Feb. 11, 1969 A. R. BOIK ET AL 3,426,714

METHOD OF FORMING BLOW-OFF RESISTANT EASY OPENING BEVERAGE CAN

Original Filed Nov. 25, 1964

FIG. 1

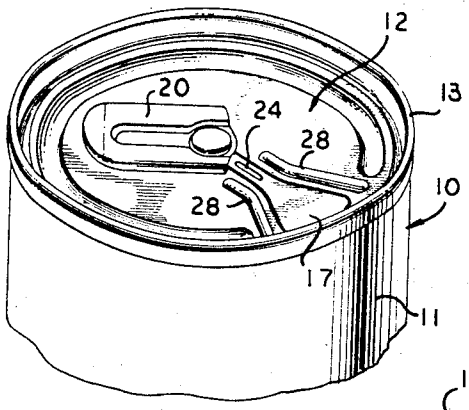


FIG. 3

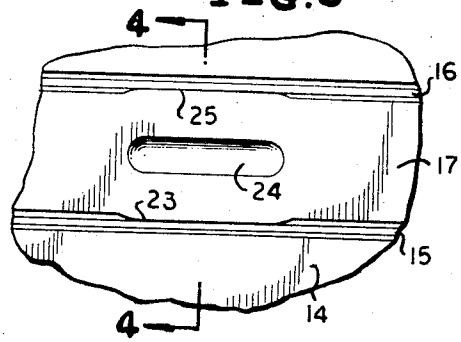


FIG. 2

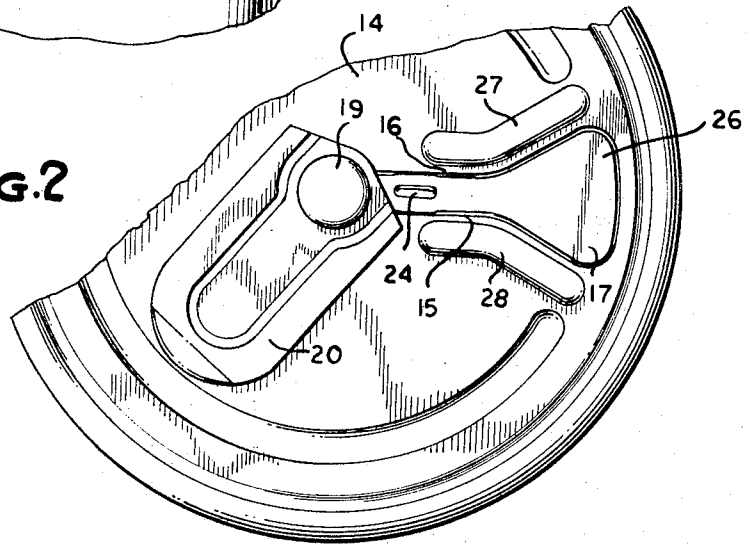


FIG. 4

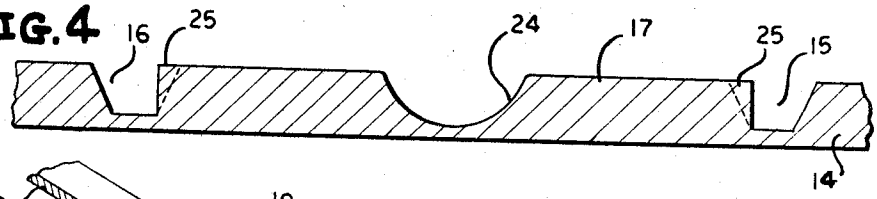
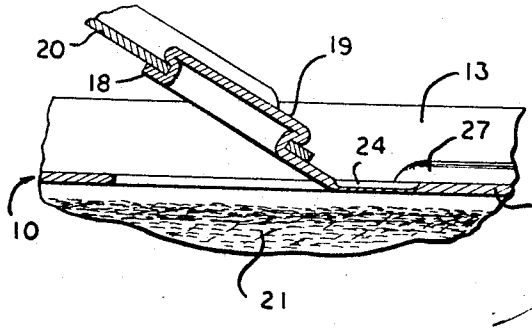


FIG. 5



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METHOD OF FORMING BLOW-OFF RESISTANT EASY OPENING BEVERAGE CAN

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Original application Nov. 25, 1964, Ser. No. 413,938, now Patent No. 3,315,837, dated Apr. 25, 1967. Divided and this application Feb. 6, 1967, Ser. No. 614,077
U.S. Cl. 113—121 6 Claims
Int. Cl. B21d 51/44, 51/40

ABSTRACT OF THE DISCLOSURE

Deformation of tear strip portions under the influence of differential gaseous pressure during the opening of an easy opening can is prevented by deforming a portion of the end panel in a manner so as to both force certain of the deformed metal into a score line defining the tear strip portion to thus increaese the resistance of the can end end panel to tearing and at the same time weakening the tear strip portion to effect a folding thereof under pressure.

This application is a division of our application Ser. No. 413,938, filed Nov. 25, 1964, entitled Easy Opening Can, now Patent No. 3,315,837, issued Apr. 25, 1967.

This invention relates in general to new and useful improvements in easy opening cans, and more particularly to a can end particularly adapted to be utilized as part of a can for containing beverages packed under pressure.

Many liquids, particularly beverages, are packed in cans under gaseous pressure. Also, in many instances the gas utilized in packaging the beverage under pressure is one which may be released upon agitation with the result that if a can is dropped or shaken immediately before opening, there is a much greater than normal pressure within the can. It has been found that with the present type easy opening cans, when an undue gaseous pressure exists within the can and the can is opened by initiating the tearing off of the removable tear strip of the can, the pressure within the can reacts on the tear strip and causes a blow-out which results in the uncontrolled tearing of the tear strip from the can end.

It is the primary object of this invention to prevent blow-outs of the type set forth above without materially changing existing easy opening can end constructions. In accordance with this invention, it is proposed to locally increase the resistance to tearing of the can end along the score lines defining the removable tear strip at points immediately adjacent the connection of a pull tab to the tear strip. This is accomplished by re-forming the end panel of the can end adjacent the score lines so as to decrease the width of the score lines without materially varying the depths thereof.

It is proposed to form an easy opening can end in the normal manner, and after the tear strip has been outlined by the forming of score lines in the end panel, to displace the metal of the tear strip transversely outwardly of the tear strip into the spaces defined by the score lines so that the flow of the metal results in the reduction in the width of each score line and the resultant increase in resistance of the end panel to tearing.

A further object of this invention is to provide a novel can end of the easy opening type which includes a removable tear strip defined by score lines and wherein the tear strip has attached thereto a pull tab for effecting the rupture of the end panel and the tearing of the tear strip therefrom, the tear strip having a central portion thereof adjacent the connection thereof with the pull tab outwardly displaced to define a longitudinally extending

groove with the material displaced from the tear strip central portion being flowed into the spaces of the score lines so as to reduce the cross sections of the score lines whereby the resistance of the end panel to tearing is increased and at the same time the resistance of the tear strip to transverse folding is decreased.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing.

In the drawing:

FIGURE 1 is a fragmentary top perspective view of a can formed in accordance with this invention.

FIGURE 2 is an enlarged fragmentary plan view of the can of FIGURE 1 and shows the specific easy opening details of the can end closing the upper end thereof.

FIGURE 3 is an enlarged fragmentary plan view of that portion of the can end which has been worked upon in accordance with this invention and shows the specific details thereof.

FIGURE 4 is an enlarged fragmentary vertical sectional view taken transversely of the tear strip through the can end only and shows the specific details of the cross section of the can end through the tear strip area.

FIGURE 5 is an enlarged fragmentary vertical sectional view taken through the upper part of the can of FIGURE 1 and shows the manner in which the starting end portion of the tear strip folds after the initial tearing thereof from the end panel occurs and the tearing reaches the affected area.

Referring now to the drawing in detail, it will be seen that there is illustrated a can formed in accordance with this invention, the can being generally referred to by the numeral **10**. The can **10** includes a can body **11** of a conventional construction which has the lower end thereof closed in the normal manner either by an integral end or an end separately secured thereto, neither of the ends being illustrated.

The upper end of the can body **11** is closed by means of an easy opening end, generally referred to by the numeral **12**, the can end **12** being secured to the can body **11** by means of a conventional double seam **13**. The can end **12** includes an end panel **14** in which there are formed score lines **15** and **16** which are separately referred to, but which may be continuous. The score lines **15** and **16** define a tear strip **17** which is removable in the opening of the can **10**. The tear strip **17**, as is clearly shown in FIGURE 5, has a starting end portion **18** which is provided with an integral rivet **19** by means of which a pull tab **20** is secured to the tear strip **17**.

The above described features of the can end **12** are well known and are used at the present time in the packaging of beverages, particularly beer, which are packed under a gaseous pressure. Such a beverage is shown in FIGURE 5 and is referred to by the numeral **21**. When a can of the type described hereinabove is opened, a relatively great force is applied to the free end of the pull tab **20** to effect the initial rupture of the end panel **14** along the score lines **15** and **16**. As the end panel **14** ruptures along the starting end of the tear strip **17**, the resistance to rupture of the end panel about the starting end portion of the tear strip **17** clearly reduces with the result that there is an immediate upward movement of the starting end portion **18** of the tear strip **17** before the force applied to the pull tab **20** can be reduced. Furthermore, in view of the fact that the beverage **21** is packed within the can **10** under a gaseous pressure, there is a high pressure exerted on the underside of the tear strip **17**. This pressure, coupled with the force applied to the pull tab **20**, causes a sudden tearing of the tear strip **17** from the end panel **14**. In certain instances where the contents of the can **10**

have been agitated immediately prior to the opening thereof, the force exerted by the gases within the can **10** are sufficient to effect a complete tearing out of the tear strip **17** and a blow off thereof in a manner which is very undesirable. This invention proposes to modify the existing type of easy opening can end to avoid this uncontrolled tearing of the tear strip from the can end.

In accordance with this invention, that portion of the tear strip **17** which is disposed adjacent the rivet **19** is worked upon to define a longitudinally extending recess **24**, as is clearly shown in FIGURES 3 and 4. A suitable punch is utilized to form the recess **24**. Since the recess **24** requires a displacement of the metal of the tear strip **17**, and since the recess **24** extends longitudinally of the tear strip **17**, it will be readily apparent that a major portion of the flow of the displaced metal will be transversely of the tear strip **17** into the spaces resulting from the formation of the score lines **15** and **16**. The flowed metal is clearly shown in FIGURE 4 and is referred to by the numeral **25**. It is to be noted that while the depth of the score lines **15** and **16** is not changed, the width of each score line **15** and **16** is materially decreased, thereby greatly reducing the cross section of the score lines **15** and **16** adjacent the longitudinal recess **24**. This abrupt reduction in cross section of the score lines **15** and **16** provides for an abrupt resistance to the tearing of the tear strip **17** from the end panel **14**. In this manner, the chances of an accidental uncontrolled tearing of the tear strip **17** from the end panel **14** are greatly reduced.

It is also pointed out at this time that when the longitudinal recess or groove **24** is formed in the tear strip **17**, although there is a displacement of the metal of the tear strip transversely outwardly into the score line areas, there is a definite reduction in the cross section of the tear strip **17**, as is clearly shown in FIGURE 4. As a result, in the reduction in the cross section of the tear strip **17**, the resistance to bending or hinging of the tear strip **17** is decreased at the same time the resistance to tearing of the end panel is increased. Therefore, as is clearly shown in FIGURE 5, during the opening of the can **10**, when the region of the displaced metal is reached, tearing of the metal of the end panel **14** suddenly decreases and a hinging action or bending of the tear strip **17** takes place. Since the pressure exerted on the tear strip starting end portion is only momentary in that the gases within the can **10** are immediately vented out through the opening formed during the rupture of the end panel in the tearing away of the starting end portion of the tear strip, it will be seen that the tear strip **17** may then be removed in the customary manner without any uncontrolled tearing or blow-out thereof.

It will be readily apparent that the reduction in cross section of each of the score lines and the reduction in the transverse cross section of the tear strip function independently although they are simultaneously effected, and that each could be utilized independent of the other.

Referring now to FIGURE 2 in particular, it will be seen that the tear strip **17** has an enlarged portion **26** disposed adjacent the outer periphery of the can end **12**. This portion of the tear strip **17**, when removed, defines a pouring portion of an opening in the can end **12**. In order to prevent one from accidentally cutting one's lips on the raw edge which results after the tear strip **17** is removed, the end panel **14** is provided with a pair of ribs **27** and **28** which extend along the outer portion of the tear strip **17**. These ribs **27** also reinforce the end panel **14**. It is to be noted that the ribs **27** and **28** start at points transversely aligned with the recess **24** and the flowed metal **25**. Thus, there is a reinforcement of the end panel **14** adjacent the point where the resistance to the tearing of the end panel is increased and the resistance to bending of the tear strip is decreased.

Although only a preferred embodiment of the invention has been specifically illustrated and described herein, it is to be understood that minor variations may be made therein within the spirit and scope of the invention, as defined by the appended claims.

We claim:

1. A method of locally increasing the resistance to tear of an end panel of a can end along a score line defining a removable tear panel portion, the method comprising the steps of locally deforming the end panel adjacent the score line and forcing material of the end panel into the space defined by the score line to locally reduce the cross section of the score line.

2. The method of claim **1** wherein the end panel is materially reduced in thickness by the local deforming thereof to effect the bending of the tear strip out of the plane of the end panel in the initial opening operation.

3. The method of claim **1** wherein the deformation of the end panel is in the end panel.

4. The method of claim **1** wherein the score line extends on opposite sides from a starting end portion, the deformation is formed generally in alignment with the starting end portion, and material is forced into the score line on opposite sides of the starting end portion.

5. The method of claim **4** wherein the deformation of the end panel is in the end panel.

6. The method of claim **4** wherein the end panel is materially reduced in thickness by the local deforming thereof to effect the bending of the tear strip out of the plane of the end panel in the initial opening operation.

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