United States Patent

[11] 3,556,335

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[54] **CONTAINER CLOSURE**
6 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **215/40,** 215/39
[51] **Int. Cl.** **B65d 23/00,** B65d 53/00
[50] **Field of Search** 215/40, 39, 52; 220/66, 67, 24.5

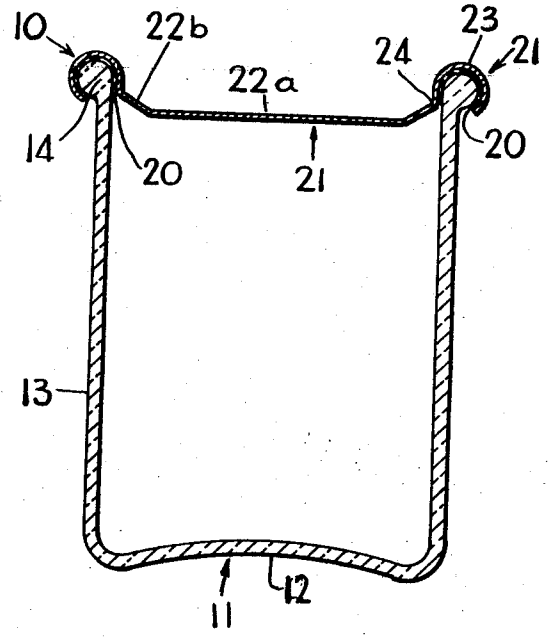
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ABSTRACT: A closure for a wide mouth glass container having a circumferential bead or enlargement at the finish of the container. A circumferential gasket of resilient material is adapted to contact the inner surface of the container finish and extend outwardly around the circumferential bead. A cap member has a central web portion positioned within the gasket and a peripheral portion which extends upwardly and outwardly around the gasket and the circumferential bead. The surface area of the central portion is greater than the area of a surface defined by a plane passing through the juncture of the central and peripheral portions so that upward pressure on the web tends to increase its diameter and urge it against the interior portion of the gasket.



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FIG. 1.

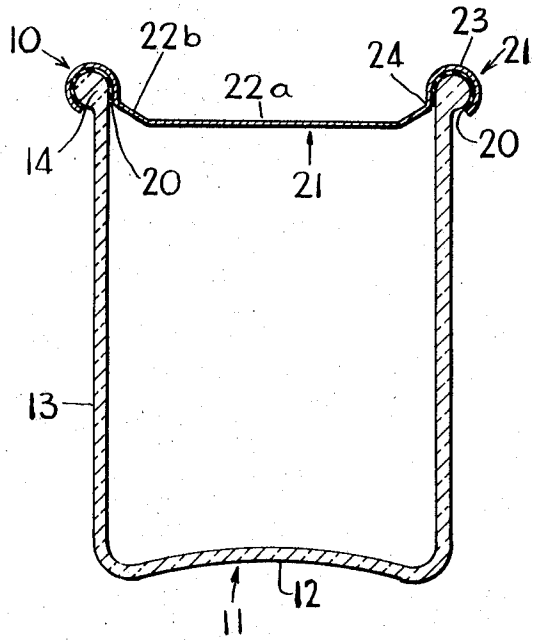


FIG. 3.

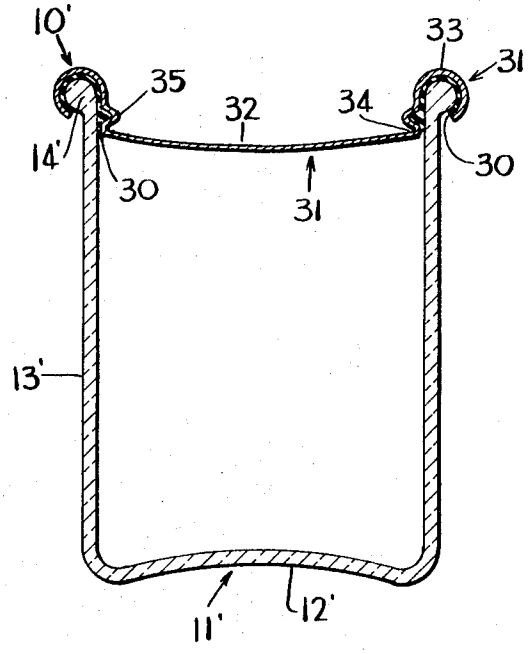


FIG. 2.

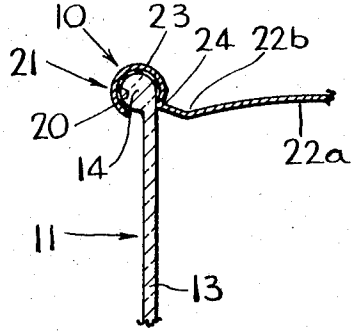
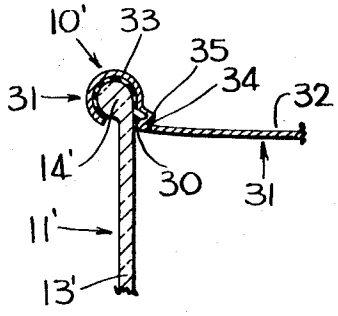


FIG. 4.



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CONTAINER CLOSURE

BACKGROUND OF THE INVENTION

This invention relates to container closures and, more particularly, to a novel closure for containers used in storing pressurized fluids.

In the past, containers for storing pressurized fluids of the kind having a cap type closure have been restricted to rather narrow mouths or openings. More particularly, it has not been possible to exceed a glass container finish diameter of about **38** millimeters and apply a cap with sufficient security to hold the pressure generated by malt beverages and carbonated water. This is because the closures have been designed to rely on the resilience of the sealing gasket and crimping force of the crown or screw thread to resist the internal pressure. This principle works well on small finishes, but as the diameter increases, the total upward load becomes great enough to overcome the gasket resilience or to deform the cap enough to lift the gasket from contact with the glass sealing surface, both of which result in gas and product leakage.

It is highly desirable to provide a wide mouth closure or pressure containers because tumbler shaped glass containers, as opposed to conventional small mouth bottles, are more economical to manufacture and in themselves more desirable containers for certain products. Economies result because a wide mouth closure would allow glass containers to be manufactured by what is known as the press and blow process which results in better glass distribution, lighter weight, and faster machine speeds.

SUMMARY OF THE INVENTION

The present invention provides a novel closure for containers used in storing pressurized fluids which closure includes a circumferential gasket and a cap member within the gasket. The closure relies on conventional top or side sealing only to hold the initial portion of pressure generation. As the pressure increases, it causes a central portion of the cap member to be stressed outwardly in a manner which applies a radially outward force compressing the gasket against the container inner surface. As a result the sealing force between the closure and the container increases as the pressure of the contents increases.

By way of illustration, the present invention will be described with particular reference to glass containers, but the principles of the invention may be variously applies to containers of other materials. While two specific embodiments of the principles of the present invention are illustrated in the accompanying drawing and described in more detail in the following specification, it is to be understood that such embodiments are by way of example only and that various mechanical modifications may be made without departing from the spirit of the invention.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a cross-sectional view of a container provided with a closure constructed in accordance with one embodiment of the present invention showing the closure just after assembly on the container and prior to any increase in pressure of the contents;

FIG. **2** is a fragmentary cross-sectional view similar to FIG. **1** showing the closure after substantial internal pressure generation;

FIG. **3** is a cross-sectional view of a container provided with a closure constructed in accordance with another embodiment of the present invention showing the closure just after assembly on the container and prior to any increase in pressure of the contents; and

FIG. **4** is a fragmentary cross-sectional view similar to FIG. **3** showing the closure after substantial internal pressure generation.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

FIG. **1** shows one embodiment of the closure **10** provided by the present invention as it would appear just after assembly on a container **11** and prior to any increase in pressure of the contents. Container **11**, preferably made of glass, is of the type including an end wall **12**, a continuous sidewall **13**, and a circumferential bead or enlargement **14** which constitutes the finish of the container.

Closure **10** comprises an annular gasket **20** of resilient material, for example rubber, adapted to be placed around the open end of container **11**. As shown in its assembled position in FIG. **1**, gasket **20** is in contact with the portion of the inner surface of container sidewall **13** at the open end thereof. Gasket **20** extends therefrom outwardly and around bead **14** and in this particular illustration substantially surrounds the entire outer surface of bead **14**.

Closure **10** further comprises a cap member **21** having a central portion **22** and a peripheral portion **23** which meet at a juncture **24**. Cap member **21** is formed from relatively thin metal and is deformable under pressure. While metal is preferred, other fluid impervious materials which exhibit slight or limited bending or deformation in response to pressure can be used for cap member **21** without departing from the spirit and scope of this invention.

In assembled condition as shown in FIG. **1**, cap member **21** is positioned within gasket **20** so that juncture **24** contacts the inner surface of the gasket and the peripheral portion **23** of the cap extends outwardly therefrom around gasket **20** in contact therewith and thus around bead **14**. In this particular embodiment cap portion **23** extends substantially over the entire surface of gasket **20** and bead **14**.

As seen in FIG. **1**, cap central portion **22** comprises an inner surface **22***a* disposed in a first plane generally perpendicular with respect to the container axis and an outer surface **22***b* disposed at an angle with respect to the first plane. In particular, surface **22***b* extends outwardly and upwardly from the generally horizontal surface **22***a* to juncture **24**. By virtue of this construction, the total surface area of cap central portion **22** is greater than the area of a plane passing through the juncture **24**.

FIG. **2** shows the condition of closure **10** after pressure generation of the contents, such as a malt or carbonated beverage, in container **11**. The resilience of gasket **20**, and the fact that cap peripheral portion **23** extends around bead **14**, as shown in FIGS. **1** and **2**, maintains closure **10** on container **11** in a manner similar to the conventional top or side sealing action relied upon in relatively narrow mouth containers provided with crown caps.

As the pressure of the contents increases, the upward force acting on closure **10** causes cap center portion **22** upwardly to compress gasket **20** against the inner surface of container wall **13**. As shown in detail in FIG. **2**, after pressure generation has occurred inner surface **22***a* of cap central portion **22** moves outwardly and outer surface **22***b* pivots outwardly about juncture **24** in a sort of toggle action. As a result, a side squeeze is exerted on gasket **20** by cap member **21** particularly in the region of juncture **24**, as indicated in FIG. **2**.

By virtue of this construction, the internal pressure generated by the container contents forces cap member **21** to seal the principles **20** more tightly against the container wall. Thus the container mouth or opening can be made significantly larger than heretofore possible in containers for pressurized liquids. By way of illustration, a closure constructed in accordance with principles of this invention was found to hold successfully five volume carbonated soda in a **68** millimeter finish diameter tumbler-shaped container.

FIG. **3** shows another embodiment of the closure, here designated **10′**, provided by the present invention as it would appear just after assembly on a container **11′** and prior to any increase in pressure of the contents. Container **11′** is in all respects identical to container **11** shown in FIGS. **1** and **2**. Clo-

sure 10' comprises an annular gasket 30 of resilient material, for example rubber, adapted to be placed around the open end or finish of container 11'.

As shown in FIG. 3, gasket 30 is in contact with the portion of the inner surface of container sidewall 13' at the open end thereof and extends inwardly therealong a slight distance past the bead 14. Gasket 30 also extends outwardly around bead 14' and, similar to the embodiment of FIGS. 1 and 2, substantially surrounds the entire outer surface of bead 14.

Closure 10' further comprises a cap member 31 having a central portion 32 and a peripheral portion 33 which meet at a juncture 34. Cap member 31, like cap 21, is of relatively thin sheet metal so as to be pressure deformable. Here again other fluid impervious materials which exhibit slight or limited bending or deformation in response to pressure can be used for cap member 31 without departing from the spirit and scope of this invention.

In assembled condition as shown in FIG. 3, cap member 31 is positioned within gasket 30 so that juncture 34 contacts the inner surface of gasket 30. Cap central portion 32 is bowed inwardly or in a direction toward container bottom 12'. By virtue of this construction, the surface area of cap central portion 32 is greater than the area of a plane passing through the juncture 34 of the cap central and peripheral portions.

Cap peripheral portion 33 is provided with an inwardly extending annular recess 35 adapted to receive a portion of gasket 30 as shown in FIG. 3. Preferably recess 35 is located near juncture 34. The remainder of cap peripheral portion 33 extends outwardly therefrom around gasket 30 in contact therewith and thus around bead 14', in this particular illustration substantially over the entire surface of gasket 30 and bead 14'.

FIG. 4 shows the condition of closure 10' after pressure generation of the contents, such as a malt or carbonated beverage, in container 11'. The resilience of gasket 30 and the fact that cap peripheral portion 33 extends around bead 14' as shown in FIGS. 3 and 4 maintains closure 10' on container 11' as shown in initial pressure generation as is closure 10 shown in FIGS. 1 and 2. As the pressure of the contents increases beyond this initial amount, the force thereof acting on closure 10' causes cap center portion 32 to bow outwardly to a position such as that shown in FIG. 4 wherein the degree of curvature of portion 32 is less than the portion shown in FIG. 3. In other words, cap center portion 32 increases in diameter as the pressure of the contents increases. This, in turn, results in gasket 30 being compressed radially outwardly against the inner surface of container wall 13 and, in addition, produces a crimping or squeezing of the portion of gasket 30 received in recess 35. As a result, a side squeeze or horizontal force is exerted on gasket 30 by cap member 31 particularly in the region of juncture 34. In addition, relative movement between gasket 30 and cap member 31 is prevented by the crimping or squeezing action.

The closure 10' constructed in accordance with this embodiment of the invention has all the advantages specified in conjunction with closure 10 of the first embodiment. When a closure provided by the present invention is used on glass containers the finish is designed primarily to hold the cap in place and not to compress the gasketing to overcome the working load resulting from pressure within the container. The closure cap can be removed by prying it off or by providing a central or peripheral tear tab thereon. The closure of the present invention advantageously allows tumbler shaped containers to be used for carbonated beverage bottles and wide mouth glass containers can be manufactured by the press and blow process which results in better glass distribution, lighter weight, and faster machine speeds.

I claim:

1. A closure for a container of the type having a circumferential bead or enlargement at the open end thereof, said closure comprising:

a. an annular gasket of resilient material disposed against a portion of the inner surface of the container sidewall and extending upwardly and around the circumferential bead; and

b. a cap member having a central portion and a peripheral portion, said cap member central portion being positioned within the container opening so that the juncture of the central and peripheral portions contacts said gasket and said peripheral portion extends upwardly around said gasket and the circumferential bead, said central portion formed inwardly relative to the plane of said juncture and being of greater area than the area of a plan passing through said juncture whereby pressure of the contents of said container tending to flatten the central portion of said cap member applies radially outward sealing force by said juncture against said gasket and container wall.

2. The closure defined in claim 1 wherein said cap central portion comprises an outer marginal portion extending angularly inwardly from said juncture whereby internal pressure flattens said angular marginal portion to exert said radially outward sealing force.

3. The closure defined in claim 1 wherein said cap central portion is bowed inwardly and wherein said cap peripheral portion has formed therein an annular inwardly extending return-bent recess adapted to receive a portion of said gasket.

4. In combination, a container having a circumferential bead or enlargement at the open end thereof, and a closure for said container comprising:

a. an annular gasket of resilient material disposed against a portion of the inner surface of the sidewall of said container and extending upwardly and around the circumferential bead; and

b. a cap member having a central portion and a peripheral portion, said cap member central portion being positioned within the opening of said container so that the juncture of the central and peripheral portions contacts said gasket and said peripheral portion extends upwardly around said gasket and the circumferential bead, said central portion formed inwardly relative to the plane of said juncture and being of greater area than the area of a plane passing through said juncture whereby pressure of the contents of said container tending to flatten the central portion of said cap member applies radially outward sealing force by said juncture against said gasket and container wall.

5. The combination defined in claim 4 wherein said cap central portion comprises an outer marginal portion extending angularly inwardly from said juncture whereby internal pressure flattens said angular marginal portion to exert said radially outward sealing force.

6. The combination defined in claim 4 wherein said cap central portion is bowed inwardly and wherein said cap peripheral portion has formed therein an annular inwardly extending return-bent recess adapted to receive a portion of said gasket.