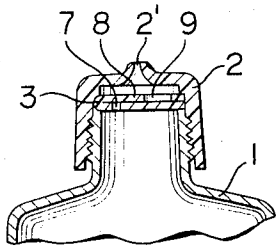
Dec. 26, 1967 RINNOSUKE SUSUKI ETAL 3,360,169

CONTAINER WITH AN IMPROVED DISPENSING CLOSURE

Filed April 7, 1966

FIG.1



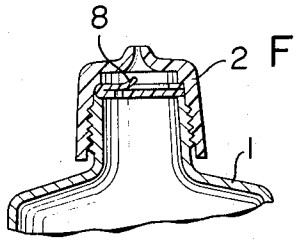


FIG.2

FIG.3

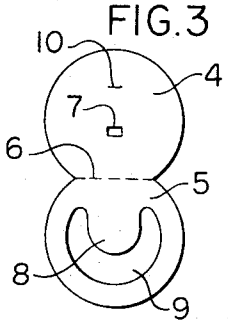


FIG.4

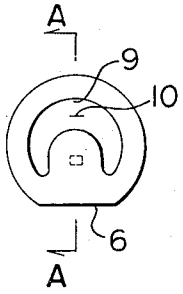


FIG.5

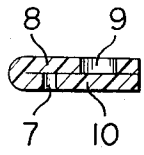


FIG.6

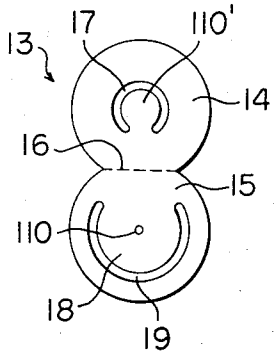


FIG.7

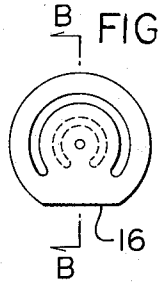


FIG.8

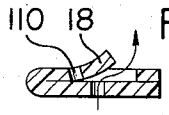
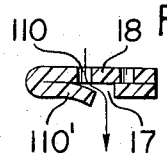


FIG.9



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CONTAINER WITH AN IMPROVED DISPENSING CLOSURE

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5 Claims. (Cl. 222—482)

This invention relates to a container having an improved dispensing closure.

More specifically, this invention relates to a container for storing liquid detergents, liquid cosmetics, liquid seasonings or the like, and particularly relates to a container having an improved dispensing closure which includes valve means of a simplified structure.

Conventional containers are commonly provided with caps so as to prevent outflow of the liquid contained therein through the mouth or the spout thereof when the container is placed in a tilted position or when it lies on its side. Such containers require the users to remove the caps each time it is desired to use such containers. Containers of an improved type require the user to use one of his hands to hold the body of the container and, in addition, to use the other hand to perform at least one process of manipulation to release or remove the cap or to open the valve involved. Furthermore, this type of container has a cap with a complicated liquid passageway structure. Such cap requires extra parts, resulting in an increased number of manufacturing steps and in an increased manufacturing cost.

It is, therefore, the primary object of the present invention to provide a liquid container provided with an improved dispensing closure which completely eliminates the foregoing drawbacks of the conventional spouts. The dispensing closure prevents spilling of the liquid stored in the container when the container topples sideways and also instantaneously arrests the outflow of the liquid whenever it is desired to stop a further outflow of the liquid through the spout. The improved dispensing closure also enables the user to freely pour a desired amount of the liquid from the container by a simple procedure including lifting the container, tilting it and squeezing the body of the container, all of which requires the use of only one of the user's hands.

Another object of the present invention is to provide a container with an improved dispensing closure having a stop valve, which closure is simple in structure, which is formed of a folded thin synthetic resin sheet and which can be manufactured at a very low cost.

Still other features and advantages of the present invention will become apparent upon reading the following description in connection with the accompanying drawings, wherein:

FIGURE 1 is a longitudinal cross section of the container having the dispensing closure of the present invention mounted thereon and showing the valve means in a closed state;

FIGURE 2 is a view similar to FIGURE 1 showing the valve means in an open state for dispensing fluid from the container;

FIGURE 3 is a top plan view of the dispensing closure before folding;

FIGURE 4 is a top plan view of the dispensing closure in the folded state;

FIGURE 5 is a cross-sectional view of the dispensing closure taken along the line A—A in FIGURE 4;

FIGURE 6 is a top plan view of a modified dispensing closure before folding;

FIGURE 7 is a top plan view showing the dispensing closure in a folded state ready for use;

FIGURE 8 is a cross-sectional view taken along the line B—B in FIGURE 7;

FIGURE 9 is a view similar to FIGURE 8 and showing the manner in which the ambient air is introduced.

Referring now to the drawings, FIG. 1 shows the structure according to the present invention which includes a dispensing closure 3 mounted on the open end of the neck of a container body 1 and which is retained firmly in place by a cap 2. When the dispensing closure is in the closed state as shown in FIG. 1, the liquid stored in the container cannot flow out through the neck even if the container 1 should topple sideways. When the body of the container is squeezed, however, the valve means of the dispensing closure will be opened as shown in FIG. 2 and the liquid will flow out smoothly from the container.

The dispensing closure 3 is formed by cutting out a thin synthetic resin film, such as polyethylene, polypropylene, polyvinyl chloride, acrylic resin or polycarbonate, into a shape as shown in FIG. 3. In FIG. 3, reference numeral 4 indicates a lower layer, numeral 5 indicates an upper layer and numeral 6 represents the fold line of the film. The lower layer 4 is provided with an aperture 7 through which liquid can flow and which is formed by punching said flap. The lower layer 4 also has an opening 10 through which air can flow and which is in the form of a slit or a pinhole. The opening 10 is defined by integral deformable edges which normally maintain said opening closed. However, a difference of pressures acting on opposite sides of the layer 4 will deform the edges of the opening 10 in order to open said opening. The upper layer 5 is formed to provide an integral elastically deformable valve member 8 at a position opposite to said aperture 7 relative to the fold line 6. The upper layer 5 also has a crescent-shaped cut-out portion 9 at the position opposite to the opening 10 relative to said fold line 6. The dispensing closure 3 in its folded state, or in other words, in the state in which it is used, is shown in FIGS. 4 and 5. It will be clearly understood from these illustrations that the aperture 7 is in engagement with and is normally closed by the valve member 8 because said valve member elastically engages the layer 4 and overlies and closes said aperture 7. Further, the opening 10 is in registry with the cut-out portion 9 so that the air within the neck portion of the container communicates with the ambient air via the nozzle 2' of the cap 2 in FIG. 1.

Returning now to FIG. 1, consideration will be given to a situation when the container body 1 is compressed or squeezed externally on its sides. As the pressure inside of the container 1 becomes elevated due to such squeezing operation and becomes greater than atmospheric pressure, the valve member 8 will be moved away from its state of engagement with the layer 4 because of the difference in the pressures on the inside and the outside of the container, as is clearly shown in FIG. 2 and the aperture 7 becomes open. The liquid, being subjected to a pressure within the container, is now easily forced to flow through the aperture 7 and the nozzle 2' of the cap out of the container.

After a desired amount of the liquid has been poured from the container, the pressure which has been applied externally to the container is released. With this release of the external pressure, the container begins to restore its initial configuration by virtue of its own elasticity while the ambient air is introduced through the opening 10. At this stage, the pressure inside of the container is not equal to atmospheric pressure, but instead, it is slightly lower than atmospheric pressure. This difference in the

pressure between the inside and the outside of the container causes the valve member **8** to come into snug engagement with the layer **4** so as to tightly cover the aperture **7**. As a consequence, the liquid in the container cannot flow out from the container even if the latter falls on its side.

The size or the area of the opening **10** is preferably selected to suit the viscosity coefficient of the liquid with which the container is filled. In the case where the liquid has a relatively high viscosity, an opening **10** of fairly large size can be used. The provision of a fairly large opening **10** offers the advantage that the restoration of the normal configuration of the container is accelerated. In the case where the liquid is of a relatively low viscosity, however, it is not advantageous to use a film with a punched opening **10** in which case a portion of the film is removed. Rather, it is preferred to use a film having a so-called sheared opening which will work in such fashion that the cut edges of the film which face with each other will be displaced relative to each other to provide an open area therebetween.

The structure of the present invention may be constructed by placing, in advance, the dispensing closure **3** onto the upper neck portion of the container and subsequently placing the cap thereon so as to retain the dispensing closure tightly therein, or by attaching the dispensing closure **3** in advance to the bottom portion of the cap before same is placed on the neck portion of the container. A satisfactory effect may also be obtained by the use of a dispensing closure which is formed by fusing a lower layer **4** and a separate upper layer **5** at a portion of their edges.

In the modified dispensing closure shown in FIGS. 6–9, the communication of the air is effected, instead of by a single air passage opening **10** as previously described in the embodiment, by an opening **110** provided in the center of the layer **15** of a thin film and by a flap **110'** provided on the layer **14** of the thin film. More specifically, in this modified dispensing closure, the valve member for the liquid and the valve flap for air passage open in opposite direction relative to each other, as is shown clearly in FIGS. 8 and 9. When the container is squeezed, the valve member **18** of the dispensing closure is opened as shown in FIG. 8, permitting the liquid to flow along the course indicated by the arrow. When the squeezing pressure is discontinued, the air valve flap **110'** is opened and the ambient air is introduced into the container along the course indicated by the arrow in FIG. 9.

While the foregoing description of the dispensing closure of the container of the present invention has been described with reference to a container which is of elastically deformable construction, the dispensing closure may be provided also on a container, such as a glass bottle, which is not squeezable. In the case where the dispensing closure of the present invention is used on a rigid container, the dispensing closure is opened, instead of by squeezing the body of the container to elevate the interior pressure, by holding the container upside down and by moving the container downwardly rapidly, in which case the pressure force of the liquid due to inertia works upon the dispensing closure to open it.

The container of the present invention uses a dispensing closure of a simple structure formed by folding a cut-out thin film of synthetic resin. The container of the present invention is effective in that the liquid stored therein does not accidentally flow out from the container merely as a result of its falling sideways and that a desired amount of the liquid can be poured from the container by tilting the container and applying a pressure to the body of the container externally.

What is claimed is:

1. A dispensing closure for a discharge opening of a container, comprising:

two parallel layers arranged in superimposed contacting relation and adapted to be sealingly engaged with the container, each layer comprising a synthetic resin sheet, one of said layers having a pair of openings therethrough, one of said openings being adapted for discharging the contents of said container and the other opening being adapted for admitting air into the container, the other layer having an integral elastically deformable valve member elastically engaging said one layer and overlying and closing one of said openings, said valve member being responsive to a difference of pressures acting on opposite sides thereof to open said one opening when the pressure on one side of said layers is greater than the pressure on the other side thereof, integral deformable means for normally maintaining the other opening closed at least one end thereof and responsive to a difference of pressures acting on opposite sides thereof to deform said integral means and open said other opening when the pressure on the other side of said layers is greater than the pressure on the one side thereof.

2. A dispensing closure according to claim **1**, in which said other layer has a cutout overlying said other opening, said other opening comprising a thin slit whose opposing walls normally contact each other and which are deformable to open said other opening.

3. A dispensing closure according to claim **2**, in which said layers are integral and are folded upon each other.

4. A dispensing closure according to claim **1**, in which said other layer has a single opening therethrough offset from said pair of openings in said one layer, said valve member closing off communication between said single opening and one of said pair of openings, a second integral elastically deformable valve member on said one layer and closing off communication between said single opening and the other of said pair of openings.

5. A dispensing closure according to claim **4**, in which said layers are integral and are folded upon each other.

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