The present invention relates to a closure for sealing containers, and more particularly to an improved type of combined venting and pour-out fitting 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 increase 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 unhygienic 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 fitting 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 fitting 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 fitting 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 container 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 fitting 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 fitting for an opened container having a pouring lip for dripless pouring of container contents.

Another object of this invention is to provide a fitting having the combined properties of being able to seal the top and side sealing surfaces between the said fitting 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 fitting embodying this invention.

Fig. 2 is a sectional plan view of the fitting taken on line 2--2 of Fig. 1.

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

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

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

The illustrated embodiment of my invention comprises a fitting 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 materials with a finish of any conventional design on the external surfaces of the body 10. Thus, the neck 10 of the bottle may be formed with a screw thread 10a around its annular periphery on its external surface. At the termination of the thread 10a, at its upper end the external diameter of the neck 10 is reduced to form an axial extension 10b of said neck 10.

The bottle neck extension 10b is formed with a continuous circumferential rib or bead 10c on its external surface. The surface of the raised bead 10c is a smooth, parabolic curve in its cross section. The bead 10c has a maximum external diameter which is smaller than...
the root diameter of the thread 10a. The mouth of the bottle neck 10 is defined by a horizontal annular lip surface 10d which comprises the sealing surface of the bottle. The screw thread 10a is provided for the purpose of accepting a suitable closure to the bottle.

The closure consists of a cap-shaped cap 11 which envelops the mouth and neck portions 10 of the bottle. The cap 11 is formed with a screw thread 11a on its inner vertical surface which conforms to the thread 10a of the bottle neck 10. The top of the cap 11 has a flat inner surface 11b parallel to the horizontal plane of the bottle lip surface 10d 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 10a and 11a 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 10a and 10b 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 flat outer surface of the cap 11 and the bottle lip 10d 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 10d of the bottle mouth and the inner top surface 11b of the cap 11 and uniformly covers the top sealing lip 10d of the bottle neck extension 10b. The ring-shaped fitment 12 has a continuous flat top surface 12a with one or several shallow recesses 12f formed therein. The horizontal top fitment surface 12a extends inwardly beyond the inner limits of the bottle lip 10d and outwardly farther than the diameter of the bead 10c on the bottle neck extension 10b. The fitment 12 has a flat lower annular surface 12b parallel to the horizontal top surface 12a comprising its inner section, the said lower annular surface 12b extending from the innermost edge of the fitment 12 to the same diameter as the bottle lip 10d and contacts said lip. This thinnest inner section of the fitment 12 provides the annular sealing surfaces between the bottle lip 10d and the lower fitment surface 11c.

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

The recesses 12f terminate short of the inner and outer annular edges of the top surface 12a so that an effective seal will be produced when said surface 12a contacts the inner cap surface 11b. Preferably, three recesses 12f are provided and are equally spaced as shown in Fig. 2. The recesses 12f 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 12g are provided in the fitment 12 directly below and in line with each of the recesses 12f in fitment 12 so that the vent passages are not connected therewith. The vent passages are disposed in the contoured surface 12c of the fitment 12, which surface fits the beaded contour 10c of the bottle neck extension 10b. 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 linear positions form a complete venting section in the fitment 12. In Fig. 1 a lower venting passage 12j is shown in the inner contoured fitment surface 12e between the said fitment and the bead 10c of the glass container. Each passage is a rectangular slot as shown in Fig. 3 in the contoured inner surface 12c of the fitment 12 which provides an opening through the said fitment between the outer edge of sealing lip 10d of the glass bottle and the said fitment. As best shown in Fig. 1 the passage 12j extends from the outer rim of the inner top surface 11b of the inner fitment 12 which contacts the bottle lip 10d when assembled thereto through the contoured inner surface 12c of the fitment 12 to an exposed lower fitment surface 12n.

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 11b from corrosive action of contained contents. The disk liner 13 is of the same diameter as the top fitment surface 12a and attached to the inner flat surface 11b 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 10d 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 11b of the cap 11 with its liner 13 against the top fitment surface 12a creates an annular seal between the cap 11 and the fitment 12. The compressive seal utilized in the fitment 12 is transmitted to the contacting surfaces of the lower annular fitment surface 12b and the bottle lip 10d 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 12f is disposed in its normal position as formed in the top fitment surface 12a. The lower passage 12g, which lies immediately below and in line with the upper recess 12f, is open to the atmosphere at the lower fitment surface 12n into the space under the cap 11 but only as far through the contoured fitment surface 12c as the outer rim of the bottle lip 10d. 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 10d with the said fitment conforming to any irregularities in both the cap liner and the bottle lip 10d.

As illustrated in Fig. 5, when the internal pressure increases above a desired limiting value, the portion of the fitment 12 beneath the recess 12f is locally deflected upwardly by the force of the excessive internal pressure. The fitment area comprising the lower and center portion of the recess 12f is deflected upwardly slightly into the void space of the such portion of the inner cap surface 11b. The deflection in response to a predetermined internal pressure level effects a slight separation between the lower fitment sealing surface 12b and the bottle lip 10d, permitting the confined
fluid to pass between the inner fitment surface 12d and the bottle lip 10d into and through the vent groove 12g to the space under the cap 13 which is open to the atmosphere. The point between the bottle lip 10d and the fitment 12 under the recess 12f 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 12e is the only operative part of each pressure-operated vent.

When a vent section performs its venting operation, the lower internal fitment surface 12b is separated from the bottle lip 10d and held open only as long as the internal force exerted upon the seal by the contained 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 10d, 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 clotted 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 12d, 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 threaded part of the bottle when the bottle is opened. The fitment flange 12e 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 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 12d. The small amount of residue on the top fitment surface 12a 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 therebetween when compressed between said cap and lip, said fitment having an annular depending flange extending from 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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