Dec. 1, 1959 R. W. BEALL, JR 2,915,223

FITMENT FOR CONTAINER

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FIG. 5.

FIG. 1.

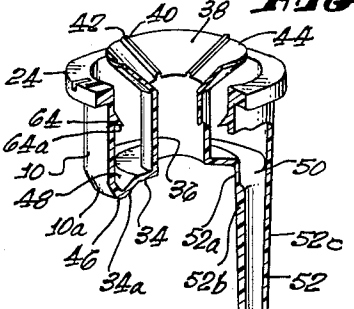


FIG. 6.

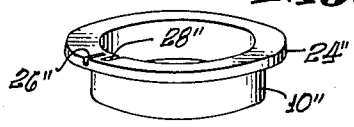


FIG. 8.

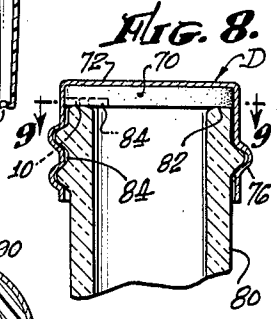
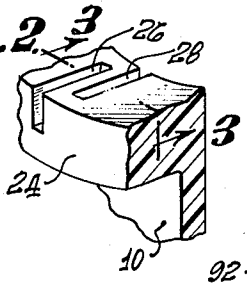


FIG. 2.



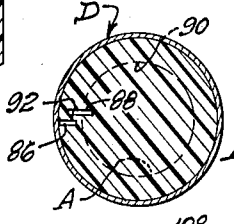


FIG. 9.

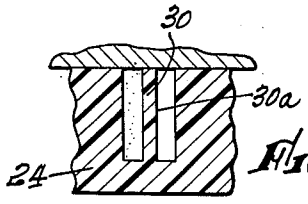
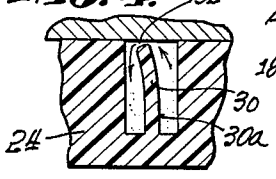


FIG. 3.

FIG. 4.



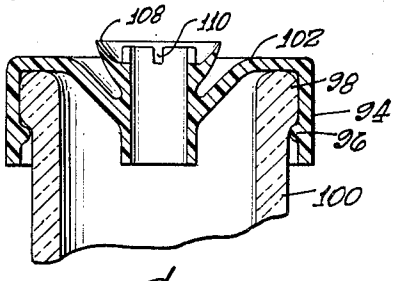


FIG. 10.

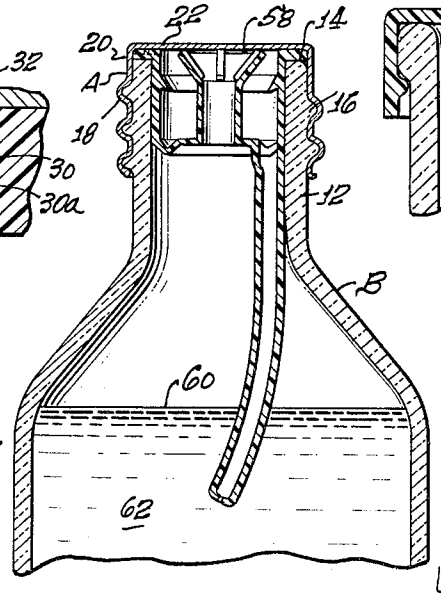


FIG. 7.

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FIG. 11.

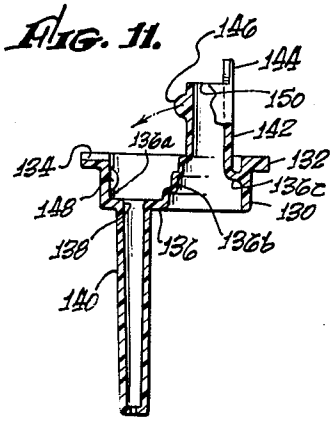


FIG. 12.

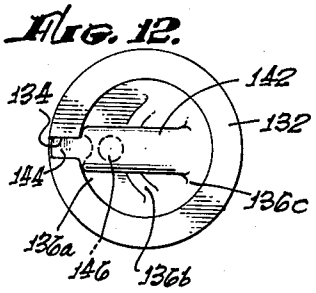


FIG. 13.

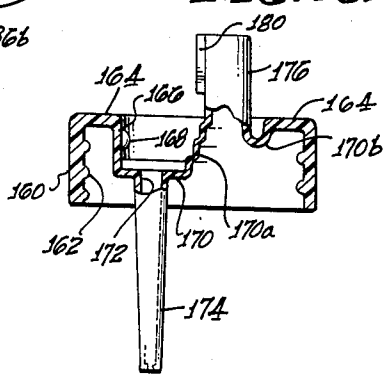


FIG. 16.

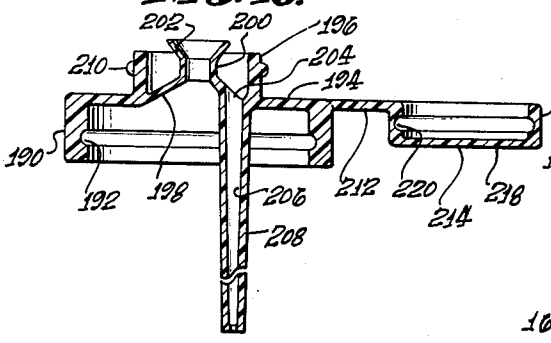


FIG. 14.

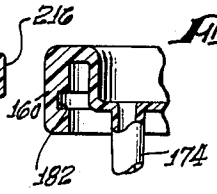


FIG. 15.

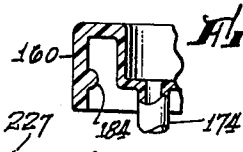
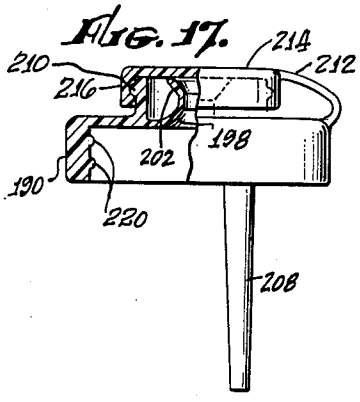


FIG. 17.



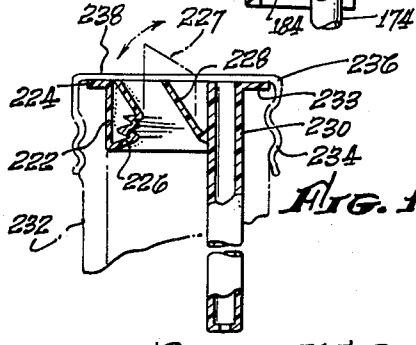


FIG. 18.

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United States Patent Office 2,915,223 Patented Dec. 1, 1959

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FITMENT FOR CONTAINER

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Application March 22, 1957, Serial No. 648,473

30 Claims. (Cl. 222—109)

The present invention relates to fitments, and more particularly to one that prevents the building up of pressure above a predetermined maximum limit within the container with which it is associated, as well as one that vents the container during discharge of liquid therefrom to provide an even, uninterrupted flow thereof.

A major object of the present invention is to provide a resilient fitment that is adapted to be situated in a sealing position between the outer surface of a liquid discharge member of a container that is removably closed by a cap whereby air or other gases is permitted to flow from the confines of the container when the pressure thereof rises above a predetermined value.

Another object of the invention is to supply a fitment adapted to be disposed in the tubular discharge member of a container to vent the container and permit an even, steady flow of liquid therefrom during the pouring operation.

Still another object of the invention is to furnish a fitment that can be mounted in the tubular discharge member of a container that is provided with an outwardly projecting lip from which liquid can be poured from any position thereon, which lip also directs liquid adhering thereto after cessation of the pouring operation to flow into a recessed portion of the fitment from which it is then discharged into an air vent for return to the confines of the container.

A further object of the invention is to provide a fitment having a tubular discharge spout associated therewith on which a pouring lip is formed that is so constructed as to cooperate with the interior surface of the cap closure of the discharge member to define passages which permit equalization of the air pressure adjacent the cap and that within the confines of the container to prevent rise of fluid within the vent tube.

Yet a further object of the invention is to provide a fitment that is adapted to replace the sealing member normally provided on the interior surface of a screw-on cap.

These and other objects and advantages of the invention will become apparent from the following description of a preferred and certain alternate forms thereof and from the accompanying drawing illustrating that form, in which:

Figure 1 is a perspective view of a preferred form of the invention;

Figure 2 is a fragmentary enlarged perspective view of a portion of the fitment shown in Figure 1, illustrating the manner in which a wall section is defined therein that can be deformed by excess pressure exerted on the interior of the container to permit flow of gases therefrom;

Figure 3 is a vertical cross-sectional view of the device shown in Figure 2 taken on line 3—3 thereof;

Figure 4 is the same view as that of Figure 3 but showing the wall section in a deformed condition;

Figure 5 is a perspective view of a first alternate form of fitment adapted to bleed off excess air or other gases

when a predetermined maximum pressure is exceeded within the container on which the fitment is mounted;

Figure 6 is a perspective view of a second alternate form of the invention;

Figure 7 is a vertical cross-sectional view of the preferred form of the invention shown mounted in a bottle neck which is closed by a screw-on cap;

Figure 8 is a vertical cross-sectional view of a conventional screw-on cap embodying a third alternate form of the invention;

Figure 9 is a horizontal cross-sectional view of the invention shown in Figure 8 taken on line 9—9 thereof;

Figure 10 is a vertical cross-sectional view of a fourth alternate form of the fitment which when removably mounted on a beaded fluid discharge member returns excess fluid to the interior of the container on which it is mounted at the cessation of the pouring operation;

Figure 11 is a vertical cross-sectional view of a fifth alternate form of the fitment;

Figure 12 is a top plan view of the device shown in Figure 11;

Figure 13 is a combined vertical cross-sectional and side elevational view of a sixth form of fitment;

Figure 4 is a fragmentary vertical cross-sectional view of a first alternate structure that can be incorporated in the device shown in Figure 13;

Figure 15 is a fragmentary vertical cross-sectional view of a second alternate form of structure that can be embodied in the device shown in Figure 13;

Figure 16 is a vertical cross-sectional view of a seventh alternate form of the invention in the open position;

Figure 17 is a combined vertical cross-sectional and side elevational view of a variation of the device shown in Figure 16 in the closed position; and

Figure 18 is a combined vertical cross-sectional and side elevational view of an eighth form of the fitment.

Referring to Figures 1–4 and 7 of the drawings for the general arrangement of the preferred form of the present invention, it will be seen to be formed as an integral unit, preferably from a polymerized resin material such as polyethylene or other resilient materials of this type presently available for the molding of such devices. This preferred form of the fitment includes a cylindrical shell 10 of such external diameter as to permit it to be slidably inserted within the confines of a bottle or a container from which liquid is dispensed.

The outer extremity of discharge member 12 terminates in a ring-shaped surface 14. Threads 16 are formed on the exterior surface of member 12, and these threads are adapted to be engaged by threads 18 formed on the side wall 20 of a cap A which has a flat circular closing portion 22. A sealing ring 24 projects outwardly from the upper edge portion of shell 10, with the width of this ring being such that it seats on surface 14 of tubular discharge member 12.

When cap A is screwed tightly on threads 16, the sealing portion 22 of the cap engages the outer surface of sealing ring 24 whereby the sealing ring is compressed on surface 14 to effect a fluid-tight seal therewith. Certain bottled liquids such as bleach, carbonated beverages, as well as other liquid products, emit gases when so confined, and particularly so when the temperature thereof rises, in which event the gas pressure may quite readily reach a dangerously high level. To avoid possible breakage of the bottle or container due to such increased internal pressure, it is highly desirable that gas or air dispelled from the confined liquid be bled off from the confines of the bottle or container B to reduce the internal pressure thereof to a safe level.

In the present invention, the details of which may best be seen in Figure 2, the sealing ring 24 is provided with a first slot 26 that extends inwardly from the external

circumferential edge thereof, and a second slot 28 circumferentially spaced from slot 26 that extends outwardly from the inner circumferential edge of the sealing ring. Neither of these slots extend completely across the width of the sealing ring, but do overlap one another to define a deformable wall section 30 therebetween as best seen in Figure 3. The thickness of wall section 30 is dependent upon the resiliency of the resinous material from which the sealing ring 24 is fabricated. In other words, the thickness of wall section 30 must be such that it will deform in a counter clockwise direction to define an escape passage 32 (Figure 4) when the gas or air pressure within bottle B rises above a predetermined value and contacts the side 30*a* of wall section 30. The free edge of section 30 and the interior surface of cap portion 22 cooperatively define passage 32 therebetween. Excess gases from within bottle or container B flow through second slot 28, passage 32, first slot 26, and then pass between the interior surface of the cap side wall 20 and external surface of the tubular discharge member 12 to the ambient atmosphere.

When the pressure in bottle or container B is reduced by this flow of excess air or gas to the ambient atmosphere, the pressure exerted against the side 30*a* of wall section 30 is insufficient to maintain section 30 in the deformed position shown in Figure 4, and due to the resiliency thereof, wall section 30 returns to its normal sealing position shown in Figure 3. It will be understood that when the wall section 30 is in the sealing position, any foreign material that may have passed upwardly between the tubular discharge member 12 and side wall 20 of cap A from the atmosphere cannot pass beyond the wall section 30 to enter the confines of the bottle or container B to contaminate the liquid contents thereof.

The lower circumferential edge of shell 10 terminates in a circular, inwardly extending web 34 that develops into a centrally disposed, outwardly extending tubular liquid discharge spout 36. The outer circumferential edge of spout 36 develops into a conical outwardly tapering pouring lip 38, the outer edge of which is preferably disposed above the exterior surface of sealing ring 24. Lip 38 is preferably provided with a number of circumferentially spaced, radially disposed reinforcing ribs 40 formed on or affixed to the interior surface thereof, with each of the ribs 40 having a portion 42 projecting above the outer circumferential edge 44 of the pouring lip 38. The purpose of ribs 40 will be explained in detail hereinafter.

The lower portion of shell 10 preferably tapers downwardly and inwardly in a circumferentially extending side wall extension 10*a* and the outer portion of web 34 tapers downwardly and outwardly in a circumferential extension 34*a*, with the two extensions meeting at a circumferentially extending junction line 46. Extensions 10*a* and 34*a* (Figure 1) cooperatively define a circumferentially extending trough 48. An opening 50 is formed in trough 48, and a tubular member 52 is provided that communicates with opening 50 and depends from portions of side wall 10 and web 34. Tube 52 is preferably tapered and narrows in cross section along the downward length thereof. The side wall of tube 52 varies in thickness, with the portion 52*a* thereof adjacent the interior extremity of opening 50 being the thinnest. The lower portion of section 52*a* develops into a heavier section 52*b* that decreases in thickness as it approaches the lower extremity of the tube. A wall section 52*c* of tube 52 directly opposite sections 52*a* and 52*b* is of intermediate thickness relative to that of the other tube sections. The lower end portion of tube 52 terminates in an inwardly extending flange 54 that defines an aperture 56. Tube 52 provides an air vent when liquid is poured from bottle or container B through spout 36, as well as serves as a drain for fluid that adheres to lip 38 at the cessation of the pouring operation and runs downwardly along the exterior surface spout 36 to web 34. After reaching web 34 the fluid flows into trough 48 and thence into the confines of bottle B through tube 52.

The fitment above described is preferably fabricated from a polymerized resinous material, and due to the thin wall section 52*a* and the heavier section 52*b* thereof, during curing of the resin, this tube assumes the inwardly curved configuration shown in Figure 7.

The preferred form of the fitment as shown in Figure 7 is disposed in the tubular discharge member or neck 12 of a bottle. It will be seen that when cap A is mounted in a sealing position on member 12, the upper extremity 42 of ribs 40 abut against the interior surface of the cap portion 22 and provides a passage 58 between the edge 44 of lip 38 and the interior surface of cap A. Passage 58 so defined serves to at all times maintain communication between gas or air situated above web 34, and gas or air located below the web and above the upper surface 60 of liquid 62 contained in bottle B. Inasmuch as the gas above and below web 34 are in communication, the pressure of these gaseous bodies are equalized and there is no tendency for liquid 62 to be forced upwardly into tube 52.

At a point intermediate sealing ring 24 and web 34 a circumferentially extending rib 64 is formed on the interior surface of shell 10. This rib 64 serves to prevent flow of liquid which might be temporarily disposed in trough 48 from the shell interior if the bottle B is suddenly inverted to a pouring position prior to the time interval required for the excess liquid in the trough to drain through opening 50 and pass into the confines of the bottle. Rib 64 is preferably of transverse triangular cross section, and is substantially normal to the interior face of shell 10 to obstruct the outward flow of liquid from the shell over the sealing ring 24.

Although the preferred form of the invention has been found to operate quite satisfactorily under certain conditions, it may be desirable to employ a sealing fitment that relieves excess pressure from the interior of a bottle or container B which is not provided with the auxiliary pouring spout accessories and air vents previously described. A fitment of this type is provided in the first alternate form of the invention, as shown in Figure 5. This alternate form of the invention is a ring 24′ that is identical to the sealing ring 24 shown in Figure 1, except that it does not have the cylindrical shell 10 depending therefrom. Pressure relieving slots are formed in ring 24′ which are identical in construction to slots 26 and 28 previously described, which for clarity herein are identified in Figure 5 by the same numerals but to which a prime is affixed. This alternate form of the device is used by placing or affixing it to the surface 14 of the tubular discharge member 12 of bottle B, and screwing the cap A in position on the neck to forcibly place the interior surface of the cap portion 22 in contact with the upper surface of ring 24′ and compress the ring into a fluid-tight seal. Insofar as relieving the internal pressure of the bottle or container B on which it is mounted, this form of the fitment operates in the same manner as the sealing ring 24 previously described, and accordingly the operation of sealing ring 24′ need not be further described herein.

A second alternate form of the invention is shown in Figure 6. This device includes a sealing ring 24″ that is provided with slots 26″ and 28″ identical to ring 24 and slots 26 and 28 shown and described in conjunction with the preferred form of the invention illustrated in Figure 1. Ring 24″ has a cylindrical shell 10″ extending downwardly therefrom which is slidably disposable within the upper confines of the tubular discharge member or neck 12 of bottle B. When this second form of the invention is positioned in bottle B it serves to relieve the internal pressure thereof in the same manner as described in detail herein.

A third alternate form of the invention is shown in Figures 8 and 9, which serves as a combination liner and pressure relief device. This third form of the invention comprises a circular sheet **70** of resilient material that abuts against the interior surface of the circular sealing portion **72** of a cap D, which includes a cylindrical side wall **74** having threads **76** formed therein. Threads **76** are adapted to engage complementary external threads **78** formed on the tubular discharge member **80** of a container (not shown). Discharge member **80** terminates in an outwardly disposed ring-shaped surface **82**.

Although cap D snugly engages discharge member **80**, it does not effect an air-tight seal between the interior surface of side wall **74** and the external surface of member **80**, but instead a circumferentially extending passage **84** is formed therebetween which is exaggeratedly shown in Figure 8. A recess **86** is formed on the lower surface of sheet **70** and extends inwardly from the circumferential edge thereof across a portion of face **82**. An elongate recess **88** is also provided in the internal face of sheet **70** that is preferably parallel to recess **86** and circumferentially spaced therefrom. Recess **88** (Figure 9) extends from a point inwardly of the inner circumferential edge **90** of tubular discharge member **80** to a point intermediate this edge and the outer circumferential edge of sheet **70**. Recesses **86** and **88** overlap and define a wall section **92** therebetween.

The thickness of wall section **92** is determined by the resilient characteristics of the material forming sheet **70**, and must be such that when the excess pressure within the confines of the container of which tubular member **80** forms a part exceeds a certain maximum limit, the wall section **92** is deformed in the same manner as the wall section **30** of the preferred form of the invention to permit excess air or gas to flow through recess **88** past wall section **92** into recess **86** and downwardly through passage **84** to the ambient atmosphere. It should be particularly noted that in this form of the invention sheet **70** serves the dual function of a resilient liner to effect a fluid-tight seal between cap D and tubular discharge member **80**, as well as providing means to vent excess gas or air whereby the internal pressure of the container of which the tubular discharge member forms a part will not rise above a predetermined value.

A fourth alternate form of the invention is shown in Figure 10 and includes a cylindrical side wall **94** having a circumferentially extending rib **96** formed on the interior surface thereof that engages the lower surface of a bead **98** formed on the upper portion of a tubular discharge member **100**. A circular web **102** extends inwardly from the upper edge portion of shell **94** and develops into a circular, downwardly tapering section **104** which terminates in an upwardly extending tubular discharge spout **106**. The upper extremity of spout **106** develops into a circular, upwardly and outwardly tapering pouring lip **108**. The upper edge portion of spout **106** is disposed above the lower extremity of lip **108**, and a number of circumferentially spaced, downwardly extending slots **110** are formed therein that communicate with the interior surface of lip **108**. Fluid adhering to the interior surface of lip **108**, on cessation of the pouring operation, flows downwardly therein through slots **110** into the confines of spout **106** where it is returned to the confines of the container of which tubular member **100** forms a part.

The fifth alternate form of the fitment, as may be seen in Figures 11 and 12, includes a cylindrical shell **130** that has a sealing ring **132** projecting outwardly from the upper circumferential edge thereof, which is adapted to engage the ring-shaped surface of a container discharge member (not shown) in the same manner as the sealing ring **24** previously described. A slot **134** is transversely disposed in the upper surface of ring **132**, the purpose of which will be hereinafter explained. The lower

portion of cylindrical shell **130** below slot **134** develops into a web **136**, a portion **136***a* of which is parallel to sealing ring **132** and in which portion an aperture **138** is formed that communicates with a tubular air vent **140** depending from the web.

Inwardly from air vent **140** the web **136** develops into an upwardly extending bellows-like portion **136***b*, the upper of which is elongated to provide a pouring spout **142**. A portion **136***c* of the web **136** is connected to the lower portion of spout **142** as well as the interior surface of shell **130**. A finger **144** is formed on the upper circumferential edge portion of spout **142**, which finger when the spout is bent to a horizontal position as shown in Figure 12, snugly engages the slot **134**, also shown in this figure.

A first protuberance **146** is formed on the upper exterior portion of the pouring spout **142** and is so located that when the spout assumes the horizontal position, the first protuberance seats on the web portion **136***a* defining the aperture **138**, and sealingly engages same to completely obstruct communication between the ambient atmosphere and the air vent **140**. A second protuberance **148** is formed on the interior of shell **130** directly below the slot **134** and is so located that it engages the open end portion **150** of spout **142** when it is in the horizontal position shown in Figure 12.

This fifth form of the fitment is fabricated from a resilient material such as polyethylene or the like, the resiliency of which permits the spout **142** to assume the horizontal position shown in Figure 12, and the bellows **136***b* facilitates this movement whereby a minimum of manual effort is required. Due to the resiliency of the material forming same, the pouring spout **142** is easily snapped into engagement with the second protuberance **148**, with this protuberance sealingly engaging the opening **150** formed therein to completely obstruct communication between the ambient atmosphere and the interior of the spout.

While the material forming the fifth form of the invention is resilient, yet it has sufficient rigidity and memory that after the spout **142** is disengaged from the second protuberance **148** it immediately returns to substantially the upright position shown in Figure 11, in which position liquid can be discharged therethrough from the container (not shown) on which the device is mounted in an even uninterrupted flow due to the venting provided by the air vent **140**. When this form of fitment is mounted on a container it serves the dual function of providing a vented liquid dispenser when in the position shown in Figure 11 and as a closure when disposed in the position shown in Figure 12.

A sixth alternate form of the fitment is shown in Figure 13 that is preferably formed of polyethylene or a like resilient material and includes a cylindrical side wall **160** having threads **162** formed on the interior thereof which threadedly engage the neck of a bottle provided with complementary threads (not shown). An annular sealing ring **164** extends inwardly from the upper circumferential edge of the shell **160** and develops into a downwardly depending recess-defining wall **166** on which a protuberance **168** is formed. The lower portion of wall **166** develops into a web **170** that has an aperture **172** formed therein which communicates with an air vent **174** that depends downwardly from the web.

Web **170** develops into a bellows-like portion **170***a* that extends upwardly, and the upper end thereof is connected to a tubular discharge member **176**. A section of the lower portion of discharge member **176** joins web portion **170***a*, with the balance of the lower portion of member **176** being connected by a web portion **170***b* to sealing ring **164** as shown in Figure 13. The exterior surface of discharge member **176** directly above the bellows portion **170***a* is provided with a sealing member **180** that removably engages the portion of web **170** defining the aperture **172** to completely obstruct communication

between the ambient atmosphere and the interior of the air vent 174 when member 176 occupies a horizontal position such as that tubular member 142 occupies in Figure 12. When discharge member 176 is in this horizontal position the free open end thereof engages the protuberance 168 whereby communication between the ambient atmosphere and the interior of the discharge member is completely obstructed.

In Figure 14 a first structural variation of the sixth form of the fitment is shown which is identical to that disclosed in Figure 13 except that the threads 162 are dispensed with, and in their stead a circumferentially extending slot 182 is provided that removably engages a projecting ring or bead formed on the container.

A second structural variation of the sixth alternate form of the invention is shown in Figure 15 wherein rather than using the threads 162 or slot 182, a circumferentially extending, inwardly projecting bead 184 is provided that is adapted to slip under a circumferentially projecting bead or rim on the neck of a container (not shown).

A seventh alternate form of fitment is disclosed in Figure 16 which is preferably made of polyethylene or a like material and comprises a cylindrical shell 190 having a circumferentially extending recess 192 formed on the interior surface thereof. The upper edge portion of shell 190 develops into an inwardly extending sealing ring 194, the interior of which is joined to a second cylindrical shell 196 as well as to an upwardly and inwardly extending web 198. The center of web 198 develops into a liquid pouring spout 200 having a circumferentially extending flared pouring lip 202. An aperture 204 is formed in web 198 that communicates with a bore 206 provided in an air vent tube 208 depending from the web. A circumferentially extending rib 210 is formed in second shell 196, the purpose of which will later be explained. The first shell 190 has a flexible tongue 212 projecting outwardly therefrom that is connected to a circular cap 214 which is defined by a side wall 216 and circular closure member 218. A circumferentially extending recess 220 is formed on the interior surface of side wall 216. When the tongue is bent to the shape shown in Figure 17 and the cap 214 is pressed downwardly on the second cylindrical shell 196, the rib 210 engages the recess 220 whereby the cap is removably locked in place on the second cylindrical shell. When cap 214 is so disposed on shell 196, the web 198 is flexed downwardly and the upper circumferential edge of lip 202 is in abutting and sealing contact with the interior surface of closure member 218. In this manner cap 214 serves to prevent communication between the ambient atmosphere and the interior of the liquid discharge member 200 as well as the air vent 208. The recess 192 formed on the interior surface of shell 190 is so located as to permit engagement with a bead or rim formed on the interior surface of the liquid discharge portion (not shown) of the container on which the device is mounted.

A variation of the seventh form of fitment is shown in Figure 17 which is identical to the device above described, with the exception that two longitudinally spaced, circumferentially extending ribs 220 are formed on the interior surface of shell 190 instead of the recess 192. Ribs 220 are so spaced as to engage a bead or rim formed on the neck portion of a container when the invention is slidably mounted thereon.

An eighth alternate form of the invention is shown in Figure 18 that includes a cylindrical shell 222 having a sealing ring 224 extending outwardly from the upper circumferential edge thereof. A web 226 of bellows-like configuration extends upwardly and inwardly from the lower circumferential edge of shell 222, and at its center develops into an upwardly projecting pouring spout 228 shown in phantom line. An air vent tube 230 is provided that is parallel to shell 222 and depends downwardly from a position flush with the upper surface of ring 224 through web 226 to terminate a substantial distance therebelow.

When the pouring spout 228 is in an upright position as shown in phantom line it is sufficiently long to project above the upper surface of sealing ring 224. The upper edge 227 of spout 228 is tapered and slopes downwardly toward air vent 230. This eighth form of fitment, like those previously described, is preferably formed of a resilient synthetic plastic material, and one having sufficient rigidity and memory that the spout 228 unless forced downwardly to the position shown in solid line in Figure 18, will occupy substantially the position shown in phantom line in the same figure.

The external diameter of shell 222 is such as to permit it to fit snugly within the upper confines of a neck 232 of a bottle or other container provided with threads 234 on the exterior surface thereof. Sealing ring 224 rests on a flat annulus-shaped surface 233 formed on the upper extremity of the neck. A threaded cap 236 is provided that includes a flat circular closure member 238, which when the cap is screwed onto threads 234, deforms web 226 to cause the spout 228 to assume the position shown in solid line in Figure 18.

When the cap 236 is mounted on neck 232 as shown in Figure 18, the closure member bears against sealing ring 224, the upper extremity of air vent 230, and spout edge 227 to completely obstruct communication between the ambient atmosphere and the interior of the bottle or container of which neck 232 forms a part. Upon removal of cap 236 from neck 232, due to the resiliency and memory of the material forming the device, the spout 228 immediately returns to the upright position shown in solid line in Figure 18, and an uninterrupted flow of liquid may be discharged from the spout due to the venting provided by air vent 230.

The fifth and eighth alternate forms of the fitment are adapted to be inserted within the confines of the neck or liquid discharge portion of a container. The sixth and seventh alternate forms, and the variations thereof are adapted to engage the exterior surface portion of a bottle neck or liquid discharge member.

The use and operation of the various embodiments of the invention previously have been described in detail and need not be repeated herein.

Although the preferred and alternate forms of my invention are fully capable of achieving the results and providing the advantages hereinbefore mentioned, it is to be understood that they are merely illustrative of the presently preferred embodiments thereof, and that I do not mean to be limited to the details of construction above described other than as defined in the appended claims.

I claim:

1. A fitment for use in preventing the internal pressure of a liquid container having a tubular discharge member that is closed by a cap extending over at least a portion of the external surface thereof from rising above a predetermined maximum limit, comprising: a resilient sheet seal which on a first side thereof abuts against the outermost surface of said tubular member and on a second side thereof opposite said first side contacts an interior surface of said cap, said sheet on said first side being formed with a first slot that extends inwardly from the edge thereof partially across said outermost surface and a second slot circumferentially spaced from said first slot, said second slot extending across an interiorly situated portion of said outermost surface, said first and second slots cooperatively defining a wall section therebetween that is adapted to deform in a direction substantially normal to the longitudinal axis of said wall section, and said first and second slots being so spaced that said wall section deforms when said internal pressure rises above said maximum limit to permit vapor above said liquid in said container to flow through said

second slot past said wall section into said first slot and outwardly therefrom to the ambient atmosphere between said cap and tubular discharge member until said internal pressure returns to a pressure below said predetermined maximum limit, with said wall section due to the resiliency of said material defining same returning to substantially the position it occupied prior to deformation by said internal pressure.

2. A fitment as defined in claim 1 in which said resilient sheet seal is ring-shaped, and said first slot originates at the outer circumferential edge thereof and said second slot at the inner circumferential edge of said sheet.

3. A fitment as defined in claim 2 in which said first and second slots are in substantially parallel relationship.

4. A fitment as defined in claim 2 in which a cylindrical shell is provided that extends downwardly from said sheet seal and is slidably insertable within the confines of said discharge member.

5. A fitment as defined in claim 4 in which said shell is formed of a resilient material that effects a liquid-tight seal with at least a portion of the interior surface of said discharge member.

6. A fitment as defined in claim 5 in which said shell is provided with an inwardly extending web that develops at substantially the center thereof into an upwardly extending tubular pouring spout.

7. A fitment as defined in claim 6 in which a tube is provided that depends downwardly from at least a portion of said web and is in communication with an opening formed therein, said tube serving as an air vent when liquid is poured from said spout and as a drain to return liquid temporarily situated above the exterior surface of said web into the interior of said container.

8. A fitment as defined in claim 7 in which said spout is provided on the upper extremity thereof with an upwardly and outwardly tapering pouring lip, the outer edge of which lip is disposed above the outer surface of said sheet seal, and any liquid dripping from said lip at the cessation of a pouring operation flowing to said web for subsequent return to said container through said tube.

9. A fitment as defined in claim 8 in which said web is formed of a sufficiently resilient material that said cap as it is placed in a sealing position on said discharge member moves said spout and lip toward the interior of said container until the external edge of said lip and the external surface of said sheet seal are in substantially the same plane.

10. A fitment as defined in claim 9 in which said lip is provided with means that define at least one passage between the outer extremity of said lip and the adjacent inner surface of said cap to permit the air pressure on each side of said web to equalize and prevent liquid from rising in said container into said tube.

11. A fitment as defined in claim 10 in which said means are a plurality of circumferentially spaced upwardly extending ribs situated on said lip and extending thereabove, with the outer extremities of said ribs contacting the interior surface of said cap to define said passages.

12. A fitment capable of being mounted in a tubular discharge member of a container that is sealable by a cap having a flat interior surface, including: a cylindrical resilient side wall capable of being slidably inserted in said member to effect a fluid-tight seal with at least a portion of the interior surface defining same; a sealing ring of resilient material extending outwardly from said side wall that seats on the outer extremity of said member and abuts against said flat interior surface of said cap; a tubular fluid discharge spout having at least a portion thereof concentrically disposed within at least a portion of said side wall and defining a circumferentially extending space therewith, with said discharge spout projecting upwardly in said shell to at least the exterior surface of said sealing ring; a tubular air vent, a portion at least of which extends below the lowermost edge of said side wall; a web that extends from said discharge spout across said circumferentially extending space to said side wall, said web being formed with a fluid drain opening therein that is in communication with the interior of said air vent; and passage forming means that at all times permit equalization of the air pressure in said container on one side of said web with that on the other side thereof to prevent discharge of fluid from said container through said air vent into said space.

13. A combination sealing liner and pressure relief device for use with a cap that is mountable on and envelops the outer end portion of a tubular discharge member of a container, which discharge member terminates in a ring-shaped surface of appreciable width, including: a circular resilient sheet sealing liner of such area as to snugly fit within the confines of said cap, with the exterior surface of said sheet abutting against an interior surface portion of said cap and the interior surface of said sheet in contact with said ring-shaped surface, the interior surface of said sheet being formed with a slot that extends inwardly from the circumferential edge thereof partially across said ring-shaped surface as well as a cavity that extends from a point inwardly from the inner circumferential edge of said ring-shaped surface to a point intermediate said inner and outer circumferential edges of said ring-shaped surface, with said slot and cavity being so circumferentially spaced as to define a wall section therebetween that deforms substantially normal to the length thereof to permit the escape of gases from said container by flowing through said slot to the ambient atmosphere when the pressure of said gases in said container rises above a predetermined maximum limit.

14. A fitment adapted to be mounted on a tubular discharge member of a container, including: a resilient cylindrical shell slidably insertable within the upper confines of said member; a sealing ring projecting outwardly from said shell and disposable against the upper extremity of said member; a tubular pouring spout; a tubular air vent; a resilient web connected to the interior of said shell, in which web first and second openings are formed and from which web said air vent depends in a communicating position with said first opening, with said pouring spout extending upwardly from said web above said shell in a communicating position with said second opening; first means that obstruct said first opening when said tubular spout is moved to a position substantially within the confines of said shell; and second means that obstruct the discharge opening in said spout when said spout is disposed substantially within the confines of said shell.

15. A fitment as defined in claim 14 wherein said second means also removably locks said tubular spout substantially within the confines of said shell.

16. A fitment as defined in claim 14 wherein said first means is a first protuberance formed on the exterior surface of said spout.

17. A fitment as defined in claim 14 wherein said second means is a second protuberance formed on the interior surface of said shell.

18. A fitment as defined in claim 14 wherein said spout is formed with a projecting finger and said ring has a slot transversely disposed therein in which said finger can be removably inserted, which finger when so disposed correctly aligns said first and second means in sealing positions.

19. A fitment as defined in claim 14 wherein at least a portion of said web is of bellows-like configuration to permit easy positioning of said spout substantially within the confines of said shell.

20. A fitment adapted to be mounted on a tubular discharge member of a container, including: a sealing

ring adapted to abut against the outer extremity of said member; means to removably hold said ring on said member; a resilient web extending inwardly from said ring, said web having first and second openings formed therein; a tubular air vent depending from said web in a communicating position with said first opening; a pouring spout extending upwardly from said web above said ring, with said spout being in a communicating position with said second opening; first means that obstruct said first opening when said tubular spout is moved to a position below the outer surface of said sealing ring; and second means that obstruct said second opening when said tubular spout is moved to a position below the outer surface of said sealing ring.

21. A fitment as defined in claim 20 wherein a portion of said web adjacent said pouring spout is of bellows-like configuration to permit positioning of said spout below the upper surface of said ring.

22. A fitment as defined in claim 20 wherein said first means is a first protuberance formed on the exterior of said spout that obstructs said first opening when said spout is disposed below said sealing ring.

23. A fitment as defined in claim 20 wherein said second means is a second protuberance formed on a portion of said web that obstructs the liquid discharge opening of said spout when said spout is disposed below said sealing ring.

24. A fitment adapted to be mounted on a tubular discharge member of a container, including: a sealing ring adapted to abut against the outer extremity of said member; a first cylindrical shell connected to said ring and adapted to removably engage said member; a second cylindrical shell that extends upwardly from the interior of said ring; a resilient web disposed within the confines of said second shell and connected thereto, said web having first and second openings formed therein; a pouring spout that extends upwardly from said web above said second shell and is in a communicating position with said first opening; a tubular air vent that depends from said web and is in a communicating position with said second opening; a resilient tongue affixed to said first shell; a cap mounted on the outer end portion of said tongue with the internal diameter of said cap being such as to permit same to slidably and snugly engage said first shell; and means to removably hold said cap in a predetermined position on said first shell, which shell when so disposed flexes said web downwardly to the extent that said pouring spout is in sealing contact with the interior of said cap and said cap is also in sealing contact with the outer extremity of said second shell.

25. A fitment as defined in claim 24 wherein said spout is formed with an outwardly tapered circular lip and said means is a circumferentially extending rib formed on said second shell and a circumferentially extending recess formed in said cap.

26. A fitment adapted to be mounted on an externally threaded tubular discharge member of a container that is capable of being sealed by a threaded cap having a flat interior surface, including: a sealing ring disposable in abutting contact with the upper extremity of said member and said flat interior surface of said cap; a cylindrical shell connected to the interior of said ring and disposable within the upper confines of said member; a tubular pouring spout possessing substantial longitudinal rigidity; a tubular air vent; and a resilient web connected to the interior of said shell through which web said air vent extends from a position thereabove to a position therebelow, said spout extending upwardly from said web above said ring in a communicating position with an opening formed in said web, with said web being sufficiently deformable that said spout can be moved to a position completely within the confines of said shell when said spout pressure contacts said interior surface of said cap as said cap is placed in a sealing position on said discharge member.

27. A fitment as defined in claim 26 wherein at least a portion of said web is of bellows-like construction, said spout has a tapered edge with the taper being such that said edge and the exterior surface of said ring are in the same plane when said spout is disposed within the confines of said shell.

28. A combination sealing liner and pressure relief device for use between the outermost ring-shaped surface of the externally threaded neck of a container and the flat interior surface of a cup-shaped closure, which closure includes a threaded cylindrical side wall that engages said threads to sealingly maintain said closure and liner on said neck, comprising: a resilient sheet of such size as to sealingly contact substantially all of said ring-shaped surface and at least that portion of said interior surface of said closure situated directly thereabove when said sheet is subjected to pressure from said interior surface of said closure when said closure is screwed on said neck, said sheet portion in contact with both said ring-shaped surface and said interior surface of said closure being formed with two adjacent recesses, with at least one of said recesses communicating with the interior of said container and the other of said recesses communicating with the ambient atmosphere, said recesses being so disposed relative to one another as to define a resilient wall section of such length and thickness therebetween that said wall section and a part of said sheet are in vertical alignment therewith when subjected to pressure from said interior surface normally exerted thereon when said closure is in a sealing position on said neck, said wall section when so disposed obstructing communication between the interior of said container and the ambient atmosphere, but said resilient wall section being adapted to be deformed sidewise into a non-sealing position when the differential between the pressure on the interior of said container and the ambient atmosphere exceeds a predetermined magnitude and so remain until the pressures on the interior of said container and that of said ambient atmosphere have equalized to reduce said differential below said predetermined magnitude, whereupon the resiliency of said wall section causes said wall section to return to said normal sealing position.

29. A combination sealing liner and pressure relief device as defined in claim 28 wherein said sheet is of circular configuration.

30. A combination sealing liner and pressure relief device as defined in claim 29 wherein said sheet is ring-shaped.

References Cited in the file of this patent

UNITED STATES PATENTS

2,715,480	Livingstone	Aug. 16, 1955
2,723,056	Smith	Nov. 8, 1955
2,763,403	Livingstone	Sept. 18, 1956
2,780,391	Jasuta	Feb. 5, 1957
2,808,964	Radtke	Oct. 8, 1957