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Patel

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[54] **RIVET PANEL (BELLOW) FOR EASY-O END UNIT RIVET STRUCTURE**

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[52] **U.S. Cl.** **220/273**

[51] **Int. Cl.²** **B65D 41/32**

[58] **Field of Search** 220/270–273

[56] **References Cited**

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[57] **ABSTRACT**

An improved pull tab mounting arrangement provides an movable fulcrum to facilitate opening a self-opening can. An expandable pleat is formed in the end panel at the base of the tab-attaching rivet and the tab is mounted with its nose portion in spaced relation above and radially inward of the opening score line. As the finger ring portion of the tab is lifted, the pleat unfolds, allowing both the rivet and the tab to travel upwardly and outwardly to bring the tab nose into contact with the score line. This displacement moves the fulcrum point of the tab toward the nose portion and away from the finger ring portion, thereby providing increased leverage and reducing the effort required to fracture the score line. In addition, the stress placed on the tab and the end panel during opening is reduced, thereby permitting the use of thinner gauge metal for these members. Further, spacing of the nose portion and the score line reduces the probability that mishandling of the container will result in an unintentional fracture of the score.

11 Claims, 4 Drawing Figures

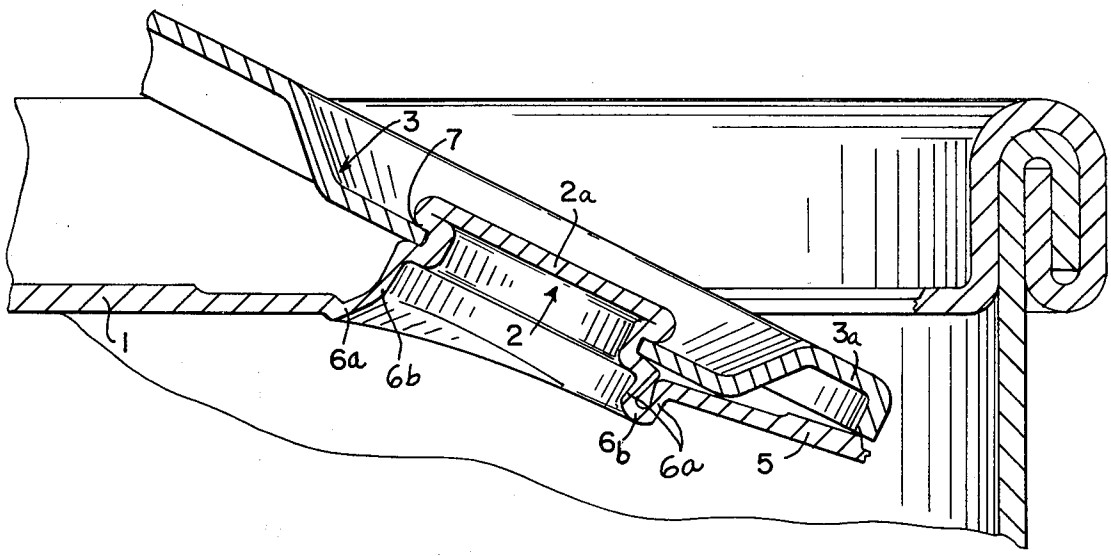


FIG. 1

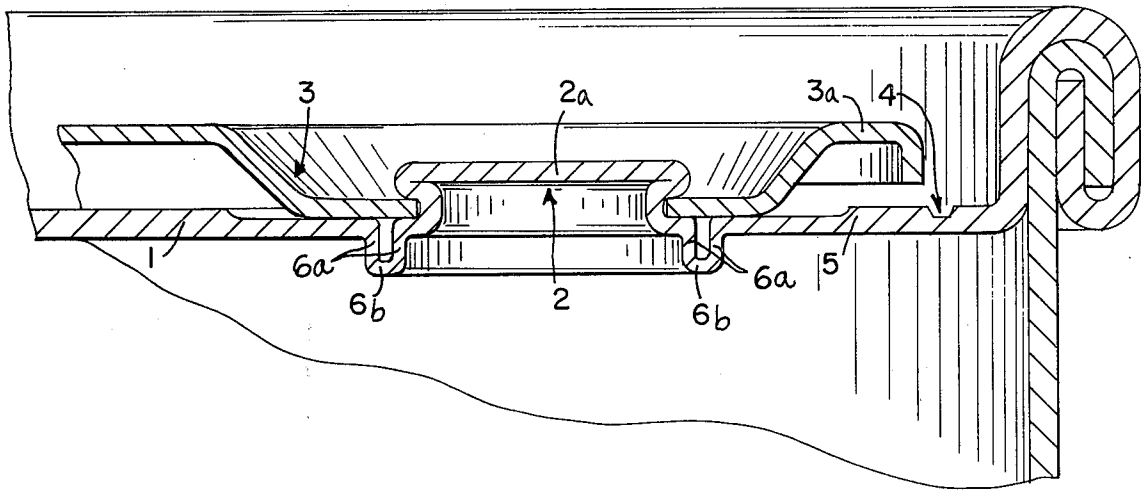


FIG. 2

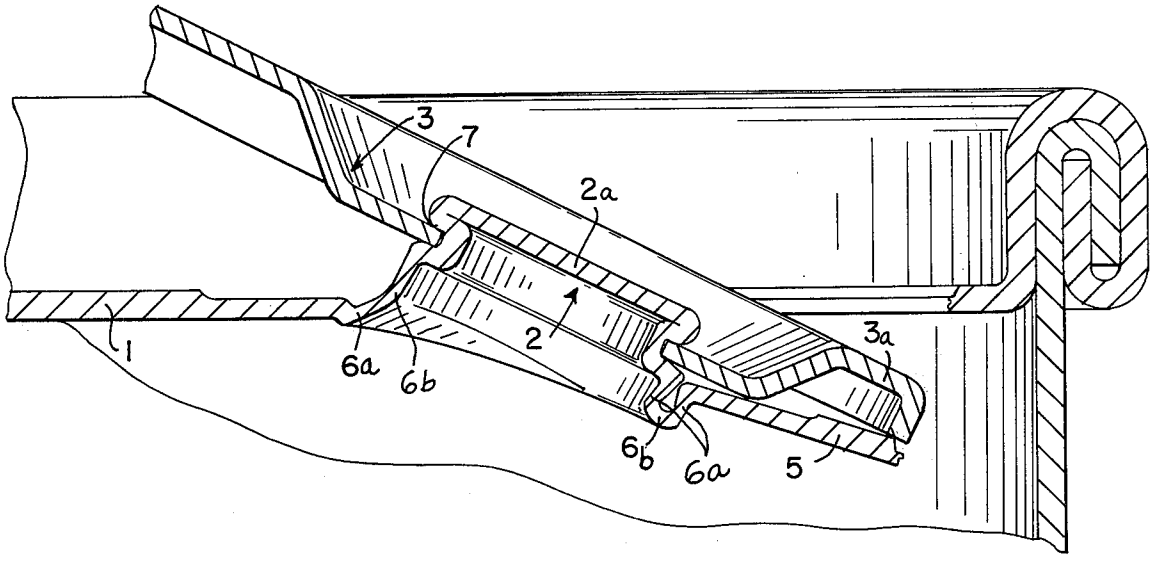


FIG. 3

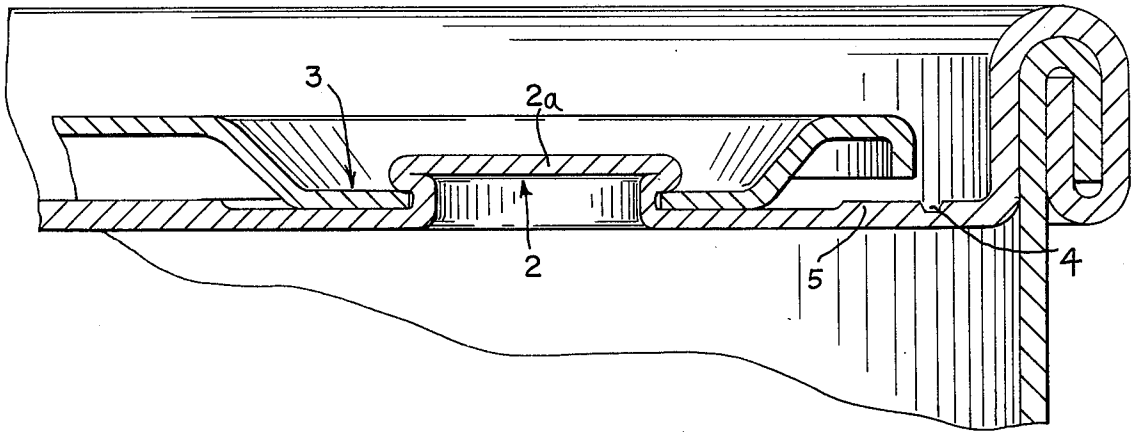
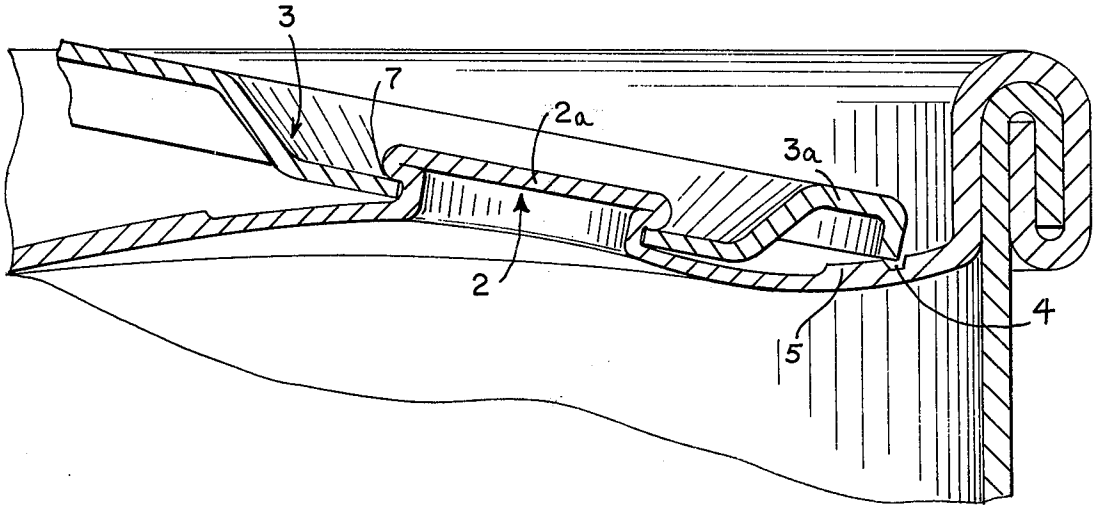


FIG. 4



RIVET PANEL (BELLOW) FOR EASY-O END UNIT RIVET STRUCTURE

SUMMARY OF THE INVENTION

This invention relates to a container having a portion of its wall weakened to serve as a tear strip and having a tab attached to the tear strip to serve as a lever for initiating the severing operation.

In general, the invention is directed to two problems which have come to the fore with widespread acceptance of this type of container. One problem is to make it easier to lift the tab to initiate severance of the tear strip. The second problem is to prevent the unintentional fracturing of the opening score line which may occur as the result of mishandling of the container.

It is, therefore, one of the primary objects of the present invention to provide an improved pull tab mounting arrangement which will facilitate the opening of a self-opening container. This is accomplished by increasing the leverage afforded by the pull tab. More specifically, the tab is mounted such that lifting of the tab causes the fulcrum point to be displaced toward the nose portion and away from the finger ring portion, thereby providing the user an increase in mechanical advantage.

It is a further object of this invention to provide an improved pull tab mounting arrangement which will reduce the probability that mishandling of the container will result in unintentional fracturing of the opening score line. This is accomplished by mounting the tab such that its nose portion is maintained in spaced relation with the score line, thereby preventing minor displacements of the tab from resulting in a score line fracture.

It is another object of this invention to provide an improved pull tab mounting arrangement which will permit the use of thinner gauge metal in the fabrication of the pull tab and end panel. This is accomplished by mounting the pull tab so as to reduce the stress placed on these members during opening. Specifically, the stress on the end panel in the region immediately adjacent to the rivet is reduced by the use of an expandable bellow which allows controlled distortion of the metal in this area.

It is still another object to provide an improved pull tab mounting arrangement which requires minimal modification of existing production tooling.

It is yet another object to provide an improved pull tab mounting arrangement which may be produced economically and with a wide degree of manufacturing latitude.

BRIEF DESCRIPTION OF THE DRAWINGS

The various features and advantages of the tab mounting arrangement of this invention will be more apparent from the following detailed description when considered in connection with the accompanying drawing wherein:

FIG. 1 is a cross-sectional view of an end closure with the improved tab mounting arrangement, illustrating the unopened condition.

FIG. 2 is a cross-sectional view similar to FIG. 1, illustrating the partially opened condition.

FIG. 3 is a cross-sectional view of a conventional end closure.

FIG. 4 is a cross-sectional view similar to FIG. 3, illustrating distortion due to opening stresses.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In keeping with the present invention, there is provided an easy-open end closure comprising a metal end panel 1, a rivet 2 integrally formed in said end panel and a metal pull tab 3 fixedly attached to said end panel 1 by said rivet 2. A score line 4 is formed in the end panel 1 and defines an opening flap 5 therein.

In the standard easy-open closure (FIG. 3), which lacks a pleat 6, opening is accomplished by vertically displacing the tab 3, thereby pivoting said tab 3 about said rivet 1 and imposing a downward force on the tab nose portion 3*a*, said force resulting in the breaking of said end panel 1 along said score line 4 beneath said nose portion 3*a*.Continued upward displacement of said tab 3 results in controlled tearing of said end panel 1 along said score line 4, the opening flap 5 defined by said score 4 being bent down and away from said end panel 1, thereby establishing an opening in said end panel 1.

The fulcrum point 7 of the conventional easy-open closure is located on the interface between the tab 3 and the rivet head 2*a* at the point furthest between the tab 3 and the 3*a*. As the tab finger ring portion 3*b* is lifted, an upward force is impressed on the rivet 2 and the end panel 1 in the area immediately adjacent to the fulcrum point 7. This stressing of the end panel 1 and the rivet 2 necessitates the use of a thickness of metal with sufficient strength and rigidity to resist deformation or tearing during opening of the container. Further, this configuration minimizes the length of the lever arm and maximizes the length of the load arm and, consequently, places the maximum stress on the tab 3. This necessitates the use of a thickness of metal for the tab 3 which will resist bending during opening of the container. The inefficient lever arrangement also results in the requirement of considerable effort to lift the tab 3 sufficiently far to effect fracture of the score line 4.

In the improved tab mounting arrangement of the present invention (FIG. 1) an expandable pleat 6 is formed in the end panel 1 concentric with and immediately adjacent to the rivet 2. The pleat 6 comprises two substantially parallel, concentric sidewalls 6*a* depending from the end panel 1 and a connecting U-shaped bight portion 6*b*. The tab nose portion 3*a* is held in spaced relation above and radially inward of the score line 4, rather than in close contact with the score line as in the standard end closure.

As the finger ring portion 3*b* is lifted, the pleat 6 unfolds everting outwardly with the unfolded sidewalls 6*a* projecting above the plane of the end panel 1 and causing displacement of the fulcrum point 7 radially outwardly upwardly toward the score line 4 (FIG. 2), thereby bringing the nose portion 3*a* into close contact with the score line 4. After the pleat 6 has unfolded, the end closure is opened in the conventional manner as described hereinabove. However, the fulcrum displacement has resulted in an increase in the length of the load arm which in turn results in a decrease in the stress loading on the tab 3 during opening of the container. Further, the effort required to open the container has been reduced.

The expansion of the pleat 6 also serves to relieve the stresses on the rivet 2 and the end panel 1 by allowing controlled distortion thereof. These stress reductions

allow the fabrication of the tab **3** and the end panel **1** from a thinner gauge metal.

The improved pull tab mounting arrangement also serves to reduce the probability that mishandling of the container will result in an unintentional fracture of the score line **4.** In the conventional pull tab mounting arrangement (FIG. **3**), the nose portion **3***a* rests in close contact with the score line **4,** such that an accidental impact against the nose portion **3***a* may well result in an unintended fracture of the score **4.** In the improved pull tab mounting (FIG. **1**), the nose portion **3***a* is held in spaced relation above and radially inward of the score line **4,** such that an accidental impact against the nose portion **3***a* will result in the nose portion **3***a* being forced downward into contact with the end panel **1,** leaving the score **4** unaffected. Further, such an accidental displacement of the tab **3** will not interfere with the subsequent opening of the container.

I claim:

1. An improved pull tab mounting arrangement for a self-opening end closure for a can or similar container, said end closure comprising an end panel, attachment means formed in said end panel, a pull tab attached by said attachment means to said end panel, and a score line formed in said end panel and defining an opening flap therein, the improvement comprising unfoldable means for shiftably mounting said attachment means in said end panel for relieving stresses on said pull tab and said end panel during lifting movements of said tab for opening of said container.

2. The improved pull tab mounting arrangement as described in claim **1,** wherein said unfoldable mounting means unfolds upon commencement of said opening of said container, thereby displacing the fulcrum point of said pull tab for enhancing the leverage thereof.

3. The improved pull tab mounting arrangement as described in claim **2,** wherein said fulcrum displacing means comprises an expandable pleat formed in said attachment means.

4. The improved pull tab mounting arrangement as described in claim **3,** wherein said attachment means comprises a tiltable rivet structure.

5. The improved pull tab mounting arrangement as described in claim **2,** wherein said stress relieving means comprises expansion means formed in said attachment means.

6. The improved pull tab mounting arrangement as described in claim **5,** wherein said expansion means expands upon stressing thereby relieving stress loading of said end panel and said tab.

7. The improved pull tab mounting arrangement as described in claim **4,** wherein said expansion means comprises a single U-shaped pleat formed in said end panel.

8. The improved pull tab mounting arrangement as described in claim **7,** wherein said pleat is concentric with and immediately adjacent to said rivet.

9. The improved pull tab mounting arrangement as described in claim **8,** wherein said pull tab has a nose portion for fracturing said score line and said nose portion in preopening position is held in spaced relation above and radially inward of said score line.

10. The improved pull tab mounting arrangement as described in claim **9,** wherein said pleat comprises two concentric circular sidewalls depending from said end panel and a substantially U-shaped bight portion connecting said sidewalls, such that folding of that portion of said pleat nearest said score line effects simultaneous unfolding of that portion of said pleat most remote from said score line, consequent to opening said container, results in displacing said pull tab relative to said end panel.

11. The improved pull tab mounting arrangement as described in claim **10,** wherein said unfolded portion of said pleat everts such that at least one sidewall of said portion projects outwardly of the plane of said end panel and said displacement of said tab brings said nose portion into contact with said score line.

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