

(No Model.)

6 Sheets—Sheet 1.

A. NOBLE & E. W. LLOYD.
BREECH LOADING ORDNANCE.

No. 531,594.
Fig. 1.

Patented Dec. 25, 1894.

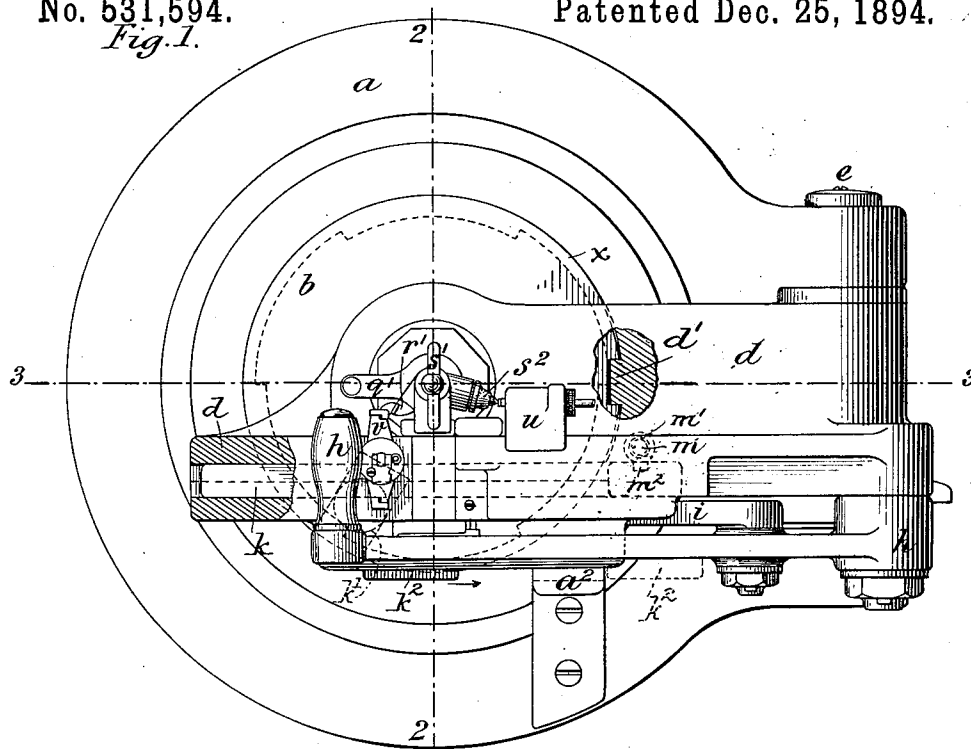


Fig. 2.^a

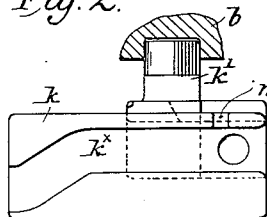
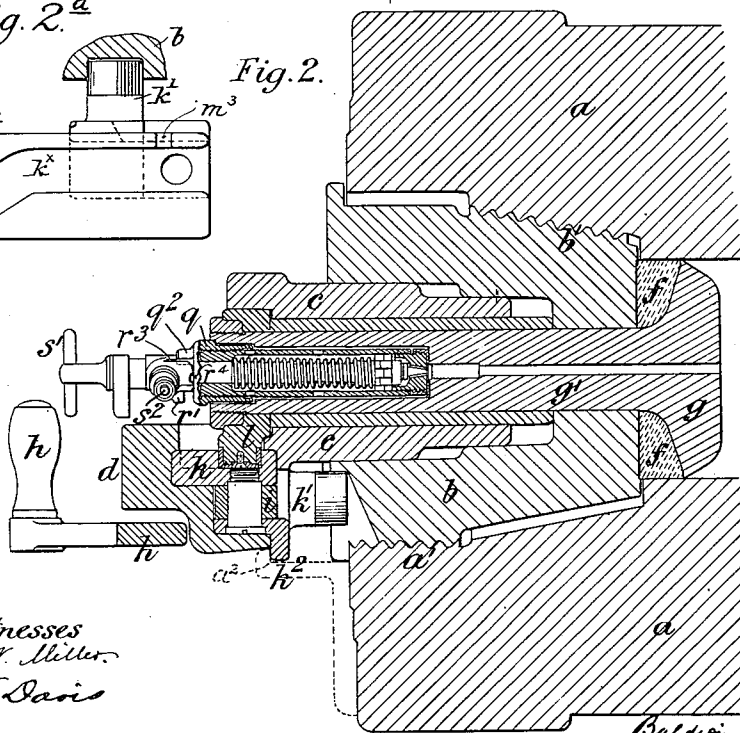


Fig. 2.



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Fig. 4.

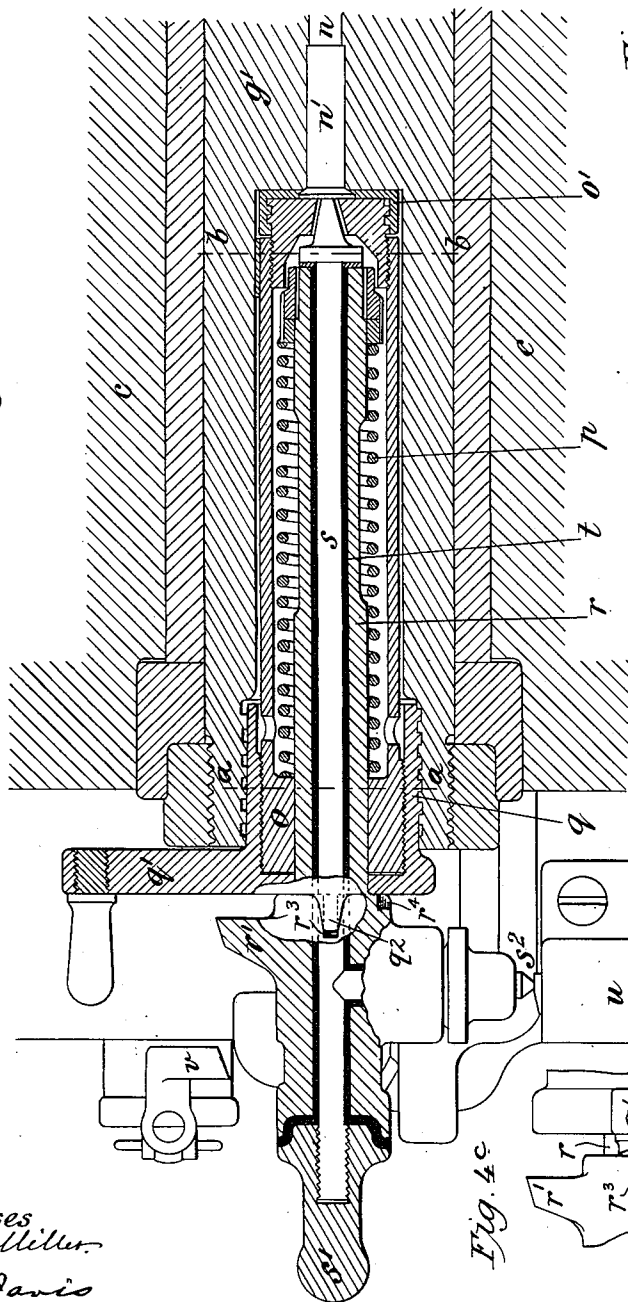


Fig. 4b
on b-b

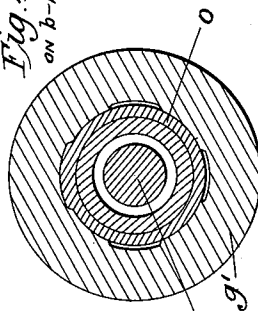


Fig. 4a
on a-a

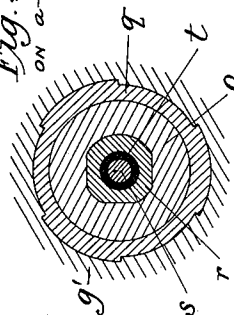
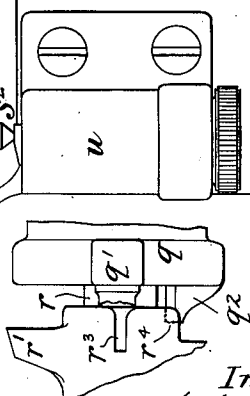


Fig. 4c



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Fig. 6.

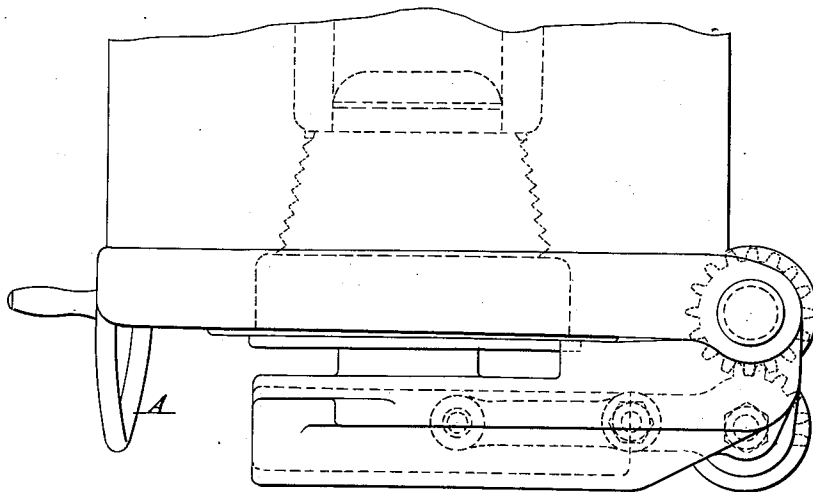
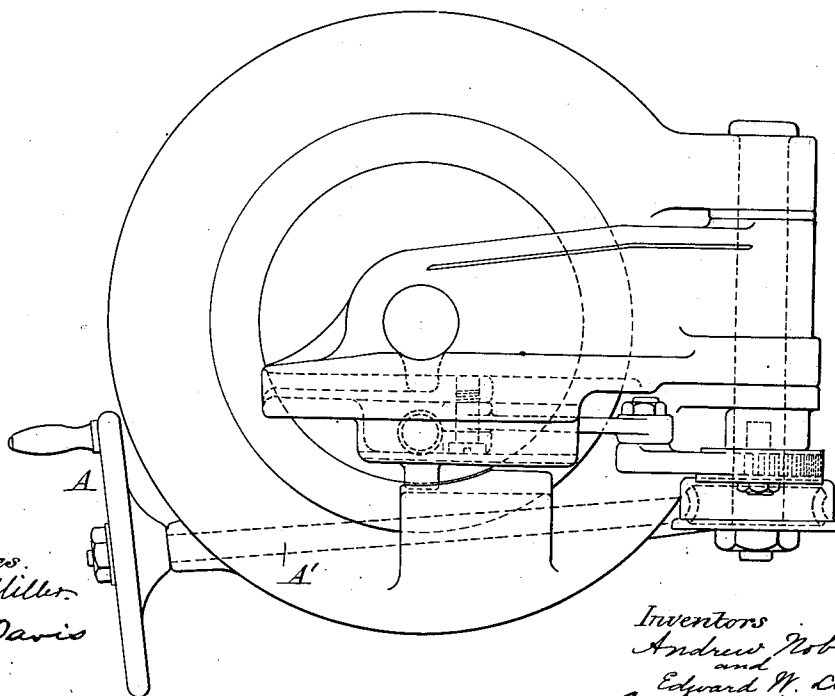


Fig. 5.



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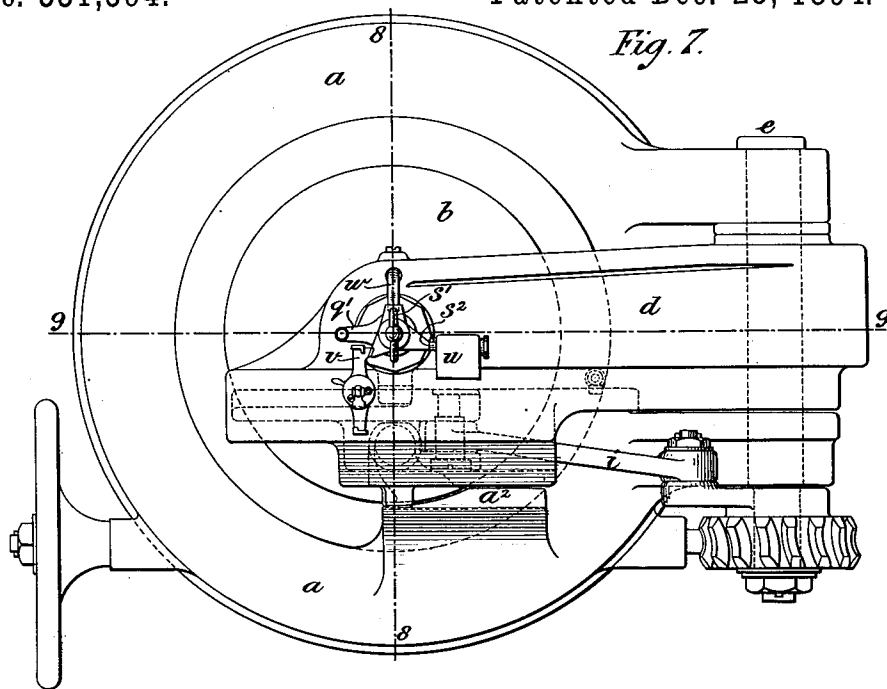
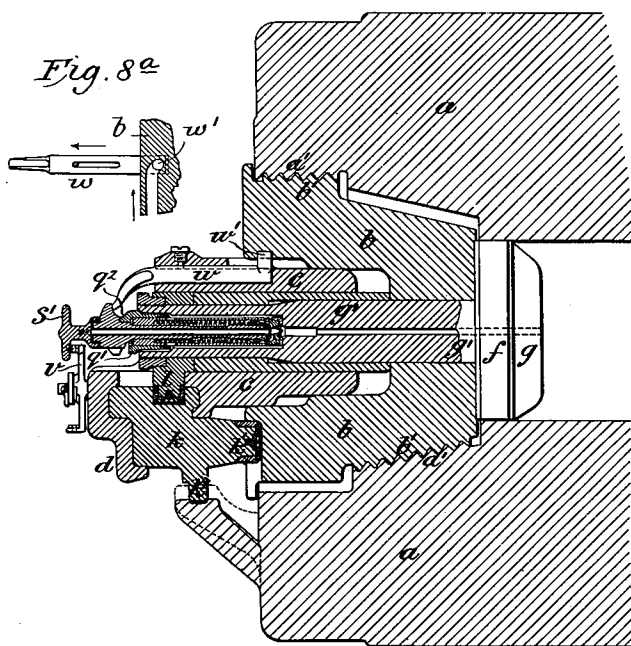


Fig. 8.



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(No Model.)

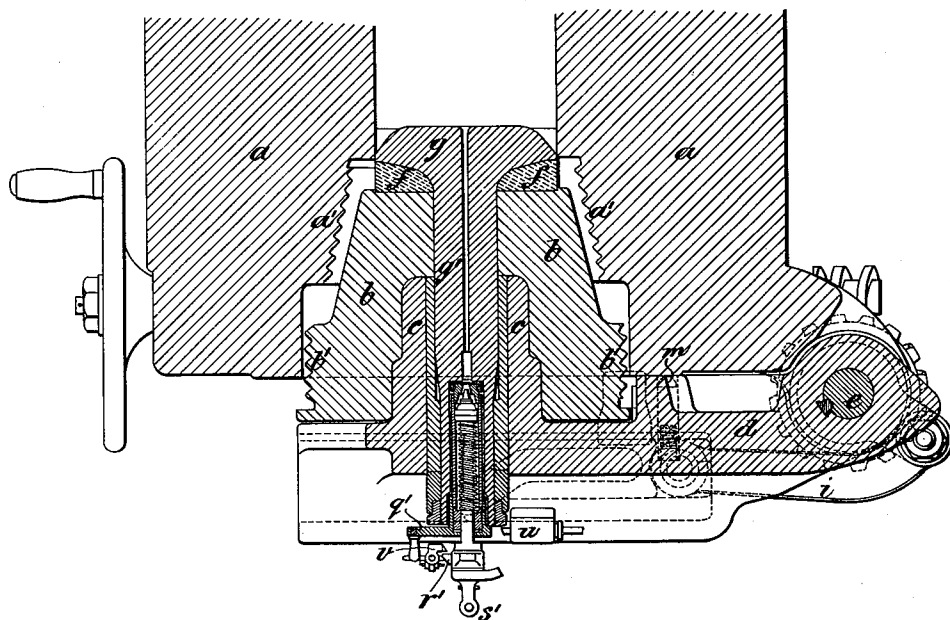
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A. NOBLE & E. W. LLOYD.
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Fig. 9.



Witnesses
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UNITED STATES PATENT OFFICE.

ANDREW NOBLE AND EDWARD W. LLOYD, OF NEWCASTLE-UPON-TYNE, ENGLAND, ASSIGNORS TO THE SIR W. G. ARMSTRONG, MITCHELL & CO., LIMITED, OF SAME PLACE.

BREECH-LOADING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 531,594, dated December 25, 1894.

Application filed February 5, 1894. Serial No. 499,144. (No model.)

To all whom it may concern:

Be it known that we, ANDREW NOBLE, manufacturing engineer, Knight Commander of the Bath, late captain in the Royal Artillery, residing at Jesmond Dene House, Newcastle-upon-Tyne, and EDWARD WILLIAM LLOYD, late commander in the Royal Navy, residing at Elswick Works, Newcastle-upon-Tyne, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Breech-Loading Ordnance, of which the following is a specification.

Our invention relates to breech loading guns having a divided screw breech block, mounted upon a carrier arm, jointed to the breech of the gun and having also upon the carrier arm a sliding piece which on receiving movement from a hand lever or otherwise, imparts to the breech block the rotation required in locking and unlocking. Such breech mechanism is described in the specification of a patent granted in the United States of America to me, Andrew Noble, and another dated the 7th day of March, 1893, No. 492,942.

By our present improvements we provide in such mechanism for the use of an obturating pad to prevent the escape of powder gases.

When an obturating pad is employed it is necessary that the breech block should travel truly in an axial direction so long as the obturating pad is in the bore. We provide for this in a manner we will presently describe.

Our invention relates also to firing mechanism for guns such as above described.

In the drawings annexed Figure 1 is a rear elevation of a gun with breech closing mechanism and firing mechanism in accordance with our invention. Some of the parts are broken away to more clearly show the mechanism. Fig. 2 is a section on the line 2, 2, in Fig. 1. Fig. 2^a shows on an enlarged scale, the details of the sliding block forming part of the breech block operating mechanism. Fig. 3 is a horizontal section on the line 3, 3, in Fig. 1. In this figure the opening of the breech has commenced. Fig. 3^a is a detail view of part of the locking mechanism. Fig. 4 is a horizontal section showing the firing mechanism to a larger scale. Fig. 4^a shows a section of the firing mechanism on the line *a*—

a of Fig. 4. Fig. 4^b is a section through the firing mechanism on the line *b*—*b* of Fig. 4. Fig. 4^c is a detail view of part of the firing mechanism. Fig. 5 is a rear elevation and Fig. 6 is a plan and shows the application of a worm and worm wheel to actuate the breech mechanism. Figs. 7, 8 and 9 illustrate a modification in the breech mechanism. Fig. 7 is a rear elevation. Fig. 8 is a section on the line 8, 8 in Fig. 7. Fig. 8^a is a detail view of the locking slide or safety device, and Fig. 9 is a section on the line 9, 9 in Fig. 7.

a is the breech of the gun.

a' is the divided screw thread cut in the breech.

b is the breech block having a corresponding divided screw thread *b'* to engage with the thread in the breech.

c is a pivot on which the breech block is carried. It forms a part of the carrier arm *d* which is jointed to the breech of the gun by means of the hinge pin *e*.

f is the obturating pad. It rests against the fore end of the breech block and when the gun is fired is compressed between it and the head *g* of the obturator. *g'* is the stem of the obturator. It passes through the pivot *c*.

h is a hand lever joined to the carrier arm. It is connected by a link *i* with the sliding piece *k* on the carrier arm and it imparts to the sliding piece a movement to and fro along the carrier arm. The slide *k* operates upon the breech block to move it as required.

In Fig. 2 the obturating pad is seen in the bore of the gun. In removing it from the bore to the position in which it is seen in Fig. 3 it is necessary as before stated that the obturating pad should travel truly in a direction parallel to the axis of the gun; otherwise the pad could not be withdrawn without damage. Similarly in closing the breech it is necessary that the obturating pad in entering the bore should move truly in an axial direction. We provide for this by so mounting the breech block that it can move along its pivot *c* for the distance required. To impart the requisite movements to the breech block the following arrangements are made: The sliding piece *k* on the carrier arm is furnished with a pin or projection *k'* which enters a groove in the

face of the breech block; also there is an inclined groove in the top of the sliding piece k and there is a radial projection l connected with the breech block entering this groove.

5 In opening the breech the first movement of the sliding piece k along the carrier arm d by the action of the projection k' turns the breech block b sufficiently to disengage the screw threads and then the groove in the top of the sliding piece operates on the projection l to withdraw the breech block along the pivot. 10 When the sliding piece k reaches the end of its course the obturating pad is already clear of the bore. Then the movement of the carrier arm d about the hinge joint which connects it with the gun, carries the breech block away to one side and leaves the breech open for loading. In closing the breech corresponding movements occur in the reverse order.

20 The breech block is prevented from turning when out of the gun by a projection d' on the carrier arm which engages the flange of the breech block when the block is turned and is in its rearward position upon the pivot. 25 When the breech block is inserted in the breech of the gun and is driven home its flange α is free to revolve in the space α' clear of the projection d' .

30 The carrier arm is prevented from leaving the rear face of the gun until the sliding piece k reaches the end of its travel for up to this time a projection k^2 on the sliding piece is engaged in a groove or guide at α^2 upon the gun which causes the sliding piece k to travel in a straight line across the breech end of the gun.

35 The carrier arm when it commences to retire from the rear face of the gun liberates a spring catch m and allows it to engage with the sliding piece k which is thus locked fast upon the carrier arm until after loading the arm is again returned to its place. The spring-catch is shown in Figs. 1 and 3^a. When the breech block is closed the catch or bolt m is forced back against the pressure of the spring m' and the lug m^2 on the catch or bolt lies in the groove k^x in the top of a sliding piece or block k but when the carrier arm is drawn away from the breech of the gun the bolt m is shot forward by the spring m' and the lug m^2 enters a notch m^3 in the wall of the groove k^x , and the sliding piece k is held firmly.

40 When the mechanism is too large and heavy to be worked by a lever as h it can as is shown by Figs. 5 and 6 be worked by a hand wheel 55 A and axis A' giving movement by means of a worm and worm wheel to a pinion loose on the joint pin of the carrier arm. This pinion engages with another toothed pinion or are mounted upon the carrier arm and replacing the hand lever.

60 In Figs. 7, 8 and 9 also a hand wheel and worm is employed to give motion to the breech mechanism. The worm actuates a pinion loose on the hinge pin e and to an arm fast with the pinion the link i is jointed. In other

70 respects these figures show mechanism similar to that already described and they are lettered in accordance with the description already given. In each case when the breech is closed the joints of the link i are so situated that the mechanism is locked and the link cannot yield to any tendency the breech block may have to unscrew under the influence of the pressure to which it is exposed when the gun is fired. 75

We will now proceed to describe the firing mechanism shown in the drawings and especially in Fig. 4. This firing mechanism is adapted to be used either with electric or 80 with percussion primers. In an axial position, in the rear part of the breech block or in the stem g' of the obturator, which may for this purpose be regarded as part of the breech block we provide a cylindrical cavity, being a continuation and enlargement of the vent n . 85 This cavity receives within it a tubular or hollow bolt o containing a coiled spring p and a firing pin which the spring presses forward.

90 The firing pin can move endwise within the bolt and the bolt within the cavity but neither is permitted to turn. At the fore end of the bolt there is a screw cap o' with a hole in the center. This cap serves as a holder for a flanged primer n' . The primer is inserted 95 through the hole in the cap. The cap is then screwed on to the bolt and the bolt is replaced in the cavity in the breech block, from which it is removed in order that the primer may be adjusted to it. The bolt o at its rear end 100 is screwed into a socket q and on the exterior of the socket piece there is a segmental thread adapted to interlock with a corresponding thread within the mouth of the cavity in the breech block. The socket piece also has a 105 handle q' upon it by which it can be turned for locking and unlocking the bolt and for other purposes hereinafter explained.

When the socket piece q is turned it by means of the screw thread within it imparts a 110 short but powerful endwise movement to the bolt o which is useful in starting the withdrawal of the primer case from the vent. The firing pin consists of an outer tube r surrounding a rod s from which it is electrically 115 insulated by an intermediate tube of vulcanite or like material t . It has an insulated handle s' at its rear end and a lateral arm s^2 which when in the firing position places the insulated parts of the firing pin in electrical 120 connection with the firing circuit at u .

The socket piece at the rear end of the bolt has a projection q^2 (Fig. 2) extending back from it and this is received into a recess in the firing pin at r^2 near to the handle. After 125 firing, the firing pin is drawn back by its handle s' until the projection q^2 is clear of the recess. The socket piece q is then turned by its handle which both unlocks the bolt o so that it can be withdrawn from the breech block 130 and also brings the projection q^2 to a shallow notch r^4 on the firing pin into which it passes.

The firing pin is then held back a short distance within the bolt so that when a primer is adjusted to the fore end of the bolt the nose of the firing pin is not in contact with it.

5 When an electric primer is used as soon as the bolt *o* has been replaced in the breech block and locked the firing pin is allowed to pass forward again and the coiled spring *p* then presses its nose into good electrical contact with the base of the primer.

10 When a percussion primer is employed a sear hook *v* which is mounted upon the carrier arm is allowed to engage a projection *r'* on the firing pin and retain it until it is released by pulling a lanyard. The sear hook *v* operates to prevent the firing pin from passing forward with the breech block *b* when in the closing of the breech the breech block is made to slide along its pivot *c* by the operation of the inclined groove upon the upper surface of the sliding piece *k* on the carrier arm as already explained.

As a safety device we sometimes employ a locking slide *w* (Fig. 8) lying in a recess in the pivot *c* on which the breech block is carried. On the locking slide there is a projection *w'* entering into a segmental groove within the breech block and this groove is of such a form that the locking slide cannot go forward until the breech block is home. At other times the rear end of the locking slide is in a position to prevent the forward movement of the firing pin.

What we claim is—

35 1. The combination of parts consisting of the screw breech block *b* mounted on the pivot *c* on which it can both turn and slide, and the carrier arm *d* supporting the pivot and jointed to the breech of the gun.

40 2. The combination of the breech block, its pivot, the carrier arm to which the pivot is secured, the sliding piece *k*, means for moving the sliding piece *k* along the carrier arm, and connections between the sliding piece and the breech block to move it along its pivots.

3. The combination of the gun, the breech block, its pivot, the carrier arm to which the pivot is secured, the sliding piece *k*, connections between the sliding piece *k* and the breech block to operate it, and the spring bolt which locks the sliding piece fast with the carrier arm when said arm retires from the breech of the gun.

55 4. The combination of the gun, the breech block, its pivot, the carrier arm to which the pivot is secured, the sliding piece *k* connected with the breech block to operate it, and a guide on the gun for the sliding piece *k* which

prevents the carrier arm from leaving the 60 breech of the gun until the unlocking movement of the slide is complete.

5. The combination of the gun, the breech block, a hollow bolt contained in a cavity in the breech block, a locking device *q* upon the 65 rear end of the bolt to lock it in the cavity and release it so that it may be withdrawn, the firing pin within the hollow bolt, a spring pressing the firing pin forward to bring it into contact with the primer, an insulated conducting core *s* in the firing pin and a contact 70 *s'* connecting in circuit with a firing key the conducting core and the primer in contact with the same.

6. Firing apparatus consisting of a hollow 75 bolt to be inserted into a cavity in the breech closing appliance with means for preventing the bolt turning in the cavity; a socket piece screwed on the rear end of the bolt and having interrupted threads on its exterior serving to lock the bolt in the cavity provided to receive it; a cap screwing on to the fore end of the bolt to hold the primer in its place; a firing pin consisting of an insulated rod increased in a tube having a handle at its rear 85 end; such firing pin being contained within the hollow bolt in which it is free to slide but restrained from turning; a coiled spring within the hollow bolt and around the firing pin which it presses forward; interlocking recesses and projections on the socket piece and the firing pin; circuit arrangements for electric firing; and releasing arrangements for percussion firing.

7. The safety appliance consisting of a locking 95 slide lying in a recess in the pivot piece and engaging with a controlling groove in the breech block; such locking slide abutting on the firing pin and only permitting it to advance when the breech block has been turned 100 sufficiently to lock it securely in the gun.

8. The combination of the gun, the breech block, a carrier arm, a pivot on the carrier arm about which the breech block is free to turn, a sliding piece mounted in the carrier 105 arm and connected with the breech block, means for moving the sliding piece in the carrier arm transversely across the breech end of the gun, connections between the breech block, and the sliding piece to move the 110 breech block backwardly from the gun, and mechanism for operating the carrier arm.

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