

Nov. 10, 1942.

J. K. LYON, JR
BUBBLE-FORMING DEVICE

2,301,427

Filed Aug. 26, 1940

3 Sheets-Sheet 1

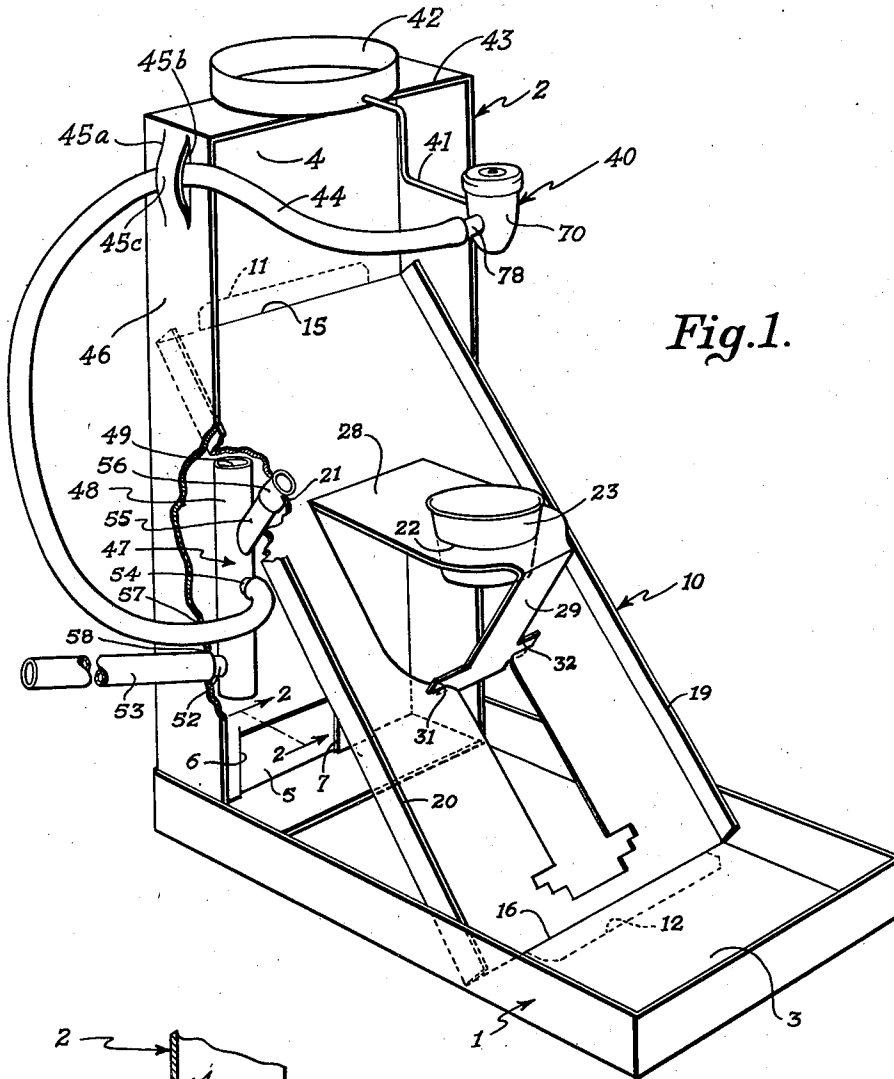


Fig. 1.

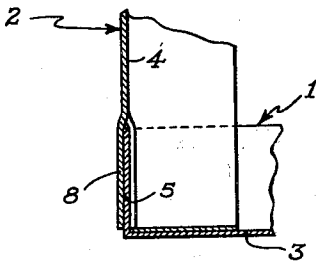


Fig. 2.

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3 Sheets-Sheet 2

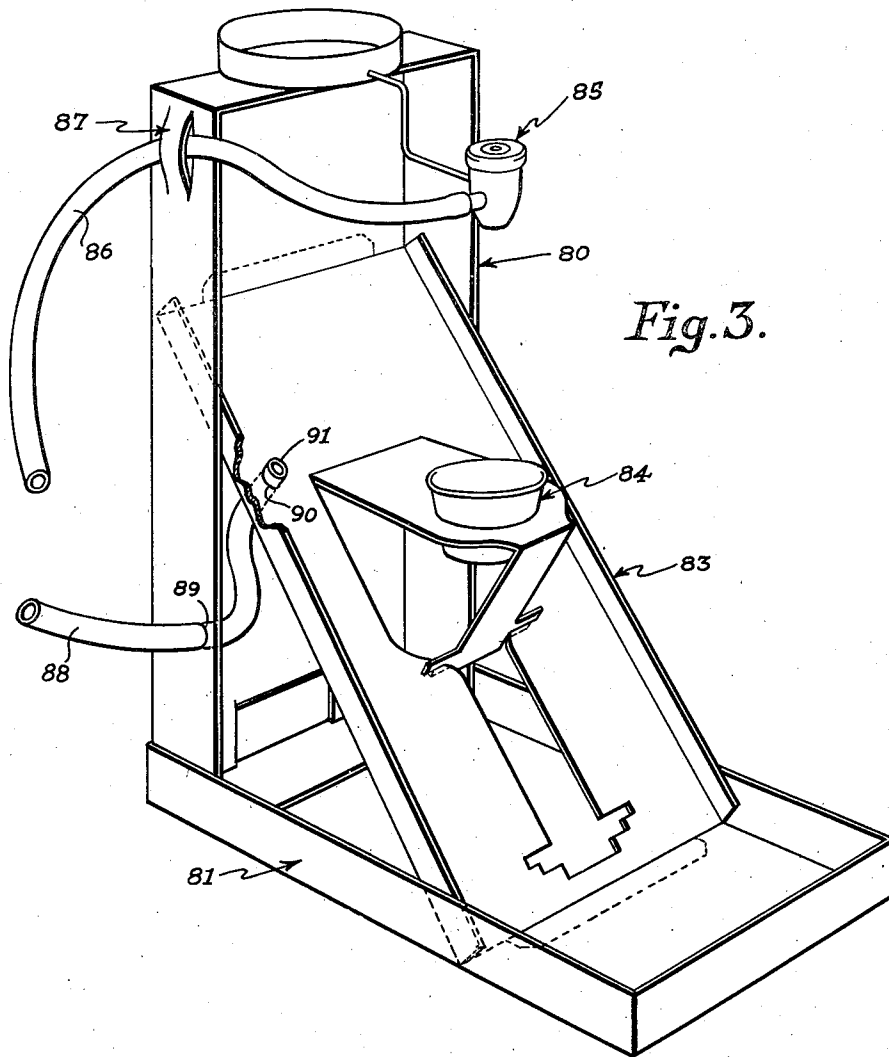


Fig. 3.

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3 Sheets-Sheet 3

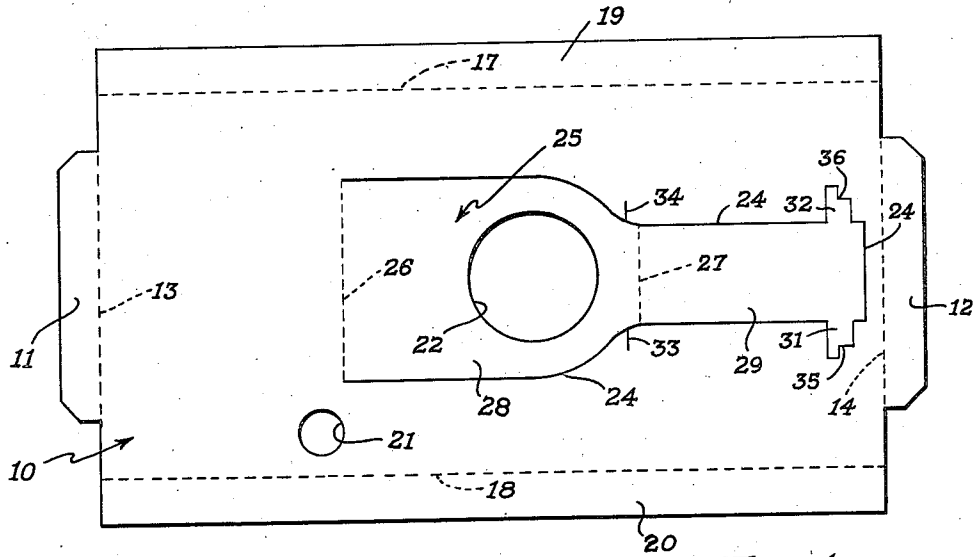


Fig. 4.

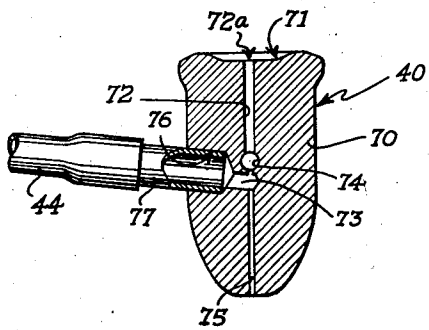


Fig. 5.

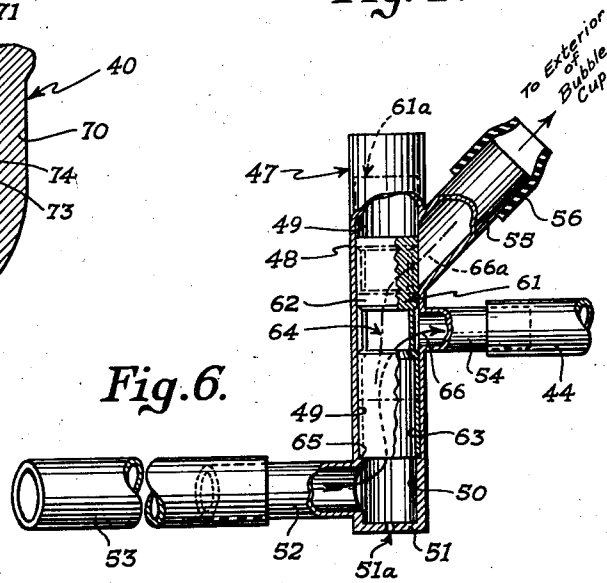


Fig. 6.

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UNITED STATES PATENT OFFICE

2,301,427

BUBBLE-FORMING DEVICE

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Application August 26, 1940, Serial No. 354,195

6 Claims. (Cl. 46—3)

This invention relates to game devices and pertains particularly to a device adapted for successive production of bubbles and the discharge of such bubbles upwardly into the air in position to be shot at in a manner comparable to the release of "birds" in "trap" or "skeet" shooting.

One of the particular objects of the invention is to provide a complete game device packaged in a box-like structure, the integral parts of which are adapted to serve as a support for the elements of the game device when in use.

A further object of the invention is to provide a game device which is small and compact when packaged for carrying, and which may be assembled with a minimum of effort into a complete game structure adapted to form and release into the air relatively large bubbles at the will of the operator, in position to be shot at by the player.

A further object of the invention is to provide a novel form of bubble-producing cup with which a plurality of successive bubbles may be produced, the bubble cup being adapted to receive a given quantity of bubble-forming solution (such as a soap solution) for the formation of each bubble, whereby the bubbles produced by the cup are substantially identical as to size.

A further object of the invention is to provide an improved form of valve device which is used alternatively and successively for the supply of air to such a bubble cup in the production of a given bubble and for the discharge of a blast of air to a position adjacent the cup to cause a dislodgement of the bubble from the cup and the forcing of such bubble upwardly into the atmosphere.

The bubble target game device of this invention is illustrated in the accompanying drawings, together with detail views of the essential portions thereof, and referring thereto:

Fig. 1 is a perspective view of the device in assembled condition, ready for use, using the automatic valve device for successive supply of air to the bubble cup for the formation of a bubble and supply of air to the exterior of the bubble cup for dislodgment of the bubble into playing position;

Fig. 2 is a sectional detail taken along line 2—2 in Fig. 1, illustrating the mode of assembling the apparatus;

Fig. 3 is a view corresponding to Fig. 1, illustrating the device as assembled for use without the automatic valve device, in which separate air supply ducts are provided for the supply of air to the bubble cup for formation of the bubble and

to the exterior of the bubble cup for dislodgment of the bubble;

Fig. 4 is a plan view of a portion of a box structure which, when the device is fully assembled, is employed as a support member;

Fig. 5 is a cross-sectional detail of the improved form of bubble cup of the present invention; and

Fig. 6 is a partly broken-away detail view of the automatic valve device referred to in connection with the description of Fig. 1, providing for the alternative and successive supply of air to the bubble-forming cup for the purpose of producing a bubble and to the exterior of such cup for the purpose of dislodging a formed bubble.

Referring to Figs. 1-4 of the drawings, the assembled device is shown as comprising a base member 1, a vertically extending support member 2, a diagonal knee brace 10 provided with a shelf portion 28, a bubble forming member 40 disposed above the shelf portion 28, a container 42 for supply of bubble forming liquid to the member 40, and associated air supply means such as the conduit 44.

Inasmuch as the structure is desirably formed so as to fold into a compact package, the base member 1 may be formed as a box lid, the vertical support member 2 may be formed as a box bottom, and the diagonal knee brace, the member 40 and container 42 may be so proportioned as to fit within the box portions when dismantled. In assembling the device, the box lid is inverted and the flat surface 3 thereof is set upon a suitable supporting surface and becomes the base member 1; the box bottom is placed with its flat surface 4 extending vertically from within the base member 1 and against one of the end walls 5 of the base member. To firmly anchor the base and support members in this relation, one end of the flat surface 4 of the member 2 is provided with spaced longitudinally extending parallel slits 6 and 7 at positions intermediate its width to provide a tab 8 (see Fig. 2) which is adapted to engage the outside of the end wall 5 of the base member 1.

The brace member 10 is adapted to support a portion of the bubble game apparatus and to connect the horizontal base member 1 and vertical support member 2 as a knee brace. The member 10 is shown in plan as a flat cardboard blank in Fig. 4 and in assembled relation in Figs. 1 and 3.

Referring particularly to Fig. 4, the member 10 is shown as a generally rectangular member provided with tabs 11 and 12 at its ends which are adapted to be bent upwardly from the plane of the blank along dashed score lines indicated at

13 and 14 and extend through slots 15 and 16 provided in the members 4 and 3 respectively. The blank is further scored as at 17 and 18 at positions parallel to and spaced from its side edges to form tabs 19 and 20 which are raised to positions perpendicular to the face of the blank as shown in Fig. 1 to strengthen the bracing member.

The blank is further provided with an opening 21 located relatively near one end and one side, such as near the tab 20, and is adapted to receive and support a portion of the air supply apparatus, as will be described more fully hereinafter. A relatively larger opening 22 is provided substantially in the center of the blank 10 and is adapted to receive a receptacle such as a paper cup 23 to catch the excess bubble-forming liquid which drains from the apparatus during use.

The blank is either cut or materially weakened along a line 24 to provide a longitudinally extending tongue 25 containing the opening 22, which is adapted to be bent upwardly from the face of the blank along the dash line 26 and thence back on itself along the dash line 27 to provide a shelf portion 28 (containing the opening 22) and a depending brace portion 29.

The lower end of the brace portion 29 may be provided with laterally extending wings 31 and 32 which are adapted for insertion through slits 33 and 34 provided in the blank to secure the parts of the member 10 in the relation indicated in Fig. 1. The slits 33 and 34 preferably extend outwardly for a shorter distance than the wings 31 and 32, and these wings are provided with notches 35 and 36, whereby the outer portions of the wings are adapted to engage the base of the blank when the remaining portions of the wings are inserted through the slits 33 and 34.

The bubble-forming pipe 40 is shown supported by a bubble-forming liquid supply conduit 41 which is secured to a liquid supply container 42 which is adapted to fit on the upper end wall 43 of the support member 2. An air supply conduit 44, for example a flexible tube of rubber or other suitable material provides communication between the bubble-forming pipe 40 and operating valve means 47.

The air supply conduit 44, at a position intermediate its ends, is shown extending through spaced parallel slits 45a and 45b provided in side wall 46 of the support member 2. The conduit is thus supported by interaction between a strap 45c raised between the slits and the portions of the wall 46 outwardly of the slits.

Referring to Fig. 6, the valve means 47 is shown as comprising a generally cylindrical vertically extending body member 48 provided with a vertically extending cylindrical bore 49 connecting with an axially aligned lower bore 50 of somewhat less diameter. The lower end of the bore 50 is closed by a bottom wall 51 preferably provided with a small breather opening 51a. An air inlet conduit 52 communicates with the bore 50 and is adapted for connection to an air supply as through the agency of a flexible tube 53 which may be blown into by a player. Air outlet conduits 54 and 55 are shown communicating with the bore 49 at longitudinally spaced positions, the conduit 54 being connected to the air supply conduit 44 for supplying air to the bubble pipe and being located below the conduit 55. The air outlet conduit 55 is provided with a nozzle member 56 in the form of a short length of flexible tubing and is directed toward

the lower end of the bubble cup for the purpose of dislodging bubbles from the cup.

The valve means is shown located beneath the brace member 10 and adjacent the wall 4. The flexible conduits 44 and 53 may extend through openings 57 and 58 in the wall 46 and support the valve means. The nozzle 56 may extend through the opening 21 in the brace member 10 in which position it cooperates with the conduits 44 and 53 to hold the valve means securely in position.

The valve means 47 is provided with pressure responsive means which is shown as comprising a piston 61 adapted for longitudinal movement in the bore 49. The piston comprises an upper head portion 62 sealing the bore 49 and a lower skirt portion 63 provided with ports 64 located below the head 62. The piston 61 is movable in response to change in air pressure in the bore 49 below the head 62, between a first position in which the ports 64 are aligned with the conduit 54 and the piston head 62 closes the bore 49 between the conduits 54 and 55 and a second position in which the ports 64 are aligned with the conduit 55 and the skirt 63 covers the opening into the conduit 54. The piston 61 is suitably biased toward its first position as by gravity and is adapted to rest in this position upon a shoulder 65 formed at the juncture of the bores 49 and 50.

Assuming that the apparatus has been assembled as described above and that the container 42 has been charged with a quantity of bubble-forming solution such as a soap solution, the apparatus is ready for use. The general theory of operation of the device in connection with forming the bubble and discharging it from the bubble forming member is comparable to that described in my copending application Serial No. 330,108, filed April 17, 1940. The bubble is formed by a relatively small amount of air at low pressure and is discharged from the bubble-forming member by a relatively large jet of air directed upwardly about the bubble-forming cup. The air for both of these operations is supplied through the conduit 53. During the period in which the bubble is formed the pressure is insufficient to raise the piston 61 materially. As a consequence air flows upwardly through the bore 50 and the skirt 63 and out through the ports 64 into the conduit 54 to the bubble cup 40, as indicated by the arrow 66.

After a formed bubble has reached a sufficient diameter it may be discharged from the bubble cup 40 by increasing the air pressure in bore 49 as by blowing harder into the conduit 53. This increase in pressure raises the piston 61 to its second position, as shown in dot-dash lines at 61a, where the skirt 63 closes the conduit 54 and prevents supply of air to the interior of the bubble, and where the ports 64 open into the conduit 55 and allow air to pass from the conduit 53 through the skirt 63 and out through the ports 64 into the conduit 55, as shown by the dot-dash arrow 66a. This air issuing from the nozzle 56 is directed upwardly around the outside of the bubble cup and dislodges the bubble therefrom.

By making the conduit 55 and nozzle 56 sufficiently large as compared to the air inlet conduit 53, the upward motion of the piston will stop when the ports 64 are aligned with the conduit 55. Obviously, a suitable stop may be provided for arresting the upward movement of the piston if desired. Upon lowering of the pres-

sure in the bore 49 below the piston head, the piston returns to its first position.

Referring particularly to Fig. 5, the improved bubble-forming member 40 according to my invention is shown as comprising a body portion 70 provided with a preferably slightly concave upper surface 71 at which a bubble is formed during use, an air exhaust passage 72 communicating with the upper surface 71 as at 72a and extending interiorly of the body portion, an air inlet passage 73 extending from the exterior of the body portion 70 into communication with the passage 72, a liquid inlet passage 74 extending from the exterior of the body portion into communication with the passage 72 at a position between the point 72a and the juncture of the passages 72 and 73 which is adapted to receive the conduit 41 (Fig. 1). A venting passage 75 is further provided which preferably extends from the lower edge of the passage 73 at the juncture thereof with the passage 72 to a position at the exterior of the body portion 70, and preferably in a generally downward direction.

The supply of liquid to the bubble-forming member is secured by gravity flow from the container 42 through the conduit 41. The air inlet passage 73 is connected to the air supply conduit 44 as by providing an enlarged bore 76 at the outer end thereof adapted to receive a nipple 77 to which the conduit 44 may be attached.

If no air is being forced through the conduit 44 and into the passage 73 the bubble-forming liquid will drain downwardly into the space below the juncture of the conduits 72 and 74, and any air entrapped thereby will be forced into the nipple 77 or downwardly through the venting passage 75. This venting passage is made sufficiently large that the liquid will flow through the same and drip from the bottom of the body portion 70 into the cup 23 until an operating pressure is applied in the conduit 44, while maintaining the space below the juncture of the conduits 72 and 74 substantially filled with liquid and without unduly flooding this liquid into the nipple 77. A portion of the liquid may extend upwardly into the bore 72, dependent upon the relative sizes of the passages and the hydrostatic head from the supply of liquid in the container 42.

Application of operating pressure to the conduit 44 as above described will force the accumulated liquid from the aforesaid space upwardly through the passage 72 and a bubble will be formed at the point 72a when the air column reaches the upper surface of the body member. The sizes of the respective passages and the size of the aforesaid space is so adjusted as to supply the correct quantity of bubble-forming liquid for the production of a given size bubble, and the aforesaid space constitutes, in effect, a reservoir for such given quantity of bubble-forming liquid.

The supply of air to the bubble-forming member will also result in any residual liquid being blown downwardly through the passage 75, and a small bubble may be formed at this position; this bubble subsequently breaks and the accumulated liquid falls into the cup 23. Upon interruption of the supply of air into the conduit 44, as when a formed bubble is dislodged from the upper surface of the bubble forming member, a new supply of bubble forming liquid will descend through the conduit 41 and passage 74 to the aforesaid space, charging the same for the production of a new bubble.

It should be appreciated that to a certain extent the advantages of my invention may be realized without the use of a valve member such as the member 47. In Fig. 3 I have illustrated a form of my invention in which no valve member is used. In this figure the supporting structure is shown as comprising vertical and horizontal members 80 and 81 formed from the bottom and top of a box like the members 1 and 2 and joined as shown in Figs. 1 and 2. A bracing member 83 is also provided for bracing the members 80 and 81 and for holding a drainage receiving cup 84. The bracing member 83 may be formed in the same way as the member 10 shown in Figs. 1 and 4.

The apparatus further comprises a bubble-forming member 85 located above the cup 84 and supported on the supporting structure in the same way as the member 40 in Fig. 1. An air supply conduit adapted for connection to a supply of air under pressure leads from the member 85 and is supported on the supporting structure at 87 in the same manner as the conduit 44 of Fig. 1.

A second air supply conduit 88 is shown passing through an opening 89 in the side wall of the member 80 and thence through an opening 90 in the member 83 to provide a discharge opening 91 to direct air upwardly around the outside of the member 85. The opening 90 is comparable to the opening 21 of Fig. 1 and the discharge opening 91 corresponds in function to the nozzle 56 of Fig. 1.

This form of the apparatus may be operated by first blowing into the conduit 86 to form the bubble and then blowing into the conduit 88 to dislodge the bubble.

It will be appreciated that wherever the word "air" is used throughout the specification and claims, any suitable gaseous fluid is contemplated. For example a suitable supply of oxygen or acetylene under pressure may be used.

Other modifications of the construction will occur to those skilled in the art and I do not choose to be limited to the specific embodiments herein delineated, but rather to the scope of the subjoined claims.

I claim:

1. In a bubble target game apparatus, the combination which comprises: a bubble-forming member; a first conduit for supplying air to said bubble-forming member; a second conduit for directing a stream of air upwardly around the outside of said bubble-forming member; a third conduit for supplying air to said first and second conduits; and valve means connecting said third conduit to said first and second conduits, said valve means comprising a member movable in response to an increase in air pressure in said third conduit from a first position admitting a flow of air from said third conduit to said first conduit while preventing a flow of air from said third conduit to said second conduit, to a second position admitting the flow of air from said third conduit to said second conduit.

2. In a bubble target game apparatus, the combination which comprises: means defining a vertically extending cylindrical chamber; a first conduit communicating with said chamber; a second conduit communicating with said chamber at a position above said first conduit; a third conduit communicating with said chamber at a position above said second conduit; and piston means slidably mounted in said chamber and biased downwardly, said piston means being adapted to

rest in a lower position closing said third conduit to prevent passage of air from said first to said third conduit and opening said second conduit to permit passage of air from said first to said second conduit under supply of air from said first conduit at one value of air pressure, and movable upwardly to a raised position in response to an increase in air pressure over said one value to open said third conduit and permit passage of air from said first to said third conduit.

3. An apparatus as set forth in claim 2, said piston means comprising an imperforate head portion and a skirt portion provided with a port communicating with the chamber below said piston means, said port communicating with said second conduit when said piston means is in its lower position and communicating with said third conduit when said piston means is in its raised position.

4. In a bubble target game apparatus, a bubble-forming member comprising: a body member having an upper surface, said body member having a plurality of passages therein, one of said passages extending downwardly from said upper surface and communicating with a second passage of smaller diameter extending downwardly through said body member and opening at the lower end thereof, a third one of said passages communicating with said first passage at a position above said second passage, and a fourth one of said passages communicating with said second passage at a position below said third passage.

5. In a bubble target game apparatus, a bubble-forming member comprising: a body member having an upper surface, said body member hav-

ing an exhaust passage extending downwardly from the central portion of said upper surface, a liquid supply passage communicating with said first passage for supplying bubble-forming liquid to said member, a venting passage of less diameter than said first passage and extending upwardly from the lower end of said body member to meet said first passage to form a venting opening in said member, and a fourth passage communicating with said first and third passages at a position below said second passage for supplying air to said member.

6. In a bubble target game apparatus, a combination which comprises: a bubble-forming member having an upper surface, said bubble forming member being provided with wall portions defining a plurality of passages therein, one of said passages extending downwardly from said upper surface to a position interiorly of said member, another of said passages extending transversely with respect to said first passage and defining a liquid inlet passage communicating with said first named passage, another of said passages adapted for communication with a source of air under pressure and extending interiorly of said member into communication with said first named passage at a position below the position of communication of said first and second named passages, and a fourth passage communicating with said last named passage at the lower portion thereof to define a venting passage, said first, second and third named passages serving to define a liquid receptacle at the lower end of said first named passage.

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