

W. D. SMITH.

ORDNANCE.

APPLICATION FILED MAR. 12, 1910.

1,073,298.

Patented Sept. 16, 1913.

4 SHEETS—SHEET 2.

Fig. 3.

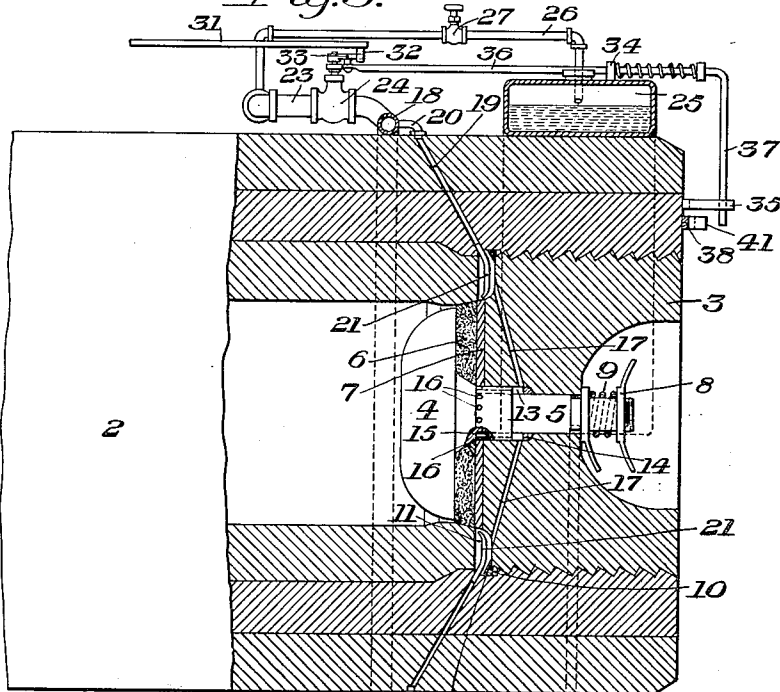
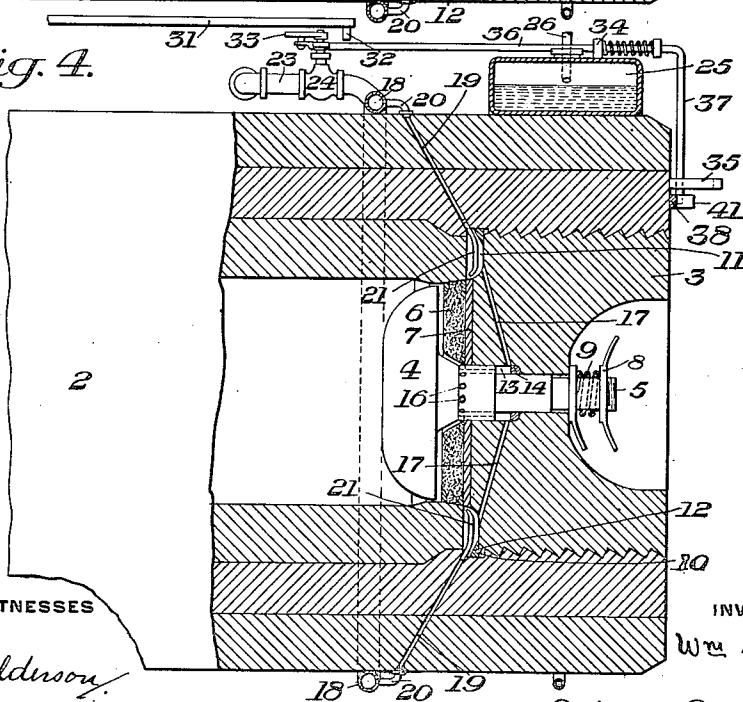


Fig. 4.



WITNESSES

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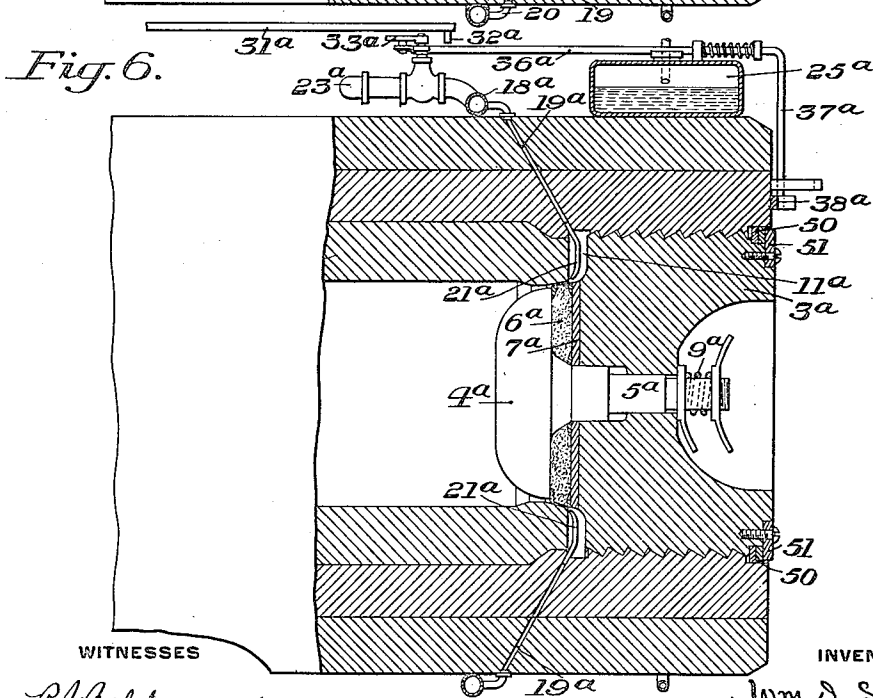
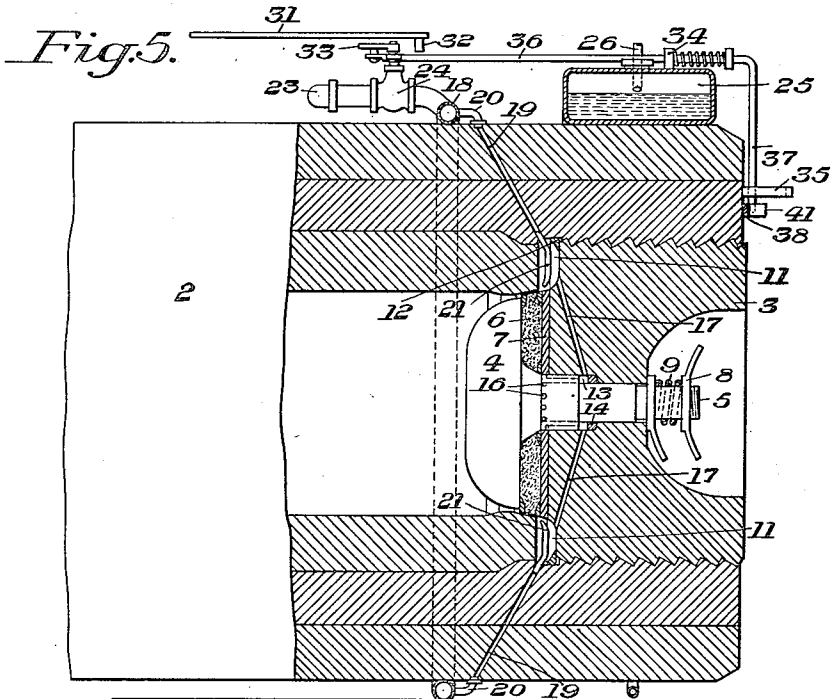
INVENTOR

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1,073,298.

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4 SHEETS—SHEET 3.



WITNESSES

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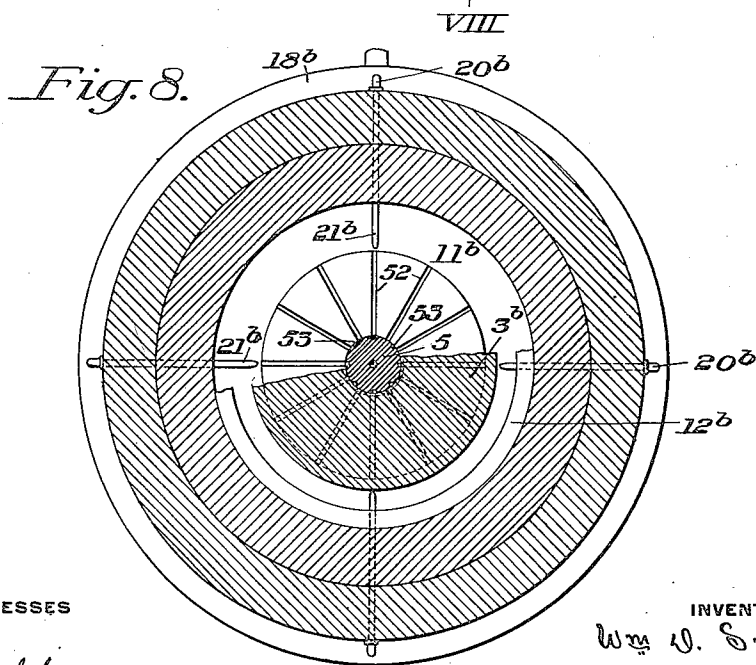
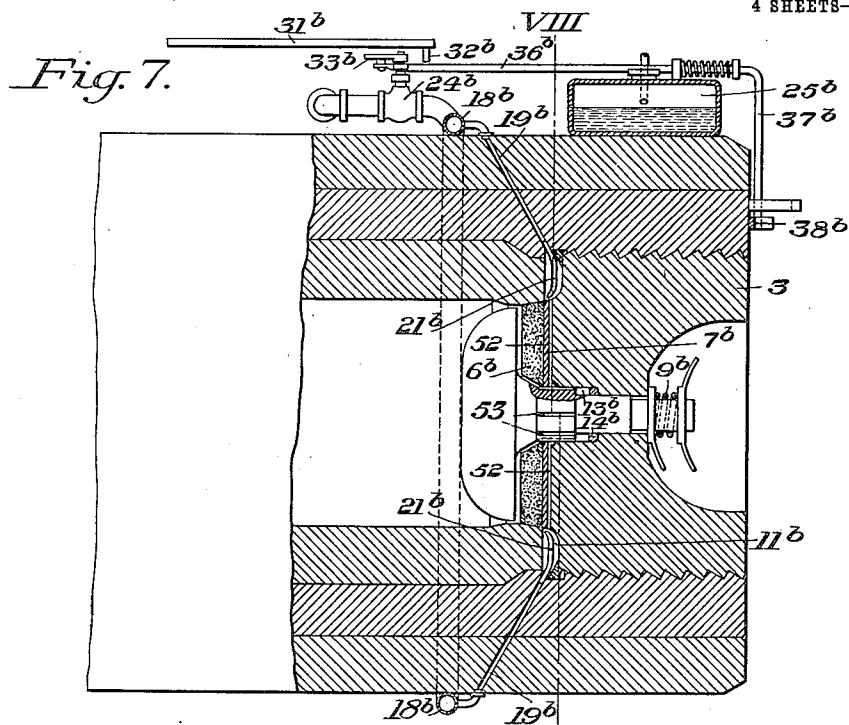
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1,073,298.

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4 SHEETS—SHEET 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM D. SMITH, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO W. D. SMITH ORDNANCE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF DELAWARE.

ORDNANCE.

1,073,298.

Specification of Letters Patent. Patented Sept. 16, 1913.

Application filed March 12, 1910. Serial No. 548,974.

To all whom it may concern:

Be it known that I, WILLIAM D. SMITH, of Washington, in the District of Columbia, 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.

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 translated, without materially changing the general type of guns now in use.

Another object of my invention is to provide mechanism which will automatically open a valve and admit fluid pressure behind the mushroom head to advance it and allow fluid to pass out between the gas check and the mushroom head, to cool the pad and flush the gun.

Another object of my invention is to provide means for sealing the opening in the breech containing the breech block, to prevent the rearward escape of gas and fluid pressure after the breech block has been rotated to loosen the gas check to allow fluid pressure to pass between the gas check and the bore of the gun.

Still another object of my invention is to provide means for admitting a proper lubricant into the breech of the gun, which will be forced over the gas check into the bore of the gun by the fluid pressure.

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 the accompanying drawings; 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. 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 initially flushed. Fig. 5 is a view similar to Fig. 4 showing the breech block rotated to partially withdraw the gas check and allow fluid to be forced over the gas check. Fig. 6 is a view similar to Fig. 3, showing a modified arrangement and showing the parts in the position they assume when the gun is being flushed. Fig. 7 is a view similar to Fig. 4, showing a modified arrangement of ports in the stem of the mushroom head, and Fig. 8 is a sectional view on the line VIII—VIII of Fig. 7.

In Figs. 1 to 5, 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, and 7 is a follower plate interposed between the gas check and the breech block. Mounted near the end of the spindle 5 of the mushroom head is a collar 8 which is held from longitudinal movement on the spindle. Surrounding the spindle and interposed between the collar 8 and the breech block is a spring 9, arranged to normally hold the mushroom head against the gas check. The inner portions of the threads for securing the breech block are cut away to a depth equal to the depth of the threads as shown at 10, and the forward portion of the breech block is cut away to form a chamber 11, between the breech block and the offset between the bore of the gun and the enlarged recess for the breech block. 12 is a split packing ring in the cut-away portion 10, and is arranged to be seated against the forward end of the breech block and the cylindrical wall of the chamber 11, to prevent the rearward escape of gas and fluid pressure from the chamber, as hereinafter described. 13 is a chamber in the breech

block through which the stem of the mushroom head passes. The extremity of this stem is reduced and passes through a packing ring 14 in the chamber 13, which will prevent any rearward leakage of the fluid pressure along the stem. The forward or enlarged portion of the stem is provided with an annular groove 15, and 16 are ports or inlets which connect with the annular groove 15 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 admit pressure to the bore of the gun between the mushroom head and the gas check, as shown in Fig. 4. The chambers 11 and 13 are connected to each other by means of the radially disposed channels 17 in the breech block. Surrounding the body of the gun is a fluid pressure pipe 18, and extending radially through the body of the gun are the channels 19. The outer end of each of these channels is connected by means of a pipe 20 with the pressure pipe 18, and 21 are short tubes extending from the inner ends of these channels into the chamber 11. The inner ends of these tubes are bent inwardly so as to direct the fluid pressure over the gas check, as shown in Fig. 5. 23 is a pressure inlet pipe leading from any suitable source of pressure supply to the pressure pipe 18, and 24 is a valve in the pipe 23 arranged to open and close the connections between the pipes 18 and 23. Mounted on the top of the breech of the gun is a tank 25 adapted to hold a lubricant for lubricating the bore of the gun. 27 is a pipe connecting the pressure inlet pipe 23 with the tank 25, and is provided with a valve 27 to cut off the pressure from the pressure inlet pipe when desired. 28 is a pipe which is connected to the lower ends of the tank, and to the pressure pipe 18. 29 is a valve for adjusting the flow of lubricant from the tank 25 to the pressure pipe 18, and 30 is a valve in the pipe 28 for opening and closing the connection through the pipe 28, from the tank 25 to the pressure pipe 18.

I have shown mechanism for automatically opening and closing the valves 24 and 30 after the gun has been fired, and which will now be described, it being understood, however, that the valves may be opened and closed by hand if desirable. It will also be understood that the lubricant may be supplied from any suitable source instead of from a tank mounted on the gun. Connected to any stationary portion of the gun is a rod 31, having a downwardly projecting pin 32, and which is in the line of movement of a lever 33 connected to the stem of the valve 24. Pivottally connected to the valve lever 33, and slidably mounted on the guides 34

and 35 on the gun, is a spring pressed rod 36, the outer end of which is provided with a downwardly projecting arm 37. Slidably mounted on the rear of the gun is a latch bar 38. This latch bar is mounted so as to slide concentric with relation to the bore of the gun, on the screws or pins 39, the bar being provided with suitable slots through which the screws pass to permit such movement.

40 is a spring bearing against one end of the latch bar to hold it in the position shown in Fig. 2, and 41 is a cam face at the other end of the latch bar, and is arranged to retain the rod in its forward position when the valve 24 has been opened by the recoil of the gun. Connected to the outer end of the stem of the valve 30 is a lever 42, having a slot and pin connection with a spring actuated lever 43, pivoted to the rear end of the gun. Pivottally mounted on the outer face of the breech block is a spring actuated lever 44, having a pin 45 in line with one end of the lever 43, and is arranged to actuate said lever to open the valve 30 when the breech block is rotated a predetermined distance and to pass beyond the lever and allow the valve to be closed by means of the spring connected to said lever, just before the breech block has rotated the required distance to free its threaded engagement with the breech of the gun.

47 is a pin on the latch bar and is in line of movement of the lever 43, and is adapted to be struck by the lever just before the pin 45 passes beyond said lever, to shift the latch bar and allow the spring connected to the rod 36 to shift said rod and close the valve 24, just prior to the translation of the breech block.

48 is a hand hold which is connected to the latch bar 38 for shifting it by hand to release the rod 36 when it is desired to do so.

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 valve lever 33 is in contact with the pin 32, on the rod 31. As soon as the gun recoils, the lever 33 will be shifted to open the valve 24, and admit pressure to the chambers 11 and 13. The movement of the lever 33 will draw the rod 36 against the action of its spring, and the arm 37 thereof will strike the cam face 41 of the latch bar 38 and move it against the action of its spring 40. When the end 37 of this rod has passed the latch bar, the spring 40 will force the latch bar into the position to lock the rod against the action of its spring, and hold the valve 24 in its open position, as shown in Fig. 4. The pressure in the chamber 13 will act on the enlarged portion of the stem of the mushroom head and force it into the bore of the gun, as shown in Fig. 4. The fluid pressure passes through the groove

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15 and ports 16, and thence to the bore of the gun between the gas check and the mushroom head, to flush the gun. The breech block is now rotated a sufficient distance to allow the pin 45 to engage and move the lever 43 to open the valve 30, and also to release the gas check, and allow pressure to escape from the chamber 11 into the bore of the gun over the gas check, thereby reducing the pressure in the chamber 13. The spring 9 will draw the mushroom rearwardly against the gas check, as shown in Fig. 6. The opening of the valve 30 will allow the lubricant to pass into the tubes 21 and it will be blown over the gas check into the bore of the gun by means of the fluid pressure. It may here be stated that the lubricant in the tank 25 is under pressure by means of the pipe 26 which connects it with the pressure inlet pipe. During the rotary movement of the breech block a tight joint is maintained between it and the chamber 11 by means of the packing ring 12, which is forced back with the breech block by the pressure in the chamber 11, such rearward movement being permitted by the cut away portion 10. After the gun has been properly flushed and lubricated, the breech block is rotated sufficiently to clear the threads on the breech block from the threads in the breech of the gun, as well known in the art. Just prior to the complete rotary movement of the breech block the pin 47 on the latch bar will be struck and the bar moved by means of the lever 43, which will release the rod 36 and allow its spring to act and close the valve 24; and shortly after the releasing of the rod 36 and just prior to the complete rotary movement of the breech block, the pin 45 will pass beyond the lever 43, and allow its spring to close the valve 30. After the breech block has been rotated a sufficient distance to clear the threads in the breech of the gun, the breech block is translated, and the gun is reloaded. The breech block is now replaced in the breech of the gun, the lever 44 being rocked on its pivot during the engagement between the pin 45 and lever 43, when screwing the breech block into place. If desired the rod 31 and the lever 44 may be removed and the valves opened and closed by hand.

In the modification shown in Fig. 6, I have shown the parts in the same positions as shown in Fig. 5, and I have used the same reference numerals to designate similar parts with the letter *a* added thereto. In this figure I have eliminated the ports connecting the chamber 13 with the chamber 11. A tight joint is maintained between the breech block and the opening in the breech in which it is seated by means of one or more packing rings 50, which are held in place by means of a ring 51 secured to the breech block. The operation of this construction

is the same as that shown in Figs. 1 to 5, excepting that the gun is not initially flushed by advancing the mushroom head, but is flushed and lubricated during the first portion of the rotation of the breech block.

In Figs. 7 and 8 I have shown a modified arrangement of ports for admitting pressure from the chamber 11^b to the chamber 13^b. In these figures I have also used the same reference numerals with the letter *b* added thereto, to designate similar parts. In this construction pressure is admitted from the chamber 11^b to the chamber 13^b through the grooves 52 in the follower plate 7^b, and the grooves 53 on the stem 5^b of the mushroom head. The operation of the device shown in this construction is precisely the same as that shown in Figs. 1 to 5.

The advantages of my invention result from the provision of a fluid pressure chamber in the breech of the gun and in front of the breech block, which is sealed to prevent the rearward escape of the pressure between the breech block and the walls of the recess in which it is seated, during the rotation of the breech block for removal therefrom. Another advantage results from the provision of means for injecting fluid pressure over the gas check into the bore of the gun to flush the gun; and to cool the gas check or pad, and the gun. Also in the provision of means for supplying a lubricant to pressure inlet tubes to lubricate the gun. Still another advantage results from the provision of means for opening and closing the valves controlling the pressure inlet pipe and the lubricant feeding pipe, after the firing of the gun and before the breech block has been rotated a sufficient distance to release it from the breech of the gun, prior to the translation thereof, and before the pressure chamber has been opened to the atmosphere through the breech of the gun. Still a further advantage results from the provision of means for automatically advancing the mushroom head by fluid pressure after the gun has been fired to initially flush and cool the gun, before the breech block has been rotated.

I claim:

1. In a gun, a mushroom head having a spindle, a fluid inlet port arranged to be opened and closed by the movement of the mushroom head, means to supply fluid pressure to said port, and means actuated by the fluid pressure to advance the mushroom head to open the port to flush the gun; substantially as described.

2. In a gun, a breech block, a valve having a spindle, a pressure chamber within the breech block, there being a fluid inlet port arranged to be opened and closed by the movement of the valve, means to supply fluid pressure to said chamber, and a piston in said chamber arranged to be actuated

by the fluid pressure to shift the valve to open the port to flush the gun; substantially as described.

3. In a gun, a mushroom head having a spindle, a fluid inlet port arranged to be opened and closed by the movement of a mushroom head, a piston connected to the spindle of the mushroom head, and means to admit fluid pressure back of said piston to advance the mushroom head to open the port to flush the gun; substantially as described.

4. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block when the breech block is seated in the breech of the gun, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, means to supply fluid pressure to said chamber, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken, substantially as described.

5. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block, when the breech block is seated in the breech of the gun, a packing ring in said chamber arranged to follow the breech block when it is rotated to seal the opening between the breech block and the wall of the opening in the gun in which the block is seated, a mushroom head, means to supply fluid pressure to said chamber, a gas check between the mushroom head and the breech block, the mushroom head being arranged to withdraw the gas check when the breech block is drawn rearwardly to allow the fluid pressure to pass over the periphery of the gas check into the bore of the gun; substantially as described.

6. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block when the breech block is seated in the breech of the gun, means to supply fluid pressure to said chamber, a valve for controlling the fluid pressure, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken; substantially as described.

7. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block

when the breech block is seated in the breech of the gun, means to supply fluid pressure to said chamber, a valve for controlling the fluid pressure, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken, and means controlled by the recoil of the gun for opening the valve; substantially as described.

8. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block when the breech block is seated in the breech of the gun, means to supply fluid pressure to said chamber, a valve for controlling the fluid pressure, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken, and means for automatically opening and closing the valve; substantially as described.

9. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block when the breech block is seated in the breech of the gun, a pressure supply pipe for said chamber, a lubricant supply pipe connected to said pressure supply pipe, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken; substantially as described.

10. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block, when the breech block is seated in the breech of the gun, a pressure supply pipe for said chamber, a lubricant supply pipe connected to said pressure supply pipe, a valve for controlling the fluid pressure, a valve in the lubricant supply pipe, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the

gun before the seal formed by the packing ring is broken; substantially as described.

11. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block, when the breech block is seated in the breech of the gun, a pressure supply pipe for said chamber, a lubricant supply pipe connected to said pressure supply pipe, a valve for controlling the fluid pressure, a valve in the lubricant supply pipe, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken, and means for automatically opening and closing both valves; substantially as described.

12. In a gun, a breech block seated therein and having a screw threaded engagement with the breech of the gun, a chamber in the breech of said gun, a portion of its walls being formed by the breech block, an annular recess in said chamber of a diameter greater than the top of the threads in the breech of the gun, a packing ring seated in said recess and arranged to seal the opening at the threaded engagement between the breech block and the breech of the gun, means to supply fluid pressure to said chamber, a gas check, the breech block being arranged to be moved rearwardly to permit the gas check to move rearwardly to allow the fluid pressure to pass over the gas check to cool the gun before the seal formed by the packing ring is broken; substantially as described.

13. In a gun, a breech block, a chamber in the breech of the gun, a portion of the walls being formed by the breech block when the breech block is seated in the breech of the gun, a mushroom head having a spindle, a fluid inlet port arranged to be opened and closed by the movement of the mushroom head, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, means to supply fluid pressure to said chamber, a piston connected to the spindle of the mushroom head, and means to admit fluid pressure back of said piston to advance the mushroom head to open the port to flush the gun; substantially as described.

14. In a gun, a mushroom head having a spindle, a fluid inlet port arranged to be opened and closed by the movement of the mushroom head, a piston connected to the mushroom head, means to admit fluid pressure back of the piston to advance the mushroom head to open the port to flush

the gun, a valve arranged to cut off the fluid pressure supply, and actuating means controlled by the recoil of the gun arranged to open said valve; substantially as described.

15. In a gun, a breech block, a chamber in the breech of the gun, a portion of its walls being formed by the breech block when the breech block is in the breech of the gun, a packing ring arranged to seal the opening between the breech block and the wall of the opening in which the breech block is seated, means to supply fluid pressure to said chamber, a gas check arranged to seal the opening between the breech block and the breech of the gun and arranged to be moved rearwardly when the breech block is rotated, to permit fluid pressure to pass over the gas check into the bore of the gun, the packing ring being arranged to seal the opening between the walls in the breech of the gun in which the breech block is seated and the breech block during a portion of the rearward movement of said breech block; substantially as described.

16. In a breech loading gun, a removable breech block having a fluid pressure chamber therein, a mushroom head having a stem extending through the breech block into said chamber and carrying a piston therein, and means for admitting fluid pressure behind said piston, together with means for permitting the escape of fluid pressure from said chamber into the bore of the gun when said piston is moved; substantially as described.

17. In a breech loading gun, a removable breech block having a fluid pressure chamber therein, a mushroom head having a stem projecting rearwardly into said chamber and carrying a piston therein, means for admitting fluid pressure behind the piston, a spring arranged to return the piston, and air passages leading from said chamber into the interior of the gun, said passages being normally closed by the mushroom head; substantially as described.

18. A gun of the character described, having a rotatable breech block, means for flushing the gun after the gun has been fired, including pressure means, and means actuated by the rotation of the breech block for supplying a lubricant to said fluid pressure means when the gun is flushed; substantially as described.

19. In a gun, a breech block, a mushroom head extending through the breech block, fluid inlet ports arranged to be opened and closed by the movement of the mushroom head, a fluid pressure supply pipe arranged to supply fluid to the inlet ports, and means to supply a lubricant to said fluid pressure supply pipe during the unlocking movement of the breech block; substantially as described.

20. In a gun, the combination with a

breech block, of a mushroom head located in the chamber of the gun inwardly of the breech block, and mounted for reciprocation, a gas check between the mushroom head and breech block, a chamber at the rear of the mushroom head, and a conduit leading into such chamber, the port of the conduit into the chamber being located in such position relatively to the position of the mushroom head that when the same is in engagement with the gas check communication from the said conduit to the chamber of the gun will be cut off and when the mushroom head is moved from the gas check such communication will be opened, and elastically yieldable means for normally retracting the mushroom head and holding the same in engagement with the gas check, the elastically yieldable

means being tensioned for yielding to fluid pressure behind the mushroom head for permitting the fluid producing such pressure to pass freely from the said conduit to the chamber of the gun.

21. In a gun-flushing device, a fluid pressure supply, a mushroom head mounted for movement in the gun and arranged to control the said supply, and means for causing the mushroom head to be moved by the fluid to thereby admit fluid to the gun to flush the same, substantially as described.

In testimony whereof, I have hereunto set my hand.

WILLIAM D. SMITH.

Witnesses:

E. G. MCCARTHY,
B. G. FOSTER.