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EASY-OPEN CONTAINER END WITH REINFORCING BEAD

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Fig. 1

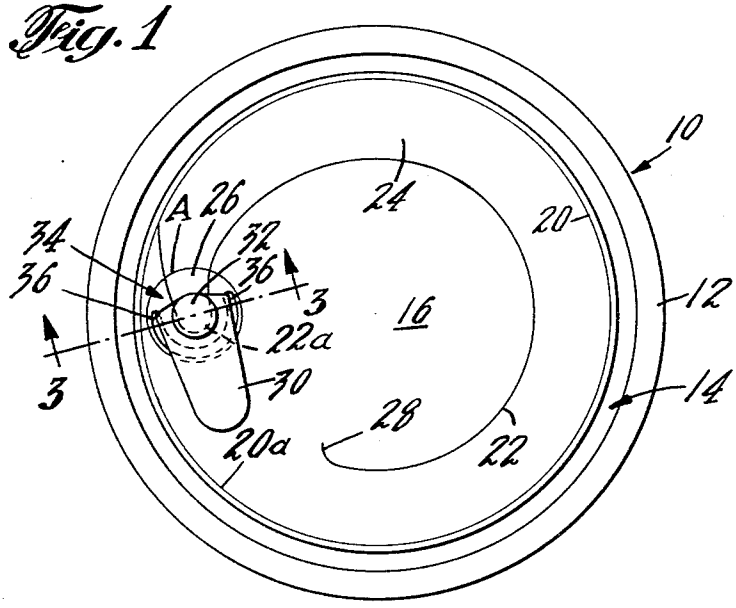


Fig. 2

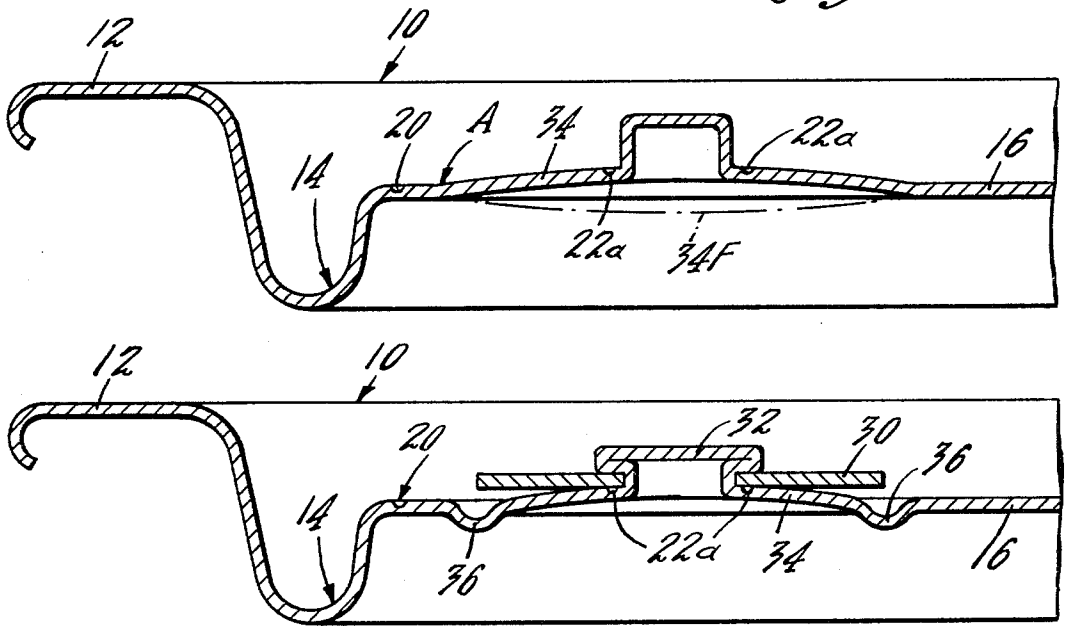


Fig. 3

INVENTOR.
RAYMOND LUSCOMBE BATCHELAR
BY
Frank J. Jordan
ATTORNEY

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Raymond Luscombe Batchelar, Westwood, N.J., assignor to American Can Company, New York, N.Y., a corporation of New Jersey

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ABSTRACT OF THE DISCLOSURE

In a container end closure or other component having a scored tear-out section with a drawn, integral rivet securing a lifting lever to said section, a bead in the end closure is disposed in such encircling proximity to the rivet as to stiffen the unstable metal of the end closure about the rivet to preclude inadvertent reverse flexing of such metal, thereby rendering a score line adjacent said rivet abuse-resistant.

Background of the invention

This invention relates in general to containers of the easy-opening type and more particularly to a metal end closure having a manually removable tear-out area set off by a score line.

Heretofore, in easy-open container ends of the type wherein a lift lever is secured to a tear-out section by means of a drawn rivet, it has been found that the score line in the area around the rivet frequently was inadvertently fractured because of flexing of the metal adjacent the rivet. The flexing, which occurred because of pressures which were inadvertently exerted on the rivet during handling and shipment, was due to the formation of a shallow flexible dome around the rivet and to the presence of excess metal which was introduced into portions of this dome during the rivet-forming and end-scoring operations. To avoid this inadvertent flexing and the resultant fracturing of the score line in the area around the rivet during normal use, means are provided, according to the present invention, to stiffen or rigidify the dome and to take up the excess metal therein.

Summary of the invention

A metal end closure for a container is provided with a tear strip set off by score lines, and with a drawn rivet, integral with the end closure, which secures a lift lever to the tear strip. The rivet is surrounded by a shallow dome which is produced in the rivet-forming operation. One of the score lines has a portion extending partially about the rivet and through the shallow dome to define the starting end for the tear strip. A bead in the panel extends partially about the rivet around the base of the dome to stiffen the dome and accommodate excess metal in it, thereby to preclude reverse flexing of the dome and thus prevent inadvertent rupture of the score line portion therein.

Brief description of the drawing

FIGURE 1 is a plan view of a container end closure embodying principles of the present invention.

FIGURE 2 is an enlarged partial sectional view taken along a line corresponding to the line 3—3 of FIGURE 1, but showing the end as it exists during an intermediate stage of manufacture.

FIGURE 3 is a partial sectional view taken substantially along the line 3—3 in FIGURE 1.

Description of the preferred embodiment

In the illustrated embodiment there is shown a metal (e.g. aluminum, tin plate) container end **10** of the easy-open type. The end **10** is adapted to be doubleseamed or otherwise affixed to the longitudinal end of a cylindrical container body (not shown) in a manner well-known to those skilled in the art. The end **10** has a conventional hooked flange **12** to facilitate the doubleseaming.

The illustrated end has an annular reinforcing groove **14** which circumscribes a circular panel **16**, substantially all of which is removable to provide access to the contents of the container. To provide for such removal, there is provided in the end panel **16** an outer score line **20** extending entirely around its periphery and an inner score line **22** which extends adjacent to and is spaced from the outer score line **20** for a major portion of the length thereof. The score lines **20** and **22** cooperate to define therebetween a tear strip **24** having a starting end **26**, the latter being defined by a portion **22***a* of the inner score line **22** which makes an approximately 180 degree turn to join the outer score line **20** as shown in FIGURE 1.

The inner score line **22** preferably does not make a complete circle of the end panel but terminates in a short, inwardly turned portion **28**. Accordingly, the tear strip **24** does not extend entirely around the tear-out end panel **16** but, rather, terminates at **28**, short of a terminal end section **20***a* of the outer score line **20**. Thus, after a major separation of the tear-out panel **16** from the remainder of the end by means of the tear strip **24**, the entire panel **16**, defined by the outer score line **20**, is separated as a unit from the remainder of the end **10** by the continued rupture or tearing along the terminal section **20***a* of the outer score line **20**.

The starting end **26** of the tear strip **24** is provided with a substantially rigid lift lever or pull tab **30** to facilitate tearing and removal of the tear-out panel **16**. The pull tab **30** may be of any configuration and is secured to the panel **16** by means of a peened-over embossment or rivet **32** which is integral with and drawn from the metal of the end panel **16**, the rivet **32** extending upwardly through an aperture in the pull tab **30** and having its upper end peened outwardly to secure the tab **30** in place. A suitable method for forming the rivet **32** is disclosed in United States Letters Patent 3,191,564, granted June 29, 1965.

In ends as heretofore produced, the end panel metal around the rivet **32** has been unstable and subject to inadvertent flexing because of the rivet-forming and the scoring operations. Thus, the drawing operations which are required to create the rivet **32** cause a thinning of the metal in the area of the end panel immediately surrounding the rivet **32** (e.g. in the circular portion generally bounded by reference circle A), and also cause it to bulge upwardly from the plane of the end panel **16** to form a shallow dome **34** which is inherently unstable and subject to reverse flexing, otherwise known as "flipping." This instability is enhanced by the formation of the score line portion **22***a*, since the metal which is displaced from this score line is caused to flow laterally into the adjacent metal of the dome **34**, where it becomes excess metal. The result is that there is distribution of excess metal in portions of the dome **34** which further increases its tendency to reversely flex inwardly to the position indicated by the dot-and-dash line **34F** in FIGURE 2, which figure shows the end during an intermediate stage of manufacture after the rivet drawing and the end-scoring operations have been completed, but before the lift tab has been secured in place. The dome profile in this FIGURE 2 corresponds to the profile of finished prior art ends. The reverse flexing of the dome of such prior art ends tends to occur during shipment and handling when pressure is inadvertently applied against the top of the rivet **32**. If this flexing occurs with sufficient frequency the possibility of premature inadvertent rupture of the scoreline section **22***a* around the rivet **32** is substantial.

According to the present invention, this excess metal is taken up, and the area adjacent the rivet **32** is stiffened or rigidified, by employment of an arcuate bead **36** extending partially around the rivet **32** and preferably located inwardly of the base line A of the dome **34**, although under certain circumstances it may be on or slightly outwardly of the base line A.

This bead **36** is preferably indented into the metal of the end and, in effect, provides a sharply defined base portion for the dome **34** and functions to deepen the dome and to decrease its diameter. It also decreases the radius of curvature of the dome, at least in its peripheral portions. All of these effects stiffen the dome **34** and greatly increase its resistance to reverse flexing. In addition, the bead **36** also functions to absorb the excess metal which has been created in portions of the dome **34** as a result of the formation of the score portion **22***a*, which excess metal would otherwise tend to cause warping of the dome and increase its instability and tendency to flip.

It will be noted that the bead **36** does not form a complete circle but, instead, extends for only somewhat more than 180° of arc so that, in general, it parallels the score **22***a*. As a result, the open mouth of the bead is positioned so that it straddles the score portion **22***a*. By virtue of this arrangement, the bead **36** does not cross the score line portion **22***a*. One advantage of this construction is that it minimizes the possibility of inadvertent rupture of the score line during the formation of the bead **36**, which formation preferably takes place concurrently with or subsequent to the scoring operation in order to have the bead absorb the excess metal which flows from the score line portion **22***a*. Another advantage is that it prevents possible interference with the tearing of the score portion **22***a* by the bead during the end-opening operation. It has been found that the arcuate bead **36** functions efficiently to prevent flipping of the dome **34** even though it does not comprise a complete circle, and that the elimination of this flipping has resulted in the substantial elimination in inadvertent premature rupture of the score line portion **22***a* in the dome **34**, which rupture was a serious problem prior to this invention.

It will be understood that the bead may have other configurations, the arcuate bead **36** being illustrative, as long as the bead is effective to rigidify the domed area adjacent the rivet **32** and to take up excess metal therein. Further, it will be understood that the tear strip **24** shown in the drawing is merely illustrative and that various other easy-opening tear strips or tabs may be used in connection with this invention. For example, the principles of the invention are equally applicable to limited access tear strips of the type commonly used on cans holding liquids, for example, beer, carbonated beverages and the like.

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.

I claim:

1. In a metal container component of the type comprising a panel, a lift lever, a drawn rivet integral with said panel and securing the lever to said panel, a shallow circular dome surrounding said rivet, and a score line setting off a removable area in said panel, a portion of said score line being located in said dome and extending partially about said rivet to define a starting end for the removable area, the improvement which comprises a bead formed in said panel adjacent the base of said dome to stiffen said dome and to absorb the excess metal which is forced into portions of said dome during the formation of said score-line portion therein, whereby inadvertent flexing of said dome and the resultant rupture of the score-line portion in said dome is prevented.

2. A metal end closure according to claim **1** wherein said bead is formed as a depression in said panel.

3. A metal end closure according to claim **1** wherein said bead has a generally arcuate configuration.

4. A metal end closure according to claim **2** wherein said bead does not extend across the score-line portion in said dome.

5. A metal end closure according to claim **1** wherein said bead at least partially underlies said lift lever.

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THERON E. CONDON, *Primary Examiner.*

G. T. HALL, *Assistant Examiner.*