

ANCIENT COUNTERPARTS TO MODERN INVENTIONS.

The statement that Henry VIII. possessed a breech-loader or the Snider system (Mark II.) and also a muzzle-loading rifle; that the Spanish Armada carried wrought iron breech-loading guns fixed on pivots, with all recoil checked, like Krupp's pivot guns; and that Marshal Vauban had a breech-loading small-arm whose breech closed with an interrupted screw, would probably be treated as statements containing some double meaning or altogether made in joke. Nevertheless, we propose to show how very nearly these are sober facts. The pieces themselves, with innumerable other curiosities in artillery are open to public inspection in the Rotunda Museum on Woolwich Common. The pieces are well arranged and catalogued, thanks chiefly to Sir H. Lefroy, K.C.B. We propose from them to give some illustrations of modern ideas forestalled in ancient times; but before doing so we would strongly protest against the use to which such anticipations are apt to be put. We hold that if a successful invention has established its reputation, it is a most unjustifiable thing to dig out of some obscure corner in a museum something that in a measure has the same idea embodied in it, and treat the unfortunate inventor as a sort of pirate by confronting him with a design that he never had seen or heard of—of which the worth was perhaps never suspected until worked out to a successful issue by the modern inventor. While, however, in no way detracting from the credit of inventors of our time, we cannot fail to see that in very many instances designs subsequently successful have been fairly worked out hundreds of years ago and allowed to drop into disuse. How is this to be accounted for?

We think it is due to the deficiency of machinery and of means of reproduction. A design might be worked out formerly by a skillful mechanic which, although rough to modern eyes, answered fairly well; but the idea of manufacturing the same article by the thousand seemed wild unless the pattern was very simple. With ordnance also we think that the difficulty was aggravated by the comparative ease with which powder was improved. The half developed breech-loaders with bad, rough joints, for example, would manifest such faults that simple sound muzzle-loaders would be far preferable. The rough wrought iron guns made of hoops and staves would in the same way give place to those of cast metal. Then the real powers of rapidity of a Snider or a Colt's revolver action might be masked by the imperfection of the old fashioned lock used in connection with them. It is easy to see how designs might remain in the stage of ingenious curiosities, until they ceased to attract attention, two hundred years ago—designs which would in the present day quickly assert their superiority, because they would be well and easily manufactured. Apparently our ancestors had as much ingenuity as ourselves, though circumstances were unfavorable to their success. It is interesting then to trace out the representatives of many of our best modern designs, while we, at the same time, distinctly repudiate the idea that the existence of the old ones detracts from the claims of the new, unless it can be shown that they were

actually copied from them. This, we hold, with perhaps rare exceptions, is out of the question; and even were it not so, considerable credit still attaches to the man who can seize what is good in a collection of obsolete arms. To come, then, to actual designs. We will first take the question

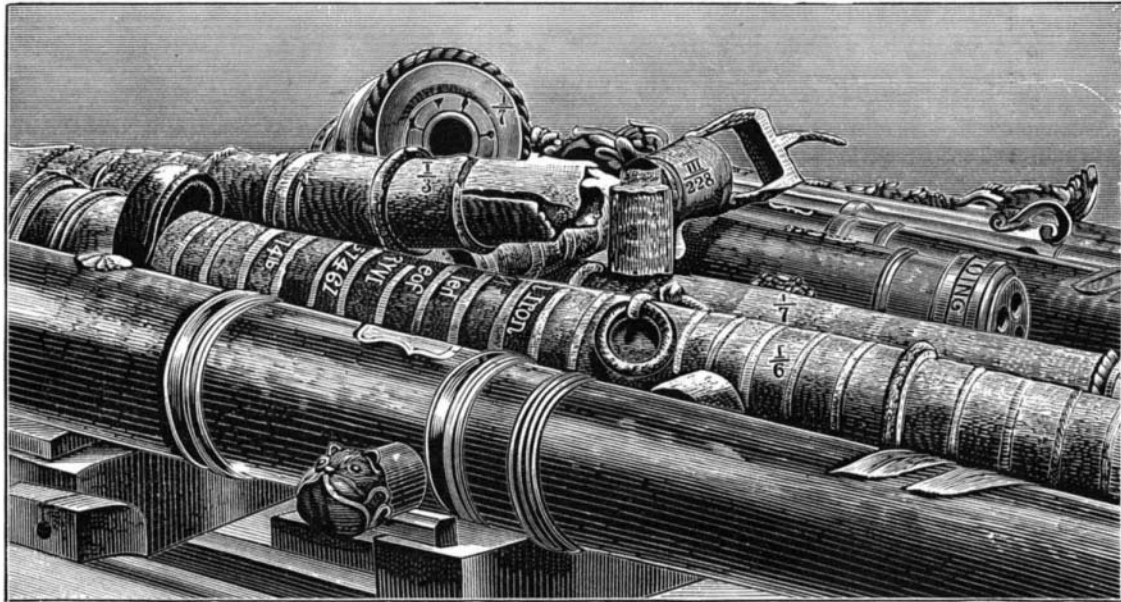


Fig. 1.—GROUP OF ANCIENT BUILT UP WROUGHT IRON GUNS.

of metal and its structural arrangement. Fig. 1 exhibits a remarkable group of guns. They are classed together in the Rotunda Museum, but by the permission of Major Hime, R.A., the secretary of the Royal Artillery Institution, they were grouped specially in order to make the photograph shown in our cut.

The guns marked —, —; and — (these being their actual Museum numbers) are some of the oldest to be found in England, belonging to the first stage of the existence of artillery.

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No. — is a portion of a wrought iron cannon thought to belong to the fourteenth or fifteenth century, found with others in the sands of Walney, Morecombe Bay, by Mr. C. A. Archibald, and presented by him to the Museum. It may be seen that this piece is built up of longitudinal pieces of wrought iron running along the bore, like the staves of a barrel, held together by hoops or rings of wrought iron. Strength in the tangential and longitudinal directions was in this case separately supplied by the exterior and interior portions of the gun respectively. The serpent

I I
cannons, Nos. — and —, are
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of nearly similar construction.

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No. — having been injured,
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it was judged right to cut it open to exhibit its structure. The breech of it is seen in cross section over the other guns. The interior ring is gun metal at this portion of the piece, the chamber being lined with a cylinder of this material. Outside this are longitudinal flat bars, placed like staves of a barrel, but two deep, welded together imperfectly, leaving interstices which are sealed up with lead. Outside are thirty-five rings or hoops, averaging 2.3 inches in width and 1.5 inches thick near the breech. These have been burred down while hot at their edges, and the joint closed. The iron is of excellent quality, giving a tenacity of about 55,258 pounds to the inch, nearly resembling that now employed in wrought iron guns—*vide* R.A.I. catalogues.

How far are modern principles embodied in these primitive designs? We cannot admit that there was great merit in the employment of wrought iron, because in early times it might only mean that the art of casting iron was imperfectly mastered. We cannot, for example, argue that wrought iron was preferred to cast metal because the latter cannot be adjusted to meet the strains that are now known to fall on the successive layers of a gun. All we can distinctly say is that the iron was placed so as to adjust its fiber to meet longitudinal and tangential strain, and that bronze had been employed to bear the erosion of the powder gas at the seat of the charge, where it unquestionably was better suited to the work than wrought iron with imperfectly closed joints. There is, however, altogether a considerable measure of science applied to very rough manufacture. The wrought iron breech loader, No. III

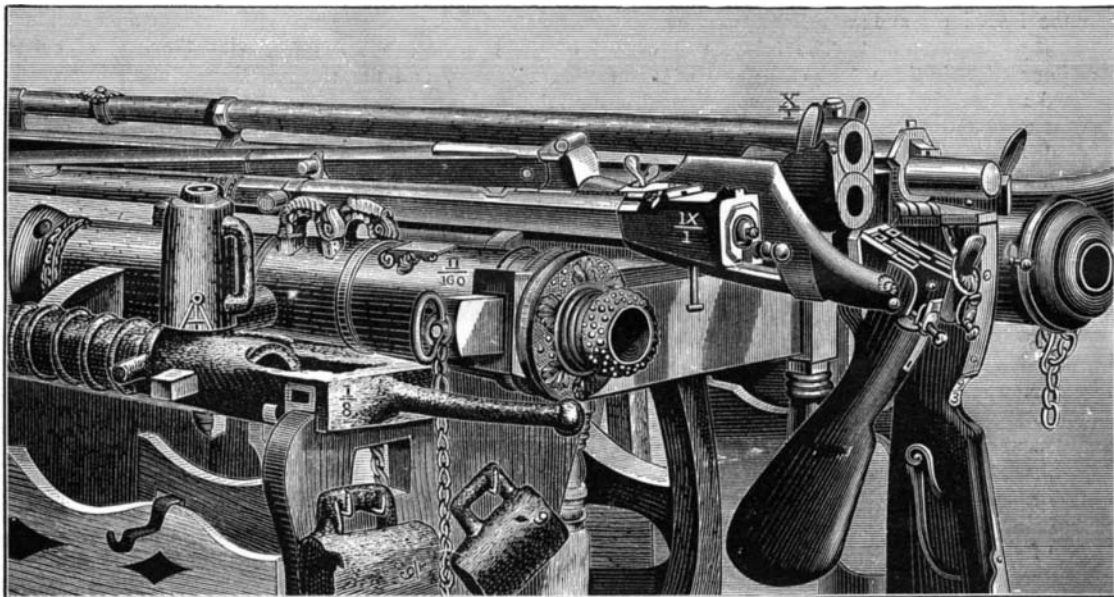


Fig. 2.—GROUP OF ANCIENT BREECH-LOADING GUNS.

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iron breech loader, No. III
—, is remarkable. It
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came out of the Spanish Armada. It has the curious tail piece running from the breech common to such guns. The chamber may be seen placed on end in front of the piece, stand-

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ing on —. These cham-
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bers were entered into the opening, which was presented upward when the gun was mounted, the gun, in fact, being slotted through vertically; the chamber was then secured, generally by a pin. It may be seen that the charge must have been very weak to suit such a gun. In many cases these guns were mounted on pivots, where there was no more allowance for recoil than in Krupp pivot boat guns. Here, at all events, we have the advantage of

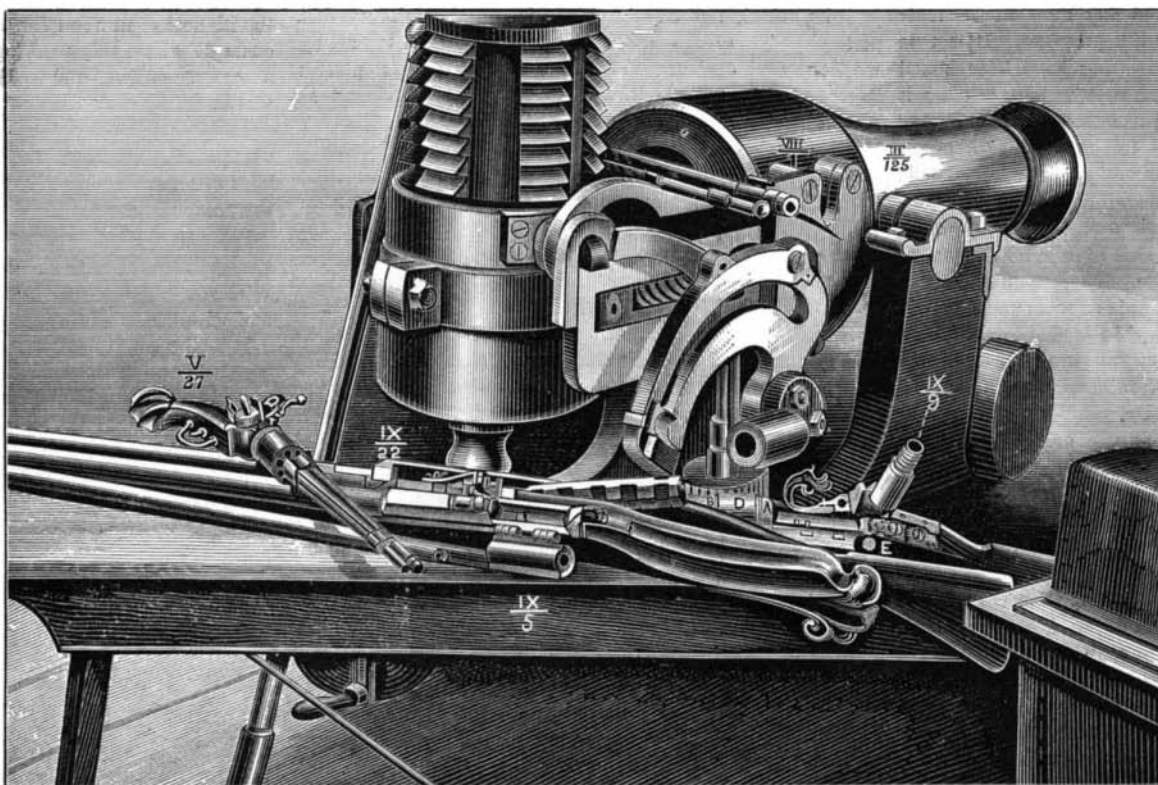


Fig. 4.—GROUP OF ANCIENT ARMS.

loading at the breech connected with absence of recoil, in a way that no roughness of manufacture can conceal. The principle of non-recoil was frequently, of course, embodied in wall pieces on tripod stands. We did not learn breech-loading from the Spanish Armada, for in Fig. 2 will be seen

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a similar gun, —, which looks better made; but it apparently

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has not been subjected to the same influences of weather—indeed, the Armada gun looks as if it had laid under water for a long time, which reminds us, by the way, that there is a breech-loader taken up out of the wreck of the Mary Rose, sunk in 1545, on which the action of sea water for three hundred years has indeed played havoc. This gun,

in Fig. 2, No. —, is of the time

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of Edward IV.—A.D. 1461 to 1483. It is made of longitudinal bars of iron hooped with iron rings. The chamber with lifting handle is complete. The vent is well preserved. Length of gun, 3 feet; caliber, 2.5 in.; weight, 1 cwt. 13 pounds.* The breech end in this gun fits on over the barrel below the trunnions. The curious square-shaped projection behind the trunnions appears to be a sort of rough key piece holding the two parts of the gun together. The bolt hole for securing the chamber may be seen in the side. Other chambers with handles may be seen

in this cut. If we learned nothing in breech-loading from the Spanish Armada, we might apparently at a subsequent date have taken something from the Dutch, judging from

II
No. —, Fig. 2, which is dated 1650. It is a brass breech-

IX
loader, a very handsome gun. The bore is continued through the cascable, being closed at the breech after loading by a wedge (*vide cut*) moving horizontally, being on the same general idea as that of Krupp. This gun was found by Captain—now Admiral—Selwyn, R. N., in a deserted Dutch fort near the mouth of Gambia River about 1851. The actual

IX
wrought iron wedge is modern. The gun —, Fig. 2, is an

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other remarkable one—also classed —; it is of wrought

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iron, beautifully finished, and bears the date of 1619. It is inlaid with gold and silver, and bears the cipher of Louis XIII., with initials M. and R., etc. The bore is continued from end to end. It has a vertical slot and a vent piece, in which is a vent with the first portion vertical and last portion horizontal, like that of the first Armstrong system. Fig. 3 shows the breech open. It will be seen that the breech piece is worked from a lever below, reminding one somewhat of the Martini lever, though it has not much in common with it, having comparatively an awkward motion. The lever, B, brought down the block, A, to open the breech. In closing the cap, C, had a catch, which holds into the breech end of the entire gun. The hinge, D, is broken; there may have been some special piece there suited to the descent of A in a straight line.

The French wall piece

X
—, Fig. 2, is an ingenious

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double barreled one, loading at the breech. The date is about 1690. The barrels are rifled, being grooved with twelve rectangular grooves. Caliber, 1.45 inches; length of rifled portions of the barrels, 7 feet 8.8 inches; length of unrifled portion—for the charge cylinders, 9.25 inches; total length of piece, 8 feet 8 inches. The breech bolt carries the motto of Louis XIV. The year 1690 is an early date for a rifle; but there is an earlier specimen, namely, a barrel taken from Hungarian insurgents in 1848, with a date of manufacture on it of 1547.

The grooving is not visible at the muzzle, having been

obliterated; but on removing the breech plug, six fine grooves, with a twist of 1 in 26, were discovered. It is thought improbable that a specimen of rifle of an earlier date than this can be found in any collection, Danner, of Nuremberg, having been commonly said to have perfected the rifle about 1552 A.D.

Our object, however, is to select the special features that have come in in modern times as new, and we would call attention to the group depicted in Fig. 4. The mus-

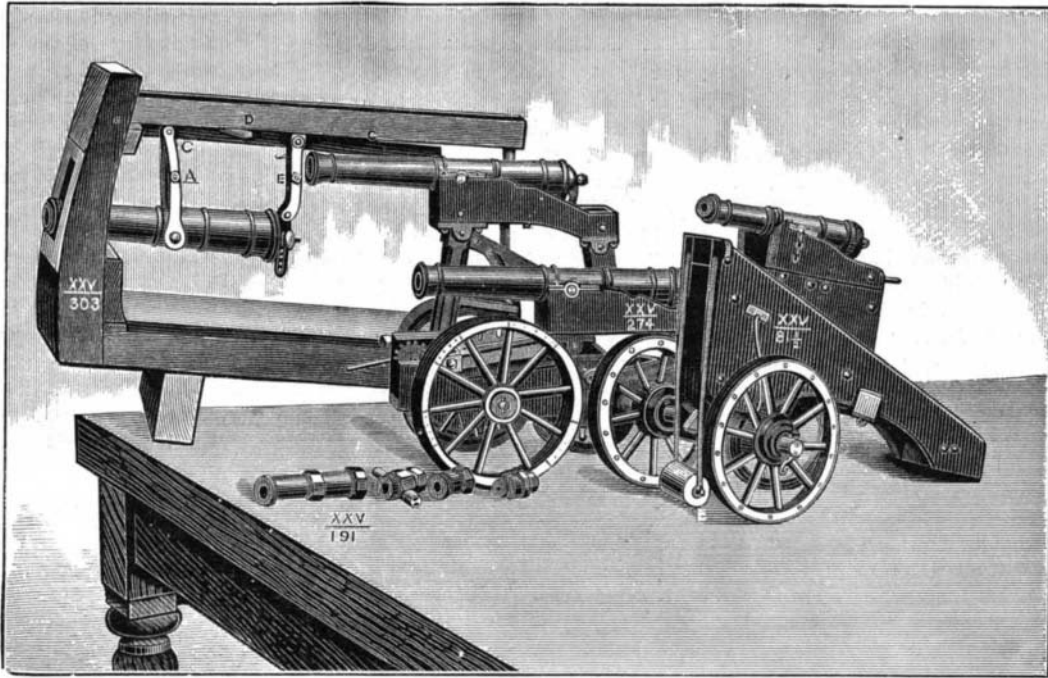


FIG. 5--GROUP OF DESIGNS FOR CHECKING AND STORING UP FORCE OF RECOIL.

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ket— is a breech-loader. The invention is ascribed to Mar-

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shal Vauban. Mr. Hewitt has shown from an English example in the Tower that this combination of flint lock and breech-loading was known in England in the time of James II. The feature we wish to point out is the interrupted screw, which forms so characteristic a point in the new

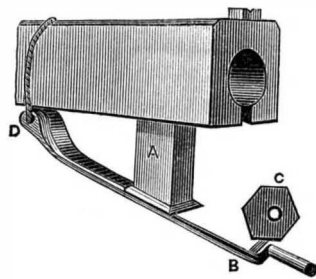


Fig. 3

French breech-loading guns and those adopted in our service during the last three years. The interrupted screw was on the front end of the breech block turned up. The corresponding interrupted thread was in the enlarged breech end of the barrel, A.

The barrel, B, with a portion of the stock, C, attached, was free to slip forward and backward through the collar, D, attached to the main portion of the stock, E.

To close the breech, the breech block is turned down, the barrel slid home on it, when turned round in the proper position for the interrupted

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look at —, attributed to the time of Henry VIII., when

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we think they cannot fail to be struck with the identity in general idea of this breech-loader with the Snider.

The Snider offered the advantage of adaptation of hammer and lock to firing a central-fire cartridge, and of application of shoe containing breech block to barrel by tapping and screwing without any operation involving the heating of the barrel. These, as well as the sliding extractor, do not belong to this piece. Nevertheless, the resemblance of the general idea is remarkable.

VIII.
Small-arm No. —, whose

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barrel is seen in cut, C, is comparatively a modern piece, having been proposed by Sergeant-Major Moore, R. A., in 1839. The arm is dated 1843. It is remarkable as having the hexagonal system of rifling recommended subsequently by Sir J. Whitworth. The twist is almost identical, being one turn in 29.5 inches, the caliber being 0.71 inch. This amounts to a spiral of one turn in forty-one calibers. The Whitworth rifle pattern, 1862, had a twist of one in 20 inches, with a diameter across angles of 0.49 inch, which amounts to a spiral of one turn in nearly 41 calibers. The combination of hexagonal rifling and spiral is, then, almost identical with that afterward proposed by

Whitworth; but we have no sort of reason to question the originality of the latter.

V
If these two last are striking, what will be said of —, which

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is a six-chambered revolver pistol of the 17th century, with wheel lock? A casual observer might almost pass it as a Colt's revolver; diameter of bore, 0.35 inch; length of barrel, 14 inches. Among the small arms there are found examples of rifled arms, breech-loaders, and a six-chambered revolver. Can we complete the series by anything like the piece that is now finding its way into the equipments of nations—that is, a magazine arm? Such an arm is

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found in —, which is seen in Fig. 4. It is a crude affair,

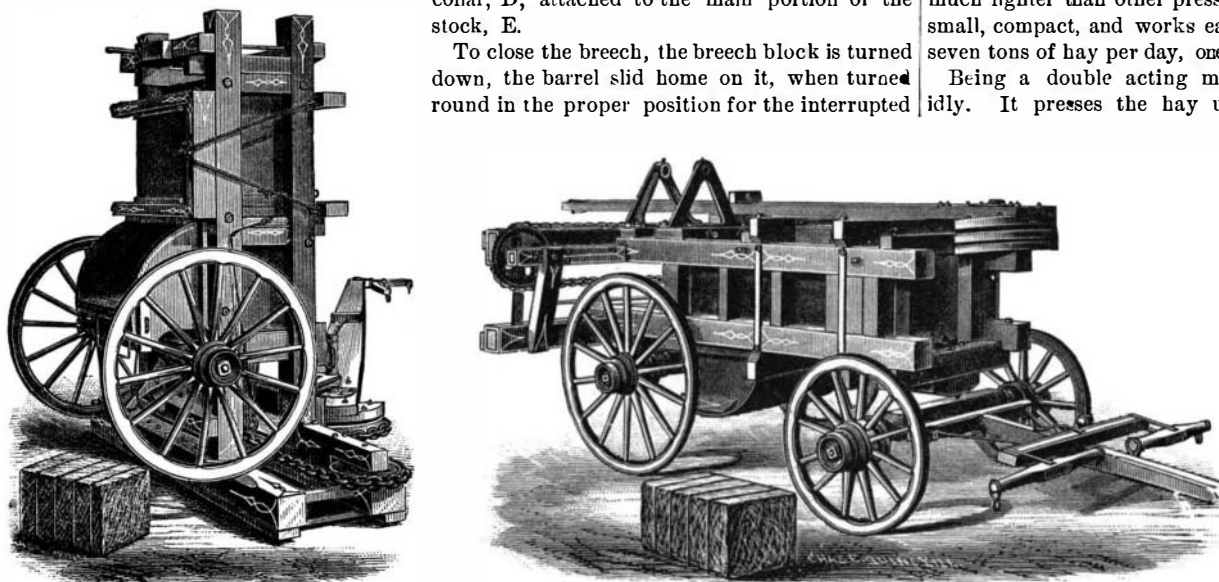
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the charges being inserted in succession in the magazine, B, probably with tight wads between them. Each charge occupies a given space with its own touch hole. The flint lock is made to slide along a guide bar. It is worked by a trigger in the stock; it is moved forward to fire the front charge, and drawn along to stops in positions fixed to enable it to fire the other charges, probably in rapid succession if everything went right, but this we should think seldom
(Continued on next page.)

PORTABLE HAY AND MOSS PRESS.

The engraving represents a new portable hay and moss press manufactured by the patentee, Mr. George Ertel, of Quincy, Ill. This press is of entirely new design, and is much lighter than other presses for the same purpose. It is small, compact, and works easily, turning out from five to seven tons of hay per day, one horse doing the work.

Being a double acting machine, it operates very rapidly. It presses the hay upward in separate charges, insuring freedom from dirt and gravel. The hay in the bale lies lengthwise and is bound up crosswise.

The average weight of bales turned out by this machine is 100 pounds, a convenient size easily handled. This press is mounted on four wheels, and arriving at the hay the sweep is taken down from the press, the nut on the kingbolt taken off, and then the press is set up, swinging on the hind wheels, and as soon as sweep is placed it is ready for work. Two



ERTEL'S PORTABLE HAY AND MOSS PRESS.

men and one boy, with one horse, can operate the press successfully.

The press is operated by an ingenious arrangement of toggle links acted on by a chain connected with a drum moved by the sweep to which the horse is hitched. The machine works both ways, so that whenever it moves it is doing its work. We understand that a number of these presses have been sold, all of them giving excellent satisfaction.