REINFORCED BEAD FOR A TAB OPENING CAN
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ABSTRACT OF THE DISCLOSURE
A tab opening can having a removable section which tends to bend or cease to an extent likely to result in fracture when it is being removed from the can, is provided with a reinforcing bead at the location where said crease or fold is likely to occur to thereby prevent the crease or fold from becoming sharp enough to result in fracture.

BACKGROUND OF THE INVENTION
With the recent trend toward the use of self-opening containers, that is, containers which can be opened without the use of tools, such as, openers or can punches, one type of such container which has become highly commercial is the "tab-opening can," wherein a small pull tab is provided on each can to facilitate detachment of a scored removable portion which is formed in one of the panels of the can.

In this type of can the removable portion or section is defined by least one weakening score which is impressed directly into the metal of the can and which may take any suitable shape. Thus, in containers designed to permit dispensing of liquids, such as, beer or soda, the score is usually shaped to provide an opening which permits easy flow of the liquid, while in containers designed to contain solid products, the score comprises a tearing line which rims an entire panel of the can to permit complete removal of the panel to provide ready access to the contents.

In many such cans, the opening tab generally takes the form of a rigid lever which is permanently secured to the can wall by a rivet which is formed integral with the removable wall section and which passes through a small hole formed in one end of the tab, the portion of the tab remote from the riveted end being formed into a handle which is engageable by the fingers of the user, who first lifts the handle portion of the tab upwardly away from the can wall to thereby cause a part of the tab to exert a force on the removable section, or on the score which defines it, to initiate the rupture of the thin metal in the score at a location near the tab.

A problem found in tab-opening cans is that the metal in a portion of the removable section adjacent to the rivet often fractures before the removable section is completely separated from the rest of the container. This fracture often occurs because of the way the opening tab is manipulated by some consumers. Many users start the opening operation by lifting the handle portion of the opening tab to initiate rupture of the score line which defines the removable section and subsequently rock the tab through a large angle to cause the rupture to continue along the score line to a location on the removable section which is proximate to the axis about which the tab fulcrums. Unfortunately, rocking the tab through a large angle sharply bends the metal of the removable section so as to cause a single sharp crease to form in the metal of the removable section near the rivet. The flexural strain in this crease is often high enough to result in fracture of the removable section as the tab is further manipulated during the opening operation and prior to complete removal of the removable section so that a portion thereof remains in place in the can end to interfere with the dispensing of the product.

SUMMARY OF THE INVENTION
The present invention overcomes the drawbacks found in the prior art as set forth above by providing a reinforcing bead in the portion of the removable section which is subject to excessive bending. The object in providing the bead is the prevention of the formation of a sharp bend or crease in the metal of the removable section during the removal thereof to thereby substantially reduce the likelihood of fracture of the removable section.

BRIEF DESCRIPTION OF THE DRAWINGS
FIG. 1 is a plan view of an end closure embodying the principles of the present invention;
FIG. 2 is an enlarged vertical section taken substantially along the line 2—2 in FIG. 1;
FIG. 3 is a sectional view similar to that shown in FIG. 2, but showing the end closure seamed onto a can body which is filled with a product under pressure;
FIG. 4 is an enlarged vertical section of a portion of the end closure shown in FIGS. 2 and 3 illustrating the position of the parts after the opening tab has been lifted to initiate rupture of the scored metal which defines the removable section of the end closure;
FIG. 5 is an enlarged vertical section of a portion of the present closure showing the position of parts after the pull tab has been lifted and then pulled to rupture a substantial portion of the score line;
FIG. 6 is a fragmentary horizontal sectional view on an enlarged scale of a portion of the end closure of FIG. 1, the section being taken through the shank of the rivet with the pull tab omitted and showing the position of the reinforcing bead of the present invention on the end closure;
FIG. 7 is an enlarged vertical section taken substantially along the line 7—7 of FIG. 6; and
FIG. 8 is a vertical section taken substantially along the line 8—8 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT
As a preferred and exemplary embodiment of the present invention, FIGURE 1 and 2 disclose a circular can end closure 20, preferably of a suitable metal such as aluminum or tinplate and formed with a circular central panel or wall 22 surrounded by a reinforcing groove 24 which merges into an upwardly extending countersink wall 26 which at its upper end merges into an outwardly extending edge-curved flange 28.

A removable section 30 is set off in the wall 22 by an
endless score 32 which is indented directly into the metal of the end by suitable scoring dies in the usual manner. At the outer end of the removable section 30, the score 32 is positioned just inwardly of the groove 24, and at the inner end a portion 33 (FIGS. 2 and 3) of it extends in a radial direction around a portion extending hollow rivet 34 which is formed integral with the removable section 30 and is preferably disposed at the center of the end. The rivet 34 may be of any suitable type, one such type being disclosed in U.S. Patent 3,191,797.

The shank of the rivet 34 passes through a small circular hole, indicated by the numeral 36, which is formed in one end of an opening tab 40, the upper end of the rivet 34 being formed with an enlarged head 42 which overlies the metal of the tab 40 around the hole 36 to secure the tab to the can end. The hole 36 is positioned at the bottom of a bell-shaped depression 44 which is disposed at one end of the tab 40 and is formed with a conical side wall 45 which extends upwardly from the end panel 22 and terminates in front, or fulcrum, edge 46. It will be noted that the portion of the depression 44 immediately beneath the rivet head is somewhat flattened as an incident to the rivet heading operation. The opposite end of the tab 40 is formed into a ring-shaped handle pull 47. If desired, any other suitable shape handle pull may be provided. Preferably, the peripheral edge of the outer edge of the tab 40 is hemmed or rolled downwardly and inwardly to form a hem while the inner edge of the ring-shaped handle portion is similarly hemmed as at 50.

The construction of the tab 40 is covered by U.S. patent application, Ser. No. 545,714 filed in the names of John Wilson Rouse and Harley Earl Simmons. It is to be understood that the particular tab 40 described herein is only a preferred embodiment and not an essential one and that other tabs, as for example, the type disclosed in U.S. Patent 3,191,797 could be used with the instant invention and function satisfactorily.

In use, the end closure 20 is secured to the upper end of a conventional can body 60 in a conventional double seam 62 wherein the end flange 28 is interfolded with the upper edge of the body 60 (see FIG. 3). The upward bulge of the central panel 22, which is seen in FIG. 2, is usually present when the can has been sealed and filled with a beverage (not shown) such as beer or soda. In many instances, the beverage is either packed under pressure or generates its own pressure. In either event, the pressure inside the can bulges its end 28 upwardly. Its non-pressurizing products, of course, the end would retain the flat shape shown in FIG. 2.

When the can is to be opened, the user grasps the outer edge of the ring handle 47 and pulls upwardly on it, thus causing the handle to rock upwardly as clearly seen in FIG. 4. The lifting of the handle subjects the rivet 34 and the surrounding metal to a sharp upward twisting or rocking action which exerts great stress on the inner circular portion 33 of the score 32 which closely surrounds the rivet 34, thus causing the thinned and weakened metal at the bottom of the score portion 33 to rupture. As explained previously, when the handle of the opening tab of a conventional end is manipulated so as to rock the tab through a large angle, which may be greater than 90° and sometimes approximates 145°, a crease or sharp bend frequently forms in the removable section adjacent to the rivet, generally along or adjacent to the line designed by the letter B in FIG. 6. The degree of flexural strain at this crease is often high enough to cause a fracture so that only a small portion of the removable section can be removed. In the instant invention, this problem is controlled by locating a reinforcing bead 70 in the vulnerable portion of the removable section 30 to prevent the formation of the sharp crease therein, the bead 70 preferably being disposed at right angles to the line B.

As seen in FIGS. 3, 6, the bead 70 extends radially of the circular end closure 20 and longitudinally of the removable section 30. The bead 70 underlies the front edge 46 of the tab 40 as shown in FIGS. 1 through 4 in order to prevent the formation of a sharp crease at the location where the edge 46 of the tab 40 fulcrums against the removable section 30 as the tab is rocked through a large angle by a user in the manner described above. In the preferred embodiment shown in the drawings, this location is the one most susceptible to creasing, but it is understood that a different opening tab might be used which would make a different portion of the removable section susceptible to creasing or sharp bending during the opening operation in which case the bead 70 would be positioned in such portion. In the dotted line position of FIG. 5 it is shown that the bead does not completely prevent bending of the metal in the area of the removable section 30 which is contacted by the tab edge 46, but it does restrict the bend to a shallow curvature of the metal and thus prevents the formation of an excessively sharp bend in the removable section when the tab is rocked about its end edge 46, thereby preventing inadvertent fracture of that section during its removal.

As shown in FIGS. 7 and 8, the bead 70 in the preferred embodiment extends into the transverse score lines 10, 15, 20, 25, which are disposed longitudinally of the removable section 30 completely separated from the can end, the product can be pored or drunk from the can.

It is to be understood that the foregoing description treats only one preferred embodiment of the present invention, that other embodiments within the scope of the present invention are possible and that many additions, substitutions, deletions and modifications may be made in the present invention as disclosed herein without exceeding the scope thereof as defined in the following claims.

We claim:

1. A container component comprising a wall, a removable section defined by a score line impressed in said wall, an opening tab having a handle portion extending away from said removable section, a rivet joining said tab and said removable section so that said handle portion may be lifted to rotate said tab in a direction toward said removable section so that the front edge of said tab contacts said section at a location adjacent to said rivet to rupture said score line and to reversely bend said section upon itself at said location and thereby break out a portion of said section, and a reinforcing bead impressed in said removable section extending in the general direction of rotation of said tab and extending away from said location and under said front edge, said bead being short enough to permit said bend to progress over most of the length of said section when said tab is manipulated to remove said section, said bead preventing said bend from becoming sharp enough at said location to result in the fracture of said section when said tab is pulled away from said section.

2. The component defined in claim 1 wherein said bead extends into the interior of said can.

3. The component defined in claim 2 wherein said component is a circular end closure, said section extends generally radially of said end closure and said bead is elongate in form and is disposed substantially on the centerline of said section.

4. A container component comprising a wall, a removable section defined by a score line in said wall, an open-
5. The component defined in claim 4 wherein said bead extends into the interior of said can.

6. The component defined in claim 5 wherein said bead extends generally longitudinally of said section.

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