DUAL MODE SHOTGUN

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Filed: Feb. 24, 1972

Appl. No.: 228,882

U.S. Cl..................89/128, 89/33 B, 89/33 MC, 89/151, 89/191 A, 89/193, 42/41

Int. Cl..................F41c 11/08, F41d 5/10

Field of Search...........42/10, 11, 40, 41; 89/128, 161, 191 A, 193

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ABSTRACT

A dual mode shotgun employing a gas driven forwardly moveable barrel to eject spent rounds and automatically reload. The gun is convertible from automatic to a single fire mode. In the single fire mode the driving gas is vented to the atmosphere to prevent movement of the barrel and the gun may be breech loaded with special purpose rounds. In the automatic mode the forward movement of the barrel provides for reloading and mechanically recocks the gun.

10 Claims, 4 Drawing Figures
DUAL MODE SHOTGUN

BACKGROUND OF THE INVENTION

Presently, patrols use a combination of several different weapons such as the 12-gauge riot gun, the automatic rifle, the machine gun, the grenade launcher, and grenades. The present invention relates generally to a dual mode shotgun and more particularly to a single weapons system capable of achieving a projectile density greater than any known hand held weapon. This single weapon provides a defensive or offensive capability equal to the total combination of the above mentioned weaponry.

In the field of automatic weapons both hand guns and rifles with forwardly movable barrels have been developed. However, these guns have not provided the multipurpose capabilities of the present invention. The multiplicity of weapons used presently by patrols is quite burdensome. By combining these capabilities in a single gun, the instant invention alleviates this burden and provides for the more effective and efficient operations of patrols.

SUMMARY OF THE INVENTION

In the automatic mode the barrel of the shotgun moves forward due to the action of the expanding gases on a piston attached to the forward end of the barrel. This forward motion is opposed by a spring which normally biases the barrel against the gun housing. The forward movement of the barrel allows the spent shell to be ejected and a new shell fall into place and, at the same time, recocks the gun. When the trigger is held down, the gun will automatically continue to fire shells. In the alternative, the trigger may be pulled intermittently to fire single or multiple bursts.

In the single fire mode the gas which normally drives the barrel forward is vented to the atmosphere. The barrel assembly is free to rotate about the housing on a breech trunion. By unlocking the barrel it may be rotated and breech loaded.

OBJECTS OF THE INVENTION

An object of the present invention is the provision of a dual mode shotgun which may be fired automatically using shells from a magazine or may be breech loaded with special purpose shells. Another object is to provide an automatic shotgun with a forwardly moving barrel employed to recock the gun.

A further object of the invention is the provision of a weapon which may be easily converted to be belt fed.

Still another object is to provide a weapon where there is no bolt, as in conventional guns, and therefore no mechanism for locking and unlocking is required.

Other objects, advantages, and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal sectional view of a gun constructed in accordance with the invention, the gun being shown cocked;

FIG. 2 is a sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a cross sectional view of the ejector mechanism; and

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 which illustrates a preferred embodiment of the gun, shows a loaded magazine 1 inserted into a receiver 2. Round 3 is held in the half-load position by the plate 4 under the load of spring 5; another round 6 is shown in the chamber. The gun has a stock 41 with a housing 47 attached thereto. Tubular members 42 and 43 are attached to the housing 47 and cylinder 44 threadedly engages tubular member 42.

Within the housing is a generally cylindrical firing pin 7, spring biased by spring 15 in the forward direction toward the loaded chamber. A sear 8 biased by spring 14 retains pin 7 in its cocked position. Trigger 9 in conjunction with trigger link 11 and cocking rod 13 serve to control the position of the sear 8.

The barrel 19 is moveable in the forward direction against the bias of spring 20. Gases from the exploded shell enter annular chamber 17 through ports 16, the chamber being formed by annular piston 18 and annular land 48.

A seal block 30 is longitudinal slideable on cylinder 44. In its normal position the block will seal relief port 32. However, when one desires to breech load the gun, seal block 30 is moved against the action of index spring 31 to open relief port 32 to the atmosphere and effectively vent chamber 17, thus preventing forward movement of the barrel due to the action of any extending gases. Breech latch 33 can then be unlocked and the barrel assembly can be rotated about breech trunion 34 in the housing.

FIG. 2 is a cross sectional view of the mechanism used to position the new shell. When the barrel 19 moves forward it allows holding bars 24 to be moved out by springs 25 to position the next round. As the expended round is cleared, spring loaded (springs not shown) feed paws 46 drop into a recess in the outer surface of the barrel, thus rotating about pins 27 a sufficient amount to allow the round in the half-load position to be injected into the weapon for chambering. Subsequent rearward movement of the barrel 19 forces feed paws 46 and holding bars 24 into the position shown in FIG. 2.

FIG. 3 depicts in more detail the ejector mechanism of the gun. As the barrel moves forward the shell casing is first free to move in the direction of recess 49. The ejector pin 26, driven by the ejector spring 27, forces the expended round from its restraining clip 28 thus causing the round to be ejected about the restraining clip 29 completing ejection of the spent round from the weapon.

FIG. 4 is a cross sectional view of the trigger mechanism of the shotgun. Trigger 9 pivots about pin 10 and has a forked upper portion. Pin 12 extends through the forked upper portion and trigger link 11 is mounted on pin 12 and rests in the forked upper portion of the trigger. Telescoping tubes 35 are also shown in FIG. 4 and are attached to the rear hand grip plate 36 which may be extended to make a 13-inch shoulder stock.

The automatic firing mode may be described as follows. Assuming that the gun is loaded and cocked as shown in FIG. 1, a force is applied to trigger 9 causing
the trigger to rotate about pin 10. The trigger link 11 in turn rotates about pin 12 and tries to move forward. Since the cocking rod 13 is restrained from moving by contact at surface 51 the trigger link is forced to rotate counterclockwise by contact with surface 52. This movement in turn applies a force at surface 53 which pulls the seat down against the seat spring 14, thus releasing the firing pin which is driven forward by the firing pin spring 15.

The round is fired and as the shot load passes the gas port 16, propellant gases are vented into the annular chamber 17 and act against the piston 18 causing the entire barrel assembly 19 to move forward against the recoil spring 20. The gas ports are located and sized in order that sufficient energy will be imparted to the piston to cause the barrel to move forward enough to eject the spent round and due to the velocity of the shot, the mass of the barrel and the resisting spring force, allow shot to clear the muzzle prior to excessive breech opening.

As the barrel begins to move forward the loading pawl 21 rotates flush with the barrel to clear the magazine. As the barrel nears the end of its travel surface 54 contacts surface 55 and moves the cocking rod forward, thus causing an interaction between the recess near the rear of the cocking rod and cocking lever 22 which recocks the firing pin by interaction at recess 56 and moves the firing pin rearward to reengage the seat.

Additional forward movement of the barrel allows the holding bars 24 to be moved out by the springs 25 to position the next round; as the barrel clears the expended round and eliminates the restraining force, the ejector pin 26, driven by the ejector spring 27, forces the expended round from its restraining clip 28 and causes the round to be pivoted about restraining clip 29 thus completing ejection of the spent round from the weapon. Final forward movement of the barrel allows the spring loaded feed pawls 46 to drop into a recess in the outer surface of the barrel, thus pivoting about pins 27 a sufficient amount so as to allow the round in the half-load position to be injected in the weapon for chambering. When the barrel has reached is maximum forward travel, it is stopped by surface 57 engaging lug 54 and the compression of the recoil spring 20.

The loading pawl 21 will have cleared the forward edge of the magazine, and as the barrel starts to recoil, the pawl will pick up the next round and move it to the half-load position. As the barrel returns to the closed position, the lug 54 on the barrel will contact the cocking rod surface 55 and drive it rearward. If the trigger has been held in firing position the cocking rod will interact with the trigger link at surface 52 causing the link to rotate and interact at surface 53, thus pulling the seat down again and automatic firing will continue. If the trigger has been released, firing will be discontinued due to the lack of the interaction at surface 52.

The single fire mode is quite simple compared to the automatic mode and may be best described by stating that basically it operates like an M-79 grenade launcher or a break action shotgun. This mode is used for firing extra long, special purpose rounds, because the recoil length is not sufficient to eject their long cases. Additionally, some of the special rounds would have insufficient propellant pressure to operate the piston mechanism.

To prevent the barrel from moving forward in this mode, the seal block 30, positioned by the indexing spring 31, is moved forward until the index spring snaps into the rear indexing groove in the seal block. This allows the propellant pressure to vent through the relief port 32. The weapon is manually loaded by releasing the breech latch 33 to allow the magazine receiver housing and the barrel assembly to rotate about the breech trunion 34. The single fire cocking lever (not shown) attached to the cocking rod, resets the firing pin as the magazine receiver housing rotates. A round is inserted and the chamber and the breech is reclosed. Single fire can, of course, be accomplished with a loaded magazine in the weapon.

It should be noted that the cocking lever used to initially cock the gun is not shown but its construction is quite simple and well within the skill in the art. Furthermore, applicant does not wish to limit himself to the exact design shown and realizes that a forward hand grip containing a telescoping bipod could be employed. In addition a pattern control muzzle attachment which could be quickly attached and removed from the barrel could also be used. It should further noted that the half-load feature makes the design compatible for addition of belt feeding mechanisms due to the rearward movement of the rounds from the magazine. The top feed and side ejection mechanisms allow the shooter a minimum profile during prone firing. Moreover, the forward hand grip can be mounted so that it may be rotated 90° in either direction from the position shown and locked at 15° intervals to accommodate the style of various shooters.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A dual mode shotgun for firing multi-purpose shells comprising:
   a stock;
   a housing attached to said stock and extending forwardly therefrom;
   firing means in said housing to fire a shell loaded in said shotgun;
   a generally tubular member mounted on said housing and extending forwardly from said housing;
   receiver means on said tubular member for accepting a magazine having shells therein;
   a barrel slidable mounted in said tubular member;
   spring means mounted in said tubular member for opposing the forward movement of said barrel;
   gas reaction means for moving said barrel in a forward direction upon sensing pressure in said barrel;
   trigger means for controlling said firing means;
   cocking means for resetting said firing means;
   automatic reloading means for positioning a new shell in said tubular member when said barrel is moved forwardly;
   pressure release means for preventing said gas reaction means from moving said barrel in a forward direction; and
   loading means for allowing breech loading of the barrel;

2. The dual mode shotgun of claim 1 wherein the gas reaction means comprises:
   a cylinder affixed to said tubular member having a land sealingly engaging said barrel;
a piston affixed to said barrel and sealingly engaging the inside of the cylinder to form a chamber between said piston and said land; and at least one gas port communicating with said barrel and said chamber.

3. The dual mode shotgun of claim 2 wherein said pressure release means comprises:
a relief port means providing communication between said chamber and the atmosphere;
a seal block circumscribing said cylinder and slidably thereon positionable to open and close said relief port; and
an index spring means for maintaining said seal block in a predetermined position.

4. The dual mode shotgun of claim 3 wherein said loading means comprises:
a breech trunion rotatably affixing said tubular member and barrel to said housing; and
a breech latch means affixed to said housing for normally holding said tubular member and barrel in place.

5. The dual mode shotgun of claim 4 wherein said firing means comprises:
a firing pin slidably mounted in said housing and a spring means urging said pin in a forward direction;
a first recess in said firing pin adapted to coact with said cocking means; and
a second recess in said firing pin adapted to coact with said trigger means.

6. The dual mode shotgun of claim 5 wherein said cocking means comprises:
a cocking rod slidably mounted in said housing having an elongated recessed portion adjacent one end and a lug on said barrel coacting with the end surfaces of said recessed portion to cause reciprocal movement of said cocking rod;
a cocking lever mounted on a pin in said housing and coacting with said first recess in said firing pin and a third recess in said cocking rod to move said firing pin rearwardly when said cocking rod moves in a forward direction.

7. The dual mode shotgun of claim 6 wherein the trigger means comprises:
a trigger mounted on a trigger pin in said housing; said trigger having a forked end within said housing and a trigger link having one end mounted on a trigger link pin in said forked end;
a sear mounted in said housing and a sear spring means for biasing said sear into locking engagement with said second recess in said firing pin;
a fourth recess in said sear;
the other end of said trigger link extending partially into said recess;
a substantially flat camming surface on the other end of said trigger link extending at an acute angle with respect to one side wall of the trigger link; and
a parallel camming surface on the rearward end of the cocking rod complementarily engaging the camming surface on the trigger link when said cocking rod is in its most rearward position so that when the trigger is pulled the other end of said trigger link will engage a side wall of said fourth recess to disengage said sear from said firing pin.

8. The dual mode shotgun of claim 1 wherein said loading means comprises:
a breech trunion rotatably affixing said tubular member and barrel to said housing; and
a breech latch means affixed to said housing for holding said tubular member and barrel in place.

9. The dual mode shotgun of claim 1 wherein said firing means comprises:
a firing pin slidably mounted in said housing and a spring means urging said pin in a forward direction;
a first recess in said firing pin adapted to coact with said cocking means;
a second recess in said firing pin adapted to coact with said trigger means; and, said cocking means comprises:
a cocking rod slidably mounted in said housing having an elongated recessed portion adjacent one end and a cam on said barrel coacting with the end surfaces of said recessed portion to cause reciprocal movement of said cocking rod; and
a cocking lever mounted on a pin in said housing and coacting with said first recess in said firing pin and a third recess in said cocking rod to move said firing pin rearwardly when said cocking rod moves in a forward direction.

10. The dual mode shotgun of claim 9 wherein the trigger means comprises:
a trigger mounted on a trigger pin in said housing; said trigger having a forked end within said housing and a trigger link having one end mounted on a trigger link pin in said forked end;
a sear mounted in said housing and a sear spring means for biasing said sear into locking engagement with said second recess in said firing pin;
a fourth recess in said sear;
the other end of said trigger link extending partially into said recess;
a substantially flat camming surface on the other end of said trigger link extending at an acute angle with respect to one side wall of the trigger link; and
a parallel camming surface on the rearward end of the cocking rod complementarily engaging the camming surface on the trigger link when said cocking rod is in its most rearward position so that when the trigger is pulled the other end of said trigger link will engage a side wall of said fourth recess to disengage said sear from said firing pin.