Nov. 17, 1953 P. KOPF 2,659,177

BUBBLE BLOWING GUN

Filed June 18, 1951

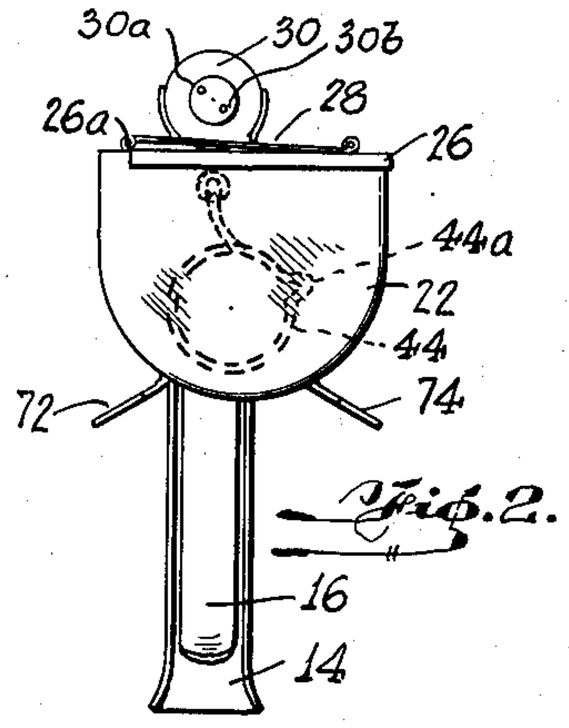

Fig. 2.

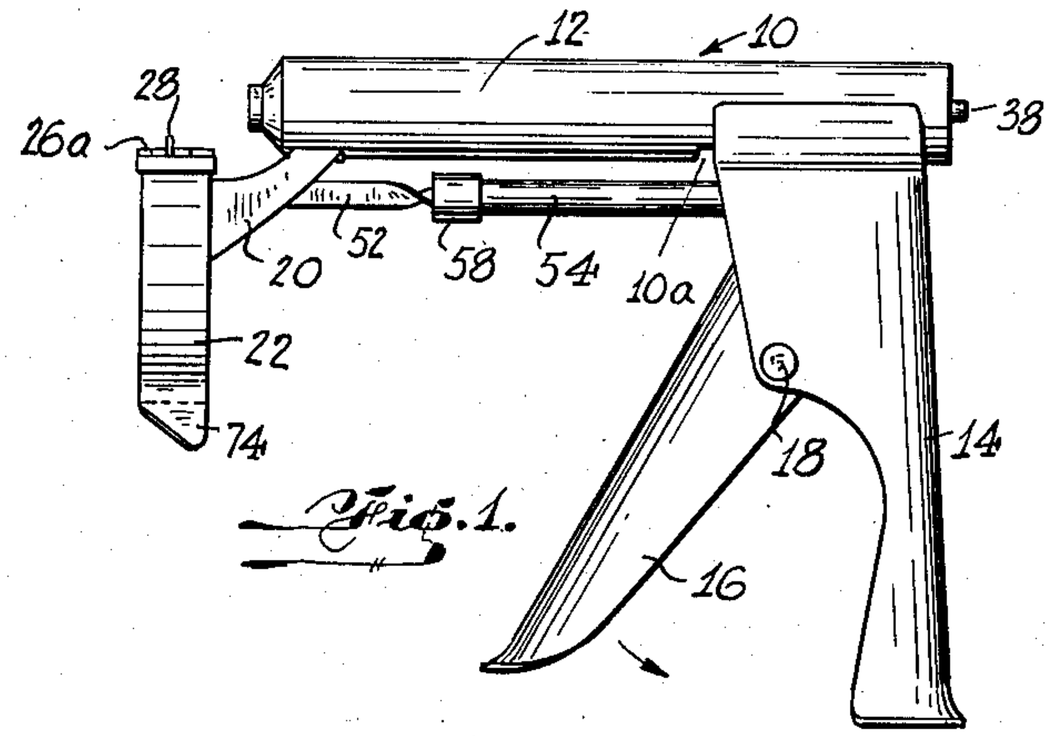

Fig. 1.

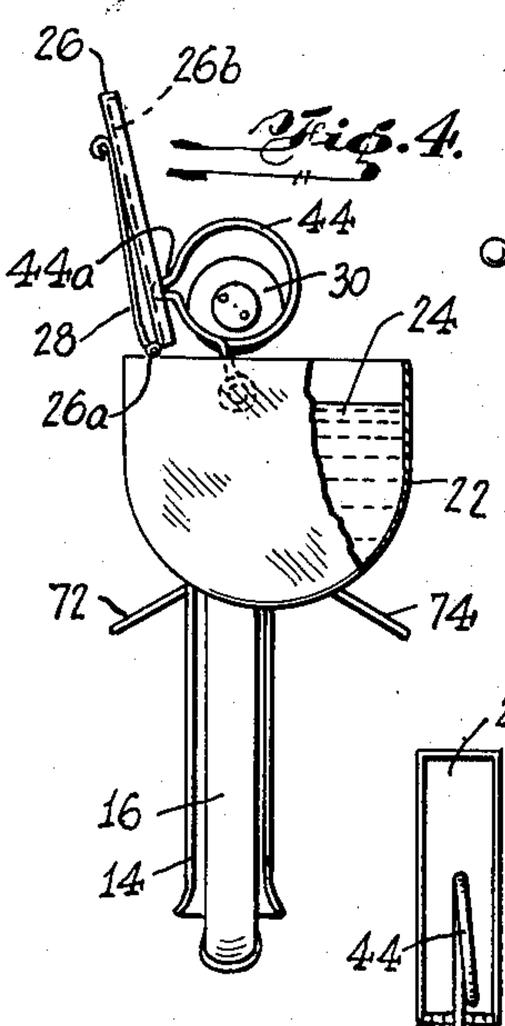

Fig. 4.

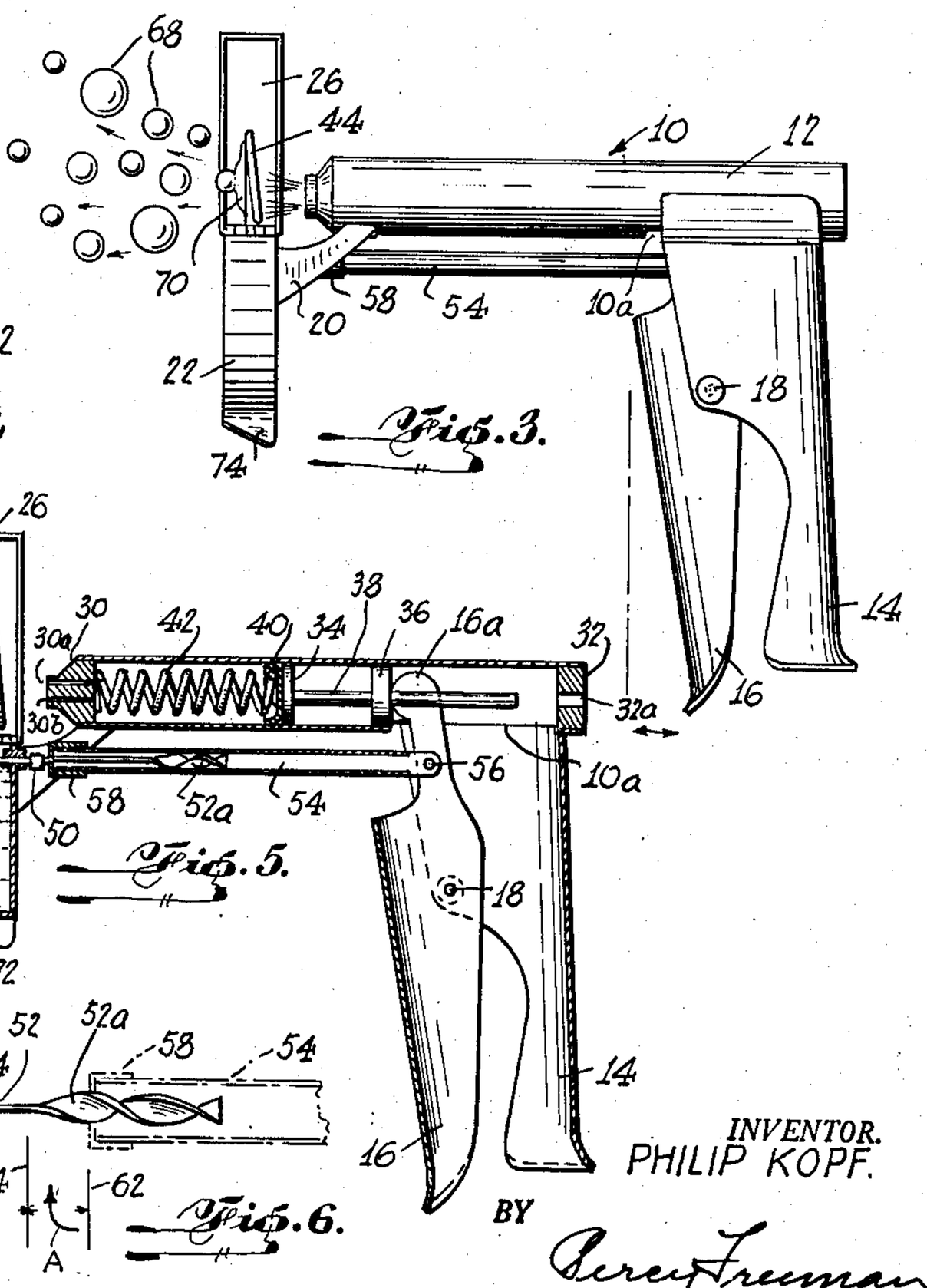

Fig. 3.

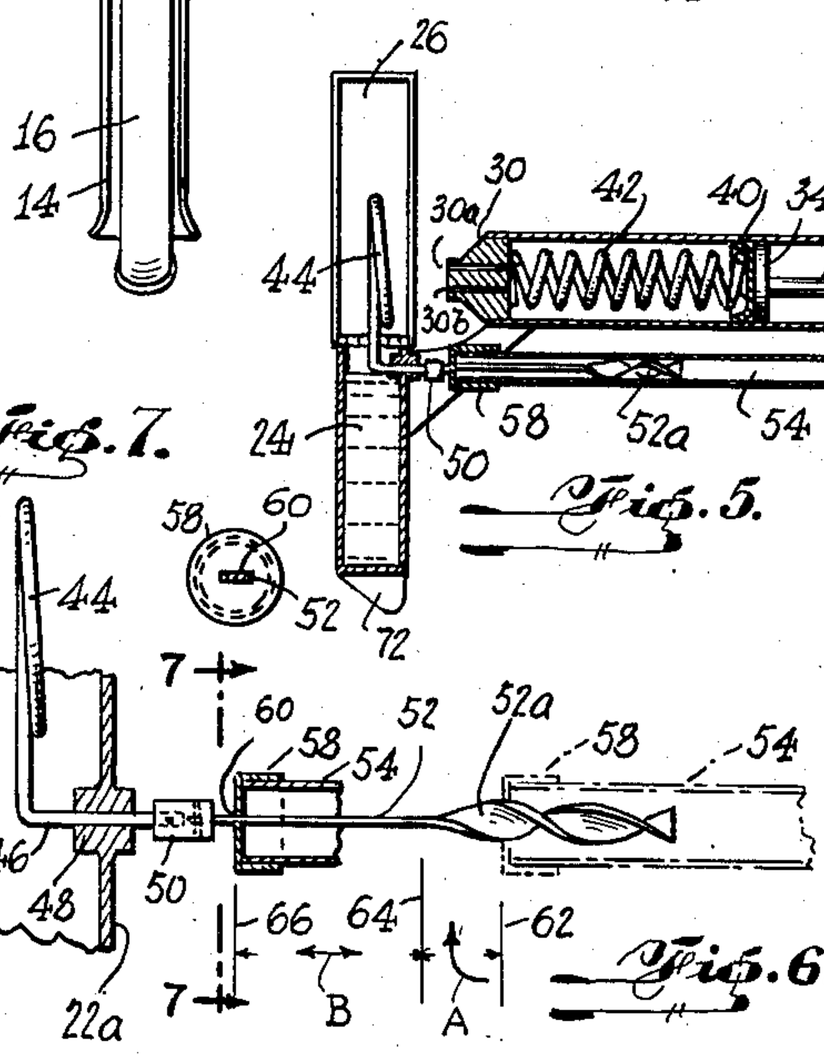

Fig. 5.

Fig. 6.

Fig. 7.

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Patented Nov. 17, 1953

2,659,177

UNITED STATES PATENT OFFICE

2,659,177

BUBBLE BLOWING GUN

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Application June 18, 1951, Serial No. 232,180

5 Claims. (Cl. 46—8)

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This invention relates to a bubble blowing gun.

The principal object of this invention is the provision of a toy gun which may be used to blow a plurality of bubbles, from a single loading thereof of bubble blowing solution, and a succession of trigger actions.

More specifically, the toy gun herein claimed may be filled with a sufficient quantity of bubble blowing liquid solution to provide for the blowing of many thousands of soap bubbles without refilling. It is necessary, however, to cock the gun from time to time and each time the gun is cocked the trigger may be actuated to blow a plurality of bubbles, and then again actuated several more times to repeat the process, before it is necessary to cock the gun again. The bubble blowing gun herein claimed may be designated as a repeater, therefore, in two respects: In the first place, a single filling provides it with sufficient bubble blowing solution to enable it to blow many hundreds of bubbles and in the second place, a single cocking of the gun enables it to blow a plurality of bubbles each of a number of times that the trigger is reciprocated.

Another object of this invention is the provision of a self-cocking bubble blowing gun which automatically cocks itself in preparation for a series of bubble blowing operations when the trigger is retracted part-way. The gun is provided with the following elements: a reservoir containing a bubble blowing solution, a film holding wand or loop, an air compressor and blower, and a trigger mechanism. The trigger mechanism is connected both to the wand and to the air compressor and blower. The normal or inactive position of the loop is in the solution. When the trigger mechanism is initially actuated, that is when the trigger is retracted to the extent of approximately half a stroke, it swings the loop out of the liquid and into operative position relative to the air compressor and blower. The loop now holds a film of the liquid and it is ready for the bubble blowing operation. Further retraction of the trigger actuates the air compressor and blower and directs a current of air against the film in the loop, thereby causing the formation of a plurality of bubbles. The gun is clearly self-cocking in the sense that all that need be done to operate it is to pull the trigger.

Another object of this invention is the provision of a bubble blowing gun of the character described which has a reservoir for a substantial quantity of bubble blowing liquid and a cover for said reservoir which automatically closes the reservoir when the gun is not in use. This is an

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important feature since it tends to prevent spilling of the liquid out of the reservoir.

A preferred form of this invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a side view of a soap bubble blowing gun made in accordance with this invention, the reservoir being shown closed and the trigger being shown in its forwardmost or inoperative position.

Fig. 2 is a front view thereof.

Fig. 3 is a view similar to that of Fig. 1, but showing the trigger in retracted or operative position, the reservoir being open and the bubble blowing wand being shown in elevated, operative position.

Fig. 4 is a view similar to that of Fig. 2, but showing the reservoir open and the bubble blowing wand in elevated, operative position.

Fig. 5 is a view similar to that of Fig. 3, but showing the gun in vertical, longitudinal section to expose all of its working parts.

Fig. 6 is a fragmentary section showing how the trigger mechanism acts upon the bubble blowing wand.

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

The bubble blowing gun 10 shown in the drawing includes a barrel 12, a handle 14 attached to said barrel and a trigger 16 which is pivotally mounted on said handle by means of a pin or rivet 18. It will be noted in the drawing that barrel 12 is tubular and handle 14 is hollow. An opening 10*a* is provided in the wall of the barrel so as to provide communication between the inside of the barrel and the inside of the handle. It will be noted in Fig. 5 that the upper end 16*a* of the trigger projects into the barrel in order to actuate the air compressing and blowing mechanism which will hereinafter be described.

At the muzzle end of the barrel is a pair of brackets 20, and a tank or container 22 is supported by said brackets a spaced distance below and in front of the muzzle. Tank or container 22 is adapted to serve as a reservoir for bubble blowing liquid 24 shown in Fig. 4. The top of the tank or container is open, and it is provided with a hinged cover 26 which is normally urged into closed position relative to the open top of the tank or container by means of a spring 28. The cover is hinged at 26*a* at one side of the barrel so that it moves past the muzzle end of the gun in its swinging movement downwardly into closed position relative to the tank or container and upwardly into elevated position, out of line with the longitudinal axis of the barrel. A rubber

gasket 26*b* is provided on cover 26 to prevent leakage of the bubble liquid 24 between said cover and the top of the tank or reservoir when the cover is in closed position relative thereto.

At the muzzle end of the barrel 12 is a nozzle 30 having a pair of longitudinally extending air passages 30*a* and 30*b*, respectively. These air passages are parallel to each other and to the longitudinal axis of the barrel, and they are disposed on opposite sides of said longitudinal axis. At the opposite end of the barrel is a breech block 32 having a centrally disposed hole 32*a* formed therein in alignment with the longitudinal axis of the barrel. A piston or plunger 34 is slidably mounted in the barrel as is a second piston or plunger 36. The two pistons or plungers are connected to each other by means of a rod 38 which extends longitudinally of the barrel along its longitudinal axis. A leather or fiber washer 40 is secured to that side of piston 34 which faces nozzle 30. A compression spring 42 is mounted in the barrel, its forward end bearing against nozzle 30 and its back end bearing against washer 40. The action of the spring is to tend to thrust the entire piston assembly backwardly, and reference is here made to the two pistons 34 and 36, rod 38 and washer 40. When said piston assembly is thrust backwardly, the back end of rod 38 enters and projects through hole 32*a* in breech block 32. It will be understood that the two pistons serve to support each other, by means of rod 38, in proper position in barrel 12 for sliding movement therein. Opening 10*a* in barrel 12 would tend to defeat this purpose since it would deprive piston 36 of adequate support. It is at this point that rod 38 enters hole 32*a* and becomes self-supporting in axial alignment with the barrel.

It has been stated that the upper end 16*a* of the trigger projects upwardly into the barrel through opening 10*a*. It will be seen from the drawings that said upper end 16*a* is bifurcated, and that it straddles rod 38, one of the furcations 16*a* being clearly visible in Fig. 5. It will also be seen in said Fig. 5 that said bifurcated end 16*a* of the trigger engages the back side of piston 36. Hence, when the trigger is pulled backwardly by the child using the gun, its upper bifurcated end moves forwardly and pushes the entire piston assembly forwardly against the action of spring 42. This has the effect of compressing the air in the barrel, that is, in that portion of the barrel which lies between washer 40 and nozzle 30, and it has the further effect of blowing said air forwardly through passages 30*a* and 30*b*, respectively. This is clearly shown in Fig. 3. When the trigger is released, in whole or in part, its upper end moves backwardly in response to the action of the spring and the entire piston assembly also moves backwardly at the same time. The effect is to place the trigger in position for further use and to draw air into the barrel through said passages 30*a* and 30*b*.

A bubble blowing wire loop 44 is provided, having a shank 46 which is bent at right angles to the plane of the loop. The shank is journaled into a boss 48 in the back wall 22*a* of the tank or container 22. It is by reason of this arrangement, and with shank 46 serving as a pintle or fulcrum, that the loop is enabled to swing upwardly into operative position and downwardly into inoperative position. It will be noted that loop 44 is ring-shaped with a small projection 44*a* extending radially outwardly therefrom. It is this projection which engages the cover of the

tank to push it upwardly into open position when the loop is itself swung upwardly into operative position. This projection also serves another important function: It will be understood that when the loop swings upwardly from the bubble blowing liquid in the tank, it carries a film of said liquid up with it. Surface tension would ordinarily tend to anchor said film both to the wand and to cover 26 which said loop engages. It is, of course, necessary to blow the film off the loop in order to form bubbles. Projection 44*a* tends to weaken the attraction or adhesion of the film to said cover and, therefore, renders it possible to blow bubbles by blowing air against the film.

A coupling 50 secures shank 46 to a flat bar 52. More precisely, said coupling is pinned to the adjacent ends of said shank and said bar. At the opposite end of bar 52 is a twisted portion 52*a*. Although the drawing shows a plurality of twists or turns, only a single twist of approximately 180 degrees is required for the purposes of this invention.

A tube 54 is pivotally secured at its back end to trigger 16 by means of pin 56, located intermediate the pin 18 and the bifurcated end portion 16*a*. The forward end of tube 54 receives bar 52 as Figs. 5 and 6 clearly show. A cap 58 having a rectangular slot 60 formed therein is affixed to the forward end of said tube 54. Bar 52 projects through slot 60 as Fig. 7 clearly shows and since the bar is rectangular in cross-section to correspond to the shape of the slot, relative angular movement between the bar and cap 58 is prevented, but the cap is free to move longitudinally of the bar. Since cap 58 is fixed to tube 54, what is said of the relationship between the cap and the bar is equally true of the relationship between the tube and the bar.

When the trigger is pulled backwardly, its upper portion moves forwardly and with it tube 54 which is connected thereto. The starting position of the tube is shown by means of dot-and-dash lines in Fig. 6, and it will there be seen that the cap is positioned on one side of the twist in the bar. As the tube moves forwardly, its cap traverses the twisted portion of the bar and since the tube cannot rotate by reason of its being pinned to the trigger, it causes the bar to turn a full 180 degrees. This turning movement of the bar on its own longitudinal axis takes place as the tube moves the distance between lines 62 and 64 in Fig. 6. The curved arrow A indicates this turning movement of the bar. Further forward movement of the tube from line 64 to the line 66 has no effect upon the angular position of the bar, and this is indicated by means of the straight arrow B. Arrow B is provided with a head at both ends to indicate travel in both directions.

When the initial forward movement of tube 54 causes bar 52 to turn, the effect is to cause the wand or loop 44 to turn with said bar and to swing upwardly from the tank into elevated position as shown in Fig. 5. The loop is now positioned in front of the nozzle and since it has been brought up from the liquid in the tank, it is now covered with a film of said liquid. Further forward movement of tube 54 and backward movement between the limits indicated by lines 64 and 66 produces no effect whatsoever upon the positional aspect of bar 52, and hence of loop 44. Stated differently, further retraction of the trigger does not change the position of the loop and said loop remains in operative position in front of the nozzle. Further retraction of the trigger does

have the effect, however, of blowing air through the nozzle and against the liquid film on the wand, thereby causing the formation of bubbles **68**. The liquid film is identified in Fig. 3 by means of the reference character **70**, and it is there shown somewhat deformed under the pressure of the air and in process of being transformed, in part, into a bubble. The trigger may be worked in both directions within the range indicated by lines **64** and **66**, so as to provide a series of air currents directed against the liquid film. When the film is completely blown away, the trigger may be released, and it will move forwardly under the influence of spring **42**. This will have the effect of retracting tube **54** to its initial position. Its cap **58** must, therefore, traverse the twist in bar **52**, and it will thereby cause said bar to turn in the opposite direction from the direction in which it was caused to turn on the forward movement of tube **54**. Consequently, the loop is caused to swing back into the liquid in the tank where it acquires a renewed film. The movement of the loop in this direction is furthered by the action of spring **28** on cover **26** of the tank since said cover bears against the loop under the influence of said spring **28**.

An important feature of this invention is the shape of tank or container **22**. It will be noted in Figs. 2 and 4 that the bottom wall of the tank is arcuate in shape, and it will be understood that said arcuate wall is substantially equidistant at all points from the horizontal shank **46** of loop **44**. The radial distance from said shank to said arcuate wall exceeds, however, the radial distance from said shank to the top of the loop. Hence it is possible to swing the loop a full 180 degrees from its elevated position in Fig. 4 to a vertically opposite position adjacent the bottom of the tank. Hence the wand will be enabled to take on a film of the bubble-making liquid even though a substantial quantity of the liquid has been consumed and only a small quantity thereof remains at the bottom of the tank. It will be noted in Figs. 2 and 4 that a pair of legs **72** and **74**, respectively, are attached to the bottom wall of the tank. The lower ends of these legs are beveled off, as shown in Figs. 1, 3 and 5, and it will be understood that these legs may be employed as a stand to support the gun on a horizontal surface, such as a table. In such case, the gun would stand in tripod fashion, the two legs and the trigger constituting the three points of support. It will be understood that the gun will tilt forwardly and downwardly when it stands in this manner but it will further be understood that the shape of the tank together with the cover which closes it will prevent the liquid from spilling out of the tank when the gun is in tilted position.

The foregoing is illustrative of a preferred form of this invention. It will be understood, however, that the specific construction shown in the drawing may be modified in many ways and other constructional forms of the invention may be provided, within the broad spirit of the invention and the broad scope of the claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A bubble blowing gun of the character described, comprising a barrel, a nozzle at the muzzle end of the barrel, a handle at the breech end of the barrel, a piston assembly in the barrel intermediate the nozzle and the handle, a lever pivotally mounted intermediate its ends on said handle, the upper end of said lever being operatively connected to said piston, whereby working the lever relative to the handle actuates the piston and causes it to blow air out of the barrel through the nozzle, a tank containing bubble-making liquid secured to the muzzle end of the barrel, a spaced distance below and in front of the nozzle, a liquid-tight closure pivoted on said tank and spring-urged to closed position, a pivotally mounted loop in said tank, and a link connecting said lever to said loop, whereby working the lever relative to the handle causes the loop to pivot out of the tank and into line with the nozzle, and means to raise the closure in advance of the loop.

2. A bubble blowing gun in accordance with claim 1, wherein the loop comprises a ring mounted on a shank, said ring having a small projection formed thereon and extending radially outwardly therefrom, said projection serving to contact and lift the closure in advance of the ring.

3. A bubble blowing gun of the character described, comprising a barrel, a nozzle at the muzzle end of the barrel, a handle at the breech end of the barrel, a spring-urged piston assembly in the barrel, a lever pivotally mounted intermediate its ends on the handle, the upper end of the lever engaging said piston assembly to move the piston, whereby retraction of the lower end of the lever causes the upper end to pivot forwardly and to thrust the piston forwardly against the action of the spring, thereby causing a current of air to be blown out of the barrel through the nozzle, a tank containing bubble-making liquid secured to the muzzle end of the barrel a spaced distance below and in front of the nozzle, a wand which is pivotally mounted on said tank for pivotal movement in one direction into inoperative position in said tank and in the opposite direction into operative position in front of the nozzle, and a reciprocating link operatively connecting said lever to said wand, one end of said link being pivotally secured to said lever at a point intermediate the lever's fulcrum and its upper end, the connection between the other end of said link and the wand including means to convert the linear movement of the link when the lever is worked, to rotary movement of the wand, whereby retraction of the lower end of the lever causes the wand to pivot out of the tank into operative position in front of the nozzle and whereby forward movement of the lower end of the lever causes the wand to pivot from its operative position in front of the nozzle back to its inoperative position in the tank, said wand comprising a ring mounted on a shank which is disposed in parallel relation to the longitudinal axis of the barrel and which constitutes the pivot on which the wand swings between its inoperative and operative positions, the link between said wand and the lever comprising a flat bar which is connected at its forward end to said shank and which is twisted at its back end about its own longitudinal axis approximately 180°, and a tube whose forward end accommodates said flat bar and whose back end is connected to the lever, whereby the tube is fixed against angular movement about its own longitudinal axis, said tube being provided at its forward end with a slotted cap which engages the flat bar and transforms the linear movement of the tube when the lever is worked, to angular movement of the flat bar when the slotted cap enters into engagement with the twisted portion of said bar, thereby causing the shank to which said bar is connected and the ring on said shank to pivot.

4. A bubble blowing gun of the character described, comprising a barrel, a nozzle at the muz-

zle end of the barrel, a handle at the breech end of the barrel, a spring-urged piston assembly in the barrel; a lever pivotally mounted intermediate its ends on the handle, the upper end of the lever engaging said piston assembly to move the piston, whereby retraction of the lower end of the lever causes the upper end to pivot forwardly and to thrust the piston forwardly against the action of the spring, thereby causing a current of air to be blown out of the barrel through the nozzle, a tank containing bubble-making liquid secured to the muzzle end of the barrel a spaced distance below and in front of the nozzle, a wand which is pivotally mounted on said tank for pivotal movement in one direction into inoperative position in said tank and in the opposite direction into operative position in front of the nozzle, and a reciprocating link operatively connecting said lever to said wand, one end of said link being pivotally secured to said lever at a point intermediate the lever's fulcrum and its upper end, the connection between the other end of said link and the wand including means to convert the linear movement of the link when the lever is worked, to rotary movement of the wand, whereby retraction of the lower end of the lever causes the wand to pivot out of the tank into operative position in front of the nozzle and whereby forward movement of the lower end of the lever causes the wand to pivot from its operative position in front of the nozzle back to its inoperative position in the tank, said liquid containing tank being provided with a hinged cover and a spring which engages said cover and urges it into closed position on said tank, said wand being pivotally mounted for engagement with said cover when the wand is swung upwardly from its inoperative position in the tank to its operative position in front of the nozzle, whereby the wand pushes the cover to open position against the action of the spring when the wand moves from inoperative to operative position, and whereby the wand releases the cover for backward movement into closed position in response to the action of its spring when the wand moves from operative back to inoperative position.

5. A bubble blowing gun comprising a barrel, a nozzle at the muzzle end of the barrel, a handle at the breech end of the barrel, a piston assembly in the barrel intermediate the nozzle and the handle, a lever pivotally mounted intermediate its ends on said handle, the upper end of said lever being operatively connected to said piston whereby working the lever relative to the handle actuates the piston and causes it to blow air out of the barrel through the nozzle, a tank containing bubble-making liquid secured to the muzzle end of the barrel a spaced distance below and in front of the nozzle, a pivotally mounted wand in said tank and means connecting said lever to said wand, and actuated by rearward movement of the lower arm of the lever sequentially to raise the wand and then to cause the piston to blow air out of the barrel by reciprocating strokes of the lever, said means comprising a flat bar which is connected at its forward end to said wand and which is twisted at its back end about its own longitudinal axis approximately 180°, and an element having its rear end connected to the upper arm of the lever whereby it is fixed against angular movement about its own longitudinal axis, said element having on its forward end a slotted member which embraces the flat bar and transforms the linear movement of the element, when the lever is worked, to angular movement of the flat bar when the slotted member traverses the twisted portion of said bar thereby causing the wand to which said bar is connected, to engage in pivotal movement, and which maintains the wand in its raised, operative position while the slotted member traverses the flat untwisted portion of the bar during reciprocation of the lever in pumping air from the nozzle.

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