ABSTRACT OF THE DISCLOSURE

A toy gun for forming bubbles from a bubble solution that basically comprises, for example, means for creating a charge of compressed air, a reservoir to contain the bubble solution, means defining a plurality of passageways interconnected with said compressed air means and said reservoir so that the bubble solution is intimately admixed and aerated with compressed air, and nozzle means interconnected with the passageways and the compressed air means to form bubbles from the bubble solution and project same into the atmosphere.

This invention relates to toys and more particularly to a bubble blowing toy by means of which bubbles may be both formed and projected into the air.

One of the objectives of the invention has been to provide a toy, preferably having the appearance of a pistol, that is adapted to project into the air a rapidly moving stream of bubbles, as though they were being shot from the toy.

Another objective of the invention has been to provide a bubble blowing toy having a leak-proof reservoir therein that is adapted to hold a supply of bubble forming solution from which vast numbers of bubbles may be formed. Thus, should a child lay the toy aside on an easily drained surface, that surface is not marred by the bubble blowing solution, and the toy is ready for play instantly upon being picked up again.

A further objective has been to provide a toy of the type set forth that is operated by a charge of pressurized air, whether it be created mechanically by means such as a pistol or whether it be created by a child blowing into the toy, to do the following: to feed the bubble blowing solution in the proper amounts from the reservoir to a bubble forming part of the toy; to form the bubbles; then to blow the bubbles from the toy in the rapidly moving stream to which reference has been made.

Another objective of the invention has been to provide a toy gun of the type set forth that is inexpensive to manufacture and yet which is sufficiently rugged to withstand the rough handling and abuse to which toys of this type are subjected in the course of play by children.

A further objective of the invention has been to provide a toy gun of the type set forth that is adapted to be made of molded plastic such that it is inexpensive to manufacture and relatively easy to assemble.

Other objectives and advantages of the invention will be more readily apparent from a further consideration of the following detailed description of the drawings in which:

FIG. 1 is a side-elevation view of a preferred embodiment of a bubble blowing toy having the appearance of a pistol and constructed in accordance with the principles of the present invention.

FIG. 2 is a perspective view of a bubble solution reservoir cap for the toy.

FIG. 3 is a cut-away view of the toy shown in FIG. 1.

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 3.

FIG. 5 is an enlarged fragmentary lay-out view illustrating the two halves of the frontal portion of the toy gun shown in FIG. 1.

FIG. 6 is a fragmentary cross-sectional view taken along line 6—6 of FIG. 1.

FIG. 7 is a fragmentary cross-sectional view taken along line 7—7 of FIG. 1.

FIG. 8 is a side-elevation view of another embodiment of the toy constructed in accordance with the principles of the present invention.

FIG. 9 is an enlarged cross-sectional view of the toy gun shown in FIG. 8.

FIG. 10 is a fragmentary cross-sectional view taken along line 10—10 of FIG. 8.

FIG. 11 is a fragmentary cross-sectional view shown along line 11—11 of FIG. 8.

As shown in FIGS. 1 and 3, a preferred embodiment of a toy gun constructed in accordance with the present invention has a molded plastic casing 1 having a barrel 2 with a chamber 3 therein, a hollow grip 4 and a nozzle-reservoir assembly generally denoted at 5. Following conventional molding techniques the plastic casing 1 is formed from left and right shells, denoted A and B respectively in FIG. 5, the dividing line of which is in a vertical plane through the approximate center of the gun. The shells are subsequently joined together by an appropriate adhesive.

To form a charge of compressed air in chamber 3, a trigger 6 is pivotally linked to a plunger assembly 7 by means of an arm 8 such that the trigger 6, upon activation, will impart to the plunger assembly 7 a reciprocating motion. The plunger assembly 7 depicted has a stem 9 pivotally connected to an upper end 10 of the arm 8 by means of a pin 11. Integral with the forward end of the stem 9 are protuberances 12 over which is placed, in a snap-on relationship, a flexible piston cup 13 by means of an aperture 14 in piston cup 13. The piston cup 13 is of such dimensions that its outer periphery is in contact with the inner wall of barrel 2. Just to the rear of the piston cup 13 is a flange 15. The flange 15 is integral with stem 9 and of a diameter just less than the inside diameter of the barrel 2. It is to be noted that the axial length between the protuberances 12 and the flange 15 is greater than the thickness of the base of the piston cup 13.

The arm 8 is pivotally mounted within the hollow grip 4 by means of a pin 16. Between the pins 11 and 16 there is, integral with the arm 8, a protuberance 17 having an aperture 18 therein. One end of a spring 19 is placed through the aperture 18 and the other end is attached to a pin 20 which is held in a fixed relationship with an inside wall of the hollow grip 4. At the lower end 21 of the arm 8 is rotatably mounted a roller 22 by means of a pin 24 and of such dimension that it extends past the tip of the lower end 21 of the arm 8.

The trigger 6 is pivotally mounted in the casing 1 by means of pin 22. The trigger is hollow, receives therein the lower end 21 of arm 8 with roller 23, and is of such dimensions that it may be extended into the hollow grip 4.

Thus, a charge of compressed air is formed in chamber 3 by a forward stroke of the plunger assembly 7 and arm 8 which commences from an initial position, as shown by the solid lines in FIG. 4, to a final position, as indicated by the dashed lines of FIG. 4, and is accomplished by movement of the trigger 6 into the hollow grip 4. During the forward stroke the flange 15 provides a support for the flexible piston cup 13 so that the cup 13 does not deform rearward but maintains its sides in contact with the inner wall of the barrel 3 so that it operates at high efficiency when forming a charge of compressed air. The spring 19 provides the means by which the plunger assembly 7 is returned from the final position to the initial position. During the return stroke
of the plunger assembly 7 the sides of the piston cup 13 are able to deform forward, i.e., away from the inner wall of the barrel 3, because of the lack of support such as provided by the flange 15 on the front 3 an stroke, and because of the space between the base of the cup 13 and the flange 15 that allows a loose and floppy movement of the cup 13 on the return stroke. As a result, on the return stroke a new charge of air is drawn into the barrel 3 through the aperture in piston cup 13. Thus, the piston 13 and the flange 15 cooperate to form a flapper valve whereby the valve is closed on the forward stroke of the plunger assembly 7 and open on the return stroke thereof. The action of the flapper valve also prevents the formation of a vacuum in the barrel 3 on the return stroke of the plunger assembly 7, thus eliminating the possibility of bubble solution being sucked back into the barrel 3 from the nozzle-reservoir assembly 5 on the return stroke.

The nozzle-reservoir assembly 5, as best shown in FIGS. 3 and 5, is integrally related to the barrel 2 and the chamber 3. A reservoir 25, wholly within the barrel 2, is provided for the bubble solution from which the bubbles are formed. The reservoir 25 is provided with an aperture 26 through which it may be filled with bubble solution, and a cap 27 which fits in close frictional relationship with the aperture such that the bubble solution is held in the reservoir 25 without spilling therefrom regardless of the position of the gun. Cap 27 has mounted thereon a retaining strap 28 shaped such that the free end thereof may be inserted into and held in an aperture 29 in the barrel 2, whereby the cap 27 is held to the toy gun and does not become lost.

The first purpose is to pressurize the bubble solution in reservoir 25, to aerate the bubble solution as it is transmitted to the nozzle 30, and to transmit the aerated bubble solution to the nozzle for mixing with additional compressed air to form bubbles on the nozzle. This first purpose is accomplished by providing a passageway 33, a first conduit 34, and a connector passageway 49 wholly within right half shell B (see FIG. 5) whereby compressed air passes from chambers 3 and 32 into air passageway 33 by way of aperture 35, subsequently proceeding into the reservoir 25 through an aperture 26. Thus, the bubble solution is placed under a positive pressure. The pressurized bubble solution thereafter exits from the reservoir 25 through an aperture 37 and is transmitted toward the nozzle 30 through the conduit 34. At a point intermediate the conduit 34, the pressurized bubble solution is aerated with air supplied from the passageway 33 and directly transmitted to conduit 34 through connector 49. The addition of the pressurized air from passageway 33 makes certain that liquid bubble solution is not provided at the nozzle 30, but an aerated bubble solution provided instead, thus ensuring that bubble solution is provided from the nozzle and not a stream of liquid bubble solution.

The second purpose of the charge of compressed air is to form bubbles from the aerated bubble solution and compressed air at a mixing point 38 adjacent the nozzle 30, the mixing point 38 being wholly within right half shell B. The bubbles so formed are transferred to nozzle 30 through a second conduit 39. The second purpose is accomplished by contacting the aerated bubble solution, which has been transported from the reservoir 25 to the mixing point 38 through the first conduit 34, with compressed air, which has been transmitted from the chambers 3 and 32 through the second air passageway 40 to the mixing point 38. The second air passageway 40 lies substantially in the left half shell A and the compressed air passes from the chambers 3 and 32 through aperture 41, behind wall 42, and through aperture 43 into right half shell B, subsequently reaching mixing point 37.

The third and last purpose of the same charge of compressed air is to project the bubbles so formed on the nozzle 30 into the atmosphere in rapid succession. This third purpose is accomplished by ejecting compressed air into the atmosphere through third air passageways and slots 44 which communicate directly with the chambers 3 and 32, and the atmosphere 45. There is a slot 44 in each of the half shells A and B. The slots 44 are located to the rear of nozzle 30 such that the compressed air issuing from the slots 44 disengage the bubbles from the nozzle 30 in rapid succession, thus causing a stream of bubbles to be projected into the atmosphere as though they were being shot from the gun.

Referring now to the other embodiment of the invention, it is best described by reference to FIGS. 8, 9, 10 and 11. The mode of forming a charge of compressed air for use in the toy gun is similar to the described embodiment, thus the second embodiment is substantially the same having the same differences between this embodiment and the preferred embodiment. Additional differences are a third slot 46 among the third air passageways for use in projecting the bubbles from the nozzle 30, and a grip 47, by means of which the toy may be handled, formed from the wall of the reservoir 25 instead of a separate reservoir and grip as in the preferred embodiment.

In this embodiment, as shown in FIG. 9, the barrel 2 has an aperture 48 at the end opposite the nozzle-reservoir assembly 5. This aperture opens into the chamber 3 within the barrel 2 and is for an intended purpose of creating a charge of compressed air.

Once the charge of compressed air is formed in this embodiment, the first two purposes to which it is put are identical to and accomplished in the same manner as the first two purposes previously described when setting forth the preferred embodiment, thus the same means is attained with the preferred embodiment as to those two purposes. The third purpose is identical to and accomplished in essentially the same manner as the third purpose described in the preferred embodiment with the exception that there is a third air stream through slot 46. In addition, the air provided from slot 46 being directed against the bubbles formed on the nozzle such that they are rapidly disengaged therefrom.

Having described my invention, what I desire to claim and protect by Letters Patent is:

1. A toy gun for forming bubbles from a bubble solution and projecting the bubbles from said gum comprising means to create a charge of compressed air, a reservoir adapted to contain a bubble solution, means defining a first air passageway from said compressed air means to said reservoir whereby the bubble solution is placed under a positive pressure, means defining a conduit through which the pressurized bubble solution may pass from said reservoir, a connector passageway interconnecting said compressed air means and said conduit at a point intermediate the ends of said conduit for preliminarily aerating the bubble solution, means defining a second air passageway interconnecting said compressed air means and said conduit downstream of the connector passageway for forming a bubble solution-air mixture at the second air passageway-conduit intersection, nozzle means interconnected with said conduit and adjacent the second air passageway-conduit intersection for forming bubbles from the bubble solution-air mixture, and means defining a third air passageway interconnecting said compressed air means with the atmosphere.
adjacent said nozzle, whereby bubbles formed on said nozzle are projected from said nozzle into the atmosphere.

2. A toy gun as set forth in claim 1 wherein said connector passageway is interconnected between said first air passageway and said conduit.

3. A toy gun as set forth in claim 1 wherein said conduit is located such that said bubble solution exits from said reservoir at a point below said compressed air means.

4. A toy gun as set forth in claim 3 wherein the intersection of said conduit and said second air passageway means is inside said nozzle, and said third air passageway terminates into the atmosphere just to the rear of and outside said nozzle.

5. A toy gun as set forth in claim 3 wherein said compressed air means comprises a piston in a chamber for creating a charge of compressed air, trigger means for activating said piston, linkage means connecting said piston in operational relationship with said trigger means, and a spring whereby said piston and trigger means are returned to an initial position after creating said charge of compressed air.

6. A toy gun as set forth in claim 1 wherein said compressed air means comprises a chamber having an aperture at the rearward end thereof and adapted such that a person blowing into said chamber creates a charge of compressed air therein.

7. In a toy gun for forming bubbles from a bubble solution and projecting said bubbles from said gun, said gun having a barrel portion with a cylinder therein, and means to create a charge of compressed air in said cylinder, a reservoir located below said cylinder, the improvement comprising and adapted to contain a bubble forming solution, means defining a first air passageway extending downwardly from said cylinder to said reservoir, whereby bubble forming solution therein is placed under a positive pressure, means defining a conduit extending upwardly from said reservoir whereby said pressurized bubble forming solution passes from said reservoir, means defining a connector passageway interconnecting said first air passageway and said conduit at points intermediate their ends whereby compressed air is transferred from said first air passageway to said conduit for aeration of said bubble forming solution, means defining a second air passageway extending forwardly from said cylinder with said second air passageway interconnecting said cylinder and conduit, whereby said pressurized bubble solution is mixed with said compressed air to form a bubble solution-compressed air mixture at the intersection of said second air passageway and said conduit, nozzle means adjacent said intersection adapted to form bubbles from said bubble solution-compressed air mixture, said nozzle means being interconnected with said conduit and having a longitudinal axis substantially co-linear with the longitudinal axis of said cylinder, and means defining a third passageway from said cylinder that is positioned to direct a stream of compressed air toward bubbles formed on said nozzle, whereby said bubbles are blown therefrom.

References Cited

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,398,479
August 27, 1968

Karl B. Rave

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, lines 32 and 33, cancel "the improvement comprising" and insert the same before "a reservoir" in line 32, same column 5.

Signed and sealed this 13th day of January 1970.

(SEAL)
Attest: Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents