

May 13, 1969

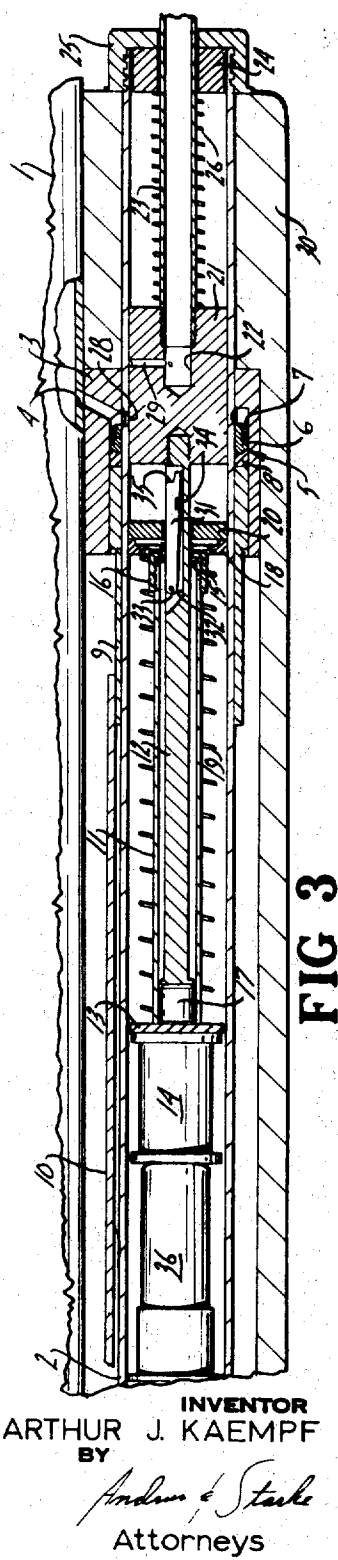
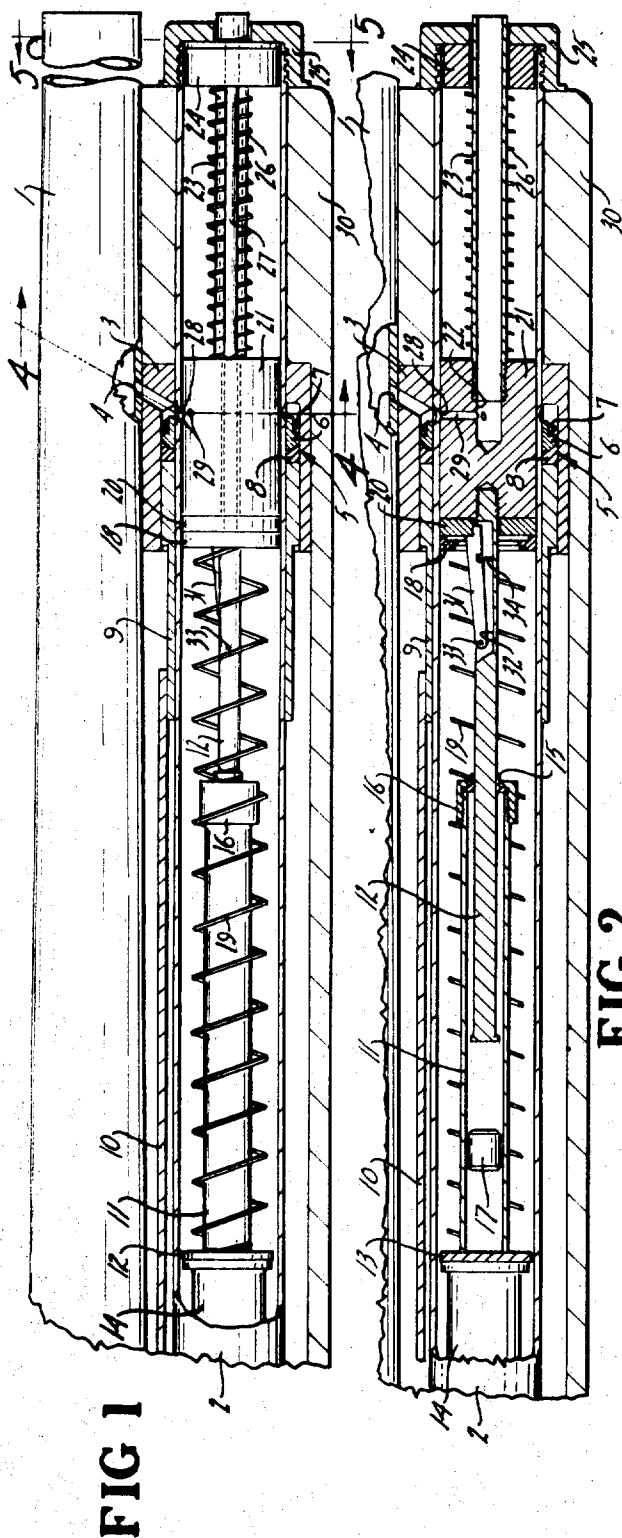
A. J. KAEMPF

3,443,477

GAS OPERATED FIREARM

Filed Oct. 26, 1967

Sheet 1 of 2



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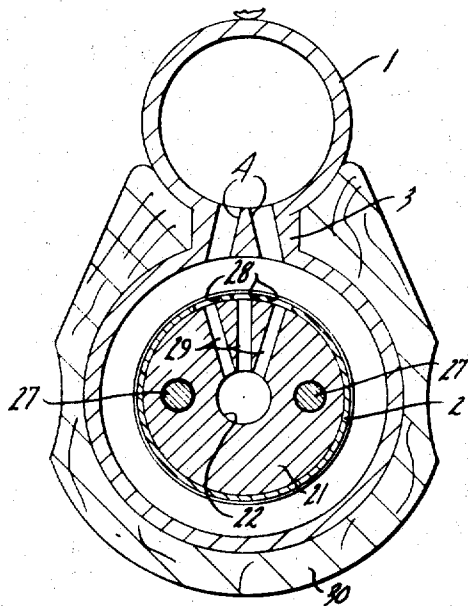


FIG 4

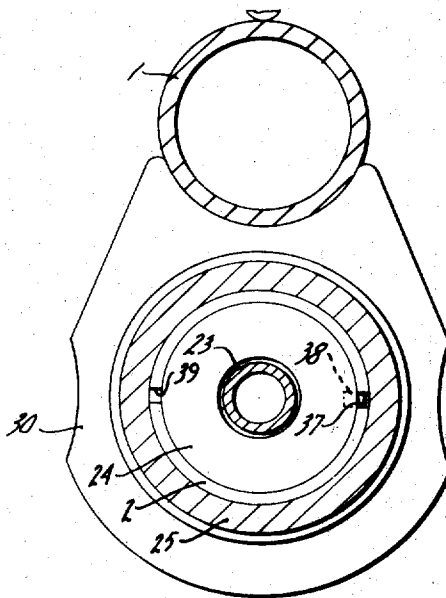


FIG 5

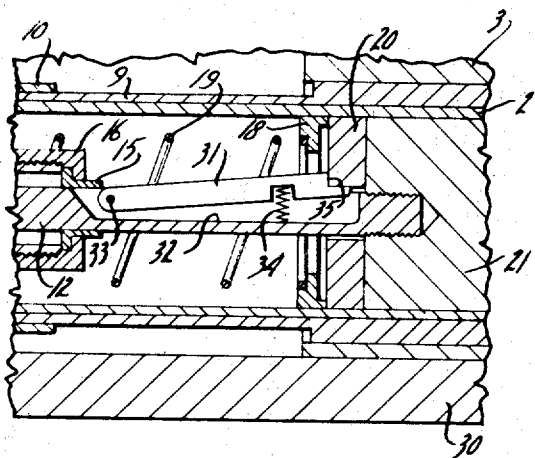


FIG 6

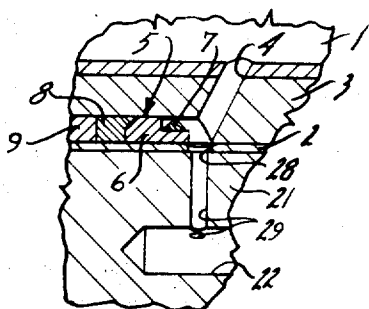


FIG 7

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3,443,477

GAS OPERATED FIREARM

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U.S. Cl. 89—128

10 Claims

ABSTRACT OF THE DISCLOSURE

The invention relates to firearms, such as shotguns, which utilize gas pressure developed by the explosion in the barrel to automatically eject the spent cartridge case or shell. A structure is provided to selectively permit manual ejection of the empty shells by bleeding off the explosion gas through ports in the magazine tube to the atmosphere before the gas can operate on the action to actuate the automatic ejection mechanism.

In gas operated shotguns, the explosion gases are directed through openings formed in the barrel to a gas cylinder where the gas pressure operates a piston connected to the action of the gun to thereby automatically eject the spent shell from the chamber. At certain times, such as when shooting skeet or trap, it is desirable to have manual ejection of the shells, but with the conventional gas operated shotgun, it is not possible to manually eject shells. For example, trap and skeet clubs have a ruling that any empty shells a shooter can take out of his gun manually belong to him, but if the empty shell is automatically ejected and hits the ground, it belongs to the club and the shooter may not pick it up. It is highly desirable for the trap and skeet shooter to retain the empty shells for the purpose of reloading, for reloading of empty shells provides a substantial cost saving to the shooter over the cost of purchasing new shells.

The present invention is directed to a shotgun having a gas operated ejection mechanism in which the shooter can selectively render the ejection mechanism inoperative so that the empty shells can be manually removed. With the use of the invention, the skeet and trap shooter can shoot singles without losing the empty shells, and if the shooter desires to shoot doubles, he can do so without any adjustment by simply putting one shell in the chamber and one in the magazine. The shell positioned in the magazine automatically programs the gun to eject the first shell, but the automatic ejection mechanism will be rendered inoperative for the second shell, so the shooter may manually remove the second shell and maintain the same for purposes of reloading.

More specifically, the shotgun of the invention includes a magazine tube which is provided with a series of ports which communicate with holes extending between the barrel and the gas cylinder. Located within the magazine tube is a spring-loaded slide or piston having a central opening which is connected by a hollow tube extending through the magazine tube cap to the atmosphere. In addition, a series of radial passages connect the central tube with the periphery of the slide. With a single shell in the chamber, the passages in the slide are in registry with the ports in the magazine tube and thus the explosion gases from the barrel are directed through the passages in the slide and through the hollow tube to the atmosphere, so the gas will not act against the piston in the gas cylinder to operate the action of the gun.

When shooting doubles with one shell in the magazine and one in the chamber, the slide is moved forwardly within the magazine tube so that the radial passages in the slide are out of registry with the ports in the maga-

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zine tube. With the first shot of doubles, the explosion gases are directed in the usual path against the piston in the gas chamber to operate the action of the gun to automatically eject the spent shell. With the ejection of the spent shell, the slide returns to its original position, whereat the radial passages are in alignment with the ports in the magazine tube. With the slide in this position, the explosion gases from the second shot will be vented through the ports in the magazine tube and through the slide to the exterior so that the automatic ejection mechanism will be inoperative for the second shot.

With the use of the present invention, the automatic ejection mechanism will be rendered inoperative when shooting singles so that the spent shell can be manually removed by the shooter and retained for purposes of reloading. However, when shooting doubles, the first shell will be automatically ejected in the normal manner, but the automatic ejection mechanism will be rendered inoperative for the second shell so that the second shell can be manually removed.

When using "field" loads the pressure developed in the barrel will be substantially greater than that developed when using "trap" loads, and thus the pressure of the "field" load will not be entirely vented to the atmosphere but also act to operate the ejection mechanism so that the gun when using "field" loads will operate in an automatic manner at all times.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

FIG. 1 is a fragmentary longitudinal section of a portion of a shotgun embodying the invention;

FIG. 2 is a view similar to FIG. 1 with the internal parts broken away in section;

FIG. 3 is a view similar to FIG. 1 showing a shell in the magazine tube;

FIG. 4 is a section taken along line 4—4 of FIG. 2;

FIG. 5 is a section taken along line 5—5 of FIG. 1;

FIG. 6 is a fragmentary, enlarged longitudinal section showing the latching member which prevents forward movement of the slide during recoil; and

FIG. 7 is an enlarged fragmentary longitudinal section showing the ports in the magazine tube in registry with the passages in the slide.

The drawings illustrate a shotgun of the type in which the explosion gases are utilized to automatically eject the spent shell from the chamber. The shotgun includes a barrel 1 and a magazine tube 2 is located beneath the barrel. Connected to the lower portion of the barrel 1 is a gas cylinder 3 and a pair of ports 4 provide communication between the interior of the barrel and the cylinder 3.

A piston assembly 5 is mounted for sliding movement within the gas cylinder 3 and includes a piston 6, a piston seal 7 and a barrel seal 8. The piston assembly 5 bears against the outer end of the action bar sleeve 9 which is connected to the action bar 10. With this construction, the explosion gases from the barrel 1 act through the ports 4 and the pressure of the gas forces the piston assembly 5 to the rear to thereby move the action bar 10 and automatically eject the spent shell from the chamber in a conventional manner such as shown in U.S. Patents 2,645,873, 2,675,638 and 2,719,375.

A pair of telescopic members 11 and 12 are located within the magazine tube 2. A cap 13 is secured to the rear end of the tube 11, and the end of magazine follower 14 bears against the cap 13, as shown in FIGS. 1-3. To guide the tube 11 in sliding movement on the rod 12, a bushing 15 is mounted within the forward end of the tube 11 by a threaded nut 16 and the bushing 15 is adapted to slide on the rod 12. To limit the telescoping travel of

tube 11, a plug 17 is slidably disposed within tube 11 and in the fully telescoped position, as shown in FIG. 3, the plug 17 bears between the cap 13 and the end of rod 12.

A ring 18 is located within the magazine tube 2 and spaced radially from the outer end of the rod 12, and a coil spring 19 is interposed between the cap 13 and ring 18 and urges the cap inwardly, or to the left as shown in FIGS. 2 and 3.

Ring 18 bears against a disc 20 which is provided with a central opening which slidably receives the rod 12. The outer end of rod 12 is threaded within a central opening in slide or valve member 21, which is mounted for sliding movement within the magazine tube 2. As shown in FIGS. 2 and 3, the outer end of slide 21 is provided with a central opening 22 and the inner end of the tube 23 is threaded within the opening 22. Tube 23 extends through a plug 24 positioned within the outer end of magazine tube 2 and through an opening in the magazine cap 25 which is threaded on the outer end of the magazine tube 2. To urge the slide 21 inwardly against the disc 20, a spring 26 is interposed between the outer end of slide 21 and the inner surface of the plug 24.

The disc 20 and the plug 24 are joined together as an integral unit by a pair of guide rods 27 which extend through suitable openings in the slide 21. With this construction, the plug 24 and disc 20 are fixed and the slide 21 can move along the guide rods 27 in relation to the inner surface of the plug 24.

As previously described, in the operation of the conventional shotgun, the explosion gases act against the piston assembly 5 to move the action bar 10 to the rear and operate the automatic ejection mechanism. In accordance with the invention, a provision is made to bleed off the explosion gases to the atmosphere so that the explosion gases will not act against the piston assembly 5 to operate the ejection mechanism. Accordingly, the magazine tube 2 is provided with a series of spaced ports 28 which are spaced through an arc around the periphery of the tube, and ports 28 communicate with the interior of gas cylinder 3. In addition, the slide 21 is formed with a series of radial passages 29 which extend from the central opening 22 to the periphery of the slide, and when slide 21 is seated against disc 20, as shown in FIGS. 1 and 2, passages 29 are in registry with ports 28. While the drawings show three ports 28 and three passages 29, it is contemplated that any number of ports and passages can be utilized.

When the passages 29 are aligned with the ports 28 in magazine tube 2, the explosion gases will be vented through the ports 28 and passages 29, and through the central tube 23, to the atmosphere. As the explosion gas is vented to the atmosphere, it will not act to move the piston assembly 5 to the rear and therefore the automatic ejection mechanism will be rendered inoperative.

The magazine tube 2 is enclosed by wooden fore-grip 30.

FIGS. 1 and 2 illustrate the mechanism when there is no shell in the magazine tube. In this position, the spring 26 urges the slide 21 against the disc 20 so that the passages 29 of slide 21 are in alignment with the ports 28 in magazine tube 2. When the shell in the chamber is exploded, the explosion gases will be vented through the ports 28, passages 29 and tube 23 to the exterior so that the piston assembly 5 will not be moved to the rear to actuate the automatic ejection mechanism. The shooter can manually remove the empty shell from the chamber.

Passages 29 must be in precise alignment with the ports 28 to permit the explosion gases to vent through the vent tube 23, so that the gases do not act on the piston assembly 5 to cause automatic ejection. Due to the sudden force of recoil, the slide 21 may tend to jump forward within the magazine tube 2 to momentarily move the passages 29 out of alignment with the ports 28, and this momentary misalignment of the ports may prevent proper venting of the gas to the atmosphere. Thus, to insure that the piston will not jump forward within the magazine tube 2

due to the force of recoil, a latching mechanism is incorporated. The latching mechanism includes a latch 31 which is pivotally mounted within a recess 32 formed in the rod 12 by a pin 33. A coil spring 34 is located within a recess in the undersurface of latch 31 and acts to urge the latch 31 upwardly. As best shown in FIG. 6, the forward end of latch 31 is provided with a shoulder 35 which bears against the rear surface of the disc 20. As rod 12 is secured to slide 21, engagement of the shoulder 35 with the disc 20 prevents the slide 21 from jumping forwardly during recoil and serves to maintain alignment between the passages 29 and the ports 28.

FIG. 3 illustrates the manner in which the present invention is utilized when shooting doubles. In this illustration, a shell 36 is inserted into the magazine tube 2 behind the magazine follower 14, causing the tube 11 to telescope over the rod 12. As the tube 11 moves forwardly, the end of the bushing 15 will ride on the upper surface of latch 31, thereby depressing the latch, and thereafter cap 13 will push plug 17 against the outer end of rod 12, thereby carrying rod 12 forwardly and permitting the latch and the rod 12 to move through the central opening in disc 20. As the rod 12 moves forwardly, the slide 21, which is secured to the end of the rod, will be moved forwardly within the magazine tube 2 to move the passages 29 out of registry with the ports 28 in the magazine tube. With the slide 21 in this forward location, as shown in FIG. 3, the explosion gases will act in a normal manner against the piston assembly 5 to move the action and thereby eject the shell automatically. When the first shell is ejected, the spring 19 will move the cap 13 and the remaining shell 14 to the rear, and spring 26 will urge the slide 21 and rod 12 to the rear. With the rod 12 and slide 21 returned to position shown in FIG. 2, the passages 29 of slide 21 will be aligned with the ports 28 and the shoulder 35 will be in engagement with the disc 20. The explosion gases from the second shell will then be vented in a manner previously described, to the atmosphere so that the empty shell can be manually removed from the chamber.

The gas pressure developed in the barrel when using a "field" load is substantially greater than the pressure developed by a "trap" load. The venting system is designed so that this increased pressure of the "field" load will not be completely vented to the atmosphere but will also act to move the piston assembly 5 and thereby operate the automatic ejection mechanism. Thus when using "field" loads, all shells will be automatically ejected.

A provision is also made so that all "trap" load shells can be automatically ejected, if desired. To accomplish this, the plug 24 is rotated through approximately 180° so that the passages 29 are out of registry with the ports 28. The explosion gases will then act in the normal manner rather than being vented to the atmosphere so that all shells will be automatically ejected.

To lock the plug 24 in position so that the passages 29 will register with ports 28, a notch 37 is provided in the end of magazine tube 2 which receives a projection 38 on plug 24. With the projection disposed within the notch, the passages 29 and ports 28 will be properly aligned so that the gases can be vented to the atmosphere. As previously noted, by rotating the plug 24 and the attached slide 21 so that the projection 38 is located at a substantial angular displacement, preferably 180°, from the notch 37, the gun will operate to eject all shells, both "field" load and "trap" load shells. To lock the plug 24 in this out-of-registry position, a second notch 39 is provided in end of magazine tube 2 which is located 180° from notch 37 and is adapted to receive projection 38.

I claim:

1. In a firearm in which the explosion gases act to automatically eject empty shells and including a barrel, a gas cylinder communicating with the barrel, and piston means slidable within the cylinder and operably connected to an ejection mechanism, the improvement com-

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prising a magazine tube having an opening therein communicating with said barrel, valve means movable within the magazine tube between a first and second position, said valve means including passage means communicating with the atmosphere and said valve means arranged so that said passage means communicates with said opening when said valve means is in said first position to vent explosion gases generated in the barrel to the atmosphere and arranged so that said passage means is out of communication with said opening when said valve means is in said second position whereby said explosion gases act against said piston means to operate said ejection mechanism, and means responsive to a shell being loaded in said magazine tube for moving said valve means from said first position to said second position.

2. The structure of claim 1, and including means for returning the valve means to said first position after said shell is fed from said magazine tube.

3. The structure of claim 1, wherein said valve means is cylindrical in shape and is slidable within the magazine tube, and said passage means includes an aperture located on the periphery of said valve means and disposed in registry with said opening in the magazine tube when said valve means is in said first position.

4. The structure of claim 1, and including means for preventing said valve means from jumping forwardly within the magazine tube during recoil for the firearm.

5. The structure of claim 3, and including fixed abutment means disposed within the magazine tube and disposed to be engaged by the rear end of the valve member to thereby align said valve member in said first position, and means acting against the forward end of said valve member for urging the valve member against said abutment means.

6. The structure of claim 3, and including means for selectively rotating said valve member within the magazine tube to prevent alignment of said opening and said aperture in both said first and second positions.

7. In a firearm in which the explosion gases act to automatically eject empty shells, and including a barrel, a gas cylinder communicating with the barrel, and piston means slidable within the cylinder and operably connected to an ejection mechanism, the improvement comprising a magazine tube having an opening therein communicating with said gas cylinder, fixed abutment means located within said magazine tube, a slide valve member slidably disposed within the magazine tube and located between said abutment means and the forward end of said magazine tube, means for biasing said valve member against said abutment means, said valve member including a pas-

sage communicating with the atmosphere and said passage having an inlet disposed on the periphery of said valve member, said inlet being in registry with said opening in the magazine tube when said valve member is in a first position in contact with said abutment means to thereby vent explosion gases generated in the barrel to the atmosphere, said inlet being out of communication with said opening in the magazine tube when the valve means is moved forwardly in said magazine tube to a second position, whereby said explosion gases act against said piston means to operate said ejection mechanism, and plunger means disposed within the magazine tube and located to the rear of said abutment means, said plunger means adapted to be engaged by a shell in said magazine tube and being connected to said valve member and arranged so that a predetermined amount of movement of said plunger means in said magazine tube acts to move said valve member from said first position to said second position.

8. The structure of claim 7, and including lost motion means connected to said plunger means for delaying forward movement of said valve member from said first position to said second position until said plunger means has moved a predetermined distance within said magazine tube.

9. The structure of claim 7, wherein said plunger means comprises a pair of telescopic members with a first of said telescopic members having a seat to be engaged by a shell in the magazine tube and the second of said telescopic members being connected to said valve member, and said telescopic members being arranged so that the loading of a shell in said magazine tube will move said second telescopic member and thereby move said valve member from said first position to said second position.

10. The structure of claim 7, wherein said passage in said valve member includes an outlet on the forward end of said valve member, and a tube is connected to said outlet and extends longitudinally of the magazine tube and projects outwardly of the forward end of said magazine tube.

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U.S. Cl. X.R.

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