

W. D. SMITH.
ORDNANCE.

APPLICATION FILED NOV. 19, 1909.

Patented Nov. 7, 1911.

4 SHEETS-SHEET 1.

1,007,744.

Fig. 1.

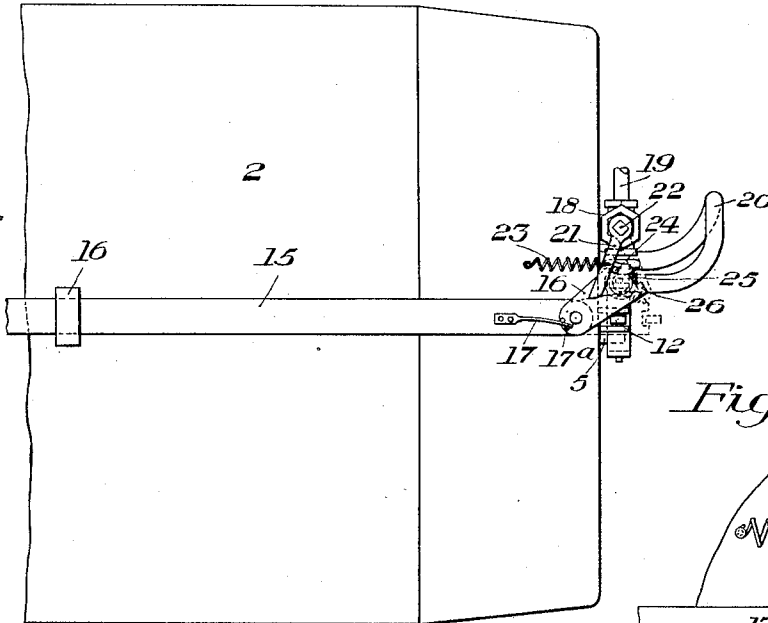


Fig. 1a

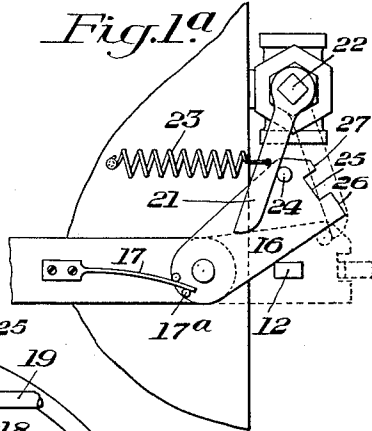
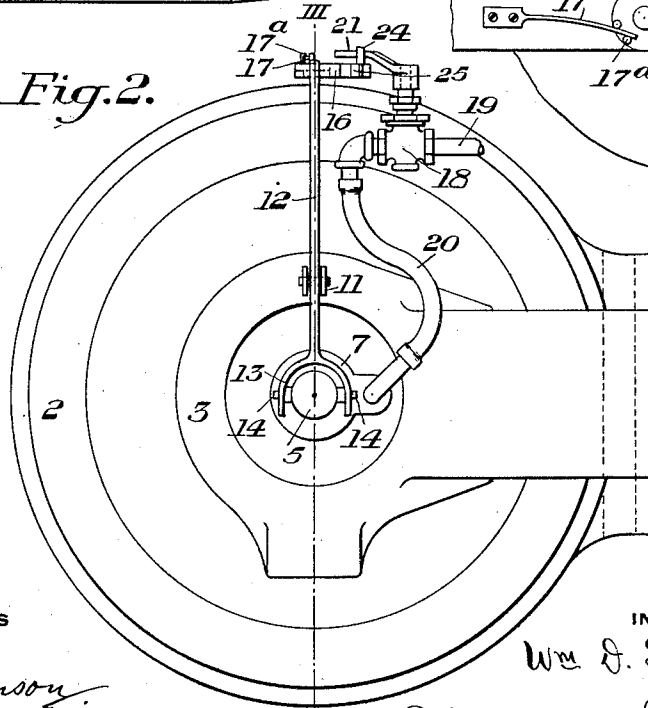


Fig. 2.



WITNESSES

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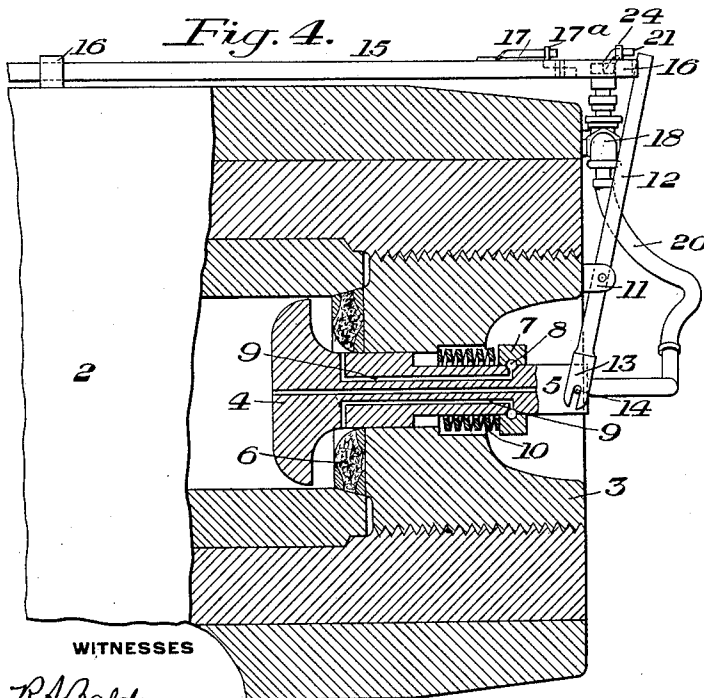
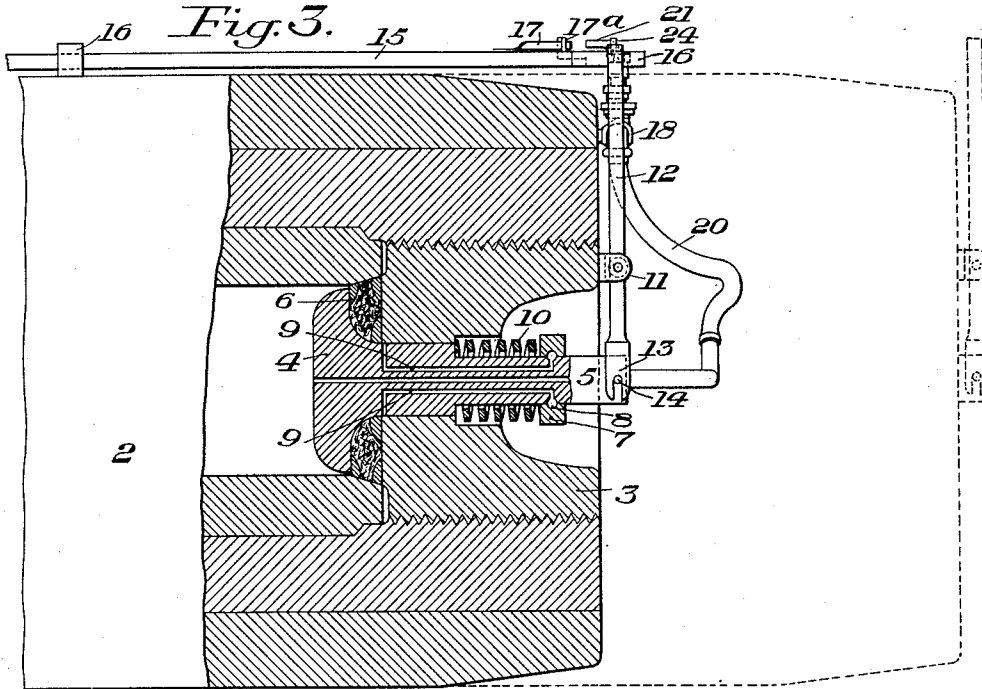
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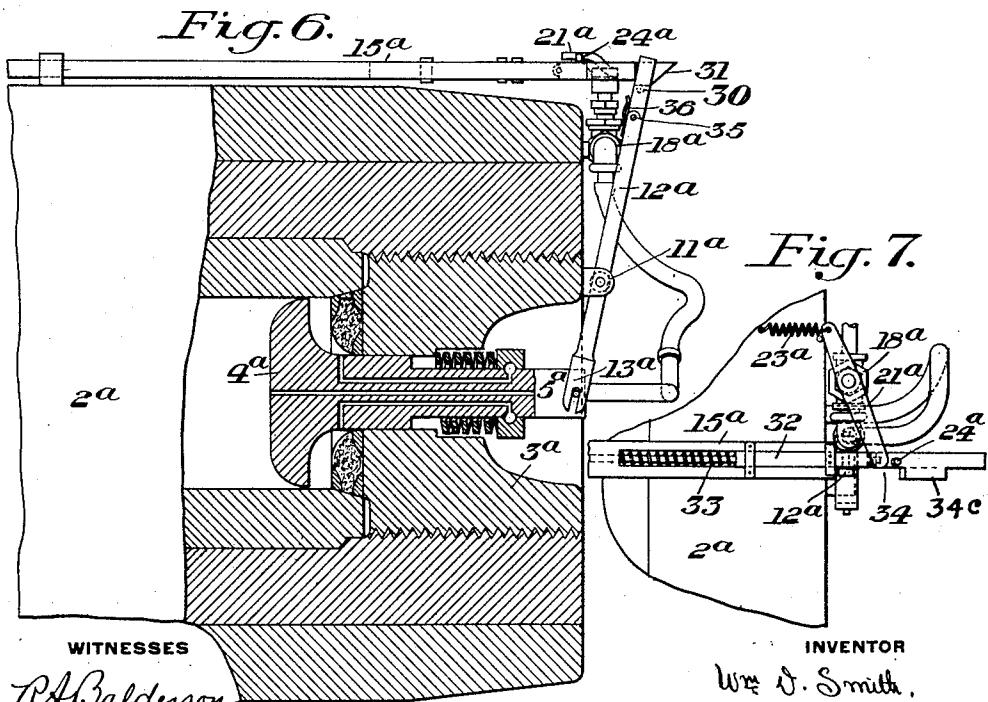
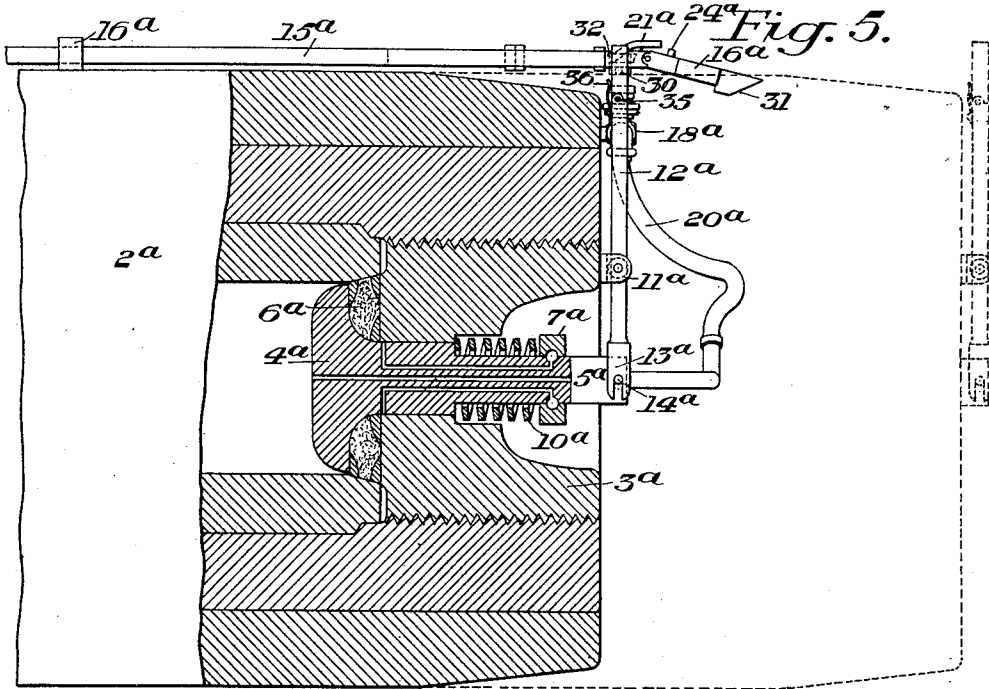
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4 SHEETS-SHEET 4.

Fig. 8.

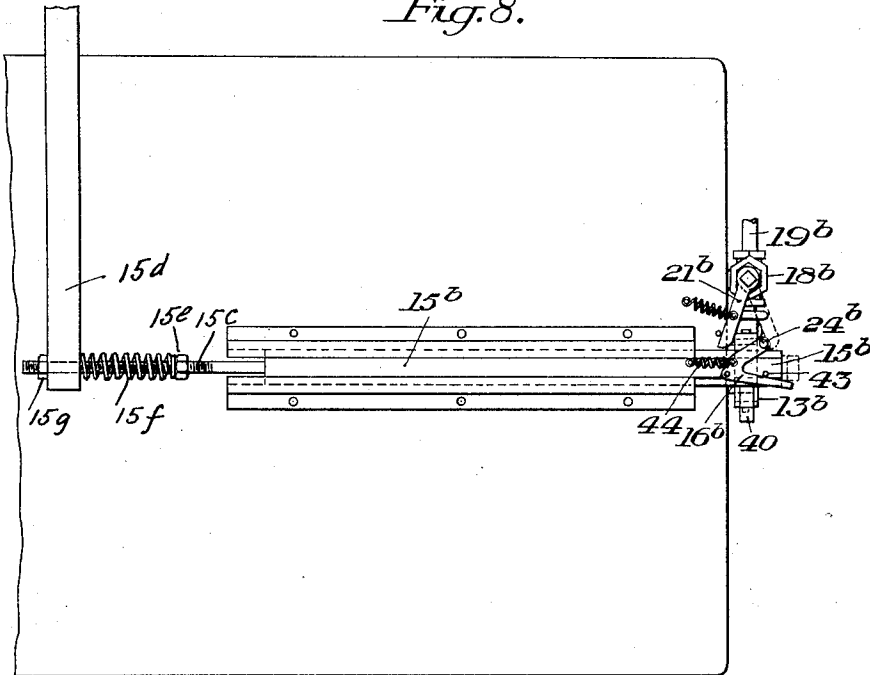


Fig. 10.

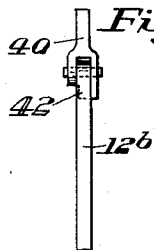
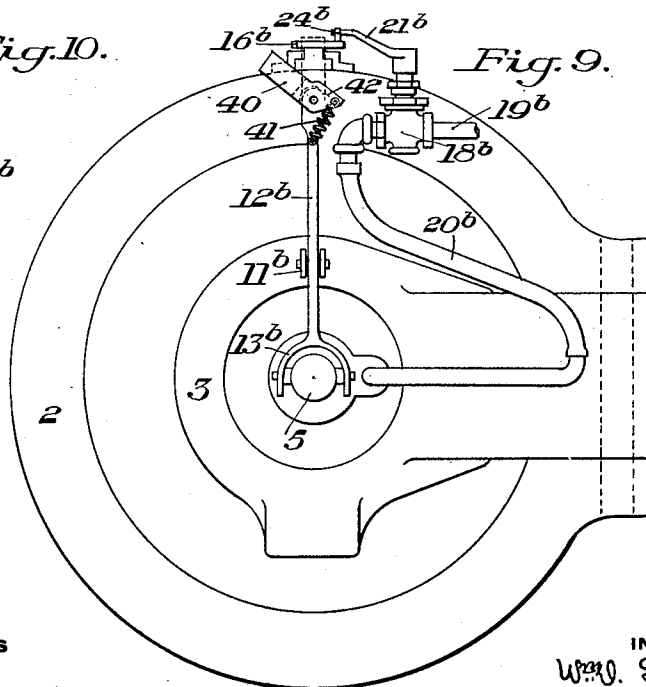


Fig. 9.



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UNITED STATES PATENT OFFICE.

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1,007,744.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM D. SMITH, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Ordnance, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of the breech portion of a gun equipped with one form of my improved apparatus for flushing a gun. Fig. 1^a is a similar view of the detail portions thereof on an enlarged scale. Fig. 2 is a rear elevation. Fig. 3 is a longitudinal section on the line III—III of Fig. 2, showing the gun in a position to be fired. Fig. 4 is a similar view of the gun after it has been fired, and is returned to battery, showing the parts in the position they occupy when the gun is being flushed. Figs. 5 and 6 are views similar to Figs. 3 and 4 showing a modified arrangement of valve operating mechanism. Fig. 7 is a plan view of the valve operating mechanism shown in Figs. 5 and 6. Figs. 8 and 9 are views similar to Figs. 1 and 2, showing a slightly modified arrangement of valve operating mechanism. Fig. 10 is a side elevation of the mushroom head shifting lever shown in Figs. 8 and 9.

This invention relates to ordnance of the breech loading type which is provided with a mushroom head, wherein it is customary to provide a gas check between the breech block and the mushroom head to prevent the escape of the gases rearwardly through the breech of the gun.

The object of my invention is to provide a simple, cheap and efficient mechanism to flush the gun after it has been fired and before the breech block has been moved without materially changing the general type of guns now in use.

Another object of my invention is to provide mechanism which will automatically advance the mushroom head, by the counter-recoil of the gun to open a valve and admit fluid pressure between the gas check and the mushroom head, to cool the pad and flush the gun.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction and general arrangement of

the parts without departing from the spirit and scope of my invention as defined in the appended claims.

In Figs. 1 to 4, the numeral 2 designates the breech portion of the gun, which is adapted to receive the threaded breech block 3 of the ordinary type. 4 is a mushroom head having a spindle 5 which extends through an orifice in the breech block 3. Surrounding the stem 5 and interposed between the mushroom head 4 and the breech block 3 is a gas check 6 of any well known construction. Mounted near the end of the spindle 5 of the mushroom head is a collar 7 which is held from longitudinal movement on the spindle and is mounted so that the spindle may rotate therein. This collar is provided with an annular groove 8, and 9 are ports or inlets which connect with the annular groove 8 and extend inwardly through the stem 5 to a point slightly to the rear of the gas check 6 when the mushroom head is in its rearward or firing position, as shown in Fig. 3. When the mushroom head is advanced into the bore of the gun the ports will be in advance of the gas check, as shown in Fig. 4. Surrounding the stem 5 and interposed between the collar 7 and an annular flange in the bore of the breech block is a coil spring 10, which normally tends to hold the mushroom head against the gas check 6. Pivotally mounted in a bracket 11, which is secured to the breech block 3, is a lever 12, having a forked end 13. Each arm of this fork is in turn bifurcated and is arranged to engage a pin or trunnion 14 on each side of the stem 5. Mounted above the gun and secured to any stationary point is a rod 15, which passes through a guide 16 on the upper portion of the gun, when the gun recoils, as hereinafter described. Pivotally connected to the end of this rod 15 is a dog 16, and 17 is a leaf spring secured to the rod 15. The end of this spring lies between two pins 17^a on the heel of the dog 16, and is arranged to normally hold the dog in its central position as shown in dotted lines in Fig. 1. 18 is a valve which is secured to the rear portion of the gun, and is adapted to cut off the pressure in a pipe 19 connected to one side thereof, and which is connected to any source of pressure supply such as compressed air, water, oil, or other liquid. 20 is a flexible tube connecting the other side of the valve 18 with the annular groove 8 in the collar

7. When the valve is open, pressure is admitted from the pipe 19 through the tube 20, the annular groove 8 and the inlet ports 9, to the interior of the gun. 21 is a lever which is connected to the stem 22 of the valve, and 23 is a spring connected to the gun and to the lever 21, and normally tending to hold the lever in its closed position, as shown in full lines in Fig. 1. 24 is a pin on the dog 16, and which is in line with the lever 21. 25 is a recess between the projections 26 and 27 on the front end of the dog 16, and arranged to receive the upper end of the lever 12 when the gun returns into battery after the recoil thereof.

The operation is as follows: The various parts of the gun before firing are in the position shown in Figs. 1 to 3 inclusive, in which the end of the lever 12 is in contact with the side of the dog 16 and holds it against the action of the spring 17. As soon as the gun recoils, the end of the lever 12 will move away from the dog 16 and allow it to be moved laterally by the action of the spring 17 to the central position. The further rearward movement of the lever 21 will throw the dog slightly beyond the central position to allow the lever 21 to pass the pin 24. As soon as the lever 21 has passed the pin 24, the dog will assume a central position, as shown in dotted lines in Fig. 1. When the gun returns to battery, the upper end of the lever 12 will enter the recess 25, and throw or move the mushroom head into position shown in Fig. 4, and the lever 21 will engage the pin 24 and will be thrown into the dotted line position shown in Fig. 1 to open the valve and allow pressure to pass through the valve 18 and enter the ports 9 in the manner previously described to flush and cool the gun. The breech block is now rotated a sufficient distance to release a screw thread engagement between the breech block and the breech of the gun, and while rotating the breech block, the end of the lever 12 will engage the projection 26 and pull the dog 16 laterally and allow the lever 21 to clear the pin 24. As soon as this pin has cleared the end of the lever, the spring 23 will return the lever 21 to the position shown in full lines in Fig. 1 and close the valve 18. As soon as the breech block has been rotated a sufficient distance to clear the projection 26, the dog 16 will be returned to its central position. After the gun has been cleaned and loaded the breech block is inserted in its place, and the final rotation of the breech block will lock it to the breech of the gun, and the upper end of the lever 12 will engage the dog 16 and throw the dog into the position shown in full lines in Fig. 1.

In Figs. 5 and 6 I have given all of the various parts the same numerals with the letter "a" added. In these figures the piv-

oted dog 16^a moves vertically, or at right angles to the movement of the dog 16 shown in Figs. 1 and 2, and when the gun returns into battery, a pin 30 on the upper end of the lever 12^a strikes a cam surface 31 and raises the dog so that the pin 24^a will be in alinement with the operating lever 21^a of the valve 18^a. This dog 16^a is pivoted to a movable rod 32 which is slidably mounted in the rod 15^a, and is normally held in its forward position by a coil spring 33. The end of this dog 16^a is also provided with a recess 34 arranged to receive the end of the lever 12^a when the gun is in firing position, as shown in Fig. 7. The end of the lever 12^a is also broken and is provided with a rule joint as shown at 35, and which is normally held in its straight position by means of a leaf spring 36. When the gun recoils, the end of the lever 12^a will strike the projection 34^c on the dog 16^a in advance of the recess 34 and it will be moved on its hinge joint 35 until it has passed the projection, after which it will assume its normal position. On the return of the gun to battery, the pin 30 will strike the cam surface 31 and raise the dog 16^a so that the pin 24^a will be in alinement with the valve lever 21^a and the end of the lever 12 will strike the projection on the dog and push the dog inwardly to open the valve. The further movement of the gun into battery will advance the mushroom head as shown in Fig. 6, and allow the fluid pressure to flush the gun. The breech block is now rotated preparatory to translating, and as soon as it has been rotated a sufficient distance to allow the end of the lever 12^a and the pin 30 to clear the dog 16^a, the spring 23^a will return the valve lever 21^a to its closed position, and the spring 33 will return the slide 32 and the dog 16^a to the position shown in the drawings.

In Figs. 8, 9 and 10, I have shown a further modification in which I have used the same reference numerals to designate similar parts with the letter "b" affixed. In this construction the end of the lever 12^b is provided with a hinged member 40, which is normally held in line with the lever 12^b by means of a spring 41. 42 is a stop on the hinged member and is arranged to engage the lever 12^b when the spring has drawn this member into its operative position. The dog 16^b pivoted on the rod 15^b is also provided with a pin 24^b arranged to be struck by the valve lever 21^b when the gun returns to battery. 43 is a pin on the rod 15^b which forms a stop for the dog 16^b, and 44 is a spring arranged to hold the dog in the position shown in Fig. 8. Extending rearwardly from the rod 15^b is a rod 15^c which is screw threaded for a portion of its length. The outer end of this rod extends through a member 15^d which is secured to any stationary portion of the gun carriage

or to the recoil cylinder. Surrounding this rod 15^c and interposed between a nut 15^e and the member 15^d is a coil spring 15^f, the strength of which is slightly greater than the coil spring surrounding the stem of the mushroom head, and 15^g is a nut surrounding the outer end of the rod 15^b and is adapted to engage the member 15^d to limit the rearward movement of the rod 15^b. This spring is provided to allow a slight forward movement of the rod 15^b when the gun returns to battery if the counter-recoil of the gun is greater than that required to advance the mushroom head against the action of the spring surrounding its stem. The operation of the various parts of this construction are the same as those in Figs. 1 to 5, with the exception that the dog 16^b is not shifted when the breech block is inserted into place. The hinged member 40 swings to the left when the breech block is inserted, as shown in Fig. 9, and as soon as the hinged member clears the rod 15^b on the recoil of the gun, the member 40 will be raised to its vertical or operative position by the spring 41.

The advantages of my invention result from the provision of means whereby pressure may be automatically admitted between the mushroom head and the gas check or pad to cool the pad and flush the gun by the counter-recoil. Also in the provision of means to advance the mushroom head by the final movement of the gun when moving into battery, which will move the mushroom head the same distance after each discharge of the gun, as the gun always moves to a predetermined point when returning to battery irrespective of its recoil movement.

I claim:

1. A gun having a fluid inlet port, a breech block, a mushroom head, a valve controlling said port, there being a constant fluid pressure supply to said valve, and actuating mechanism arranged to be actuated by the counter-recoil of the gun to shift the mushroom head and open the valve to admit fluid pressure to the gun before the breech block is unlocked; substantially as described.
2. In a gun, a breech block, a mushroom head, a fluid inlet port controlled by the mushroom head, means to supply fluid pressure to said port, a gas check between the mushroom head and breech block, and means actuated by the counter recoil of the gun to advance the mushroom head to open the port and flush the gun, and to cool the gun and gas check; substantially as described.
3. A gun having a fluid inlet port, a breech block, a valve controlling said port, there being a constant fluid pressure supply to said valve, valve actuating mechanism arranged to be actuated by the counter-recoil of the gun to open the valve to admit fluid pressure to the port before the breech

block is unlocked, and valve closing mechanism arranged to close the valve during the opening movement of the breech block; substantially as described.

4. In a gun, a breech block, a mushroom head, a fluid inlet port, means to supply fluid pressure to the inlet port, a valve to control the flow of fluid pressure to the port, a lever pivoted to the breech block, and means to move the lever to open the port and to open the valve when the gun returns into battery; substantially as described.

5. A gun having a fluid inlet port, a breech block, a valve controlling said port, there being a constant fluid pressure supply to said valve, a second valve controlling the flow of fluid pressure from the port to the gun, and actuating mechanism arranged to be actuated by the counter-recoil of the gun to open both valves before the breech block is unlocked to flush and cool the gun; substantially as described.

6. A gun having a fluid inlet port, a breech block, a valve controlling said port, there being a constant fluid pressure supply to said valve, a second valve controlling the flow of fluid pressure from the port to the gun, actuating mechanism arranged to be actuated by the counter-recoil of the gun to open both valves before the breech block is unlocked to flush and cool the gun, and valve closing mechanism for each valve arranged to close the valves during the unlocking movement of the breech block; substantially as described.

7. In a gun, a breech block, a mushroom head having a spindle extending through the breech-block, a fluid inlet port normally closed when the mushroom head is in its rearward position, means to supply fluid pressure to said port, and means connected to the spindle to advance the mushroom head by the counter-recoil of the gun; substantially as described.

8. In a gun, a breech block, a mushroom head having a spindle extending through the breech block, a fluid inlet port normally closed when the mushroom head is in its rearward position, means to supply fluid pressure to said port, a lever connected to the spindle, and means to actuate the lever to advance the mushroom head when the gun moves into battery; substantially as described.

9. In a gun, a breech block, a mushroom head having a spindle extending through the breech-block, a fluid inlet port normally closed when the mushroom head is in its rearward position, means to supply fluid pressure to said port, a pressure supply pipe connected to said port, a valve in the pressure supply pipe, and means to open the valve and advance the mushroom head by the counter-recoil of the gun; substantially as described.

10. In a gun, a breech block, a mushroom head having a spindle extending through the breech-block, a fluid inlet port normally closed when the mushroom head is in its rearward position, means to supply fluid pressure to said port, a pressure supply pipe connected to said port, a valve in the pressure supply pipe, means to open the valve and advance the mushroom head by the counter-recoil of the gun, and means to close the valve and return the mushroom head when the breech block is rotated to remove it from the gun; substantially as described.

11. In a gun, a breech block, a mushroom head, a fluid inlet port, means to supply fluid pressure to said port, means actuated by the counter-recoil of the gun to advance the mushroom head to open the port, and a yielding connection arranged to limit the advance of the mushroom head; substantially as described.

12. In a gun, a breech block, a mushroom head, a fluid inlet port, means to supply fluid pressure to said port, means actuated by the counter-recoil of the gun to advance the mushroom head to open the port, and a spring arranged to limit the advance of the mushroom head; substantially as described.

13. A gun having a fluid inlet port, a breech block, a mushroom head controlling said port, a fluid pressure pipe leading to said port, a valve arranged to control the flow of pressure in the pipe, a lever connected to the valve, and actuating connections arranged to move the lever to open the valve on the counter-recoil of the gun before the breech block is unlocked; substantially as described.

14. A gun having a fluid inlet port, a breech block, a mushroom head controlling said port, a fluid pressure pipe leading to said port, a valve arranged to control the flow of pressure in the pipe, a lever connected to the valve, actuating connections arranged to move the lever to open the valve

on the counter-recoil of the gun before the breech block is unlocked, and valve closing mechanism arranged to close the valve during the unlocking movement of the breech block; substantially as described.

15. In a gun, a breech block, a fluid inlet port, a mushroom head controlling said port, a fluid pressure pipe, a valve secured to the gun and arranged to control the flow of pressure in said pipe, a lever connected to the valve, and means arranged to open the valve by the counter-recoil of the gun to admit pressure to the bore of the gun before the breech block is unlocked; substantially as described.

16. In a gun, a breech block, a fluid inlet port, a mushroom head controlling said port, a fluid pressure pipe, a valve arranged to control the flow of pressure in the pipe, a lever connected to the valve, and valve actuating means arranged to be shifted by the movement of the gun caused by the recoil thereof to open the valve to flush the gun before the breech block is unlocked; substantially as described.

17. In a gun having a breech block, means for flushing the bore of the gun after explosion and before the removal of the breech block, said means comprising a fluid supply pipe arranged to discharge through the breech block, a valve for controlling said pipe, automatic means for opening said valve upon the discharge of the gun, and means for temporarily holding the valve in its open position, said means being arranged to be released during the unlocking movement of the breech block preparatory to its removal; substantially as described.

In testimony whereof, I have hereunto set my hand.

WILLIAM D. SMITH.

Witnesses:

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H. M. CORWIN.