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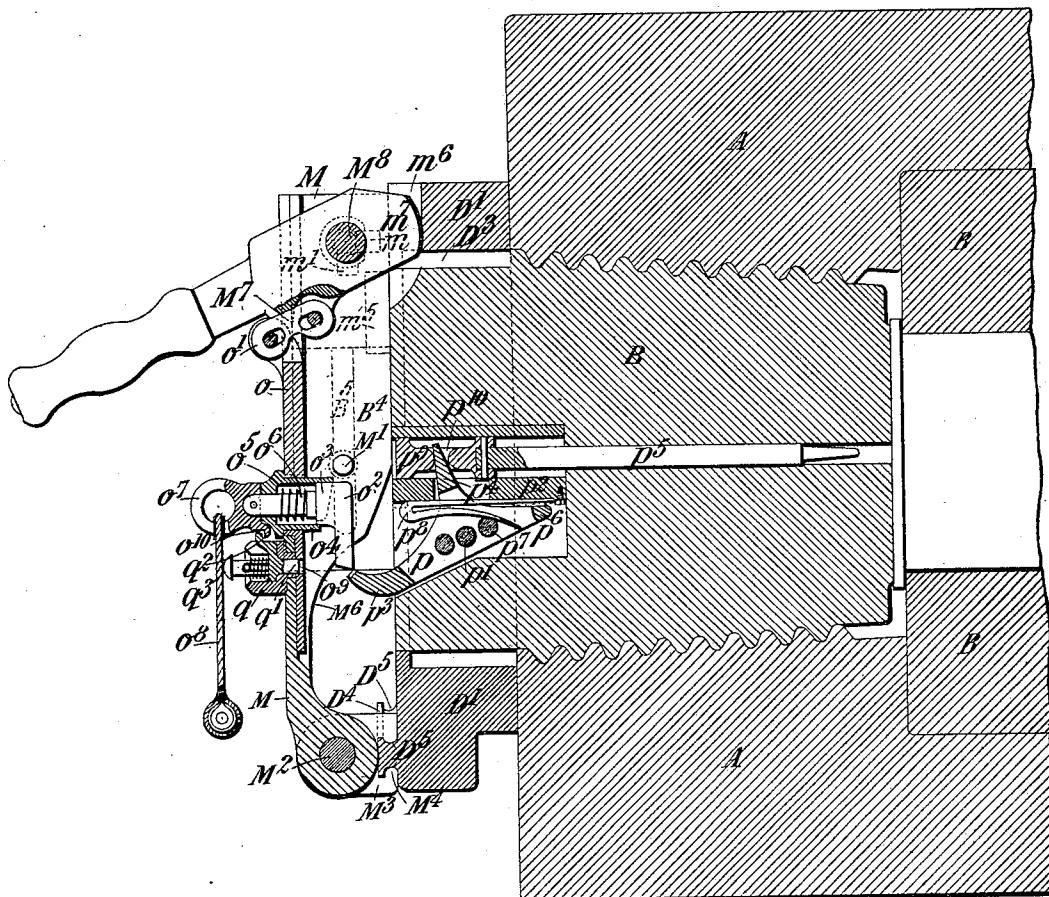
6 Sheets—Sheet 2.

M. GLEDHILL.  
BREECH MECHANISM FOR ORDNANCE.

No. 565,164.

Patented Aug. 4, 1896.

Fig. 2.



Witnesses,

Thos. A. Green

Robert Emmett

Inventor,

Manassah Gledhill.

By

James L. Norris

Atty.

(No Model.)

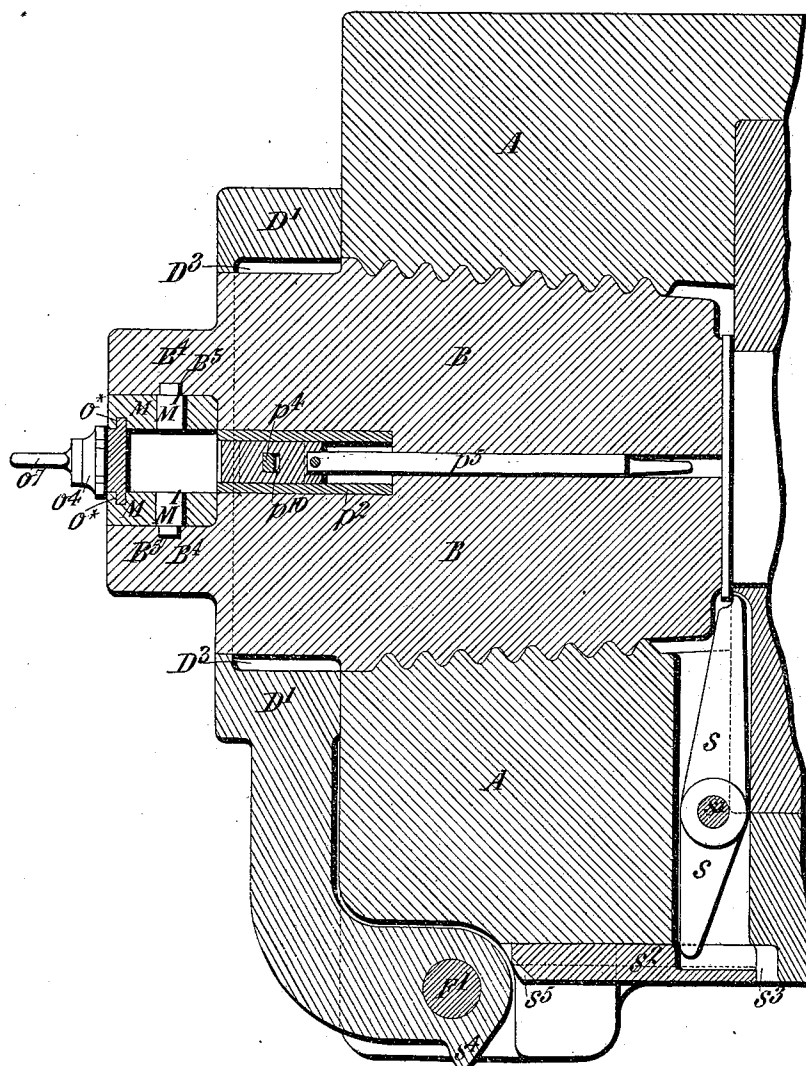
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M. GLEDHILL.  
BREECH MECHANISM FOR ORDNANCE.

No. 565,164.

Patented Aug. 4, 1896.

*Fig. 3.*



*Witnesses.*  
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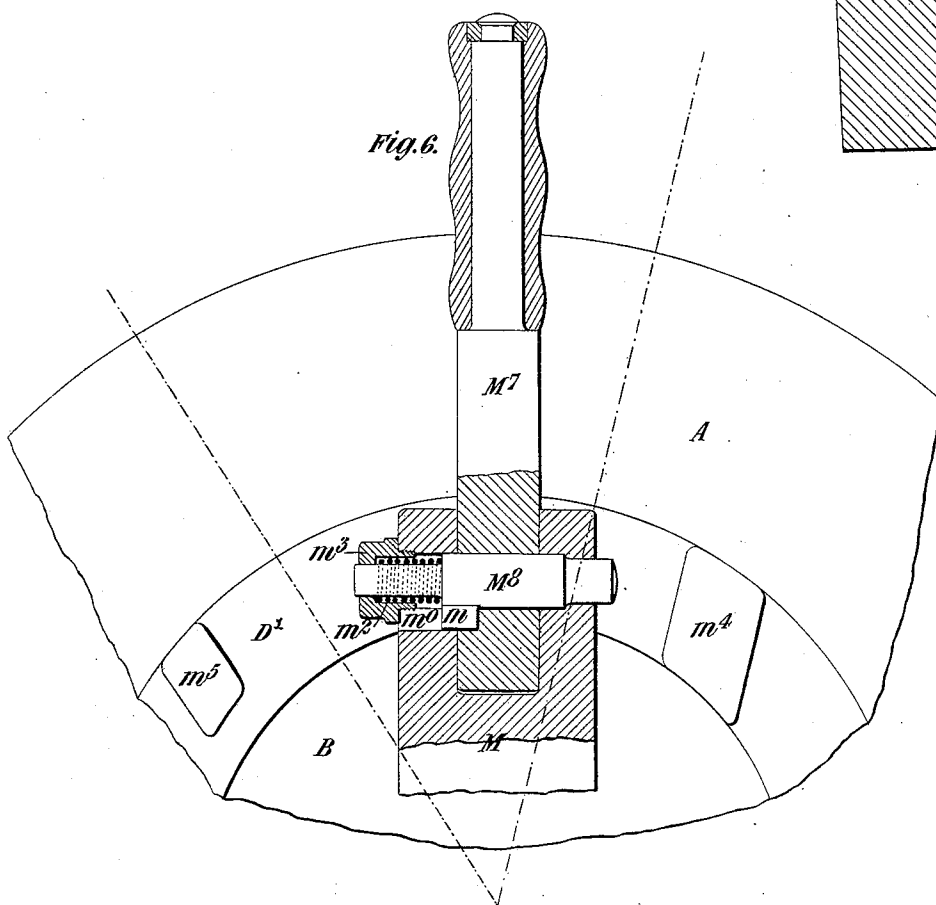
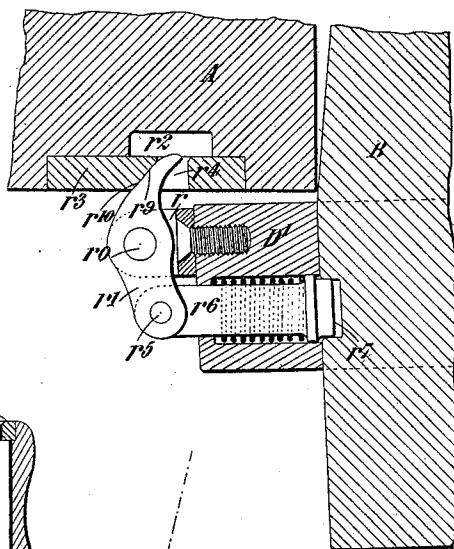
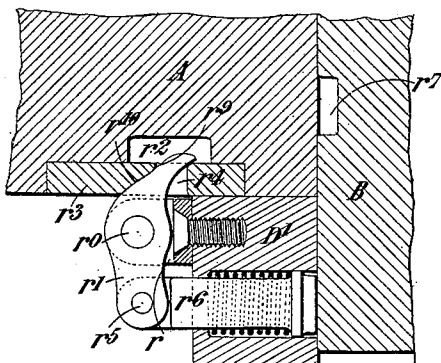
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M. GLEDHILL.  
BREECH MECHANISM FOR ORDNANCE.

No. 565,164 *Fig. 4.*

Patented Aug. 4, 1896.  
*Fig. 5.*



Witnesses,  
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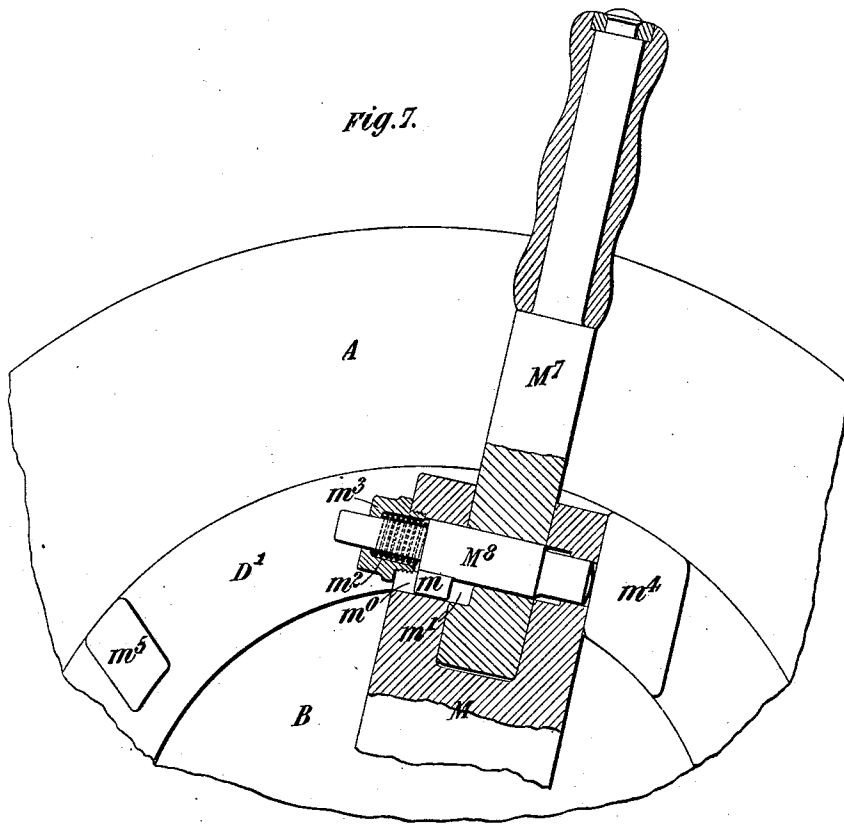
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M. GLEDHILL.  
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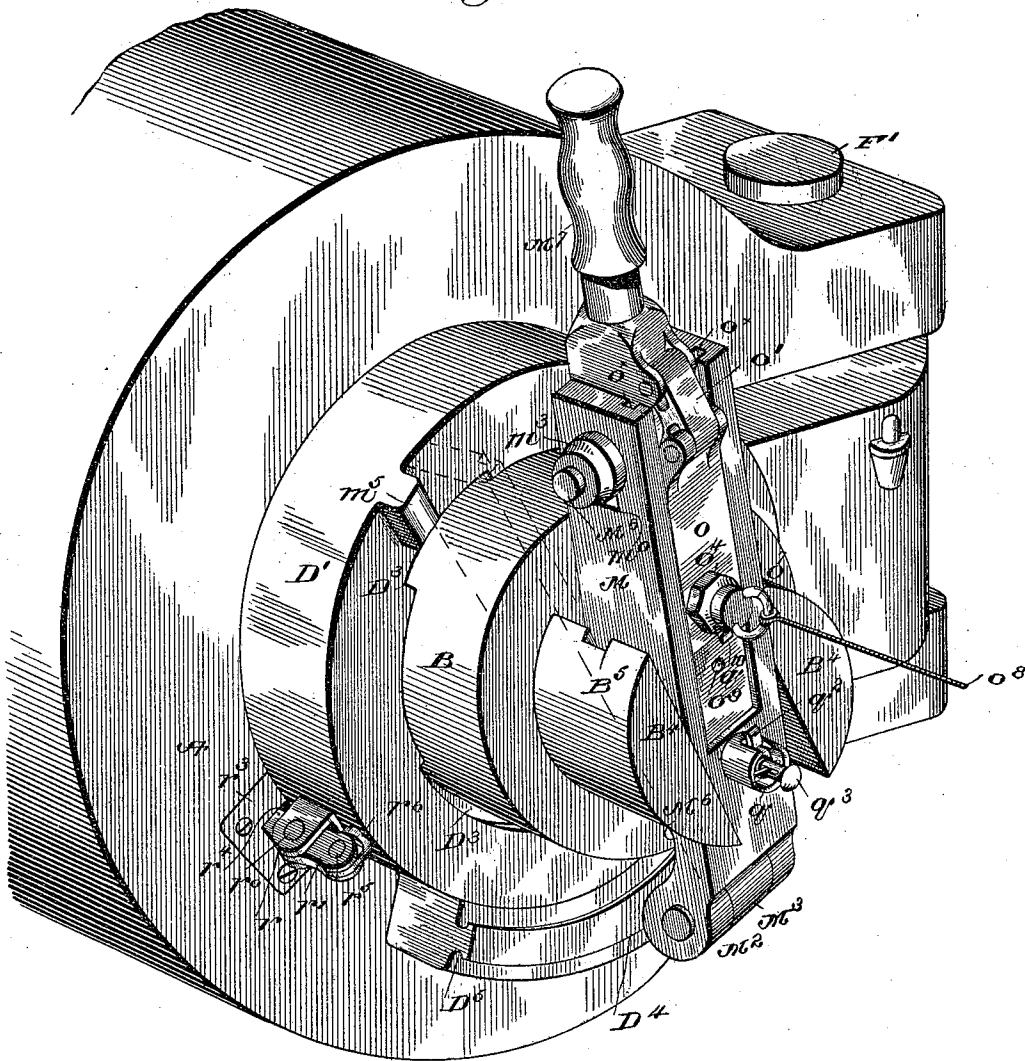
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M. GLEDHILL.  
BREECH MECHANISM FOR ORDNANCE.

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Patented Aug. 4, 1896.

*Fig. 8.*



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Attorney:

# UNITED STATES PATENT OFFICE.

MANASSAH GLEDHILL, OF MANCHESTER, ENGLAND, ASSIGNOR TO THE SIR JOSEPH WHITWORTH & COMPANY, LIMITED, OF SAME PLACE.

## BREECH MECHANISM FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 565,164, dated August 4, 1896.

Application filed July 18, 1894. Serial No. 517,893. (No model.) Patented in England June 2, 1892, No. 10,537.

*To all whom it may concern:*

Be it known that I, MANASSAH GLEDHILL, director of the Sir Joseph Whitworth & Company, Limited, engineers, of Openshaw, Manchester, England, a subject of the Queen of Great Britain, and a resident of Openshaw, Manchester, England, have invented certain new and useful Improvements in Breech Mechanism for Quick-Firing and other Guns, (for which I have obtained a patent in Great Britain, No. 10,537, bearing date June 2, 1892,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates partly to breech mechanism of that class wherein the breech is closed by a screw breech-block with interrupted or segmental screw-threads supported with a capability of turning on its axis in a carrier or bracket hinged to one side of the breech end of the gun. In breech mechanism of this class the opening of the breech involves, first, the partial rotation of the breech-block about its axis; secondly, the withdrawal of the said block from the gun, and, thirdly, the movement of the said block away from the breech by turning the bracket about its hinge or pivot. The closing of the breech involves the reverse of these operations.

According to my invention, which is more especially advantageous for quick-firing guns of large caliber, I provide an improved handle-lever arrangement for very rapidly opening and closing the breech without necessitating the removal of the hand from the lever during the operation. I also provide improved means for preventing any possibility of firing the gun when the breech is not properly closed and locked, and also for preventing any possibility of the unfastening or unlocking of the breech-block by or during the firing of the gun, and for putting the mechanism to half-cock after closing the breech. These improvements are applicable to guns which fire metallic cartridges or to those in which the breech-block is fitted with an obturator and with either a top or rear vent.

Figure 1 is a rear end elevation of a gun-breech constructed according to my invention. Fig. 2 is a central longitudinal section on the line  $x\ x$ , Fig. 1; and Fig. 3 is a horizontal

central section of the same. Fig. 4 is a section, on an enlarged scale, taken on the line  $x' x'$ , Fig. 1, showing a detail hereinafter described. Fig. 5 is a similar section showing the breech-block partially withdrawn. Fig. 6 is a rear elevation of a portion of the gun and of the operating-handle, partly in section, also drawn to a larger scale. Fig. 7 is a similar view showing the handle in a different position and unlocked ready to be turned down; and Fig. 8 is a detail perspective view of the breech end of the gun, showing the breech partially open.

Like letters indicate corresponding parts in all the figures.

A is the breech end of the gun-barrel.

B is the breech-block. The taper-screw breech-block is supported by a carrier or bracket  $D'$ , which is in the form of a ring and hinged on the bolt  $F'$  at one side of the breech. The said carrier is provided with recesses  $D^3$  for receiving the screw-threaded portions of the breech-block when the latter is withdrawn from the breech, as hereinafter described. The rear end of the breech-block, which extends through the carrier-ring, has on it two projecting cheeks  $B^4\ B^4$ , between which the operating-lever  $M$  is situated. The said lever extends across the ring  $D'$  and carries pins  $M' M'$ , which project into grooves  $B^5\ B^5$  in the inner faces of the said cheeks  $B^4$  and thus connect the lever to the breech-block. The said lever  $M$  is pivoted at  $M^2$  to a piece  $M^3$ , which is mounted on a curved guide  $D^4$ , formed on or attached to the carrier-ring  $D'$ . The curvature of the guide is such as to have for its center the axis of the breech-block. The guide is grooved, as at  $D^5$ , on each side thereof, with which grooves the internal flanges  $M^4\ M^4$ , formed on the piece  $M^3$ , engage. The piece  $M^3$  can slide freely on the guide  $D^4$ .

It will be seen from this construction that when the breech-block is turned about its axis the fulcrum of the operating-lever  $M$  maintains a constant distance from the center of the breech-block, and while being securely held upon the ring  $D'$  it can turn with the breech-block and thus adapt itself to the different positions of the said block. When the breech-block has been turned to unlock the same from the breech, it can then be par-

tially withdrawn by a straight rearward pull on the operating-lever, which, acting through the pins  $M'$ , causes the block to slide through the carrier-ring until the screw-threaded sections thereof arrive at the end of the recesses  $D^3$ , whereupon the continued rearward pull on the lever causes the carrier-ring to swing about its hinge and thus removes the breech-block clear of the breech. The lever  $M$  is made hollow at the lower half of the forward face, as indicated at  $M^6$ , to allow of the rearward travel of the breech-block during the time it is sliding through the carrier-ring.

$M^7$  is a handle pivoted to the lever  $M$  at  $M^8$  in such manner that it can form a straight continuation of the lever  $M$  and so give ample purchase to turn the breech-block, and it can be turned down to the position shown in Fig. 2, in which position it locks the breech-block to prevent the rotation thereof while firing, as will be hereinafter described. The pivot-pin  $M^8$  of the said handle has on it a projection  $m$ , which when the handle is raised to form an approximately straight continuation of the lever  $M$  is in line with a recess or keyway  $m'$ , Fig. 7, in the said handle  $M^7$ , and is then, as soon as the breech-block has been turned to partially unlock the same, pushed into the said recess by a spring  $m^2$ , contained within a cap  $m^3$  and arranged to press against a shoulder of the pivot-pin.

$m^0$ , Fig. 6, is a recess formed in the lever  $M$  to receive the projection  $m$  and operating to prevent the rotation of the pin  $M^8$  while allowing it to slide axially. When the projection  $m$  is engaged with the keyway  $m'$ , it locks the handle  $M^7$  and retains the said handle in the extended position, that is to say, in line with the lever  $M$ .  $m^4$  is a lug or shoulder on the breech-ring forming a stop with which one side of the operating-lever comes in contact, and is thereby arrested when the breech-block is properly screwed home. The said stop also serves to unlock the handle  $M^7$  as follows, that is to say, the end of the pivot-pin  $M^8$  is constructed to project beyond the side of the lever  $M$ , so that when the said lever is turned to screw the breech-block home the said pin strikes the stop  $m^4$  before the lever is arrested and is thereby moved axially against the resistance of the spring  $m^2$ , and thus withdraws the key  $m$  from the keyway  $m'$ , as shown in Fig. 7. The handle  $M^7$  is then free to be turned about its pivot-pin  $M^8$ . When opening the breech, the handle  $M^7$  is first raised and then operated to turn the breech-block, and immediately the lever  $M$  retires from the stop  $m^4$  the spring  $m^2$  operates to push the pin  $M^8$  axially and thus lock the handle  $M^7$  by forcing the lug  $m$  into the recess  $m'$ .

$m^5$  is another stop formed on the carrier-ring to limit the rotary movement of the lever  $N$  when unscrewing the breech-block.

$m^6$  is a recess or depression formed in the face of the carrier-ring  $D'$  in a position which

is opposite the hinge of the handle  $M^7$  when the breech is closed.

$m^7$  is a short extension of the handle  $M^7$  beyond the pivot, which extension is adapted to enter the said recess when the handle is turned down, as shown in Fig. 2. When so turned down, the handle serves to lock the breech-block in its closed position.

$o$  is a plate fitted to slide within the lever  $M$  and connected at its upper end by a short link  $o'$  with the handle  $M^7$ , so that by turning the handle about its pivot  $M^8$  the plate  $o$  can be caused to slide along the lever  $M$ . As clearly shown in Fig. 3, the plate is constructed to slide in guideways or grooves  $o^*$ , provided in the lever. The pivot holes of the link  $o'$  are elongated to allow the lever  $M^7$  to turn the required amount. When this improved mechanism is adapted for firing metallic cartridges, the said sliding plate  $o$  carries a combined trigger and cocking-piece  $o^2$ . The said trigger is formed with a shank  $o^3$ , which can slide in a socket  $o^4$ , fixed to the plate  $o$ .

$o^5$  is a spring for forcing the trigger outward from the socket.  $o^6$  is the stem or spindle of the trigger, which extends through the back of the socket and is attached to an eyebolt  $o^7$ .

$o^8$  is the lanyard for pulling the trigger.

The hammer  $p$  is in the form of a three-armed lever and has its fulcrum on a pin  $p'$ , extending transversely through a rectangular block  $p^2$ , let into the end of the breech-block. One arm,  $p^3$ , of the said hammer extends backward through the rear face of the breech-block into the path of the trigger. Another arm,  $p^4$ , extends upward and engages with the firing-pin  $p^5$ , and the other arm,  $p^6$ , has on it a pin or stud  $p^7$ , upon which bears the main spring  $p^8$ . I prefer that the firing-pin should be attached to a piece  $p^9$ , having a slot  $p^{10}$ , through which the arm  $p^4$  of the hammer extends. With this construction it will be seen that when the trigger is pulled to release the hammer the arm  $p^3$  of the latter rises in front of the trigger and prevents the trigger recovering its initial position. When, however, the handle  $M^7$  is raised for the purpose of opening the breech, it carries with it the slide  $o$  and trigger until the latter is raised above the arm  $p^3$ , whereupon the spring  $o^5$  immediately acts to force the trigger out again above the end of the arm  $p^3$  of the hammer. When now the handle  $M^7$  is turned down again to the position shown in Fig. 2 after having reclosed the breech, the plate  $o$  is depressed, carrying with it the trigger, which latter is thereby caused to depress the arm  $p^3$ , and thus recock the hammer. For preventing the raising of the handle  $M^7$ , unless and until the gun has been fired, I provide a safety locking device, as follows, that is to say, I attach to the rear face of the lever  $M$ , just below the trigger-socket  $o^4$ , a piece  $q$ , carrying a spring-actuated bolt  $q'$ , which projects

through the lever and is adapted to enter a hole  $o^9$  in the plate  $o$  when the said plate is depressed, and thus lock the plate to the operating-lever. The said bolt  $q'$  has a projecting lip  $q^2$ , which is adapted to engage with a corresponding lip  $o^{10}$ , projecting from the eye-bolt  $o^7$ , so that when the said bolt is pulled to release the hammer it at the same time withdraws the locking-bolt  $q'$  from the hole  $o^9$  of the sliding plate  $o$ , and thus enables the handle  $M^7$  to be raised for the purpose of unlatching the breech-block and opening the breech. The bolt  $q'$  is provided with a stem  $q^3$  to enable it to be withdrawn directly from the hole  $o^9$ , when desired, without pulling the lanyard.

In combination with the aforesaid breech-block and carrier-ring I provide devices for locking the carrier-ring to the gun when the breech is closed and for locking the breech-block to the carrier-ring when withdrawn from the gun. For these purposes I attach to the peripheral surface of the ring a small bracket  $r$ , to which I pivot at  $r^0$  a short lever  $r'$ , which is curved at its forward end to form a latch. In the face of the breech end of the gun I form a cavity  $r^2$ , over which I securely fix a plate  $r^3$ , having a hole  $r^4$  smaller than the cavity  $r^2$ , through which hole the forward or curved end of the said lever  $r'$  can project. The other end of the said lever is connected by a pin  $r^5$  with a spring-actuated bolt  $r^6$ , one end of which passes through the carrier-ring in the proper position to enter a hole  $r^7$  in the periphery of the breech-block when the block has been withdrawn from the gun.

The operation of this mechanism is as follows: When the breech-block has been turned to disengage its screw-threads from those of the breech, the rearward pull on the handle  $M^7$  causes the block to slide out through the carrier-ring until its screw-threaded sections arrive at the end of the recess  $D^3$  in the ring. In this position of the block the hole  $r^7$  therein is in line with the pin  $r^6$ , and the said pin is free to enter the said hole when the forward end of the lever  $r'$  is released. The continued pull on the handle  $M^7$  now causes the carrier-ring to swing on its hinge, because the latch or lever  $r'$  is no longer prevented from turning about its pivot. The same movement which causes the lever or latch  $r'$  to clear the edge of the hole  $r^4$  also causes or allows the bolt  $r^6$  to enter the hole  $r^7$  in the breech-block and lock the block to the carrier-ring. During the reclosing of the breech the curved face  $r^9$  of the lever  $r'$  slides over the curved edge  $r^{10}$  of the hole  $r^4$ , and the lever is thereby turned about its pivot, thus compressing the spring on the bolt  $r^6$  until the latch passes behind the inner edge of the hole  $r^4$  and the bolt  $r^6$  is withdrawn from the hole  $r^7$ , thus freeing the breech-block. The latter is then pushed into the breech by the continued thrust on the lever  $M^7$  and a plain part of the breech-block passes underneath the bolt  $r^6$ , thus locking the said bolt and preventing the

unlatching of the carrier-ring until the breech has again been withdrawn, as above described.

The extracting mechanism consists of a lever  $s$ , which is pivoted on a pin  $s'$ , passed through the body of the gun. The inner end of the said lever is adapted to engage with the rim of the cartridge, and the outer end abuts against a block  $s^2$ , which is arranged to slide in parallel grooves  $s^3$ , extending forward from the joint or hinge of the carrier-bracket along the side of the gun. The said carrier has a lug or projection  $s^4$ , which in the opening of the breech acts upon the rear extremity  $s^5$  of the block  $s^2$  and slides the said block in its groove, thus acting upon the extractor-lever in such a manner as to withdraw the spent cartridge from the gun.

What I claim is—

1. The combination of the breech-block, an operating-lever coupled thereto and hinged or pivoted to a block which is free to slide on a curved guide attached to the breech-block-carrier bracket so that the lever can turn with the breech-block, substantially as described.

2. The combination, with the breech-block of an operating-lever situated between cheeks on the breech-block and connected therewith by pins working in grooves, said lever being hinged or pivoted to a block which is free to slide on a curved guide attached to the breech-block-carrier bracket so that the lever can turn with the breech-block, substantially as described.

3. The combination of the breech-block, an operating-lever connected thereto and hinged or pivoted to a block which is free to slide on a curved guide attached to the breech-block-carrier bracket so that the lever can turn with the breech-block, and a handle pivoted to the said lever, said handle having a projection  $m^7$  adapted when the breech-block is screwed home to enter a recess  $m^6$  in the carrier-bracket whereby the turning of the handle about its pivot is caused to lock the breech-block, substantially as described.

4. The combination of the breech-block, an operating-lever connected thereto and hinged or pivoted to a block which is free to slide on a curved guide attached to the breech-block-carrier bracket so that the lever can turn with the breech-block, a handle pivoted to the said lever on a hinge-pin  $M^8$  which is adapted to slide axially in its bearings and project through the side of the lever, a lug  $m$  formed on the hinge-pin and adapted to enter a recess  $m'$  in the handle  $M^7$ , a spring  $m^2$  to force the said lug  $m$  into the said recess  $m'$  when the handle is raised, thereby locking the handle in its raised position, and a stop  $m^4$  on the carrier-bracket so arranged that as the breech-block is being screwed home the projecting end of the pin  $M^8$  will strike the stop  $m^4$  and be thereby moved against the pressure of the spring  $m^2$  to disengage the lug  $m$  from the recess  $m'$  thus unlocking the handle and permitting it to be turned down, about its pivot, substantially as described.

5. The combination of the breech-block, an operating-lever connected thereto and hinged or pivoted to a block which is free to slide on a curved guide attached to the breech-block-carrier bracket so that the lever can turn with the breech-block, a handle pivoted to the said lever and coupled by a link  $o'$  to a plate  $o$  adapted to slide in guides in the operating-lever, and a spring-controlled combined cocking-piece and trigger  $o^2$  mounted in a socket  $o^4$  carried by the plate  $o$ , substantially as described, for the purpose specified.

6. The combination of the breech-block, an operating-lever connected thereto and hinged or pivoted to a block which is free to slide on a curved guide attached to the breech-block-carrier bracket so that the lever can turn with the breech-block, a handle pivoted to the said lever and coupled by a link  $o'$  to a plate  $o$  adapted to slide in guides in the operating-lever, a spring-controlled combined cocking-piece and trigger  $o^2$  mounted in a socket  $o^4$  carried by the plate  $o$ , a spring locking-pin  $q'$  mounted to slide in a socket fixed to the operating-lever and projecting into a hole in the sliding plate  $o$  thereby locking said plate, and a finger  $q^2$  formed on the pin  $q'$  to engage

a part of the trigger so that when the trigger is pulled the said locking-pin  $q'$  will be simultaneously withdrawn from the hole in the plate  $o$ , substantially as, and for the purpose specified.

7. In a breech-loading gun the combination of the breech-block, the carrier-bracket, the lever  $r'$  pivoted to the carrier-bracket and articulated at its rear end to the spring-controlled pin  $r^6$  which is adapted to enter a hole  $r^7$  in the breech-block when the latter is unscrewed and partially withdrawn from the breech, the said lever  $r'$  being curved at its forward end to form a latch and adapted to engage a latch-plate  $r^3$  attached to the gun, said latch-plate having a curved face  $r^{10}$  to ride over the outer curved surface of the latch as the carrier-bracket is being shut to the breech, substantially as described for the purpose specified.

In witness whereof I have hereunto set my hand this 29th day of June, 1894.

MANASSAH GLEDHILL.

Witnesses:

JOHN M. GLEDHILL,  
ARTHUR E. HALL.