

[54] **DISPENSING CLOSURE WITH PUMP PARTS AND CONTAINER USING THE SAME**

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[57] **ABSTRACT**

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A deformable container can be utilized with a dispensing closure having a cap and a rotary spout adapted to be moved between an open and a closed position as a "pump" so as to exhaust the contents of the container by utilizing in connection with these parts or elements a vent extending through the closure, and inlet and outlet check valves. Preferably the check valves are mounted on a fitment within the cap so as to serve as a part of the closure itself. Preferably the vent is closed off by the spout when the spout is in a closed position.

[52] U.S. Cl. 222/209, 222/211, 222/212, 222/536

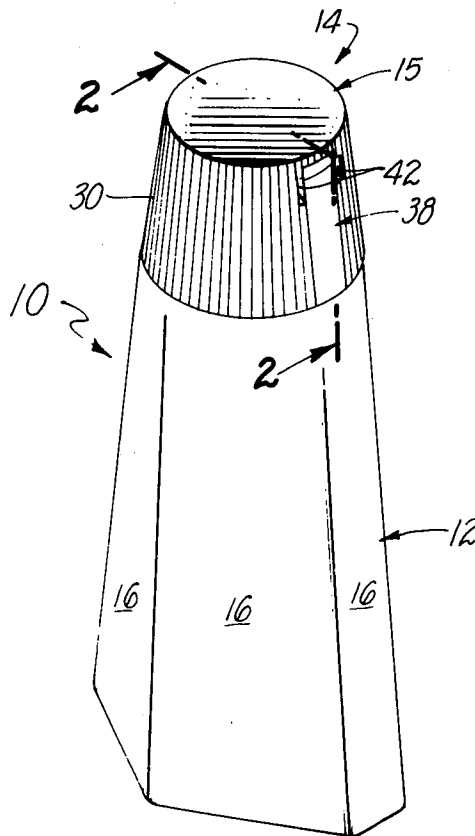
[51] Int. Cl. **B65d 37/00**

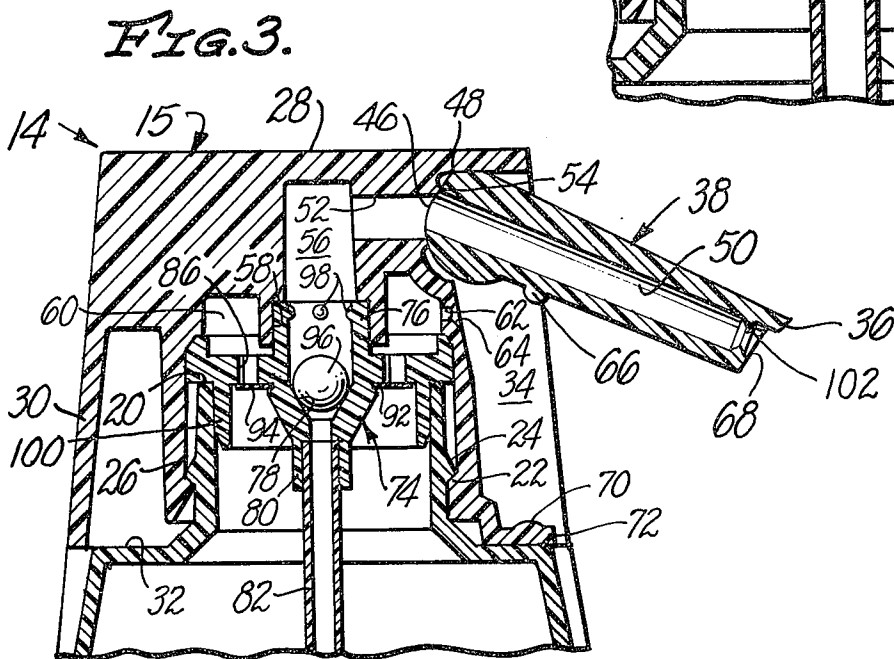
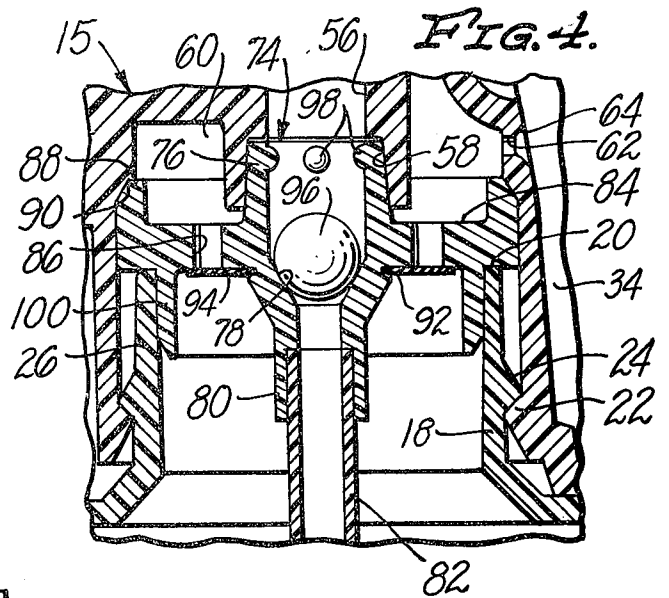
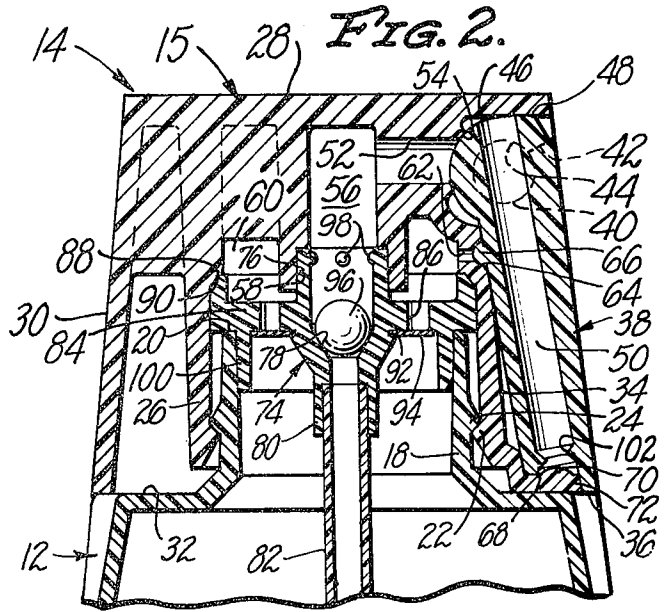
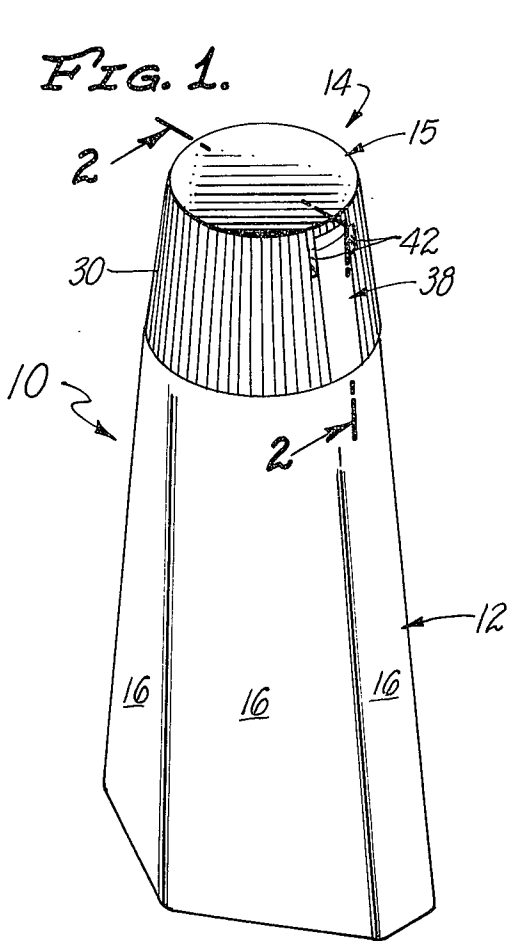
[58] Field of Search 222/209, 211, 212, 484, 222/536, 383, 529, 537; 417/472

[56] **References Cited**
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3,163,337 12/1964 Wilson 222/484 X

10 Claims, 4 Drawing Figures





**DISPENSING CLOSURE WITH PUMP PARTS AND
CONTAINER USING THE SAME**
**CROSS-REFERENCE TO RELATED
APPLICATIONS**

Robert E. Hazard patent application Ser. No. 305,487 filed Nov. 10, 1972, entitled "Dispensing Closure With Spout Mounted in Closure Skirt".

BACKGROUND OF THE INVENTION

The term "dispensing closure" is at present commonly utilized to designate closures having a closure cap which is intended to be mounted upon a container or formed integrally with a container and having a spout movably mounted on the cap so as to be capable of being moved between opened and closed positions. When such a spout is in an open position a passage within it is in communication with an opening through the cap and when the spout is in a closed position it serves to seal off this opening. These dispensing closures are most commonly manufactured as two-part structures using materials such as common polyolefins enabling these parts to be snapped together by a procedure involving temporary material deformation. Many millions of these closures are made and sold annually.

Many of these dispensing closures are utilized in connection with so-called "squeeze bottles." Such squeeze bottles are deformable containers manufactured of vinyl or polyolefin compositions so as to be of such a character that when pressure or force is applied to them that their internal capacity will be reduced and are of such a character that when such pressure or force is release their internal capacities revert to what they were before pre-sure was applied to them. Such deformable containers are considered highly preferable in packaging many types of products because they are relatively unbreakable and because their costs are essentially nominal.

As conventional dispensing closures have been used on such containers, it has been necessary to invert these containers when these closures are in an open position and then to squeeze these containers so as to force their contents out through these closures. On occasion, such closures have been connected to tubes extending from them to the bottoms of containers. When such tubes have been employed it has not been necessary to invent containers as indicated in order to dispense the contents of these containers.

Although this "squeeze" mechanism of dispensing container contents is closely related to a pumping action it is not technically a pumping action. This can be illustrated by considering that when a dispensing closure is used on a squeeze container and that when such a container is at least partially collapsed and is then released so as to resume its original configuration a partial vacuum will be created within the interior of the container. This vacuum will tend to draw back into the container any contents within a dispensing closure and/or a tube as indicated. Such a partial vacuum will also tend to draw air back into the container. As a result of these factors, as a container as indicated is subsequently squeezed or collapsed in volume this action will not directly and immediately deliver the contents of the container through the closure used. This can be somewhat frustrating and inconvenient.

Because of this type of thing a number of manufacturers utilize pump structures on comparatively large

containers. Frequently such a pump structure is mounted upon a conventional closure type of cap. Such a pump structure normally incorporates the conventional pump elements of inlet and outlet check valves and a piston or a diaphragm or the like capable of being manipulated so as to actuate the pump structure. Normally, such a piston or the equivalent is of an undesirable size. Because of this size, problems are frequently encountered in packaging and in stacking containers utilizing such pump structures.

Normally such a piston or the like or its associated structure to be operative has to extend from or be exposed to the surface of a package in such a way that it is apt to be damaged during normal handling and various related operations. Further, when a conventional pump is used on a container there is always a significant danger of individuals actuating such a pump on a display shelf unless specialized, separate means are used in connection with the pump to discourage this.

As a consequence of this type of thing and the costs of separate pump structures, it is considered that the use of conventional pumps on many types of products such as cosmetic products is undesirable. However, pumps are frequently utilized on comparatively large sized containers for a number of products because of their ability of being able to dispense a product without the container for the product being lifted. It is common for manufacturers to utilize dispensing closures on comparatively small containers for a product and to utilize such pumps on larger containers of the same product even though this is not desired from an aesthetic point of view. These aesthetic factors normally cause manufacturers to want all packages or containers for a product to have essentially the same generalized appearance even though such containers may differ from one another as to size.

BRIEF SUMMARY OF THE INVENTION

From a consideration of the foregoing it will be realized that there is a need for dispensing closures which can be utilized in combination with deformable containers to replace the use of complete pumps or pump-type structures as have been utilized with various types of containers. A broad objective of the present invention is to satisfy this need.

A more specific objective of the present invention is to provide dispensing closures which can be utilized in conjunction with deformable containers and with inlet and outlet check valve means so that the combination of these elements constitutes what in effect is a pump. A further objective of the invention is to provide dispensing closures in which these valve means are incorporated within the closure itself as an integral part of the closure so that the closure may be handled in essentially the same manner as any other closure during capping and related operations.

Further objectives of this invention are to provide dispensing closures as indicated for use in dispensing a product which are comparatively inexpensive to manufacture, and assemble, which are comparatively inexpensive, which are comparatively easy to install and use upon a deformable container, which are of such a character as to be desirable from aesthetic and other related considerations, which facilitate stacking of capped containers, which do not present any significant shipment or related problems, which may be easily and conve-

niently used and which are effective for their intended purposes.

The invention is also directed to what may be considered as new and improved pump structures in which such dispensing closures and the deformable containers cooperate together to define complete packages capable of serving as pumps which do not utilize as any separate element or elements corresponding to a conventional piston, a deformable diaphragm or the like.

In accordance with this invention these and various related objectives of the invention are achieved in the combination of a deformable container and a dispensing closure for such a container having a cap with an opening extending therethrough and a spout movably mounted on said cap so as to be capable of being moved between an open position in which the spout is in communication with the opening and a closed position in which the spout seals off the opening of a structure including a vent extending through the closure and inlet and outlet check valve means positioned as hereinafter described so that force may be applied to the deformable container in order to obtain a pumping action serving to dispense the container contents through the spout. Preferably, such a closure is capable of being sold as a separate article incorporating these check valve means so that it can be utilized on a conventional deformable container without modification of such a container.

BRIEF DESCRIPTION OF THE DRAWING

The invention encompasses many more features and details than can be specifically indicated in a summary of its principle features as indicated in the preceding. Further details as to the invention are best indicated with reference to the remainder of this specification, the appended claims and the accompanying drawing in which:

FIG. 1 is an isometric view of a presently preferred embodiment or form of a dispensing closure in accordance with this invention used in combination with a conventionally constructed deformable container;

FIG. 2 is a partial cross-sectional view taken at line 2-2 of FIG. 1;

FIG. 3 is a partial cross-sectional view corresponding to FIG. 2 showing the spout used in this closure in an open position; and

FIG. 4 is a fragmentary cross-sectional view enlarging a part of FIG. 2.

The accompanying drawing is primarily intended to clearly illustrate for explanatory purposes several structures embodying the essentially intangible concepts of the invention set forth and defined in the appended claims. Through the use of routine skill in the dispensing closure industry it is possible to utilize these concepts in a number of different ways in connection with both closures and packages which are significantly different from the closure and the container illustrated both as to appearance and construction. For this reason the illustrated structures and the description of them embodied in this specification are not to be taken as limiting this invention as it is set forth in the claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 of the drawing there is shown a complete package 10 in accordance with this invention which includes in combination a container 12 and a dispensing

closure 14. This container 12 is of conventional "squeeze bottle" character and is formed so that its side walls 16 may be pushed towards one another when force is applied through manual manipulation so as to reduce the internal volume within the container 12. This container 12 is also of such character that when the pressure applied in this manner is released it will return to its initial configuration due to the inherent resiliency of the material within it. This container 12 may conveniently be formed of a known vinyl composition, a known polyolefin composition or the like.

As the container 12 is formed it preferably includes an extended top cylindrical neck 18 having an end 20 and having a surrounding conventional bead 22. This bead 22 is intended to mate with a corresponding bead 24 on a sub-skirt 26 formed on a cap part 15 of the closure 14 so as to depend from a top 28 of this cap 15. The particular cap 15 illustrated is set forth in detail in the aforementioned Hazard U.S. patent application entitled, "Dispensing Closure with Spout Mounted in Closure Skirt." The entire disclosure of this co-pending application is incorporated herein by reference.

This cap 15 includes a principal skirt 30 dependent from the top 28 which is adapted to fit against the container 12 so as to cover a shoulder 32 on this container 12 and a peripheral lengthwise groove 34 extending generally between the top 28 and the shoulder 32. The groove 34 does not extend through the top 28 and the container 12 is formed so that a lip 36 on a rotatable spout 38 may be engaged from beneath the skirt 30 so that this spout 38 may be rotated from a closed position as indicated in FIGS. 1 and 2 to an open position as indicated in FIG. 3.

This spout 38 carries aligned trunnions 40 which are adapted to be snapped through restricted entrances 42 into bearing openings 44 as described in the Wilson et al U.S. Pat. No. 2,793,795. It is also to be understood that the spout 38 can be movably mounted in other manners. Certain of these are indicated in the aforementioned co-pending application. The spout 38 may be mounted as indicated so that friction alone will serve to hold it in an open position as shown in FIG. 3. However, preferably the spout 38 includes on its base 46 a projection 48 engaging the undersurface of the top 28 so that as a result of temporary material deformation this spout 38 can only be rotated between two positions with difficulty and so that this projection 48 will engage the top 28 so as to serve to hold the spout 38 in an open position as indicated in FIG. 3.

In this position, the spout 38 extends outwardly and downwardly from the skirt 30 so that it can be conveniently utilized to deliver the contents of the container 12 into a hand or receptacle located adjacent to the package 10 as this package 10 is used in its intended manner. Because of the operation of the projection 48 serving to hold the spout 38 in an open position as indicated this projection 48 and the top 28 may be considered as essentially a holding means or a detent means for holding the spout 38 in an intended open position.

When the spout 38 is in such an open position the base 46 is located so that the passage 50 in the spout 38 is in communication with a horizontally extending opening 52 in the cap 15. Normally a conventionally known sealing ring 54 will be located on the cap 15 around the opening 52 so that a seal will be formed at all times between the base 46 and the cap 15. This cap 15 also includes an internal cylindrical chamber 56 in

communication with the opening 52. The bottom of this chamber 56 is defined by a cylindrical end portion 58 of larger diameter than the remainder of the chamber 56.

It will be noted that there is an annular channel 60 extending around this portion 58 between it and the sub-skirt 26. When the spout 38 is in other than a closed position as indicated in FIG. 2 of the drawing, this channel 60 is in communication with the exterior of the closure 14 through a small vent 62 leading from the bottom of the groove 34 to the channel 60. Thus, when the spout 38 is in an open position as shown in FIG. 3 of the drawing, this vent 62 is opened. In order to effectively seal this vent 62 when the spout 38 is closed it is preferred to form in the bottom of the groove 34 around it a small valve seat 64 and to locate upon the spout 38 a projection 66 serving as a valve member to mate against the seat 64 so as to seal it.

Normally the spout 38 will be "latched" in a closed position in which the projection 66 is seated and sealed at the valve seat 64 because of the action of the projection 48 with respect to the top 28 as indicated in the preceding discussion. Normally this latching action will be reinforced by the end 68 of the spout 38 adjacent to the lip 36 popping over a small upstanding bump 70 located on an end wall 72 on the cap part 15. However, this bump 70 or an equivalent structure can if desired be omitted.

In the interest of clarity it should be pointed out that the cap part 15 and the spout 38 as described to this point in the specification can be separately utilized as a dispensing closure in accordance with known or conventional practice. Normally for such utilization the vent 62 and the valve seat 64 and the projection 66 are omitted when the cap part 15 and the spout 38 are used as a dispensing closure. The present invention is not directly concerned with the details of such a "separate" closure using only the cap 15 and the spout 38 which are considered to make it desirable.

Instead, the present invention is primarily concerned with parts which are added to such a cap part 15 and the spout 38 so as to create what is defined herein as the complete dispensing closure 14 and to the utilization of such a complete dispensing closure 14 in combination with the container 12. It is to be understood that various subsequently described parts either directly or through routine design modification can be utilized with some other complete dispensing closures constructed utilizing functional equivalents of the cap part 15 and the spout 38.

In what is described herein as a complete dispensing closure 14 is a fitment 74 which is utilized with the cap part 15. This fitment 74 includes a central cylindrical body 76 which is adapted to fit closely within the plug 58 so as to be held in position by friction in communication with the chamber 56. Conventional equivalents of friction may be used to hold the fitment 74 in position. The lower part of this body 76 carries a tapered, conical valve seat 78 leading to a centrally located cylindrical extension 80. This extension 80 is adapted to frictionally hold an extending tube 82 which leads to the bottom of a container 12. It is possible to form the tube 82 as a part of the extension 80, but this is not normally desired for economic reasons.

Around the body 76 adjacent to the middle of this body 76 there is located an outwardly extending flange 84. At least one opening or port 86 extends through

this flange 84 so as to place the interior of the channel 60 in communication with the interior of the closure 14 and the container 12. Preferably this flange 84 is formed as shown so as to seat against the end 20 and so as to have a shoulder 88 which mates and seats against a corresponding shoulder 90 on the sub-skirt 26. The body 76 also includes a peripheral groove 92 into which a small, flat rubber or similar washer 94 may be snapped in such a manner that this washer 94 normally fits against the flange 84 so as to form a seal therewith covering any openings 86 used.

It is to be noted that the periphery of the washer 94 is spaced slightly from the interior of the neck 18 so as to be capable of flexing during the operation of the closure 14. Thus, this washer 94 acts essentially as a movable valve member. A common ball 96 acting as a similar valve member is located within the interior of the body 76 in a position in which gravity will normally hold it against the valve seat 78. The ball 96 and the seat 78 constitute a check valve—more specifically an outlet check valve—through which the contents of the container 12 must pass during a dispensing operation. The washer 94 and the flange 84 in effect constitute a similar check valve—in this case an inlet check valve—through which air must pass during the use of the closure 14 in combination with the container 12.

Normally small temporarily deformable bumps 98 will be located on the interior of the body 76 adjacent to the upper end of this body 76. These bumps 98 are of such a dimension and are spaced so as to be capable of being deformed during assembly so that the ball 96 can be "popped" into place in such a manner that it will not fall out during handling or use. This ball 96 is of course slightly smaller in diameter than the interior of the body 76. During use the ball will be retained in this body by these bumps 98. If desired, the flange 84 may be provided with a dependent plug 100 adapted to fit closely within the interior of the neck 18 so as to form a seal in connection with this neck.

The use of the described structure is essentially very simple. When the complete package 10 is to be employed the spout 38 is moved to an open position as shown in FIG. 3. Thereafter, the walls 16 may be pushed together. This will cause a decrease in the capacity of the container 12, forcing the contents of the container 12 up through the tube 82. As this occurs the ball 96 will be lifted off of the seat 78 and such contents will flow into the chamber 56 and then into the opening 52 and finally out through the spout 38.

When the pressure on the walls 16 is released the container 12 will resume its initial configuration, enlarging the available space within this container 12. As this occurs the ball 96 will move against the seat 78 so that there is no further flow past it. During such reversion of the container 12 to its initial configuration, air will be drawn in through the vent 62 and the channel 60 through the openings 86 and the washer 94 will flex to a sufficient extent to permit this air flow.

When the walls 16 are again squeezed so as to be deformed the cycle of operations will again be carried out. During the partial collapsing of the container 12 any air within this container 12 will be compressed to some extent. During such compression any of the container contents elevated to the height of the opening 52 will tend to drain out through the spout 38.

This mode of operation of the complete package 10 is considered to make it possible to achieve results not

previously achieved in a satisfactory manner through the use of a dispensing closure. This can be illustrated in several different ways. Because of the effective dispensing action achieved, it is possible to locate within the spout 38 an internal spray structure 102 positioned within the passage 50 adjacent to the end 68. This structure 102 is shaped in the conventional manner of a spray nozzle; when a complete package 10 including this optional structure 102 is used, an effective spray can be obtained.

It is also possible to modify the closure 14 in various different ways so that when the closure is operated a mixture of container contents and air is dispensed. Such a modification can be accomplished by utilizing one or more small air openings in the fitment 74 which will bypass or extend around the tube 82 so that a restricted amount of air in the top of the container 12 will be ejected from the complete package 10 when the contents of this container are dispensed. Preferably any such passage should bypass or be located in parallel with the valve seat 78.

The invention is quite important in enabling the contents of a container to be dispensed without a container being moved off of a shelf or the like and/or without utilizing in connection with a container all of the normal, separate, essential pump elements. It is considered highly significant that a pump-type action has been achieved in the package 10 with essentially a flat top being provided on the package 10 so as to facilitate store stacking and the like.

It is also considered significant that with the package 10 the spout 38 serves to "seal" the package in a broad sense of the term so that material will not be dispensed from the package 10 until the spout 38 is opened, even though minor pressure may be applied to the container 12 during handling or the like. It is further considered significant in that the described package 10 contains no exposed parts located where they may be damaged during handling and the like.

I claim:

1. In the combination of a deformable container and a dispensing closure used in removing contents from within said container, said closure having a cap with an opening extending therethrough and a spout movably mounted on said cap so as to be capable of being moved between an open position in which said spout is in communication with said opening and a closed position in which said spout seals off said opening, the improvement which comprises:

- a vent extending through said closure,
- a flow actuated inlet check valve means leading into said container mounted on said closure in communication with said vent,
- said vent and said inlet check valve means serving to permit air to enter the interior of said container,
- a flow actuated outlet check valve means leading from the interior of said container to said opening mounted on said closure,
- a tube means attached to said closure in communication with said outlet check valve means and leading to the bottom of said container,
- said deformable container being capable of being reduced in internal dimension when force is applied to it and being capable of returning to its original dimension when force is no longer applied to it,
- said deformable container and both of said check valve means cooperating to serve as a pump to dis-

pense the contents of said container through said tube means, said outlet check valve means and said spout when said spout is in said open position and to draw air into said container through said inlet check valve means to replace the dispensed contents as pressure is applied to said container and then released,

said spout closing off said vent and said opening when said spout is in said closed position, said vent being in communication with the interior of said spout when said spout is in said open position.

2. A combination as claimed in claim 1 including: means for holding said spout against inadvertent movement when said spout is in said closed position.

3. A combination as claimed in claim 1 including: means for holding said spout so that said spout extends downwardly and outwardly when in said open position.

4. A combination as claimed in claim 1 wherein: both of said check valve means are mounted on said closure so as to form a part of said closure and are located generally within the interior of said closure.

5. A combination as claimed in claim 1 including: a fitment having a surface with at least one port extending therethrough and having a valve seat formed therein located on said closure and forming a part of said closure,

said port being in communication with said vent, said valve seat being in communication with said outlet opening,

two movable valve member means located on said fitment,

one of said means serving to normally seal off said port so as to define in connection with said port said inlet check valve means,

the other of said movable means seating against said seat so as to define in conjunction with said seat said outlet check valve means.

6. A combination as claimed in claim 5 wherein: said first movable valve member is an elastomeric member mounted on said fitment so as to normally cover said port,

said second movable valve member comprises a ball located within said fitment and constrained against movement by said fitment and said cap.

7. A combination as claimed in claim 5 including: said first movable valve member is an elastomeric member mounted on said fitment so as to normally cover said port,

said second movable valve member comprises a ball located within said fitment and constrained against movement by said fitment and said cap,

a tube attached to said fitment extending to the bottom of said container and placing the bottom of said container in communication with said outlet check valve means,

said spout fits against said vent so as to close off said vent when said spout is in said closed position, and means for holding said spout so that said spout extends downwardly and outwardly when in said open position,

means for holding said spout against inadvertent movement when said spout is in said closed position.

8. A dispensing closure having a closure cap with an opening extending therethrough and a spout movably

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mounted on said cap so as to be capable of being moved between an open position in which said spout is in communication with said opening and a closed position in which said spout seals off said opening, in which the improvement comprises:

- a vent extending through said cap,
- a flow actuated inlet check valve means mounted on said cap within the interior of said cap and having an inlet in communication with said vent, said inlet check valve means leading into the interior of said cap,
- a flow actuated outlet check valve means mounted on said cap within the interior of said cap and having an outlet in communication with said opening, said outlet check valve means leading from the interior of said cap to said opening,
- said spout closing off said vent and said opening when said spout is in said closed position, said vent being open to the exterior of said cap and said opening being in communication with the interior of said spout when said spout is in said open position,
- means for attaching a tube to said cap so that said tube is in communication with said outlet check valve means within the interior of said cap, said closure being capable of being used with a deformable container as a pump.

9. A dispensing closure having a closure cap with an opening extending therethrough and a spout movably mounted on said cap so as to be capable of being moved between an open position in which said spout is in communication with said opening and a closed position in which said spout seals off said opening, in which the improvement comprises:

- a vent extending through said closure, said vent being sealed by said spout when said spout is in said closed position,
- an inlet check valve means mounted on said cap within the interior of said cap in communication with said vent,
- an outlet check valve means mounted on said cap

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within the interior of said cap in communication with said opening,

- said vent and said both of said check valve means enabling said closure to be utilized in connection with a deformable container as a pump,
- a fitment having a surface with at least one port extending therethrough and having a valve seat formed therein located on said closure so that said valve seat is in communication with said opening and said port is in communication with said vent, a flexible member capable of fitting against said surface and capable of bending away from said surface when pressure is applied to it and then moving against said surface so as to form a seal therewith when air pressure is no longer applied to it located on said fitment so as to engage said surface,
- said surface and said flexible member serving as said inlet check valve means and permitting air to be drawn through said cap into the interior of said closure,
- a ball capable of being moved within said fitment located within said fitment so as to be capable of normally seating against said valve seat,
- said ball and said valve seat constituting said outlet check valve means and permitting the contents of a container to be dispensed out through said cap through said spout,
- resilient latch means for holding said spout in said closed position, and
- means for holding said spout so that said spout extends downwardly and outwardly when in said open position.

10. A dispensing closure as claimed in claim 9 wherein:

- said cap has a dependent skirt,
- said spout is rotatably mounted on said skirt so as to be spaced from the top of said skirt, and including means for holding said spout so that it extends outwardly and downwardly from said skirt when said spout is in said open position.

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