

W. D. SMITH.

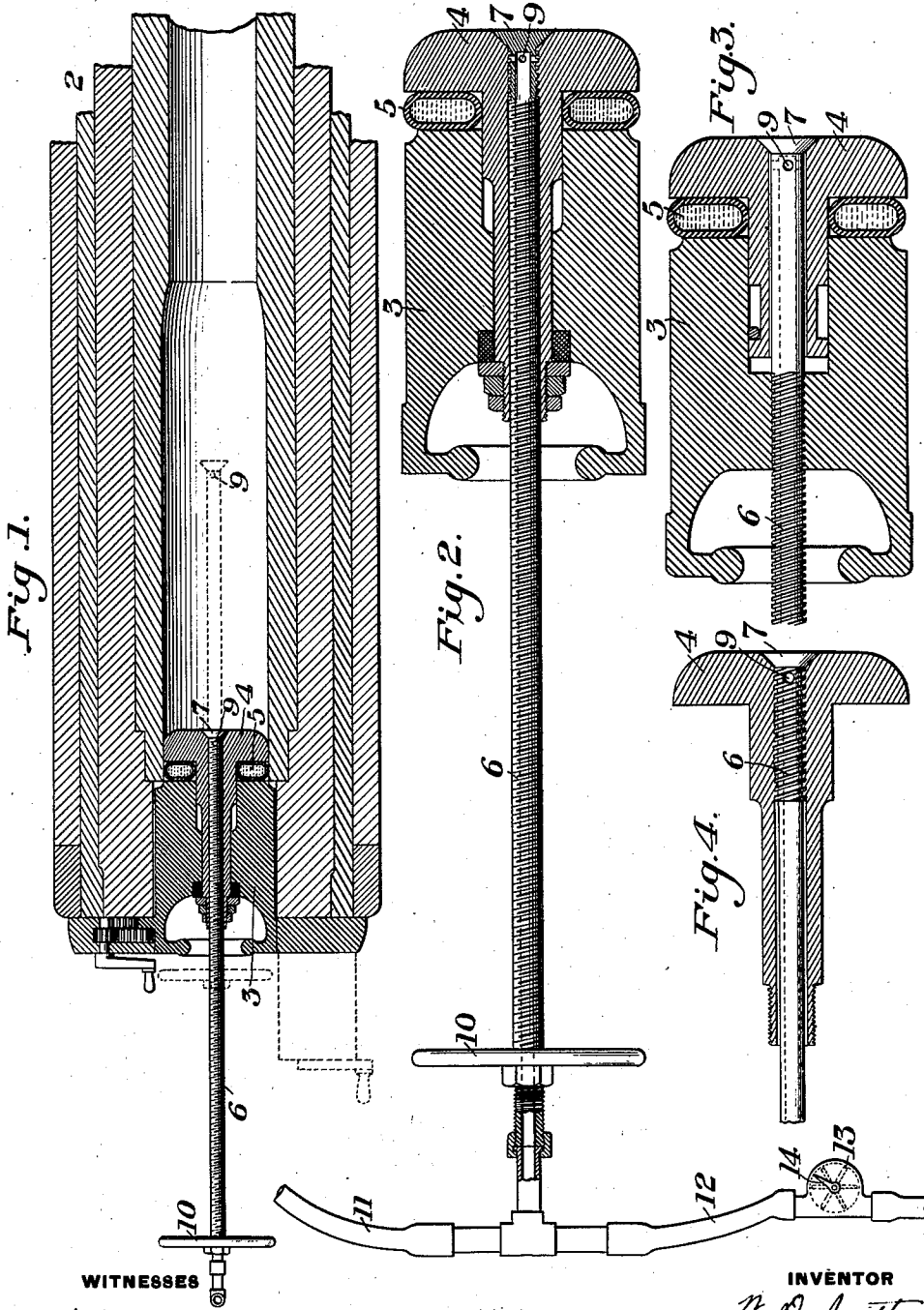
GUN.

APPLICATION FILED OCT. 9, 1905.

944,973.

Patented Dec. 28, 1909.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 5.

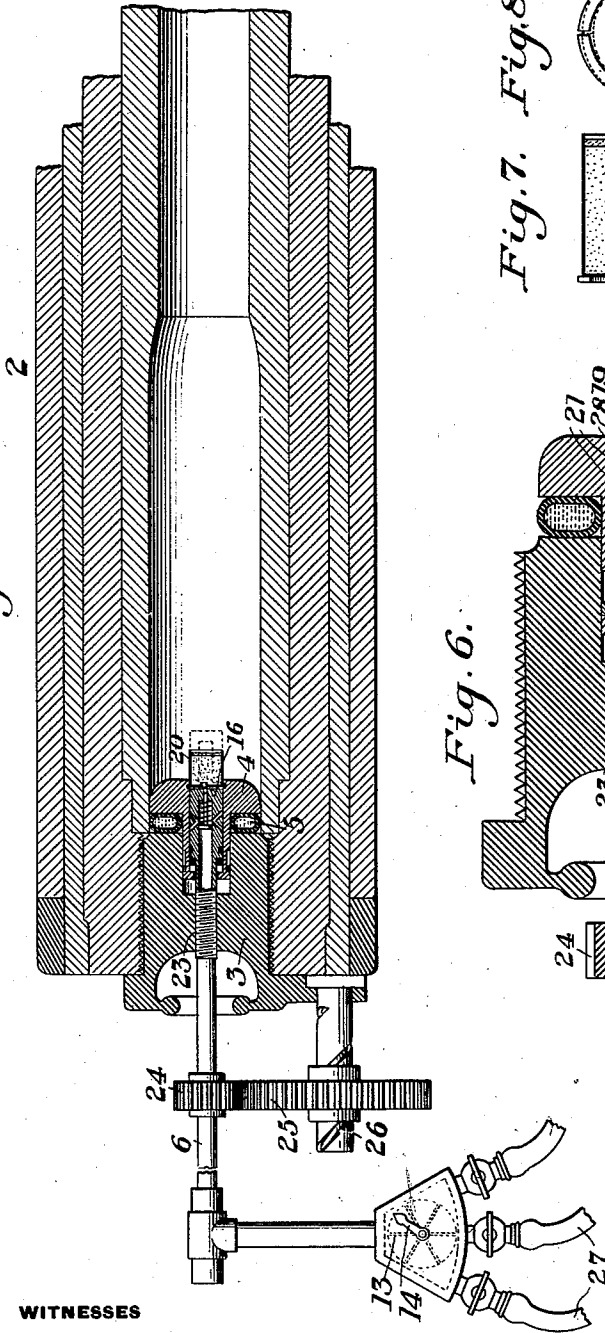


Fig. 6.

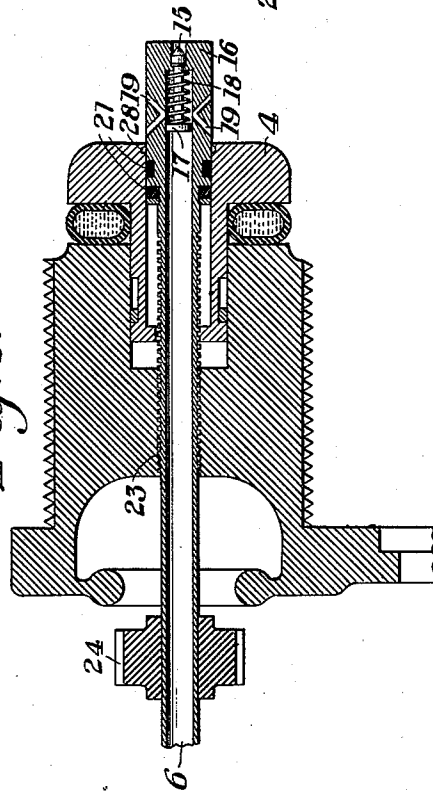
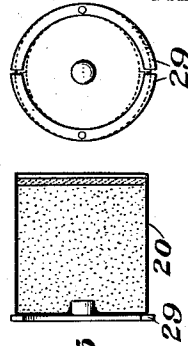


Fig. 7. Fig. 8.



WITNESSES

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UNITED STATES PATENT OFFICE.

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GUN.

944,973.

Specification of Letters Patent. Patented Dec. 28, 1909.

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To all whom it may concern:

Be it known that I, WILLIAM D. SMITH, of Denver, in the county of Denver, Colorado, have invented a new and useful Improvement in Guns, 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 longitudinal section of a gun constructed in accordance with my invention, a part of the gun being broken away; Fig. 2 is an enlarged sectional view of the breech-block with my attachment applied thereto; Fig. 3 is a sectional view of the breech-block showing a modified construction; Fig. 4 is a sectional view of the mushroom-head; Fig. 5 is a view similar to Fig. 1 showing another modification; Fig. 6 is an enlarged sectional view of the breech-block, firing-pin and injector, as shown in Fig. 5; and Figs. 7 and 8 are detail views of the priming shell or cartridge.

In the handling of large guns, serious and destructive accidents have occurred by what is termed the "flare-back", the flame resulting from the ignition, in some manner not fully understood, of the residual gases attendant upon the combustion of smokeless powder. Accidents of this kind are particularly apt to happen when firing guns to windward, but under the conditions heretofore existing, they may happen under any circumstances, and the serious consequences resulting render it of the greatest importance to provide means by which they can be certainly prevented. It is one purpose of my invention to accomplish this result, and I have found that it can be attained by injecting into the gun after its passage and before the removal of the breech-block, a jet of fluid, such as water, steam or air, which will act to displace the residual gases or other foreign matter contained within the gun. When the fluid used for this purpose is water or steam, it will also act to effectually extinguish all sparks, and will thus render it safe to remove the breech-block and to introduce the next charge.

While the use of steam, air, or any other suitable liquid or gas, is within the scope of my invention, I have found water to be particularly advantageous for the purpose, for the reason that it not only displaces the residual gases and other foreign matter in

the gun, but it effectually washes out the gun after each discharge and obviates the necessity of sponging; also, if the combustion does not take place promptly, instead of waiting for a sufficient period to elapse to insure absolute safety, the jet of water may be introduced and the powder saturated with the same, thus allowing the immediate opening of the breech with safety.

A further object of my invention is to provide means for operating the firing-pin by means of a jet of fluid under pressure, which fluid can subsequently be injected into the combustion chamber of the gun for the purpose first described, also to so arrange the firing-pin that it will present practically the same resistance as a solid piece of metal and thereby prevent its being blown out by the force of the explosion.

My invention also provides for the thorough lubrication of the chamber of the gun.

While various forms of apparatus may be used in carrying out my invention, those which I have shown and which I will now describe may be conveniently and satisfactorily employed for the purpose.

In these drawings, 2 represents a gun which in the usual manner is built up of a series of concentric tubes, 3 is the breech-block, 4 is the mushroom-head which is slidably mounted at the inner end of the breech-block, and 5 is the usual compressible gas-check which is expanded by the backward motion of the mushroom-head when the gun is fired. These parts are common and well known, either in the form in which I have illustrated them or any other equivalent forms.

In carrying out my invention I provide a tube 6 which extends longitudinally through a passage in the breech-block, and has a conical or otherwise enlarged head 7 which seats at the end of said passage, so that when the tube is retracted to its full extent, as shown by full lines in Fig. 1, the head seating at the end of the passage will close the same against the back passage of the gases from the gun, but when the tube is moved forward as indicated by dotted lines in Fig. 1, it will expose lateral passages 9 from which the jets of cleansing fluid can be discharged as described below. This tube is preferably moved through the breech-block by providing it with external screw-threads extending throughout its length as

shown in Fig. 1, fitting in a female thread in the passage in the breech-block, so that by turning the tube by means of a hand-wheel 10 or otherwise, it can be moved forward and caused to project from the mushroom-head within the gun to the desired extent. I may, however, as shown in Fig. 4, form the screw-thread only along a portion of the length of the tube 6 and along only a corresponding portion of the passage in the mushroom-head. The first few turns of the tube will then screw the tube forwardly within the mushroom-head and will disengage its screw-threads from the latter, and thereupon it can be moved forwardly during the remainder of its stroke by a longitudinal motion. This enables the device to be operated more quickly and therefore may be more desirable where very rapid firing is sought for.

In the modification shown in Fig. 3, the screw-thread on the tube engages the breech-block, and not the mushroom-head as in the other figures. In this case I may employ the tube as a means of drawing the mushroom-head toward the breech-block and thus compressing and expanding the gas-check independently of the act of explosion. The gas check may, in this manner, be positively compressed each time before firing to an extent substantially equal to or greater than that to which it is usually compressed by the explosion.

When the apparatus is constructed as shown in Figs. 1 and 2, immediately after the firing of the gun the operator screws forward the tube 6 so as to cause its inner end to project forward of the mushroom-head, and thereupon a current of the cleansing fluid is forced through the tube 6 and out of the jet holes 9. The screw is then turned farther and is caused to advance within the combustion chamber of the gun as shown by dotted lines in Fig. 1, and as it advances with a rotary motion, the jets are caused to impinge around the circumference of the combustion chamber and are distributed around the same, thus reaching all parts of the wall of the combustion chamber and effectually cleaning it from hot sparks as well as displacing the residual gases from the combustion chamber forwardly and out of the gun. This entirely prevents portions of burning gunnysack or powder from adhering to the rifling or any portion of the gun, and also displaces all residual gases from the combustion chamber so as to make it perfectly safe to remove the breech-block and to introduce a new explosive charge.

Where steam or water is introduced, the current not only mechanically displaces the gases and sparks, etc., but also extinguishes such sparks, steam being well known to be one of the most effectual mediums for the extinguishment of sparks and fire.

Where the form of the invention shown in Fig. 4 is employed, after the tube has been turned sufficiently to disengage its screw-threads from the threads of the mushroom-head, the tube is then pushed forward by hand, and may be rotated while it is being pushed so as to accomplish the distributing of the jets which I describe above.

The apparatus shown in Fig. 3 may be operated in like manner as that shown in Fig. 1.

A further useful feature of my invention consists in providing the pipes 11, 12 by which the steam and air are supplied to the tube with small vanes or fluid-operated wheels 13 which may be provided with exterior index hands 14. So long as any substantial current is passing through the tubes these vanes will rotate, causing the hand on the outside to rotate. Thus, when the operator turns the tube 6 so as to project its forward end within the combustion chamber of the gun, if the gun has been fired the jet will immediately pass through the tube and the corresponding vane or vanes will rotate with great rapidity. If, however, these vanes should not rotate when the tube is thus projected the gunner will immediately know that the gun has not been discharged, and by thus providing a reliable and efficient means of determining this point, this portion of my device affords an important safeguard against accident arising from premature opening of the breech-block.

Figs. 5 and 6 illustrate a construction which may be employed for carrying out my improved method of operating the firing-pin. In these figures the firing-pin 15 is seated in the chambered block 16 which is located within the mushroom-head 4 and is carried by the tube 6 which is similar to the corresponding tubes of the constructions first described, in that it may be used to introduce a jet of fluid under pressure. Seated within the block 16 is a piston 17 which operates the firing-pin 15 against the pressure of a retracting spring 18. 19 are discharge or jet passages in the block 16. These discharges are directed at different angles, and any desired number of them may be provided, their inner ends communicating with the interior of said block and with the passage of the tube 6. 20 indicates the priming cartridge or shell, which is arranged to be held in the end of the mushroom-head in such a manner that it can be readily forced out by the longitudinal movement of the tube 6. 21 designates suitable packing rings. The tube 6 in this construction may be operated by any suitable means, such as those shown on Sheet 1 of the drawings, but in Fig. 5 I have shown this tube as having a threaded bearing 23 in the breech-block and carrying a pinion 24 which is engaged by spur-wheel 25 mounted for a longitudinal

travel on a screw-shaft 26 supported by the breech-block. The spur-wheel 25 may be rotated by any suitable means, and the pitch of the screw of the shaft 26 bears the same proportion to the pitch of the thread 23 that the diameter of the wheel 25 bears to the pinion 24. As the wheel 25 is rotated it will, therefore, move longitudinally on the screw-shaft 26 coincidently with the movement of the pinion 24. 27 designates supply tubes, by means of which water, air or oil under pressure may be supplied to the tube 6.

In order to hold the priming cartridge or shell in the mushroom-head, I provide the latter with the internal annular recess 28, designed to engage spring metal pieces 29 which are secured to the base of the shell. As the shell is seated these spring pieces 29 expand into the groove 28 and thereby hold the cartridge securely in the mushroom-head. When the tube 6 is advanced after firing, the cartridge is forced from its engagement by the pressure exerted upon it, either by stripping the metal pieces 29, or otherwise.

Inasmuch as the cartridge is seated solidly against the chambered block 16, the resistance afforded by the screw-threaded engagement at 23 is substantially equal to that of solid metal, so that the firing-pin cannot be blown out by the force of the explosion.

The operation is as follows:—A jet of fluid, such as water, air or steam, being admitted to the tube 6, impinges upon the piston 19 and thereby actuates the firing-pin. After the firing has taken place, the tube 6 is advanced, thereby bringing the openings 19 within the chambered gun and the fluid is discharged against the walls thereof as the said tube continues to be advanced and rotated, in a similar manner to that effected by the arrangement shown on Sheet 1 of the drawings. After the products of combustion have been removed by the introduction of the jet of water or other fluid in the manner described, a jet of oil under pressure may be injected through the tube 6, the supply being by way of one of the pipes 27. In doing this, the screw 6 is actuated just sufficient to separate the inclined surface of the head 7 from its seat in the head 4 without advancing the openings 9 into the chamber of the gun. The oil, which enters the tube 6 under pressure, is thrown forward into the bore of the gun, which is thereby lubricated. This lubrication very greatly reduces wear in the bore, and materially prolongs the life of the gun.

While, as before stated, I may use any suitable fluid in accomplishing the first object of my invention, I prefer water for the reasons stated, and for the further reason that it has a maximum cooling effect upon the gun.

My invention not only eliminates danger

to the person who is operating the gun, but also excludes the entrance of foul air from the gun into the turret, thereby increasing the comfort of the gunners and enabling them to work more quickly and efficiently. It also enables a much more rapid firing.

By keeping the gun clean and cool after each passage, as well as thoroughly lubricating, the danger of shells sticking and bursting in the muzzle of the gun is eliminated. Undue stress from crystallization of the steel is also prevented.

While the indicator above described may be conveniently used to show whether or not the explosion has occurred, it will be readily seen that the injector itself forms a means for determining this, since, if the explosion has not occurred, the resistance of the charge, when it is attempted to operate the injector, will show such fact.

The invention as described and shown can be readily applied to existing guns with but little change. It will be obvious, however, that various changes may be made in the construction and arrangement of the parts without departing from my invention, since

What I claim is:—

1. In a gun, the combination with a breech-block, of a fluid injector carried by the block and movable with relation thereto; substantially as described.

2. In a gun, the combination with a breech-block, of a rotatable fluid injecting device carried by the said block arranged to be advanced into the combustion chamber of the gun; substantially as described.

3. In a gun, the combination with a breech-block, of injecting means therein, and means for advancing the injecting means into the combustion chamber of the gun; substantially as described.

4. In a gun, the combination with a breech-block and injecting means therein, of means for advancing the injecting means into the explosion chamber of the gun and for rotating the same therein; substantially as described.

5. In a gun, the combination with the breech-block, of the mushroom-head seated therein, the injecting device extending through said head, and means for advancing the injecting device into the combustion chamber of the gun; substantially as described.

6. In a gun, the combination with a breech-block and mushroom-head, of a fluid injecting tube extending through the breech-block into said head, and having discharge passages normally within the head but arranged to be advanced into the combustion chamber of the gun; substantially as described.

7. In a gun, the combination with the breech-block and the mushroom-head, of the fluid injecting tube extending through the

breech-block in the said head, and having discharge openings normally closed by the same, means for supplying fluid under pressure to the said tube, and means for advancing the discharge portion of said tube into the combustion chamber of the gun and for rotating the same; substantially as described.

8. In a gun, the combination with a breech-block and a mushroom-head secured therein, of a fluid injecting tube extending in the said head and having a threaded bearing, and means for rotating the said tube in its bearing to move the same longitudinally; substantially as described.

9. In a gun, a fluid injecting device arranged to be advanced into the combustion chamber of the gun before opening the breech-block, and means for operating the same; substantially as described.

10. In a gun, the combination of a mushroom-head, an injecting tube extending into the head and arranged to be advanced there-through into the combustion chamber of the gun, means for supplying fluid under pressure to the said tube, and an indicating device arranged in the path of said fluid and operated thereby; substantially as described.

11. In a gun, the combination with a breech-block and a mushroom-head slidably mounted in the inner end of the breech-block, of a compressible gas-check between the head and block, and means for readily actuating the head after the breech-block is closed to effect an initial compression of the gas-check; substantially as described.

12. In a gun, the combination with a breech-block and a mushroom-head slidably mounted in the inner end of the breech-block, of a compressible gas-check between the head and block, means for readily expanding and compressing the gas-check while the breech-block is closed, and means for contracting the gas-check after an explosion and before opening the breech-block; substantially as described.

13. In a gun, the combination with a breech-block and a mushroom-head slidably mounted in the inner end of the breech-block, of a compressible gas-check between the head and block, and means for actuating the head after the breech-block is closed to effect an initial compression of the gas-check substantially equal to or greater than that ordinarily effected by the explosion; substantially as described.

14. In a gun, the combination with a breech-block, and a mushroom-head seated in the inner end portion of said block and provided with holding means for a priming shell or cartridge, of a firing-pin, and means for directing fluid under pressure against the said pin to operate the same; substantially as described.

15. In a gun, the combination with a

mushroom-head having means for holding a priming cartridge, of a firing-pin and a fluid-operated piston for actuating the said pin; substantially as described.

16. In a gun, a sliding firing pin, a piston for actuating said pin, means for directing fluid under pressure against said piston, and means for causing such fluid to be subsequently discharged into the chamber of the gun when the piston is advanced; substantially as described.

17. In a gun, a sliding firing pin, a piston for actuating said pin in one direction, means for directing a jet of fluid under pressure against said piston, means for causing said fluid to be subsequently discharged into the chamber of the gun when the piston is advanced, and a spring for retracting said pin; substantially as described.

18. In a gun, the combination with a breech-block and a mushroom-head, of a fluid-supply pipe extending through the said head, a piston-actuated firing-pin in said supply pipe, and means for advancing said pipe into the combustion chamber of the gun after firing; substantially as described.

19. A gun having a fluid-injector pipe mounted in its breech-block, a piston-operated firing-pin in said pipe, and means for advancing the discharge portion of said pipe into the combustion chamber of the gun after firing; substantially as described.

20. In a gun, the combination with a breech-block, and the mushroom-head slidably seated in the inner end portion of said block, gas seals for the said head, a fluid injecting pipe extending through the said head and having discharge passages normally closed thereby, and means for advancing the discharge portion of said pipe into the combustion chamber of the gun; substantially as described.

21. In a gun, the combination with a breech-block, of a fluid injecting tube extending through the said block and having a threaded bearing in said block, and gear for rotating the said tube; substantially as described.

22. A gun having means carried by the block and movable with relation thereto for the injection of water or other fluid into its combustion chamber before opening the breech block, means for supplying the fluid to the injector, and an indicator in the path of and operated by the fluid; substantially as described.

23. The combination with a mushroom-head having at its inner end means for seating and holding a priming cartridge, a firing-pin for said cartridge, means for actuating the said pin and means carried by the block and movable therethrough for expelling said cartridge; substantially as described.

24. In a gun, the combination of a mushroom-head having means for holding a priming

room-head, gas seals or checks seated between the head and the inner end of the breech-block, and means connected to the head and extending through the breech-block, whereby the head may be actuated prior to firing to thereby compress the gas check, independently of the explosion, to an extent equal to or greater than that ordinarily effected by the explosion.

25. In a gun, the combination of a mushroom-head, a gas-check seated between the head and the inner end of the breech-block, means for seating the cartridge in the mushroom-head, and means for ejecting the cartridge before the breech-block is opened; substantially as described.

26. In a gun, the combination of a mushroom-head, a gas-check seated between the head and the inner end of the breech-block,

means for seating the cartridge in the mushroom-head, means for ejecting the cartridge before the breech-block is opened, and means connected to the head and extending through the breech-block, whereby the head may be actuated prior to firing to thereby compress the gas-check; substantially as described.

27. In a gun, the combination with a breech block, of a movable fluid injector carried by the said block, and means for supplying water to and through said injector; substantially as described.

In testimony whereof, I have hereunto set my hand.

WILLIAM D. SMITH.

Witnesses:

GEO. B. BLEMING,

GEO. H. PARMELEE.