United States Patent [19]

Wilcox

[11] **3,779,416**

[45] **Dec. 18, 1973**

[54] **FLEXIBLE SEALING CLOSURE WITH FRANGIBLE SECTION**

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[73] Assignee: **Denver Plastics, Inc.,** Lakewood, Colo.

[22] Filed: **Nov. 15, 1971**

[21] Appl. No.: **198,715**

[52] **U.S. Cl.** **220/27,** 215/42, 215/47, 220/48

[51] **Int. Cl.** **B65d 17/00,** B65d 45/00

[58] **Field of Search** 220/27, 54, 48; 215/42, 47

[56] **References Cited**

UNITED STATES PATENTS

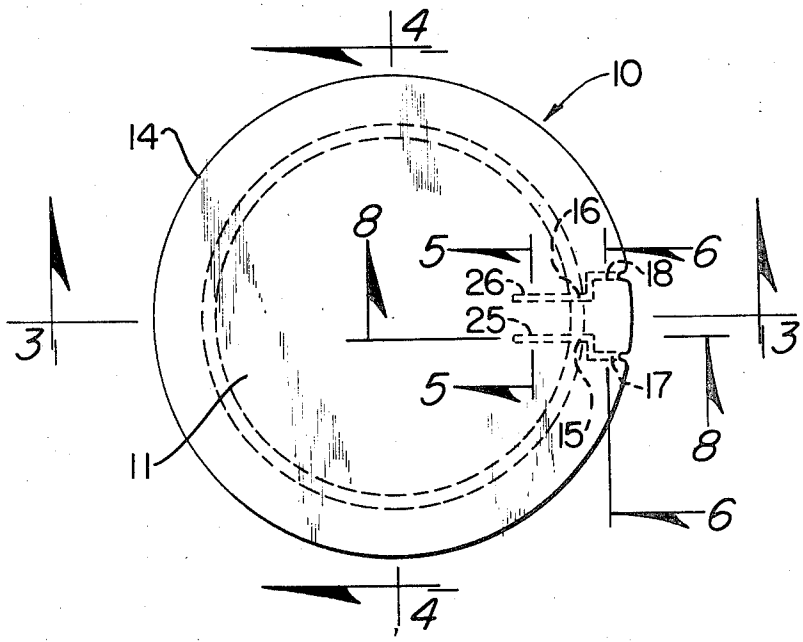
3,596,792	8/1971	Wilcox	220/27
3,357,592	12/1967	Kusserow	220/27
3,317,070	5/1967	Rausing	215/47
3,362,563	1/1968	Koll	220/27

Primary Examiner—George E. Lowrance
Attorney—Reilly and Lewis

[57] **ABSTRACT**

A flexible sealing closure for an opening in the wall of a container, such as in the top closure wall of bulk containers for milk, includes a cover portion having a pull tab forming an outwardly projecting extension thereof and a flange portion depending from one side of the cover portion. The flange portion has a circumferentially continuous surface with an intermediate annular sealing ring portion and a lower annular holding lip portion. Weakened sections in the closure are provided by reductions in wall cross section which are located in such a way as to insure that the pull tab breaks away from the flange and tears away a part of the cover portion along shear line portions upon the application of a pulling force to the pull tab to provide a hole of a selected size in the cover portion.

11 Claims, 10 Drawing Figures



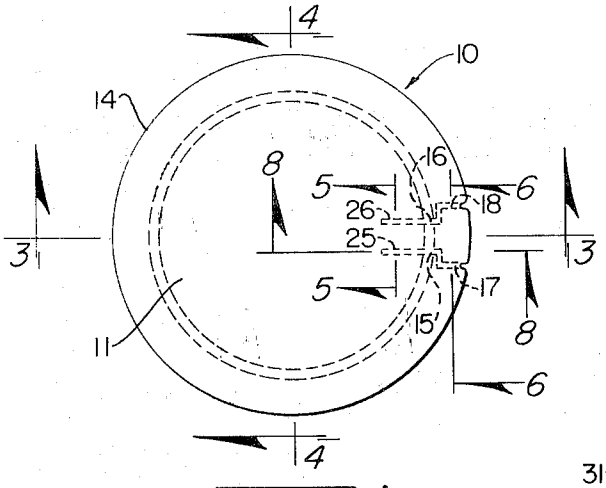


FIG. 1

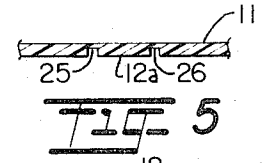


FIG. 5

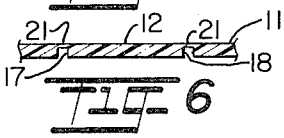


FIG. 6

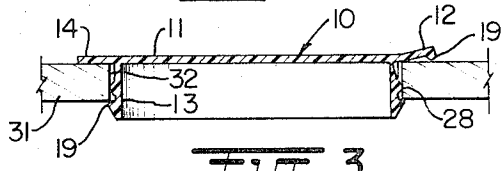


FIG. 3

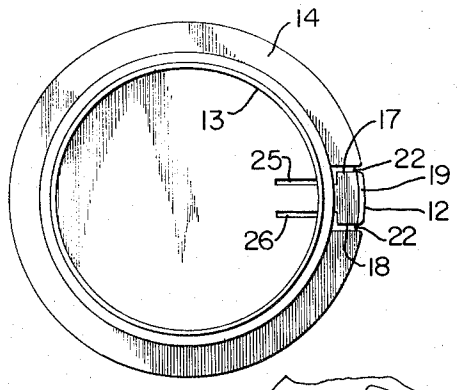


FIG. 2

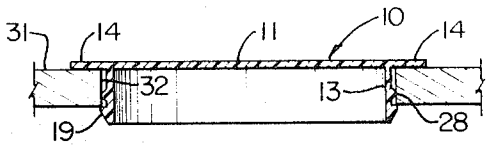


FIG. 4

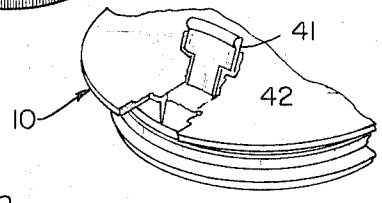


FIG. 10

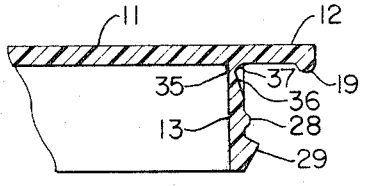


FIG. 7

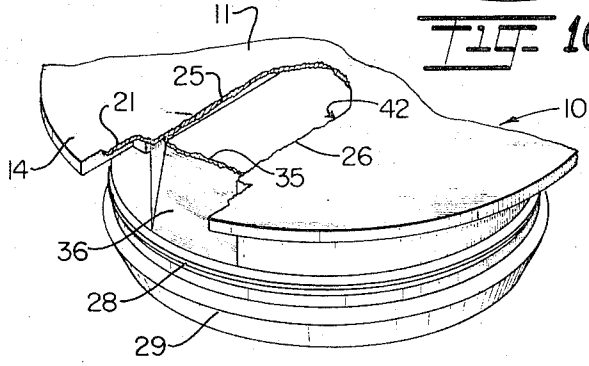


FIG. 9

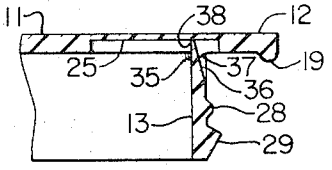


FIG. 8

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FLEXIBLE SEALING CLOSURE WITH FRANGIBLE SECTION

This invention relates generally to closures for containers and more particularly to improvements in sealing closures for liquid-filled containers such as bulk milk containers and the like.

There are a wide variety of applications wherein filled containers require a sealing closure. In situations where the container is filled with a fluid the closure is usually required to form a fluid-tight seal. In the milk industry, for example, bulk containers are filled with milk at the dairies and transported to the point of use such as restaurants, cafeterias and the like where the containers are placed in a refrigerated dispenser and the milk is dispensed through a tube in an opening in the bottom of the container as required. For bulk milk containers it is necessary to provide a vent hole in the top to prevent a vacuum therein during drainage thereby allowing the drainage of the milk through the bottom tub. To this end it is desirable to provide a closure which will form a fluid-tight seal during transport and afford a vent hole after the bulk container is in place in the dispenser.

Previous flexible closures made as an integral molded unit with a pull tab and frangible sections have been designed principally as dust covers wtihout requiring a liquid-tight seal and further have been designed to tear away from the container so as not to be reused. Examples of these closures are found in U.S. Pat. Nos. 3,357,592 and 3,596,792 assigned to the assignee of the present invention.

Accordingly, it is an object of this invention to provide a novel flexible integral closure for containers which forms a liquid-tight seal and has a pull tab capable of breaking away a frangible section of the top portion of the closure with a pulling force applied preferably by the fingers to form a useful opening of a limited size.

Another object of this invention is to provide a novel flexible sealing closure for containers which can be molded as an integral unit using relatively low-cost high-volume injection molding techniques.

Yet a further object of this invention is to provide a novel integral molded closure having weakened sections so arranged as to insure that a desired frangible section associated with a pull tab will break away upon the application of a pulling force, preferably by the fingers, to provide an opening of a selected size therein for vent or container content removal purposes as required.

Still a further object of this invention is to provide a flexible integral sealing closure with a cover portion, a pull tab and an annular flange, the closure having frangible sections with an intermediate annular seal ring and a holding annular lip portion on the flange which inserts into the container opening to firmly secure the closure in place on the container and at the same time facilitate the pulling of the pull tab to form a hole in the closure of a selected size upon the application of a force by the fingers to the pull tab.

Yet a further object of this invention is to provide a novel integral flexible closure having a pull tab and frangible section capable of forming a liquid-tight seal with the container and providing a hole in a portion thereof when a removal force is applied to the pull tab.

In accordance with the present invention in a preferred embodiment shown there is provided a flexible

closure, preferably an integral molded body, including a top cover portion having a pull tab forming an outward extension thereof and a flange portion depending from one side of the cover portion in a direction transversely thereto. The flange portion has a circumferentially continuous surface and has an intermedaite annular sealing ring portion and a lower annular holding lip portion. The cover portion has a pair of indented shear line portions forming extensions or continuations of the sides of the pull tab, the shear line portions being of a limited extent relative to the full length of the cover portion and adapted to be easily torn upon application of a tearing force to the pull tab to break along the shear line portions. The flange portion has a weakened section provided by a reduced cross section and an upwardly tapered outer surface arranged so that the smallest cross section is preferably below the bottom face of the cap portion and tab portion and a thickened radius portion is provided above the weakened section to ensure that the break is produced in the flange portion and not across the tab outwardly of the cover portion. A further weakened section is provided in the cover portion along each side of the pull tab portion sides which is an upward extension of the outer tapered surface of the flange to ensure a tearing away in the desired place.

Other objects, advantages and capabilities of the present invention will become more apparent as the description proceeds taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a top plan view of a flexible sealing closure embodying features of the present invention;

FIG. 2 is a bottom plan view thereof;

FIG. 3 is a sectional view taken along lines 3—3 of FIG. 1 and showing the closure mounted in a circular opening in a container wall;

FIG. 4 is a sectional view taken along lines 4—4 of FIG. 1;

FIG. 5 is a sectional view taken along lines 5—5 of FIG. 1;

FIG. 6 is a sectional view taken along lines 6—6 of FIG. 1;

FIG. 7 is an enlarged fragmentary sectional view along lines 3—3 of FIG. 1;

FIG. 8 is an enlarged sectional view taken along lines 7—7 of FIG. 1;

FIG. 9 is an enlarged fragmentary perspective view of the closure with a top section removed by the application of a pull force to the tab to form a hole therein; and

FIG. 10 is a fragmentary perspective view of the closure with a section torn away but with the pull tab left attached to the cover portion.

Referring now to the drawings, there is shown an integral flexible closure **10**, made as a unitary molded body preferably from a polyethylene material, including a disclike circular top cover portion **11** having a pull tab **11** intgral with and forming an outwardly directed projection or radial extension of the cover portion and an annular flange portion **13** integral with and depending from one side of the cover portion extending transversely thereto. The cover portion **11** has an outwardly extending continuation or an extension **14** projecting outwardly beyond the flange which prevents the cover from slipping through the container opening and as shown is generally coextensive with the pull tab **12**.

The pull tab **12** is outwardly stepped along the side edges with a pair of spaced inner side edges **15** and **16**

and a pair of outer side edges 17 and 18 spaced further apart than the inner side edges defining an enlarged tab end portion. The enlarged tab end portion has a thickened bulge or bar 19 along the under face of the tab to facilitate the grasping thereof between the fingers. In the molded construction shown best in FIG. 6 the sides of the pull tab are provided by forming indentations or indented shear line portions in the body along the inside which divide the tab and outer extension leaving a pair of thin web portions or weakened sections 21 along the top which are capable of being easily torn by applying pulling forces to the pull tab with the fingers with a pair of small open recessed areas 22 at the periphery between the pull tab 12 and extension 14 further facilitating the easy breaking away of the pull tab.

The top cover portion 11 has a pair of indentations or indented shear line portions 25 and 26 formed by making straight depressions in the inner face thereof, the shear line portions forming extensions or continuations of the inner side edges 17 and 18, respectively, of the pull tab to establish a frangible section in the cap portion capable of braking away from a larger section of the top cover portion 11. The indented shear lines 25 and 26 are of a limited extent relative to the full length of the cover portion and are of a thickness so that they may be easily torn upon the application of a tearing or pulling force to the pull tab sufficient to break away long the shear line portions.

The flange portion 13 is closed throughout its circumferential extent to provide a circumferentially continuous surface. The flange portion is torsionally flexible and generally cylindrical in shape with a smooth inner annular surface. The flange portion 13 has an intermediate annular rib 28 on its outer surface which functions as a sealing ring in that it is forced against the container wall surface. The flange portion 13 also has a radially outwardly extending and upwardly divergent tapered lip portion 29 on its outer surface which functions as a hold-down lip for the closure. Referring now to FIGS. 3 and 4, there is shown a portion of a container wall 31 having a circular opening 32. A typical bulk milk container having a top closure wall with a circular opening is illustrated in a copending application Ser. No. 198,684 entitled DISPENSING CLOSURE ASSEMBLY FOR CONTAINERS assigned to the same assignee as the present invention.

In place in the container opening 32 the annular sealing ring portion 28 is forced against the axial surface of the wall and the retaining lip portion 29 engages the inner wall surface of the container at the corner formed between the axial surface and inner wall surface of the container. The closure is forcibly inserted into the opening with the extension 14 abutting the outer container wall surface adjacent the opening.

The flange portion 14 is formed with a weakened section or a section 35 of minimum thickness located slightly below the juncture between the tab portion and flange portion by reducing the cross section of a limited width of the flange portion between the shear line portions. The cross section is reduced by providing an upwardly and inwardly tapered outer face 36 in the outer surface of the flange which terminates in a thickened radius portion 37 above the weakened section at the juncture between the tab portion and flange portion. This tends to cause the pull tab to break away from the flange portion and tear along the shear lines rather than have the pull tab break away from the top portion without forming an opening or hole therein.

To further insure the desired tear-away action another weakened section 38 is provided between the pull tab and flange portion at shear line portions, which weakened section 38 is provided by extending the tapered surface up into each shear line portion to further reduce the thickness of the flange so that the pull tab will more readily separate from the flange portion along the shear line portions at the juncture between the pull tab, flange portion and cover portion.

Once the closure is in place in the container opening as shown in FIGS. 3 and 4, a hole is formed in the cover section by grasping the pull tab between the fingers. As best seen in FIG. 9, the tab sides sever along the stepped web portion 21 and then break at weakened sections 35 and 38 followed by a tearing along line portions 25 and 26 to form a frangible pull tab section 41 leaving a hole 42 in the cover portion 11. This frangible pull tab section 41 includes the pull tab 12 and a section 12*a* of the top closure between line portions 25 and 26 and may be torn completely off of the closure as shown in FIG. 9 or left on as shown in FIG. 10. For providing a vent hole in the top of the bulk milk container the pull tab is usually left on as shown in FIG. 10.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made by way of example and that changes in details of structure may be made without departing from the spirit thereof.

I claim:

1. A flexible closure for an opening in the wall of a container, said closure comprising an integral body including a cover portion having a pull tab forming an outwardly projecting extension of the cover portion and a flange portion integral with and projecting from one side of the cover portion, said cover portion having a pair of weakened shear line portions limited in extent to the cover portion forming a continuation of the inner side edges of the pull tab, said shear line portions being adapted to be easily torn upon the application of a pulling force to the pull tab to break along the shear line portions and make a hole in the cover portion, said flange portion having a weakened section defined by a reduced wall thickness in the upper portion of the flange portion adjacent the juncture between the flange portion and the pull tab, there being a thickened portion greater than the normal tool-making tolerances at the intersection of a lower face of the pull tab and outer face of the flange between the shear line portions to ensure that the break is produced at the juncture of the cover portion and the flange portion and not across the tab portion outwardly of the cover portion, said flange portion having sealing means to form a fluid-tight seal with a wall surface of the container defining the opening.

2. A flexible sealing closure as set forth in claim 1 wherein said flange portion has a lower annular downwardly divergent holding lip portion adapted to bear against an inner wall surface of the container to secure the closure in the container.

3. A flexible sealing closure as set forth in claim 1 wherein said cover portion has an outwardly extending extension projecting outwardly beyond the flange portion to limit the extent of movement of the closure into the container opening.

4. A flexible sealing closure as set forth in claim 3 wherein said pull tab is generally coextensive with said cover portion extension.

5. A flexible sealing closure as set forth in claim 3 wherein said cover portion extensions and pull tab are connected by a thin upper web portion.

6. A flexible sealing closure as set forth in claim 5 wherein said web portion has a recess along the outer edges thereof.

7. A flexible sealing closure as set forth in claim 1 wherein said pull tab is outwardly stepped along the side edges with a pair of inner narrower side edges and a pair of outer wider side edges defining an enlarged tab end portion.

8. A flexible sealing closure as set forth in claim 1 wherein said reduced wall section is provided by an upwardly and inwardly tapered outer face in the flange portion.

9. A flexible sealing closure as set forth in claim 8 including a second weakened section between the pull tab and flange portion at the shear line portion, said second weakened section being provided by extending the tapered outer face up to each associated shear line portion.

10. A flexible sealing closure for an opening in a container comprising an integral body including a cover portion, a pull tab formed integral with and projecting outwardly from said cover portion, and a depending annular flange portion formed integral with one side of said cover portion, said flange portion having a circumferentially continuous surface having an external sealing ring to form a fluid-tight seal with the wall surfaces of the container, said cover portion having a pair of indented shear line portions forming a continuation of the pull tab sides, said shear line portions being limited in extent to said cover portion and adapted to be easily torn upon application of a tearing force to the pull tab to break along the shear line portions, said flange portion having a weakened section in the upper portion of the flange portion defined by a reduced thickness in the cross section of the flange portion adjacent the pull tab to facilitate severance of the pull tab from the flange portion and the tearing of the cover portion between said shear line portions, there being a thickened radius portion greater than the normal tool-making tolerances at the intersection of a lower face of the pull tab and outer face of the flange between the shear line portions to ensure that the break is produced at the juncture of the cover portion and the flange portion and not across the tab portion outwardly of the cover portion, whereby a frangible section including the pull tab and a part of the cover portion between the shear line portions is torn along the shear line portions to provide a hole of a selected size in the cover portion.

11. A flexible closure for an opening in a container comprising an integral body including a cover portion, a pull tab formed integral with and projecting outwardly from said cover portion, and a depending annular flange portion formed integral with one side of said cover portion, said flange portion having a circumferentially continuous surface having an external sealing ring to form a fluid-tight seal with the wall surfaces of the container, said cover portion having a pair of indented shear line portions forming a continuation of the pull tab sides, said shear line portions being of substantially less than the full length of said cover portion and adapted to be easily torn upon application of a tearing force to the pull tab to break along the shear line portions, said flange portion having a first weakened section in the upper portion of the flange portion defined by a reduced thickness in the cross section of the flange portion adjacent the pull tab, said reduced thickness being provided by an upwardly and inwardly tapered outer face in the flange portion, there being a thickened radius portion greater than the normal tool-making tolerances at the intersection of a lower face of the pull tab and outer face of the flange between the shear line portions to ensure that the break is produced at the juncture of the cover portion and the flange portion and not across the tab portion outwardly of the cover portion, said flange portion having a second weakened section between the pull tab and flange portion at each of the shear line portions provided by extending said tapered outer face up to each shear line portion to facilitate severance of the pull tab from the flange portion and the tearing of the cover portion between said shear line portions whereby a frangible section including the pull tab and a part of the cover portion between the shear line portions is torn along the shear line portions to provide a hole of a selected size in the cover portion, and a lower annular downwardly divergent holding lip portion adapted to bear against an inner wall surface of the container to secure the closure in the container.

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