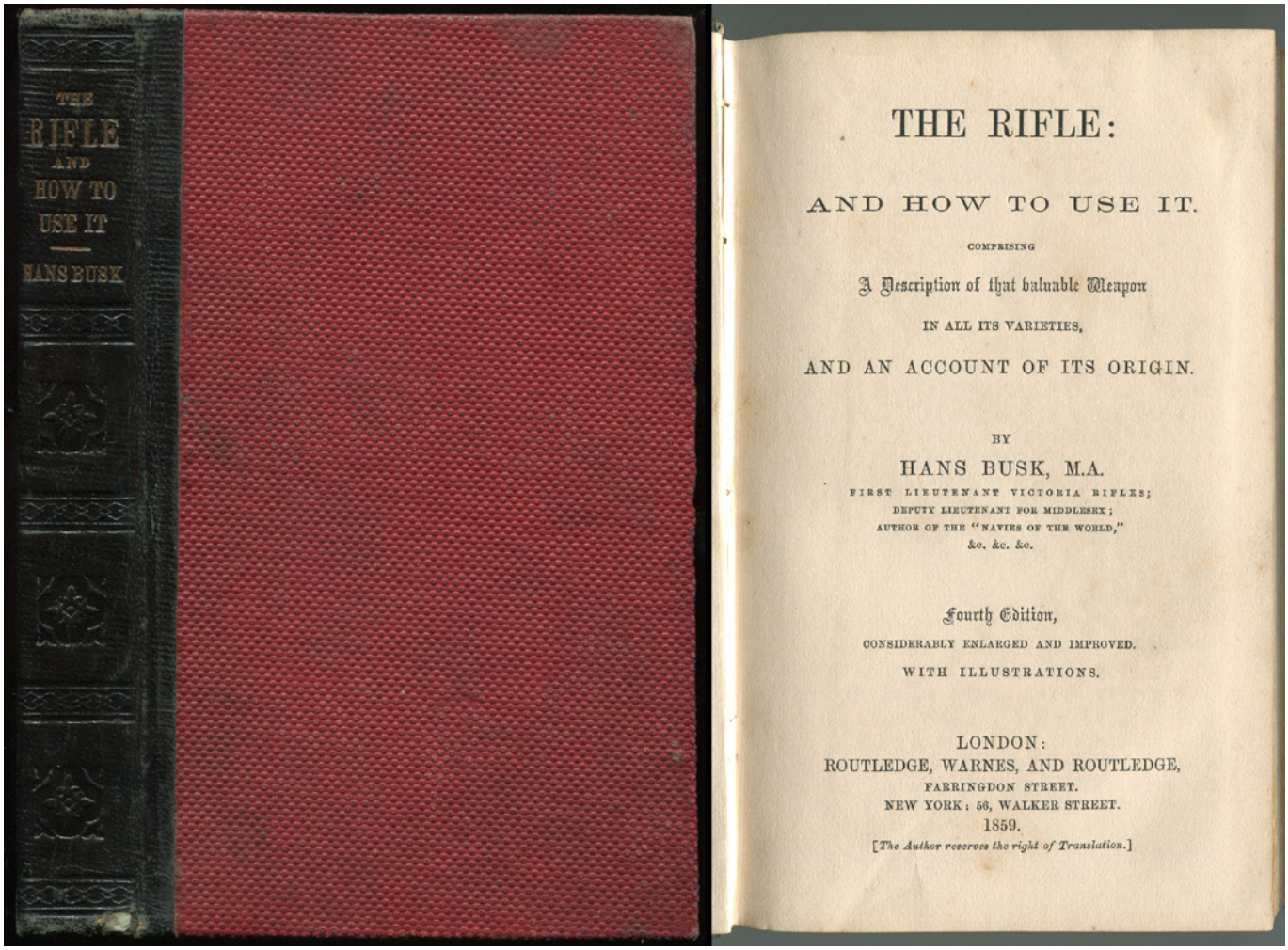
Hans Busk

Probably the single most influential author of the period prior to and at the beginning of the 1859 Movement was the barrister, Captain Hans Busk (1815 - 1882) of the Victoria Rifles. His unit was one of the very few surviving Association/Clubs from the Napoleonic period. In its earlier days it achieved a leading place in the history of shooting as The Duke of Cumberland's Sharp-shooters. For those who might have believed otherwise, Sharpshooter is an expression dating well back into the 18th Century and has nothing to do with the rifles of Christian Sharps.

Hans Busk was born on 11th May 1815, six weeks before the Battle of Waterloo, and as far back as the 1830's, as an undergraduate at Cambridge, was pressing the government to encourage the formation of Rifle Clubs for the defence of the country against possible invasion. When rebuffed by the Prime Minister, Lord Melbourne, he established a model Rifle Club in the University and published a series of articles in one of the quarterly journals. This series was revived by him in book form in 1858. In the preface to the Second Edition, dated 18th June (*) 1858, entitled **THE RIFLEMAN'S MANUAL OR, RIFLES, AND HOW TO USE THEM** (Riling 693), he describes how he has been persuaded to modernise and re-issue his earlier work. This Second Edition is, in fact, an early version of the well known **THE RIFLE: AND HOW TO USE IT**. A high level of interest in the Second Edition led to a Third dated 18th September 1858 followed by the Fourth on 18th May 1859. The Second is the only edition to appear in Octavo size, as from the Third Edition onwards it became a pocket book when the publisher was changed from Charles Noble to Routledge, Warne and Routledge.

By the end of 1859, following the government's decision of 12th May, to permit Volunteer Corps to form under the authority of Lords Lieutenant of Counties, enthusiasm for the idea grew rapidly. Busk responded by writing in rapid succession **RIFLE VOLUNTEERS: HOW TO ORGANISE AND DRILL THEM IN ACCORDANCE WITH THE LATEST OFFICIAL REGULATIONS** (not listed by Riling), **HANDBOOK FOR HYTHE: COMPRISING A FAMILIAR EXPLANATION OF THE LAWS OF PROJECTILES AND AN INTRODUCTION TO THE SYSTEMS OF MUSKETRY, NOW ADOPTED BY ALL MILITARY POWERS** (Riling 733), **HANS BUSK'S TABULAR ARRANGEMENT OF COMPANY DRILL** (not listed by Riling) and, not content with all that he was writing for the Volunteers, he also produced in 1859, **THE NAVIES OF THE WORLD; THEIR PRESENT STATE, AND FUTURE CAPABILITIES** (not listed by Riling).

(*) Footnote - June 18th was a date filled with meaning throughout the 19th Century in Great Britain. It was the day upon which the Battle of Waterloo had been fought in 1815. In 1855 it was the day chosen for the Assault upon Sevastopol following the Fourth Bombardment and had been given an almost mystical significance which made the failure of that Assault all the more poignant. Lord Raglan, himself a Waterloo veteran, died ten days later, some say of a broken heart.



THE RIFLE:

AND HOW TO USE IT.

COMPRISING

A Description of that Valuable Weapon

IN ALL ITS VARIETIES,

AND AN ACCOUNT OF ITS ORIGIN.

BY

HANS BUSK, M.A.

FIRST LIEUTENANT VICTORIA RIFLES;
DEPUTY LIEUTENANT FOR MIDDLESEX;
AUTHOR OF THE "NAVIES OF THE WORLD,"
&c. &c. &c.

Fourth Edition,

CONSIDERABLY ENLARGED AND IMPROVED.

WITH ILLUSTRATIONS.

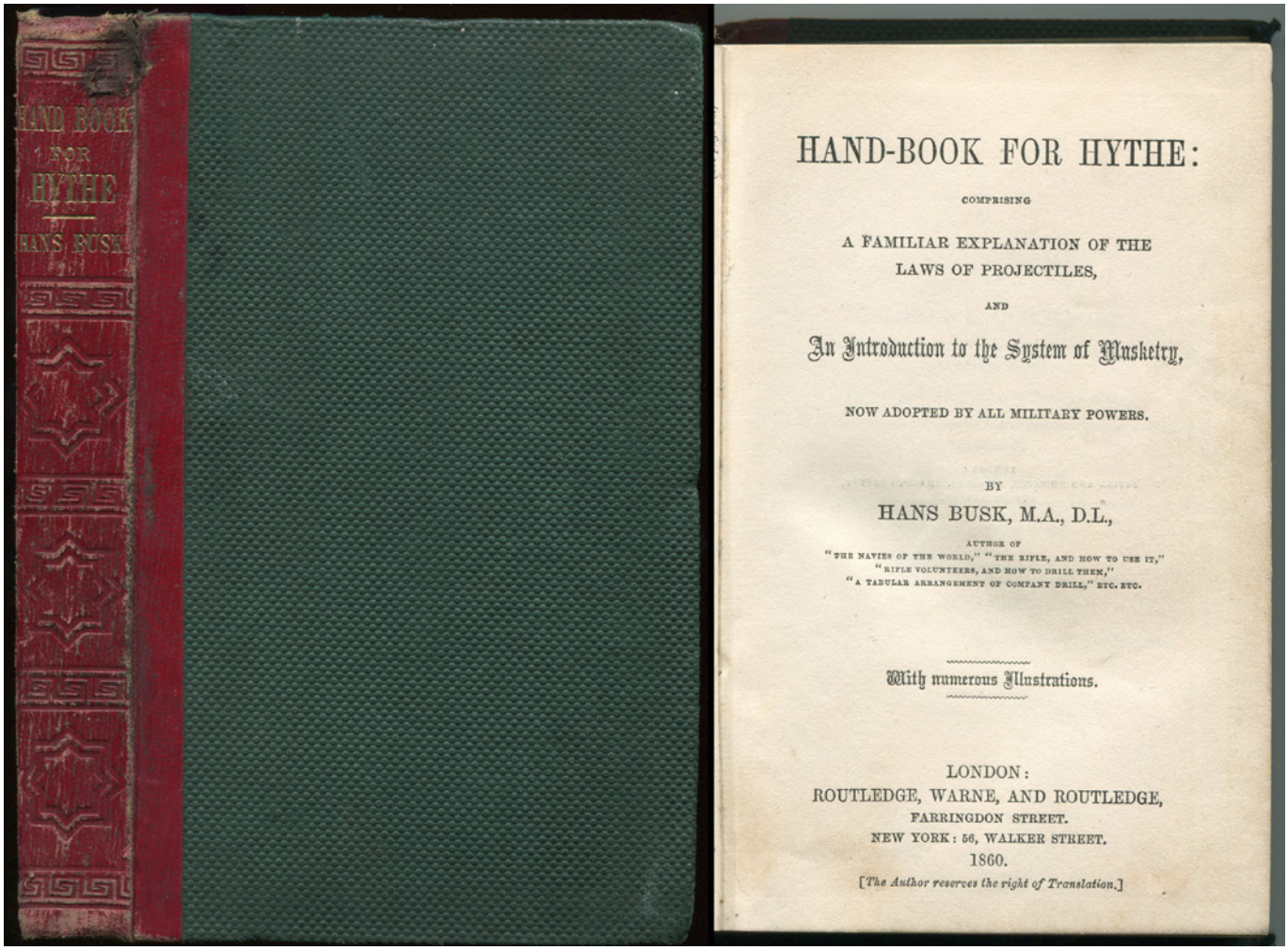
LONDON:
ROUTLEDGE, WARNES, AND ROUTLEDGE,
FARRINGDON STREET.
NEW YORK: 56, WALKER STREET.
1859.
[*The Author reserves the right of Translation.*]

Busk's best known work is **THE RIFLE AND HOW TO USE IT**. This ran to at least eight editions. We have looked at the first three already. The Fourth to the Sixth were in the same style as the Third but the Seventh was greatly enlarged and featured Busk's portrait as the frontispiece. All these editions appeared before the end of 1860. The earliest editions concentrated more on firearms development but, by the Fourth, equal emphasis is being placed upon drill and musketry.

The only other work listed by Riling is **HANDBOOK FOR HYTHE** of 1860 which reached at least two editions. This is an excellent technical treatise for the training of officers at the School of Musketry at Hythe which had been established by General Hay in 1854. Much of its material was used subsequently in the official **TEXTBOOK FOR HYTHE** published by H.M.S.O. in several editions.

Both **THE RIFLE AND HOW TO USE IT** and **HANDBOOK FOR HYTHE** were reissued in facsimile by Richmond Publishing Company in 1971 and second-hand copies are readily available. The first is still easily found in one of its original editions but it will be extremely unlikely to be an earlier edition than the Fourth. **HANDBOOK** is very scarce in the original.

RIFLE VOLUNTEERS: HOW TO ORGANISE AND DRILL THEM was also written in 1859 and had reached its Seventh Edition by 5th January 1860. This is once again an indication of the enthusiasm with which the public took to Volunteering. The book is in the same pocket size format of the two just mentioned and is bound in boards with printed paper covers showing two soldiers dressed in the uniforms specified in the text within. The usual binding for the others is embossed red cloth with leather spines.



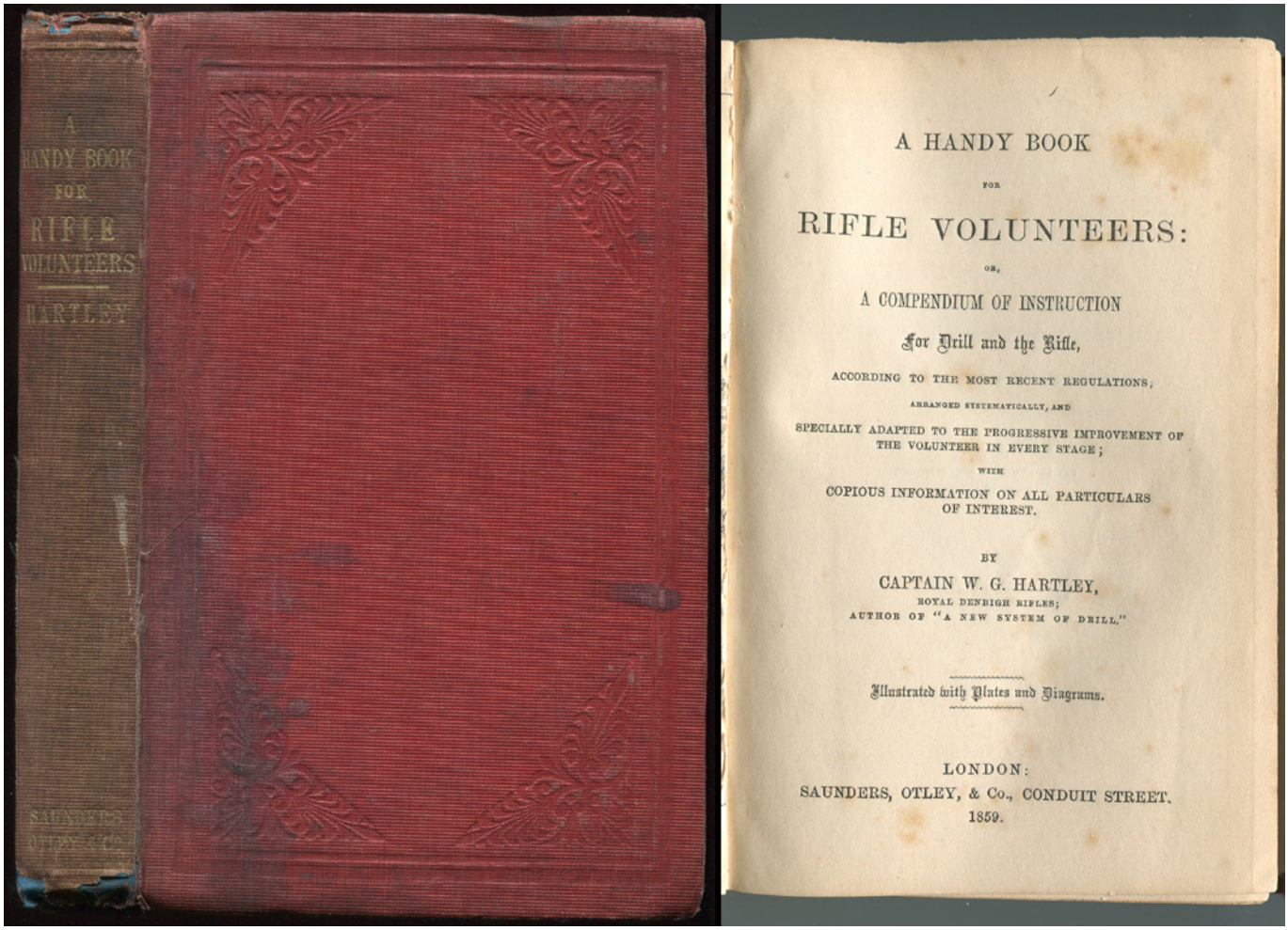
HANS BUSK'S TABULAR ARRANGEMENT OF COMPANY DRILL is an unusual little item. It is, in fact, a wall chart or poster, mounted on cloth like a map, and is intended to be hung upon the Drill Hall wall to provide an instant reference to all ranks of their respective positions and duties. He also produced a book of Rifle Target Registers.

His book **NAVIES OF THE WORLD** is not really applicable to the Volunteers other than its references to the risks of sea borne invasion but it is a valuable source for students of the navy and packed with data. Busk himself became Deputy Lieutenant of Middlesex and was also High Sheriff of Radnorshire, the location of the family seat.

The Pressure Mounts

The years 1859 and 1860 were particularly active ones in the literary field as writers sprang to both encourage the urge towards volunteering and to instruct the new citizen soldiers. From the provinces we have an example to consider from among those that appeared.

The small County of Denbigh in North Wales raised no fewer than nine Corps between 30th January 1860 and the end of 1861. Leading up to this, in July 1859, an officer of the County's Militia, Captain W. G. Hartley of the Royal Denbigh Rifles, wrote **A HANDY BOOK FOR VOLUNTEERS: OR, A COMPENDIUM OF INSTRUCTION FOR DRILL AND RIFLE** .. (we will spare the full title). This is not listed by Riling but, unusually, it is listed by Gerrare as #1108 in the 1895 Bibliography. The book has eight introductory



pages followed by 248 of text together with a number of charming illustrations of Volunteers in the author's idea of the ideal uniform. This owes much to the Italian Alpine troops with plenty of cocks' feathers in the hats and thigh length leggings under short breeches. Hartley gives a very full set of instructions for the management and training of Volunteers and goes at length into his ideas of uniform. A very interesting set of tables gives the degree of visibility at different distances and conditions of light for the various colours of uniforms that might be encountered. He favours brown as being the least visible of all the colours in most lights. His chosen rifle is the Lancaster Oval Bore and he pays great attention to the vital necessity of Judging Distance Drill. Much of the book is given to standard military instruction in drill including the Manual and Platoon Exercises and to both theoretical and practical rifle instruction.

In the next part we shall look at the flood of books that appeared with the Volunteers and consider the relationship with the National Rifle Association which grew out of the Movement and which probably represents their most visible link with the present day.

Notes:

'Riling' references are to: '*Guns and Shooting: A Selected Chronological Bibliography*' by Ray Riling (Greenberg, New York, 1951)

Illustrations courtesy; *Research Press Library*.

Muzzle Loaders Association of Great Britain

The MLAGB was formed in 1952 and is the Governing Body for muzzle loading within the UK.

Its objectives are to encourage an interest in muzzle loading firearms, to promote, regulate and safeguard their use and to preserve their freedom of collection.

www.mlagb.com

Historical Breechloading Smallarms Association

The HBSA was founded in 1973. The fundamental aims of the HBSA are to encourage the Preservation of Historic and Heritage Breechloading firearms and to foster the research and study of all aspects of the subject, from the aesthetics of sporting guns and the engraver's art to the functional aspects of firearms used by the soldier, target shooter and the sporting shooter.

www.hbsa-uk.org

Long Range Black Powder Rifle Target Shooting

Long range target shooting with the percussion muzzle loading rifle and black powder cartridge rifle.

Historical study and shooting today.
19th Century competition at Wimbledon, Creedmoor and Dollymount. The rifles, ammunition and equipment, riflemen and gunmakers.

www.facebook.com/groups/researchpress

The Hepsworth Medal
Long Range Rifles Branch of the Muzzle Loaders Association of Great Britain

obverse

reverse