

[54] FULL-OPEN END WITH CAMBERED TAB

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[51] Int. Cl. B65d 17/20

[58] Field of Search 220/54, 27, 48, 53

[56] References Cited

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[57] ABSTRACT

An improvement in a can end closure having a sub-

stantially flat, imperforate central wall with a peripheral flange adapted to be interfolded with an edge flange of a can body to form a double-seam whose top portion is disposed above the central wall, a peripheral score defining a removable panel in the central wall, and an opening tab having a nose portion at the outer end adjacent the peripheral score and a handle portion at the inner end thereof, said tab being secured to the removable panel by a securement adjacent the nose portion. The improvement inhibits the raising of the tab when internal pressure is applied to the can and comprises a chamber and stress in the tab extending from at least about the securement to about the handle portion and a corresponding raised area of stress in the panel disposed beneath the cambered area of the tab. The stress in the raised area of the panel is caused by the cambered tab, after its being fastened to the panel, seeking to revert to its unstressed position existing prior to its fastening to the panel.

8 Claims, 5 Drawing Figures

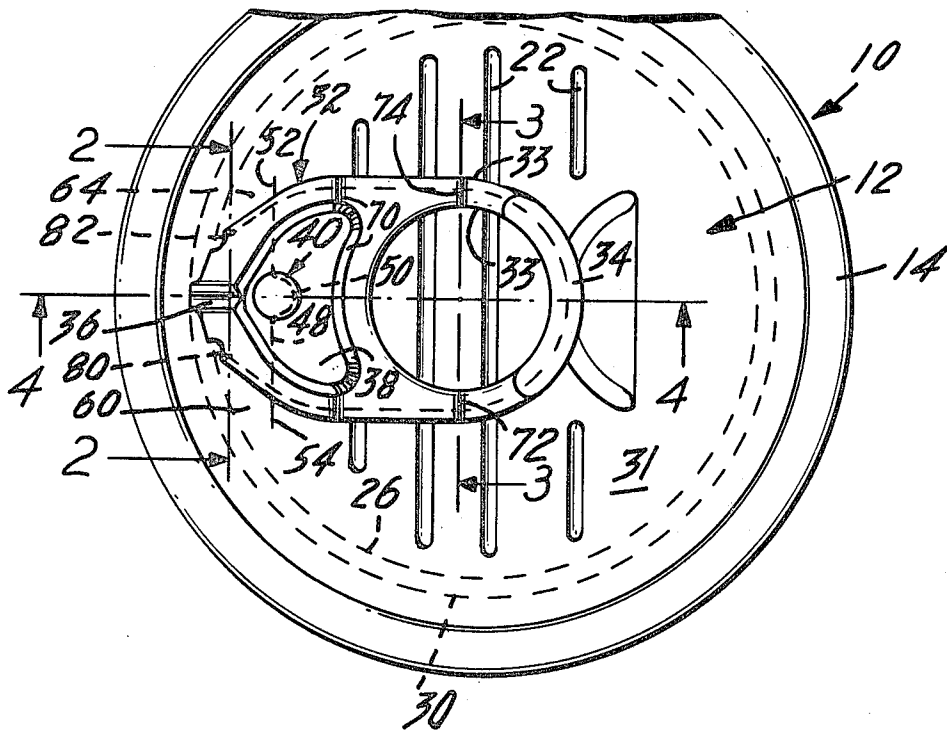


FIG. 1

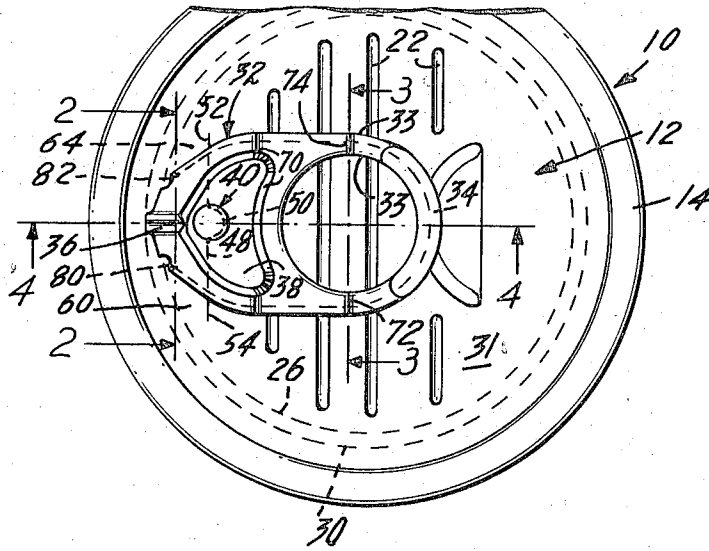


FIG. 2

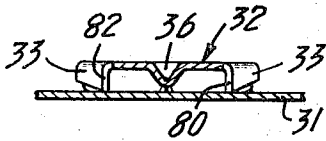


FIG. 3

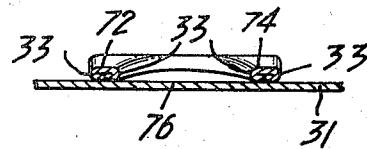


FIG. 4

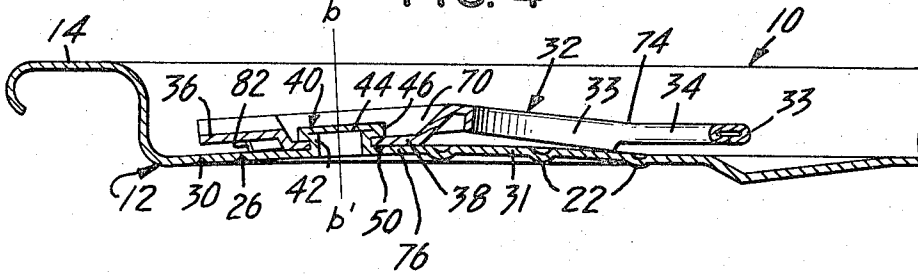
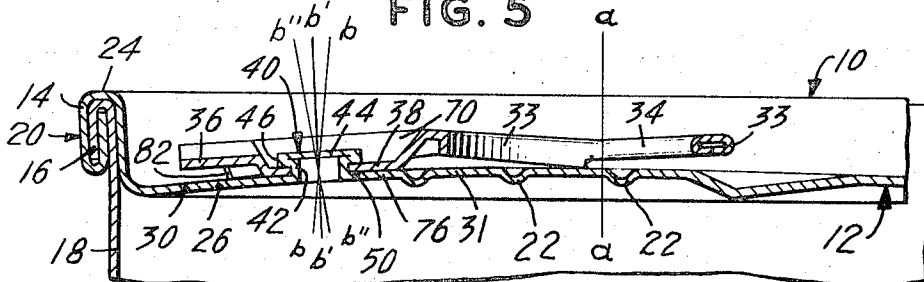


FIG. 5



FULL-OPEN END WITH CAMBERED TAB

BACKGROUND OF THE INVENTION

The instant invention relates to full open ends, and more particularly to full open ends having a tab secured to a removable panel portion of the end.

One form of self-opening can which is in wide use today is the "full-open" can in which a peripheral score, generally circular in configuration, is formed in the end panel at or adjacent the periphery thereof to permit its complete removal. "Full-open" cans are to be distinguished from those self-opening cans which have a comparatively small removable section, which when separated, provide a comparatively small aperture for dispensing the product. The latter are generally appropriate for packaging beer, other beverages and other liquids which are to be poured from the container.

Full-open cans, on the other hand, are suitable for packaging solid products which are customarily removed by inserting a hand or a spoon or a measuring cup into the container and for products which require a large opening if they are to be removed without mutilation. Candy, shell nuts, meats, ground coffee, solid or chunky products such as processed frozen vegetables, fruits, frozen fruit juices, sausages and other meat products are examples of products which are suitable for packaging in full-open cans.

In the construction of the full-open end, an opening tab is positioned close enough to the peripheral score so that when its inner end is rocked upwardly to cause its outer end to move downwardly and exert a downward force on the end panel at or near the peripheral score, a portion of the end panel is bent downwardly to initiate rupture of the peripheral score. Thereafter an upward and backward pull on the opening tab by the user induces tearing of the metal in the score on both sides of the area of initial rupture to effect the complete detachment from the end of the removable section of the end which is defined by the peripheral score.

In the development of the present type of full-open end, several problems have appeared. One of these has been that in the course of manufacture of the end, various strains are introduced into the end which cause slack or loose metal to accumulate. After the end is double-seamed onto the can body, the closed can is generally subjected to increased pressure within the can which distorts the end outwardly, causing the inner portion of the opening tab to rise above the double-seam. The raised tabs are subsequently liable to catch on various components of the canning apparatus as the can is conveyed therethrough, resulting not only in broken tabs but jams as well. These resultant problems can be avoided if the slack in the can end is eliminated or controlled. The instant invention employs a modification of the tab and stresses in the tab and end panel to take up or accommodate the loose metal introduced into the end during its manufacture.

SUMMARY OF THE INVENTION

The instant invention provides an improvement in a can end closure having a substantially flat, imperforate central wall with a peripheral flange adapted to be interfolded with an edge flange of a can body to form a double seam whose top portion is disposed above the central wall, a peripheral score defining a removable

panel in the central wall and an opening tab having a nose portion at the outer end adjacent the peripheral score and a handle portion at the inner end thereof, said tab being secured to the removable panel by a securement adjacent the nose portion. The improvement comprises a camber and stress in the tab extending from at least about the securement to about the handle portion and a corresponding raised area of stress in the panel disposed beneath the cambered area of the tab.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a full open end of the instant invention.

FIG. 2 is a sectional view taken on the vertical plane indicated by the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken on the vertical plane indicated by the line 3—3 of FIG. 1.

FIG. 4 is an enlarged sectional view taken on the vertical plane indicated by the line 4—4 of FIG. 1.

FIG. 5 is a partial, enlarged, vertical sectional view of the end shown in FIG. 1 after it has been double-seamed onto a can body and subjected to increased internal pressure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 1 and 4 of the drawings illustrate a can end closure indicated generally as 10, and made in accordance with the instant invention. Preferably, it is circular and made of aluminum, tin plate, or other rupturable material. The end closure 10 is formed with a substantially flat imperforate central wall 12 and has an edge curled peripheral flange 14 which is adapted to be interfolded with an edge flange 16 on a can body 18 to form a double seam 20 as shown in FIG. 5. The bottom end of the can body 18 is closed in any suitable manner, as by seaming a conventional end (not shown) thereto, or if desired, by an end wall (not shown) formed as an integral part of the body 18. As seen in FIG. 5, the top portion 24 of the double-seam 20 is disposed above the central wall 12.

At or adjacent the periphery of the central wall 12 is a peripheral score 30 which is indented into the metal and defines a removable panel 31 with parallel ribs 22, the panel 31 including most of the wall 12. Parallel and coextensive with the peripheral score 30 is an auxiliary score 26 of less depth and within the peripheral score 30. Positioned proximate to scores 30 and 26 and within the removable panel 31 is a stiff, non-bendable opening tab 32 having a curved peripheral edge 33, and at its inner end a handle portion 34. The opening tab 32 has at its outer end a nose portion 36, and a flat-web portion 38 which extends between the nose portion 36 and the handle portion 34.

The pull tab 32 is joined to the removable panel 31 by a suitable securement, preferably by a rivet 40 which is formed integral with the removable panel 31, and extends through a rivet hole in the flat-web portion 38 of the pull tab 32. The rivet 40 (see FIG. 5) has an annular side-wall 42 which merges at its top into a transverse wall 44 having about its periphery an annular bead 46 which extends over the flat-web portion 38 of the opening tab 32 to secure the opening tab 32 to the removable panel 31.

In the outer edge portion of the removable panel 31 (see FIG. 1) is a generally chordally extending ancillary score 48 having a curved central portion 50 which

passes immediately inward of the rivet 40. The score 48 also includes straight segments 52 and 54 which extend outwardly from the curved portion 50 and diametrically of the rivet 40. The metal between the ancillary score 48 and the peripheral score 30 forms a pivotable section 60.

Initial rupture of the ancillary score 48 occurs in its curved portion 50 during the first stage of the upward rock of the tab 32. Continued upward rocking movement of the tab 32 causes the tear to progress outwardly in opposite directions along the straight segments 52 and 54 of the ancillary score 48, thus freeing the major portion of the inner edge of the inner portion 64 of the pivotable section 60.

Further upward movement of the tab handle 34 brings the tab nose 36 into pressured engagement against the outer pivotable portion of section 60, with the outer edge of the nose 36 positioned just above or inwardly of the score 30 and thus initiates rupture of the peripheral score 30, and continued rocking of the opening tab 32 forward forces the outer pivotable section of section 60 out of the original horizontal plane of the removable panel 31 and causes the tear in the peripheral score 30 to extend laterally in opposite directions, thereby creating a free edge (not shown) at the outer edge of the section 60. As it is thus rocked, the outer portion of section 60 moves from a horizontal to an inclined (not shown) position.

The final step in the opening operation is an upward and backward pull on the opening tab to cause the tear in the peripheral score 30 to continue to extend in both directions around that score for 360 degrees to completely detach the removable panel 31 from the central wall 12, thus completing the opening of the can.

In the course of manufacturing the can end 10, slack or loose metal accumulates. The operations of scoring and rivet forming produce loose metal in the removable panel 31, especially in the rivet area, which is not completely removed even when the parallel ribs 22 are formed. After the can body 18 is filled with product and the end 10 is double-seamed onto the body 18, the filled can is often subjected to internal pressures, such as during sterilizing operations, which distort the end in a domed fashion as illustrated in FIG. 5. This doming action combined with the loose metal in the removable panel 31 causes the axis of the rivet 40 to rotate from its normal position *b*, parallel to the can axis *a*, to position *b'*. The rotation of the rivet axis causes the handle portion 34 of the tab 32 to move above the top portion 24 of the double-seam 20.

The instant invention overcomes this problem by rotating the rivets axis to position *b'* as soon as it is fastened to the removable panel 31. This is achieved by the use of a camber or bend 70, in the tab 32, extending from about the starts 80 and 82 of the curved peripheral edge 33 to the midpoints of the two opposing sides at 72 and 74 of the handle portion 34 of the tab 32. Only these four points of the tab 32 contact the removable panel 31. When the tab 32 is first formed it is made with more camber than what is illustrated in FIG. 4 which shows the tab 32 and the end 10 after they have been securely fastened together. Before the tab 32 is fastened to the end 10 the axis *b* of the rivet 40 is parallel to the can axis *a*. During the tab fastening operation the tab camber 70 is temporarily reduced (flattened) so that the tab 32 can be slipped over the rivet 40 while it is in normal axis position *b*. The transverse wall 44 of

the rivet 40 is then formed, securely fastening the tab 32 to the removable panel 31. During the fastening operation the elastic limit of the tab material is not exceeded. When the fastening operation is completed, the tab 32 is under stress and attempts to revert to its original, larger camber while still contacting the removable panel 31 at points 80, 82, 72 and 74, and in so doing rotates the axis of the rivet to position *b'* as shown in FIGS. 4 and 5. This takes up loose metal in the removable panel 31 and incorporates into the panel 31 a raised area of tension 76 corresponding to that area of the tab 32 which is encompassed by the four points defined above, and positions the rivet 40 and the tension area 76 of the removable panel 31 to better resist further movement when the can is pressurized as illustrated in FIG. 5. The camber 70 and stress introduced into the tab 70 by the fastening operation in the tab 32 is great enough so that in the unpressurized condition, shown in FIG. 4 the tab 32 does not return to its original "first formed" shape. When the can is pressurized as shown in FIG. 5, the rivet axis can rotate slightly from position *b'* to *b''* but the tab will still contact the removable panel 31 at points 80, 82, 72, and 74 owing to the sufficiently great camber 70 and stress. The tab 32 is thereby prevented from rising above the top portion 24 of the double seam 20 on a pressurized can.

It should be noted, however, that the invention still achieves the objective of preventing the tab 32 from rising above the double seam 20 even if the tab 32 does not make contact with the removable panel 31 at one or more of the points 80, 82, 72 and 74, as long as sufficient camber and stress are incorporated into the tab at 32.

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 its material advantages, and the form here and before described being merely a preferred embodiment thereof.

What is claimed is:

1. In a can end closure having a substantially flat, imperforate central wall with a peripheral flange adapted to be interfolded with an edge flange of a can body to form a double seam whose top portion is disposed above the central wall, a peripheral score defining a removable panel in the central wall, and an opening tab having a nose portion at the outer end adjacent the peripheral score and a handle portion at the inner end thereof, said tab being secured to the removable panel by a securement adjacent the nose portion, the improvement which comprises a camber and stress in the tab extending from at least about the securement to about the handle portion and a corresponding raised area of stress in the panel disposed beneath the cambered area of the tab, whereby when the end closure is placed on a can and the closed can is subjected to internal pressure, the tab handle portion will not rise above the top portion of the double seam.

2. The improvement defined in claim 1 wherein the tab handle portion has two opposing sides which make point contact with the panel.

3. The improvement defined in claim 2 wherein the innermost section of the tab handle portion is spaced from the removable panel.

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4. The improvement defined in claim 3 wherein the securement is a rivet.

5. The improvement defined in claim 4 further including an ancillary score passing inward of the rivet and extending laterally therefrom to set off a pivotable section in said removable panel.

6. The improvement defined in claim 5 wherein the camber extends approximately to the midpoint of the

sides of the handle portion.

7. The improvement defined in claim 6 wherein the camber extends from a point outward of the rivet.

8. The improvements defined in claim 7 wherein the tab has a curved peripheral edge and the camber extends from the starts of the curved peripheral edge, said starts making point contact with the removable panel.

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