April 23, 1957 J. M. WHEATON 2,789,719

CONTAINER CLOSURE FITMENT

Filed Feb. 23, 1955

FIG. 2.

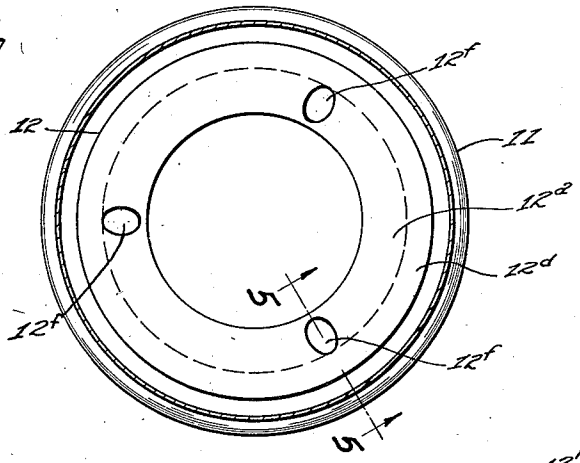


FIG. 1.

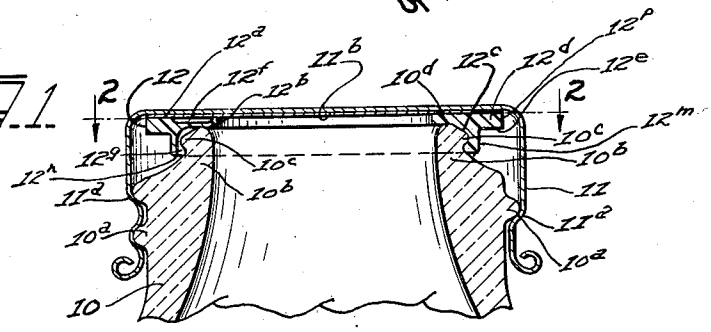
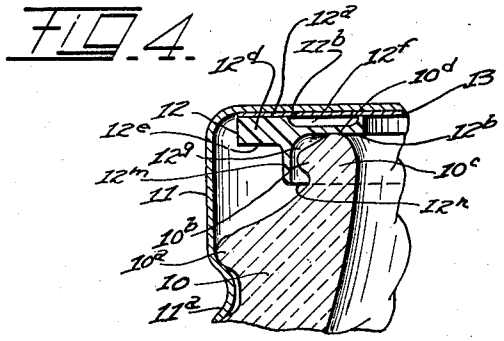


FIG. 4.



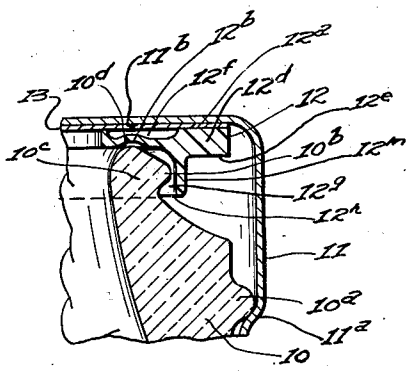


FIG. 5.

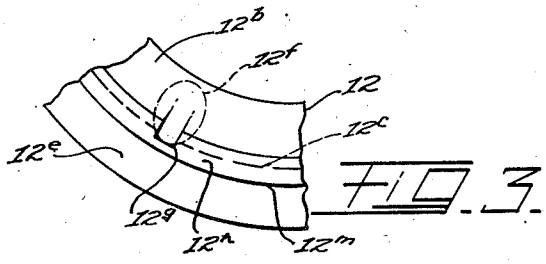


FIG. 3.

INVENTOR
Jack M. Wheaton
BY
Schaick & Hoge
ATTORNEYS

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CONTAINER CLOSURE FITMENT

Jack M. Wheaton, Toledo, Ohio, assignor to Owens-Illinois Glass Company, a corporation of Ohio

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7 Claims. (Cl. 215—56)

The present invention relates to a closure for sealing containers, and more particularly to an improved type of combined venting and pour-out fitment for sealed glass jars, bottles or like containers. This invention contemplates the use with a container sealed by a suitable closure of a filament interposed between the container mouth and said closure to perform the functions of sealing the container, venting the sealed container as excessive pressure develops therein, and providing a pouring lip for the opened container.

In the packaging of certain materials for distribution in sealed containers such as bottles or jars where the closure hermetically confines the said materials, the containers are occasionally subjected to excessive internal pressure by contents which are sealed under pressure or which tend to liberate a gas or vapor under storage conditions. Due to chemical or physical changes in the stored materials, internal pressure within the sealed container can substantially increase to ultimately cause breakage of the container or of the sealing closure. Unless some facility is provided to safely and automatically vent or relieve accumulations of excessive internal pressure the container can rupture without warning causing personal injury or property damage.

The ideal closure for a container should be leakproof under normal pressure conditions to preserve the contents of said container and yet able to relieve excessive internal pressure no matter how often the pressure in the container should fluctuate. If the vent which is provided should only operate upon the first undue influence of increased pressure and remain open thereafter, the container would leak and permit escape or spoilage of the contents. If the vent should open and then close only once and then lose its ability to reopen to respond to subsequent increases in internal pressure, the aforementioned danger of rupture of the container would again be present.

In the packaging of certain materials having such properties that they tend to adhere to the surfaces of the container which are wet by the contents when poured therefrom, a distinct disadvantage is the dripping of the contents from the external surfaces of the container mouth when the flow is stopped. This condition results because the forces of adhesion of the contents to the surfaces of the container are considerably greater than the cohesive forces of the contents. The dripping of the material which remains around the container mouth creates a generally untidy condition on the external surfaces of the container which is detrimental to safe and sanitary handling of said container. Most common containers in present use have a rounded edge at the lip of their mouth of the same composition as the material of the container and are a part thereof. This type of mouth does not attempt to retard or prevent the dripping characteristics of viscous or adhering products.

The principal object of the present invention is to provide for use with a closure of a container a fitment that tightly seals the mouth against leakage under normal pressure conditions, functions as a vent to rapidly and

effectively release excessive internal pressure as it occurs within a sealed container and provides a pouring lip of such design and composition that it will permit dripless pouring of liquid materials stored within the container.

Another object of this invention is to provide a simple, inexpensive fitment for use with a closure of a container which will eliminate the aforementioned difficulties without appreciably increasing the cost of the package.

Another object of this invention is to provide an inexpensive fitment for use with a closure of a container which will tightly seal the package and vent the same periodically as excessive internal pressure occurs within.

Another object of this invention is to provide an improved vent for a container to relieve the said pressure within the container without impairing the efficiency or effectiveness of the seal.

Another object of this invention is to provide an improved pressure-vented closure for a cointainer characterized by the property of being able to reseal the container after the internal pressure has been relieved to the normal or near-normal pressure desired, thus avoiding exposure of the contents to external contamination.

Another object of this invention is to provide a combination venting and pour-out fitment for a container having an improved pouring lip particularly useful in the extraction from the opened container of contents which tend to adhere to the surfaces of the container.

Another object of this invention is to provide a removable fitment for an opened container having a pouring lip for dripless pouring of container contents.

Another object of this invention is to provide a fitment having the combined properties of being able to seal the top and side sealing surfaces between the said fitment and neck to furnish a dripless pouring lip for an opened container.

The specific nature of this invention, as well as other objects and advantages thereof, will become apparent to those skilled in the art from the following detailed description taken in conjunction with the annexed sheet of drawings, on which by way of preferred example only, is illustrated one embodiment of this invention.

Referring to the accompanying drawings:

Fig. 1 is a vertical sectional view of the upper portion of a container illustrating a fitment embodying this invention.

Fig. 2 is a sectional plan view of the fitment taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary bottom view of the fitment only disassembled from the container.

Fig. 4 is an enlarged view of the left-hand portion of Fig. 1 illustrating the fitment in its sealing position.

Fig. 5 is an enlarged view taken on line 5—5 of Fig. 2 illustrating the fitment in its venting position.

The illustrated embodiment of my invention comprises a fitment attached to the mouth of a container or bottle.

Referring to the drawings and more particularly to the vertical sectional view of Fig. 1, only the upper portion or neck of a bottle designated by reference numeral **10** is illustrated as pertinent to the subject invention. The bottle is contemplated as being constructed of glass or other similar material with a finish of any conventional design on the external surfaces of the bottle neck **10**. Thus, the neck **10** of the bottle may be formed with a screw thread **10***a* around its annular periphery on its external surface. At the termination of the thread **10***a* at its upper end the external diameter of the neck **10** is reduced to form an axial extension **10***b* of said neck **10**.

The bottle neck extension **10***b* is formed with a continuous circumferential rib or bead **10***c* on its external surface. The surface of the raised bead **10***c* is a smooth parabolic curve in its cross section. The bead **10***c* has a maximum external diameter which is smaller than

the root diameter of the thread **10***a*. The mouth of the bottle neck **10** is defined by a horizontal annular lip surface **10***d* which comprises the sealing surface of the bottle. The screw thread **10***a* is provided for the purpose of attaching a suitable closure to the bottle.

The closure consists of a cup-shaped cap **11** which envelops the mouth and neck portions **10** of the bottle. The cap **11** is formed with a screw thread **11***a* on its inner vertical surface which conforms to the thread **10***a* of the bottle neck **10**. The top of the cap **11** has a flat inner surface **11***b* parallel to the horizontal plane of the bottle lip surface **10***d* and overlying the periphery of the said lip when the bottle and cap are joined. The cap **11** may be constructed of metal or plastic or other relatively rigid material which is compatible with the materials of the fitment and bottle. When the mating threads **10***a* and **11***a* of the bottle neck **10** and the cap **11**, respectively, are engaged by rotating the said members in opposite directions, the cap **11** is securely attached to the bottle neck **10**. The mating of the threads **10***a* and **10***b* of the cap and neck does not produce a hermetic seal at the junction of said threads but only provides the necessary compressive force between the inner top surface **11***b* of a cap **11** and the bottle lip **10***d* to produce a seal of the bottle mouth by the use of the subject fitment.

The fitment **12** comprises an annular ring which is interposed between the top of the bottle neck **10** and the enveloping cap **11** of the bottle. The fitment **12** is disposed between the top lip surface **10***d* of the bottle mouth and the inner top surface **11***b* of the cap **11** and uniformly covers the top sealing lip **10***d* of the bottle neck extension **10***b*.

The ring-shaped fitment **12** has a continuous flat top surface **12***a* with one or several shallow recesses **12***f* formed therein. The horizontal top fitment surface **12***a* extends inwardly beyond the inner limits of the bottle lip **10***d* and outwardly radially further than the diameter of the bead **10***c* on the bottle neck extension **10***b*. The fitment **12** has a flat lower annular surface **12***b* parallel to the horizontal top surface **12***a* comprising its inner section, the said lower annular surface **12***b* extending from the innermost edge of the fitment **12** to the same diameter as the bottle lip **10***d* and contacts said lip. This thinnest inner section of the fitment **12** provides the annular sealing surfaces between the bottle lip **10***d* and the flat inner cap surface **11***b*.

The lower side of fitment **12** is further provided with a depending annular flange bounded by the vertical surface **12***m*, which flange defines a contoured surface **12***c* designed to snugly mate with the contour of the radial bead **10***c* of the bottle neck extension **10***b*. The fitment **12** is formed of resilient material, as hereafter described, and may thus be secured to the bottle neck extension **10***b* by merely snapping it on over the raised bead **10***c* or, if desired, by the use of an adhesive or cement. If the fitment **12** is made slightly undersize on the contoured surface **12***c* it can be held in place in tension by the contour of the bead **10***c* when attached thereto. The ring-shaped fitment **12** is further provided with a flange **12***d* projecting radially and continuously around the external periphery of the said fitment, its top surface flush with the top fitment surface **12***a*. The lower surface **12***e* of the flange **12***d* is parallel to the top surface **12***a* and both surfaces are joined by a vertical cylindrical surface **12***p*, but may be angled to meet top surface **12***a* at a point.

The recesses **12***f* terminate short of the inner and outer annular edges of the top surface **12***a* so that an effective seal will be produced when said surface **12***a* contacts the inner cap surface **11***b*. Preferably, three such recesses **12***f* are provided and are equally spaced as shown in Fig. 2. The recesses **12***f* are the same depth for a given fitment **12** but may vary in depth and/or width in the construction of other fitments depending upon the internal pressure level at which the venting action is desired. The recesses may be circular, or elliptical, being shown as the latter on the drawings.

Venting grooves or passages **12***g* are provided in the fitment **12** directly below and in line with each of the recesses **12***f* formed in the top fitment surface **12***a* but are not connected therewith. The vent passages are disposed in the contoured surface **12***c* of the fitment **12**, which surface fits the beaded contour **10***c* of the bottle neck extension **10***b*. The lower passages are located precisely in line with the upper recesses, one passage below each recess. The upper recess and the lower passage in combination in their respective lineal positions form a complete venting section in the fitment **12**. In Fig. 1 a lower venting passage **12***g* is shown in the inner contoured fitment surface **12***c* between the said fitment and the bead **10***c* of the glass container. Each passage is a rectangular slot as shown in Fig. 3 in the contoured inner surface **12***c* of the fitment **12** which provides an opening through the said fitment between the outer edge of sealing lip **10***d* of the glass bottle and the said fitment. As best shown in Fig. 1 the passage **12***g* extends from the outer rim of the flat annular sealing surface **12***b* of the fitment **12** which contacts the bottle lip **10***d* when assembled thereto through the contoured inner surface **12***c* of the fitment **12** to an exposed lower fitment surface **12***n*.

The improved fitment **12** is preferably constructed of a flexible plastic material such as polyethylene or other composition having the particular property of being difficult to wet with most liquid materials and sufficiently strong and durable to securely seal the bottle mouth.

A liner **13** comprising a flat thin disk of coated paper or cardboard may be disposed between the fitment **12** and the cap **11** to protect the inner top cap surface **11***b* from corrosive action of the contents. The disk liner **13** is of the same diameter as the top fitment surface **12***a* and attached to the inner flat surface **11***b* of the cap **11**. The liner **13** also insures a better seal between the fitment and cap when the two are joined.

When the fitment **12** is assembled between the bottle lip **10***d* and the cap **11** it is compressed by the compressive action of the cap **11** when the said cap is drawn tight against the said fitment by the mating threads. The compression applied to the inner top surface **11***b* of the cap **11** with its liner **13** against the top fitment surface **12***a* creates an annular seal between the cap **11** and the fitment **12**. The compression of the cap **11** against the fitment **12** is transmitted to the contacting surfaces of the lower annular fitment surface **12***b* and the bottle lip **10***d* providing an annular seal at the junction of these surfaces, thus producing a tight seal of the bottle mouth.

As best shown on Fig. 4, with the said fitment in its normal position sealing the bottle, the upper recess **12***f* is disposed in its normal position as formed in the top fitment surface **12***a*. The lower passage **12***g*, which lies immediately below and in line with the upper recess **12***f*, is open to the atmosphere at the lower fitment surface **12***n* into the space under the cap **11** but only as far through the contoured fitment surface **12***c* as the outer rim of the bottle lip **10***d*. The contents within the bottle are sealed by the mating of the flexible fitment **12** to the inner cap liner **13** and the bottle lip **10***d* with the said fitment conforming to any irregularities in both the cap liner and bottle lip.

As illustrated in Fig. 5, when the internal pressure increases above a desired limiting value, the portion of the fitment **12** beneath the recess **12***f* is locally deflected upward by the force of the excessive internal pressure. The fitment area comprising the lower and center portion of the recess **12***f* is deflected upwardly slightly into the void space of the hollow recess **12***f* toward the liner **13** of the internal cap surface **11***b*. The deflection in response to a predetermined internal pressure level effects a slight separation between the lower fitment sealing surface **12***b* and the bottle lip **10***d*, permitting the confined

fluid to pass between the inner fitment surface 12*b* and the bottle lip 10*d* into and through the vent groove or passage 12*g* to the space under the cap 11 which is open to the atmosphere. The point between the bottle lip 10*d* and the fitment 12 under the recess 12*f* or one of the other similar recesses, whichever is the weakest point of the seal, is the first to yield to the internal force exerted by the excessive fluid pressure. The portion of the fitment 12 beneath each of the upper recesses 12*f* is the only operative part of each pressure-operated vent.

When a vent section performs its venting operation the lower internal fitment surface 12*b* is separated from the bottle lip 10*d* and held open only as long as the internal force exerted upon the seal by the confined fluid is sufficient to overcome the sealing and resilient forces acting on such deflected portion of the fitment 12. The fitment 12 being constructed of a flexible material returns to its former sealed position in contact with the bottle lip 10*d*, as shown in Fig. 4, when the pressure within the bottle has been relieved and thus reseals the bottle at or near the desired pressure level within the bottle. The fitment assumes the normal sealed position immediately without permitting any contamination of the contents by the surrounding external atmosphere. The vent is able to reopen to relieve subsequent increases in internal pressure as often as they occur because of the elastic nature of the material comprising the fitment. The permanent flexibility of the fitment and its simple construction assure uniform and dependable venting when the bottle is stored for long periods.

The exterior contour of the container neck 10 providing a side sealing surface of materially smaller diameter than the threaded portion which holds the cap, provides the required space within the closure cap to accommodate the pour-out lip or flange 12*d*, such space being between the vertical skirt or flange of the cap and the outer surface of the bottle neck. The fitment 12 remains in a fixed position attached to the mouth of the bottle when the bottle is opened. The fitment flange 12*d* is not deformed on long standing of the sealed bottle and is in a position of constant readiness for use when the cap 11 is removed from the bottle and provides an annular pour-out lip for the opened bottle when the said bottle is held in any pouring position.

The construction of the fitment 12 provides a pouring lip of substantially larger diameter than the finish or exterior surface of the bottle. The pouring lip will carry the liquid which is being dispensed from the bottle some distance outward from the glass wall, thus preventing liability of dripping onto the exterior wall surface of the bottle.

The contents of the bottle when poured therefrom do not adhere to or wet the surfaces of the polyethylene fitment 12 because of its composition. When the flow is stopped the stream of contents is broken cleanly with a sharp division of the poured material by the right angle corners of the thin pouring lip of fitment flange 12*d*. The small amount of residue on the top fitment surface 12*a* is drawn back into the bottle by the cohesive forces of the contents when the flow is stopped. With most contents being unable to appreciably wet the fitment, the adhesive forces between the contents and the fitment are greatly reduced to prevent an escape of the contents onto the external surfaces of the bottle.

The fitment embodying this invention may obviously be employed with closures of various types other than the threaded cap illustrated which apply sealing pressure to the annular area of the bottle mouth. The fitment may be used with a container having a neck finish contoured to receive a mating lug or crown-type cap.

It will, of course, be understood that various details of construction may be modified through a wide range without departing from the principles of this invention, and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim:

1. A pour-out and sealing fitment for a container subject to internal pressure comprising an annular ring of flexible material having a lower annular sealing surface adapted to snugly conform to the top and adjacent side portions of the container mouth, whereby compression of said ring against said container mouth by an enveloping closure produces a seal between said fitment and said container mouth, said fitment having at least one recess formed in its top surface to permit local deflection of a portion of said lower sealing surface opposite said recess in response to a predetermined internal pressure in said container, and a venting passage formed in said lower surface and extending from the outer edge of said locally deflected portion to an exposed surface of said fitment.

2. A pour-out and sealing fitment for a container subject to internal pressure comprising an annular ring of flexible material having a lower annular sealing surface adapted to snugly conform to the top and adjacent side portions of the container mouth, whereby compression of said ring against said container mouth by an enveloping closure produces a seal between said fitment and said container mouth, said fitment having a radially projecting flange flush with its top surface providing a pour-out lip, said fitment also having at least one recess formed in its top surface to permit local deflection of a portion of said lower sealing surface opposite said recess in response to a predetermined internal pressure in said container, and a venting passage formed in said lower surface and extending from the outer edge of said locally deflected portion to an exposed surface of said fitment.

3. A pour-out and sealing fitment for a container subject to internal pressure comprising an annular ring of flexible material having a lower annular sealing surface adapted to snugly conform to the top and adjacent side portions of the container mouth, whereby compression of said ring against said container mouth by an enveloping closure produces a seal between said fitment and said container mouth, said fitment having at least one recess formed in its top surface in overlying position above the annular sealing surface of said container mouth, to permit local deflection of a portion of said lower sealing surface opposite said recess in response to a predetermined internal pressure in said container, said recess being of a greater radial length than the width of the annular sealing surface of the said container mouth beneath the said recess, and a venting passage formed in said lower surface and extending from the outer edge of said locally deflected portion to an exposed surface of said fitment.

4. The combination of a container, closure cap and fitment comprising a unit subject to internal pressure, said container having a sealing lip at its mouth and a finish on its external neck portion adjacent to the mouth to permit the attachment of both the said cap and fitment, the said cap formed of relatively rigid material being generally cup-shaped to envelop the container mouth and having a means for attachment to the container, said fitment comprising a ring of flexible material interposed between the said container lip and said cap having upper and lower annular sealing surfaces to contact said cap and container lip respectively to produce a seal therewith when compressed between said cap and lip, said fitment having an annular depending flange extending around its lower portion with an inner contoured surface formed therein for attachment to the container, said fitment having at least one recess formed in its top surface in overlying position above the annular sealing surface of said container mouth to permit local deflection of a portion of said lower sealing surface opposite said recess in response to a predetermined internal pressure in said container, and a venting passage formed in said lower sealing sur-

face extending from the outer edge of said locally deflected portion to an exposed surface of said fitment.

5. The combination defined in claim 4, said fitment having a radial flange flush with its top surface projecting outwardly beyond the adjacent portion of the container mouth to provide a pour-out lip for the opened container.

6. The combination of a container, closure cap and fitment comprising a unit subject to internal pressure, said container having a sealing lip at its mouth and a finish on its external neck portion adjacent to the mouth to permit the attachment of both the said cap and fitment, the said cap formed of relatively rigid material being generally cup-shaped to envelop the container mouth and having a means for attachment to the container, said fitment comprising a ring of flexible material interposed between the said container lip and said cap having upper and lower annular sealing surfaces to contact said cap and container lip respectively to produce a seal therewith when compressed between said cap and lip, said fitment having an annular depending flange extending around its lower portion with an inner contoured surface formed therein for attachment to the container, said fitment having at least one recess formed in its top surface in overlying position above the annular sealing surface of said container mouth to permit local deflection of a portion of said lower sealing surface opposite said recess in response to a predetermined internal pressure in said container, said recess being of a greater radial length than the width of the annular sealing surface of the said container mouth beneath the said recess, and a venting passage formed in said lower surface and extending from the outer edge of said locally deflected portion to an exposed surface of said fitment.

7. A pour-out and sealing fitment for a container comprising a ring of flexible material having an annular lower sealing surface adapted to make a seal with annular top and side sealing surfaces of an open-mouth container, said fitment having an annular top sealing surface for sealing contact with a closure cap for the said container and an annular lower depending flange extending from the lower fitment surface providing top and adjacent side sealing surfaces for sealing contact with top and side sealing surfaces of the container, said fitment extending inwardly further than the innermost edge of the container mouth and outwardly substantially further than the said adjacent exterior portions of the container mouth having a circumferential flange flush with the top fitment surface providing a pouring lip on its periphery beyond the said adjacent portions of the container mouth, the said top fitment surface having at least one recess formed therein providing a comparatively thin membrane flexible upwardly when subjected to pressure developed within the sealed container for venting said container, the said lower depending flange of said fitment having at least one passage formed therein in its inner sealing surface to register with said recess to permit the escape of vented fluid.

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