

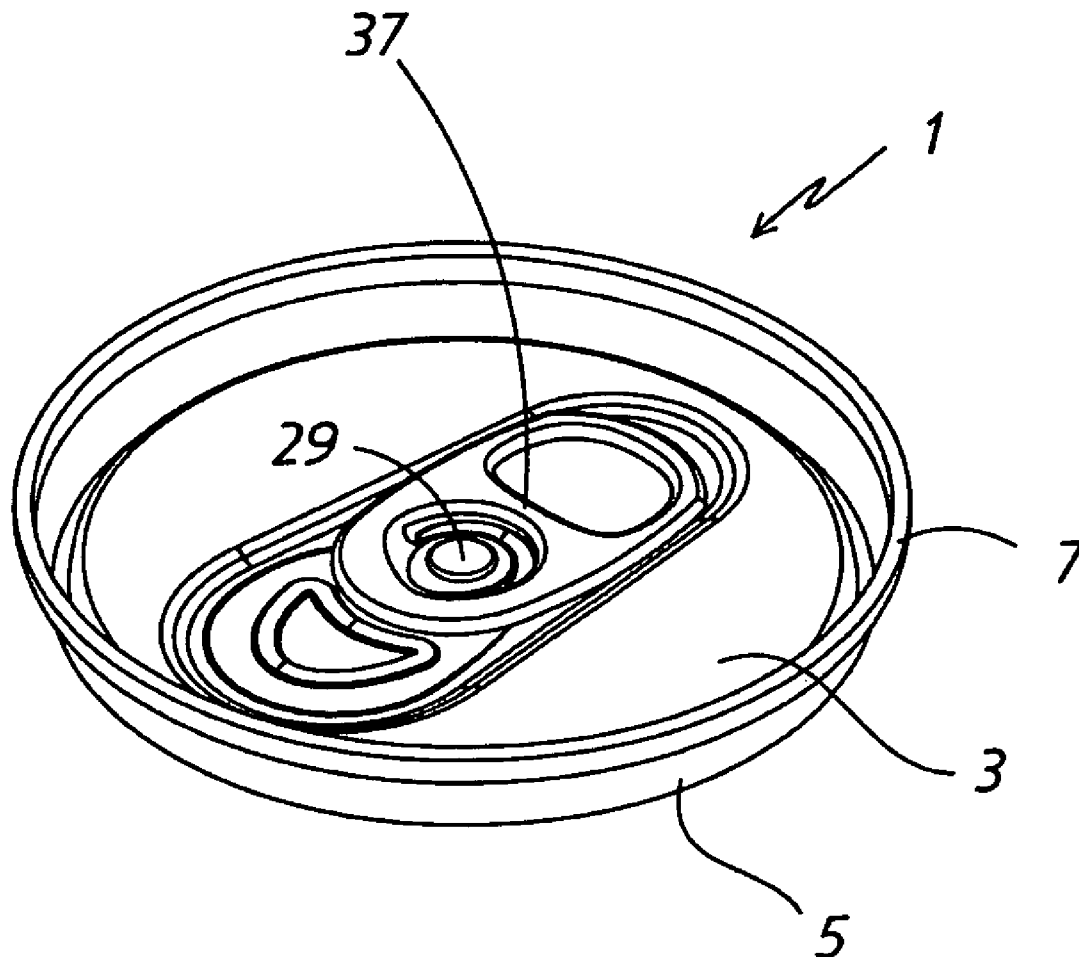


US 20070108208A1

(19) **United States**(12) **Patent Application Publication**
Dickie(10) **Pub. No.: US 2007/0108208 A1**(43) **Pub. Date: May 17, 2007**(54) **CONTAINER END CLOSURE WITH PULL
TAB**(52) **U.S. Cl. 220/269; 220/906**(75) **Inventor: Robert G. Dickie, Newmarket (CA)**(57) **ABSTRACT**

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An easy opening end closure for a container has a central panel with a tear panel defined by a score line. A pull tab is attached by a rivet to the central panel and has a nose end for engaging the tear panel and an opposite lift end for pivoting the tab about the rivet to fracture the score line. One or a pair of crescent-shaped protrusions are formed on the central panel closely adjacent to and rearwardly of the rivet to reduce the lift force required to initially lift the lift end of the tab to start the fracturing of the score line. The protrusions are concentric to each other and partially circumscribe the rivet and are located beneath the pull tab or within openings of the pull tab to avoid interference with can making equipment and with the pull tab. The protrusions provide greater flexibility to the area of the central panel adjacent the rivet to enable the rivet to pull slightly upwards from the panel at the start lifting the lift end of the tab.

(73) **Assignee: SPARKTAB INC., King City (CA)**(21) **Appl. No.: 11/274,519**(22) **Filed: Nov. 15, 2005****Publication Classification**(51) **Int. Cl.**
B65D 17/34 (2006.01)

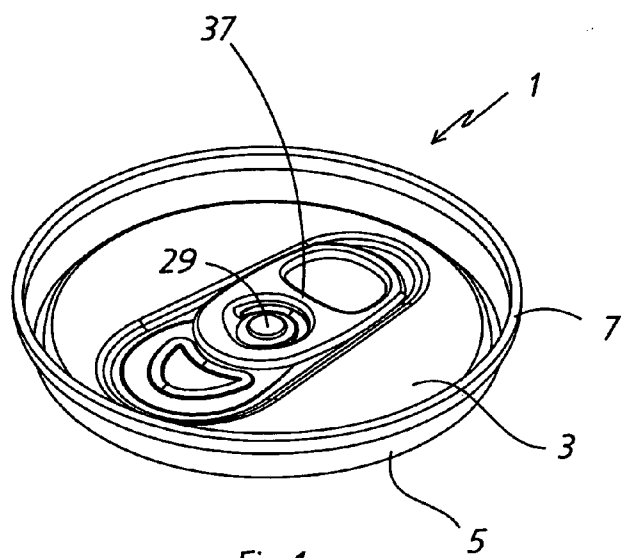


Fig. 1

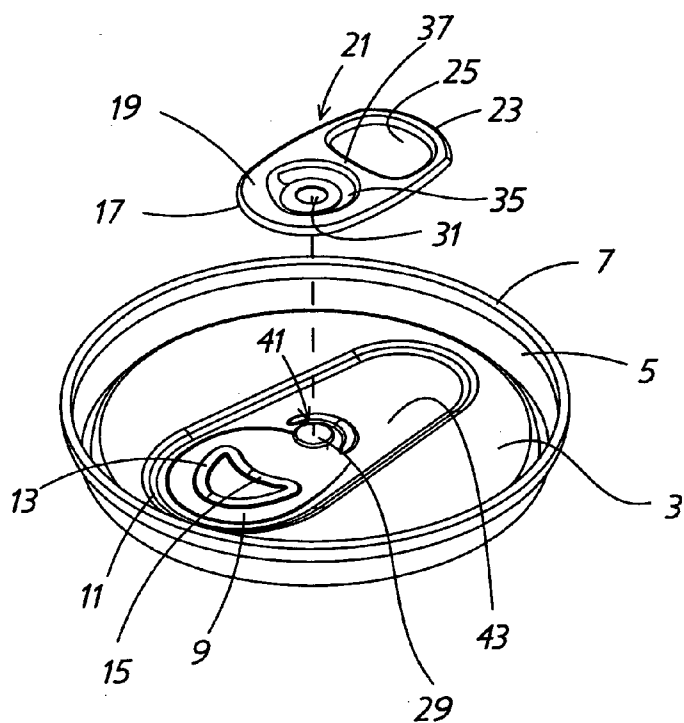


Fig. 2

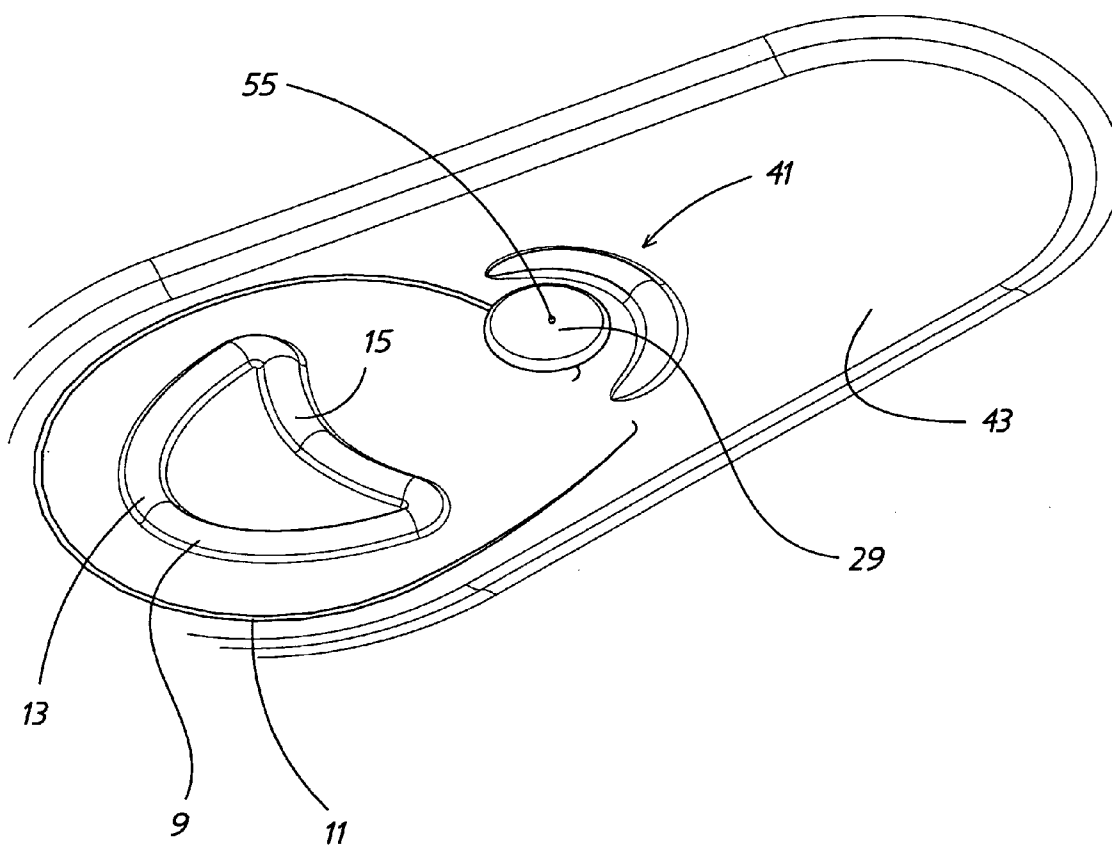


Fig. 3

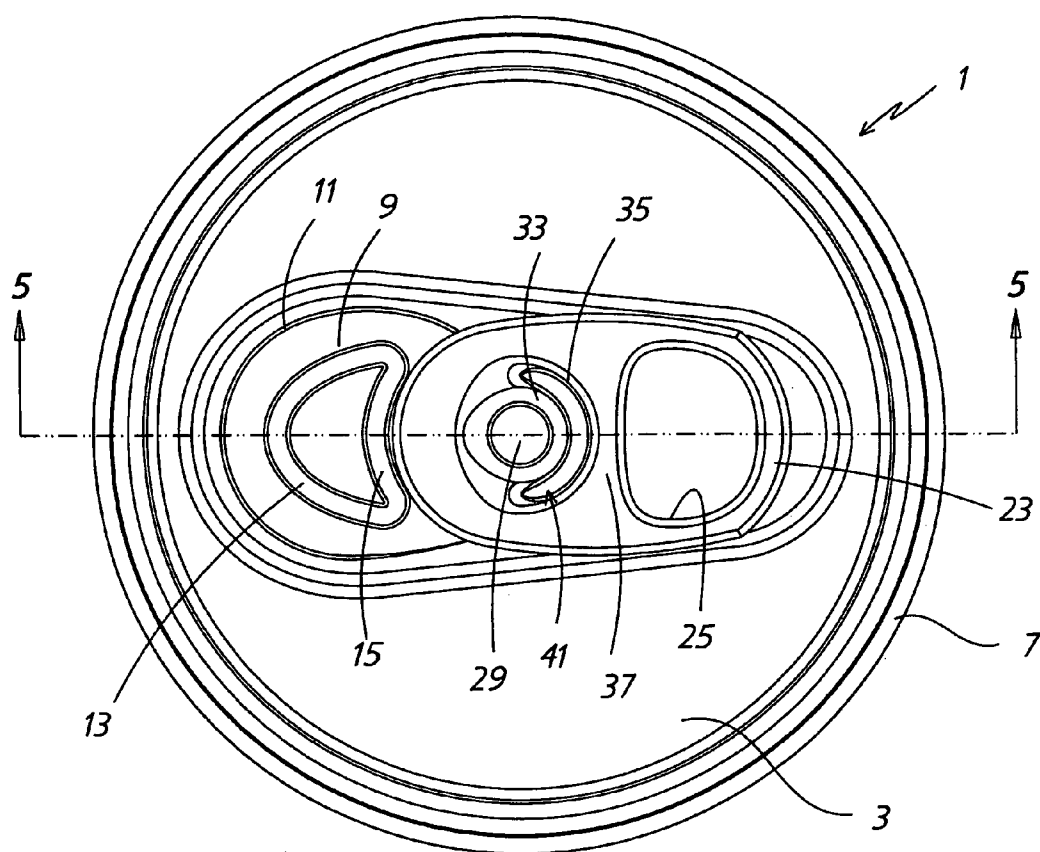


Fig. 4

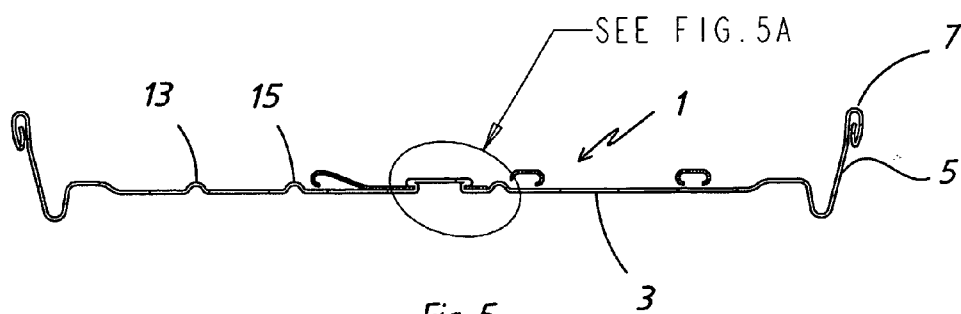


Fig. 5

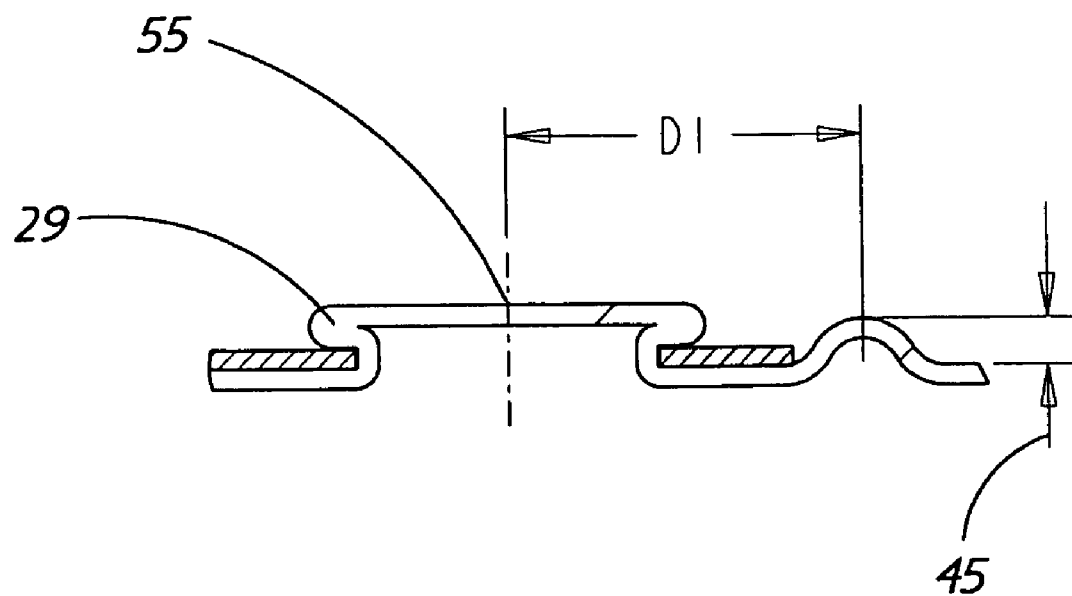


Fig. 5A

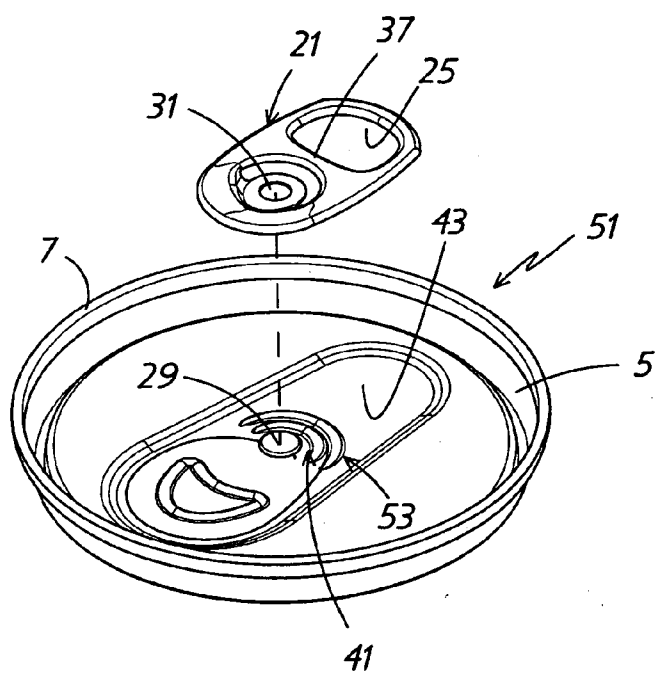
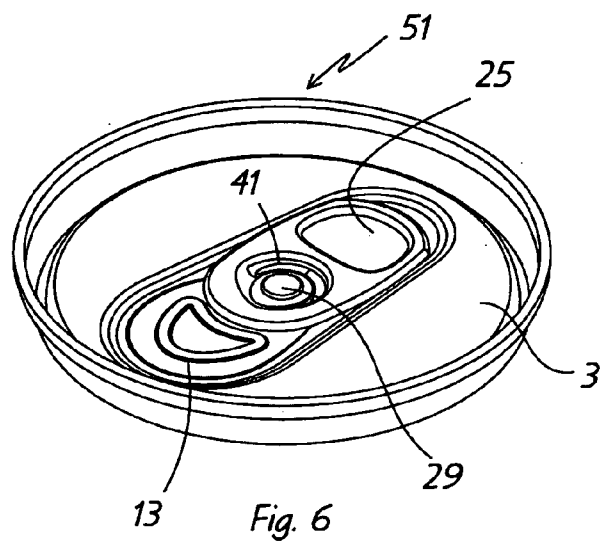
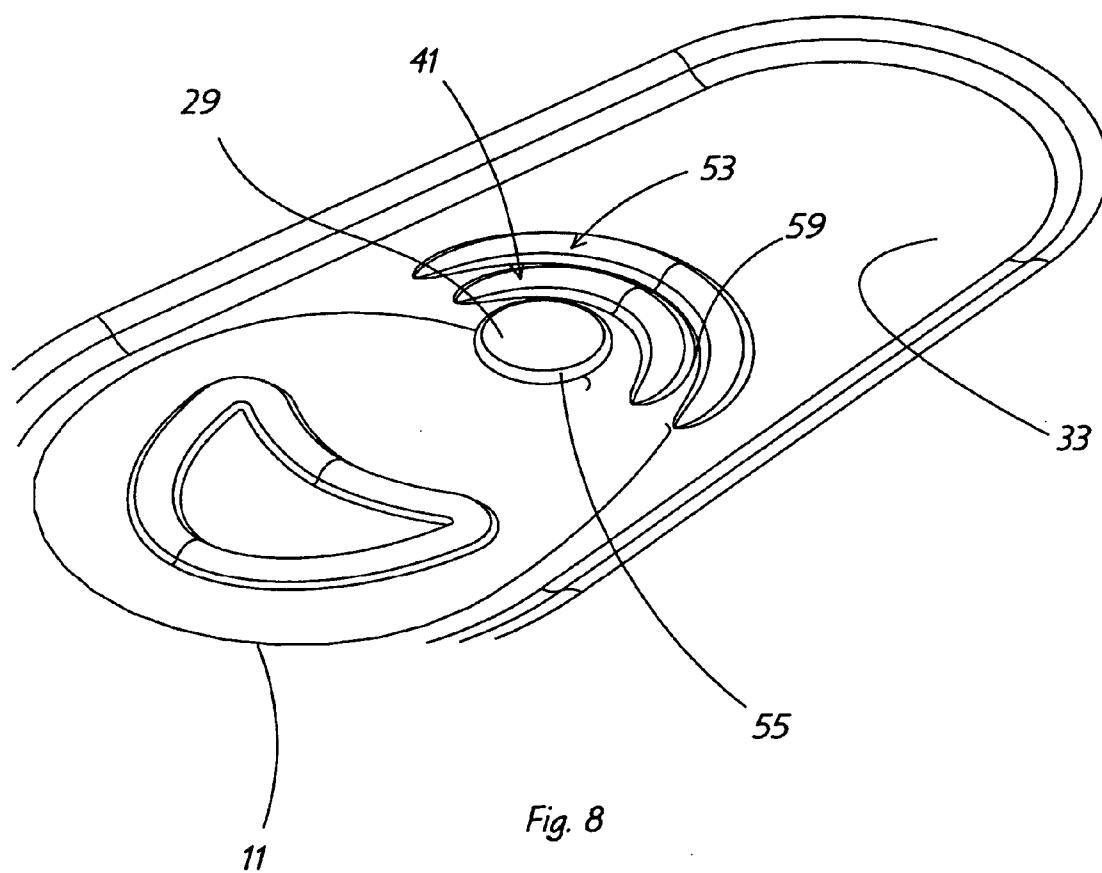


Fig. 7



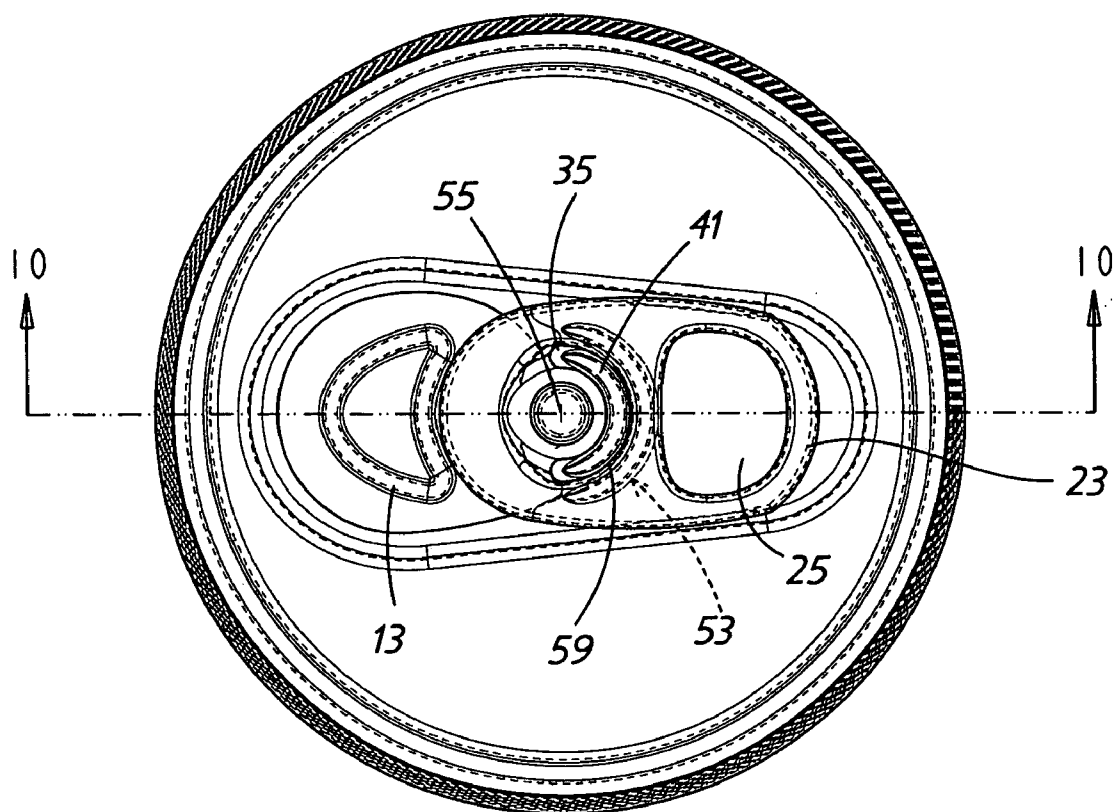


Fig. 9

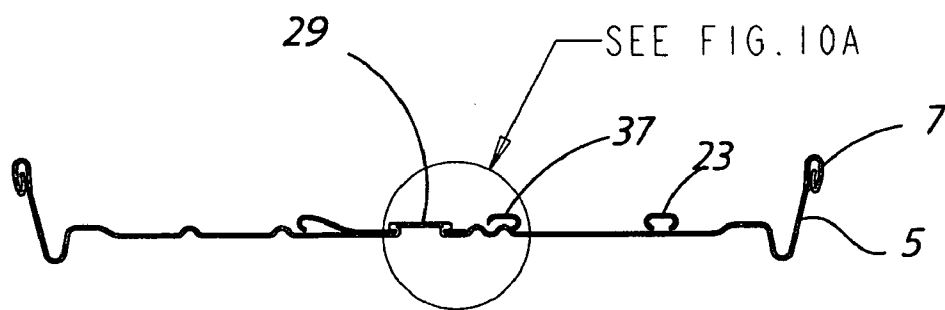


Fig. 10

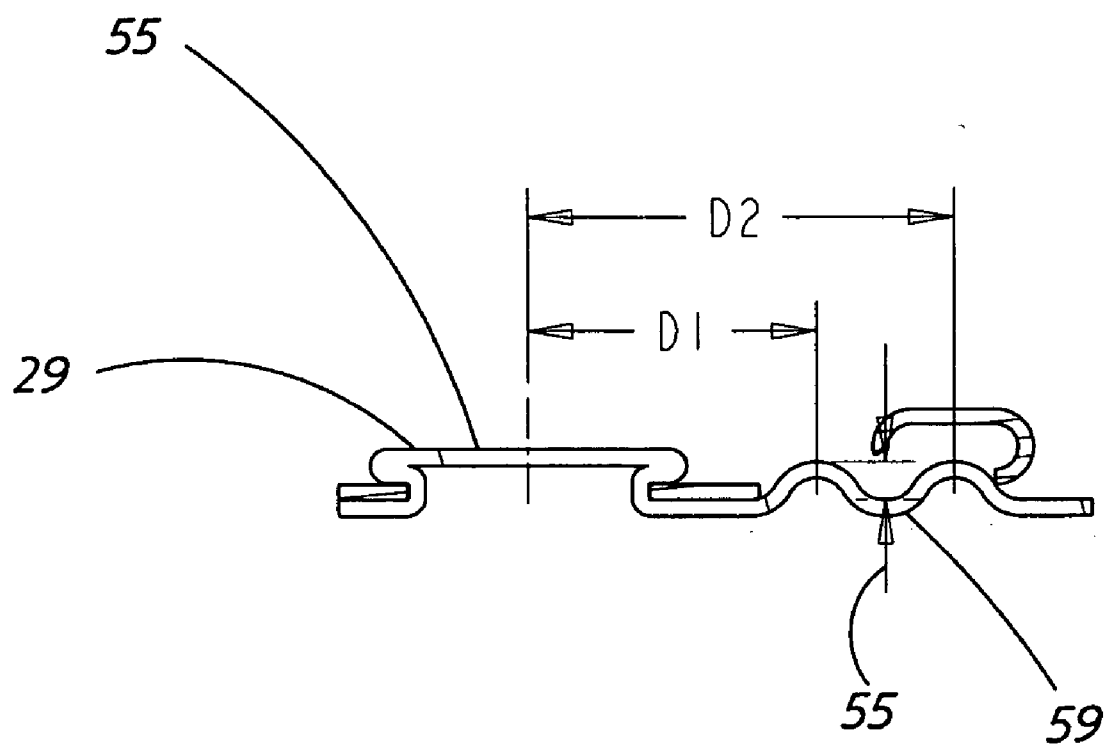


Fig. 10A

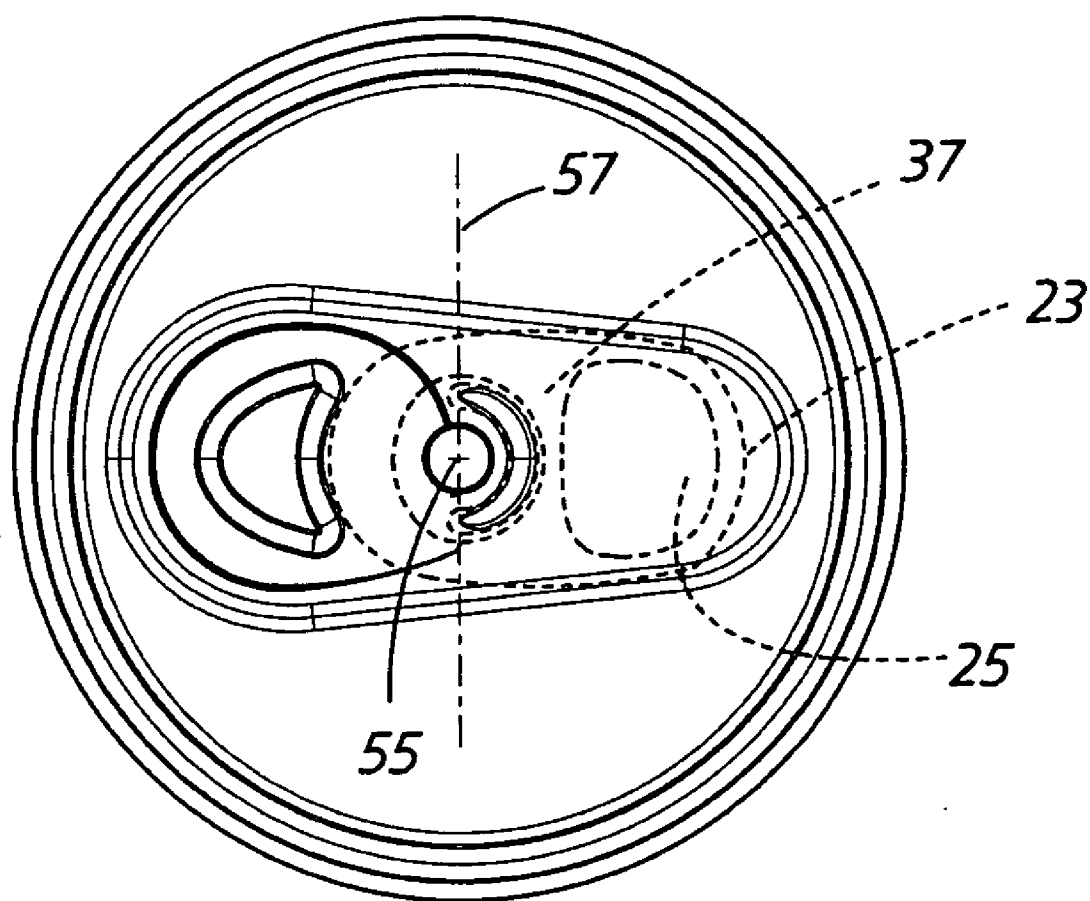


Fig. 11

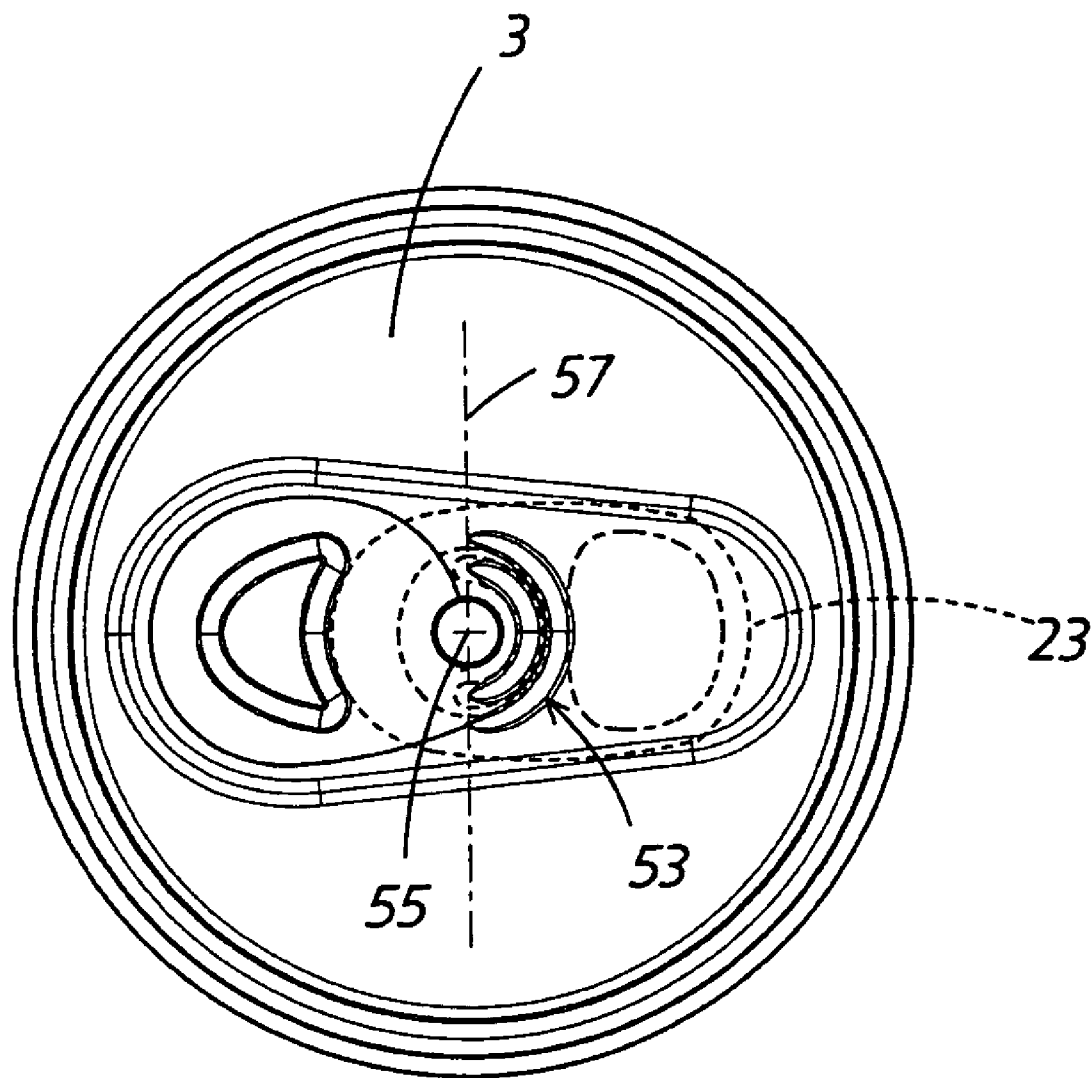


Fig. 12

CONTAINER END CLOSURE WITH PULL TAB

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The invention relates to containers and pull tab openers therefore. In particular, the invention relates to a pull tab opener formed with one or more protrusions in the central panel portion of the end closure approximate the rivet which reduce the force required to lift up the back end of the tab for subsequent breakage of the frangible panel from the end closure.

[0003] 2. Background Information

[0004] Millions of aluminum containers are produced each year, usually for storing beverages. These containers have a pull tab for separating a tear panel from the central panel of the end closure to provide access to the contents of the container. These pull tabs are attached to the central panels of the end closures by rivets which are usually formed integral with the end closure. At one side of the rivet opposite the outer end of the pull tab, is a scored opening which is a push-in closure which seals the can and withstands the internal pressure. The push-in closure or tear panel is opened by lifting the outer end of the tab and pulling upward so as to pivot the tab about the rivet. This tends to deform the central panel of the end closure with the nose of the pull tab breaking the frangible panel away from the central panel. Free lift is referred to in the container art as the force required to lift up the back of the tab until the tab nose begins to press down on the frangible panel. This free lift is an ergonomic feature to allow one to get the end of ones finger under the tab end for leverage for lifting the tab and breaking the frangible panel. Experience shows that this free lift is not as easy as desired in the container industry, and that numerous attempts have been made to reduce this free lift force without weakening the end closure and components thereof. Furthermore, the tabs must sit tight to the lids during can manufacturing to prevent interference with the canning equipment and must stay properly aligned for subsequent breakage of the frangible panel.

[0005] The ability to lift up the rear of the tab with less force is a long time goal of the can industry. With up to 90 PSI inside some container cans and the varying thin walls, the container is very optimized. Numerous end closure modifications have been made for accomplishing this function with modified and articulate tabs. Examples of these prior art container end closures with pull tabs which attempt to reduce the free lift are shown in U.S. Pat. Nos. 6,050,440, 6,234,336, 6,405,889, 6,575,325, and 6,889,862. Although some of the can end closures of these prior art patents may be satisfactory in reducing the free lift, the present invention is believed to provide for an enhanced container end closure which reduces the free lift force in a simple and effective manner without materially changing the usual construction of the end closure, and which avoids any adverse effect during can end manufacture and subsequent attachment of the end closure to a filled container.

BRIEF SUMMARY OF THE INVENTION

[0006] One aspect of the present invention is to provide a container end closure primarily for beverage containers, in which one or two C-shaped or crescent-shaped protrusions

are formed in the central panel of the end closure located closely adjacent about the rear of the rivet, which protrusions will lessen the free lift forces required to lift the rear end of the tab, enabling the tab end to more easily be raised up and then pivoted about the rivet, whereby the nose of the tab engages the frangible panel.

[0007] A further aspect of the present invention is to arrange the crescent-shaped protrusions concentrically with respect to each other and concentrically about the rivet, with each of the protrusions having an arcuate length of approximately 180°, and in which the ends of the protrusions lie on an imaginary line extending through the center of the tab rivet.

[0008] A still further feature of the present invention is to form the crescent-shaped protrusions whereby the top center of the first protrusion is approximately 0.20 inches from the center of the rivet with the top center of the second protrusion lying approximately 0.25 inches from the center of the rivet, which distances are closer than the heretofore prior art protrusions and indentations to facilitate the pulling up of the rivet from the central panel to lessen the free lift forces and allow the rear of the tab to be more easily raised up prior to the nose of the rivet engaging the frangible panel.

[0009] A further feature of the present invention is to provide the crescent-shaped protrusions with a height of approximately 0.010 inches when the thickness of the end panel metal, when formed of aluminum, is approximately 0.007 inches.

[0010] A further feature of the invention is that the location of a first and/or second protrusion is either within an opening of the pull tab or beneath the pull tab to prevent interference with the can manufacturing equipment and to permit the tab to lay relatively flat against the end panel.

[0011] These features and advantages are obtained by the easy opening end closure of the present invention, the general nature of which may be stated as comprising: a central panel having a product side and a public side and a tear panel defined by a score line wherein said tear panel is to be at least partially separated from the central panel to form an opening in said end closure; a rivet disposed on the central panel; a pull tab hingedly secured to the rivet, said pull tab having a nose at one end overlying the tear panel and a lift end on an opposing end, at least one opening formed in the opposing end of the pull tab; and a first crescent-shaped protrusion formed in the central panel proximate the rivet and disposed under either the lift end of the tab or within the opening formed therein.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0012] Preferred embodiments of the invention, illustrative of the best modes in which Applicant contemplates applying the principles, are set forth in the following description and are shown in the drawings and are particularly and distinctly pointed out and set forth in the appended claims.

[0013] FIG. 1 is a top perspective view of the container end closure with the pull tab secured thereon.

[0014] FIG. 2 is an exploded perspective view of FIG. 1 showing the pull tab removed from the end panel.

[0015] FIG. 3 is an enlarged fragmentary top perspective view of the end panel with the pull tab removed.

[0016] FIG. 4 is an enlarged top plan view of the end panel and pull tab as shown in FIG. 1.

[0017] FIG. 5 is a sectional view taken on line 5-5, FIG. 4.

[0018] FIG. 5A is a greatly enlarged fragmentary view of the encircled portion of FIG. 5.

[0019] FIG. 6 is a top perspective view of a second embodiment of the container end closure.

[0020] FIG. 7 is an exploded perspective view of FIG. 6 with the pull tab removed from the end panel.

[0021] FIG. 8 is an enlarged fragmentary top perspective view of the second embodiment of FIG. 6 with the pull tab removed from the end panel.

[0022] FIG. 9 is an enlarged top plan view of the end panel and pull tab as shown in FIG. 6.

[0023] FIG. 10 is a sectional view taken on line 10-10, FIG. 9.

[0024] FIG. 10A is a greatly enlarged fragmentary view of the encircled portion of FIG. 10.

[0025] FIG. 11 is a top plan view of the first embodiment of FIGS. 1-5 with the pull tab shown in dot dashed lines on the end panel.

[0026] FIG. 12 is a top plan view of the second embodiment of FIGS. 6-10 with the pull tab shown in dot dashed lines on the end panel.

[0027] Similar numbers refer to similar parts throughout the drawings.

DETAILED DESCRIPTION OF THE INVENTION

[0028] A first embodiment of the improved container end closure of the present invention is indicated generally at 1, and is shown in FIGS. 1-7 and 11. End closure 1 includes a central panel 3 having a generally circular shape which includes a circumferentially extending raised side wall 5 having an edge 7 for attaching end closure 1 to a suitable cylindrical container (not shown) in a manner well-known in the art.

[0029] In a preferred embodiment, end closure 1 will be formed of aluminum with central panel 3 having a thickness of approximately 0.007 inches. A usual tear panel 9 is formed in central panel 3 and defined by a frangible score line 11. Tear panel 9 includes a usual curved D-shaped protrusion 13 having an inner curved portion 15 which closely aligns with the curved outer end 17 of tab nose 19 of a usual pull tab, indicated generally at 21. Tab 21 is of a usual construction well-known in the beverage can art, having nose 17 and a rear curved lift end 23. Lift end 23 is grasped by a user which positions their fingers under the end and partially into an adjacent circular opening 25. The opposite end of the pull tab includes nose 19 which is used to drive the tear panel 9 downwardly when the pull tab lift end 23 is pulled upwardly and hingedly pivots tab 21 about a pull tab rivet 29.

[0030] Rivet 29 is formed integrally in central panel 3 and is attached to tab 21 by usual metal staking operation as it extends through a circular hole 31 formed in a forward end of tab 21. Hole 31 is formed in an arcuate-shaped hinge portion 33 which is partially circumscribed by an arcuate-shaped cutout 35 formed in tab 21. Furthermore, arcuate cutout 35 is separated from tab opening 25 by a solid material cross member 37 of pull tab 21. This pull tab attachment construction is well-known in the container end closure art and thus is not described in further detail.

[0031] In accordance with the main feature of the present invention, a generally C-shaped or crescent-shaped protrusion or depression, hereinafter referred to as protrusion 41, is formed in central panel 3, and in particular in the oval-shaped recessed portion 43 of central panel 3 in which the pull tab tear panel, score line and other components of the easy opening can end tab are located.

[0032] Protrusion 41 preferably has an arcuate length in the range of from 140° to 180° and partially circumscribes rivet 29. Protrusion 41 preferably has an arcuate length of 180°. The ends of protrusion 41 as shown in FIG. 11, lie on an imaginary line 57 which extends through midpoint 55 of rivet 29. In the preferred embodiment, protrusion 41 has a height 45 as shown in FIG. 5A which is approximately 0.010 inches when the thickness of central panel 3 is approximately 0.007 inches. Furthermore, in accordance with one of the unique features of the present invention, the top center midpoint of protrusion 41 lies a distance indicated at D1, from the top center midpoint 55 of rivet 29, approximately 0.20 inches. It has been found that locating protrusion 41 closely adjacent and rearward of rivet 29 with respect to tab nose 19 this distance D1 provides the desired results, that is, a lowering of the lift force required to lift rivet end 23 upwardly from its at rest position to begin the initial upward movement of rivet 29 closely followed by the downward movement of tab nose 19 to fracture score line 11.

[0033] A modified enclosure is indicated generally at 51, and is shown in particular in FIGS. 6-10 and 12. Enclosure 51 is similar in many respects to that of end closure 1, and thus is not described in further detail except for the addition of a second protrusion 53. Protrusion 53 has a similar C-shape or crescent-shape configuration as protrusion 41 and is located concentrically with respect to protrusion 41 as shown in FIG. 8. Protrusion 53 also extends throughout an arc of 180° and the ends thereof lie on the same imaginary line 57 as do the ends of protrusion 41 as best shown in FIG. 12. As shown in FIG. 10, protrusion 53 has a height 55 which preferably is the same as height 45 of protrusion 41, that is, 0.010 inches when central panel 3 has a thickness of approximately 0.007 inches. Furthermore, in accordance with the invention, the top center midpoint of protrusion 53 is located a distance D2, approximately 0.25 inches from the top midpoint of rivet 29, as shown in FIG. 10A.

[0034] In accordance with still another feature of the present invention, inner protrusion 41 lies completely within arcuate cutout 35 of tab 21, as shown in FIGS. 4 and 9, with outer protrusion 53 lying beneath the solid material cross member 37 of pull tab 21 as shown in FIGS. 9 and 12. This prevents either of the protrusions from coming into contact with the various tab-staking equipment and transfer mechanisms used when forming end closures 1 and 51, and the subsequent equipment used for seaming the end closures

onto a filled container. It also enables the pull tab to remain relatively flat against the central panel as is required for use with existing can manufacturing equipment.

[0035] It has been found that the location of protrusion **41** and the pair of protrusions **41** and **53** at the relatively close locations rearwardly of tab **29**, that is, a distance of approximately 0.20 inches and 0.25 inches respectively, and their concealment and protection within arcuate cutout **35** and beneath tab cross member **37**, provides for reduction in the free lift force and prevents the protrusions from hampering the use of existing can-making equipment, enabling the tab to remain in its designed flat condition within recess **43** of the end closure. Thus, protrusion **41** and the pair of protrusions **41** and **53**, enables the rivet to lift upwardly more easily thereby lessening the free lift force on tab end **23**, allowing the rear of the tab to be more easily raised up followed by the subsequent engagement of the nose end of the tab against the tear panel than believed heretofore possible with existing pull tabs having various types of projections and protrusions formed in the end panel adjacent the rear of the rivet.

[0036] Furthermore, as shown in the drawings, protrusions **41** and **53** have substantially flat top outer surfaces and are separated by a substantially flat arcuate surface portion **59** of central panel **3**. Also, protrusions **41** and **53** are formed independently on central panel **3** and are free of any connecting members or portions therebetween, except for arcuate portion **59**.

[0037] In the foregoing description, certain terms have been used for brevity, clearness, and understanding. No unnecessary limitations are to be implied therefrom beyond the requirement of the prior art because such terms are used for descriptive purposes and are intended to be broadly construed.

[0038] Moreover, the description and illustration of the invention is an example and the invention is not limited to the exact details shown or described.

1. An easy open end closure for a container comprising:

a central panel having a product side and a public side and a tear panel defined by a score line wherein said tear panel is to be at least partially separated from the central panel to form an opening in said end closure;

a rivet disposed on the central panel;

a pull tab hingedly secured to the rivet, said pull tab having a nose at one end overlying the tear panel and a lift end on an opposing end,

a crescent-shaped opening formed in the top surface of the pull tab adjacent the rivet; and

one of a first crescent-shaped protrusion and depression formed in the central panel proximate the rivet and disposed within the crescent-shaped opening formed therein.

2. The end closure defined in claim 1 wherein the pull tab opening includes a pair of openings including an arcuate inner opening and an outer opening separated by a cross member.

3. The end closure defined in claim 2 including one of a second crescent-shaped protrusion and depression formed in

the central panel located concentrically with respect to the first protrusion and lying beneath the cross member of the pull tab.

4. The end closure defined in claim 3 wherein the second protrusion is located a distance of approximately 0.25 inches from the rivet measured between the center of the rivet and the top center of said second protrusion.

5. The end closure defined in claim 3 wherein the first and second protrusions partially circumscribe the rivet, each of the protrusions having terminal ends, said ends lying on an imaginary line extending through the midpoint of the rivet.

6. The end closure defined in claim 2 wherein the first protrusion lies substantially within the inner arcuate opening.

7. The end closure defined in claim 3 wherein the first and second protrusions have equal heights of approximately 0.010 inches.

8. The end closure defined in claim 3 wherein the first and second protrusions are separated by a substantially flat arcuate area of the end panel.

9. The end closure defined in claim 3 in which the first and second protrusions have generally flat outer top surfaces; and in which said protrusions are free of connecting member therebetween.

10. The end closure defined in claim 3 wherein the second protrusion has an arcuate length in the range of from 140° to 180°.

11. The end closure defined in claim 1 wherein the end closure is formed of sheet aluminum and the central panel has a thickness of approximately 0.007 inches.

12. The end closure defined in claim 1 wherein the first protrusion has a height of approximately 0.010 inches.

13. The end closure defined in claim 1 wherein the first protrusion has an arcuate length in the range of from 140° to 180°.

14. The end closure defined in claim 1 wherein the first protrusion lies a distance of approximately 0.20 inches from the rivet measured between a center of the rivet and a top center of the protrusion.

15. An easy open end closure for a container comprising:

a central panel having a tear panel defined by a score line wherein said tear panel is to be at least partially separated from the central panel to form an opening in said end closure;

a rivet disposed on the central panel;

a pull tab hingedly secured to the rivet, said pull tab having a nose at one end overlying the tear panel and a lift end on an opposing end; and

first and second crescent-shaped protrusions formed in the central panel between the rivet and lift end of the tab, said protrusions being concentric to each other and partially circumscribe the pull tab rivet, said first and second protrusions lying a distance from the rivet measured between a center of the rivet and a top center of said protrusions of approximately 0.20 inches and 0.25 inches, respectively.

16. The end closure defined in claim 15 wherein the first and second protrusions partially circumscribe the rivet, each of the protrusions having terminal ends, said ends lying on an imaginary line extending through the midpoint of the rivet.

17. The end closure defined in claim 15 wherein each of the protrusions have an arcuate length in the range of from 140° to 180°.

18. The end closure defined in claim 15 wherein each of the protrusions have a height of 0.010 inches.

19. The end closure defined in claim 15 wherein the lift end of the pull tab is formed with an outer opening to facilitate lifting of the tab to fracture the score line with the nose of the tab, and has an inner arcuate opening in which

the rivet is located, said inner and outer openings being separated by a cross member; and in which the first protrusion lies substantially within the inner opening and the second protrusion lies substantially under the cross member.

20. The end closure defined in claim 15 wherein the first and second protrusions are separated by a substantially flat arcuate area of the end panel.

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