Aug. 3, 1965 A. W. KOPELMAN 3,198,406

DISPENSER CAP WITH DEFORMABLE CONE ASSEMBLY

Filed July 16, 1964

FIG. 1.

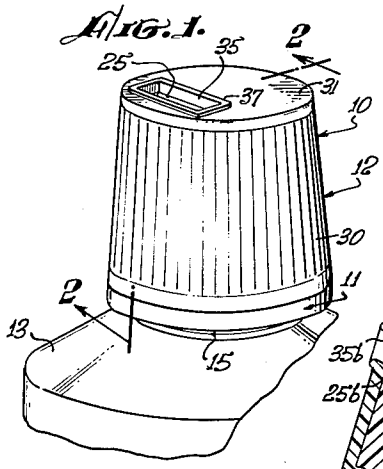


FIG. 2.

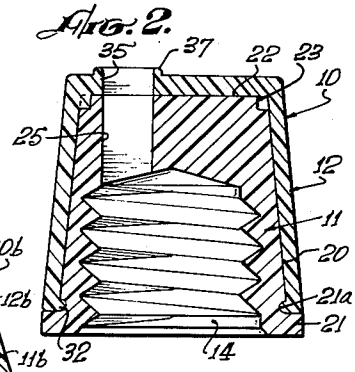


FIG. 5.

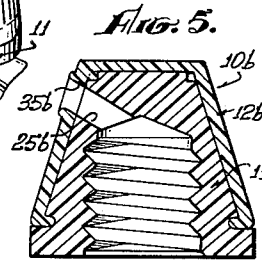


FIG. 3a.

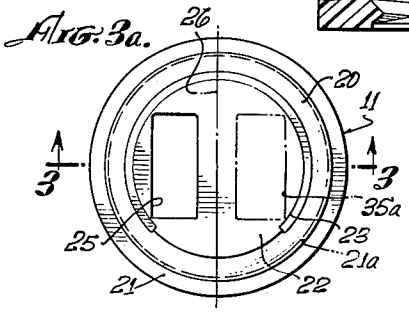


FIG. 4a.

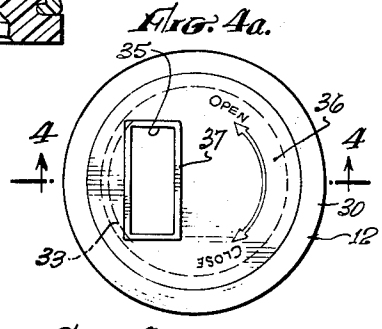


FIG. 3.

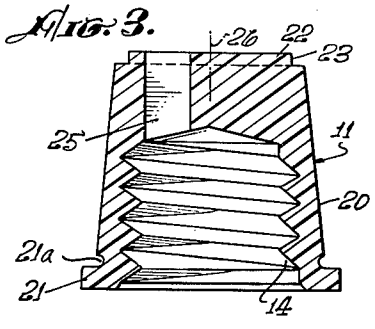


FIG. 4.

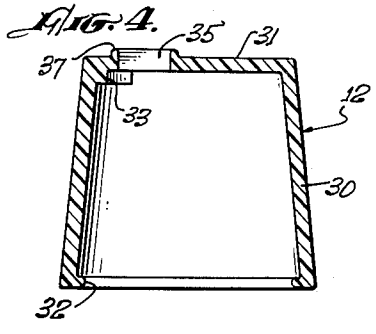


FIG. 3b.

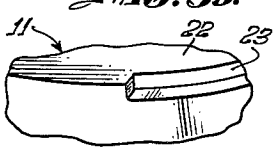
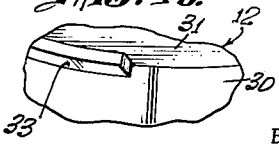


FIG. 4b.



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DISPENSER CAP WITH DEFORMABLE CONE ASSEMBLY

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This invention relates generally to dispenser caps having controllable valve means for dispensing liquids or pastes from a container, and more particularly, it relates to a dispenser cap comprising an outer cap rotatably retained on an inner cap, the outer cap having a resiliently expandable conical sleeve to permit assembly to be achieved by elastic deformation.

A common bathroom inconvenience is the loss of the cap from a tube of toothpaste. Since the cap must be completely unthreaded and removed from the toothpaste tube several times a day, it often occurs that the cap falls on the floor, or is even permanently lost down the drain. A similar inconvenience frequently occurs with containers of many other viscous liquids which are extruded from the container by pressure on the container walls. Flexible-walled polyethylene bottles are commonly used to dispense everything from thick shampoo to plumber's soldering flux; the walls of the container are squeezed in order to force the desired amount of liquid from the container opening.

In most cases, loss of the cap results in the loss of all or substantial parts of the liquid remaining in the container. Many liquids, such as glue or toothpaste, become so hardened in the part exposed to the air that the remaining liquid cannot be extruded from the container. In other cases, the liquids are lost by spillage, spoilage, or evaporation, etc.

A remedy for this inconvenience would be to provide a valve-type of cap for flexible-walled containers. Up to the present, however, no such dispensing cap has ever come into general acceptance because the valve-type caps hitherto proposed have been too large, and too expensive, to be included as a part of a disposable package.

Heretofore, it has generally been necessary to employ the combination of non-corroding metal parts with a rubber-like sealing ring or gasket, in order to achieve both good sealing against leakage and precise operation during opening and closure.

The present invention provides a very low-cost but efficient dispensing cap comprised only of two parts, an inner cap, and an outer cap made of plastic moldings.

The dispensing cap of the invention performs all the required functions of a valve-type cap. It provides efficient sealing of the container contents from exposure to air, or leakage under moderate pressure. It operates smoothly and positively between open and closed positions, which are positively located by integral stops, and the operation of opening and closing may be repeated over and over again without damage to the cap or impairment of its efficiency.

The dispenser cap of the invention achieves unique cheapness of manufacture because its parts are so constructed that they can be instantaneously pressed into permanent assembly by momentary deformation of the outer cap.

Moreover, the resilient construction of the outer cap serves not only to make possible a snap-together assembly, but also to achieve a moderate pressure between sealing surfaces after assembly, and to provide just sufficient friction between the inner cap and the outer cap to prevent unwanted movement between open and closed positions.

The foregoing and other objects and advantages of the invention will be understood from the following description, when read in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a dispensing cap constructed according to the invention, as it appears when attached to the outlet of a flexible-walled container;

FIGURE 2 is a transverse sectional view taken at a vertical plane indicated in FIGURE 1 by the arrows 2—2;

FIGURES 3*a* and 4*a* show plan views of the inner and outer cap parts, respectively, of the dispensing cap of FIGURES 1 and 2;

FIGURES 3 and 4 are transverse sectional views of the inner and outer caps, respectively, taken at the planes indicated in FIGURES 3*a* and 4*a* by the correspondingly numbered numerals;

FIGURE 3*b* is a fragmentary perspective view of an external annular step around part of the circumference of the inner cap of FIGURES 3 and 3*a*;

FIGURE 4*b* is a fragmentary perspective view of the internal annular shoulder in the upper end of the interior of the outer cap of FIGURES 4 and 4*a*; and

FIGURE 5 is a transverse sectional view, corresponding to the view of FIGURE 2, but showing an alternative construction of the invention, employing a side opening instead of a top opening in the outer cap component.

In FIGURE 1, a cap constructed according to the invention is indicated generally by the numeral **10**, and is seen from the cross sectional view of FIGURE 2 to be comprised of an inner cap **11**, and an outer cap **12**.

Cap **10** is mounted on the outlet of a flexible-walled container **13** by virtue of a threaded bore **14**, which is threadably received on the outlet **15** of container **13**. It will be understood that container **13** might be a tube of toothpaste, a polyethylene bottle of shampoo, or the like.

FIGURES 3 and 3*a* reveal that the inner cap **11** is in the form of the frustrum of an upwardly converging cone. The exterior conical surface may be designated by the numeral **20**. At the base of conical surface **20**, a horizontal radial flange **21** extends outwardly a distance corresponding approximately to the thickness of outer cap **12**. Just above flange **21** an annular groove **22** encircles the base of inner cap **11**, for the locking reception of outer cap **12** as will be explained hereinafter.

The upper surface of inner cap **11** is shown, in the preferred embodiment illustrated, as flat and horizontal, although, obviously, other cylindrical surfaces might be employed, as long as sealing contact with the underside of outer cap **12** is achieved. The flat upper surface **22** is partially surrounded by a circumferential step **23**, the function of which will be described hereinafter.

A vertical outlet passage of rectangular cross section **25**, is seen in plan in FIGURE 3*a*, and cross section in FIGURE 3. It is to be noted that vertical passage **25** is located entirely to the left of an axial plane indicated generally by the numeral **26**.

The outer cap **12** is illustrated in detail in FIGURES 4, 4*a*, and 4*b*, and is seen to be of relatively thin-walled construction, as compared with inner cap **11**. Outer cap **12** is thus elastically deformable for purposes of assembly. It is formed with a downwardly diverging conical sleeve **30**, depending from a top portion **31**, which is provided with an outlet opening **35**, which corresponds with inner cap passage **25**.

The base of outer cap **12** is provided with an internal annual shoulder **32**, which, upon assembly, is received in the external annular groove **22** in inner cap **11**. It will be seen, by comparing FIGURES 3 and 4, that assembly of outer cap **12** to inner cap **11** achieved by vertical pressure on outer cap **12** so as to cause its lower circumference to slide down on conical surface **20**, until it is momentarily deformed, and annular shoulder **32** then snaps into position in annular groove **22**, permanently holding outer cap **12** in rotational assembly with inner cap **11**.

An internal annular shoulder 33 extends around part of the circumference of the upper end of the interior of outer cap 12, and is adapted to be received in nesting and slidable engagement with the step 23 at the upper end of the exterior of inner cap 11.

Preferably, shoulder 33 extends around 90°, for example, of the circumference of the interior of outer cap 12, while step or groove 23 extends 270° around the circumference of inner cap 11, thus permitting 270° of rotation of outer cap 12 on inner cap 11, but providing positive stopping location at each end of the rotational path.

The rotational operation of the dispensing cap 10 will be seen from an examination of FIGURE 3*a* and FIGURE 4*a*. As illustrated in FIGURES 2 to 4, the inner and outer caps 11 and 12 are shown in the open position, with passage 25 in alignment with outlet 35. However, clockwise rotation through 270°, as indicated by the instruction arrow 36 imprinted on the top of outer cap 12, moves the opening 35 out of alignment with passage 25 and into a position indicated in FIGURE 3*a* by the dashed outline 35*a*, in which location closure is achieved.

In one preferred form of the invention, a peripheral projection 37 on the exterior of outer cap 12, as seen in FIGURES 4 and 4*a*, provides a nozzle effect, which prevents unwanted lateral flow of some types of paste or viscous liquid.

FIGURE 5 illustrates an alternative form of the invention, in which an inner passage 25*b* extends laterally through an inner cap 11*b*, and discharges through a side opening 35*b* and an outer cap 12*b*.

While I have described a preferred specific embodiment of my invention, it will be understood that modifications, additions, and variations might be made to the basic form of the invention, without departing from the scope covered by the invention as defined in the appended claims.

What is claimed is:

1. A dispenser cap which includes:

an inner cap having an internally threaded bore at its lower end for the reception of a threaded container outlet, and having an external conical wall surface diminishing in horizontal cross section to an upper end, and having the upper end of said conical surface provided with a circumferential step around at least part of its circumference;

an outer cap comprised of a top and a downwardly diverging conical sleeve depending from said top and mating with the upwardly converging conical wall surface of said inner cap, said outer cap having an internal annular shoulder adapted to mate with the external annular groove of said inner cap, and having an internal annular shoulder extending partially around the interior circumference of the upper interior of said outer cap to be slidably received in said upper exterior step of said inner cap, and permit partial relative rotation of said outer cap on said inner cap;

and walls defining mating passages in said inner and outer caps on one side of the axis of rotation of said outer cap, to provide selective opening and closure between said inner cap bore and the exterior of said outer cap.

2. A dispensar cap which includes:

an inner cap having an internally threaded bore at its lower end for the reception of a threaded container outlet, and having an external conical wall surface diminishing in horizontal cross section to an upper end, and having the lower end of said conical surface terminating at a radially projecting base flange, and an annular groove at the lower end of said conical surface immediately above said flange, and having the upper end of said conical surface provided with a circumferential step around at least part of its circumference;

an outer cap comprised of a top and a downwardly diverging conical sleeve depending from said top and mating with the upwardly converging conical wall surface of said inner cap, said outer cap having an internal annular shoulder adapted to mate with the external annular groove of said inner cap, and having an internal annular shoulder extending partially around the interior circumference of the upper interior of said outer cap to be slidably received in said upper exterior step of said inner cap, and permit partial relative rotation of said outer cap on said inner cap;

and walls defining mating passages in said inner and outer caps on one side of the axis of rotation of said outer cap, to provide selective opening and closure between said inner cap bore and the exterior of said outer cap.

References Cited by the Examiner

UNITED STATES PATENTS

751,157	2/04	Fisher	222—545
2,138,992	12/38	Baker	222—545
2,765,954	10/56	Wohlbier	222—248 X
3,029,003	4/62	Gronemeyer	222—245
3,104,039	9/63	Dike	222—245 X

FOREIGN PATENTS

662,616	12/51	Great Britain.
609,566	9/60	Italy.

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