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SIPHON-RESISTANT SQUEEZABLE DISPENSER

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FIG. 1

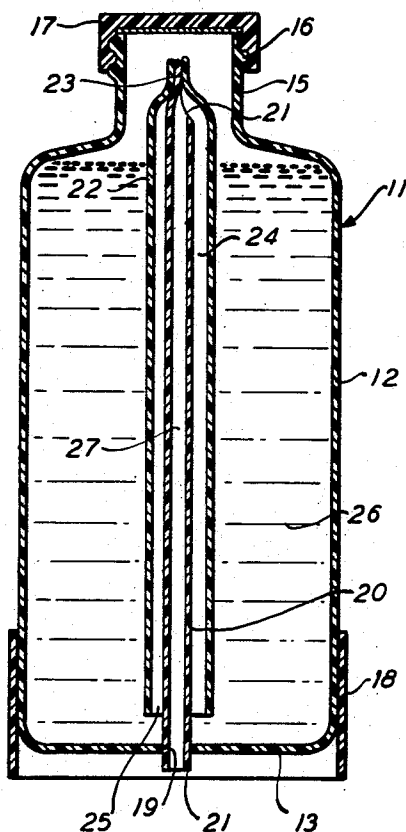


FIG. 2

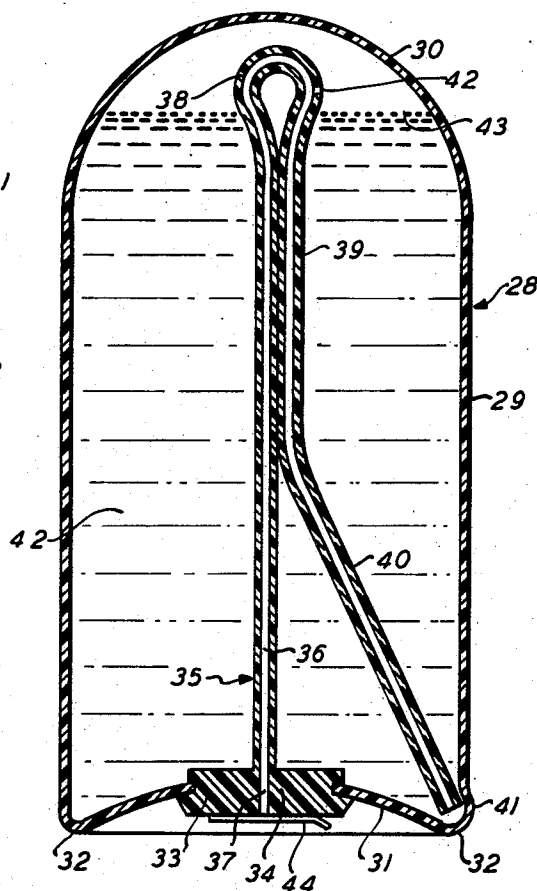
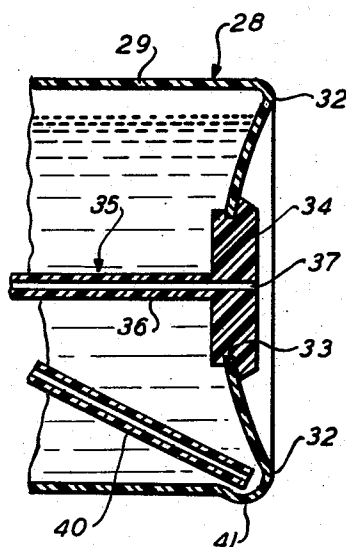


FIG. 3



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1

3,499,583

SIPHON-RESISTANT SQUEEZABLE DISPENSER

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3 Claims

ABSTRACT OF THE DISCLOSURE

Our invention is a squeezable dispenser which embodies a discharge tube extending within the container in such a position that it will not leak when not in use notwithstanding variations in ambient barometric pressure and which can be operated in either a vertical or horizontal position or any position intermediate thereto.

BACKGROUND OF INVENTION

Most squeeze bottles require some sort of cap to prevent leakage of material contained therein when not in use. Some squeezable dispensers are known which are provided with internal mechanisms to prevent leakage when not in use but which do leak under changing ambient barometric pressures. In other designs, means have been provided for the prevention of leakage under changing ambient barometric pressures but these means are complicated and costly.

In addition, many squeezable dispensers operate in one vertical orientation but must be stored in the opposite vertical orientation. Others, which may operate and be stored in the same vertical orientation cannot operable in a horizontal position. None of the known squeezable dispensers is provided with means for properly orienting the discharge orifice with respect to the surface to which the material is to be applied. All of the aforesaid defects in existing containers have rendered them commercially unusable.

Therefore, it is among the objects and advantages of our invention to provide a capless squeezable dispenser for a wide variety of fluids including foods, cosmetics, detergents, waxes and polishes, hand lotions, sterilizing solutions, fire extinguishing liquids and the like.

Another object of our invention is to provide a capless squeezable dispenser which will not leak when stored in the vertical orientation for discharge notwithstanding drastic changes in ambient barometric pressure.

A further object of our invention is to provide a capless squeezable dispenser which may be operated for discharge and stored in the same vertical orientation.

Yet another object of our invention is to provide a capless squeezable dispenser which may be operated by one hand and which is provided with means for precisely aiming the direction of discharge of the fluid therein contained.

Still another object of our invention is to provide a capless squeezable dispenser which is free of movable mechanical parts which are subject to failure.

Another object of our invention is to provide a capless, squeezable dispenser which, when stored, rests upon the end of the dispenser through which the material contained therein is discharged so that gravity maintains the material at all times over an end of the internal discharge tube.

Yet still a further object of our invention is to provide a capless squeezable dispenser which is fully operative for discharge of the contents therein contained in a generally horizontally plane with the discharge orifice in the vertical plane.

A further object of our invention is to provide a capless squeezable dispenser in which the material contained therein is stirred or agitated after each use.

2

Yet still a further object of our invention is to provide a capless squeezable dispenser which may be repeatedly filled or may be discarded after use.

Another object of our invention is to provide a capless squeezable dispenser which has means for discharging the contents contained therein in the usual fashion of an ordinary bottle as well as dripless discharge without one function interfering with the operation of the other function.

Still yet another object of our invention is to provide a capless squeezable dispenser which may be fabricated from inexpensive synthetic materials which are unbreakable upon impact and which are sufficiently inexpensive to be discarded after a single use.

Squeezable dispensers of the character disclosed herein may be found in the U.S. Patent Office Class 222, subclasses 211, 214 and 464; Class 248, sub-classes 108 and 109. The following patents broadly relate to our invention but do not anticipate the same: 56,004; 1,573,334; 1,937,505; 2,189,454; 2,758,879; 2,763,404; 2,824,668; 2,989,216; 637,577; 1,334,606; 3,154,222; 3,172,575.

SUMMARY OF INVENTION

By way of summary, our invention is a squeezable dispenser comprising a closed container, at least a portion of which is resiliently flexible, a guide depending from the bottom of the container, the lower-most end of the guide lying in a plane, the container being standable on said guide, a tube within the container, the tube extending through the bottom thereof and terminating externally to the container in an open end, the said open end terminating at a level above the lower-most extent of the guide, the said external terminal end of the tube being generally parallel to the plane of the lower-most end of the guide, the tube defining a passage extending through the bottom of the container, upwardly and then downwardly therewithin and terminating internally in the container in an open end in close proximity to the bottom of the container.

PREFERRED EMBODIMENT OF INVENTION

These objects and advantages as well as other objects and advantages may be achieved by our invention, two preferred embodiments of which are illustrated in the drawings in which:

FIGURE 1 is a side elevational cross-sectional view of a refillable, capless squeezable dispenser;

FIGURE 2 is a side elevational cross-sectional view of a disposable capless squeezable dispenser;

FIGURE 3 is a fragmentary side elevational cross-sectional view of our dispenser illustrated in FIGURE 2 operating in a horizontal position.

Referring now to the drawings in detail and specifically to the embodiment of our invention illustrated in FIGURE 1, there is provided a resilient, squeezable flask or bottle 11 fabricated of some convenient material such as polyethylene. The bottle or flask 11 has a conventional shape comprising a generally cylindrical body portion 12, a circular bottom 13 and a top, integral neck 15 of reduced diameter. The neck 15 is also provided with external threads 16 to accommodate a cap 17 which is threadably engaged thereto. The cap 17 is not generally adapted for discharge of material contained in the bottle 11 but rather to facilitate recharging of the bottle with new material.

The bottle 11 and cap 17 may be fabricated of any convenient, resiliently flexible material, such as polyethylene.

The cylindrical portion 12 of the bottle 11 is provided with an annular depending collar 18, which serves as a positioning guide for the dispensing of fluid from within the bottle.

The bottom 13 of the bottle 11 is provided with a central, circular opening 19. A discharge tube 20 is seated within and extends through the opening 19 terminating in an open-ended nozzle 21. The discharge tube 20 extends vertically upwardly in the direction of the neck 15 of the bottle 11 and may be conveniently positioned generally coaxial with the longitudinal axis of the bottle 11. The upper-most end of the discharge tube 20 is provided with an aperture 21.

An external feed tube 22 telescopically receives the discharge tube 20 and is generally coaxial therewith. The feed tube 22 is secured to the discharge tube 20 at its top most end defining a closed end 23. The feed tube 22 and discharge tube 20 collectively define an annular passage 24 therebetween. The annular passage 24 communicates with the opening 21 in the top of the discharge tube 20. The feed tube 22 extends downwardly to a point immediately above the bottom 13 of the bottle 11 defining an annular opening 25 which communicates with the internal chamber 26 of the bottle 11.

In operation, fluid material is charged into the bottle 11 through the open neck 15 thereof when the cap 17 is removed. The fluid material may substantially fill the bottle 11 and surrounds the two internal tubes 20 and 22. To dispense material from the annular collar 18 is brought into contact with the surface onto which the fluid is to be discharged. The nozzle 21 extends to a point between the bottom of the annular collar 18 and the bottom 13 of the bottle 11. The bottle 11 is then squeezed thereby reducing the total volume of the chamber 26. This increases internal pressure within the bottle 11 forcing fluid material through the annular opening 25 at the bottom of the feed tube 22. The material passes upwardly through the annular passage 24 between the feed tube 22 and the discharge tube 20 to the aperture 21 in the top of the tube 20. From thence, the material is forced by the unbalanced internal pressure within the chamber 26 downwardly through the central passage 27 in the discharge tube 20 to be discharged through the open nozzle 21. The collar 18 serves to quickly and easily position the nozzle with respect to the surface onto which the material is to be discharged. Thus, when discharging material onto the body in a shower or bathtub, the bottle may be squeezed and the material therein contained properly discharged with the eyes closed and merely by touch.

As the pressure exerted upon the outside of the bottle 11 is released, the resilient character thereof will cause the bottle 11 to assume its normal configuration thereby increasing the total volume of the chamber 26 and reducing the pressure therein. Since some material has been discharged through the discharge tube 20, a slight negative pressure will be generated within the chamber 26 as the bottle 11 attains its original configuration and volumetric displacement. This negative pressure will draw air through the open end of the nozzle 21 upwardly through the passage 27 in the tube 20 forcing the fluid material in front of it upwardly through the said passage 27, through the opening 21 and downwardly through the annular passage 24 between the tube 20 and the tube 22. If the volume of the fluid discharged is equal to the total volume of the passage 27 of tube 20 and the annular passage 24 between tubes 20 and 22, the said passages will be completely cleared of fluid material. Even if the passages 27 and 22 are not completely cleared of fluid, none will drift downwardly through passage 27 to the nozzle 21 since the total pressure head of material which may be left in passage 27 will be easily overcome by the vacuum created by its downward displacement. No siphoning effect is possible since the bottle 11 is sealed and therefore no air can leak in to replace fluid which may siphon off downwardly through passage 27 and that would leak through nozzle 21. Thus, the bottle is substantially dripless.

Referring now to species of our invention illustrated in FIGURES 2 and 3, there is provided a squeezable, flexible, flask or bottle 28 having a generally cylindrical por-

tion 29 formed integral with an arcuate or domed top portion 30. The bottle or flask 28 is provided with an inwardly arcuate or concave bottom 31 formed integral with the cylindrical portion 29, thereby defining a depending annular edge 32. The bottom 31 is provided with a generally circular central opening 33 into which a plug 34 is fixedly seated.

The plug 34 is formed integrally with an upstanding generally vertical discharge tube 35. The discharge tube 35 is provided with an internal passage 36 which communicates with an internal passage 37 extending transversely through the plug 34.

The discharge tube 35 extends upwardly and for convenience generally coaxial with the longitudinal axis of the bottle 28, to a point immediately beneath the domed top 30 thereof. The tube 35 is provided with a loop 38 at the top and extends downwardly from the loop 38 in a depending leg 39. The depending leg 39 flares radially, outwardly and downwardly in a bottom leg 40 terminating adjacent to the edge 32 of the bottle 28.

The wall of the bottle 28 adjacent to the end of the outwardly and downwardly flaring leg 40 of the tube 35 is provided with an externally convex bulge 41 thereby defining an internally concave bulge to accept the end of the leg 40 of tube 35.

In addition, the tube 35 is provided with a pressure equalization aperture 42 located immediately beneath the topmost portion of the loop 38 and contiguous to the depending leg 39.

In operation, the bottle 28 is positioned against the surface onto which the material from within the chamber 42 is to be discharged by engaging the circular edge 32 thereagainst. The end of passage 37 is somewhat above the plane of the edge 32 sufficient to permit the discharge of material into the cavity defined between the surface onto which the material is to be discharged and the concave bottom 31. Thus, the edge 32 functions as a positioning guide as did the depending collar 18 of the species of our invention illustrated in FIGURE 1.

The bottle 28 is then squeezed to reduce the total volume of the chamber 42 with resultant increase in internal pressure. It is convenient to maintain the topmost level of the fluid within the chamber 42 beneath the aperture 42 in the loop 38. The increase in internal pressure forces fluid upwardly through the outwardly and downwardly flaring leg 40, leg 39 and through and around the loop 38 and downwardly through passage 36 and 37 to be discharged therefrom. The decrease in volume of the chamber 42 will cause the surface 43 of the fluid contained therein to rise above the aperture 42. Nevertheless, as the amount of material within the chamber 42 decreases, the pressure above the level 43 of the fluid will force the fluid to remain in the discharge tube 35. Still further, the aperture 42 is so small as to create sufficient frictional orifice resistance to prevent substantial loss of fluid through it.

As pressure is released from the bottle 28, the chamber 42 returns to its original volume creating a negative pressure equivalent to the volume of material displaced. Such negative pressure draws fluid in passage 36 upwardly until the pressure in the air space above the level 43 of the fluid in the chamber 42 is equal to the head of material left in passage 36.

The opening 42 in the loop 38 accommodates for changes in ambient atmospheric pressure. For instance, should the ambient atmospheric pressure decrease substantially, air would be drawn through the opening 42 thereby breaking the siphon effect and preventing the leakage of material through passage 36 and passage 37.

As can be seen in FIGURE 3, the species of our invention illustrated therein and in FIGURE 2 is adaptable for use in the horizontal position as for instance in the dispensing of window cleaning fluids or other cleaners on vertical surfaces. The bottle 29 is oriented so that the bulge 41 is at the bottom. Thus, no matter how little ma-

terial may remain within the chamber 42, it will always cover the end of the outwardly and downwardly flaring leg 40 until the material is completely exhausted and bottle empty.

As an added protective measure, an adhesive strip 44 may be fixed to the bottom of the plug 34 covering the end of passage 37. However, this strip may be removed once the bottle is purchased and not replaced.

As has been clearly illustrated, the embodiment of our invention illustrated in FIGURE 1 is refillable since, (1) the material is exhausted from the chamber 26, new material may be introduced through the neck 15 of the bottle 11. The embodiment of our invention illustrated in FIGURE 2 is not refillable in any convenient manner, but is adaptable for use in the horizontal position. Obviously, features of the species illustrated in FIGURE 1 may be combined with elements of the species illustrated in FIGURE 2 to provide a dispenser which is not only refillable but operable in the horizontal position. The refilling feature of our invention is important since one dispensing bottle may be used to dispense material ordinarily not contained within such a dispensing bottle but rather contained within other bottles.

Dispensing bottles of the character illustrated in our present application have particular use for materials which are extremely viscous. Ordinarily, bottles containing viscous materials as for instance ketchup, are stored with the neck in the upward position. As the contents of the bottle are exhausted, one must wait for the remaining contents to flow downwardly to the neck of the bottle before discharge occurs. In our invention, the dispenser always rests upon the guide, either collar 18 in FIGURE 1 or circular edge 32 in FIGURE 2. The pick-up for material in both species of our invention is located adjacent to these said guide elements. Thus, the dispenser may conveniently stand upon these guide elements so that the material contained within the dispenser, no matter how viscous, will always be positioned for immediate discharge.

The foregoing description is merely intended to illustrate an embodiment of the invention. The component parts have been shown and described. They each may have substitutes which may perform a substantially similar function; such substitutes may be known as proper sub-

stitutes for the said components and may have actually been known or invented before the present invention.

We claim:

1. A squeezable dispenser comprising,
 - (a) a closed container at least a portion of which is resiliently flexible,
 - (b) a guide depending from the bottom of the container, the lower-most end of the guide lying in a plane, the container being standable on said guide,
 - (c) a tube within the container, the tube extending through the bottom thereof and terminating externally to the container in an open end, the said open end terminating at a level above the lower most extent of the guide, the said external terminal end of the tube being generally parallel to the plane of the lower-most end of the guide,
 - (d) the tube defining a passage extending through the bottom of the container upwardly and then downwardly therewithin and terminating in an open end within the container in close proximity to the radially outer edge of the bottom thereof, the tube having a second passage in its upper-most portion communicating with the interior of the container.
2. A squeezable dispenser comprising,
 - (a) the structure in accordance with claim 1 in which
 - (b) the guide is defined by the lower-most edges of an upwardly concave bottom on the container.
3. A squeezable dispenser comprising,
 - (a) the structure in accordance with claim 1 in which
 - (b) the container has an internal enlargement at the radially outer edge of the bottom thereof, and
 - (c) the tube terminates in an open end within the container at said enlargement.

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