United States Patent [19]

Whitehead

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[54] **CONTAINER CLOSURES**

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[52] **U.S. Cl.** **222/494,** 222/511

[51] **Int. Cl.** **B65d 5/72**

[58] **Field of Search** 222/106, 107, 212, 213, 222/215, 490, 498, 557, 517, 511, 491, 494

[56] **References Cited**

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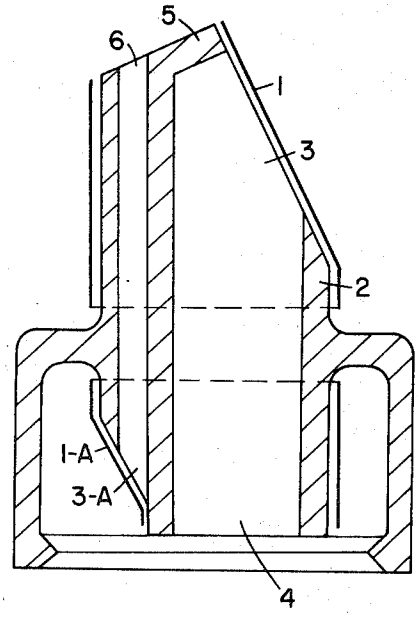
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Assistant Examiner—James M. Slattery

[57] **ABSTRACT**

This invention relates to dispensing caps for squeeze type containers for liquids, and semiliquids, which dispense said liquids, and semiliquids when pressure is applied to said containers. This applies to those containers which collapse when squeezed, such as toothpaste tubes, and the like, and squeeze bottles which revert to their normal shape after being squeezed. This applies also to liquids which are thin, such as water, and semiliquids which are thick, such as toothpaste, and all graduations between.

2 Claims, 2 Drawing Figures



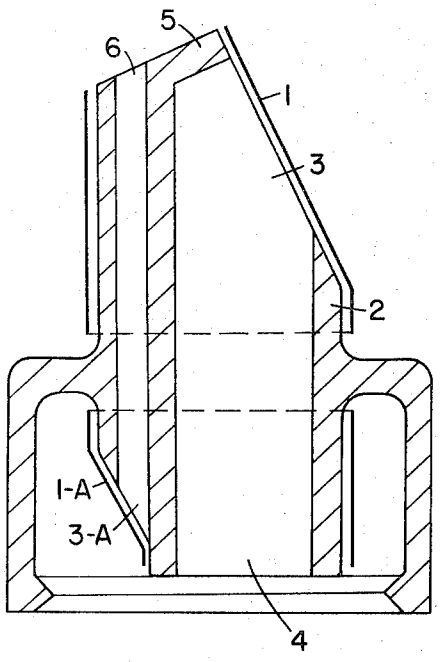


FIG. 1

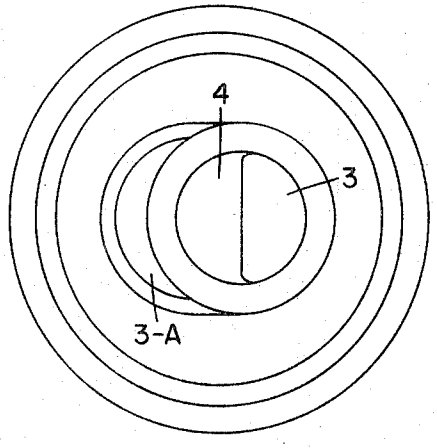


FIG. 2

CONTAINER CLOSURES

It is the object of this invention to provide an inexpensive, easily manufactured cap, which can be manufactured by know means, such as injection molding, using materials readily available.

Another object is to provide a cap which is fully automatic in its action of dispensing, and resealing.

Another object is to provide a cap which is also automatic in its action of recharging the container it is used on with air, when such recharging is necessary for efficient dispensing.

Yet another object is a cap which will not clog, drip, drool, weep, or stick open or closed.

Still another object is to provide a cap which lends itself to all means of attaching to containers, including screw on, snap on, press on, etc., and also molding as an integral part of the container, or making it a permanent member by use of glue, heat sealing, etc.

Another object is a cap simple in operation, yet positive in its actions.

These objects and still futher objects will be apparent from a study of the following drawings and disclosures.

FIG. 1 is a side view in section of the cap in snap on form, with a means of recharging the container embodied into it. This view also shows the diaphragm sleeve in place over the inclined opening, and the inner diaphragm sleeve in place over the inner inclined opening of the vent tube.

FIG. 2 is a rear end view of FIG. 1 showing the hollow interior, the inlet opening, and the inner inclined opening of the vent tube.

The improved cap of this invention is comprised of two basic parts, the cap body 2, and the diaphragm sleeve 1. The cap body 2, best shown in FIG. 1, is a hollow generally cylindrical shaped member, molded or otherwise constructed of a rigid or nearly rigid material, such as plastic. It is open at one end on a vertical plane to the longitudinal axis of the cap body 2. This is the entrance opening 4, which allows the contents of the container to enter the cap. Located at the opposite end, and at an inclined angle to the longitudinal axis of the cap body 2, is the exit opening 3. This is where the contents of the container will exit the cap. The dimensions of the cap body 2 are flexible, as the size may be changed to accommodate various liquids and semiliquids. The diaphragm sleeve 1, best shown in FIG. 1, is a hollow, generally sleeve shaped member, open both ends. It is made of an elastic material having the characteristic of resuming its shape after being stretched, such as rubber. It may be of a true tube or sleeve shape, or shaped the same as the cap body 2. In either case it must be somewhat smaller than the cap body 2, and stretched, rolled, slipped, etc., over the cap body 2, in such a way as to cover the inclined opening 3, sealing it. This cap uses the principals of hydraulics to operate, that being, pressure applied to a liquid will be transmitted in all directions equally. Therefore, when the container is squeezed, the pressure of the squeeze is transmitted through the liquid to that portion of the diaphragm sleeve 1 covering the inclined opening 3, causing it to lift, allowing the exit of said liquid. When the pressure is relaxed, the diaphragm sleeve 1 will resume its former shape, sealing the cap, stopping the flow of liquid, and forcing the remainder back into the container. Located at the front of the cap body 2, and

below the exit opening 3, is the face 5 of the cap, best shown in FIG. 1. The face 5 being at an angle of no less than 90° to the plane of the exit opening 3. This provides a more or less sharp angle at the junction of the exit opening 3, and the face 5, and allows the extruded material to be chopped off, minimizing the amount of material left sticking to the cap.

When it is desirable to recharge the container between uses, some means must be made availiable to allow air to enter the container. This is accomplished by incorporating into the cap body 2 a vent tube 6. This being best shown in FIG. 1. An inner diaphragm sleeve 1A is added to this assembly, to allow the cap to remain in a sealing condition, thus the finished assembly of the recharging Self Sealing Cap would consist of the cap body 2, the diaphragm sleeve 1, and the inner diaphragm sleeve 1A, and could accurately be described as two self-sealing caps placed back to back, one facing out, and the other facing in. The action of this assembly would be as described before in as much as the diaphragm sleeve 1 would be lifted by pressure created within the liquid by squeezing the container. However this same pressure would act upon the inner diaphragm sleeve 1A causing it to seal even tighter. With the squeezing of the container relaxed, the flow of material would cease as before. Due to the exit of part of its contents, a partial vacuum would be created within the container. This vacuum would cause the inner diaphragm sleeve 1A to lift from the inner inclined opening 3A, allowing air to enter and replace this vacuum, thereby recharging the container. After the recharging operation was complete, the inner diaphragm sleeve 1A would resume its former shape, covering and sealing the inner inclined opening 3A.

Having described the invention, what I am claiming as being new, and wish to secure letters patent for is:

1. A self sealing cap adapted to connection to squeeze type containers, comprised of an assembly of three parts, said parts being a substantially rigid cap body, having a generally cylindrical surface shape, hollow and open at both ends, said cap having an upper face, one opening being inclined at an angle to a longitudinal axis, the plane of said opening extending from a point on the cylindrical surface to the upper face, bisecting this face, said opening being substantially of a rounded triangle shape, the upper face of the cap body being at an angle to the plain of this opening, said cap body having a vent tube as an integral part of it, said vent tube being a passage from the outside of said cap, with an inner inclined opening into the interior of the container, positioned substantially parallel to the longitudinal axis of said cap body; an elastic diaphragm sleeve of the same general cylindrical configuration as said cap body, said diaphragm sleeve is adapted to fit over the cap body in such a manner as to cover the inclined opening, sealing it; and an inner diaphragm sleeve adapted to fit over said inner inclined opening, said assembly utilizing the pressure transmitted through the contents of the container, when said container is squeezed, to cause the diaphragm sleeve to open, said diaphragm sleeve utilizing its own natural resiliency to resume its normal shape, resealing said inclined opening, this being its normal shape in this assembly, the inner diaphragm sleeve utilizing the partial vacumm caused by the intended discharge of a portion of the contents of said container to open, venting the interior of the container to the atmosphere, and the natural resiliency of the inner diaphragm sleeve to reseal the inner inclined opening, this being its normal shape in this assembly.

2. A self sealing cap in accordance with claim 1, whereby the cap body is molded as an integral part of the container.

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