

(No Model.)

4 Sheets—Sheet 1.

A. NOBLE & C. H. MURRAY.

AUTOMATICALLY OPERATED BREECH MECHANISM FOR ORDNANCE.

No. 517,391.

Patented Mar. 27, 1894.

Fig. 2.

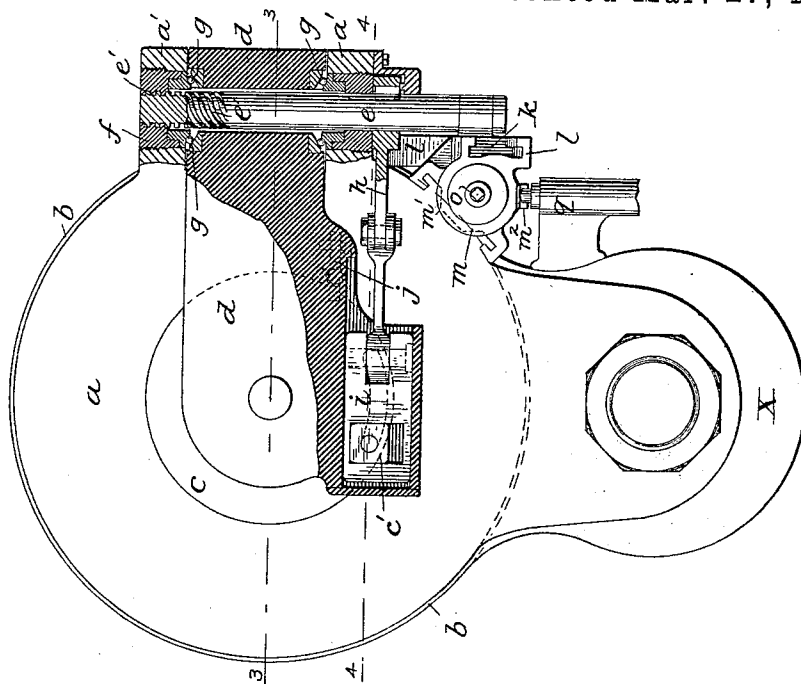
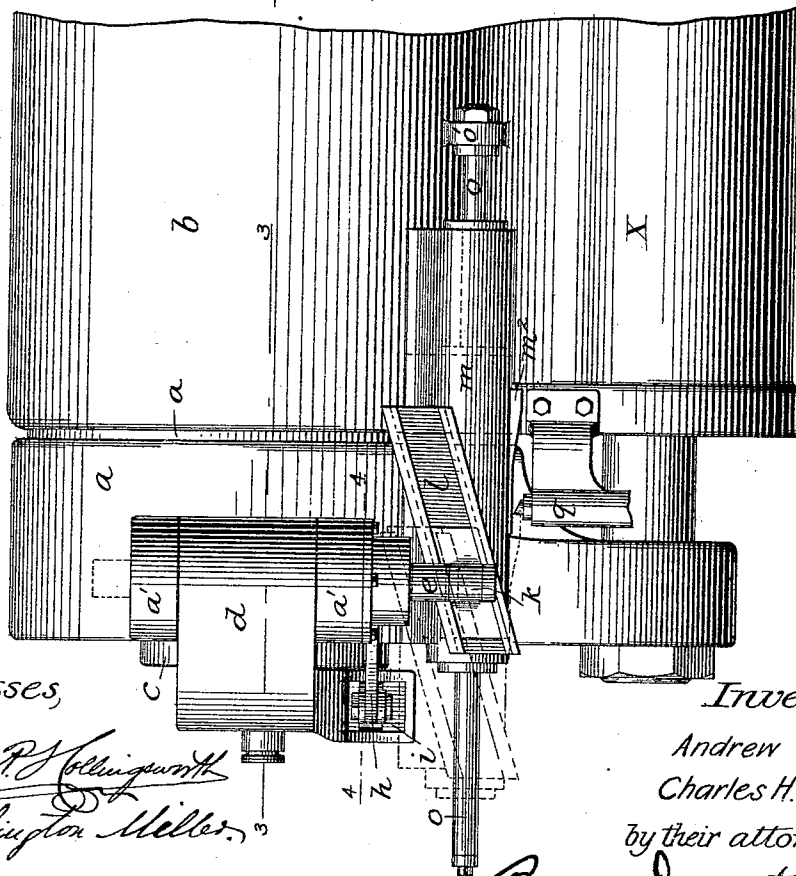


Fig. 1.



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Palmer Davidson & Wright

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Fig. 3.

ON 3-3

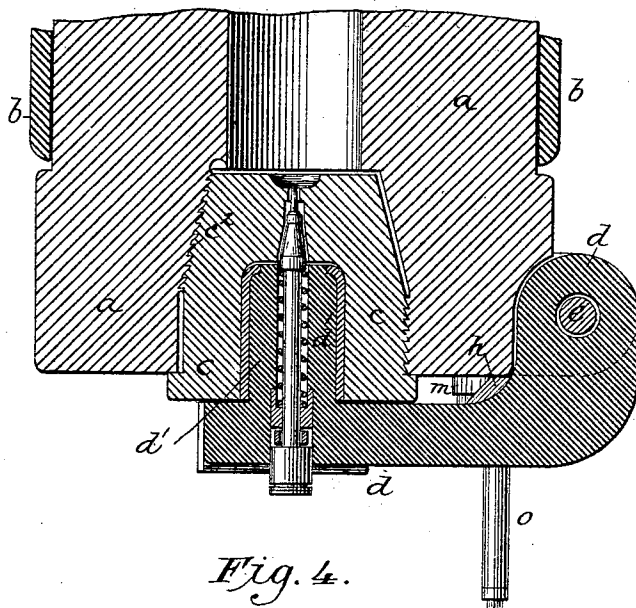
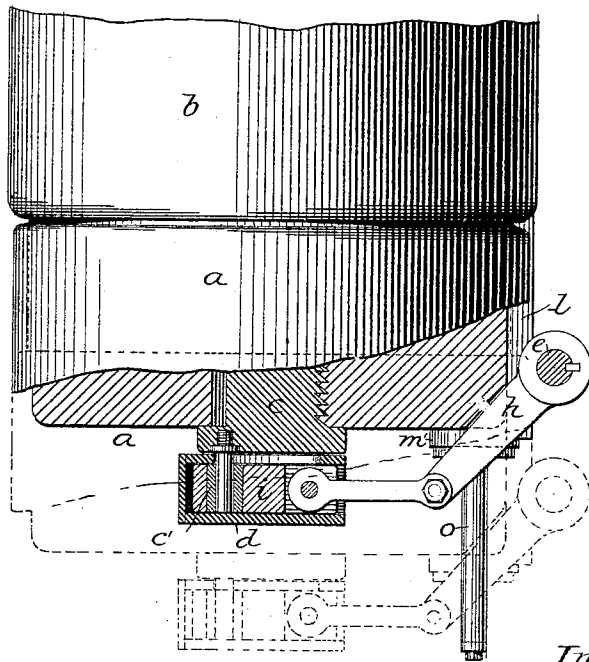


Fig. 4.

ON 4-4



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Fig. 5.

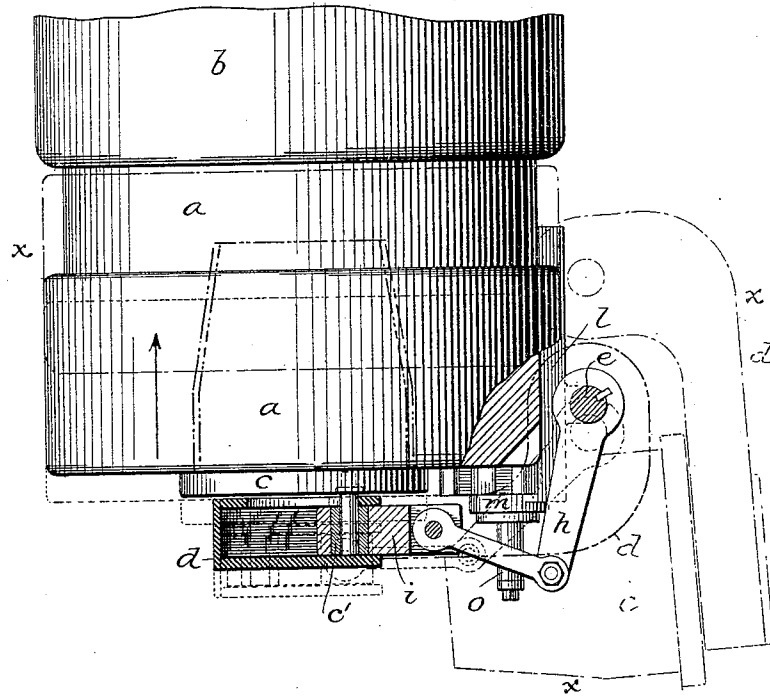


Fig. 6.

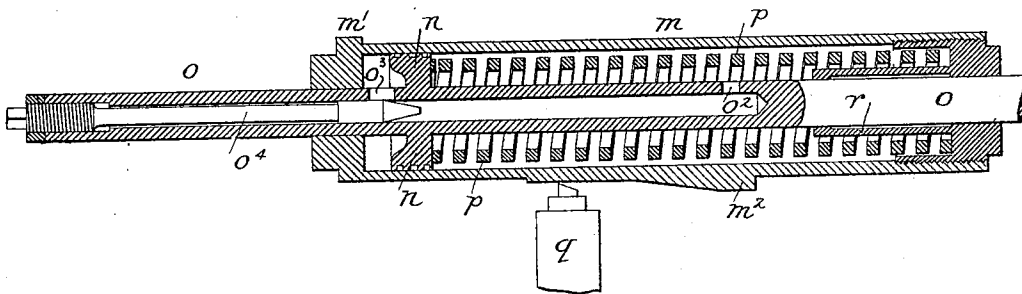
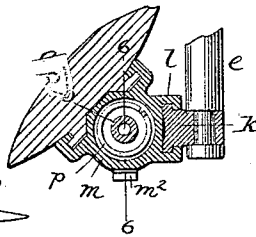


Fig. 7.



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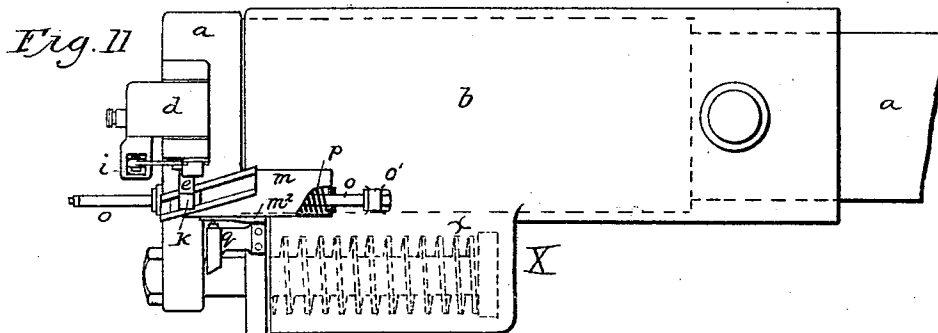
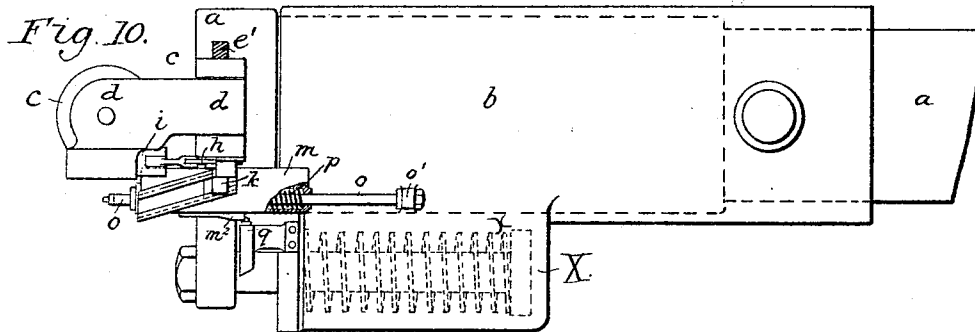
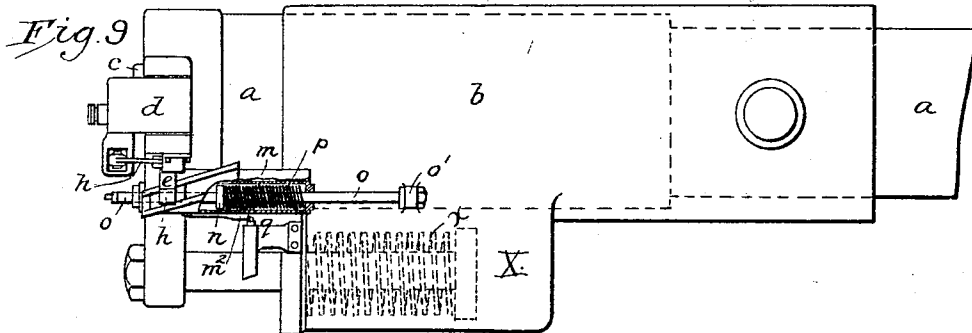
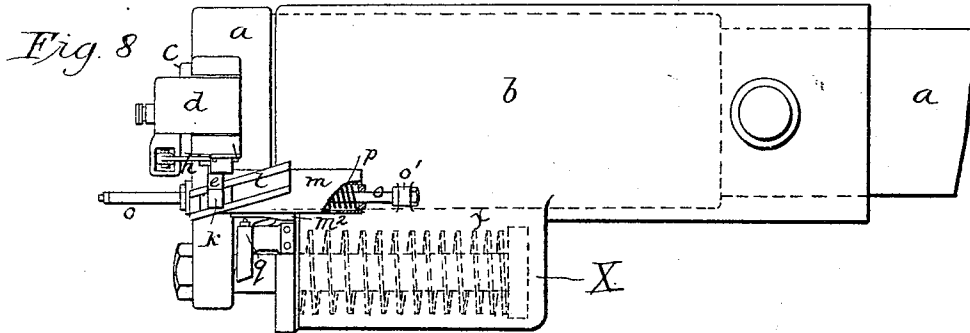
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Patented Mar. 27, 1894.



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Inventors:

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By order of said magistrates
 Alden Dundon Night

UNITED STATES PATENT OFFICE.

ANDREW NOBLE AND CHARLES H. MURRAY, OF NEWCASTLE-ON-TYNE, ENGLAND, ASSIGNORS TO SIR W. G. ARMSTRONG, MITCHELL & CO., LIMITED, OF SAME PLACE.

AUTOMATICALLY-OPERATED BREECH MECHANISM FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 517,391, dated March 27, 1894.

Application filed April 24, 1893. Serial No. 471,687. (No model.)

To all whom it may concern:

Be it known that we, ANDREW NOBLE, C. B., manufacturing engineer, late captain in the Royal Artillery, residing at Jesmond Dene House, Newcastle-on-Tyne, England, and CHARLES HENRY MURRAY, engineer, residing at Elswick Works, Newcastle-on-Tyne, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Apparatus for Automatically Opening and Closing the Breech of a Gun, of which the following is a specification.

This invention relates to guns which after recoil are immediately run out again by the operation of recoil springs, and which also have a screw breech block mounted upon a carrier hinged to the breech of the gun. For such guns the invention provides automatic apparatus for opening and closing the breech. The pin passing through the hinge joint is arranged to move longitudinally, and a fast threaded screw and nut in connection with it then causes the hinge pin to turn. The hinge pin is, by intermediate parts, connected with the breech block and its carrier in such manner that the rotary movement of the hinge pin causes the breech block to turn through the angle necessary to lock and unlock it and also moves the carrier around the hinge pin to convey the breech block away from the breech of the gun for loading and to replace it when the loading has been performed. The longitudinal motion is imparted automatically to the hinge pin by means of an incline. The speed at which the breech block and the carrier are moved in closing the breech is regulated by a hydraulic cylinder and piston; liquid contained in the cylinder being compelled during the opening and closing movement to pass from one side of the piston to the other by a passage in the piston rod of suitably regulated dimensions. The cylinder also contains a spring, and the incline which imparts longitudinal movement to the hinge pin is upon the exterior of the cylinder. The gun when it recoils carries the cylinder back with it compressing the spring which the latter contains; the cylinder is then retained by a catch while the gun

runs forward and, the hinge pin receiving movement, the breech is opened. After loading the catch retaining the cylinder is released, it goes forward by the reaction of the spring, the hinge pin is moved in the contrary direction and the breech of the gun is closed.

In the annexed drawings, Figure 1 is a side elevation of the breech end of a gun embodying our improvements. Fig. 2 is a rear elevation thereof, with parts broken away to show some of the mechanism in section. Fig. 3 is a horizontal, central section on the line 3—3 of Figs. 1 and 2. Fig. 4 is a plan view, partly in section, on the line 4—4 of Figs. 1 and 2, and showing by dotted lines the position of the gun and the parts connected therewith, after recoil and just before the gun begins to move forward. Fig. 5 is a plan view, showing by full and dotted lines, the gun and the parts connected therewith in three positions, viz., the position of the gun at the end of recoil and just before it begins to run forward after recoil; the position of the gun and the parts connected therewith after the gun has run forward, a short distance,—and their position after the gun has run forward to the limit of its movement. Fig. 6 is a vertical, longitudinal section on an enlarged scale, of the mechanism for operating the breech block, on the line 6—6 of Fig. 7. Fig. 7 is a detail view in section of parts of the same mechanism. Figs. 8 to 11 are on a reduced scale. Fig. 8 is a side elevation of the breech end of a gun embodying my improvements with some of the parts shown in dotted lines and some of the parts broken away. The position shown is the position just before firing. Fig. 9 is a similar view showing parts as they appear just after firing, and before the forward movement after recoil. Fig. 10 is a similar view with the parts shown as they appear when the gun has run forward after recoil, and with the breech open. Fig. 11 is a similar view with the parts shown as they appear after the breech is closed.

a is the gun, and *b* is the cradle in which the gun slides during recoil, and in running out by the reaction of the recoil springs *x* in

the recoil cylinder *X*, with which a gun mounting of this class is always provided.

c is the divided screw breech block.

d is the breech block carrier. It is hinged to the breech of the gun by means of lugs *a' a'*, formed upon the gun, to receive it. The carrier *d*, supports the breech block upon a pivot piece *d'*, and the breech block has a cavity in it, into which the pivot piece fits. The firing pin, as seen in Fig. 3, passes through the breech block *c*, and the pivot piece *d'*. It will thus be seen that the breech block is free to turn upon the carrier. It is provided, as is usual, with a segmental screw thread at *c*², by which it engages with the breech of the gun, within which a corresponding segmental thread is cut. These arrangements are more fully described in Letters Patent No. 492,942, granted to Andrew Noble and George Henderson, March 7, 1893.

e is the hinge pin, it has a rapid screw thread upon it at *e'* and it works through a corresponding nut *f* fixed upon the gun in the lug *a'*.

g g are ball bearings for the carrier *d*.

h is a lever arm turning with the hinge pin but the pin is able to move longitudinally through it.

i is a slide block movable horizontally in a recess in the carrier *d* and connected by a link with the arm *h*.

c' is a pin projecting from the breech block and entering a die which can slide vertically in an elongated hole in the slide block *i*. This constitutes a suitable way of connecting the hinge pin *e* with the breech block but others may be resorted to.

j is a spring catch which when carrier *d* is not in contact with the breech of the gun engages with the breech block and prevents it turning.

It will now be obvious that a partial rotary motion imparted to the hinge pin *e*, will serve to open or close the breech as the case may be. Thus if the breech be closed and the pin *e* be so rotated as to move the arm *h* rearward, then by its connecting link the arm draws the block *i* from left to right along the recess in the carrier *d* in which it is contained. From this movement of the slide block *i* a rotary movement of the breech block results, the pin *c'* and the die upon it being engaged in a vertical slot in the slide block *i*. This movement continues for a sufficient distance to unlock the breech block from the gun. Then the slide block *i* comes to the end of its free path and the further movement of the arm *h* causes the carrier *d* to swing rearward carrying the breech block with it. In closing the breech similar movements take place in reverse order.

k is a shoe at the lower end of the hinge pin *e*, it is lodged in the inclined guide groove *l*. The guide *l* is formed upon the exterior of the hydraulic control cylinder *m* which itself is able to slide longitudinally upon the gun.

The cylinder *m* contains a piston *n* and the hollow piston rod *o* passes through it.

p is a spring contained within the cylinder *m*. The piston rod is fixed to the cradle or gun mounting at *o'* and the breech of the gun abuts on the cylinder at *m'*; consequently when the gun recoils the cylinder *m* moves rearward with it; the spring *p* is thus compressed and liquid passes through the hollow piston rod and the perforations *o*² *o*³ in it, from one side of the piston to the other.

q is a spring catch on the gun mounting which engages with the projection *m*² on the exterior of the cylinder *m* and retains the cylinder while the gun moves forward as soon as the recoil is spent. The shoe *k* then advances from the rear to the fore end of the guide groove *l* and in consequence of the rotary motion thus imparted to the hinge pin *e* the breech is unlocked and opened as herein fully described. The charge is then put into the gun; the spring catch *q* is drawn down releasing the cylinder *m* which moves forward, with the result that the breech is again closed and locked fast.

*o*⁴ is a screw plug for the regulation of the orifice *o*³.

r is a ring supported within the cylinder *m*, it covers and partially closes the orifice *o*² at the time when the carrier *d* approaches the breech of the gun and prevents the breech closing with violence.

In Fig. 4, the gun and the parts connected therewith are shown by full lines in their normal position, or before firing.

The dotted lines in Fig. 4 indicate the position of the parts at the end of recoil and before the gun has started forward after recoil. It will be observed that the breech block has not changed its normal position.

In Fig. 5, the light dotted lines show the parts in the same position as that shown in Fig. 4, viz., at the end of recoil, and before the gun is started forward. The full lines show the position of the parts after the gun has commenced to move forward, and it will be seen that the parts after moving the breech block, have shifted a sufficient distance to unlock the screw threads. The dotted lines *x*, show the position of the parts after the gun has fully run forward and it will be observed that the breech block has been withdrawn and moved away from the breech opening. The mechanism for effecting the unlocking and withdrawal of the breech block and also for returning the breech block to the breech opening and locking it therein, have been heretofore fully described.

What we claim is—

1. The combination, substantially as heretofore set forth, of a gun, the cradle in which the gun slides back and forth, recoil mechanism connecting the gun with the cradle for running the gun forward after recoil, a screw threaded breech block in the breech of the gun, a carrier on which the breech

block is mounted, and which is hinged to the breech of the gun, a hinge pin with a quick-threaded screw, a nut mounted on the screw, and held in a fixed relation thereto at the
 5 breech end of the gun, connections between the hinge pin and the breech block for turning it and withdrawing it, and means for moving the hinge pin longitudinally to effect its rotation, the organization being such that the
 10 hinge pin when moved longitudinally also rotates and unlocks and withdraws the breech block.

2. The combination, substantially as here-
 inbefore set forth, of a gun, a cradle in which
 15 the gun slides, recoil mechanism connecting the gun with the cradle for running the gun forward after recoil, a screw-threaded breech block in the breech of the gun, a carrier on which the breech block is mounted, and which
 20 is hinged to the breech of the gun, a hinge pin with a quick-threaded screw, a nut mounted on the screw and held in a fixed relation thereto at the breech end of the gun, connections between the hinge pin and the breech block
 25 for turning it and withdrawing it, and a movable incline with which the hinge pin and by which it is moved longitudinally to effect its rotation, the organization being such that the hinge pin when moved longitudinally also rotates and unlocks and withdraws the breech
 30 block.

3. The combination, substantially as here-
 inbefore set forth, of the gun, the screw-threaded breech block in the gun, the breech
 35 block carrier hinged to the breech of the gun, the cradle in which the gun slides, recoil mechanism connecting the cradle with the gun for

moving the gun forward after recoil, the hinge pin having a quick-threaded screw, a nut fixed to the gun and mounted on the
 40 screw, an arm turning with the hinge pin, connecting links between the arm and the breech block, a shoe secured to the hinge pin, an incline along which the shoe travels, a cylinder to which the incline is secured, a spring
 45 within the cylinder which is compressed when the cylinder recoils, with the gun, a catch which retains the cylinder while the gun runs out, a piston and passages for liquid which control the movement of the parts when the
 50 cylinder is released.

4. The combination of a stationary cradle, a gun mounted therein to slide back and forth, a recoil cylinder carried by the cradle, a piston mounted in the cylinder and connected
 55 with the gun, a breech block locked in the gun by a divided screw thread, a carrier in which the breech block is mounted, and which is hinged to the breech of the gun, a hinge pin with a quick-threaded screw, a nut mounted on the screw and fixed to the gun, the cylinder, *m*, the incline carried thereby and engaging with the hinge pin, a catch for holding the cylinder in position against the force
 60 of a spring to hold the breech block open, 65 and connections between the hinge pin and the breech block to turn it to enable it to be withdrawn by the carrier.

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