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Bollmann et al.

[11] **3,833,144**

[45] **Sept. 3, 1974**

[54] **TWO POSITION PULL TAB EASY-OPEN CONTAINER COMPONENT**

[75] Inventors: **Robert Henry Bollmann,** Woodstock; **Guy Curtis Richards,** Crystal Lake, both of Ill.

[73] Assignee: **American Can Company,** Greenwich, Conn.

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[52] **U.S. Cl.** ..... **220/267,** 220/42 B

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

[58] **Field of Search** ..... 220/53, 42 B, 24 A, 27, 220/32, 42 B

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Primary Examiner—William I. Price
Assistant Examiner—Allan N. Shoap
Attorney, Agent, or Firm—Robert P. Auber; Paul R. Audet; Harries A. Mumma, Jr.

[57] **ABSTRACT**

An easy-open container component comprising an end closure having an aperture therein and a reclosable two-position pull-tab having a downwardly depending plug member whose sidewall is larger at its top than at the bottom, and whose bottom surface initially is planar with, and is adhered to a sealing membrane in turn adhered to, the underside of the central panel of the end closure. Opening of the end closure is effected by pulling upwardly on the pull-tab to pull the plug member out of the aperture and to cut the sealing membrane about the edge of the rim of the aperture. Reclosure is effected by pressuredly inserting the plug member downwardly into the aperture so that the edge of the rim of the aperture pressuredly sealingly engages the larger top portion of the plug member sidewall, and so that the bottom surface of the plug member is below the plane of the underside of the central panel of the end closure.

16 Claims, 6 Drawing Figures

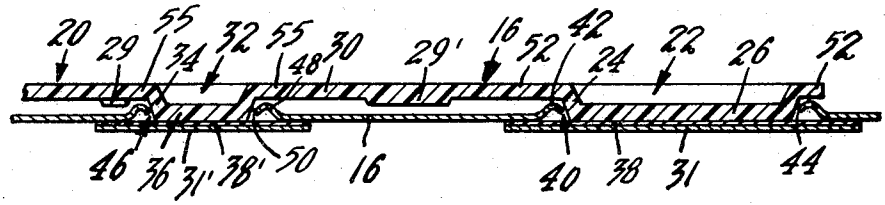


FIG. 1

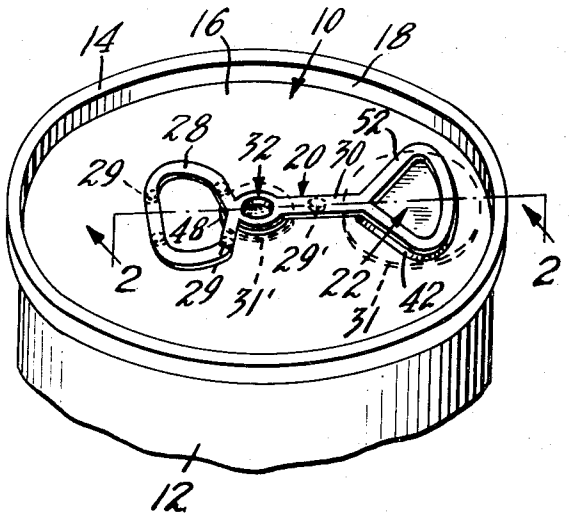


FIG. 3

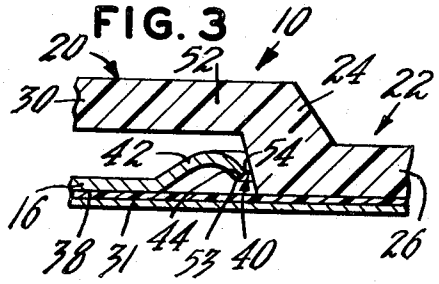


FIG. 4

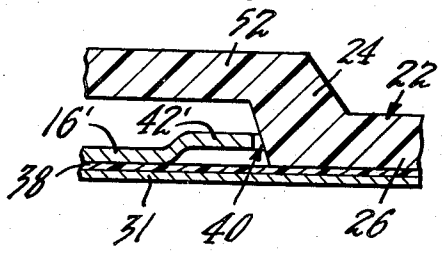


FIG. 2

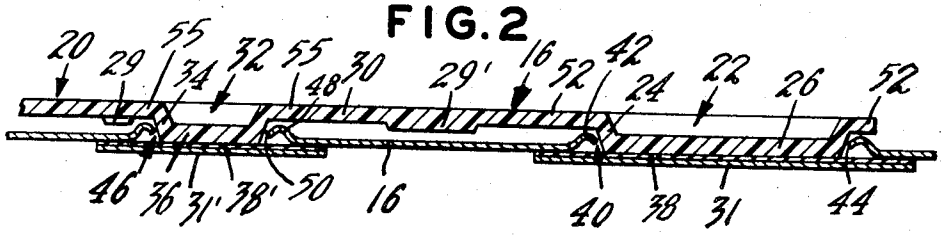


FIG. 5

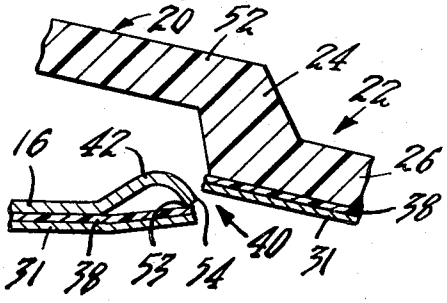
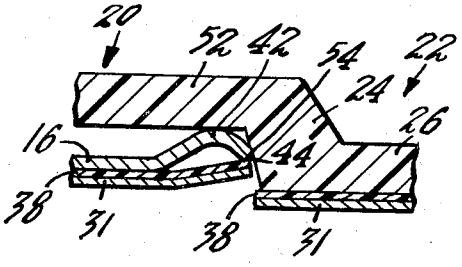


FIG. 6



TWO POSITION PULL TAB EASY-OPEN CONTAINER COMPONENT

BACKGROUND OF THE INVENTION

This invention relates to hermetically sealed easy-open containers and more particularly to reclosable, easy-open containers for non-carbonated beverages and vacuum-packed products.

It is known that the typical, commonly used, easy-open metal container end closures having a metal opening tab riveted to a score-defined tear-out panel of a central panel have several disadvantages. Among these are that they often require an excessive opening force, they leave dangerous exposed metal edges on the panel section removed and about the periphery of the opening, and they are not reclosable.

The container end closure component of this invention is advantageous because it provides a removable, resilient pull tab which does not require excessive force to open the end closure and which, when removed, does not have exposed, dangerous raw metal edges thereon. It is also advantageous because it is reclosable and because the preferred embodiment provides a raised bead around the aperture which not only reinforces the end closure but rigidifies and positions the exposed metal edges downwardly and protectingly away from the lips of a consumer.

An object of this invention is to provide an easy open reclosable container which incorporates some or all of the foregoing advantages.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the description which follows, which, taken in connection with the drawings, discloses a preferred embodiment thereof.

BRIEF SUMMARY OF THE INVENTION

This invention is an easy-open container component comprising a panel portion having an aperture therein, a rim and an edge defining the aperture, an internal sealing membrane bonded to the underside of the panel and sealing the aperture, and a two-position pull tab having a flange vertically spaced from the rim, and a plug member which includes a side wall and a bottom wall. The bottom wall is positioned within the aperture, substantially planar to the underside of the panel portion and is bonded to a portion of the sealing membrane through the aperture. The pull tab is adapted by means such as a handle member, to be pulled upwardly to cut the sealing membrane along the edge when the pull tab is removed from the panel portion. The upper portion of the side wall is larger than its lower portion so that the upper portion is pressuredly sealingly engaged by the edge when the plug member is pressed into a second position within the aperture and so that the bottom wall is below the plane of the panel portion when the pull tab serves as a reclosure. Preferably, the side wall is inwardly tapered from top to bottom. The rim can be disposed in substantially the same plane as the panel portion but preferably it is a raised substantially arcuate bead which causes the edge to face downward and be disposed above the level of the adjacent interior surface of the panel. Also preferably, the edge has corners and is inclined upwardly with respect to the aperture so that its bottom corner is closest to the sealing membrane and functions as a knife-like cutting edge when the sealing membrane is pulled upwardly against it, when the pull tab is removed from the panel portion. Still more preferably, the edge is inclined inwardly and upwardly from the bottom corner so that the top corner is closest to the plug side wall and is that portion of the edge which engages the plug when it is reclosably inserted into the aperture. The sealing membrane preferably includes a gas impermeable layer of foil but it can also be a thermoplastic.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a fragmentary view in perspective of the upper portion of a container made in accordance with this invention.

FIG. **2** is an enlarged fragmentary section of a portion of the end closure of the container of FIG. **1**, taken substantially along a portion of line **2—2** of FIG. **1**.

FIG. **3** is a greatly enlarged detailed fragmentary section of the left portion of the plug member shown at the right of FIG. **2**.

FIG. **4** is a greatly enlarged detailed fragmentary section similar to FIG. **3** but showing another embodiment of the plug of this invention.

FIG. **5** is a greatly enlarged detailed fragmentary section showing the plug of FIG. **3** during opening of the end closure.

FIG. **6** is a greatly enlarged detailed fragmentary section showing the plug of FIG. **5** in a reclosure position.

DETAILED DESCRIPTION OF THE INVENTION

As a preferred and exemplary embodiment of this invention, the drawings disclose, in FIG. **1**, a can end closure **10** adapted to be secured to the upper end of a tubular can body **12** in any suitable manner, as by a conventional hermetical double seam **14**. Body **12** may be of any suitable type and can have its bottom end closed by means of a suitable bottom end closure (not shown).

Top end closure **10** has a central panel portion **16** which can be surrounded by a peripheral reinforcing groove (not shown) which can merge at its outer edge into an upwardly extending countersink wall **18** whose upper end portion in turn merges into an outwardly extending flange (not numbered) which, after assembly of body **12** and closure **10**, becomes a portion of double seam **14**. End closure **10** also includes a pull tab **20** having recessed plug members **22** and **32** and handle element **28**. Pull tab **20** also has lugs **29** and **29'** (dotted lines) depending downwardly from the respective undersides of handle element **28** and of intermediary tab portion **30**.

Also shown in FIG. **1**, are circular sealing membranes **31** and **31'** (dotted lines) bonded to the undersurface of central panel **16** and to the undersurfaces of respective plug members **22** and **32**.

FIG. **2** generally shows a cross section through a portion of end closure **10** and pull tab **20** of FIG. **1**. More particularly, FIG. **2** shows pouring plug member **22** having a side wall **24** and a bottom wall **26**, and vent plug **32** having a side wall **34** and a bottom wall **36**. The undersurfaces of bottomwalls **26** and **36** are substantially planar to the underside of central panel **16** and are bonded to portions of sealing membranes **31** and **31'** by means of a suitable adhesive **38** and **38'** through apertures **40** and **46** defined by raised, substantially arcuate, beaded rims **42** and **48** and downwardly facing

edges 44 and 50 disposed above the level of the adjacent under-surface of panel 16. Side walls 24 and 34 are tapered inwardly from top to bottom, i.e., their diameters at their tops are greater than their diameters at their bottoms.

FIG. 2 also shows pull tab 20 having respective flanges 52 and 55 adjoining respective side walls 24 and 34 and shows that the flanges are vertically spaced above the uppermost surfaces of respective raised, beaded rims 42 and 48 to allow side walls 24 and 34 to travel within apertures 40 and 46 when plug members 22 and 32 are pressed into the apertures to effect a reclosure. FIG. 2 also shows lugs 29 and 29' depending downwardly from handle element 28 and intermediate tab portion 30. The function of lugs 29 and 29' will be explained later.

FIG. 3 is an enlarged detailed section specifically showing the portion of the end closure of FIG. 2 that is adjacent the left portion of pouring plug member 22. Since all portions of the end closure adjacent the plug sidewalls are substantially the same, what is hereinafter stated with respect to the portion of the end closure shown in FIG. 2 (and FIGS. 4 through 6) also applies to other portions of the end closure adjacent pouring plug 22 and vent plug 32. FIG. 3 shows tab 20 in its initial, assembled position wherein the undersurface of bottom wall 26 is bonded to a portion of sealing membrane 31 by means of a layer of adhesive 38. In the initial position of FIG. 3, the lower portion of inwardly tapered sidewall 24 of pouring plug member 22 can contact a portion of edge 44 as plug 22 is seated within aperture 40, but preferably the lower portion of tapered side wall 24 is spaced or slightly removed from edge 44 of rim 42 to provide some tolerance for variations in aperture and plug dimensions and to provide some clearance to facilitate the locating and placing of the plug member within the aperture during initial manufacturing assembly and during customer reclosure. It has been found desirable to provide a clearance of say from about 0.006 to 0.008 inch between a portion of edge 44 and the adjacent lower portion of tapered sidewall 24.

Rim 42 surrounding and defining aperture 40 is formed from panel 16 and need not be but preferably is a raised, arcuate, beaded rim terminating in edge 44 which also need not be but preferably is positioned at least slightly above the plane of the inside surface of central panel 16. Preferably, edge 44 is inclined relative to sealing membrane 31, and preferably, it has corners, its bottom or outermost corner 53 forming a sharp corner and its innermost top corner being closest to and adapted to engage an upper portion of sidewall 24 of plug member 22 when the plug member is inserted into aperture 40 upon reclosure.

In this preferred embodiment, edge 44 and the inner surface of bead 42 intersect at corner 53 at substantially right angles to each other. Rim 42 can be flat or at any suitable angle so long as an edge is provided which can function as a knife-like cutting blade in relation to the sealing membrane when the plug is pulled from the aperture, and so long as the edge can engage a portion of sidewall 24 within the amount of plug travel into aperture 40 as determined and fixed by the travel space provided between the lower surface of flange 52 and the top of rim 42. Thus, if rim 42 were flat and planar with the rest of central panel 16, side wall 24 could be shorter and flange 52 lower while permitting the same amount of plug travel as permitted with a raised rim and a raised flange. Flat rims are less preferred than arcuate beaded rims because they provide no guiding surface for easily locating the respective plugs within their respective apertures during initial assembly and customer reclosure, and because their close proximity of their edges to the sealing membranes can result in inadvertent fracturing and tearing of the membranes for example during shipping, handling, and storage.

It has been found advantageous to have edge 44 positioned so that corner 53 is about 0.001 to 0.002 inch above the adjacent inside surface of container end closure 10. This precludes inadvertent premature ruptur-ings of sealing membrane 31 while still providing for easy openings of the container. Positioning the edge too high would make it increasingly difficult to bring a portion of membrane 31 into severing contact with corner 53.

FIG. 4 shows another embodiment of the invention wherein rim 42' is horizontal and parallel with, but raised above the plane of central panel 16' to prevent the aforementioned inadvertent fracturing and tearing of sealing membrane 31. The membrane is secured to the undersurface of central panel 16' in a manner which seals aperture 40 and prevents the product contained within the container from reaching either of the apertures.

Sealing membrane 31 and 31' may be made of one integral piece, large enough to seal both apertures 40 and 46, but preferably, the membranes are individual patches 31 and 31' as previously shown in FIG. 1. The sealing membranes are imperforate, gas impermeable and preferably fabricated from flat sheet stock or tape comprising a suitable thin, readily tearable, flavor-resistant, impervious material such as aluminum or other metallic foil, thermoplastic, or lamination of any one or combination of such materials. Sealing membranes 31 and 31' of the illustrated embodiments of the invention, comprise pieces of aluminum foil of suitable thickness (2 mils is suitable for many products) and suitable shape such as rectangular or circular.

The upper surface of membrane 31 is substantially fully coated with a pre-applied layer or lamination 38 of an adhesive which bonds the foil or other membrane material to the interior surface of closure 10 around apertures 40 and 46 and thereby seals the apertures off from the interior of the can. The bottom surface of foil 31, as well as its edges, may, if desired, be protected in a conventional manner as by a thin layer or lamination of an inert organic resin (not shown) to protect the foil from corrosive action inherent in some products in this type of container. It is understood that all other surfaces of the container body and ends exposed to such products would be similarly protected by similar organic coatings (not shown) pre-applied to the inner surfaces of body 12 end closure 10, and panel 16. In such event, adhesive 38 would adhere to such inner organic coatings. If desired, well-known adhesion promoting coatings and/or surface treatments can be utilized to enhance adhesion between the various aforementioned elements of the container component of this invention.

Adhesives 38 and 38' preferably are formed of a synthetic thermoplastic resin or polymeric plastic adherently compatible with the other materials of which end closure 10 is made. Some exemplary adhesives are

polyurethane, polyvinyl plastisols, vinyl films, polyamides, and random copolymers of ethylene and acrylic acids such as are disclosed in U.S. Pat. No. 3,239,370. By way of example, satisfactory results have been obtained using a two mil layer of a random copolymer of ethylene and acrylic acid. However, thinner or thicker adhesive films and other types of adhesives such as pressure-sensitive or thermosetting adhesives, may be utilized.

The bonding of sealing membrane **31** to the underside of central panel **16** or **16'** and to the bottom surface of bottomwall **26** of plug member **22,** involves the application of heat to soften adhesive **38** and pressure to effect the desired adherence. Since pull tab **20** is preferably injection molded from a suitable flexible thermoplastic resin such as polyethylene, polypropylene, polyurethane, phenoxy, a vinyl-modified polyurethane, a random copolymer of ethylene and acrylic acids such as hereinbefore described, etc., and since such materials would tend to soften when heated, lugs **29** and **29'** are provided on the undersurface of handle member **28** and intermediate portion of tab **20** to prevent the underlying surfaces of the tab from flushly abutting, being heated by and perhaps adhering to the upper surface of the heated central panel when pressure is applied to the tab during its assembly to end closure **10.**

FIG. **5** shows what occurs when handle member **28** of tab **20** (shown in FIG. **1**) is pulled upwardly by a consumer to effect an opening in end closure **10.** When a consumer inserts a finger or other device into the opening of handle element **28** and hinges and pulls the handle upwardly, the upward pulling force first lifts vent plug **32** out of aperture **46** (see FIG. **2**). The force then hinges intermediary tab portion **30** and pulls pouring plug **22** out of aperture **40** to effect an opening which allows product removal as by pouring from aperture **40.** The cutting or tearing action which occurs adjacent vent aperture **46** when vent plug **32** is pulled therefrom is similar to that which occurs adjacent pouring aperture **40** when pouring plug **32** is pulled therefrom. FIG. **5** shows flange **52,** comprising a portion of intermediate tab portion **30,** being pulled upwardly, thereby pulling sidewall **24** out of aperture **40.** This action pulls sealing membrane **31** against edge **44,** more particularly, in this preferred embodiment, against its sharp, knife-like, cutting bottom corner **53** which surrounds pouring aperture **40** to thereby cut, tear or sever from the patch a small disk-like portion which remains secured to the bottom surface of pouring plug **22** and is pulled with it through venting aperture **40** to leave pouring aperture **40** unobstructed.

Tearing of sealing membrane **31** occurs rather gradually and simultaneously along the sides of the roughly triangular-shaped pouring aperture **40** to the points where the sides meet the slightly arcuate base of the triangle adjacent countersink wall **18,** whereat continued upward pulling effects a tearing or severance of the membrane substantially simultaneously along the length of the base of the aperture.

Edge **44** need not have corners to effect an adequate tearing of sealing membrane **31** when pouring plug **22** is removed from aperture **40.** Central panel **16** is usually sufficiently thin, beverage cans, usually on the order of 0.010 inch, so that any edge resulting from the formation of aperture **40** will be sufficiently sharp to effect a satisfactory tearing of sealing membrane **31** during plug removal. FIG. **5** shows that sealing membrane **31,** being foil, bends upward and can remain in that position after plug member **22** and the disk-like portion of sealing membrane **31** remaining adhered thereto, are removed from the end closure.

As shown in FIG. **6,** once container end closure **10** has been opened, pull tab **20** can be used to effect a reclosure by exerting downward pressure on tab **20** adjacent the plug members, (pouring plug **22** in FIG. **6**), so that edge **44** pressuredly sealingly engages an upper portion of inwardly tapered sidewall **24** and so that the undersurface of bottom wall **26** is positioned below the plane of the underside of panel **16.** Although FIG. **6** shows plug **22** fully inserted within aperture **40** so that substantially no space is left between the upper portion of rim **42** and the lower surface of flange **52,** and although edge **44** is shown having a top corner **54** embedded into a portion of sidewall **24,** satisfactory pressured sealing engagements between edge **44** and sidewall **24** can be effected when a space is left between the upper surface of rim **42** and flange **52** and when edge **44** does not have a top corner **54.** Just where corner **54** and/or edge **44** will pressuredly sealingly engage sidewall **24** depends on several factors, such as their initial position relative to the planar portion of central panel portion **16,** the angle at which side wall **24** is inwardly tapered, the resiliency of the thermoplastic material from which the pull tab is manufactured, the amount of travel space provided between rim **42** and flange **52,** and, of course, the amount of pressure exerted on the top of plug member **22** during reclosure.

Thus, referring to FIGS. **3** and **6,** it can be seen that pull tab **20** has two positions relative to central panel **16** of container end closure **10.** The first position is its assembled position, wherein the undersurface of bottomwall **26** is substantially planar to the plane of underside of central panel **16.** The second, its subsequent, reclosure position is that wherein plug **22** has been inserted within aperture **40** so that the undersurface of bottomwall **26** is below the plane of the underside of central panel **16.** The easy-open container component of this invention therefore provides a reclosable two-position tab easy-open container end closure whereby the edge of the rim of its central panel cooperates with an upper portion of a plug side wall whose upper portion is larger than its bottom portion, preferably inwardly tapered, by becoming pressuredly sealingly engaged with an upper portion of the sidewall when the plug member is inserted into a rim-and-edge defined aperture in the panel.

Again, although the above discussion of FIGS. **3** through **6** relates to a shown portion of enclosure **10** adjacent the left-hand portion of pouring plug member **22,** it is to be understood that the discussion also applies to the portion of the end closure adjacent the rest of plug **22** and adjacent plug **32.**

End closure **10,** as well as body **12,** may be formed of suitable materials such as tinplate, coated steel, steel, aluminum, etc. Other types of materials such as plastics, metal-plastic laminations or other suitable laminated structures may also be utilized.

Apertures **40** and **46** need not be as shown but can be of any other suitable shapes such as keyhole, oval, or radially elongated, etc. The size of the apertures is not critical, it being dependent to some extent on the product (not shown) usually a liquid, which is packed in the container.

When pouring aperture **40** is relatively small in size, as illustrated, it is desirable that the vent aperture **46** be included in the end closure and be somewhat smaller in size, and spaced a sufficient distance from pouring aperture **40** to allow it to admit air to the interior of the container when the product is poured through the aperture. When pouring aperture **40** is sufficiently large in size, aperture **46** may be omitted.

It will be understood that it would be possible to embody the principles of construction of this invention in a container body rather than in a container end closure. It will also be understood that the term edge is used to designate an unhemmed edge, regardless of whether or not such edge is coated with a protective coating material.

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 the material advantages, the forms hereinbefore described being merely preferred embodiments thereof.

We claim:

1. An easy-open container component comprising:

a panel portion having an aperture therein, and a rim and an edge defining the aperture,

an internal sealing membrane bonded to the underside of said panel and sealing said aperture, and

a two-position pull tab having a flange vertically spaced from said rim, and a plug member including a side wall, and a bottom wall, said bottom wall being positioned within said aperture so that its undersurface is substantially planar to the underside of said panel portion, and is bonded to a portion of said sealing membrane through said aperture, said pull tab being adapted to be pulled upwardly to cut said sealing membrane along said edge when said pull tab is removed from said panel portion, and said side wall being adapted to be pressuredly sealingly engaged by said edge when said plug member is pressed into a second position within said aperture whereby said undersurface of said bottomwall is below the underside of said panel portion and whereby said pull tab serves as a reclosure.

2. The container component of claim **1** wherein said rim is disposed in substantially the same plane as said panel portion.

3. The container component of claim **1** wherein said rim is a raised substantially arcuate bead and said edge faces downward.

4. The container component of claim **3** wherein said downwardly facing edge is disposed above the level of the adjacent inner surface of said panel.

5. The container component of claim **3** wherein said membrane is gas impermeable.

6. The container component of claim **5** wherein said membrane includes a layer of foil.

7. The container component of claim **5** wherein said membrane is thermoplastic.

8. The container component of claim **1** wherein said pull tab is an injection molded plastic piece formed with an integral pull handle element.

9. The container component of claim **1** wherein said side wall is tapered inwardly from top to bottom and the upper portion of said sidewall is larger than said aperture and is pressuredly sealingly engaged by said edge when said plug member is pressed into said second position to permit said pull tab to serve as a reclosure.

10. The container component of claim **2** wherein said side wall is tapered inwardly from top to bottom and the upper portion of said sidewall is larger than said aperture and is pressuredly sealingly engaged by said edge when said plug member is pressed into said second position to permit said pull tab to serve as a reclosure.

11. The container component of claim **3** wherein said side wall is tapered inwardly from top to bottom and the upper portion of said sidewall is larger than said aperture and is pressuredly sealingly engaged by said edge when said plug member is pressed into said second position to permit said pull tab to serve as a reclosure.

12. The container component of claim **8** wherein said side wall is tapered inwardly from top to bottom and the upper portion of said sidewall is larger than said aperture and is pressuredly sealingly engaged by said edge when said plug member is pressed into said second position to permit said pull tab to serve as a reclosure.

13. An easy-open container component comprising:

a panel portion having an aperture therein, and a raised substantially arcuate, beaded rim and a downwardly facing edge, said edge being disposed above the level of the adjacent inner surface of said panel and defining the aperture,

a metallic foil sealing membrane bonded to the underside of said panel and sealing said aperture, and

a two-position, molded, plastic pull tab having a flange vertically spaced above the uppermost portion of said rim, and a plug member including a side wall and a bottom wall, said bottom wall being positioned within said aperture, and having its undersurface substantially planar to the underside of said panel portion and bonded to a portion of said sealing membrane through said aperture, said pull tab being adapted to being pulled upwardly to cut said sealing membrane along said edge when said pull tab is removed from said panel portion, and said side wall being tapered inwardly from top to bottom and being adapted to be pressuredly engaged by said edge when said plug member is pressed into a second position within said aperture whereby said undersurface of said bottom-wall is below the underside of said panel portion and whereby said pull tab serves as a reclosure.

14. The container component of claim **13** wherein the upper portion of said sidewall is larger than said aperture and is that portion of said side wall which is pressuredly sealingly engaged by said edge when said plug member is pressed into said second position whereby said pull tab serves as a reclosure.

15. The container component of claim **13** wherein said edge has corners and is inclined upwardly with respect to said aperture so that its bottom corner is closest to said sealing membrane and functions as a knife-like cutting edge when said sealing membrane is pulled upwardly against it, when said pull tab is removed from said panel portion.

16. The container component of claim **15** wherein said edge is inclined upwardly and inwardly from said bottom corner so that said top corner is closest to said plug member is inserted into said aperture to thereby permit said pull tab to serve as a reclosure.

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