Sept. 8, 1959 V. A. BROWNING 2,902,903

CLEANING DEVICE FOR A GAS OPERATED FIREARM

Filed Sept. 11, 1958 2 Sheets-Sheet 1

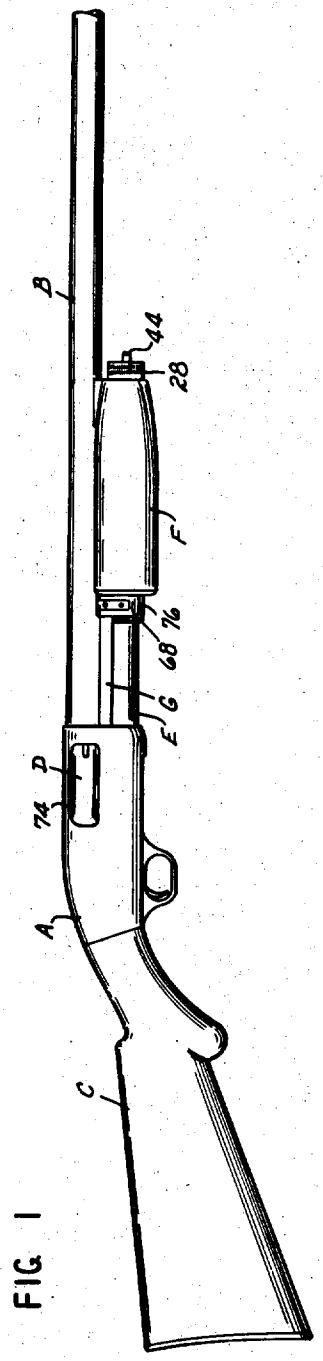


FIG. 1

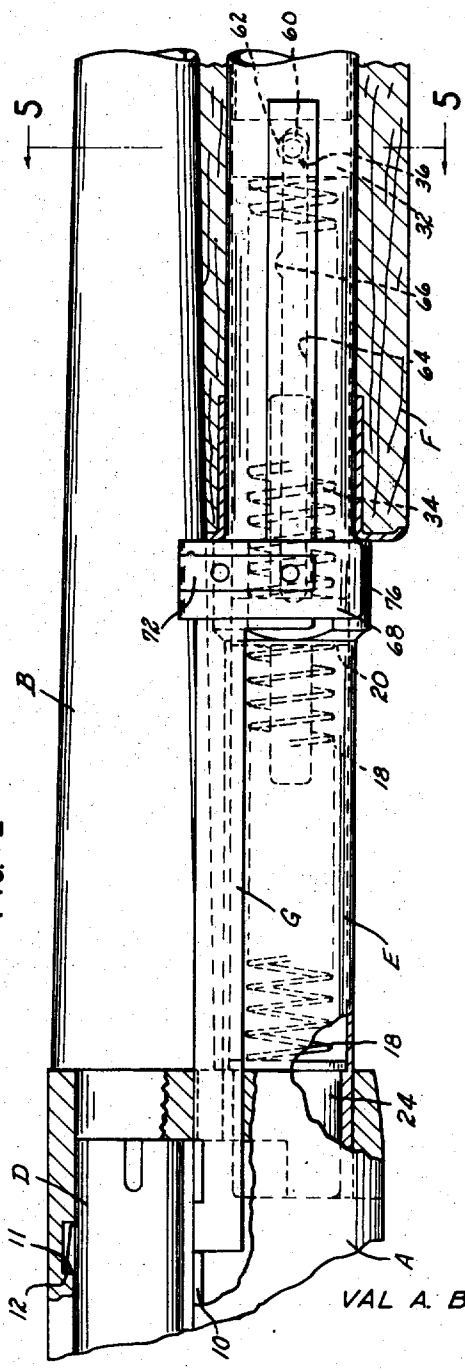


FIG. 2

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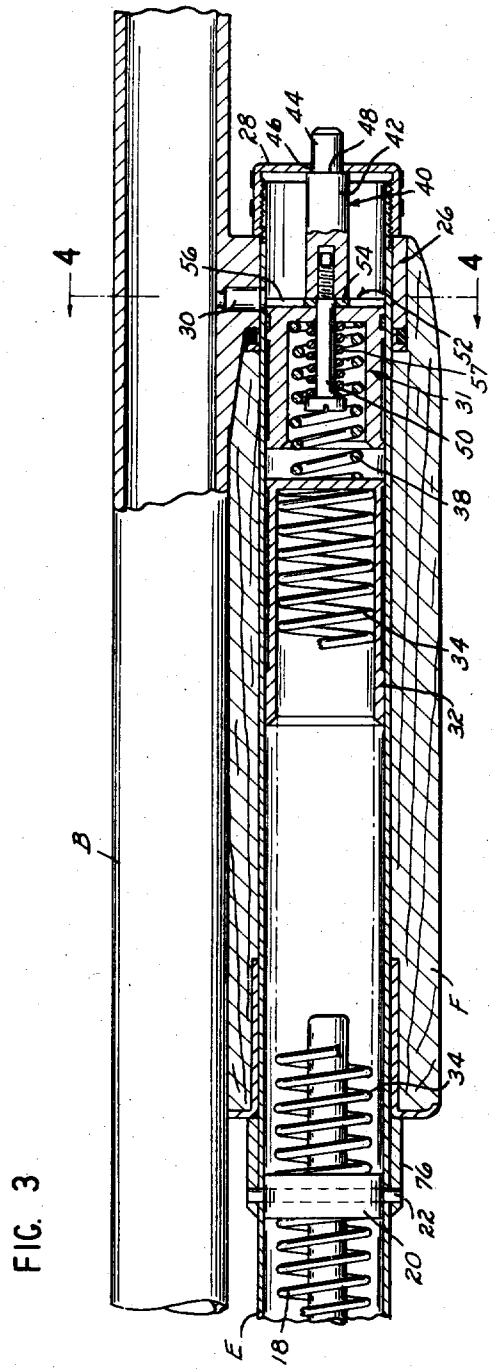


FIG. 3

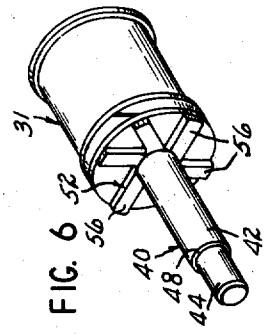


FIG. 6

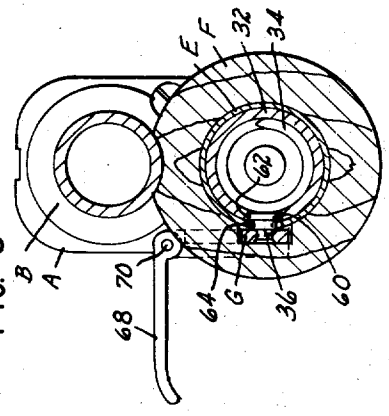


FIG. 5

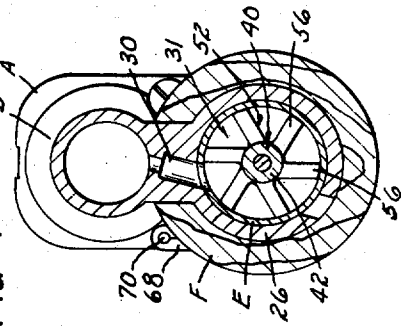


FIG. 4

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CLEANING DEVICE FOR A GAS OPERATED FIREARM

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Application September 11, 1958, Serial No. 760,363

3 Claims. (Cl. 89—191)

This invention relates to firearms of the character having a breech block mechanism retractable to eject a spent cartridge or shell upon firing of the gun, and means controlled by the breech mechanism for transferring another cartridge into a position to be moved into the barrel by the breech block mechanism as the latter advances into breech-closing position. The invention has particular reference to a gas-cylinder and piston arrangement by means of which the gases of explosion from the barrel operate to retract the breech block mechanism upon firing of the gun.

The object of the invention is to provide an improved gas-cylinder and piston mechanism having various features of advantage, among which are the following:

(*a*) Shocks and strains on the action bar and the mechanisms operated thereby are considerably reduced;

(*b*) The action bar may be manually operated to retract the breech mechanism with less effort;

(*c*) Cartridges having powder charges or loads of various intensity may be fired without making any adjustment; and

(*d*) The face of the piston against which the explosion gases exert pressure is automatically kept free of carbon and dirt, and the carbon and dirt are discharged through the forward end of the cylinder.

A further aim of the invention is to provide an improved gas-cylinder and piston mechanism which is effective in operation and simple in construction, and the parts of which may be readily assembled.

Other objects will in part be obvious and in part pointed out more in detail hereinafter.

In the drawings:

Fig. 1 is a side elevational view of the firearm, which is here shown in the form of a shotgun;

Fig. 2 is a similar view on a larger scale with portions of the forward end of the receiver broken away, the forearm being shown in vertical longitudinal section;

Fig. 3 is a vertical longitudinal view through the intermediate portion of the barrel, the forearm and the gas-cylinder and piston arrangement;

Fig. 4 is a cross-sectional view taken along line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 is a cross-sectional view taken substantially along line 5—5 of Fig. 2 looking in the direction of the arrows; and

Fig. 6 is a perspective view of the primary piston looking toward the front end thereof.

Referring to the drawings more in detail, A designates a receiver, and B, a barrel the rear end of which removably fits in an opening in the front wall of the receiver. C is a stock; D, a breech block reciprocally mounted in the receiver; E, a tube secured at its rear end to the receiver below the barrel; F, a forearm about the tube; and G, an action bar operatively connected to the breech mechanism.

The details of the breech block mechanism are not shown in the drawings, as such mechanisms are old in the art. In the present illustrative disclosure, the breech block D is shown as having a locking block 10 provided

with a rearwardly facing shoulder 11 arranged to engage a forwardly facing shoulder 12 in the upper wall of the receiver for locking the breech block in the breech-closing position shown in Fig. 2. The locking and unlocking mechanism is arranged and constructed in such manner that initial rearward movement of the action bar causes the shoulder 11 to be moved out of engagement with shoulder 12 to permit retraction of the breech block. Further rearward movement of the action bar will retract the breech block to extract the fired shell and open the breech.

The rear end of the tube E serves as a cartridge magazine within which is a spring 18, the forward end of which bears against a disc 20 fixed in the tube by means of a pin 22. The rear end of the spring bears against the usual follower 24. The receiver is arranged to house a cartridge carrier operable by the breech mechanism and mounted for movement from a depressed cartridge-receiving position to an elevation position where it holds the cartridge thereon in alignment with the barrel so that during the advancing movement of the breech block, the cartridge will be forced by the breech block into the firing chamber. A transfer carrier is not shown in the drawings as any suitable type of carrier may be employed, such, for example, as that shown in my Patent No. 2,604,713, granted July 29, 1952.

Referring now to my improved gas-cylinder and piston arrangement, it will be seen that the forward end of the tube E extends through a collar or ring 26 depending from the barrel intermediate its ends. Screwed on the forward end of the tube is a cap 28, the open end of which engages against the forward face of the collar. Leading from the bore of the barrel through the upper wall of the collar and the wall of the tube is a port 30 through which powder gases generated upon firing the gun may flow into the forward end portion of the tube E after the bullet or shot charge has passed this port, but before it leaves the muzzle of the barrel.

The bore portion of the tube E between the disc 20 and the port 30 serves as a cylinder for the piston means which comprises a primary piston 31 and a second piston 32. The front portion of the bore of the tube between the port 30 and the cap 28 serves as a gas pressure chamber. The numeral 34 designates an action spring, the rear end of which engages against the disc 20 and the forward end of which extends into the bore of the second piston 32 and engages the end face thereof. As shown in Figs. 2 and 5, the piston 32 adjacent its rear end is connected to the forward end of the action bar G by a stud 36, as hereinafter described. The numeral 38 designates a coiled compression spring which serves as a cushion between the two pistons. The rear end of this spring engages the front end of the second piston, and its forward end extends into the bore of the primary piston and engages the end wall thereof.

Secured to and extending axially forwardly from the primary piston is a stop and valve member 40 having a stop portion 42 from the forward end of which extends a stem 44 of lesser diameter than the stop portion. Thus, a shoulder 48 is provided at the forward end of the stop portion 42. When the firearm is in normal position, as shown in Fig. 3, the stem 44 projects through an aperture or escape vent 46 in the center of the end wall of the cap, and the shoulder 48 engages the cap about the vent 46 so that the primary piston is stopped on its forward movement in the position where the forward end thereof is adjacent the port 30. The member 40 is secured to the primary piston by means of a screw 50 which extends forwardly through the head of the piston 31 and is threaded into the rear end of the member 40.

Interposed between the front face of the piston 31 and the rear end of the member 40 is a device 52 which

serves to automatically keep the front face of the primary piston free of dirt and carbon carried by the explosion gases delivered through the port **30** to the pressure chamber. In the present illustrated disclosure, this device has a flat hub **54** from which extends arms or spokes **56** of rectangular cross section and against which spokes the explosion gases passing through the port **30** impinge to cause a limited rotary movement of the device **52** upon each firing of the gun. In order to permit such rotary movement and to cause the arms to bear with a scraping action against the head of the piston **31**, there is provided about the stem of the screw **50** a compression spring **57**. The ends of this spring respectively engage against the head of the screw and the end wall of the bore of the primary piston. It will be observed from Fig. 4 that the port **30** is laterally inclined to the vertical radius of the device **52** so that the explosion gases passing through the port will impinge on the spokes at an angle to cause the device **52** to rotate.

As previously stated, the second piston **32** adjacent its rear end is connected to the forward end of the action bar by a stud **36**. This stud is fixed to the bar and has a head **60** fitting a radial opening **62** in the wall of the piston **32**. The stem of the stud extends through a longitudinally extending slot **64** in the tube E so as to permit longitudinal movement of the action bar. This slot, somewhat rearwardly of its forward end and in its upper edge, has a notch **66** (see Fig. 2) so as to permit the head **60** of the stud at this point to be inserted and withdrawn through the slot during the operations of connecting and disconnecting the action bar to the piston **32**.

For the purpose of manually operating the action bar when it is desired to retract the breechblock mechanism within the receiver, the action bar is provided between its ends with a handle **68**. This handle is pivoted at its upper end by a pintle **70** to a plate **72** welded to the central offset portion of the action bar. The handle is shown in Fig. 5 in its outstanding or operative position, and in Fig. 2 in its inoperative position. This handle is so located that when the action bar is retracted thereby, the hand of the operator is in a position to catch a cartridge ejected through the ejection opening **74** in the side wall of the receiver.

Referring to Fig. 3, it will be seen that the cap **28** on the threaded end of the tube E by its engagement with the edge of the collar **26** prevents the barrel from moving forwardly out of engagement with the receiver. It will also be seen that the cap serves to clamp the forearm between the collar **26** and the forward end of a ring **76** secured about the tube E by the pin **22**. This arrangement permits ready removal of the barrel and the forearm from the firearm. It is merely necessary to take off the cap **28** and move the barrel forwardly and then slide the forearm over the forward end of the tube.

The operation of the firearm is briefly as follows: Assuming there is a cartridge in the chamber of the barrel and the parts are in the normal position shown in the drawings, upon firing of the firearm, gases of explosion will flow under pressure through the port **30** into the pressure chamber in front of the primary piston as soon as the shot charge has gone beyond the port. The jet of gases passing through the port will impinge against the arms of the cleaning device **52** and cause the same to turn through a small arc. The pressure of the gases within the chamber quickly causes the primary piston to move rearwardly. During the initial movement of the primary piston, the spring **38** is compressed and starts a relatively gentle rearward movement of the second piston and when the rear end of the primary piston engages the second piston, both pistons will move as one causing compression of the action spring and retraction of the breechblock through the action bar. It will be understood that upon rearward movement of the primary piston, the stem **44**, which acts as a valve, is withdrawn from the vent **46** in the cap of the tube E. While the stem **44** remains in the vent **46**, the gas compression chamber is closed so that the full available pressure of the power gases is exerted against the face of the piston **31**. The length of the stem is determined so that the chamber remains closed long enough for complete opening of the breech and compression of the action spring with the weakest loads that are apt to be fired in the firearm. When heavier loads are employed, the compression chamber remains closed during the initial rearward movement of the piston **31** long enough to assure operation of the firearm, after which the further rearward movement of the piston **31** and the stem **44** withdraws the latter from the vent **46** and allows the surplus power gases to escape forwardly through the vent thus greatly mitigating the violence with which the piston is blown to the rear and reducing shocks and strains to the mechanism and kick to the shooter's shoulder. As the residual gases escape forwardly, they carry with them the powder residues which have been scraped from the face of the piston by the arms of the cleaning device and from the walls of the cylinder by the return of the piston **31** to its forward position. Due to the two-part piston arrangement and the cushion spring therebetween, it will be clear that there is less shock and strain on the parts of the action than are present when only a single piston is employed. When the gun is in normal position and it is desired to manually operate the breechblock, this can be done with less effort as the primary piston remains in its forward position. Also due to the valve arrangement described, cartridges having power charges of various intensities may be fired without the necessity of adjusting any of the parts.

I claim:

1. In a gas operated firearm, a barrel, a receiver, a breechblock mechanism for reciprocation within the receiver, a tube, a piston in said tube, an action spring behind the piston, a port leading from the bore of the barrel into the forward end of the tube for the flow of gases of explosion from the bore of the barrel into the tube, and a cleaning device having radiating arms rotatably mounted on and engaging the front face of the piston, said device being normally in the path of movement of a jet of gases passing through said port upon firing of the firearm, whereby said jet will impinge upon said arms and cause the device to rotate through a small arc and scrape against the front face of the piston.

2. In a gas operated firearm, a barrel, a receiver, a breechblock mechanism for reciprocation within the receiver, a tube, a piston in said tube, an action spring behind the piston, a port leading from the bore of the barrel into the forward end of the tube for the flow of gases of explosion from the bore of the barrel into the tube, and a cleaning device rotatably mounted on the front face of the piston and urged thereagainst and comprising a hub and radiating scraping arms, said port being laterally inclined so that the gases of explosion issuing from the port impinge against the arms.

3. In a gas operated firearm, a barrel, a tube, a first piston in the tube and normally spaced from the forward end thereof, a second piston behind the first piston, an action spring behind and bearing against the second piston, a compression spring between said pistons and normally urging them apart, and a cleaning device rotatably mounted on the front face of the first piston and having a hub and scraping arms radiating therefrom, and a port leading from the bore of the barrel to the tube for the flow of gases of explosion into the forward portion of the tube and for impingement against the arms of said device.

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