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VALVE FOR LIQUID CONTAINERS

Filed Jan. 16, 1967

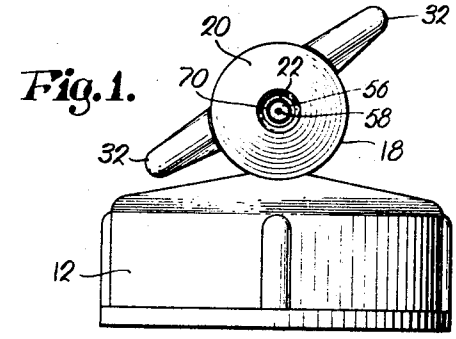


Fig.1.

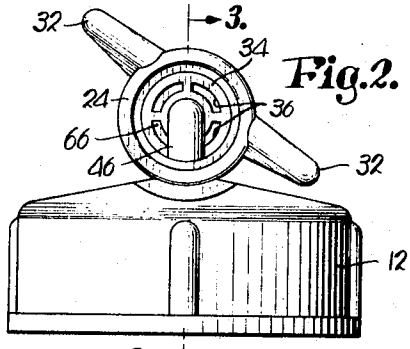


Fig.2.

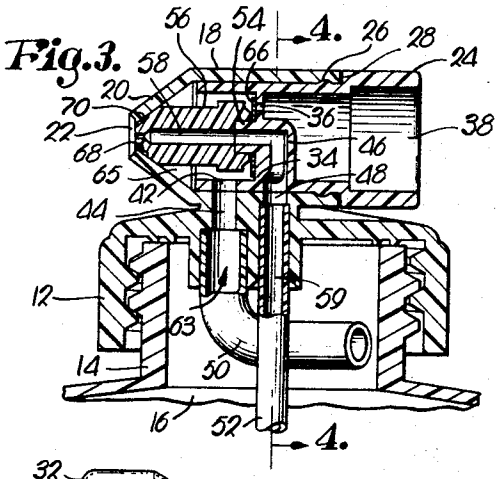


Fig.3.

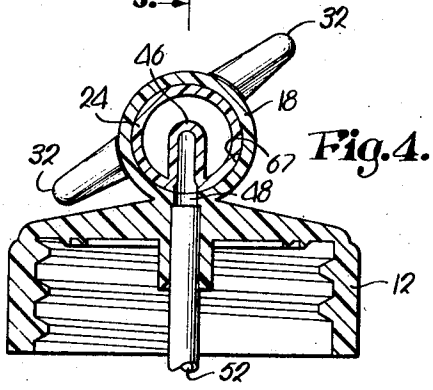


Fig.4.

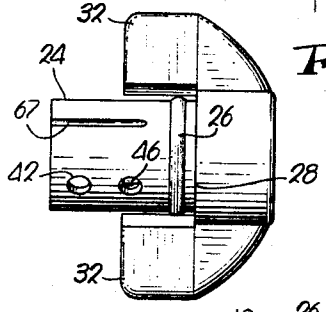


Fig.9.

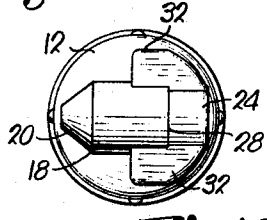


Fig.10.

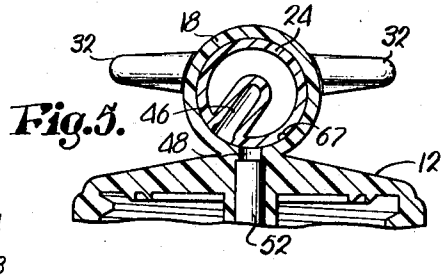


Fig.5.

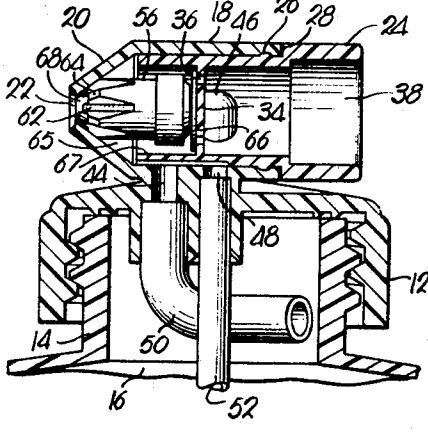


Fig.7.



Fig.8.

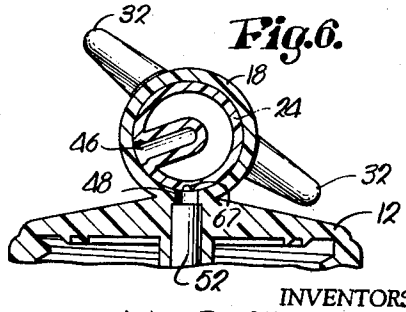


Fig.6.

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VALVE FOR LIQUID CONTAINERS

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ABSTRACT OF THE DISCLOSURE

A squeeze bottle valve for dispensing liquid and air from the bottle in the form of a spray, or for dispensing the liquid in a jet stream or in drops. The dispenser is provided with a movable disc valve responsive to pressure drop within the bottle for permitting the latter to fill rapidly with air upon release of squeeze pressure thereon. The dispenser has manual control rotatable from shutoff to a spraying position and to a drop dispensing position.

This invention relates to an improved liquid dispenser for use with a squeeze bottle, and particularly to a dispenser adapted for admixing and spraying air and liquid emanating from the bottle, for dispensing liquid in a jet stream as well as for discharging the liquid drop by drop, while being capable of rapidly filling with air upon release of squeeze pressure thereon.

Squeeze bottles using conventional liquid dispensers are not only slow to refill with air but are not capable of multiple use as a sprayer, as a jet stream dispenser and as a dropper.

It is, therefore, the primary object of the instant invention to provide a liquid dispenser capable of permitting rapid filling of the bottle with air upon release of squeeze pressure thereon.

It is an important object of the instant invention to provide a liquid dispenser capable of dispensing liquid products in an atomized spray and at the same time capable of dispensing individual droplets or a jet stream of the liquid whereby the overall commercial flexibility of the dispenser is maximized. That is to say, the dispenser is adapted for use with a variety of products.

Still another important object of the instant invention is to provide such a dispenser having novel structure permitting sealing the contents within the bottle as well as use of the bottle as a sprayer, as a dropper and for delivering a jet stream.

In the drawings:

FIGURE 1 is a front elevational view of a valve for liquid containers embodying the concepts of the instant invention showing the shutoff in position for spraying;

FIG. 2 is a rear elevational view thereof;

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 2;

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

FIG. 5 is a fragmentary view similar to FIG. 4 showing the shutoff closed;

FIG. 6 is a view similar to FIG. 5 showing the shut-off in position for use as a dropper;

FIG. 7 is a view similar to FIG. 3 showing the shut-off in the position of FIG. 6;

FIG. 8 is a view of the atomizer plug;

FIG. 9 is a bottom view of the shutoff; and

FIG. 10 is a top plan view of the valve on a reduced scale.

A screw cap 12 for neck 14 of a squeeze bottle 16 is integral with a tubular body 18 having a frustoconical end portion 20 provided with a discharge orifice 22. A

tubular shutoff 24 rotatable in body 18 is snapped in place and retained by rib-groove means 26. An annular shoulder 28 on shutoff 24 engages the proximal end of body 18 to prevent shutoff 24 from wedging in portion 20 of body 18. Shutoff 24 is rotated by application of finger pressure to wings 32 thereof.

Shutoff 24 is provided with a partition 34 having a plurality of perforations 36. Hole 42 in shutoff 24 may be aligned with an aperture 44 extending through cap 12 from body 18, and an L-shaped tube 46 in shutoff 24 may be aligned at the same time with a passageway 48 extending through cap 12 alongside aperture 44. An L-shaped tube 50 in aperture 44 extends into neck 14 of bottle 16 laterally of a conduit 52 in passageway 48 which terminates adjacent the bottom (not shown) of bottle 16.

Tube 46 extends through partition 34 and presents a support 54 for a plug 56. Plug 56 has an opening 58 therethrough communicating with tube 46 and aligned with orifice 22; conduit 52, passageway 48, tube 46 and opening 58 present a passage 59 for liquid emanating from bottle 16. Plug 56 is provided with a plurality of longitudinally extending slots 62 at its beveled portion 64, the latter engaging the inner surface of end portion 20. A chamber 65 surrounds plug 56 within end portion 20 in spaced relationship to passage 59. Plug 56 has a frustoconical terminus 68 disposed in closely spaced relationship to the inner surface of portion 20 to present an annular restricted space 70 communicating chamber 65 with orifice 22. Tube 50, aperture 44, hole 42, chamber 65, slots 62, space 70, and orifice 22 present a duct 63 for flow of air from bottle 16.

An annular, movable disc 66 surrounds support 54 between plug 56 and partition 34 in a position normally closing the perforations 36. A groove 67 in shutoff 24 may be placed in bridging relationship to hole 42 and aperture 44.

The air and liquid are sealed in bottle 16 when shutoff 24 is rotated to shift hole 42 and tube 46 out of communication with aperture 44 and passageway 48 respectively, to thereby block passage 59 and duct 63 (see FIG. 5). Upon squeezing of bottle 16 (when shutoff 24 is in the position shown in FIG. 4) the air in the bottle 16 above its liquid level is pressurized and forced at a high velocity through the orifice 22. The high velocity air emanating from duct 63 admixes with liquid flowing through passage 59 and the liquid is broken up into a spray or fine mist.

If it is desired to use the dispenser for discharging the liquid in a jet stream, plug 56 may be replaced by a similar plug which does not have the slots 62 therein. Thus, beveled portion 64 will abut the inner surface of end portion 20 in blocking relationship to duct 63. In this case, tube 50, aperture 44 and hole 42 present duct means for flow of air from chamber 65 into bottle 16.

During either jet stream or spray use, upon release of hand pressure from squeeze bottle 16, a vacuum is developed therewithin above its liquid level as the walls of the bottle expand outwardly. Disc 66 moves away from perforations 36 to admit air into chamber 65 and thereby into the interior of bottle 16 from air inlet 38 of shutoff 24. Hence, bottle 16 rapidly fills with air immediately upon release of squeezing pressure thereon. The disposition of tube 50 permits the air flow into and out of bottle 16 even when it is tilted on its side for spraying downwardly from orifice 22.

When shutoff 24 is rotated to the position shown in FIG. 6 a gentle squeeze on bottle 16 forces liquid into groove 67 for flow therefrom into body 18 around plug 56 and thence through slots 62 for discharge from orifice 22 in the form of drops which may be counted if desired.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A squeeze bottle liquid dispenser comprising:
a tubular body having means for attaching the same to the neck of a squeeze bottle;
means at one end of the body providing an inlet for air into the body,
said body having a discharge orifice at the opposite end thereof;
means providing a passage for the liquid contents of the bottle from the bottle into said body and thence through said orifice when the bottle is squeezed;
means providing a duct for flow of air from the bottle into the body and thence through said orifice when the bottle is squeezed; and
a bypass valve in said body interposed between said inlet and said duct for blocking flow of air from the duct to said inlet when the bottle is squeezed,
said valve being operable upon a predetermined drop of pressure within said bottle to admit air into the latter from the inlet past the valve and through said duct; and
shutoff means shiftably carried by said body for movement to and from a position closing the passage and the duct.

2. The invention of claim 1,
and means in the body for admixing air and liquid emanating from the bottle and discharging through said orifice when the bottle is squeezed.

3. The invention of claim 1,
and a plug in the body adjacent said orifice, a portion of said passage extending through the plug and being disposed to direct the liquid through the orifice, a portion of said duct being in the body exteriorly of the plug and disposed to direct air through the orifice for admixture with the liquid.

4. The invention of claim 3,
said valve being between the plug and the inlet, said passage extending through the valve.

5. The invention of claim 1,
said shutoff means extending into the body and having a bore presenting said inlet; and
retainer means holding the valve in the bore.

6. The invention of claim 1,
and a plug in the body adjacent said orifice, a portion of said passage extending through the plug and being disposed to direct the liquid through the orifice, a portion of said duct being in the body exteriorly of the plug and disposed to direct air through the orifice for admixture with the liquid,
said shutoff means having a support for the plug.

7. The invention of claim 1,
said shutoff means comprising a tubular rotor in the body having ports normally disposed to receive air and liquid for flow into the rotor from the bottle.

8. The invention of claim 7,
said rotor having a secondary passage, and being rotatable to a position for receiving air and liquid from the bottle for flow in the body exteriorly of the rotor to the orifice.

9. A squeeze bottle liquid dispenser comprising:
a tubular body having means for attaching the same to the neck of a squeeze bottle,
said body having a discharge orifice at one end thereof;
means at the opposite end of the body presenting an inlet for air into the body;
structure providing a passage for the liquid contents of the bottle from the bottle into said body and thence through said orifice when the bottle is squeezed,

said structure having parts thereof disposed in the body to present an air chamber therein,
there being duct means intercommunicating the bottle and the chamber for flow of air from the latter into the bottle;
a bypass valve in the body interposed between said chamber and the inlet for blocking flow of air from the chamber to said inlet when the bottle is squeezed,
said valve being operable upon a predetermined drop of pressure within said bottle to admit air into the latter from the inlet past the valve and through said chamber and duct means; and
a tubular rotor in the body having ports normally disposed to receive air and liquid for flow into the rotor from the bottle, said rotor having a secondary passage and being rotatable to a position for receiving air and liquid from the bottle for flow through the secondary passage into the rotor exteriorly of the rotor to the orifice.

10. The invention of claim 9,
and means presenting a restricted flow path between said chamber and said orifice for flow of air from the bottle into the chamber and thence through said orifice when the bottle is squeezed.

11. A squeeze bottle liquid dispenser comprising:
a cap having means for attachment to the neck of a squeeze bottle;
a tubular body integral with and extending diametrically across the normally uppermost face of the cap,
said body having a discharge orifice at one end thereof;
an open ended tubular drum extending into the opposite end of the body and having means rotatably attaching the same to the body;
a radial, perforated partition in the drum;
an L-shaped tube in the drum having a radial leg and a second leg extending through the partition on the axis of the drum;
a plug mounted on said second leg between the partition and the orifice and having a bore in aligned communication with the second leg and with the orifice, presenting an air chamber therearound communicating with the orifice,
there being a liquid passageway and an air aperture in the cap and body radially of the latter and communicating with the bottle when the cap is on the bottle neck,
said radial leg registering with the liquid passageway upon rotation of the drum to a predetermined position,
said drum having a hole placing the aperture into communication with the chamber when the drum is in said position; and
a bypass valve shiftable on said second leg toward and away from partition between the latter and the plug for closing the perforations of the partition upon squeezing of said bottle to force air and liquid to the orifice and for admission of air into the bottle when the latter is released.

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STANLEY H. TOLLBERG, *Primary Examiner.*