

[54] EASY OPENING STRUCTURE 3,552,597 1/1971 Moller 220/53
3,421,654 1/1969 Hexel..... 220/31 S

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[57] ABSTRACT

[52] U.S. Cl..... 220/53, 220/60 R, 220/31 S, 220/44 R, 222/541

[51] Int. Cl..... B65d 17/20

[58] Field of Search 220/54, 44, 53, 27, 220/315, 60; 222/541

An easy opening container including a plastic closure having a pull tab releasably bonded to an end closure for sealing a pour opening. The pull tab includes a lateral flexible section extending across the tab. The flexible section provides a hinge line about which the tab swings to permit venting of gases within the container.

[56] References Cited

UNITED STATES PATENTS

3,395,839 8/1968 Vercillo 220/541

5 Claims, 9 Drawing Figures

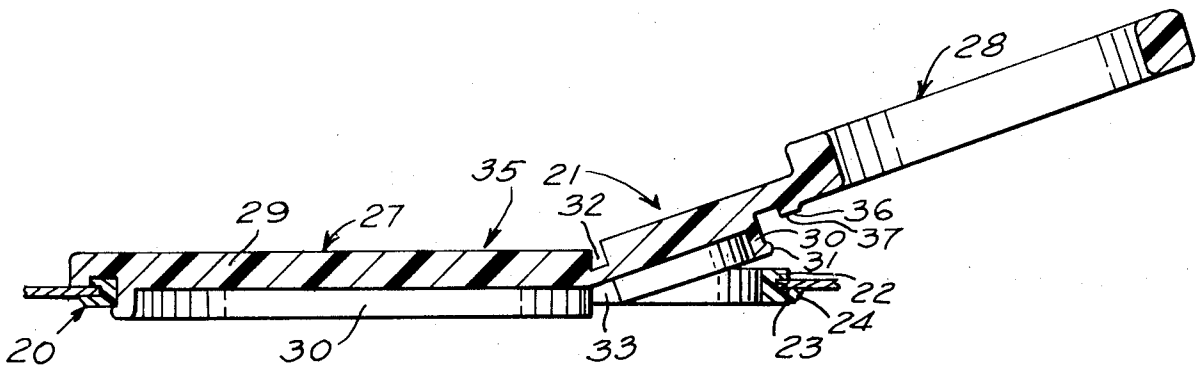


FIG-1

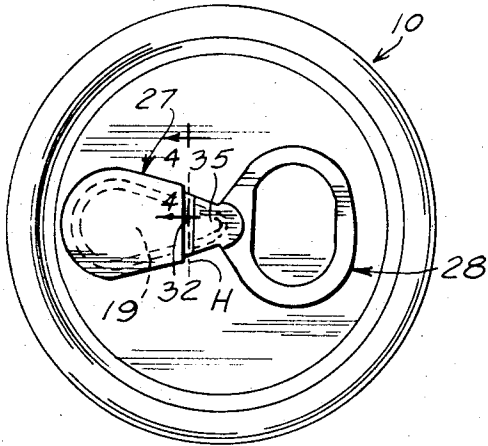


FIG-2

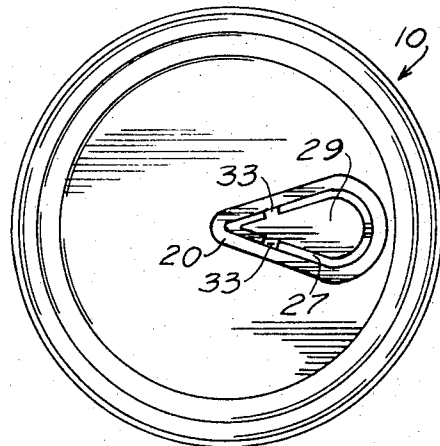


FIG-3

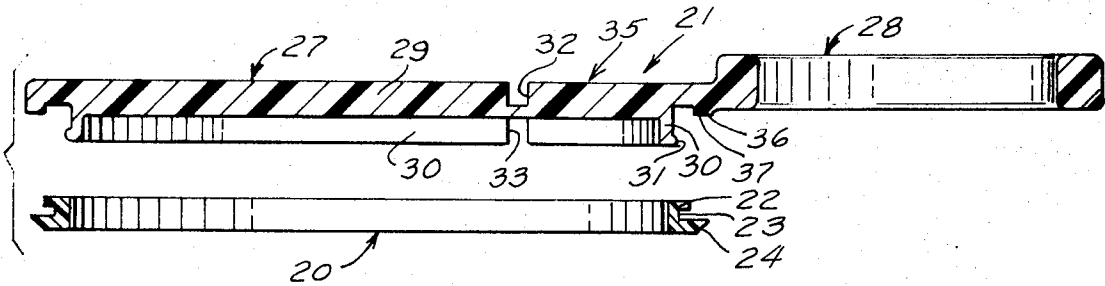
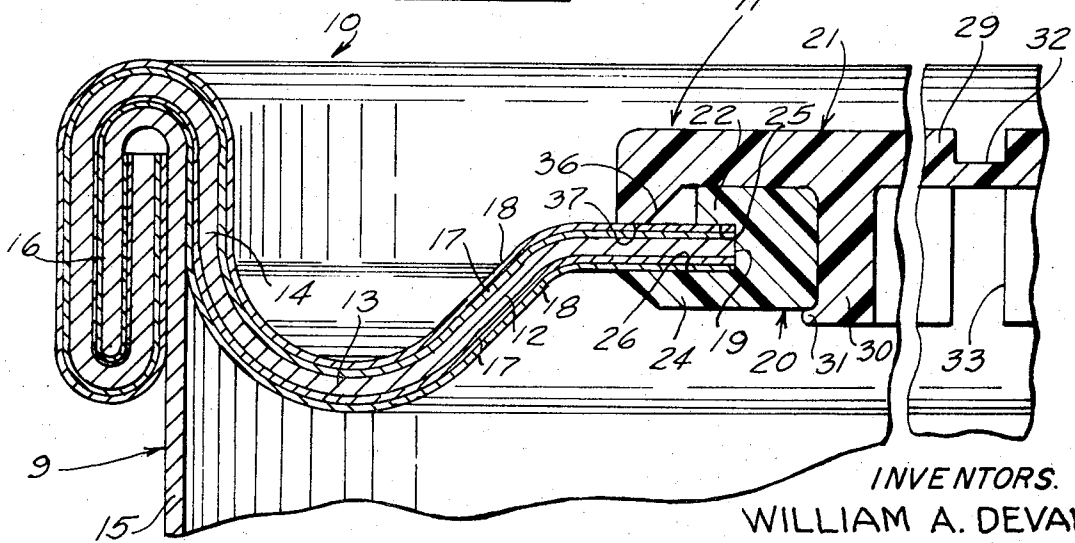


FIG-4



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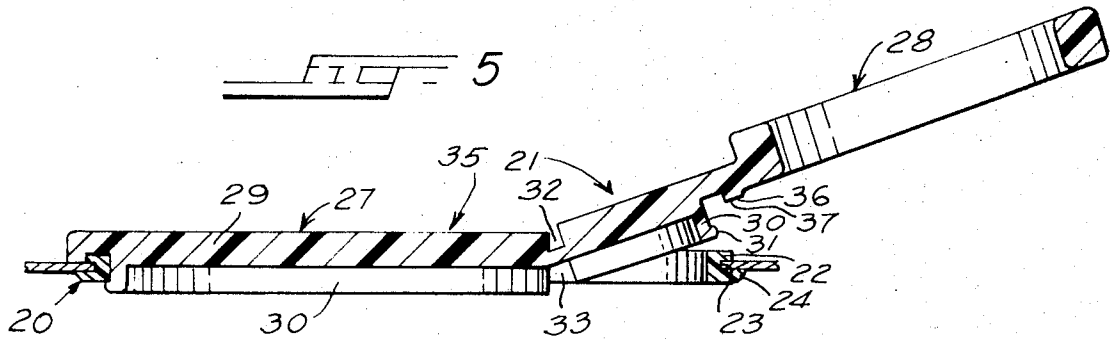


FIG. 6

FIG. 7

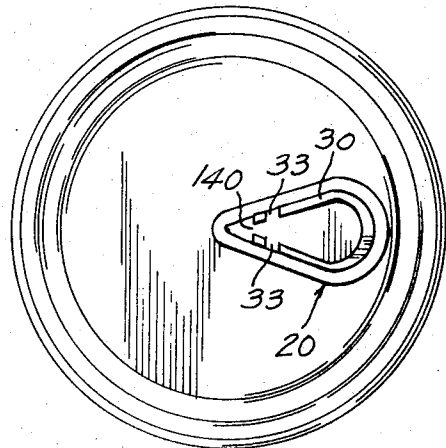
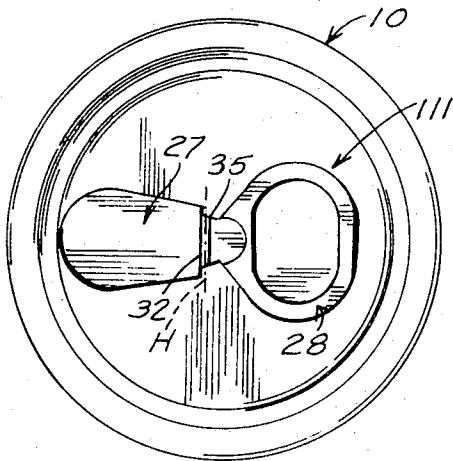
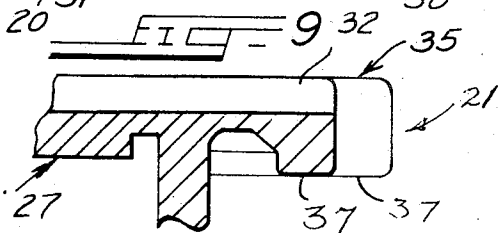
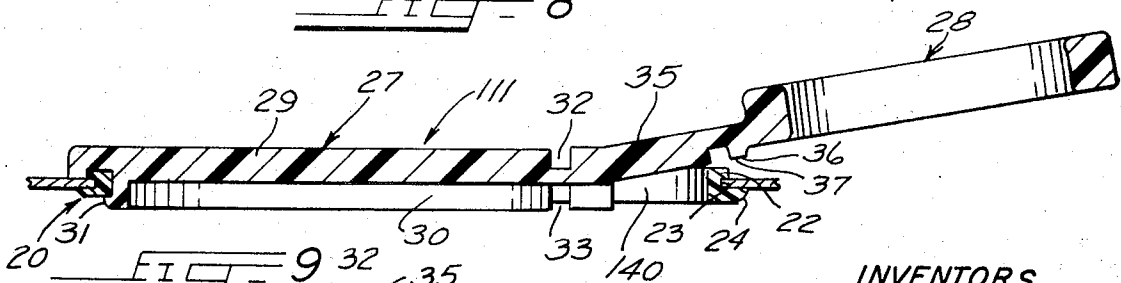


FIG. 8



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EASY OPENING STRUCTURE

BACKGROUND OF THE PRESENT INVENTION

The present invention relates to containers having a metal end closure formed with a pour opening which is sealed by a separately attached closure made from plastic.

The structure of the present invention is an improvement of the container and end closure therefor described in copending U.S. patent application Ser. No. 12,981 assigned to the assignee of the present invention.

The prior structure comprises a container having a metal end closure formed with a pre-cut pour opening and a plastic closure sealing the opening. The closure includes a rim bounding the opening and a tab which overlies the rim and is bonded solely to the end panel so as to be peelable therefrom upon the application of a pulling force thereon.

When products are packaged in a container under pressure considerable pressure forces are exerted on the closure member. During opening of the closure, the gases are vented outwardly through the initially opened portion. However, the pressure forces remaining in the container may still be of a magnitude causing the bond between the end unit and the tab to continue to separate without the application of additional manual force. That is to say, the pressure forces may cause the tab to be "blown off" after initial opening.

SUMMARY OF THE INVENTION

By the present invention, it is proposed to provide a closure of the general type described in the aforementioned application with a structure imparting improved opening and venting characteristics thereto.

This is accomplished generally by forming the pull tab that seals the opening with a reduced section about which the tab is hinged after the initial opening. The reduced section extends across the width of the tab so that the initially opened or detached portion of the tab freely flexes relative to the attached portion of the tab. The pressure forces acting on the detached portion of the tab and venting through the opening are therefore not transmitted to the still bonded or attached portion. In this manner, the detached portion does not apply a leverage force on the bonded portion until a further manual force is applied.

The tab may also be provided with means for creating a pre-vent condition upon initial separation of the closure from the end unit prior to the separation at the hinge means. The pre-vent condition minimizes the product spillage during venting.

To reduce the possibility of blow-off, the bonding area at the undetached portion of the pull tab may be greater than the bonding area on the opposite side of the hinge.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a container end unit embodying the closure structure of the present invention;

FIG. 2 is a bottom plan view of the end unit shown in FIG. 1;

FIG. 3 is an enlarged exploded and cross sectional view of the closure structure shown in FIGS. 1 and 2 prior to being applied on the end closure;

FIG. 4 is an enlarged fragmentary cross sectional view of a container with the end closure of FIGS. 1 and 2 attached thereto;

FIG. 5 is a cross sectional view similar to FIG. 4 but showing closure partially opened and in the venting condition;

FIG. 6 is a top plan view of an end closure showing a further embodiment of the invention;

FIG. 7 is a bottom plan view of FIG. 6;

FIG. 8 is a cross sectional view of a container end unit embodying the structure of FIGS. 6 and 7 and showing the closure in a pre-vent position; and

FIG. 9 is a cross sectional view taken generally along lines 9-9 of FIG. 3.

Referring now to the drawings, there is shown a container 9 including an end closure or unit 10 incorporating the closure 11 of the present invention. The end unit 10 is made from sheet metal such as aluminum or a ferrous metal, as for example, tin free steel, black plate or the like. The end unit 10 includes a panel 12 having a peripheral bead 13. Extending upwardly from the bead 13 is an upstanding wall 14 from the upper end of which there extends a peripheral flange. The end unit is attached to the upper end of a container body 15 by means of a double seam 16.

The end unit 10 as shown is coated on the outer and inner surfaces thereof with an enamel coating 17 prepared from a thermosetting resin, such as epoxy resin of the polyhydric alcohol-polyfunctional halohydrin condensation type, a heat hardenable phenol-formaldehyde resin, an aminoplast, such as an urea or melamine/formaldehyde resin. In addition, certain thermoplastic resins may be employed in combination with these thermosetting resins to prepare enamel coatings having thermosetting properties. Illustrative of these thermoplastic resins are vinyl chloride polymers, such as vinyl chloride/vinyl acetate copolymers and vinyl chloride/vinyl acetate/maleic anhydride terpolymers.

Superimposed on the enamel coating 17 is a bond promoting coating 18. The bond promoting coating 18 is selected to form a releasable bond or peelable seal with the plastic from which the closure 11 is made. Illustrative examples of bond promoting coatings which can be applied to the enamel coating are carboxyl containing olefin polymers, such as carboxyl modified polypropylene graft copolymers, carboxyl modified polyethylene graft copolymers, and mixtures of carboxyl modified polyethylene graft copolymers and vinyl butyral polymers, such as polyvinyl butyral. The enamel coating 17 and bond promoting coating 18 may be applied to the flat metal sheets from which the end unit 10 is formed. For a more complete description of the enamel coating 17 and the bonding promoting coating 18 and the method of applying the same to the end unit 10, reference is made to copending applications of Kenneth D. Gilliam and Alfred W. Kehe, Ser. No. 858,164 filed Sept. 15, 1969 and Alfred W. Kehe filed Sept. 18, 1969, Ser. No. 855,878, both assigned to the assignee of the present invention.

As shown, the end unit 10 is made with a tear drop opening 19 extending generally radially of the panel 12 with the narrow section disposed substantially at the center thereof.

The closure 11 as shown, comprises a rim 20 and a sealing member or pull tab 21. The rim 20 is fastened about the edge of the opening 19 and the pull tab 21

is positioned over the rim 20 and opening 19 and releasably bonded to the marginal edge portions bounding the rim. The rim 20 is made from a thermo-plastic polymer such as an olefin homopolymer or copolymer such as polyethylene, polypropylene or ethylene/poly-
 5 ethylene copolymer and is formed by molding to a contour complementary to the pre-cut opening 19 in the end. A groove 23 defined by an upper chambered lip 22 and a spaced lower lip 24 is formed along the periphery of the rim 20. The rim 20 is sufficiently pliable or resilient
 10 so that the groove 23 may be snapped fitted into seating engagement with the edge about the pre-cut opening 19. When thus seated, the surfaces 25 and 26 of the lips 22 and 24, respectively, are in face to face engagement with the bond promoting coating 18 bounding the edge.

The pull tab 21 is also made from plastic and comprises a plug or closure portion 27 from which there extends an integral finger grip portion 28. The finger grip
 15 portion 28 may be in the form of a ring. The plug 27 includes a closure web 29 from the underside of which there projects a flange 30 adapted to seat within rim 20. The lower end of the flange 30 is formed with a detent
 20 31 which seats along the underside of the rim 20, as shown in FIG. 4. The detent 31 serves to releasably latch the pull tab 21 to the rim 20.

A lateral groove 32 extending across the width of the tab is formed on the upper face of web 29. The groove
 25 is spaced from the attachment thereof with the finger grip portion 28. A pair of notches 33 is formed in the flange 30 in alignment with the groove 32. The notches
 30 33 and groove 32 provide a hinge line H about which the tab is free to swing.

As shown in FIG. 1, the end of the web 29 lying at the juncture with the finger grip portion 28 is shaped similarly
 35 to the opening 19 so that a marginal portion 34 of substantially constant width overlies the panel 17. At the other end of the tab 21 and on the opposite side of the groove 32, the marginal edge portion 34 is increased. Depending downwardly from the marginal
 40 edge portion 34 is a continuous length flange 36 which terminates in a face 37 at which the tab is bonded to the coating 18 on the metal panel 12. The width of the face 37 varies directly with the width of the marginal portion 34. Thus, immediately outwardly of the groove 32
 45 as shown in FIG. 9, the width of the face 37 is greater than on the terminal end portion on the opposite side of the hinge line H. This results in an increased bonding area and a corresponding greater resistance to separation of the pull tab from the panel at the outboard side of the hinge line H.

The pull tab 21 is made from a thermoplastic material which may have a composition substantially similar to that of the rim 20, for example, polypropylene or polyethylene, and is formed by molding or the like.
 50 When the pull tab 21 is made from polyethylene, the bond promoting coating 17 is preferably comprised of a mixture of a carboxyl modified polyethylene resin and a vinyl butyral polymer resin. When the pull tab 21
 55 is made from polypropylene the bond promoting coating 18 is preferably comprised of a carboxylated polypropylene resin.

The pull tab 21 is releasably bonded to the metal end unit 10 by heat sealing. For a more complete description of the method and assembly of the closure to the metal end reference is made to the aforementioned patent application Ser. No. 12,981.

It is preferred that the pull tab 21 be releasably attached solely to the bond promoting coating 18 and not bonded to the rim 20. The bond at the face 37 and the bond promoting coating 18 is capable of being separated by force manually applied by the fingers.

To open the closure 11 the pull tab is gripped at the finger grip portion 28 and pulled angularly upwardly. Upon upward angular bending, the portion of the closure web 29 disposed adjacent to the finger grip portion
 10 28 separates from coating 18 along the face 37. When the separation occurs at the hinge line H the rear portion 35 of the web 29 is free to swing thereabout so that separation of the pull tab is interrupted for the length of time required to swing the finger grip through the arc necessary to again apply an upward separating force on the outboard end of the web 29. During the period in
 15 which the web 29 is swinging, the gases of the product under pressure are free to escape through the opened portion as shown in FIG. 5. In this connection, it is to be noted that the hinge line H is flexible so that the transmission of the pressure forces acting on the opened portion or rear portion 35 to the forward attached portion are minimized. Thereby the lever arm effect as resulted when the web 29 is of uniform thickness and the flange 33 is continuous is substantially
 20 eliminated so that the tendency for the tab 21 to "blow-off" is reduced.

Moreover, the bond strength adjacent the forward side of the hinge line H may also be increased by the increase in the surface contact at the face 37 with the bond promoting coating 18. This increase in bonding area increases the resistance to separation so as to withstand the forces tending to blow off the tab.

Referring now to FIGS. 6-8 there is shown another embodiment of closure in which a secondary or prevent structure is incorporated therein. As above described in the structure of the embodiment of FIGS. 1-5 a relatively large vent opening is provided when the rear portion 35 of the web is separated from the end panel 10. In the presence of relatively high internal pressures within the container, the product may be expelled through the opening. To minimize the spillage in this manner, the portion of the flange 30 at the narrow end of the pour opening 19 is eliminated to provide a vent groove 40. Thus, upon the initial separation of the face 37 with the bond promoting coating 18 at the juncture with the finger grip 28, as shown in FIG. 8, a relatively restricted passage is provided to initiate the venting of the gases in the container through the vent groove 40 to the atmosphere. This groove 40 is restricted so as to tend to retain the product carried upwardly within the container body 10. At the same time, the gases are released so as to reduce the pressure which is present when the tab is opened to the position shown in FIG. 5. In this manner, product spillage is further minimized because of the further reduced pressure in the body.

What is claimed is:

1. An easy-opening end unit for a container comprising an end unit having a pour opening, a plastic pull tab having a sealing web including marginal edge portion bordering said opening and releasably bonded to said end unit for sealing said opening, a downwardly extending flange contoured complementary to said pour opening for insertion therein, a finger grip portion extending from said web, said web overlying said opening and having a groove extending normal to the direction

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in which a force is applied to separate said web from said end, a pair of notches in said flange aligned with said groove, said groove and said notches providing a hinge line about which said pull tab is swingable during removal of said tab from bonding relation with said end unit.

2. The invention as defined in claim 1 wherein the marginal edge portions releasably bonded to said end unit on the side of said hinge line remote from said finger grip portion is of greater cross-section area than said marginal edge portion on the same side of said finger grip portion.

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3. The invention as defined in claim 1 wherein said flange is formed with a further notch adjacent the juncture of said finger grip portion and said web.

4. The invention as defined in claim 3 wherein said opening is substantially tear drop shaped, and wherein said further notch is located at the narrow end of said tear drop.

5. The invention as defined in claim 3 wherein said opening is bounded by a plastic rim and wherein said flange includes means releasably latching said pull tab to said rim.

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