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Holc et al.

[11] **3,780,902**

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[54] **CONTAINER END CLOSURE**

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[52] **U.S. Cl.** **220/54**

[51] **Int. Cl.** **B65d 17/20**

[58] **Field of Search** 220/54, 27, 48

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

In a container subjected to internal pressure, a metallic end closure is provided having a central panel portion, a removable portion defined by a score line included in the central panel portion, and an opening tab attached to the removable portion proximate the periphery of the central panel portion, the pull ring or handle of the opening tab being radially inward from the point of attachment of the opening tab to the removable portion. The end closure is additionally provided with means on said central panel portion for releasably holding said opening tab substantially flat against said central panel portion when the central panel portion bulges outwardly due to the internal pressure of the container.

15 Claims, 5 Drawing Figures

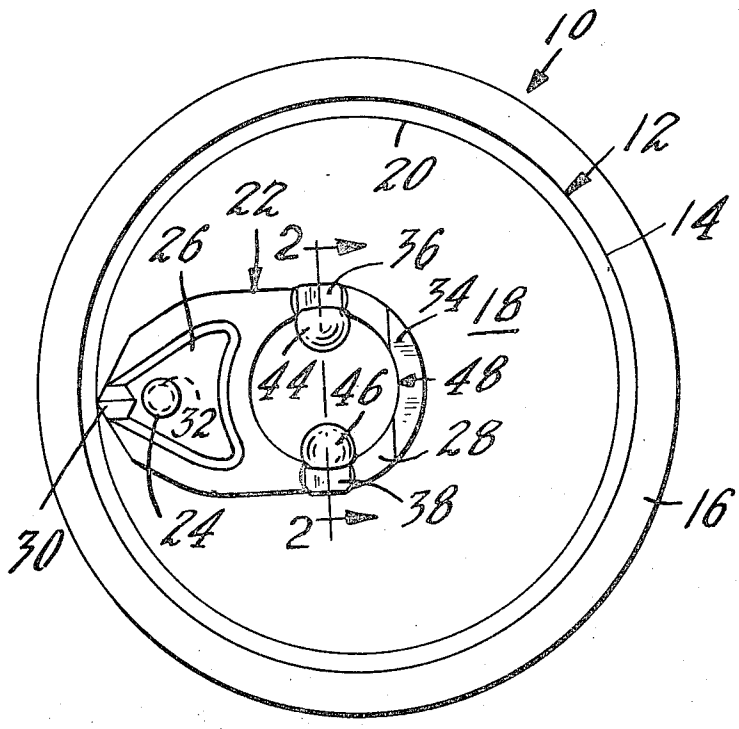


FIG. 1

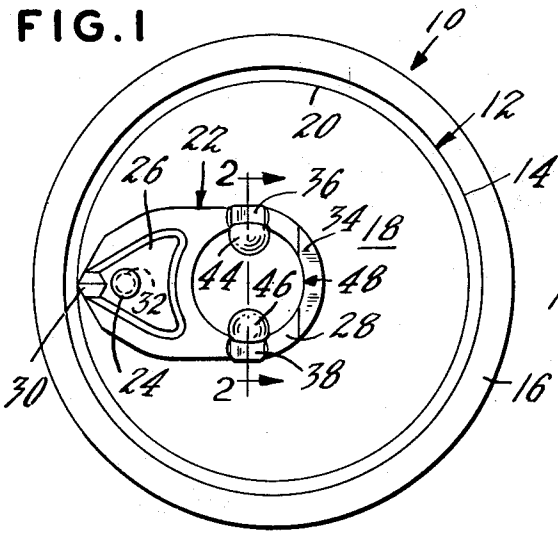


FIG. 4

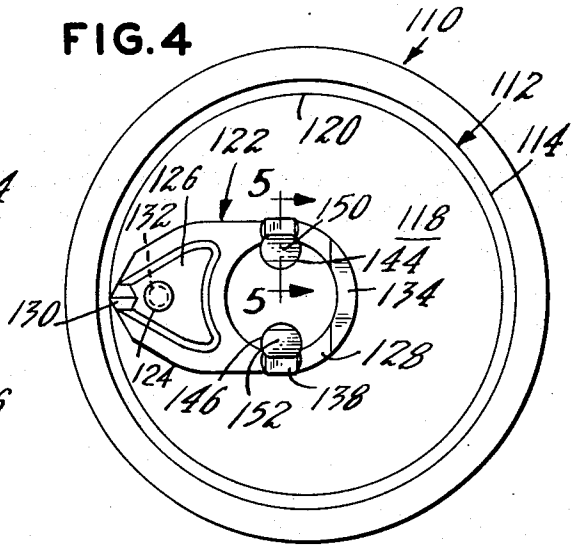


FIG. 2

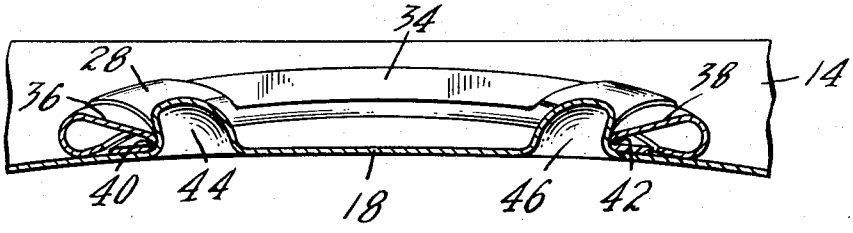


FIG. 3

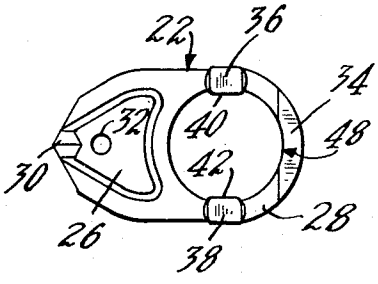
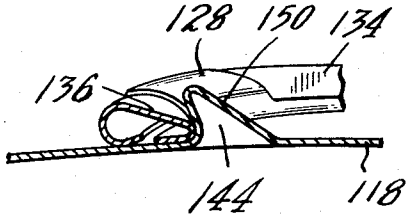


FIG. 5



CONTAINER END CLOSURE

The present invention relates generally to metallic end closures for easy opening containers. More specifically, the present invention relates to an improved metallic end closure for easy opening containers of the type having an opening tab attached to a removable portion of the end closure.

One of the basic developments in the container making industry was the development of the scored end for an easy opening container, opened by means of a lifting force exerted on an opening tab secured to the removable portion of the end defined by the score. The most common form of such containers are the beer and beverage cans in which the removable portion defines a comparatively small opening through which the contents are dispensed when the removable portion is removed from the end closure. In another form of easy opening container the score line is formed proximate to the periphery of the central panel of the end closure to permit the substantially complete removal of the central panel. This latter form of container is generally termed the "full-open" container and is suitable for use in the packaging of solid-like or chunk-like products, such as processed foods, which are to be removed from the container in their entirety. The opening tab for such a full open container is usually attached to the removable portion at a point near the score line, the pull ring or handle being radially inward from the point of attachment of the opening tab to the removable portion. The point of attachment of the opening tab on end closures having comparatively small removable portions may also be proximate to the periphery of the end with the pull ring radially inward from the point of attachment. Thus, when the user desires to open the container, the pull ring or handle is grasped and lifted upwardly causing the nose portion of the tab, which acts as a stress concentrator, to initially break or pop the scored section adjacent to it. A pulling force is then exerted on the pull ring to continue tearing along the score line thereby removing the removable portion from the end. In the case of containers which require sterilization subsequent to the canning operation, the central panel of the end closure has a tendency to bulge outwardly due to the internal pressure of the container resulting from the sterilization process. This outward bulging of the central panel of the end closure to which the opening tab is attached causes the free end of the tab, which is radially inward from the point of attachment of the tab to the central panel, to lift away from the central panel of the end closure. Since the free end of the opening tab of this type of container, which coincides with the pull ring or handle of the tab, does not lie flat against the central panel of the end closure, there exists the possibility that the pull ring could be inadvertently dislodged causing premature opening of the container during the processing and transportation thereof.

It is, therefore, a primary object of the present invention to provide an improved end closure for an easy opening container, wherein the opening tab is attached to the central panel of the end closure proximate the periphery thereof and tehe pull ring is radially inward from this point of attachment, which eliminates in whole or in part the possibility of accidentally opening the container owing to the lifted free end of the opening tab.

According to the present invention, this object, and others which will become apparent, is accomplished by providing an end closure of the type having a central panel portion, a removable portion defined by a score line included in said central panel portion, and an opening tab attached to said removable portion proximate to the periphery of the central panel portion, the pull ring or handle of the opening tab being radially inward from the point of attachment of the tab to the removable portion, with means for releasably holding the opening tab substantially flat against the central panel portion when the central panel portion bulges outwardly due to the internal pressure of the container.

The present invention will be described and understood more readily when considered with the embodiments of the accompanying drawings, in which:

FIG. 1 is a plan view of a container end closure according to the present invention;

FIG. 2 is an enlarged partial cross-sectional view of the end closure of FIG. 1 taken along line 2—2 of FIG. 1;

FIG. 3 is a plan view of the opening tab of the end closure of FIG. 1;

FIG. 4 is a plan view of a modified form of the end closure of FIG. 1; and

FIG. 5 is an enlarged partial cross-sectional view of the end closure of FIG. 4 taken along line 5—5 of FIG. 4.

Now referring to the drawings, there is shown in FIG. 1 an end closure, generally designated **10**, for an easy opening container of the "full-open" end type. End closure **10** maybe circular and constructed of steel, aluminum, tin plate, plastic, or other suitable repturable material. As clearly seen, end closure **10** is formed with a generally planar central panel portion, generally designated **12**, which merges at its periphery with annular countersink wall **14**. The upper end portion of wall **14** merges with outwardly extending curled flange **16** which may be interfolded with the end flange of a container body (not shown) to form an end seam (not shown).

Included in central panel **12** is a removable portion, generally designated **18**, which is defined by and included within score line **20**. Removable portion **18** becomes detached from end closure **10** when score **20** is completely ruptured. The entire length of score line **20** may be proximate to the periphery of central panel **12** thereby making removable portion **18** substantially coextensive with the central panel.

In order to rupture score **20** and detach removable portion **18** from end closure **10**, an opening tab, generally designated **22**, is provided. Opening tab **22** is attached to the removable portion proximate the periphery of central panel **12** by a suitable securing means such as hollow rivet **24** which may be integral with and formed in removable portion **18**.

As clearly seen, opening tab **22** includes a web portion **26**, a handle portion or pull ring **28** attached to web portion **26**, and a stress concentrating nose portion **30** formed in web portion **26** and oppositely disposed from pull ring **28**. Opening **32** is provided in web portion **26** for the purpose of accepting rivet **24** for the attachment of opening tab **22** to removable portion **18**. In this manner rivet **24** functions as a fulcrum for opening tab **22** such that when pull ring **28** is lifted upwardly tab **22** pivots about rivet **24** causing nose portion **30** to contact score line **20** and concentrate the stress at the

point of contact thereby breaking the score. Handle portion or pull ring **28**, although shown in the drawings as being in the form of a ring may have any suitable shape or configuration desired, such as rectangular, triangular, etc. The handle portion is adapted for ease of grasping by the user, such as by the insertion through the ring of at least one of the user's fingers. A flattened portion, generally designated **34**, may be provided at that portion of pull ring **28** which is to be initially lifted by the user for the purpose of permitting easier insertion of the user's finger. Inwardly angularly flattened portions, generally designated **36** and **38**, of pull ring **28** are provided having inwardly extending arcuate projections, respectively designated **40** and **42**, as most clearly seen in FIG. **3**.

As hereinbefore noted with respect to containers which are sterilized subsequent to the canning operation, the central panel of the end closure tends to bulge outwardly due to the internal pressure within the container resulting from the sterilization process. Such a condition is most clearly depicted in FIG. **2** where central panel **12** is arcuate in shape having the smallest deflection at its periphery and the maximum deflection at its center.

Since the point of attachment of opening tab **22** is proximate to the periphery of central panel **12**, where a small amount of end deflection occurs, the free portion of tab **22** which is radially inward from rivet **24** would be displaced upwardly with respect to central panel **12**. In order to prevent this upward displacement of the free portion of opening tab **22**, protuberances **44** and **46** are provided on central panel **12**. Protuberances **44** and **46** are so positioned that they lie within pull ring **28** adjacent the inner edge **48** of the pull ring and proximate to the flattened portions **36** and **38** thereof. The sides of protuberances **44** and **46** adjacent projections **40** and **42** are substantially flat with the upper portions thereof extending slightly over projections **40** and **42** when pull ring **28** lies flat against central panel **12**, as clearly seen in FIG. **2**. Due to the arcuate shape of projections **40** and **42** there results a point contact between the projections and the respective protuberances which permits the pull ring to be disengaged from the protuberances with relative ease. Protuberances **44** and **46** may be formed in central panel **12** by suitable dimple forming dies simultaneously with the formation of rivet **24** and are preferably hemispherical in shape. The flattened sides of protuberances **44** and **46** are formed by flattening the portions thereof with suitable dies and due to the spring back of the stretched upper portions of the protuberances these upper portions extend outwardly over the flattened sides when the die is removed.

A slightly modified form of the present invention is seen in FIGS. **4** and **5** where the reference numerals indicating parts similar to the parts designated in FIGS. **1–3** are preceded by the numeral **1**. The difference between the embodiments lies in the shape of the respective protuberances. As clearly seen in the drawings protuberances **144** and **146** are formed similarly to protuberances **44** and **46** with the added feature that they are angularly flattened at **150** and **152** thereby resulting in a greater overlapping of pull ring **128**.

It is understood that the foregoing general and detailed descriptions are explanatory of the present invention and are not to be interpreted as restrictive of the scope of the following claims.

What is claimed is:

1. An improved end closure for a container subjected to internal pressure of the type having a central panel portion, a removable portion defined by a score line included in said central panel portion, and an opening tab including a pull ring attached to said removable portion for removal thereof by the user, the point of attachment of said opening tab to said removable portion being proximate the periphery of said central panel portion with the pull ring of said opening tab radially inward from the point of attachment, wherein the improvement comprises means on said central panel portion releasably engaging the pull ring of said opening tab to thereby hold said opening tab substantially flat against said central panel portion when said central panel portion bulges outwardly due to the internal pressure of the container.

2. The improved end closure as defined in claim **17** wherein the means for releasably engaging the pull ring of said opening tab comprises at least one protuberance on said central panel portion adjacent the pull ring of said opening tab, said protuberance having an upper portion which partially overlapps said pull ring when said pull ring is pressed onto said central panel portion thereby releasably holding said opening tab substantially flat against said central panel portion when said central panel portion bulges outwardly due to the internal pressure of the container.

3. The improved end closure as defined in claim **1** wherein the means for releasably engaging the pull ring of said opening tab comprises a first protuberance on said central panel portion adjacent the pull ring of said opening tab and a second protuberance on said central panel portion adjacent the pull ring of said opening tab, said first and second protuberances having upper portions which partially overlap said pull ring when said pull ring is pressed onto said central panel portion thereby releasably holding said opening tab substantially flat against said central panel portion when said central panel portion bulges outwardly due to the internal pressure of the container.

4. The improved end closure as defined in claim **3** wherein said first and second protuberances are so positioned on said central panel portion as to be within the pull ring of said opening tab.

5. The improved end closure as defined in claim **3** wherein said first and second protuberances are raised dimples on said central panel portion which protrude above the plane defined by said central panel portion.

6. The improved end closure as defined in claim **5** wherein said raised dimples are hemispherical in shape having the sides adjacent said pull ring substantially flat.

7. The improved end closure as defined in claim **6** wherein the portions of said pull ring adjacent the flat sides of said raised dimples are substantially flat having arcuate projections extending toward said dimples whereby point contact is made between said projections and the flat sides of said dimples when said pull ring is pressed onto said central panel portion.

8. The improved end closure as defined in claim **6** wherein said hemispherically shaped raised dimples are angularly flattened thereby extending the upper portions of the flat sides of the dimples partially over said pull ring.

9. The improved end closure as defined in claim **1** wherein said end clousre is metallic.

10. The improved end closure as defined in claim 1 wherein said end closure is plastic.

11. An end closure for a container subjected to internal pressure which comprises a central panel portion, a removable portion defined by a score line included in said central panel portion, an opening tab attached to said removable portion, the point of attachment of said opening tab to said removable portion being proximate to the periphery of said central panel portion, the pull ring of said opening tab being radially inward from the point of attachment of said opening tab to said removable portion, a first hemispherically shaped dimple on said central panel portion within the pull ring of said opening tab, and a second hemispherically shaped dimple on said central panel portion within the pull ring of said opening tab, the sides of said first and second dimples adjacent the inner edge of the pull ring being substantially flat and having upper portions extending slightly over said pull ring when said pull ring is pressed onto said central panel portion to thereby releasably

engage the pull ring of said opening tab and releasably hold said opening tab substantially flat against said central panel portion when said central panel portion bulges outwardly due to the internal pressure of the container.

12. The end closure as defined in claim 11 wherein said removable portion defined by said score line is substantially co-extensive with said central panel portion.

13. The end closure as defined in claim 11 wherein said pull ring further comprises substantially flat portions adjacent the flat sides of said dimples and arcuate projections extending toward said dimples from said flat portions whereby point contact is made between said projections and the flat sides of said dimples.

14. The end closure as defined in claim 11 wherein said end closure is metallic.

15. The end closure as defined in claim 11 wherein said end closure is plastic.

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