H. L. WELCH.

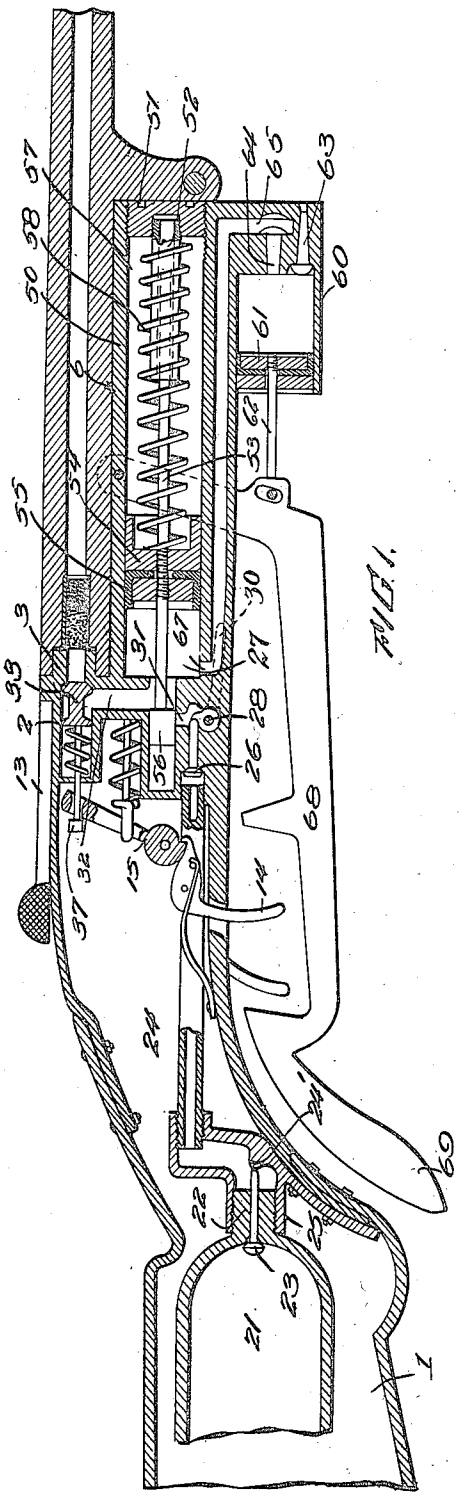
AIR GUN.

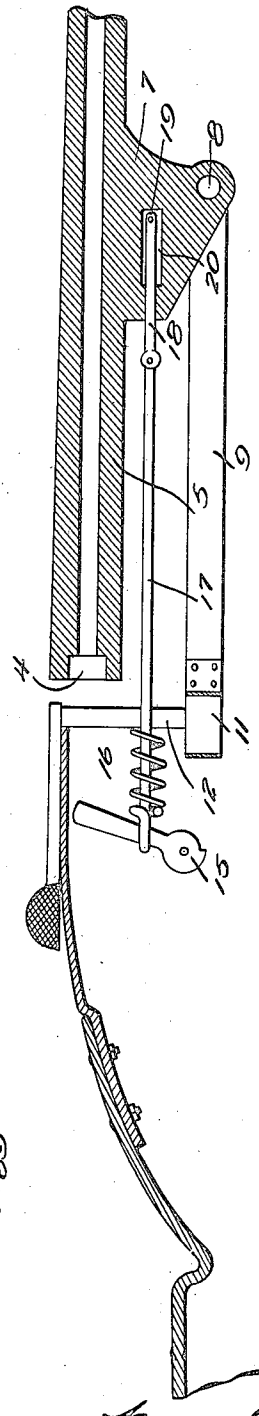
APPLICATION FILED APR. 12, 1916.

1,214,398.

Patented Jan. 30, 1917.

2 SHEETS—SHEET 1.





Inventor

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AIR GUN.

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2 SHEETS—SHEET 2.

FIG. 2.

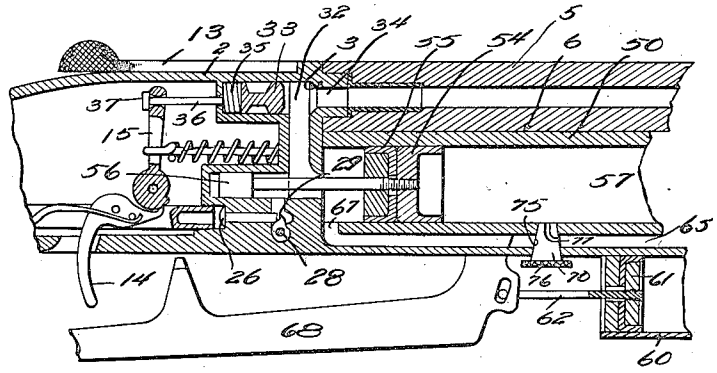


FIG. 6.

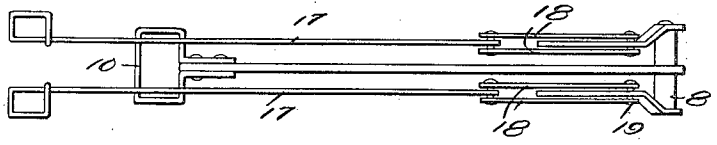


FIG. 4.

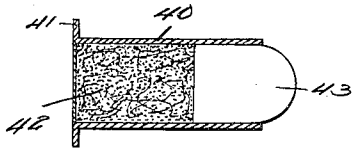


FIG. 5.

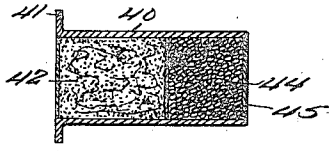
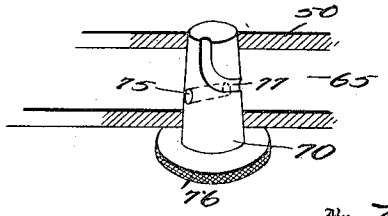


FIG. 3.



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UNITED STATES PATENT OFFICE.

HERMAN L. WELCH, OF LOS ANGELES, CALIFORNIA.

AIR-GUN.

1,214,398. Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed April 12, 1916. Serial No. 90,741.

To all whom it may concern:

Be it known that I, HERMAN L. WELCH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Air-Guns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to guns, and more especially to those wherein the projectile is expelled from the barrel by air or gas under pressure; and the main object of the same is to provide means in the shape of a cushion for automatically assisting the action of the air at the time the gun is fired.

A secondary object is to provide means in the shape of a manually operable pump for increasing the pressure in the discharge chamber, together with switching means whereby the air so pumped may be diverted to the cushion chamber when the cushion therein is compressed air instead of a spring.

Another object is to produce an air gun whose barrel breaks for reloading, and wherein the hammer and balanced valve are reset in the act of breaking it.

Other and minor objects will appear throughout the following specification and claims, and reference is made to the accompanying drawings wherein—

Figure 1 is a central vertical longitudinal section through the gun, or rather through one barrel of a double-barreled gun of this type, showing the parts as they stand ready for firing. Fig. 2 is a similar section of most of the parts shown in Fig. 1, showing them as they stand after the gun has been fired. Fig. 3 is a perspective detail of a switch valve which may be used in the construction shown in Fig. 2. The latter omits the spring as a cushion as shown in Fig. 1, and to this extent it may be said to be a modification thereof. Figs. 4 and 5 are longitudinal sections of the projectiles or cartridges which may be used with this gun. Fig. 6 is a plan view and Fig. 7 a vertical section of the breaking mechanism.

The gun forming the subject-matter of this application has many parts in common with breech loading guns and rifles now in use. The stock 1 is secured to the rear end of the breech 2 and both are made hollow for containing the mechanism described below. The front end of the breech, where the breech block usually occurs, carries a nipple 3 which seats in a socket 4 in the rear end of the barrel 5. Fig. 1 shows a double-barreled gun, and Fig. 2 a single-barreled gun, but each barrel has its own mechanism and I may describe but one. When the barrel is in position for firing, its rear end lies in a groove in the breech indicated at 6, and is held there by the engagement of the nipple with the socket. Just forward of the breech a lug 7 depends from the barrel and has a longitudinal slot for a purpose yet to appear. To this lug at 8 is pivoted the front end of a push bar 9 whose rear end carries a loop 10 encircling an eccentric 11. Said eccentric is fast on the lower end of an upright shaft or post 12 whose upper end carries a lever 13 normally overlying the breech 2 and parallel therewith as seen in Fig. 1. When this lever is thrown to one side the eccentric acting on the loop pushes the bar 9 and pivot 8 forward, and slides the barrel in the groove 6 so that its socket 4 disengages the nipple, after which the gun will "break down" to expose the shell chamber in the rear end of the bore of the barrel. The ejector and its mechanism are not shown in this case, as they form no part of the present invention. After reloading the barrel, it is restored to its former position and the lever 13 moved to the position shown in Fig. 1, and the gun is then ready for firing. The trigger 14 has a hook engaging a shoulder on the hammer 15, and when these elements are disengaged the hammer is thrown to the rear by means of a spring 16 surrounding a rod 17 which leads forward beneath the barrel as best seen in Fig. 7. Pivoted to the front end of this rod is a pair of links 18 whose front ends are connected by a pin 19 which moves with some lost motion in said slot 20 in the lug 7. With this construction of parts, it follows that when the operator breaks the gun for reloading, the rear end of the slot 20 strikes the pin 19 and draws the rod 17 forward, and by this means the hammer is reset as seen in Fig. 1. If it should happen that this barrel has not been fired, the pin 19 will then stand so far forward in the slot

20 that the rear end of the latter will not strike it, and therefore no harm will be done. The principal point of difference between the structure thus far described and that ordinarily employed in guns of this character, is that the hammer discharges the load by moving to the rear instead of forward; but while the structure and operation is otherwise quite similar to that ordinarily employed, I consider it important in connection with what follows.

The high pressure mechanism for ejecting the charge includes a flask 21 for air under considerable pressure (although some gases might be used), which flask is inserted into the rear end of the stock—the latter being hollow for this purpose. At the front end this flask carries a nipple 22 preferably threaded externally as shown, and within this nipple moves a flask valve 23 normally closed by the pressure within the flask. Within the breech is an air line or pipe 24 whose rear end has a female coupling 25 to receive the nipple 22, and adjacent the same a shoulder 24′ (which might be a bend in the pipe) so disposed that when the nipple is screwed into the coupling the tip of the valve-stem abuts against said shoulder and the valve is automatically opened to permit air from the flask to flow into the air line 24. The front end of the latter is normally closed by a charging valve 26, beyond which the air line turns upward (past a slide valve yet to be described) and communicates with a discharge chamber 27. Any suitable means may be provided for opening the charging valve 26 to permit air from the flask to flow into the chamber 27, and as one such means I have shown a shaft 28 journaled in the breech and carrying a cam 29 standing adjacent the forward end of the stem of the valve 26, and on one end of said shaft (or on the outer end if there are two such shafts) is a hand lever 30 as indicated in dotted lines in Fig. 1. When this lever is raised, it is obvious that some of the compressed air will flow into the chamber 27. The outlet 31 from the charging valve 26 communicates, through the chamber 27, with the inlet 32 to the casing of a balanced valve 33 whose front end or face closes on a seat surrounding a port 34 through the nipple 3, and by preference I employ a spring 35 for holding this valve closed with gentle force. A rod 36 extends from the rear end of this valve, through the spring 35, and through an opening in the hammer 15, behind which latter the rod has a head 37. Therefore when the hammer moves quickly to the rear after it has been released by the trigger, it strikes the head 37 and draws the balanced valve 33 to the rear so as to throw the inlet 32 into communication with the port 34, and the result is that the compressed charge of air within the chamber 27 is permitted to escape through the tube of the nipple 3, and the charge is driven out the bore of the barrel.

The cartridges used are best seen in Figs. 4 and 5. Each comprises a shell 40 open at front and rear and having a surrounding flange 41 at its rear end. The load consists of a rather large rear wad 42, the charge proper forward of said wad which may be a bullet 43 as shown in Fig. 4 or a number of buckshot or even finer shot as shown at 44 in Fig. 5, and finally a lighter wad 45 forward of the shot. Thus when the compressed charge of air is admitted through the bore of the nipple 3 to the rear end of this cartridge, the wad or wads with the bullet or shot are blown out of the bore of the barrel in a manner which will be clear; and after breaking the barrel the shell can be withdrawn and reloaded for future use.

A cushion is preferably employed in connection with the mechanism above described, and for purposes which will yet be made clear. Said discharge chamber 27 is by preference at the rear end of a cylinder 50 formed with or attached to the breech 2 and underlying the barrel as shown, and the front end of this cylinder may be closed by an adjustable plug 51 which can be set farther to the rear as desired, or can be removed when the parts are to be cleaned or repaired. Said plug carries a guide in the shape of a sleeve 52, in which moves loosely the forward end of a rod 53 extending along the axis of the cylinder 50 and carrying a piston 54 suitably packed as at 55; and the rear end of said rod carries a slide valve 56 adapted to move over the outlet 31 from the charging valve 26 above described. The forward portion 57 of the cylinder may be said to constitute the cushion chamber, and it is separated from the discharge chamber 27 by the piston 54. It is obvious that when the latter is moved forward the discharge chamber is increased in size, and the reverse. For the purpose of automatically assisting the action of the high pressure air within the discharge chamber, at the time the gun is fired, a cushion is inserted within the cushion chamber 57. As seen in Fig. 1 this cushion is in the shape of a strong helical spring 58 surrounding the rod and sleeve and contacting at its extremities with the piston and the plug; but in Fig. 2 this spring is replaced by compressed air in a manner yet to be described. Obviously the tension of the cushion can be increased by adjusting the plug 51 deeper into the front end of the cylinder 50, or by setting the piston 54 farther forward on the rod 53.

In operation, the parts stand as seen in Fig. 1 when the gun is ready to be fired. It is fired by moving the trigger and freeing the hammer, and the movement of the latter to the rear opens the balanced valve and

lets the charge of compressed air from the discharge chamber 27 flow out through the cartridge shell in the manner above described. The parts now stand as seen in Fig. 2 with the valves 33 and 56, the hammer 15, and the piston 54 to the rear. The operator next breaks the gun and puts in a new cartridge in the manner already described, and this operation resets the hammer and automatically restores the balanced valve 33 to the position shown in Fig. 1. He then raises the lever 30 and its cam 29 opens the charging valve 26, and the result is that high pressure air from the flask 21 flows along the air line 24, through the outlet 31 which is now uncovered by the valve 56, and into the charging chamber 27. It is intended that the operator shall hold the valve 26 open until the charge in the chamber 27 drives the piston 54 forward and compresses the cushion, and when this has occurred the valve 56 is drawn over the outlet 31 and further admission of high pressure air is automatically cut off. He then restores the lever 30 to its normal position, and the charge within the chamber 27 holds back the cushion (whether the latter is a spring or compressed air) until the gun is again fired. This operation releases the air within the discharge chamber 27 and it rushes out through ports 32 and 34 and the cartridge in the manner above described, but the advantage of the cushion is now apparent. As the compressed air projects the charge from the cartridge shell, the cushion forces the piston 54 back within the cylinder 50 and assists in the ejection of the projectile.

For manually increasing the air pressure in the discharge chamber 27, as for instance when the pressure in the flask begins to run low, I provide additional means in the shape of a pump which may well be actuated at will. This pump has a cylinder 60 underlying the cylinder 50, a piston 61 and rod 62, an inlet valve 63 and an outlet valve 64, and an air line 65 leading from the outlet valve back to a point or port 67 which communicates with the discharge chamber 27. The piston rod 62 is connected in any suitable manner with an actuating lever 68 which extends to the rear and may constitute a trigger guard, and the rear end of this lever may be bent downward in the shape of a pistol grip as shown at 69. When the operator grasps this grip and manipulates the lever 68, the piston 61 is reciprocated within its cylinder, air is drawn in at 63 and forced out at 64, and it flows along the line 65 to the point 67 where it enters the discharge chamber 27. This is preferably done before the high pressure air is admitted to this chamber, but in any event its effect is to increase the pressure therein, and therefore the cushion will be put under a little greater compression. I have described only the preferred means for actuating this pump, and it is obvious that it could be actuated by other means. An adaptation of this pump for further use is shown in Figs. 2 and 3. Here a switch valve 70 of any appropriate type is inserted within the air line 65, one port 75 leading straight through the plug and another port 77 leading in at one side of the plug and upward through the lower wall of the cylinder 50 and into the cushion chamber 57; and any suitable means such as a knob 76 on the exposed end of the plug may be provided by which it can be turned. When set so that the port 75 alines with the air line 65, manipulation of the pump will result as above described. When turned so that the port 77 connects the air line with the chamber 57, manipulation of the pump will increase the pressure within said chamber and therefore enhance the force of the cushion when air pressure is used for the latter. In fact, it is quite possible to use air pressure in this chamber 57 in addition to the spring 58. This adaptation may be employed in case the air leaks from the chamber 57, or in case it is desired to use a stronger cushion as is sometimes thought wise.

Although I do not wish to be limited in respect to the use to which this gun is to be put, I have intended it for indoor trap shooting. It is obvious that when the cushion is set for this use and the operator desires to use the gun for some other purpose, or perhaps change the style of cartridge or the length of his range, he may want greater pressure in either chamber 27 or 57; and with the switch valve 70 he can direct the air pressure generated by the pump into either chamber desired.

Thus it will be seen that the projectile is blown from the gun by compressed air or other fluid taken mainly from a high pressure flask; that the expansion of the compressed air as it is released from the discharge chamber, and its flow from the same through the port 34 and the cartridge shell is assisted by the expansion of the cushion which was put under compression when the charge of high pressure air was first admitted to said chamber from the flask; and that, if the operator desires yet further to increase the pressure in the chamber 27, the pump affords manual means permitting him to do so. Also the use of the switch valve 70, if it be employed, affords him means for diverting the air from the pump to the cushion chamber, and therefore gives him the privilege of increasing the pressure therein if and when he desires to do so. A distinction is made between the structure herein whereby the pump is useful for increasing the pressure in a discharge chamber into which only a small portion of the high

pressure air has been admitted and from which the flask is separated by valves, and other structures in which the pressure in the main flask or tank can be increased manually at times, or may be restored after it has become depleted. While it is barely possible that my pump could be worked so long and so vigorously that compressed air would be driven back through both valves 26 and 23, such would rarely be the case in my invention because I consider the main source of power in this gun to lie within the high pressure trapped within the flask, and the pressure would probably be always greater than could be generated by hand pump. By the time the flask pressure fell to a point where the operator felt the need of a pump with several discharges of the gun, he would doubtless substitute a fresh flask.

What I claim is:

1. In a gun, the combination with a discharge chamber normally closed to the barrel, means for filling it with a charge of precompressed fluid, and devices for permitting the escape of the charge into the barrel when the gun is fired; of auxiliary means for increasing the pressure of such charge within said chamber.

2. In a gun, the combination with a discharge chamber normally closed to the barrel, means for filling it with a firing charge of compressed fluid, and manually controlled means for increasing the pressure of such charge within the chamber; of devices for permitting the escape of the increased pressure-charge into the barrel in firing the gun.

3. In a pneumatic gun, the combination with a discharge chamber normally closed to the barrel, a source of fluid under high pressure, a valve for admitting a charge from such source to said chamber, and manually controlled auxiliary means for increasing the pressure of such charge within the chamber; of devices for permitting the escape of the increased pressure-charge into the barrel in firing the gun.

4. In a pneumatic gun, the combination with a discharge chamber, a source of fluid under pressure, means for admitting a charge from the source to the chamber, and the firing devices for permitting the escape of said charge; of two auxiliary mechanisms for applying pressure to said charge, automatic means for actuating one of them, and manual means for actuating the other.

5. In a pneumatic gun, the combination with a discharge chamber, a source of fluid under pressure, means for admitting a charge from the source to the chamber, and the firing devices for permitting the escape of said charge; of two independent auxiliary mechanisms for applying pressure to said charge, automatic means for actuating one of them whenever the gun is fired, a manual adjustment for this mechanism, and manual means for actuating the other mechanism at will.

6. In a pnuematic gun, the combination with a discharge chamber, a source of fluid under pressure, means for admitting a charge from the source to the chamber, and the firing devices; of two auxiliary mechanisms for applying pressure to said charge, means for automatically storing power in one mechanism when the charge is admitted to the chamber and permitting its use when the charge is fired, and manual means for controlling the action of the other mechanism at will.

7. In a pneumatic gun, the combination with a discharge chamber, a source of fluid under high pressure connected with said chamber by a conduit, a manual valve in said conduit for admitting a charge of fluid to the chamber, and the firing devices; of auxiliary mechanism for applying pressure to said charge, means for automatically storing power in said mechanism when the charge is admitted to the chamber, and a valve actuated by said means for closing the conduit after such admission of the charge.

8. In an air gun, the combination with a discharge chamber, means for charging it with compressed air, and means for permitting the escape of the charge when the gun is fired; of a cushion connected with said chamber and automatically put under compression when the chamber is charged.

9. In an air gun, the combination with a discharge chamber, means for charging it with compressed air, and means for permitting the escape of the charge when the gun is fired; of a cushion connected with said chamber and automatically put under compression when the chamber is charged, and manual means for adjusting the strength of said cushion.

10. In an air gun, the combination with a discharge chamber, a flask for compressed air connected with the chamber by a conduit, a manual valve in the conduit for admitting a charge to the chamber, and the firing devices for permitting its escape therefrom; of a cushion including a casing communicating with that of the chamber and a member moving in one direction in said casing when the charge is admitted and in the other direction when it escapes, and a valve connected with said member and automatically closing the conduit after the charge has been admitted and reopening it when the gun is fired.

11. In an air gun having a discharge chamber and firing devices permitting the escape of the charge therefrom, the combination with a manually controlled conduit for admitting a charge of compressed air to the chamber, a cushion including a casing communicating with that of the chamber and a plunger moving therein, the cushion

being put under compression by the admission of the charge, a valve controlling said conduit, and a rod connecting said plunger and valve whereby the movement of the former as the cushion is put under compression closes the valve, for the purpose set forth.

12. In an air gun, the combination with the barrel, the breech having a passage communicating with the bore of said barrel, a valve in said passage, and firing devices for opening the valve; of a cylinder carried by the breech, a plug for closing its forward extremity, a piston movable within the cylinder and dividing it into a cushion chamber at its front end and a discharge chamber at its rear end communicating with said passage, an air flask in the stock, a conduit leading thence forward to an opening communicating with a discharge chamber, a valve slidable over said opening, and a rod leading from the valve and adjustably connected with the piston.

13. In an air gun, the combination with the barrel, the breech having a passage communicating with the bore of said barrel, a valve in said passage, and firing devices for opening the valve; of a cylinder carried by the breech, a plug adjustably mounted in its forward extremity, a sleeve extending rearward from said plug, a piston movable within the cylinder and dividing it into a cushion chamber at its front end and a discharge chamber at its rear end communicating with said passage, an air flask in the stock, a conduit leading thence forward to an opening communicating with the discharge chamber, a valve controlling said opening, and a rod leading from the valve through and attached to the piston and guided within said sleeve.

14. In an air gun, the combination with a discharge chamber, means for supplying it with air under pressure, the barrel having a socket in its rear end, and the breech having a nipple engaging said socket and a passage through the nipple and communicating with said chamber; of a valve seat in said passage, a balanced valve therefor, and firing devices for retracting said valve.

15. In an air gun, the combination with a discharge chamber, means for supplying it with air under pressure, the barrel having a socket in its rear end, and the breech having a nipple engaging said socket and a passage through the nipple and communicating with said chamber; of a valve seat in said passage, a balanced valve therefor, a rod leading to the rear from said valve and having a head, a spring-pressed hammer loosely engaging said head, and a trigger for holding the hammer cocked or releasing it whereby the valve is retracted and the gun is fired.

16. In an air gun, the combination with the breech containing a discharge chamber and a passage leading thence to the barrel, a valve in said passage, and devices for unseating the valve to fire the gun; of an air line leading from the chamber within the breech and having a coupling at its rear end and an internal shoulder adjacent said coupling, a hollow stock, an air flask removably inserted therein and having a coupling adapted to engage that on the air line, and a check valve in the flask-coupling having a stem adapted to engage said shoulder when the couplings are connected, for the purpose set forth.

17. In an air gun, the combination with a discharge chamber, a valve casing having an inlet leading from said chamber and an outlet communicating with the bore of the barrel and surrounded by a valve seat, a balanced valve moving in said casing, a weak spring pressing it upon its seat, and a rod projecting through the rear of its casing and having a head; of means for admitting a charge to said chamber, the trigger, the hammer engaging said head, a hammer rod slidably mounted in the breech and engaging said hammer, and a spring pressing the latter to the rear to open the valve and fire the gun when the hammer is released by the trigger.

18. In an air gun, the combination with a discharge chamber normally closed to the barrel, means for admitting a charge of compressed air to said chamber, and the firing devices for admitting the charge to the barrel; of a pump whose outlet communicates with said chamber, a valve in said outlet, and means for actuating the pump at will.

19. In an air gun, the combination with a discharge chamber, means for admitting a charge of compressed air thereto, and the firing devices; of a cushion whose cylinder communicates with said chamber and whose plunger is moved by the admission of said charge, a pump whose outlet also communicates with said chamber, a valve in said outlet, and means for actuating the pump at will.

20. In an air gun, the combination with a discharge chamber, means for admitting a charge of compressed air thereto, and the firing devices; of a cushion whose cylinder communicates with said chamber and whose plunger is moved by the admission of said charge, a pump having air inlet and outlet, an air line leading from the outlet alongside said cylinder and entering the chamber at a point beyond the extreme movement of said plunger, and a hand valve in said air line.

21. In an air gun, the combination with a discharge chamber, and the firing devices; of a cushion including a cylinder communicating with said chamber and a plunger

therein moved by the admission of said charge, a hand pump, an air line leading from it to said chamber, and a switch valve in the air line capable of being set so as to communicate with said cylinder.

22. In an air gun, the combination with a cylinder, a piston movable therein and dividing the cylinder into discharge chamber and cushion chamber, and means for throwing the discharge chamber into communication with the gun-barrel; of a hand pump, an air line leading from it along said cylinder and opening into the discharge chamber, and means for closing the air line to the discharge chamber and throwing it into communication with the cushion chamber at will.

23. In an air gun, the combination with a cylinder, a piston movable therein and dividing the cylinder into discharge chamber and cushion chamber, and means for throwing the discharge chamber into communication with the gun-barrel for firing the gun; of means for admitting a charge of compressed air to the discharge chamber, a pump independent of such means, an air line leading from it along the cylinder and into the discharge chamber, and a switch valve in said air line capable of being set so as to communicate with said cushion chamber, for the purpose set forth.

24. In an air gun, the combination with means for sliding the barrel forward and "breaking" it in reloading, said barrel having a socket in its rear end; of the breech having a nipple adapted to engage said socket when the barrel is restored to firing position, a passage being provided through the breech and nipple, a discharge chamber communicating with such passage, the firing mechanism including a valve in the passage, a source of compressed air supply, an air line connecting it with said chamber, and a manually operable charging valve in such line.

In testimony whereof I affix my signature in presence of two witnesses.

HERMAN L. WELCH.

Witnesses:
JOHN SEVERY,
W. J. BRYANT.