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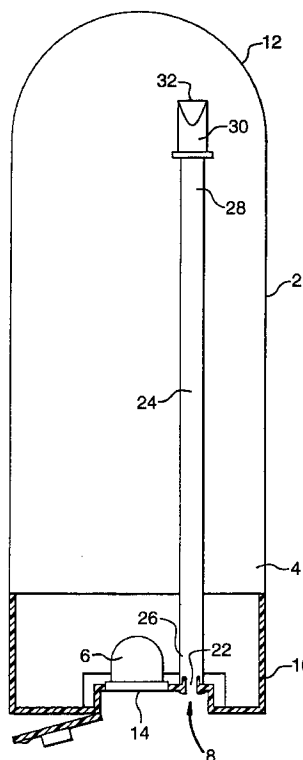
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(54) **Bottom delivery package with air suction system**

(57) A dispensing package is provided for delivery of fluid products and includes a container (2) for storage with first and second ends, the first end including a discharge opening and configured to standingly engage support surfaces upon which the package normally rests, a flow control valve (6) for controlling the flow of the product from the container and a one-way venting mechanism (8) separate from the flow control valve for allowing equalization of air pressure.

Fig.1.



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Description

The invention relates to inverted dispensing packages fitted with vent mechanisms for improving the speed of air pressure equalization.

There has been a growing popularity for inverted packaging to dispense fluid products, especially those that are highly viscous. The term "inverted" refers to packaging whose discharge opening is on the same end of the container intended to standingly engage support surfaces upon which the package normally rests. Colloquially the arrangement is known as bottom delivery packaging.

Bottom delivery packages with self-sealing valves for storing and dispensing fluid materials have been commercially employed as packaging for shampoos, conditioners, soaps and detergents. Use of a self-sealing valve eliminates the need to operate a removable closure when dispensing the product. Typically the self-sealing valve has a closed position for preventing any discharge of fluid through the valve when not in use, and an open position to dispense fluid through the valve upon application of manual squeezing forces.

The advantage of the inverted configuration is that product is immediately available. One need not wait till a viscous fluid flows from the closed to the open end. With this benefit comes a problem. It is necessary to admit ambient air to enter the package to achieve pressure equalization. Poor air flow inhibits dispensing, causes glugging, sometimes results in splatter and is generally frustrating for a consumer to operate.

Air equalization problems are particularly prevalent with self-sealing valves such as the slitted silicone rubber type reported in U.S. Patent 5,033,655, U.S. Patent 5,213,236 and U.S. Patent 5,339,995, all to Brown et al. of Liquid Molding Systems, Inc. Similar difficulties are associated with self-sealing dispensing valves in containers disclosed by U.S. Patent 4,728,006 (Drobish et al.) designed for shampoos, conditioners and other hair care products.

U.S. Patent 5,431,290 (Vinciguerra) in the context of baby bottles has achieved improved flow through use of a one-way air valve including a central diverging passage defined by opposed converging sidewalls which have a tiny slit elongated along the apex portion of the converging sidewalls in an annular base sized for attachment to the open end of the baby bottle. The valve is concavely mounted onto the bottle to avoid breakage and to prevent leakage of the contents.

It is an object of the present invention to provide an inverted dispensing package with a venting mechanism for allowing equalization of air pressure, especially for highly viscous fluid products.

Another object of the present invention is to provide an inverted dispensing package for fluid products that permit rapid recovery of the dispensing package by greatly increasing the amount of air re-entering the package.

Still another object of the present invention is to

provide an inverted dispensing package with a venting mechanism that permits significant reduction in container weight without a loss of package performance.

A dispensing package for a fluid product is provided that includes:

- (i) a container for storing the fluid product, the container having opposite first and second ends, the first end including a discharge opening and configured to standingly engage support surfaces upon which the package normally rests;
- (ii) a flow control valve for controlling the flow of product from the container; and
- (iii) a one-way venting mechanism separated from the flow control valve and functioning to allow equalization of air pressure between the interior and exterior of the container.

A particularly useful flow control valve for purposes of this invention is a silicone rubber formed with a resiliently flexible connector sleeve capped with a head that shifts outwardly in a manner which causes the sleeve to double over and extend rollingly when pressure within the container rises above a pre-determined amount. Sliced across the head are at least one slit, preferably at least a pair of slits. The preferred embodiment orients the first and second slits in a mutually intersecting relationship. U.S. Patent 5,339,995 (Brown et al.) assigned to Liquid Molding Systems, Inc. discloses a preferred valve of the aforementioned construction.

In an embodiment of the present invention, the package may further include an opening along the first end adjacent the flow control valve. A hollow dip tube having first and second termini at opposite ends is arranged within the container, the first terminus being anchored over the open end. The hollow dip tube projects inwardly toward the second end of the container. A one-way venting mechanism is fitted onto the second terminus of the dip tube.

Venting mechanisms of the present invention may include an elastomeric head having a slit with lips closed together when air pressure inside is equal to ambient pressure outside. When ambient air pressure outside the container is greater than that inside, the lips will be forced open.

In a further embodiment of the invention, the venting mechanism includes a plug seal fitment arranged at the second end of the container. Within the container is held an elastomeric rubber member. This rubber member has a round conical segment which tapers outwardly to a thinner width terminating in a edge sealingly contacting an inner wall of the plug seal fitment. The round conical segment desirably is sufficiently resilient to flex downwardly toward the first end of the container upon creation of a reduced pressure therewithin to admit equalizing ambient air pressure into the container.

In a further embodiment according to the present invention, an elastomeric head is seated within walls of the container and includes an anchor portion, a body

portion and a head portion. The head portion is directed and tapers toward an interior of the container, terminating in an end having a slit which includes lips held sealingly together under equal pressurization but flexibly separable to allow air passage under unequal pressurization.

The anchor portion is a flange whose underside abuts an outer wall of the container.

For all embodiments, it is desirable that the container have walls squeezably deformable upon application of hand pressure. Pressure forces dispensing of the container contents. These walls can rapidly recover their storage shape after removal of the hand pressure.

The above features, advantages and objects of a present invention will more fully be appreciated through the following discussion, reference being made to the drawings, wherein:

Fig. 1 is a cross-sectional highly schematic view of the first embodiment according to the present invention;

Fig. 2 is an enlarged cross-sectional partial view of a preferred control flow valve installed in an associated container, the valve being shown in a fully open, and fully extended position;

Fig. 3 is a cross-sectional view of a second embodiment of the present invention in highly schematic form with the second end of the package being separated to better illustrate aspects of the one-way venting mechanism;

Fig. 4 is an enlarged cross-sectional view of the one-way venting mechanism indicated along circular line 4-4 of Fig. 3; and

Fig. 5 is a third embodiment according to the present invention shown in highly schematic form with a duckbill one-way venting mechanism separated from the container showing its mode of attachment.

According to the first embodiment illustrated in Fig. 1, the dispensing package includes a container 2 storing a fluid product 4, a flow control valve 6 and a one-way venting mechanism 8. The container has a first and second end 10, 12 opposite one another. A discharge opening 14 is located at the first end and configured to standingly engage support surfaces upon which the package normally rests.

A preferred embodiment of the flow control valve 6 is shown in Fig. 2. Therein a silicone rubber is formed into a resiliently flexible connector sleeve 16 capped with a head 18 that shifts outwardly in a manner which causes the sleeve to double over and extend rollingly when pressure within the container rises above a predetermined amount. The head includes first and second slits 20 oriented in a mutually intersecting relationship.

As shown in Fig. 1, the package further includes an opening 22 along the first end 10 of the container adjacent the flow control valve 6. A hollow dip tube 24 within the container has a first and second terminus 26, 28 at opposite ends. The first terminus 26 is anchored over the opening 22 and projects inwardly toward the second end 12 of the container. The second terminus of the dip tube is attached to the one-way venting mechanism which is an elastomeric head 30 having a slit 32 with lips closed together when air pressure inside is equal to ambient pressure outside the container and with lips forced open when ambient pressure outside is greater than that inside the container.

Fig. 3 illustrates a second embodiment of the dispensing package. Herein the venting mechanism includes a plug seal fitment 34 arranged at the second end of the container. Within the plug seal fitment is held an elastomeric rubber member 36. Fitment 34 seats over neck 38, the latter having an air inlet 40.

Fig. 4 illustrates the elastomeric rubber member 36 in greater detail. This member has a round conical segment 42 which tapers outwardly to a thinner width terminating in an edge 44 sealingly contacting an inner wall 46 of the plug seal fitment 34. Round conical segment 42 is sufficiently resilient to flex downwardly toward the first end 10 of the container upon creation of a reduced pressure therewithin to thereby admit equalizing ambient air pressure into the container. A central gripping post 48 projects downward from the fitment. The round conical segment embraces post 48 through a central recess 50. Vent holes 52 allow transfer of air through the fitment.

Fig. 5 illustrates a third embodiment of the present invention. An elastomeric head 54 is seated within the walls 56 of container 2. The elastomeric head includes an anchor portion 58, a body portion 60 and a head portion 62. The head portion is directed and tapers toward an interior 64 of the container, terminating in an end having a slit 66. The slit includes lips held sealingly together under equal pressurization but flexibly separable to allow air passage under unequal pressurization. The anchor portion is constructed as a flange whose underside 68 abuts the outer wall 56 of the container.

The foregoing description illustrates only selected embodiments of the present invention. In light thereof, various further modifications will be suggested to one skilled in the art, all of which are within the spirit and purview of this invention.

Claims

1. A dispensing package for a fluid product comprising:
 - (i) a container for storing the fluid product, the container having opposite first and second ends, the first end including a discharge opening and configured to standingly engage support surfaces upon which the package normally

rests;

(ii) a flow control valve for controlling the flow of product from the container; and

(iii) a one-way venting mechanism separated from the flow control valve and functioning to allow equalization of air pressure between the interior and exterior of the container.

2. A dispensing package according to claim 1 wherein the flow control valve is a silicone rubber formed with a resiliently flexible connector sleeve capped with a head that shifts outwardly in a manner which causes the sleeve to double over and extend rollingly when pressure within the container rises above a predetermined amount.
3. A dispensing package according to claim 2 wherein the head includes first and second slits oriented in a mutually intersecting relationship.
4. A dispensing package according to any one of the preceding claims, further comprising an opening along the first end adjacent the flow control valve.
5. A dispensing package according to any one of the preceding claims, further comprising a hollow dip tube within the container having first and second termini at opposite ends, the first terminus anchored over the opening and projecting inwardly toward the second end of the container, the second terminus of the dip tube being attached to the one-way venting means.
6. A dispensing package according to any one of the preceding claims, wherein the venting means is an elastomeric head having a slit with lips closed together when air pressure inside is equal to ambient pressure outside the container and with lips forced open when ambient pressure outside is greater than that inside the container.
7. A dispensing package according to any one of the preceding claims, wherein the venting means comprises a plug seal fitment arranged at the second end of the container within which is held an elastomeric rubber member.
8. A dispensing package according to claim 7 wherein the rubber member has a round conical segment which tapers outwardly to a thinner width terminating in an edge sealingly contacting an inner wall of the plug seal fitment.
9. A dispensing package according to claim 8 wherein the round conical segment is sufficiently resilient to flex downwardly toward the first end of the container upon creation of a reduced pressure there-within to thereby admit equalizing ambient air pressure into the container.

10. A dispensing package according to any one of claims 6-9, wherein the elastomeric head is a duck-bill valve.

11. A dispensing package according to any one of claims 6-10, wherein the elastomeric head is seated within walls of the container and comprises an anchor portion, a body portion and a head portion.

12. A dispensing package according to claim 11 wherein the head portion is directed and tapers toward an interior of the container terminating in an end having a slit comprising lips held sealingly together under equal pressurization but flexibly separable to allow air passage under unequal pressurization.

13. A dispensing package according to claim 12 wherein the anchor portion is a flange whose underside abuts an outer wall of the container.

14. A dispensing package according to any one of the preceding claims, wherein the container has walls squeezably deformable upon application of hand pressure to force dispensing, which walls can rapidly recover after removal of hand pressure.

Fig.1.

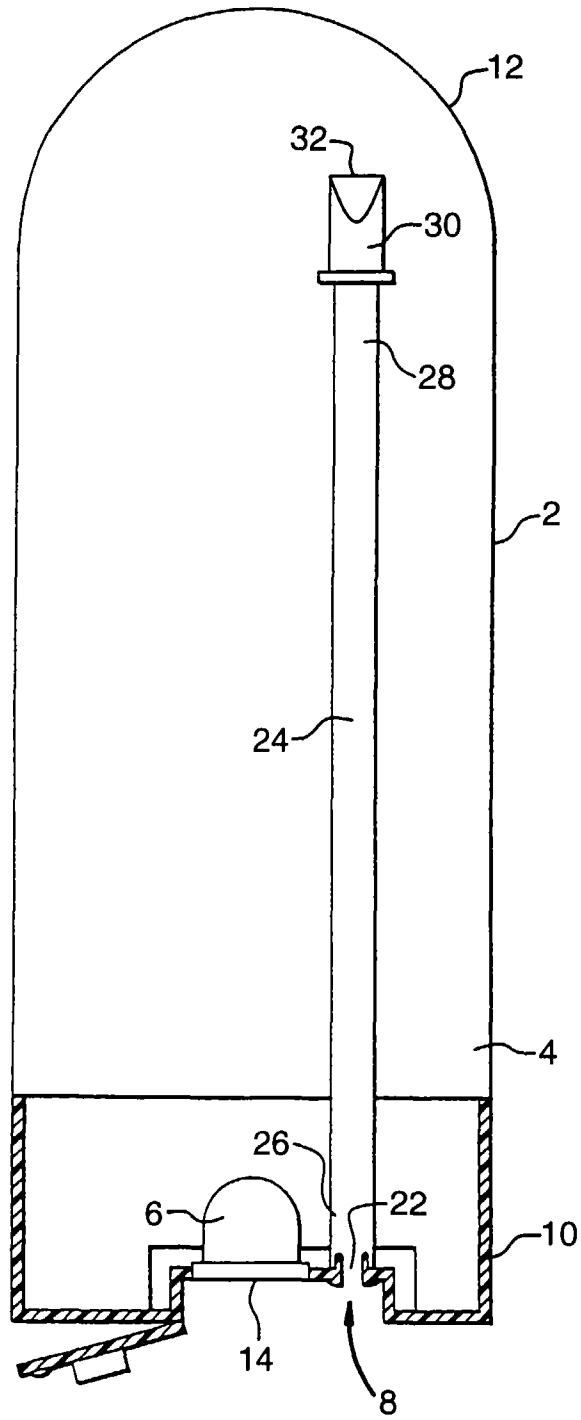


Fig.2.

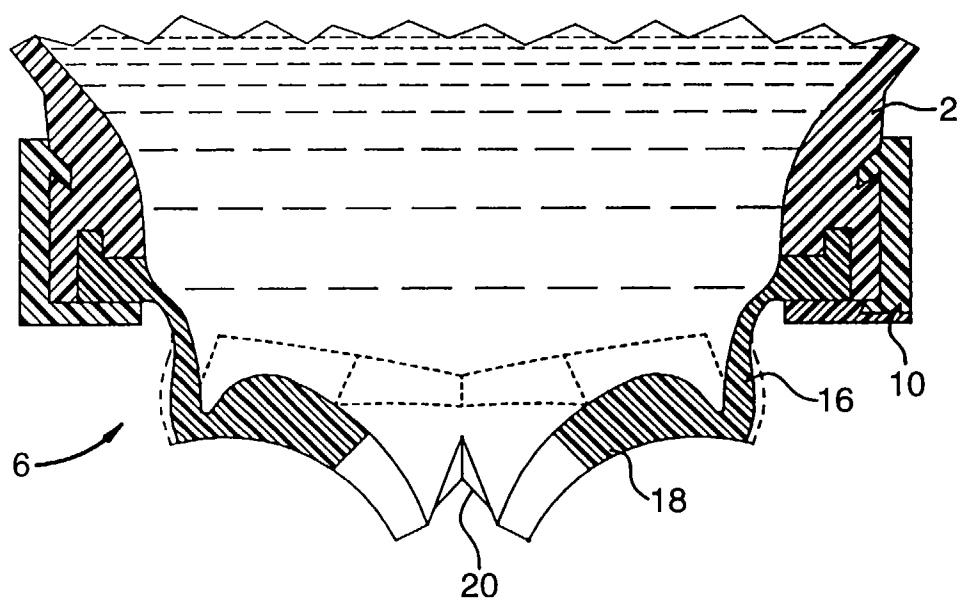


Fig.3.

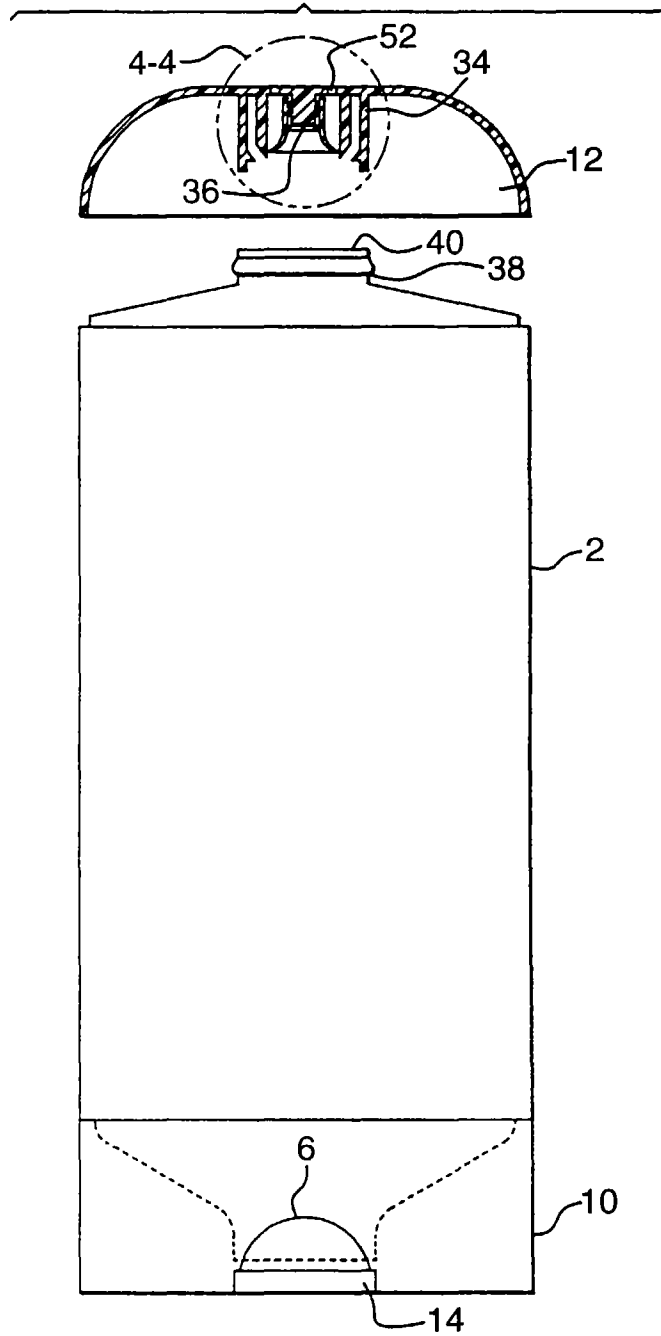


Fig.4.

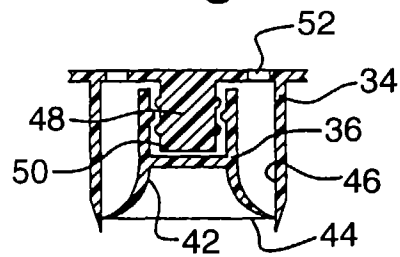
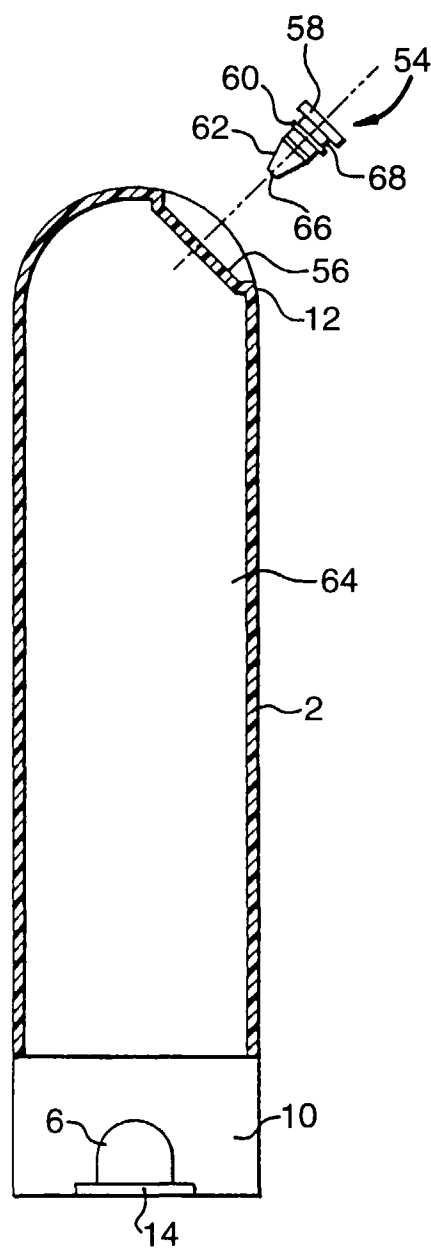


Fig.5.





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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 3359

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|----------------------------------|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| D,Y | US 5 213 236 A (BROWN PAUL E ET AL) 25 May 1993 * column 6, line 53 - column 7, line 26 * * column 8, line 58 - column 9, line 27 * * figures 1-6,13 * | 1-4,6,7,14 | B65D51/16 B65D1/32 B65D47/20 |
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| D,Y | US 5 431 290 A (VINCIGUERRA MARK T) 11 July 1995 * column 3, line 47 - column 4, line 12 * * figure 2 * | 6,7 | |
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| The present search report has been drawn up for all claims | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| | | | B65D A47K |
| Place of search | | Date of completion of the search | Examiner |
| THE HAGUE | | 1 September 1997 | Farizon, P |
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