

Dec. 3, 1957

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2,814,972

SAFETY DEVICE FOR GAS-OPERATED AUTOMATIC SHOTGUNS

Filed April 10, 1956

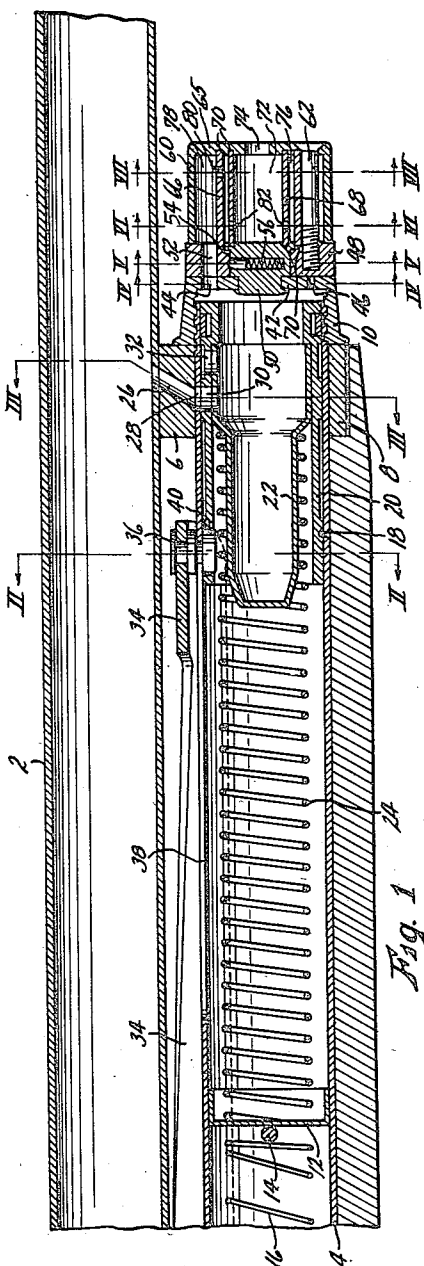


Fig. 1

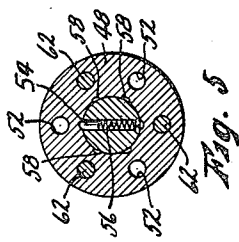


Fig. 5

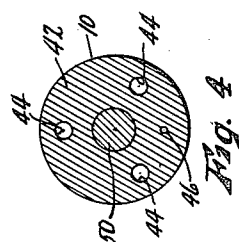


Fig. 4

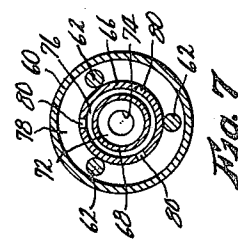


Fig. 7

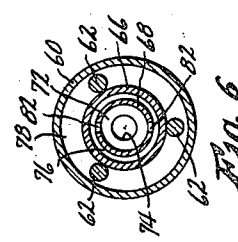


Fig. 6

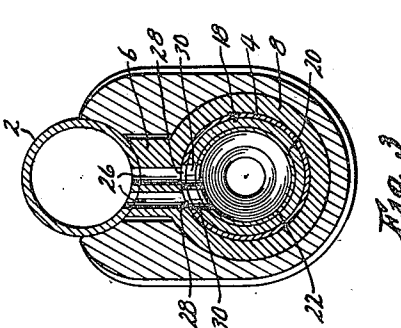


Fig. 3

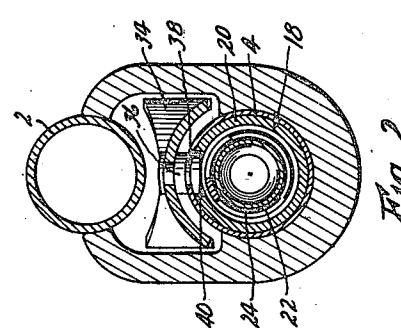


Fig. 2

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SAFETY DEVICE FOR GAS-OPERATED
AUTOMATIC SHOTGUNS

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Application April 10, 1956, Serial No. 577,323

2 Claims. (Cl. 89—193)

This invention relates to new and useful improvements in safety devices for shotguns, and has particular reference to automatic shotguns of the gas-operated type.

The principal object of the present invention is the provision of a flame arrester device for use in connection with guns having apertures through which flames and hot gases of explosion are expelled, whereby to prevent possible injury to the gunner. For example, in certain gas-operated shotguns, the explosion gases are directed into a cylinder wherein they operate a piston connected to the action of the gun, whereby the expended cartridge case is ejected and the gun reloaded from a magazine. In order to maintain the proper operating pressure in the cylinder when different ammunition loads (measured by the amount of powder in a cartridge) are used, the cylinder is provided with a variable vent to the atmosphere. This vent is usually located at the forward end of the magazine tube, and many gunners slide their hands forwardly along the forepiece of the gun to a position where they cover said vents, with the result that they may be burned by the hot gases or flames ejected therethrough. This position is used particularly by skeet shooters, since holding the gun as far forwardly as possible is of assistance in swinging the gun about rapidly and accurately. Although I have shown my device applied to a gun of this type, it will be readily understood that it is applicable to any gun having vents or apertures through which the hot gases of explosion are ejected.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for application to pre-existing guns with a minimum of alteration or modification.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

Fig. 1 is a fragmentary longitudinal vertical sectional view of an automatic shotgun, showing a portion of the barrel and the forward portion of the magazine tube, with a safety device embodying the present invention attached thereto, and

Figs. 2 to 7 are sectional views taken respectively on lines II—II, III—III, IV—IV, V—V, VI—VI and VII—VII of Fig. 1.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to the barrel of an automatic shotgun, only such parts of said gun pertinent to the present invention being shown. Disposed beneath and parallel to barrel 2 is a magazine tube 4. Both the barrel and the magazine tube are secured at their rearward ends in the receiver assembly of the gun, not shown, the magazine tube ordinarily being secured rigidly and permanently in the receiver, and the barrel ordinarily being secured detachably in the receiver for easy dismantling of the gun. Rigidly attached to barrel 2 is a depending lug 6 having a barrel guide ring 8 formed integrally therewith, said guide ring engaging slidably over the forward end portion of the magazine

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tube. Threaded on the extreme forward end of the magazine tube is a magazine cap 10 which engages the forward face of ring 8, thereby securing the barrel in assembly.

Magazine tube 4 is divided intermediate its ends by a disc 12 which seats rearwardly against a pin 14 extending transversely through said tube. Rearwardly of disc 12, tube 4 carries a magazine spring 16 which serves to urge cartridges (not shown) carried in said tube rearwardly into the receiver of the gun, in a manner well known in the art. That portion of the magazine tube forward of disc 12 is designated as the gas cylinder or piston section thereof, and carries slidably therein a piston 18 comprising a sleeve 20 and a forwardly opening cup-shaped liner 22 fitted tightly and permanently into said sleeve. Said piston is urged forwardly by an action spring 24 carried in the piston section of the magazine tube and bearing at its rearward end against disc 12.

Whenever the gun is fired, a portion of the hot gases of explosion pass downwardly from barrel 2 through a pair of passages 26 formed through lug 6 (Figs. 1 and 3), then through a pair of matching holes 28 formed in the magazine tube, and thence through a pair of matching holes 30 formed through the wall of piston 18 to the interior of said piston. The piston is thereby forced rearwardly against action spring 24. As the piston starts rearwardly, holes 30 thereof move out of registry with holes 28, and the supply of gas is interrupted, but the piston continues rearwardly by inertia until the forward edge thereof uncovers holes 28, whereupon the gas supply actuating the piston is restored. The gas supply to the piston may be made more uniform during this portion of the piston movement by providing additional holes 32 in the piston wall intermediate holes 30 and the forward end thereof.

As the piston moves rearwardly, it drives an action bar 34 which is disposed substantially between and parallel to barrel 2 and magazine tube 4. Said action bar has a stud 36 fixed in the forward end thereof, said stud depending through a slot 38 formed longitudinally in the magazine tube and engaging in a hole 40 formed in piston sleeve 20. Said action bar is thus driven rearwardly by the piston. At its rearward end said action bar extends into the receiver of the gun, and functions to unlock the breech, eject the expended cartridge case, and to reload the gun with a fresh cartridge from the magazine. The details of this action are not pertinent to this invention, and are not here shown.

In order to provide a substantially uniform operating pressure to piston 18, despite the fact that either light load ammunition or long-range heavy load ammunition may be used in the gun, the magazine tube 10 is variably vented to the atmosphere. As seen in Figs. 1 and 4, the forward end wall 42 of said cap has three larger holes 44 formed therethrough at equal angular intervals, and a single smaller hole 46 spaced midway between two of holes 44. A circular regulator plate 48 (Figs. 1 and 5) overlies end wall 42 in contact therewith, being carried rotatably on an axle pin 50 fixed in said end wall. Said regulator plate has three holes 52 formed therethrough corresponding in size and spacing to holes 44. A detent 54 carried transversely in pin 50 and urged outwardly by spring 56 is adapted to engage selectively in any one of six sockets 58 formed in the inner periphery of plate 48, whereby to hold said plate releasably in any one of six angular positions. It will be seen that in every other position, holes 52 of plate 48 will register with holes 44, thereby presenting a maximum vent area from the gas cylinder. This position is for heavy ammunition loads. In each of the alternate positions of regulator plate 48, said plate covers holes 44, but one of holes 52 of said plate will register with the

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smaller hole 46 of the cap. This presents a minimum vent area, and is used for light ammunition loads.

The structure thus far described is well-known, but as previously described has the disadvantage that if the gunner places his hand or fingers over the magazine cap, as often occurs, he will be burned by the hot gases or actual flame emerging through the vents. In order to prevent this occurrence, I have provided the muffler or flame-arrester device forming the subject matter of this invention, as best shown in Figs. 1, 6 and 7.

A circular cup-shaped body member 60 is secured to regulator plate 48 with its open end thereagainst, by means of three screws 62 extending through the end wall 65 of said body member and threaded into said regulator plate. A pair of tubular baffles 66 and 68 are disposed within the body member being secured in concentric relationship with the circular wall of said body member by their engagement in circular grooves 70 formed therefor in the inner surface of body member end wall 65, and in the outer face of regulator plate 48 or the outer end of axle in 50. Said baffles divide the space within the body member into a central chamber 72 which is vented to the atmosphere through a port 74 formed centrally in end walls 65, an annular chamber 76 between the baffles, and an annular chamber 78 between baffle 66 and the circular wall of the body member. All of the holes 52 in the regulator plate discharge into the outer annular chamber 78. Chamber 78 communicates with chamber 76 through a series of holes 80 formed through baffle 66 adjacent end wall 65, and chamber 76 communicates with central chamber 72 through holes 82 formed in baffle 68 adjacent regulator plate 48.

Thus it will be seen that explosion gases emerging through holes 52 of regulator plate 48 first enter annular chamber 78 and pass forwardly therethrough, then pass through holes 80 and rearwardly through annular chamber 76, then pass through holes 82 and forwardly through central chamber 72 and to the atmosphere through port 74. The substantial lengthening of the path the gases must travel before being discharged to the atmosphere, plus the two reversals of direction of travel in said path, have been found to eliminate completely any possibility that actual flame will emerge through port 74, and to cool said gases to a point where they cannot burn the gunner's hand, and are in fact scarcely noticeable to the touch. Furthermore, the device has been found not to increase to any objectionable degree the back pressure in the gas cylinder. For example, the gun action will not normally be operated by light-load ammunition, if regulator plate

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48 is set for a heavy load. This setting is in fact recommended in certain instances when automatic operation is not desired. The addition of my safety device does not cause operation of the gun action in these circumstances.

It is apparent also that my device may be very easily attached to pre-existing guns. The only adaptation necessary in the gun shown to receive the safety device is the drilling and tapping of plate 48 to receive screws 62, and the grooving of said plate to receive the ends of baffles 66 and 68. The latter operation also could be eliminated if desired.

Although I have shown and described a specific embodiment of my invention, it is apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. In combination with a gun having a part with a vent therein through which hot gases of explosion normally are discharged into the atmosphere, a safety device comprising a hollow body member secured to said gun part so as to receive therein the gases discharged from said vent, and having an outlet port formed therein, and baffles carried in said body member and comprising a plurality of concentrically disposed tubes from annular chambers therebetween and between the outermost baffle and said body member, and a central chamber within the innermost of said baffle tubes, said vent communicating with the outermost of said annular chambers and said outlet port communicating with said central chamber, each of said baffle tubes having a hole formed in the wall thereof, the hole in each tube being offset longitudinally of said tubes from the hole in the adjacent tube.

2. The structure as recited in claim 1 wherein said vent and said outlet port are disposed to discharge gases in a direction parallel to the barrel of the gun, wherein said baffle tubes are parallel to said barrel, and wherein each of said baffle tubes has a plurality of holes formed therein, said holes being spaced at equal angular intervals about the periphery of said tube, whereby the reactive force of the passage of said gases through said vent, port, or holes will not exert forces on said gun transverse to said barrel.

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