Dec. 14, 1965 R. C. ROBERSON ETAL 3,223,298

BOTTLE CAP

Filed April 6, 1962

FIG. 1.

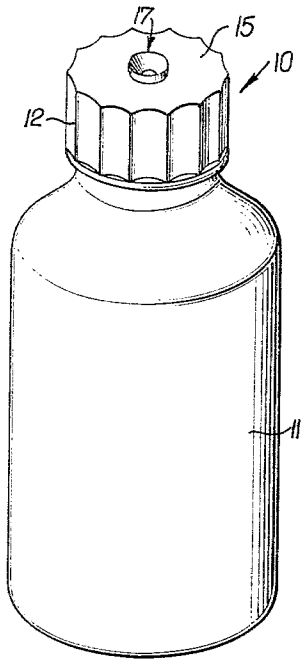


FIG. 2.

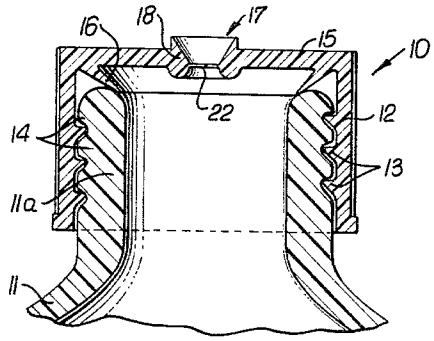


FIG. 3.

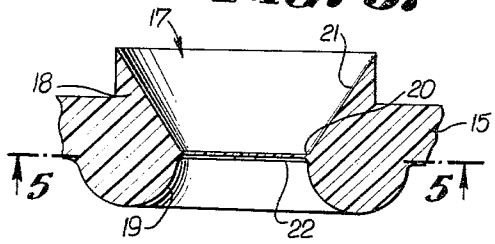


FIG. 4.

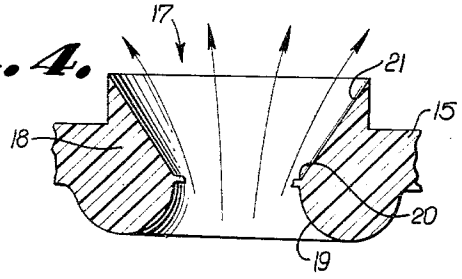


FIG. 6.

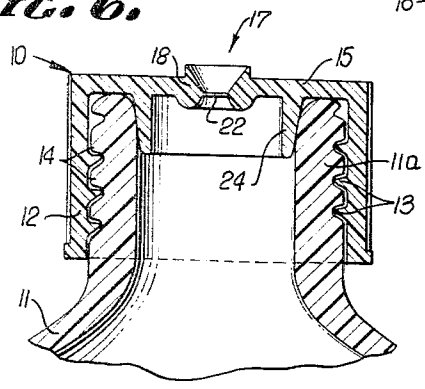
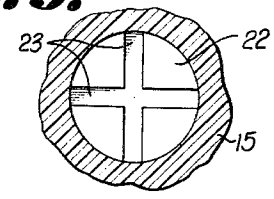


FIG. 5.



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BOTTLE CAP

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3 Claims. (Cl. 222—541)

This invention has to do generally with dispensing caps for so-called squeeze bottles from which liquid may be dispensed through an apertured cap by squeezing together the sides of the container. More particularly the invention pertains to improvements in dispensing caps typically for liquid detergent plastic bottles, applicable to and sealable about the container mouth and a centrally positioned dispensing passage.

Dispensing caps are commonly made to have a centrally projecting tip which may be opened to pass liquid from the container by cutting off the end of the tip. The present invention departs from such conventional practices by forming centrally within the end wall of the cap a dispensing passage normally closed by a diaphragm rupturable by a pointed instrument thrust into the passage, all to the exclusion of any consequential projection, such as the conventional tip, which has the disadvantages of occupying stacking space and interferring with maximum desired convenience and compactness in stacking and shipping.

In accordance with the invention, the cap is formed with an annular portion applicable to the container neck, most usually by internal threading, and an end wall containing a central dispensing passage extending axially of the cap and which normally is closed by a rupturable diaphragm. Preferably the end wall carries an inwardly projecting seal annulus engageable against the mouth of the container and about a central area of the cap openly communicable with the discharge passage when the diaphragm is ruptured.

The invention has a particular objective of so forming the discharge passage as to prevent or minimize any tendency for the liquid to be deposited on the outer surface of the cap during or as a result of dispensing the liquid. As will appear, the invention contemplates giving the passage an essentially venturi-shape, i.e. with convergence, preferably curved, to the passage throat, and with outward flare or divergence from and beyond the throat. The diaphragm may be accommodated at substantially the location of the throat, and may be locally weakened, as by scoring, to facilitate its rupture.

The entire cap structure mentioned, i.e. the annular and end wall portions, diaphragm and sealing annulus, preferably are molded integrally of a suitable organic plastic material selectable from the types commonly used for container caps.

All the features and objects of the invention, as well as the details of certain illustrative embodiments, will be understood more fully from the following detailed description of the accompanying drawing in which:

FIG. 1 is a view showing the cap applied to a conventionally illustrated squeeze bottle;

FIG. 2 is a view showing in axial cross section one form of the invention as applied to the bottle neck;

FIG. 3 is an enlargement showing the diaphragm-closed discharge passage in the cap;

FIG. 4 is a view similar to FIG. 3, indicating the liquid discharge pattern after rupture of the diaphragm;

FIG. 5 is a fragmentary view taken in the plane of line 5—5 of FIG. 3 showing the scored diaphragm; and

FIG. 6 is a view similar to FIG. 2 showing a variational form of the invention.

The dispensing cap generally indicated at **10** in FIG. 1, is shown to be applied to a container or bottle **11** which may have any suitable size and shape characteristics, the bottle being made of plastic material so that the walls may be deflected together to displace liquid content out through the cap.

Referring to FIGS. 2 to 5, the cap **10** is shown to comprise an annular skirt portion **12** applicable to the bottle neck **11***a*, most usually by forming the cap with integrally molded thread **13** mating with the container neck thread **14**. The cap has an end wall **15** and an internal sealing annulus **16**, both integrally molded with the skirt **12**, the sealing annulus engaging against the mouth of the bottle when the cap is screwed down to the FIG. 2 position, to seal about the central area of the cap in a manner permitting free access of liquid to the discharge passage generally indicated at **17**.

The wall **15** is centrally thickened at **18** to accommodate the essentially venturi-shaped discharge passage **17**, the latter having curved inlet convergence at **19** inside the cap to the throat at **20**, and outwardly flared divergence at **21** beyond the throat.

The passage **17** normally is closed by an integrally molded rupturable diaphragm **22** extending across the passage preferably at the throat **20**. To assure and facilitate complete rupture of the diaphragm **22**, the latter preferably is locally weakened in a suitable manner, as by the crossed scorings at **23**, so that upon impact, the diaphragm will tend to disintegrate and break from the passage wall.

It will be understood the containers may be shipped or displayed with no consequential obstruction being presented by the caps at the central areas, the extent of projection of the thickened center above the outer plane surface of the cap ordinarily being capable of accommodation within bottle cavitations given the container **11**. When the liquid content of the container is to be dispensed, the diaphragm **22** may be ruptured by any of various available small or pointed objects thrust into the passage **17** to break free the diaphragm. Upon squeezing the container, a small amount of the liquid is projected out through the passage **17**, the effect of the venturi shape given the passage, being to cause the liquid to be propelled sufficiently completely and free from the cap surfaces beyond the passage outlet, to relieve the cap surfaces from any undesirable retention of the liquid.

It will be understood that the cap may carry or contain a sealing means about the discharge passage, of any of various specific forms, of which the inwardly deflected lip **16** in FIG. 2, is merely typical. FIG. 6 is illustrative of another form of sealing annulus, the cap structure otherwise being the same as the described embodiment. Here the cap wall **15** is shown to carry an integrally molded sealing annulus **24** which is received within the container neck **11***a* in sufficiently tight or smooth engagement therewith as to prevent leakage through the threads.

We claim:

1. A liquid dispensing cap for a liquid-containing bottle the sides of which are deflectable to project the liquid out through the cap, said cap having an outer annular portion applicable to the bottle neck and having an annular end wall the outer surface of which is essentially flat, said end wall having a centrally thickened outwardly projecting portion forming a small diameter orifice the walls of which are essentially venturi-shaped to form an outwardly flared discharge extent projecting axially from said outer surface of the cap, the venturi

shaped walls of the orifice also forming inlet extent tapering toward the orifice throat, and a diaphragm normally extending across and closing said orifice, said diaphragm being rupturable to permit said liquid projection through the cap in a restricted stream, said flare extending from a point proximate the venturi orifice throat and being widely divergent in relation to the size of said throat, said orifice with said outwardly flared discharge extent providing means for substantially freeing the cap surface immediately outside the flare from an overflow of residue liquid accompanying the dispensing operation.

2. A cap according to claim 1, in which said diaphragm is scored to locally thin and weaken it and thereby facilitate its rupture.

3. A cap according to claim 1, in which said diaphragm is located at the throat of venturi shape and the orifice wall flares outwardly beyond the diaphragm.

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