June 10, 1952 W. D. BEEZLEY ET AL 2,599,888

REPEATING TOY BUBBLE GUN

Filed March 28, 1946

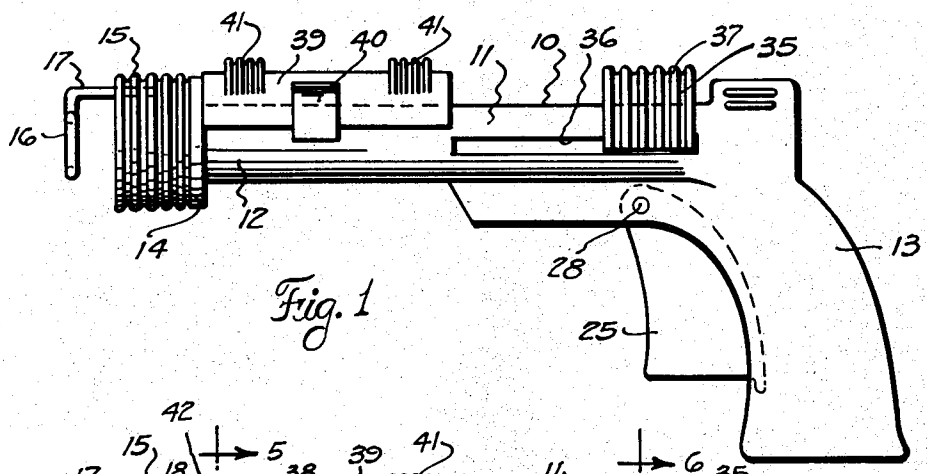


Fig. 1

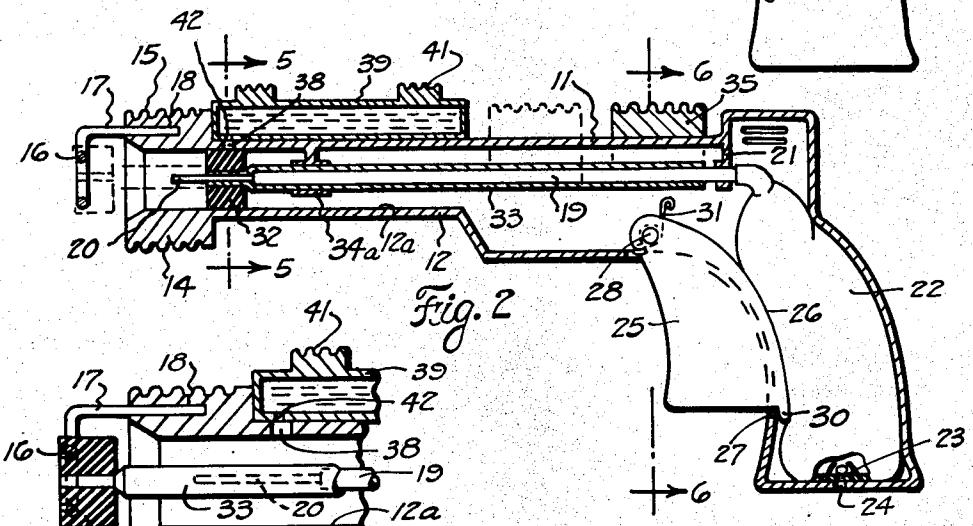


Fig. 2

Fig. 4

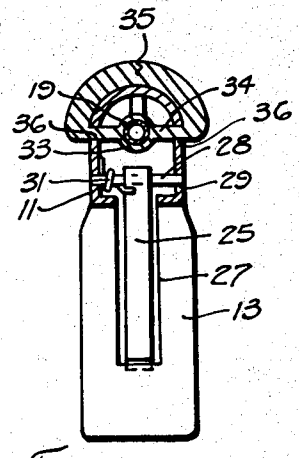


Fig. 6

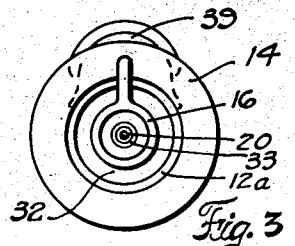


Fig. 3

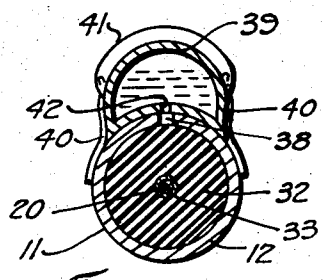


Fig. 5

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REPEATING TOY BUBBLE GUN

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7 Claims. (Cl. 46—8)

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This invention relates to new and useful improvements in toy guns.

This application is filed as an improvement on our co-pending application, Serial No. 647,878, filed February 15, 1946, and now abandoned.

One object of the invention is to provide an improved toy gun which is constructed so that a bubble or bubbles may be ejected from the muzzle of said gun when the gun is actuated.

An important object of the invention is to provide an improved toy gun having means adjacent its muzzle end for retaining a film of liquid capable of forming a bubble or bubbles and also having means for directing a stream of air against said film to form and project a bubble or bubbles forwardly of said retaining means; said gun also having improved means for reforming the film on said retaining means after said film has been removed and dissipated by the formation of a bubble or bubbles during the preceding operation of the gun, whereby the necessity of dipping of said retaining means into the bubble forming liquid to provide the film is eliminated.

A particular object of the invention is to provide an improved toy gun having means for "shooting" a bubble or bubbles by directing a stream of air against a film of bubble-forming liquid which is retained on a retaining member at the muzzle end of said gun; the device also including a bubble liquid reservoir or chamber, together with means for applying the liquid from said reservoir to the film retaining member to form a film thereon, whereby each time the gun is actuated to remove the film and form bubbles, additional liquid to provide a new film may be applied to said member to make the gun ready for the next operation.

Still another object of the invention is to provide a gun, of the character described, wherein the liquid reservoir is sealed against leakage while the gun is being actuated to "shoot" a bubble or bubbles therefrom.

A further object of the invention is to provide a gun of the character described, wherein the bubble-forming liquid reservoir is in the form of a cartridge or chamber which may be detachably mounted on the gun, whereby when said cartridge or chamber is emptied, it may be readily replaced with a full cartridge or chamber of duplicate construction.

Still another object of the invention is to provide an improved gun, of the character described, wherein the liquid reservoir is a sealed container having the bubble-forming liquid therein, the container having a sealed outlet opening which

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may be manually punctured prior to mounting of the container on the gun or which may be adapted to co-act with means on the gun whereby the outlet is opened automatically when the container is mounted in proper position.

The construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, wherein an example of the invention is shown, and wherein:

Figure 1 is a side elevation of a gun, constructed in accordance with the invention,

Figure 2 is a longitudinal sectional view of the same,

Figure 3 is an end elevation of the muzzle end of said gun,

Figure 4 is an enlarged sectional detail of the muzzle end of the gun and showing the parts in a position applying liquid to the liquid-retaining member,

Figure 5 is an enlarged, transverse, vertical, sectional view, taken on the line 5—5 of Figure 2, and

Figure 6 is a transverse, vertical, sectional view, taken on the line 6—6 of Figure 2.

In the drawings, the numeral 10 designates a gun which is formed of metal, plastic or other suitable material. The gun is constructed of an outer shell which is formed so as to provide a tubular gun barrel 12 and a hollow handle portion 13, these parts being preferably made integral with each other. It is desirable, although not essential, that the outlet or muzzle end of the barrel 12 be enlarged outwardly as shown at 14 and the forward portion of this flared end may be provided with annular corrugations 15. The corrugations are provided merely for the sake of appearance and may be omitted; also the enlargement 14 may be eliminated and the barrel made of a constant diameter throughout its length.

A liquid retaining member 16 which is shown in the form of an annular wire ring is secured by means of an angular arm 17 to the forward end of the muzzle of the gun barrel. As illustrated, the arm 17 is made integral with the ring 16 and has its end extending into and suitably fastened within an opening 18 which is drilled in the forward end of the gun barrel. As is clearly shown in Figures 2 and 3, the angular arm 17 locates the ring 16 in spaced relation to the outlet or muzzle end of the barrel and also disposes said ring in

axial alignment with said barrel. It is noted that the retaining member need not be an annular ring but could take any desired shape.

The ring 16 is adapted to retain a bubble forming liquid thereacross. This liquid has a glycerine base and may be purchased on the open market. When the liquid is applied to the ring, a film of said liquid is formed thereacross and is retained in such position until displaced therefrom by air or other pressure.

For directing a stream of air against the film which is retained across the ring 16, an air eduction tube 19 is mounted axially within the gun barrel and has its forward end 20 reduced. The outlet end of the reduced portion 20 terminates in spaced relation to the ring 16. The rear end of the tube 19 is supported by a depending bracket 21 which is preferably made integral with the outer shell 11 of the gun. A depressible bulb 22, which is constructed of rubber, rubber compound or other depressible material, is disposed within the hollow handle portion 13 of the gun and has its end engaged over the rear end of the air eduction tube 19. The bulb is preferably provided with a valved air inlet or breather hole 23 to admit air into the interior of said bulb and the inlet 23 overlies an inlet opening 24 in the base of the handle 13.

It is obvious that when the bulb 22 is depressed, a stream of air is forced outwardly through the air eduction tube 19 and since the tube is in substantial axial alignment with the ring 16, a portion of the emitting air will strike the film on the ring 16 to form a bubble. This stream of air projected forwardly into the film will form and detach the bubble from the ring and will project it forwardly from the gun barrel. It is apparent that the effect of shooting the bubble from the gun barrel will be obtained.

It might be noted that the spacing between the ring 16 and the end of the air eduction tube 19 controls the action of the bubble or bubbles which are formed. Also the volume, as well as the velocity of the air passing through the tube, which velocity is controlled by the bore of the outlet end of said tube, has an effect on the results obtained. If the end 20 of the tube is too close to the ring 16, the force of the air stream will merely displace the liquid film without forming the bubble or bubbles; in other words, it will merely break through the film and will displace it from its retained position on the ring. On the other hand if the spacing between the ring 16 and the end 20 of the tube is too great, the air stream will be dissipated before it reaches the film and bubbles will not be formed. By properly spacing the tube from the ring, a series of bubbles, the size of which is controlled by the size of the retaining ring 16, will be formed upon depression of the bulb or a single large bubble may be formed upon each operation of said bulb. Thus, by adjusting the distance between the ring 16 and the tube 19, as well as by controlling the size of the bore of the tube, the desired effect may be obtained.

The diameter of the ring controls to some extent the size of the bubble or bubbles which are formed but the size of the ring should be such that the film thereon is sufficient to form more than one bubble or one series of bubbles. In other words, the depression of the bulb 22 will form a bubble or bubbles and will detach them from the ring. However, the volume and velocity of the air ejected upon one depression of the bulb is not sufficient to detach all of the film from the ring with the result that the bulb may be depressed a number of times before all of the film across the ring 16 has been used.

The bulb 22 may be depressed in any desired manner but it is preferable to depress the same by means of a trigger element 25. This element has its forward portion curved to be readily engaged by a finger of the operator while its rear portion 26 is curved to engage the bulb 22. This rear portion of the trigger element extends through a slot 27 in the handle portion 13. The upper end of the trigger element is pivoted on a transverse pin 28 which is suitably mounted in openings 29 in the side walls of the gun frame 11. Obviously when the trigger is depressed, the bulb 22 is depressed to force the air outwardly through the tube 19. A stop lug 30 is formed on the rear lower portion of the trigger element to prevent outward displacement of said element from the handle portion 13. The bulb 22 may be made of a material which is sufficiently resilient to return the trigger to its normal position, as shown in Figure 2 but if desired a small coiled spring 31 may be associated with the trigger pivot 28 to maintain the trigger in a normal inactive position and to return the same to such position after each operation.

For applying a film of bubble forming liquid to the retaining member or ring 16, a piston applicator 32 is slidable within the bore 12*a* of the gun barrel 12. This piston applicator may be constructed of felt, cotton or other liquid absorbent material and said piston has a sliding fit within the bore of the barrel. This piston is secured to the forward end of a sleeve 33 which surrounds the eduction tube 19 and which is slidable thereon. The forward portion of the sleeve is supported and slidable through a bearing 34*a* which may be formed integral with the gun frame. The rear end of the sleeve 33 is secured by diametrically extending arms 34 to a slide actuator 35, which actuator engages over the upper end of the gun frame 11. The connecting arms 34 extend and are movable through elongate slots 36 which are formed in the sides of the frame 11. The actuator 35 is preferably, although not essentially formed with spaced corrugations 37 similar to those which are formed in the forward enlarged end 14 of the gun barrel. These corrugations are merely for the purpose of appearance and may be eliminated.

Normally the parts are in the position shown in Figure 2 with the absorbent piston 32 retracted within the gun barrel. It is apparent that by moving the actuator 35 forwardly of the gun barrel, to the dotted line position shown in Figure 2, the sleeve 33 and absorbent piston 32 connected therewith are also moved forwardly, whereby the absorbent piston 32 is moved into engagement with the retaining ring 16, which position is shown in Figure 4. The material of which the piston 32 is constructed is sufficiently soft so that said piston may engage around the ring and at the same time the ring will function to squeeze liquid from said piston. The liquid so removed from the absorbent piston will attach to the ring and will form a film thereacross. After the formation of such film, the actuator is slid rearwardly on the gun frame to return the piston 32 to its retracted position within the bore of the gun barrel.

In its retracted position within the gun barrel, the absorbent piston 32 is aligned with a liquid inlet port 38 which is provided in the top of the gun barrel 11. A liquid containing cartridge 39 which is substantially tubular is adapted to be removably mounted on the top of the gun barrel

within spring clips 40. This cartridge may have suitable corrugations 41 which are provided for appearance sake on its exterior surface. The forward lower end of the cartridge 39 is provided with an outlet port 42 which when the cartridge is in position on the gun barrel is aligned with the liquid inlet port 38, whereby liquid from the interior of the cartridge 39 may flow onto the absorbent piston 32. It will be apparent that the liquid from the cartridge will flow into the piston and will thoroughly saturate the same. When the piston 32 becomes saturated it will not take any further liquid and it is only after said piston has been moved into engagement with the ring 16 to form a film thereon and remove the liquid from the saturated piston, that said piston will taken on more liquid. Thus, the piston is maintained in a saturated condition at all times and when in its retracted position, serves to seal the openings 38 and 42 to prevent the free escape of liquid from the cartridge. It will be evident that while the piston 32 is moved forwardly and is engaged with the ring to form the film, the openings 38 and 42 will be open but since this will be only for a relatively short period of time only a drop or two of liquid can escape at this time.

The cartridge 39 which contains the bubble forming liquid may be provided as a separate unit from the gun with the opening 42 in said cartridge sealed by a lead seal which may be readily punctured before application of the cartridge to the gun. On the other hand the gun barrel may have a puncturing prong (not shown) surrounding the opening 38 so that when the cartridge is placed in position, the seal closing the opening 42 will be opened. The operation of the gun is believed to be obvious. The cartridge 39 is placed in position and the liquid therefrom is permitted to saturated the absorbent piston 32. The slide actuator 35 is then slid forwardly on the gun frame to move the absorbent piston into contact with the retaining member or ring 16. The material of the piston 32 is sufficiently soft to permit it to fully engage around the ring and to thereby squeeze or remove liquid from the piston. This liquid adheres to the ring and forms a film thereacross, after which the slide actuator is returned to its original rearward position to retract the piston into the barrel. In such position, the piston receives additional liquid from the cartridge 39 through the openings 38 and 42 and at the same time serves to seal or close said openings.

After the film is formed on the ring 16 the gun is ready for actuation to form bubbles and this is accomplished by merely operating the trigger element 25 to depress the bulb 22. Depression of the bulb ejects an air stream outwardly through the air eduction tube 19 and this air stream strikes the film to form and project a bubble or bubbles forwardly from said ring. As has been explained, the ring is of sufficient size to retain enough liquid to permit several operations of the trigger before all of said film is removed, whereby a repeater type of action is obtained. After all of the film is removed, it is only necessary to again slide the actuator 35 forwardly to re-engage the piston 32 with the ring and thereby form another film on said ring. Upon retraction of the piston, the gun is ready for the next operation. It is apparent that after all of the liquid in the cartridge 39 has been used up, it is only necessary to replace the empty cartridge with one filled with liquid. The provision of the cartridge and absorbent piston make it possible to automatically replace the film on the retaining member or ring 16 and eliminates the necessity of dipping the ring in the liquid to form a film thereon. The supply of liquid is carried right with the gun at all times and this is a decided advantage.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

We claim:

1. A toy gun including, an outer gun frame defining a gun barrel and a gun handle, an air eduction tube within the frame, a retaining member spaced from the outlet end of the tube for receiving and retaining a film of bubble-forming liquid, means for directing air under pressure through said tube and against the film on the retaining member to form and project a bubble from said member, a bubble forming liquid reservoir mounted on the gun frame, and a piston slidable axially within the gun barrel and adapted to be engaged with the retaining member, said piston being constructed of an absorbent material and arranged to receive liquid from the reservoir, engagement of the liquid-soaked absorbent piston with the retaining member resulting in an application of liquid to said member to form a film thereon.

2. A toy gun as set forth in claim 1, wherein the reservoir has a liquid outlet which is normally closed by the absorbent piston when said piston is in a retracted position.

3. A toy gun as set forth in claim 1, together with manually operable means accessible from the exterior of the gun frame for imparting movement to the piston.

4. A toy gun as set forth in claim 1, wherein the liquid reservoir is a separate container, and co-acting means on said container and on the gun frame for mounting the container in position on said frame.

5. A toy gun including, an outer gun frame defining a gun barrel and a gun handle, an air eduction tube within the frame, a retaining member spaced from the outlet end of the tube for receiving and retaining a film of bubble-forming liquid, means for directing air under pressure through said tube and against the film on the retaining member to form and project a bubble from said member, a bubble forming liquid reservoir mounted on the gun frame and having a liquid outlet, movable means slidable within the gun frame and arranged to receive liquid from said reservoir, said movable means being slidable outwardly of the gun frame into engagement with the retaining member for applying a liquid film to said member, an actuator slidably mounted on the exterior of the gun frame, said frame having a longitudinal slot in its wall, and a connecting means between the actuator and the movable means and extending through said slot whereby movement of the actuator imparts movement to said movable means.

6. A toy gun including, an outer gun frame defining a gun barrel and a gun handle, an air eduction passage within the frame, a retaining member spaced from the outlet end of the passage for receiving and retaining a film of bubble-forming liquid, means for directing air under pressure through said passage and against the film on the retaining member to form and project a bubble from said member, means slidably

mounted within the gun barrel and movable into contact with the retaining member for replacing the liquid film on the retaining member after said film has been removed by the air under pressure which forms and projects the bubble, an actuator slidably mounted on the exterior of the gun frame, said frame having a longitudinal slot in its wall, and a connecting means between the actuator and the movable means and extending through said slot whereby movement of the actuator imparts movement to said movable means.

7. A toy gun including, an outer gun frame defining a gun barrel and a gun handle, an air eduction tube within the frame, a retaining member spaced from the outlet end of the tube for receiving and retaining a film of bubble-forming liquid, means for directing air under pressure through said tube and against the film on the retaining member to form and project a bubble from said member, a bubble forming liquid reservoir mounted on the gun frame and having a liquid outlet, movable means within the gun frame arranged to receive liquid from said reservoir, said movable means slidable outwardly of the gun frame into engagement with the retaining member for applying a liquid film to said member, said liquid reservoir comprising a seperate container, and co-acting means on said container and said frame for detachably mounting said container on the frame.

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