March 3, 1953 L. L. WHITE 2,630,108

REPEATING AIR PRESSURE GUN

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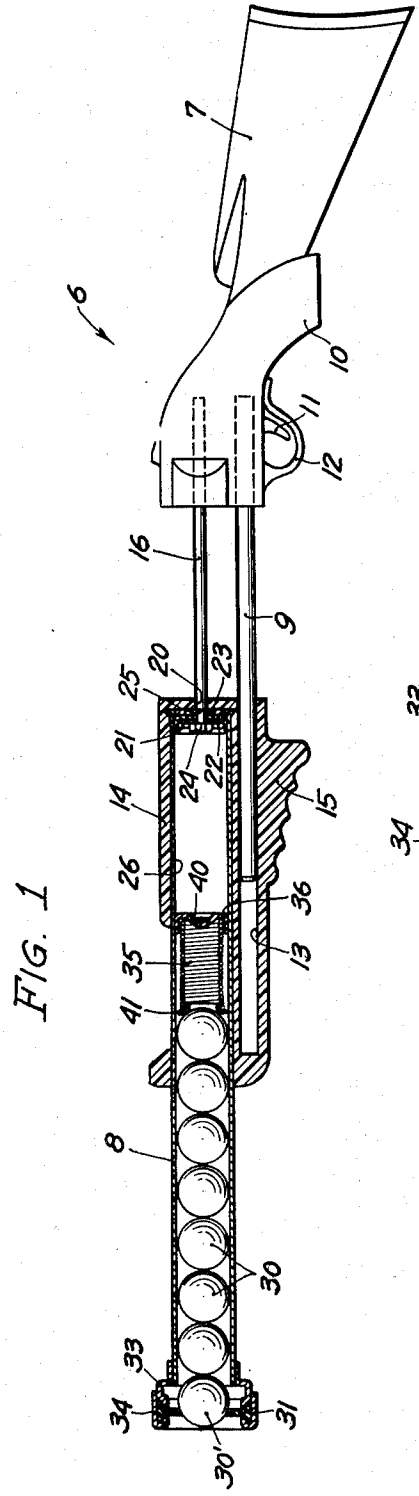


FIG. 1

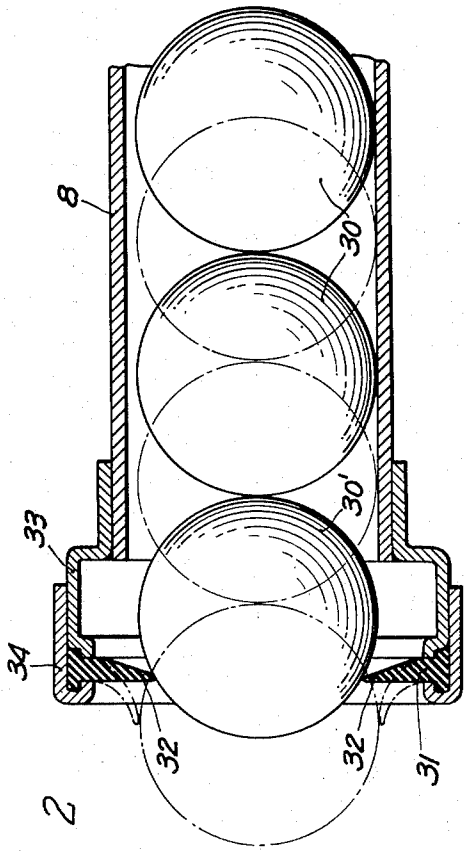


FIG. 2

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REPEATING AIR PRESSURE GUN

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3 Claims. (Cl. 124—13)

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The present invention relates to air pressure guns of the type used primarily as toys or amusement devices, and one of its objects is to provide a new and improved air pressure gun particularly designed to shoot light-weight spherical missiles similar to "ping-pong" balls; the balls being yieldably held within the barrel of the gun by a resilient sealing ring of rubber or the like until the air pressure behind it exceeds the restraining force of the sealing ring, at which point the ball is forcibly expelled from the gun barrel.

More specifically, the primary object of the invention is to provide a pump action air gun of the class described which is adapted to receive and hold a plurality of balls that can be discharged one at a time as fast as the pump action of the gun is worked. To this end, I have provided a novel arrangement for holding the balls within the barrel of the gun and automatically advancing the next-in-line ball to the firing position each time that one of the balls is discharged. In the preferred embodiment of the invention, the balls are loaded into the barrel of the gun, compressing a light spring which functions to urge the balls forwardly against an annular sealing ring at the muzzle end of the barrel. The said sealing ring is of rubber or the like, and is attached around its outer periphery to the gun barrel, the inside diameter being slightly smaller than the diameter of the balls, so that the balls must be forced through the ring, stretching the same. The ring serves the dual function of sealing against leakage of air pressure around the ball, and yieldingly restraining the end ball against leaving the muzzle end of the barrel. When the pump action of the gun is operated, the air pressure within the barrel forces the end ball out through the annular sealing ring with sufficient velocity to cause it to fly through the air, and the spring then acts to advance the remaining balls within the barrel so that the next in line is brought up to the sealing ring.

Another object of the invention is to provide a repeating air pressure gun of the class described that is attractive in appearance, and at the same time, simple and inexpensive to manufacture.

The foregoing and other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment thereof, reference being had to the accompanying drawings, wherein:

Figure 1 is a longitudinally sectioned view of a repeating air pressure gun embodying the principles of my invention; and

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Figure 2 is an enlarged fragmentary sectional view, taken through the muzzle end of the gun barrel, showing the details of the annular sealing ring and the manner in which it works.

In the drawings, the gun is designated in its entirety by the reference numeral 6, and is seen to comprise a stock 7 and barrel 8, the said barrel being slidably mounted on a guide rod 9 projecting forwardly from the front end of the stock. The stock is preferably molded of plastic, and may be formed with a pistol grip 10 and trigger 11, the latter being enclosed within a guard 12. The trigger 11 is merely ornamental, and serves no useful function other than to enhance the realistic appearance of the gun.

The guide rod 9 may conveniently be formed of a length of wood dowel embedded at its rear end in the stock 7, the front end thereof being slidably received within a bore 13 in a plastic housing 14 which is molded around or cemented to the rear end of the barrel 8. A handle grip 15 is formed on the lower edge of the housing 14 and projects downwardly therefrom. The bore 13 is parallel to the barrel 8, and the gun is operated by pulling the housing 14 and barrel 8 rearwardly along the guide rod 9.

Also embedded in the front end of the stock 7 and projecting forwardly therefrom is a metal rod pump plunger 16 which slides through a hole 20 in the rear end of the housing 14. The plunger 16 is coaxial with the barrel 8, and mounted on its front end is a leather cup 21 which is clamped between two washers 22 and 23. A nut 24 is screwed onto the end of the plunger 16 and bears against washer 22, clamping the assembly against a shoulder 25 on the rod. The leather cup 21 is slidable within the rear end of the bore 26 of the barrel, and functions as an air pump on its forward stroke.

The front end of the bore serves as a magazine to receive and hold a plurality of light-weight balls 30 similar to "ping-pong" balls. The balls 30 fit loosely within the bore 26 and are restrained against leaving the muzzle end of the barrel by an annular, resilient sealing member 31 of rubber or the like. As shown in Fig. 2, the balls rest on the bottom of the barrel and do not touch the top, i. e., there is an air space between the balls and the barrel except where the balls rest on the bottom of the barrel, that is, the balls are out of contact with the barrel except where they rest on the bottom of the barrel. The sealing ring 31 is preferably, altho not necessarily, T-shaped in cross section, and tapers radially inward, forming a relatively thin inner edge 32 which is flexi-

ble and stretchable, so that the balls 30 can be forced through it, as shown in phantom lines in Figure 2.

The flanged outer periphery of the sealing ring 31 is secured within a T-shaped channel formed between a fitting 33 and a co-operating collar 34; the said fitting being pressed onto the end of the barrel 8, and the collar being pressed tightly onto the fitting. The inside diameter of the sealing ring 31 is somewhat smaller than the diameter of the balls 30, and the latter must therefore be forced through the opening in the sealing ring, stretching the lip 32 in the process. The snug, enveloping fit of the sealing ring 31 around the front end ball 30' forms an air tight seal, preventing leakage of air around the ball during the compression stroke of the pump.

The balls 30 are urged forwardly along the barrel 8 by means of a light compression coil spring 35 which is attached at its rear end to a cup-shaped spring keeper 36. The keeper 36 is pressed into the bore 26 of the barrel, and is located just ahead of the forward extremity of travel of the leather cup 21. The keeper may take any desired form, and is herein shown as having a loop struck out of its base; the end of the spring 35 being hooked through the loop, and the air compressed by leather cup 21 passing through the openings on either side thereof into the front end of the barrel. A collar 41 is attached to the front end of the spring 35, and engages the rear ball to push the entire group of balls forwardly. The spring is of such length and tension that it may be axially displaced so as to move the collar 41 to a position where the distance between the collar 41 and the ring 31 is more than twice the diameter of the balls and more than twice the inner diameter of the resilient ring member 31, so that the barrel may act as a magazine for more than one ball.

The method of operation of my invention is believed to be self-evident from the drawings and the foregoing description. The balls are loaded into the barrel by pushing them in through the annular sealing ring 31, compressing the spring 35. To operate the gun, the housing 14 with its attached barrel 8 are pulled rearwardly with a quick jerk, which causes the leather cup 21 to compress the air within the front end of the barrel, until the thrust of the air pressure against the front end ball 30' exceeds the restraint of the sealing ring 31. At this point, the relatively thin inner edge of the ring bends outwardly and stretches until the front end ball 30' pops suddenly through the ring, leaving the muzzle end of the barrel with sufficient velocity to fly through the air. The instant that the end ball 30' leaves the sealing ring 31, the air pressure within the bore falls to zero, and the inner lip 32 of the ring snaps back to its normal shape. The spring 35 then advances the remaining balls in the bore 26 until the next in line comes up against the sealing ring 31, in readiness for the next operation of the gun.

While I have shown in considerable detail what I believe to be the preferred embodiments of my invention, it will be understood that these details are merely illustrative, and that various changes may be made in the shape and arrangement of the several parts without departing from the broad scope of the invention, as defined in the appended claims.

I claim:

1. In a repeater gun in which a plurality of balls of a predetermined outer diameter are successively projected from said gun the construction which comprises an elongated barrel of a length sufficient to accommodate at least two balls, a muzzle for said barrel, a resilient ring mounted at said muzzle, the internal diameter of said ring being less than the external diameter of said balls, air pressure operating means connected to said barrel, the internal diameter of said barrel being greater than the external diameter of said balls, an air venting communication between the walls of said barrel and over the balls rearward of the forwardmost ball.

2. In a repeater gun in which a plurality of balls of a predetermined outer diameter are successively projected from said gun, the construction which comprises an elongated barrel of a length sufficient to accommodate at least two balls, a muzzle for said barrel, a resilient ring mounted at said muzzle, a plurality of balls positioned in said barrel, means positioned in said barrel for holding said balls in a row in said barrel with the initial ball pressed against said ring, the internal diameter of said ring being less than the external diameter of said balls, the external diameter of said balls being less than the internal diameter of said barrel, air pressure generating means connected to said barrel behind said balls, the space between said wall and said balls forming an air pressure venting communication through said barrel between the wall and over said balls rearward of said initial ball.

3. In a repeater gun in which a plurality of balls of a predetermined outer diameter are successively projected from said gun, the construction which comprises an elongated barrel of a length sufficient to accommodate at least two balls, a muzzle for said barrel, a resilient ring mounted at said muzzle, a stock, a piston in said barrel, a piston rod connected to said piston and to said stock, a housing for said barrel, a bore in said housing, the axis of said bore being parallel to the axis of said barrel, a guide rod connected to said stock and slidably positioned in said bore, a resilient ball holding means positioned in said barrel between said piston and said resilient ring, a plurality of balls positioned in a row between said holding means and said ring with the forwardmost ball pressed against said ring, the internal diameter of said ring being less than the external diameter of said ball, the internal diameter of said barrel being greater than the external diameter of said balls, the space between said balls and said barrel forming an air venting passageway between the wall and over said balls rearward of said forwardmost ball and connecting the portion of said barrel at said piston with the said muzzle.

LEO L. WHITE.

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