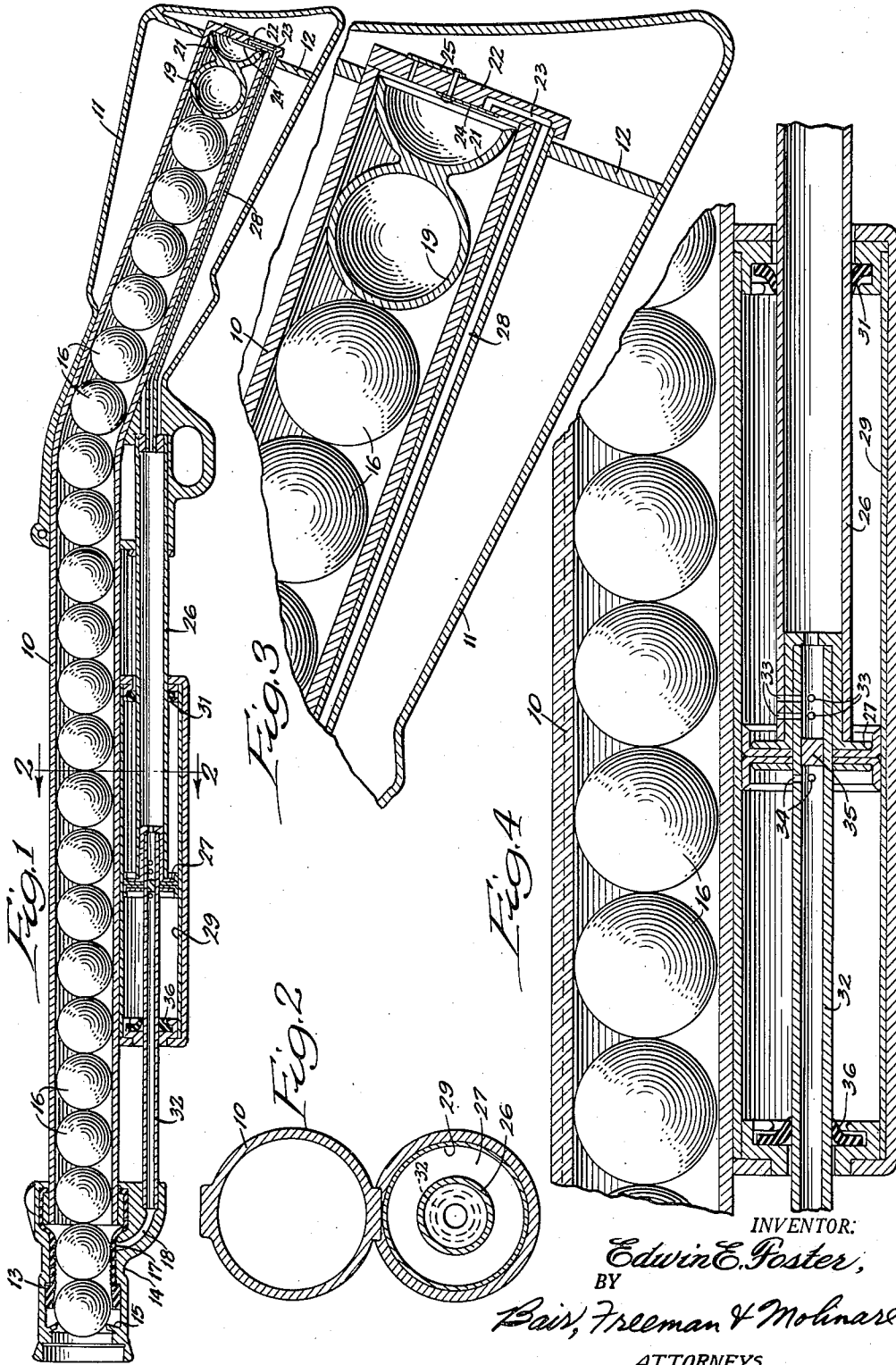


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REPEATING AIR RIFLE  
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1

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REPEATING AIR RIFLE

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7 Claims. (Cl. 124—13)

This invention relates to repeating toy rifles and more particularly to an air operated rifle of the type which shoots hollow light projectiles such as Ping-pong balls.

In rifles of this type it is desirable to employ a relatively long barrel to hold a large number of balls so that a large number of shots can be fired for each loading. It is necessary that the balls be fed through the barrel to the firing chamber to be discharged therefrom, and it is one of the objects of the present invention to provide a repeating toy rifle in which the projectiles in the barrel are fed therethrough into the firing chamber by air pressure.

Another object is to provide a repeating rifle in which a pump is connected to the firing chamber to furnish air under pressure for discharging projectiles therefrom and is also connected to the rear end of the barrel to force the projectiles therein to the firing chamber.

According to one feature of the invention a follower is provided slidably sealed in the barrel to press the projectiles therein toward the firing chamber. Preferably a relief valve is provided in the barrel to limit the feeding pressure so that the projectiles will be fed properly without being damaged or crushed.

A further object is to provide a repeating toy rifle in which a double acting pump is employed having one stroke which pumps air to the firing chamber to discharge a projectile therefrom and another stroke which pumps air to the rear end of the barrel to feed the projectiles therethrough to the firing chamber.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which:

Figure 1 is a central section through a repeating toy rifle embodying the invention.

Figure 2 is a transverse section on the line 2—2 of Figure 1.

Figure 3 is an enlarged partial section similar to Figure 1 of the stock end of the rifle, and

Figure 4 is an enlarged partial section similar to Figure 1 showing the pump.

The rifle as illustrated comprises an elongated tubular barrel 10 which is bent intermediate its ends to follow the general angle of a conventional rifle. A stock 11 encloses the rear end of the barrel and may be formed of molded plastic or the like in two halves to fit together over the barrel. The end of the barrel extends substantially to the end of the stock and is rigidly supported therein by a cross-piece 12.

At its forward end the barrel carries a firing chamber indicated generally at 13 which may be constructed as more particularly described and claimed in my copending application, Serial No. 314,158, filed October 10, 1952, now matured into Patent No. 2,653,592. The firing chamber as shown comprises a body 14 formed of molded material such as rubber, plastic, or the like, and is secured to the end of the barrel. Near its outer end the body 14 is formed with a resilient annular lip 15 to pro-

2

vide a restriction to discharge of the outermost of a series of projectiles 16 which are carried in the barrel and firing chamber. When pressure is applied to the outermost projectile the annular lip 15 will yield, allowing the projectile to be fired from the firing chamber accompanied by a popping noise.

Near the inner end of the firing chamber a resilient tubular sleeve 17 is provided which is secured to the rear end of the firing chamber and which is detached from the firing chamber at its front end. Air is supplied to the space around the sleeve 17 through an air passage 18 to expand the sleeve into sealing and gripping engagement with the second projectile in the series. After gripping the second projectile, the sleeve will yield so that air can pass to the space between the outermost and second projectiles to force the outermost projectile from the gun. As soon as the outermost projectile is discharged, the air pressure will be dissipated and the sleeve will relax to the position shown so that the series of projectiles can be advanced to a new firing position.

To advance the projectiles through the barrel toward the firing chamber, a follower is provided having a forward spherical portion 19 of substantially the same size and shape as the projectiles 16 and a flexible skirt portion 21 which fits sealingly against the inner surface of the barrel. The rear end of the barrel is closed by a plate 22 formed with an air passage 23 through which air can be pumped into the barrel to advance the follower there-through. The passage 23 is closed against outflow of air by a flapper type check valve 24 and a flapper relief valve 25 is preferably provided to limit air pressure in the barrel to the amount desired for feeding the balls and to prevent excessive pressure from damaging or crushing the balls.

Air is supplied to the firing chamber and to the rear end of the barrel by a double acting pump mounted immediately beneath the forward portion of the barrel for operation in the manner of a standard pump gun. As shown the pump comprises a rigid piston tube 26 rigidly secured in the stock and projecting forward therefrom. At its forward end the tube 26 carries a piston 27 which is double sealed to be effective in both directions. At its rear end the tube 26 is connected through a relatively small tube or conduit 28 to the passage 23. A cylinder 29 fits slidably over the piston 27 and is sealed there-against to cooperate with the piston to form an air pump. One end of the cylinder fits slidably over the piston tube 26 and is sealed thereto by a seal 31 which acts to prevent air from leaking out of the cylinder but which will permit air to flow into the cylinder when it has moved toward the stock.

A rigid discharge tube 32 extends through the front end of the cylinder and fits into the end of the piston tube 26 to form a rigid continuation thereof. Openings 33 are provided in the tubes just to the right of the piston so that air in the cylinder to the right of the piston can flow into the tube 20. Similar openings 34 are formed in the discharge tube 32 to the left of the piston and a closure 35 in the discharge tube separates the two sets of openings. The discharge tube 32 communicates with the air passage 18 in the firing chamber and is sealed to the cylinder by a seal 36 similar to the seal 31 which acts as an air inlet check valve.

In operation balls may be loaded into the gun by forcing them into the firing chamber past the annular lip 15 which will yield easily for this purpose. As the balls are forced into the chamber the follower will be pressed back to the rear end of the barrel until the barrel and firing chamber are completely filled, as shown in Figure 1. At this time the gun is ready for operation. Assuming that the cylinder 29 is pushed forward or to the left, the

3

gun is fired by pulling it rapidly backward. As the cylinder is moved backwards, air trapped to the left of the piston 27 will be pumped through the openings 34 and tube 32 to the firing chamber to fire the outermost projectile therein. During this operation air will flow into the right end of the cylinder past the seal 31. As the cylinder is moved forward or to the left, air will leak into the left end thereof, past the seal 36, and the air trapped in the right end will be pumped through the openings 33 and the tubes 26 and 28 into the rear end of the barrel. This air will force the follower forward in the barrel to move the series of projectiles forward until the next projectile engages the annular lip 15 and is in a position for firing. The piston tube 26 may be made of such a size relative to the diameter of the cylinder that the forward stroke of the cylinder will pump just sufficient air to advance the series of projectiles the proper distance to move the next outermost projectile to the firing position.

It will thus be seen that with the present invention, each time the pump cylinder is reciprocated one projectile will be discharged through the firing chamber and the series of projectiles in the barrel will be advanced to bring the next projectile to firing position. It will also be apparent that the entire barrel can be filled with projectiles without requiring any space for spring mechanisms or the like so that the maximum number of projectiles can be carried by the gun at each loading.

While one embodiment of the invention has been shown and described in detail it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel to receive projectiles from the barrel and to discharge them successively, an annular yielding ring in the firing chamber sealing against the outermost projectile and yieldable in response to pressure to permit discharge of the outermost projectile, a double acting pump connected to the firing chamber to supply air thereto to discharge a projectile therefrom on each operation of the pump in one direction, and a connection from the pump to the other end of the barrel to supply air thereto upon operation of the pump in the other direction to force the projectiles through the barrel and into the firing chamber.

2. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel to receive projectiles from the barrel and to discharge them successively, an annular yielding ring in the firing chamber sealing against the outermost projectile and yieldable in response to pressure to permit discharge of the outermost projectile, a reciprocating air pump, an open connection from the pump to the firing chamber to supply air thereto to discharge a projectile therefrom each time the pump is reciprocated, a connection from the pump to the other end of the barrel to supply air thereto to force the projectiles through the barrel and into the firing chamber a check valve in the last named connection to prevent flow of air therethrough toward the pump and to retain air under pressure in the other end of the barrel, and a relief valve communicating with the other end of the barrel to limit the pressure therein.

3. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel to receive projectiles from the barrel and to discharge them successively, an annular yielding ring in the firing chamber sealing against the outermost projectile and yieldable in response to pressure to permit discharge of the outermost projectile, a follower fitting slidably in and sealing against the barrel behind the series of projectiles, a reciprocating air pump, an

4

open connection from the pump to the firing chamber to supply air to the firing chamber to discharge a projectile therefrom each time the pump is reciprocated, a connection from the pump to the other end of the barrel to supply air thereto to force the follower and the projectiles through the barrel toward the firing chamber a check valve in the last named connection to prevent flow of air therethrough toward the pump and to retain air under pressure in the other end of the barrel, and a relief valve communicating with the other end of the barrel to limit the pressure therein.

4. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel to receive projectiles from the barrel and to discharge them successively, an annular yielding ring in the firing chamber sealing against the outermost projectile and yieldable in response to pressure to permit discharge of the outermost projectile, a follower fitting slidably in and sealing against the barrel behind the series of projectiles, a double acting pump including a reciprocable element, and connections from the pump to the firing chamber and to the other end of the barrel so that when the pump element is moved in one direction air will be pumped to the firing chamber to discharge a projectile therefrom and when the pump element is moved in the other direction air will be pumped into the other end of the barrel to force the follower and the projectiles through the barrel toward the firing chamber.

5. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel, means in the firing chamber operable in response to air pressure to grip a second projectile in the series whereby air pressure will force the outermost projectile from the gun, a follower fitting in and sealing against the barrel, a double acting pump including a reciprocating operating element, and connections from the pump to the firing chamber and the other end of the barrel so that when the element is moved in one direction air will be pumped to the firing chamber and when the element is moved in the other direction air will be pumped to the other end of the barrel.

6. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel, and a pump including a piston tube rigidly secured beside the barrel and fixedly carrying a piston, a connection from the piston tube to the other end of the barrel, a cylinder fitting slidably and sealingly over the piston and tube with the tube extending through one end thereof, there being an opening from the cylinder into the piston tube at one side of the piston, and a discharge tube connected to the firing chamber and opening into the cylinder at the other side of the piston.

7. A repeating toy rifle comprising an elongated barrel adapted to hold a series of projectiles, a firing chamber at one end of the barrel, and a pump including a piston tube rigidly secured beside the barrel and fixedly carrying a piston, a connection from the piston tube to the other end of the barrel, a cylinder fitting slidably and sealingly over the piston and tube with the tube extending through one end thereof, there being an opening from the cylinder into the piston tube at one side of the piston, and a discharge tube secured to the piston tube in alignment therewith and extending through and opening into the cylinder at the other side of the piston and connected to the firing chamber.

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