United States Patent

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[54] EASY-OPEN END WITH ABUSE-RESISTANT OPENING TAB

3 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **220/54**
[51] **Int. Cl.** **B65d 17/24**
[50] **Field of Search** 220/54, 27; 215/46

[56] **References Cited**

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ABSTRACT: A scored can end closure is provided with an opening tab which is secured adjacent the score to a panel of the closure by a rivet and is held against vibration during shipment to prevent inadvertent rupture of the score. The opening tab is formed with downwardly curled edges, at least one portion of which is opened up, or made greater in diameter than the adjacent portions, so that it extends downwardly and contacts the end at an area spaced from the rivet, even when the panel is bulged outwardly by internal pressure, and thus dampens the tab against vibration during long distance shipment in freight cars and trucks.

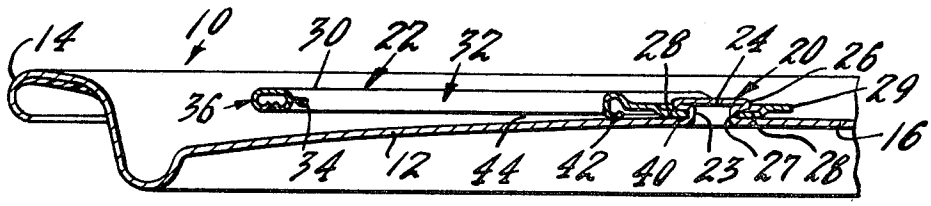


Fig. 1

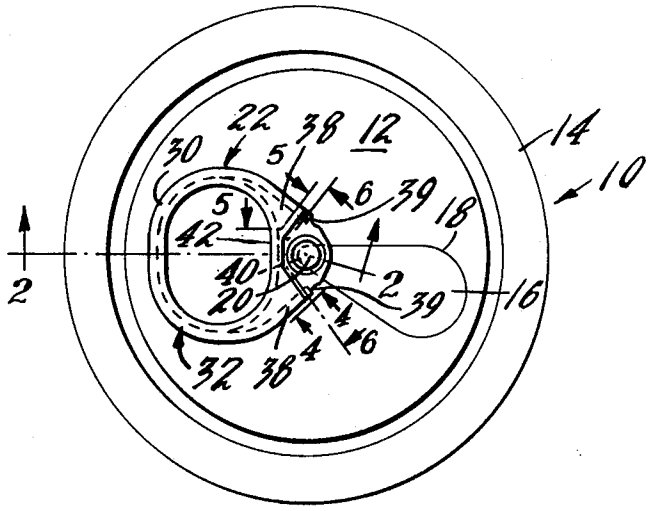


Fig. 2

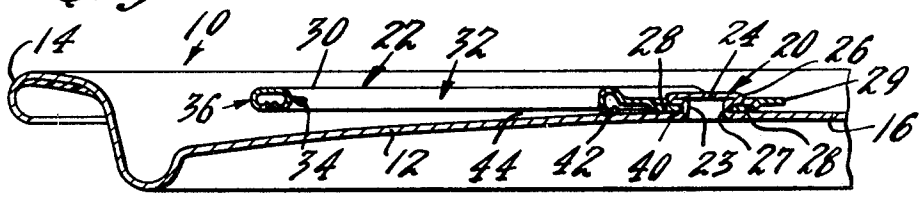


Fig. 3

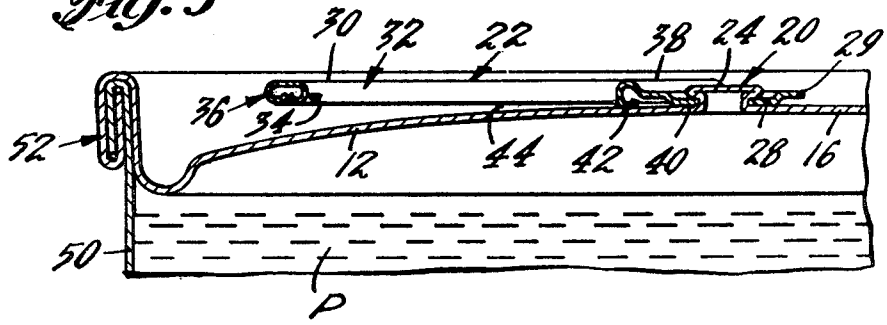


Fig. 6

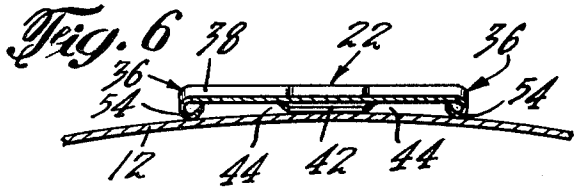


Fig. 4

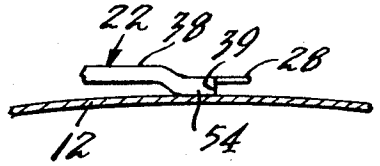
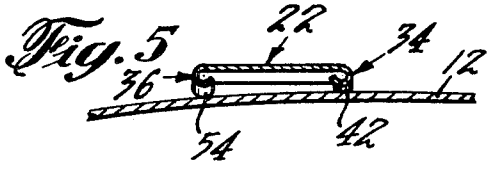


Fig. 5



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EASY-OPEN END WITH ABUSE-RESISTANT OPENING TAB

BACKGROUND OF THE INVENTION

One of the more widely used types of easy-open containers is a metal can which has formed in its top end a tear-out removable section which is defined by a score line and which has a pull-type opening tab riveted at one end to that section to expedite its removal. The opening tab is manipulated by the consumer to first rupture the score and to then tear the score to detach the removable section from the end to give access to the product. In order to minimize the force which must be applied on the pull tab to initiate rupture in the score line, a portion of the score is disposed closely adjacent to the rivet.

On the problems which has heretofore existed with this type of container is that during prolonged shipment or other rough handling the opening tab, which contacts the end panel only at its riveted end, vibrates in a "springboard" effect and transmits its vibrations to the rivet to stress and eventually fracture the portion of the score close to it due to metal fatigue which occurs in the thin metal of the score. Such premature fracture of the score has been particularly severe during long-distance shipment, where the tab vibrations in many instances are almost continuously present.

SUMMARY OF THE INVENTION

The present invention overcomes the problem of premature score fracture which is discussed above by preventing the opening tab which is riveted to the scored removable area in a can from vibrating sufficiently during shipment of the container to induce premature rupture of the score line. This is accomplished by providing means for maintaining continuous contact between the free handle of the tab and the end, at areas spaced from the rivet, in order to dampen or prevent vibration of the tab. This is done by increasing the diameter of the curled edges of the tab in areas closely spaced from the rivet edges of the tab in areas closely spaced from the rivet so that the curled edges in those areas project below the normal contour of the tab and fill the gap which normally exists between the tab and the end panel.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a plan view of an end closure made in accordance with the present invention and prior to its application to the can body;

FIG. 2 is a vertical sectional view, on an enlarged scale, taken substantially along the line 2–2 of FIG. 1;

FIG. 3 is a vertical sectional view corresponding to FIG. 2, but taken through the end after it has been seamed onto a filled can and bulged outwardly by the pressure of the can's contents; and

FIGS. 4, 5 and 6 are section details on an enlarged scale, taken substantially along the lines 4–4, 5–5, and 6–6, respectively of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings disclose a metal can end closure indicated generally as **10** having a gently rounded central panel **12** and a compound-lined, curled peripheral flange **14**. The panel **12**, which if desired could be flat, includes a removable section **16**, defined by an endless score line **18**, which when removed provides a dispensing opening. Within the removable section **16** is a rivet **20** which is centrally located on the end and secures an opening tab **22** in place on the closure.

As shown in FIG. **2** the rivet **20** includes a generally cylindrical shank **23** and a horizontal transverse wall **24** at the upper end of the shank **23**. The transverse wall **24** extends outwardly to an annular bead **26** which projects over a portion of the pull tab **22** and clamps it to the panel **12**. The rivet **20** extends through a hole **27** which is formed at the bottom of a depression **28** which is formed at the fulcrum end **29** of the tab **22**. The opposite, handle end **30** of the tab **22** is formed into a pull ring **32**, the inner edge of which is defined by a downwardly extending edge curl **34** of small cross-sectional diameter. The major portion of the outer edge of the pull ring **32** is defined by a similar edge curl **36** which is formed with a pair of side extensions **38** which extend along the sides of the tab and terminate at points **39** adjacent the fulcrum end **29** of the tab. It will be noted that the bottom portions of the edge curls **34, 36** comprise the lowermost surfaces of the handle portion **30** of the tab **22** and are, in common with the other portions of the handle end **30**, spaced slightly above the panel **12**.

In order to minimize the force which must be applied by fulcrum end **29** of the opening tab **22** to initiate rupture in the score **18** when the pull ring **32** is lifted, a section **40** of the score **18** is located closely adjacent to and in encircling relationship to a portion of the rivet shank **23**.

This placement of the score section **40** renders it very vulnerable to vibrations of the tab **22**, since the vibrations of the tab **22** are transmitted to the rivet **20** and thence into the score section **40**. If the stresses caused by these vibrations are applied to the score section **40** over a long period of time, the thinned metal in the section **40** becomes fatigued and eventually cracks. In order to prevent premature rupture of the score section **40** means are provided to prevent vibrations of the tab **22**, or to at least so minimize them so that they will not fatigue the metal in the score section **40**.

This is effected by "opening up," e.g., expanding or increasing the diameter of, a portion **42** of the edge curl **34** in such manner that its bottom edge portion projects below the bottom contour of the adjacent portions of the edge curl **34** and actually contacts the end panel **12** and thus fills the gap **44** which exists between the handle end **30** and the panel **12**. Preferably, the portion **42** projects downwardly a sufficient distance to tilt the opening tab **22** upwardly in order to maintain it under tension, even when the end **10** is not attached to a can and the panel **12** is not bulged upwardly under pressure of the contents. However, the upward force exerted on the tab **22** by the expanded curl section **42** must not be great enough to rupture the score section **40**.

In order to steady the tab **22** against lateral rocking, the terminal edge portions **54** of the edge curl **36** may be bent downwardly into contact with the panel **12** in such manner as to also exert a slight tension against the panel **12** on either side of the rivet **20**.

When the end **10** is applied to a can body **50**, which is filled with a pressure-producing product P such as beer or carbonated soda, and its flange **14** is seamed onto the upper end of the body in a double seam **52**, the pressure of the product P causes the end panel **12** to bulge upwardly and assume a more rounded form, as seen in FIG. **3**. However, this change in shape is minimal in the area of the panel **12** which is contacted by the "opened up" curl portion **42** and the curl portions **54**, and is not sufficient to create a gap between the curl portions **42, 54** and the panel **12**, since even in the bulged position of the panel **12**, the portions **42, 54** maintain contact with the panel **12**, and in fact preferably still maintain a slight pressure on it to maintain the tab **12** under tension and positively prevent it from vibrating during shipment and handling.

It should be appreciated that the curl portions **42, 54** need not actually exert tension against, or even actually contact, the panel **12** in the bulged end condition of FIG. **3**, since, if they only make light contact with, or are merely in closely spaced relationship to the panel **12**, they will still function to dampen the vibrations of the opening tab **22** and thereby decrease the metal-fatiguing effect. However, it is preferred that some tension be applied by these elements, since in such event their vibration-dampening effect is most effective.

It will also be understood that the curl portion **42** may be "opened up" in ways other than by increasing its diameter. Thus, as an example, the metal in this portion may be extended downwardly vertically, or at an angle, in order to have it project below the adjacent portions of the curl **34** and to thereby contact the panel **12** and fill up the gap **44**.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. A can end closure having a panel,

a score formed in said panel and defining a removable portion therein, and

an opening tab,

one end of said opening tab being secured to said panel adjacent said score by a rivet and the other end of said opening tab comprising a handle end which is spaced above said panel,

portions of said handle end being curled downwardly to form an edge curl, at least one area of which is opened up so that it projects downwardly beyond the adjacent portions of the edge curl a sufficient distance to contact the panel and thereby dampen the vibrations of said opening tab relative to said panel and prevent fracture of said score when the can end is subjected to abuse.

2. The can end closure of claim 1 wherein said handle end comprises a pull ring having its inner edge defined by said edge curl, and wherein the portion of said edge curl which is nearest said rivet is opened up.

3. The can end closure of claim 2, wherein the outer edge of said handle end is formed into a downwardly projecting edge curl which extends on adjacent opposite sides of said rivet, and wherein the terminal edge portions of said edge curl are bent downwardly into contact with said end panel to prevent lateral rocking of said tab.