April 22, 1969 D. F. CORSETTE 3,439,843

LIQUID DISPENSER HAVING A CLOSURE CAP

Filed Aug. 14, 1967

FIG. 1

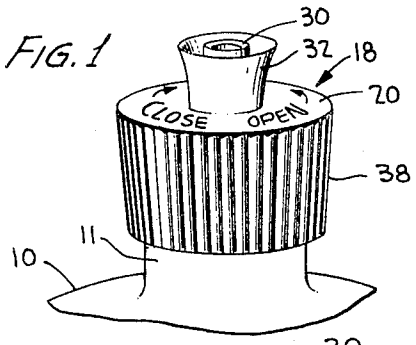


FIG. 2

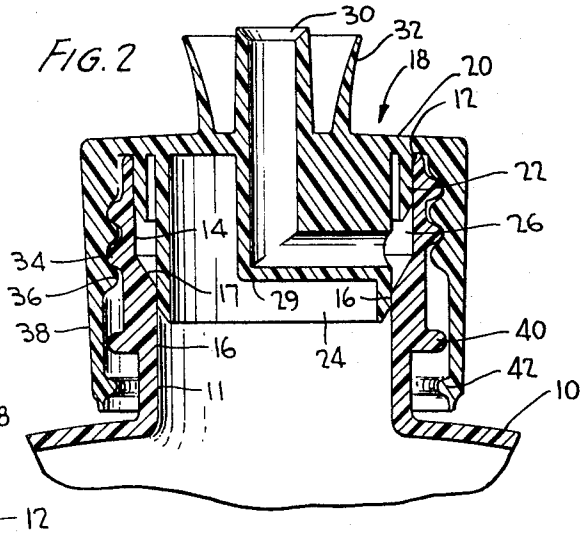


FIG. 3

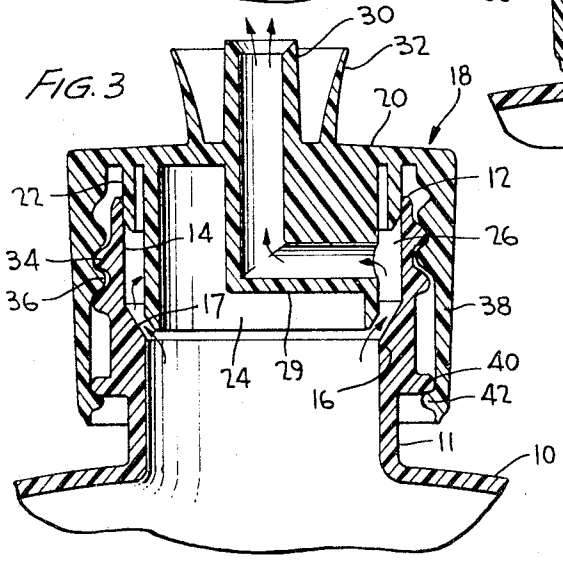


FIG. 4

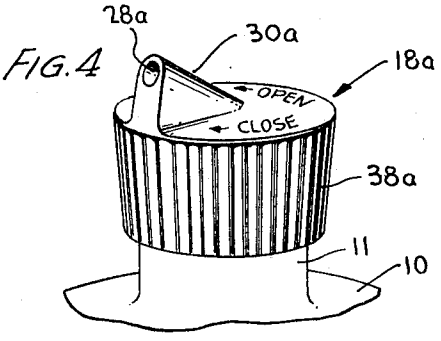


FIG. 6

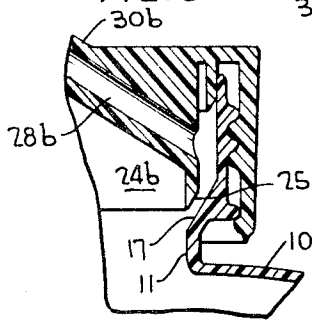


FIG. 7

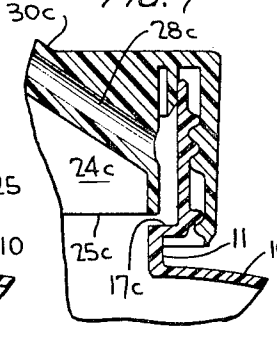
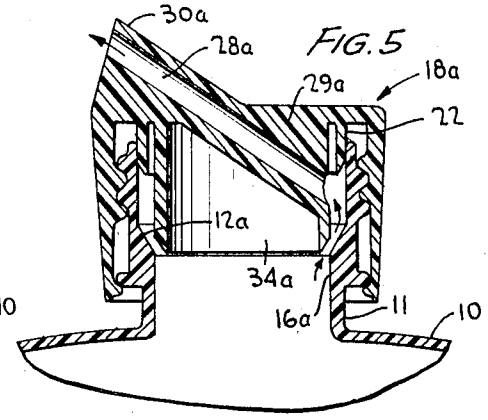


FIG. 5



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3,439,843

LIQUID DISPENSER HAVING A CLOSURE CAP

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U.S. Cl. 222—212 7 Claims

ABSTRACT OF THE DISCLOSURE

A plastic squeeze bottle formed with a neck having an internal constriction spaced from its mouth and fitted with an axially movable unitary valve closure. The closure carries a plug disposed for sealing engagement with said constriction, and is provided with a discharge passage opening into the plug from a location above the constriction and communicating with the atmosphere. A continuous seal is maintained by an enlarged stopper in sealing engagement with the neck above the constriction. An internally threaded skirt provides for securing and axially moving the closure on the container neck and snap beads on the neck and skirt respectively limit the axial movement of the closure.

Background of the invention

This invention relates to improvements in a combination container and closure in which the closure acts as a dispensing valve for the liquid contents of the container. Generally speaking, the invention is of the type broadly exemplified in the United States patents to Collins 3,118,578 and Moran 3,261,513.

In the Collins device, however, rotary movement of the closure is required to bring its discharge passages into registry and angular orientation of the container and closure is required incident to their assembly. In the Moran type of device, although the container and closure are relatively rotatable, no angular orientation of the closure on the container is required, the closure being moved axially between dispensing and sealing positions. However, in the type of device exemplified by the Moran disclosure, the internal seal within the container neck is necessarily disengaged in order to position the closure in dispensing position leaving only the inter-engaged threaded portions of the closure skirt and container neck to resist leakage of the container contents.

With these factors in mind, the present invention provides a device in which the closure is movable axially between a closed sealing position and an open dispensing position without the requirement for angular orientation between the parts and in addition provides an internal seal within the container neck which remains fully operative in both positions of the closure.

Thus, in accordance with the present invention, the container neck is formed with an internal constriction spaced from its mouth and the closure is provided with a stopper which is axially slidable in the neck above the constriction and of sufficient axial extent to maintain an effective seal throughout the range of operative movement of the closure. The closure also includes a plug

which depends below the stopper and is of smaller diameter than the stopper to be radially inwardly spaced from the neck above the constriction, though of a diameter for snug sealing engagement with the constriction in the closed sealing position of the closure. When the closure is axially moved or raised to withdraw the plug from the constriction the contents of the container is permitted to pass through the constriction and into the annular space thereabove between the plug and the neck to thence flow into a discharge passage extending through the closure to the atmosphere with its inner end opening through the plug into the annular space above mentioned.

Brief description of the drawing

In the preferred exemplification of the invention shown in the accompanying drawings:

FIGURE 1 is a perspective view of the upper end portion of a container having a closure applied thereto in accordance with the invention;

FIGURE 2 is an enlarged diametrical cross-section through the structure shown in FIGURE 1, with the closure in sealing position;

FIGURE 3 is a view similar to FIGURE 2, but with the closure in dispensing position;

FIGURE 4 is a view similar to FIGURE 1, showing a modified form of the invention;

FIGURE 5 is a section in an axial plane through FIGURE 4;

FIGURES 6 and 7, respectively, are views, similar to FIGURE 5, of further modifications of the invention.

Detailed description of the invention

In the preferred embodiment of the invention shown in the accompanying drawings there is shown in FIGURES 1, 2 and 3 a more or less conventional container **10** which appears in the form of a plastic collapsible or squeeze container having a tubular neck **11** defining a mouth **12** at its upper end. Extending inwardly from the mouth of the neck is an internal cylindrical portion **14** of comparatively large diameter. A reduced diameter cylindrical portion **16**, coaxial with the portion **14**, provides a constriction which preferably is joined to the portion **14** by means of a generally downwardly converging conical tapered surface **17**.

The numeral **18** designates in its entirety a dispensing closure in the form of a cap of unitary plastic construction which is supported on the neck both for rotation and for axial movement between a raised dispensing position (as shown in FIGURE 3), and a lowered sealing position (as shown in FIGURE 2). In the present embodiment, the closure **18** comprises a substantially circular top wall **20** which extends across the mouth **12** of the container and from which a stopper **22**, in the form of an annular sleeve, depends into the enlarged diameter portion **14** of the neck in snug radial sealing engagement therewith. It will be obvious that such sealing engagement is maintained despite relative rotary and axial movement between the container and the closure. Further the closure comprises a plug portion or plug **24**, preferably in the form of a sleeve which is coaxial with and preferably radially spaced from the stopper **22** and depends from the top wall **20** to a location substantially below the

stopper for sealing engagement with the constriction **16** in the fully closed or sealed position of the closure **18**, as shown in FIGURE 2. However, it is to be noted that the lower end of the plug terminates at an axial location such that in the raised dispensing position of the closure, as shown in FIGURE 3, it is spaced above and disengaged from the constriction whereby to permit passage of the container contents through the constriction upwardly and into the annular space **26** between the plug and the enlarged diameter portion **14** of the container neck.

The plug **24** is formed with a discharge passage **28** one end of which opens upwardly through the container top wall to the atmosphere, while the inner end thereof opens radially through the cylindrical outer wall of the plug into the annular space **26**. The passage extends through a conduit defining portion or mass of plastic material within and integral with the sleeve-like plug. The passage **28** is thus arranged to communicate with the annular space **26** which in turn communicates through the constriction **16** with the interior of the container when the closure is raised to its dispensing position. However, when the closure is pressed down onto the container neck to its closed or sealed position, the depending lower end portion of the plug sealingly engages the constriction **16**.

It is to be noted that in the dispensing position of the closure as well as in its sealed position, the sliding seal or stop **22** operatively engages the inner surface of the neck adjacent its mouth **12** to maintain an efficient sealing relationship between these parts at all times.

It will be seen that in the preferred embodiment the upper end of the discharge passage **28** opens outwardly through the axial center of the top wall through a discharge nozzle **30** which is surrounded by a partly flaring protective sleeve **32**.

While the closure cap may be readily manually moved between its operative positions, it is desirable to achieve such movement with a certain degree of mechanical advantage so as to readily overcome the frictional resistance between the stopper **22** and container neck as well as to firmly seat and seal plug **24** in the constriction **16**. Therefore, it has been found desirable to provide the container neck with external threads **34** for cooperation with internal threads **36** within the depending skirt **38** of the closure cap.

Manifestly, downward movement of the closure **18** onto the closure neck **11** will be limited by engagement between the upper end of the neck and the lower face of the closure top wall **20** when the closure is in its predetermined sealing position.

In order to limit the upward axial movement of the closure and to determine its proper axial dispensing position, there may be provided around the container neck a snap bead **40** for cooperation with an internal snap bead **42** within the skirt **38**. It will be noted that the snap bead **42** is located in spaced relation below the snap bead **40** in the fully applied sealing position of the closure (as in FIGURE 3) and at a location such as to engage the bead **40** and resist further unthreading movement of the closure when the latter is moved axially to its dispensing position.

In the operation of the invention which is believed to be apparent from the foregoing description, the closure **18** is applied to the container **16** after filling of the latter, merely by threading it fully onto the container neck **11** and into a fully sealed and tightened relation thereon. Thereafter, when it is desired to dispense a portion of the contents of the container, the closure is partially unthreaded to bring the snap beads **42** and **40** into abutting engagement and thus to position the closure in its dispensing position. With the parts so positioned, the container may then be inverted and squeezed so as to expel some of its contents upwardly through the annular gap between the plug **24** and constriction **16** and thence into annular space **26** for movement into and through the discharge passage **28**, as indicated by the arrows in FIGURE 3, regardless of the angular position of the closure at the time.

It will be readily appreciated that both the threads **34** and **26**, and the snap beads **40** and **42** are not essential to the invention, but that these may be omitted if desired, in which event the axial positioning of the closure may be accomplished simply by manual pushing and pulling, or by other means than the threads.

In the modified embodiment shown in FIGURES 4 and 5, the construction and operation are generally similar to those of FIGURES 1 to 3, and corresponding parts are designated by similar reference characters, bearing the suffix *a*.

In the modification, however, the discharge passage **28***a* extends diagonally to the axis of the neck and closure, for generally radial discharge, and the guard sleeve **32** is omitted.

It will have previously been noted that in FIGURES 1 through 5, the valve plug **24**, **24***a* is proportioned for snug telescoping reception in, and radial sealing engagement with the inner periphery of the neck constriction **16**, in a manner similar to that in which the stopper **22** cooperates with the mouth **12** and adjacent large diameter portion of the neck. This has the advantage of insuring that both the stopper and plug will establish efficient seals in a range of axial positions at which the top wall **20** of the closure might engage the end of the bottle neck. Thus a substantial range of tolerance is permissible in the formation of such a closure.

In the modification of FIGURE 6, however, the tapered end surface **25** of the plug **24***b* is of a diameter to seat axially against the tapered surface **17***a* of the neck, or in other words against the upper end of the constriction **16***a*.

In the modification of FIGURE 7, the plug **24***c* is provided with an end surface **25***c* in a radial plane for axial abutting sealing engagement with a radial annular shoulder **17***c*.

Having thus described my invention, I claim:

1. In combination with a container having a tubular neck defining a mouth at its upper end and formed internally with an annular constriction spaced from its mouth, and with an internal cylindrical portion **14** of larger diameter than the constriction located between said mouth and the constriction, a dispensing valve closure supported on said neck for limited axial movement between a raised dispensing position and a lowered sealing position; said closure comprising a cylindrical stopper portion for snug axial sliding reception in said internal cylindrical portion of the container neck and for sealing engagement with said internal cylindrical portion of the neck in all operative positions of the closure; and an externally cylindrical plug of lesser diameter than the stopper depending from the closure coaxially with and below the stopper for axial movement with the closure into and from sealing engagement with said constriction, said closure and said neck defining an annular space around the plug between said constriction and said stopper portion, said closure being formed with a discharge passage opening radially thereinto from said annular space and extending through the top wall of the closure into communication with the atmosphere.

2. The combination defined in claim **1** in which said container comprises a plastic squeeze bottle.

3. The combination defined in claim **1** wherein said plug is telescopically received in said constriction in radial sealing engagement therewith.

4. The combination defined in claim **1** in which said plug is proportioned for axial sealing engagement with said constriction.

5. The combination defined in claim **1** in which said neck is formed with an external snap bead spaced axially from its mouth and said closure is provided with a de-

pending skirt encircling said neck, said skirt being formed internally with an annular bead positioned in spaced relation below said neck bead in the sealing position of the closure and adapted for axial abutment with the neck bead in the dispensing position of the closure.

6. The combination of claim 5 in which said closure comprises a top wall axially abutting the upper end of said neck, said plug and said stopper being coaxially secured to the top wall.

7. The combination defined in claim 6 in which said stopper and said plug, respectively, comprise generally cylindrical skirts in coaxial relation, said skirt of the plug including a conduit defining portion through which said passage extends.

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WALTER SOBIN, *Primary Examiner.*

U.S. Cl. X.R.

222—525, 520, 546, 559, 568