

[54] FULL OR PARTIAL OPENING EASY-OPEN CONTAINER END CLOSURE

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[22] Filed: Dec. 30, 1971

[21] Appl. No.: 213,965

[52] U.S. Cl. 220/54

[51] Int. Cl. B65d 17/20

[58] Field of Search 220/48, 54, 27, 47; 222/541

[56] References Cited
UNITED STATES PATENTS

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Primary Examiner—George T. Hall
Attorney—Robert P. Auber et al.

[57] ABSTRACT

A full or partial opening easy-open container end closure having indented into its central panel a large substantially peripheral score pattern encompassing a smaller score pattern. A rivet secures an opening tab to the panel section defined by the smaller score pattern in a manner that allows the tab to be manipulated to initially rupture a portion of either score pattern and to effect a partial or full opening in the end. At least one of the initial rupturings is not effectable by the tab nose directly rupturing a portion of one of the first or second score lines when the tab handle is lifted in a direction substantially perpendicular to the direction of a portion of one of the score lines, but is effectable adjacent the rivet means when the tab nose is forced downwardly onto a portion of the removable second panel section when the tab handle is lifted upwardly away from the central panel.

3 Claims, 9 Drawing Figures

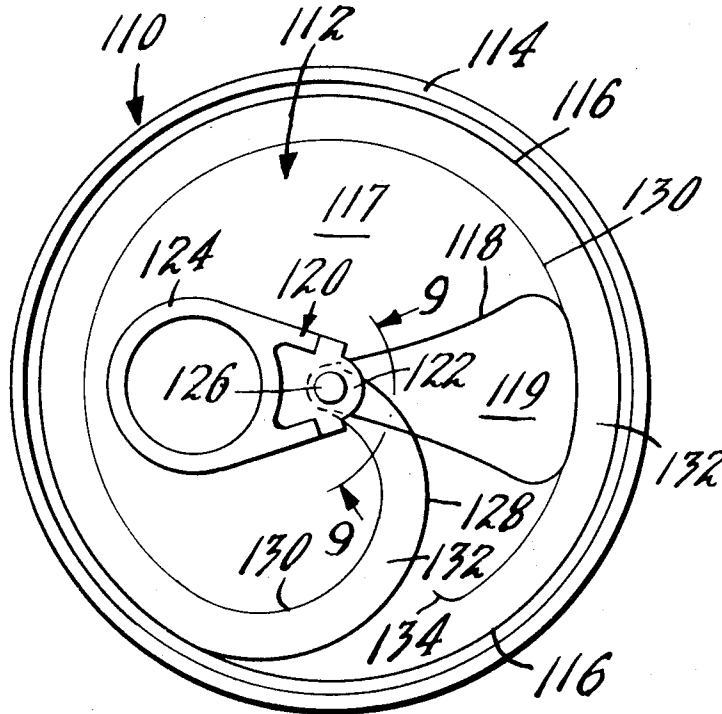


FIG. 1

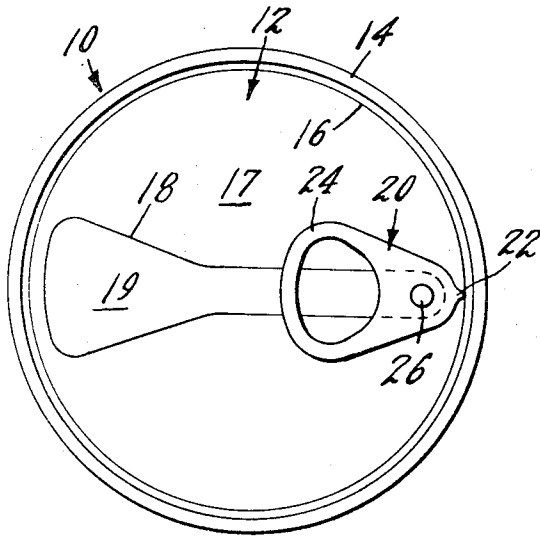


FIG. 2

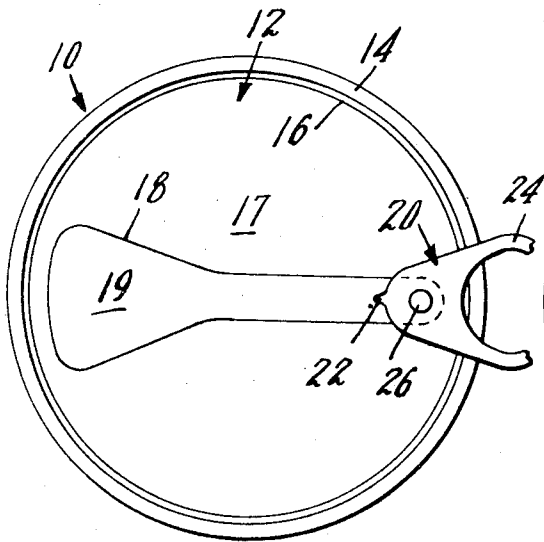
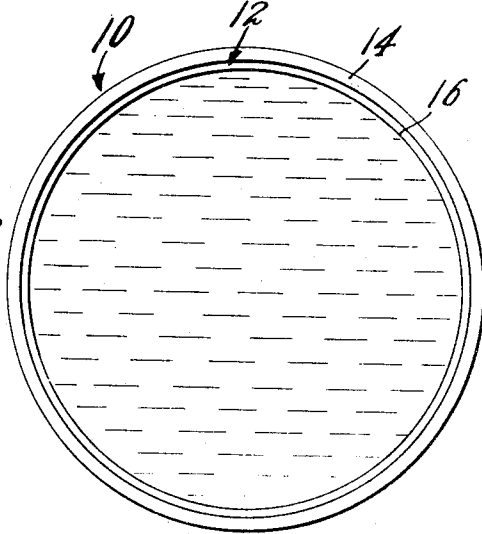


FIG. 3

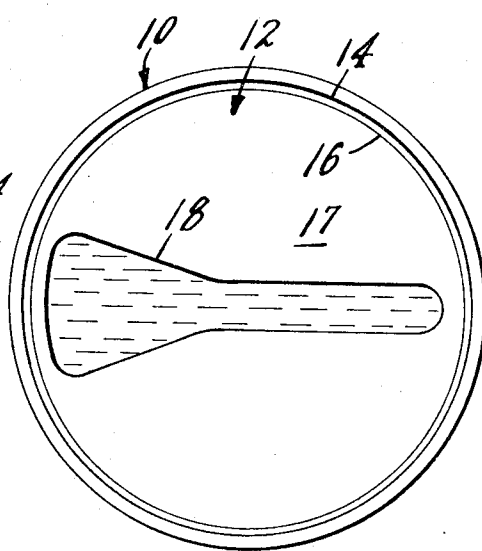


FIG. 4

FIG. 5

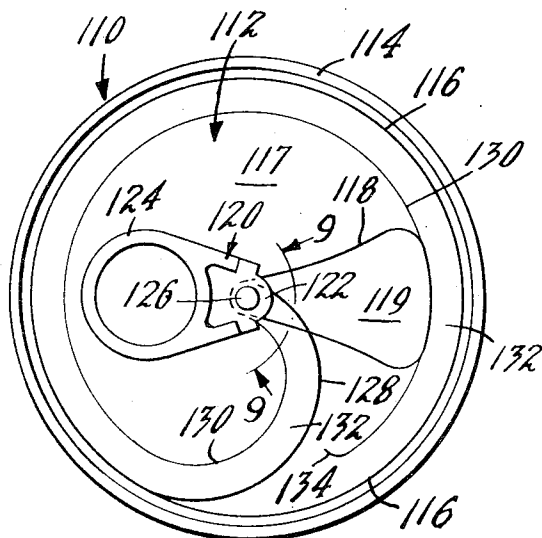


FIG. 6

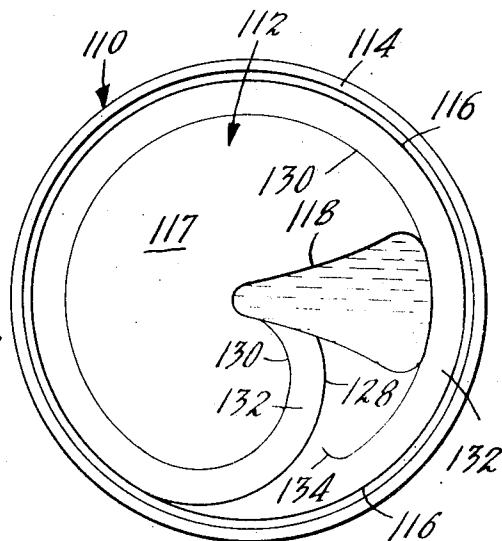


FIG. 7

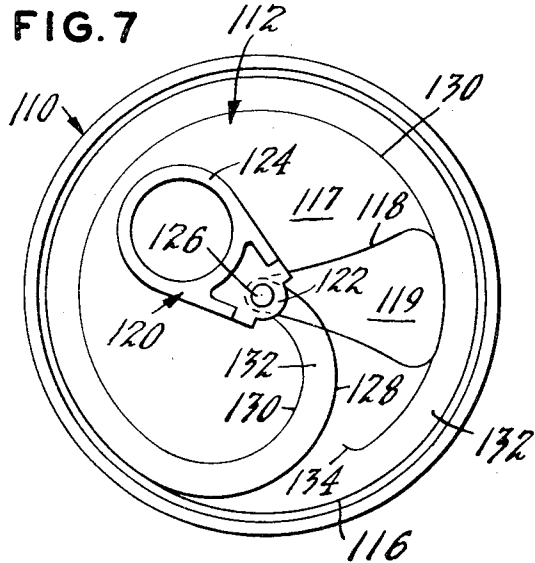


FIG. 8

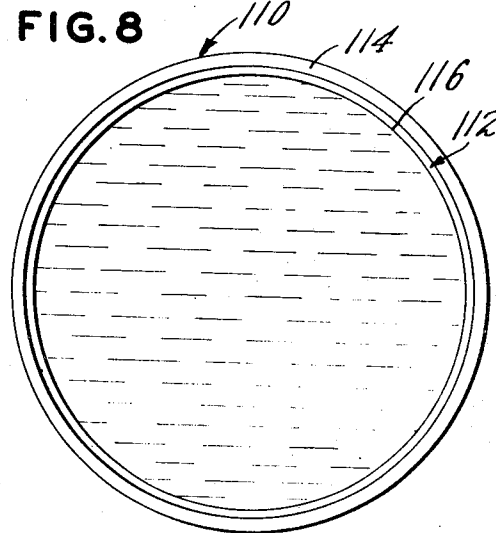
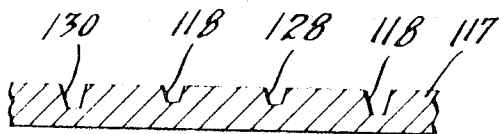


FIG. 9



FULL OR PARTIAL OPENING EASY-OPEN CONTAINER END CLOSURE

BACKGROUND OF THE INVENTION

Easy-open end closures for containers have become widely known and used on containers for beverages and solid foodstuffs. Such ends have typically included a substantially flat panel having a score line therein defining a removable portion of the panel, and a tab attached to a rivet in the removable portion, the tab being adapted to cause a rupturing of the score line and to allow the removable portion to be torn from the remainder of the panel.

Easy-open ends have been either of the full-open or partial-open type, the former being characterized by a removable panel portion corresponding to substantially all of the central panel, and the latter by a removable portion somewhat smaller than the central panel. Typically, full-open ends have been used for containers for solid foodstuffs, while partial-open ends have been used for containers for beverages.

Presently, there is a need for a single easy-open end closure that would incorporate both of the aforementioned full-opening and partial-opening features. Such an end would provide heretofore unknown dispensing convenience, for it would provide consumers of for example beverages, the option of quickly pouring the beverage from a large opening or more slowly dispensing it from a smaller opening in the end.

BRIEF SUMMARY OF THE INVENTION

The easy-open end closure of this invention comprises a substantially flat central panel having therein a full-open first score line defining a removable first panel section and a partial-open second score line within and encompassed by the first score line, defining a movable second panel section. The end closure also includes an opening tab having a rivet hole therein and a nose at one end and a handle at the other end thereof. A rivet means integral with the second panel section secures the opening tab to the central panel. The rivet means and the tab are adapted to permit circumferential rotation of the tab about the rivet. The tab can be manipulated to effect initial rupturing of either the first or second score lines and to effect removal of either of said first or second panel sections. At least one of the initial rupturings is not effectable by the tab nose directly rupturing a portion of one of the first or second score lines when the tab handle is lifted in a direction substantially perpendicular to the direction of a portion of one of the score lines but is effectable adjacent the rivet means when the tab nose is forced downwardly onto a portion of the removable second panel section when the tab handle is lifted upwardly away from the central panel. In the preferred embodiment, one initial rupturing is effectable by the tab nose directly rupturing a portion of one of the first or second score lines when the tab handle is lifted in a direction substantially perpendicular to the direction of a portion of one of the score lines, and the other initial rupturing is effectable by the tab nose being forced downwardly onto a portion of the removable second panel section. In another embodiment, both of the initial rupturings are effectable by the tab nose being forced downwardly onto a portion of either of the respective removable panel sections, and, in this embodiment, the end closure includes a pair of score lines defining a tear strip which runs

from adjacent the rivet means in the second panel section to the substantially peripheral first score line. One score line of the pair has a shorter radius of curvature than the other of the pair and adjoins the first score line, and the other score line of the pair runs alongside the first score line and terminates in the first panel section. The tear strip remains integral with and is removed with the first panel section when the tab handle is lifted, pivoted adjacent its rivet and manipulated to effect a complete tearing of the pair of score lines defining the tear strip. The score line of the pair that adjoins the substantially peripheral first score line intersects the second score line, and, the intersecting lines, at least from adjacent the rivets to their intersecting point, have greater residual panel material than other portions of the other score lines.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a container end closure of this invention having the nose of its opening tab overlying a portion of the full-open score line.

FIG. 2 is a top plan view of the end closure of FIG. 1, after rupture of the full-open score line and removal of the full-open section from the central panel of the end.

FIG. 3 is a top plan view of the end closure of FIG. 1, the tab having been rotated 180° so that its nose overlies a portion of the partial-open section of the central panel of the end.

FIG. 4 is a top plan view of the end closure of FIG. 3 after removal of the partial-open panel section from the central panel of the end.

FIG. 5 is a top plan view of another embodiment of the end closure of this invention, the end having its tab aligned for removal of the partial-open panel section from the central panel of the end.

FIG. 6 is a top plan view of the end closure of FIG. 5, after removal of the partial-open panel section from the central panel of the end.

FIG. 7 is a top plan view of the end closure of FIG. 5, the tab this time aligned for removal of a spiral-out tear strip and the integral full-open panel section of the central panel of the end.

FIG. 8 is a top plan view of the end closure of FIG. 7 after removal of the spiral-out tear strip and full-open panel section from the central panel of the end.

FIG. 9 is an enlarged cross section taken along line 9-9 of FIG. 5 and shows the depths of the various score lines.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawings in detail, FIG. 1, shows a container end closure generally designated 10, having a substantially flat imperforate central panel 12 and a peripheral flange 14 interfolded with and seamed in a conventional manner to a can body (not shown). Central panel 12 has a pair of continuous score lines impressed or indented into its upper surface. First score line 16 is substantially peripheral to central panel 12 and defines a removable full-open first panel section 17. Wholly within first panel section 17 and its score line is second score line 18 which defines a removable partial-open second panel section 19. The portion of second score line 18 underlying the opening tab is shown as a dashed line. End closure 10 has affixed to it a substantially rigid opening tab 20 having a nose 22 at one end overlying first score line 16 and a handle 24

at the other end near the center point of central panel 12. Opening tab 20 is affixed to removable second panel section 19 by means such as rivet 26 formed integral with second panel section 19 and extending through a circular rivet hole (not shown) formed in the forward portion of opening tab 20.

FIG. 2 shows container end closure 10 after full-open first panel section 17 (not shown) defined by first score line 16, has been removed from end closure 10 and from central panel 12. Removable partial-open second panel section 19 remains integral with and is removed will full-open first panel section 17. First panel section 17 is removed from central panel 12 of end closure 10 by raising or pulling tab handle 24 upwardly away from central panel 12, in a direction substantially perpendicular to the portion of first score line 16 underlying tab nose 22. Such pulling action allows substantially rigid tab 20 to hinge or pivot adjacent rivet 26 and causes its nose 22 to initially directly rupture the underlying portion of first score line 16. Further pulling of tab handle 24 substantially diagonally upwardly and backwardly away from the initial point of rupture causes first score line 16 to tear continuously and rather simultaneously and gradually back along a semicircular arc on either side of removable first panel section 17 until the entire roughly 360° of score line 16 is torn and tab 20 and full-open first panel section 17 are detached and removed from end closure 10 and central panel 12.

FIG. 3 shows opening tab 20 of container end closure 10 of FIG. 1 rotated about 180° so that tab nose 22 overlies a portion of removable second panel section 19. When opening tab 20 is in this position, its nose 22 cannot directly effect an initial rupture of a portion of one of the first or second score lines 16 and 18 when tab handle 24 is lifted in a direction substantially perpendicular to the direction of the portions of the score lines. If tab handle 24 were lifted in such a direction, its nose would not overlie and could not come into contact with such portions of the score lines. Initial rupture of second score line 18, defining removable partial-open second panel section 19, is effected adjacent rivet means 26 when tab handle 24 is lifted upwardly away from central panel 12. When the tab is so lifted, it pivots adjacent rivet 26 and tab nose 22 is forced downwardly onto an underlying portion of second panel section 19. The lifting force exerted on tab 20 and transferred through rivet means 26 tears second score line 18 adjacent rivet means and detaches a portion of second panel section 19 from first panel section 17. Gradual pulling substantially diagonally upwardly and backwardly away from the initial point of rupture adjacent rivet means 26 causes a continued tearing of second score line 18 back away from the rivet area, until the entire teardrop-shaped second panel section 19 is detached from end closure 10.

As shown in FIG. 4, when teardrop-shaped second panel section 19 is removed from within second score line 18, there is left a partial-open area in first panel section 17, which remains intact with central panel 12 of end closure 10.

FIGS. 5-8 show another embodiment of the container end closure of this invention. FIG. 5 shows a container end closure generally designated 110, having a substantially flat imperforate central panel 112 and a peripheral flange 114 interfolded with and seamed in a conventional manner to a can body (not shown). Central panel 112 has impressed or indented into its upper

surface a substantially peripheral first score line 116 defining a removable first panel section 117, and, wholly within the first panel section, a second score line 118 defining a removable second panel section 119. A portion of second score line 118 underlying the opening tab (to be later described) is shown as a dashed line. Also indented into the upper surface of central panel 112 is a pair of tear strip score lines 128 and 130 defining a tear strip 132. Tear strip score line 128 at one end adjoins a portion of second score line 118 adjacent one side of rivet means 126, intersects a portion of second score line 118 on the other (lower) side of rivet 126 and adjoins substantially peripheral first score line 116. Tear strip score line 130 commencing where it adjoins second score line 118 adjacent rivet 126, has a shorter radius of curvature than and runs substantially equidistantly from and alongside score line 128 and adjoining first score line 116 where it terminates in hook 134 in central panel 112. The discontinuity of tear strip score line 130 allows tear strip 132 to remain integral with full-open first panel section 117, defined by first score line 116, when first panel section 117 is removed from central panel 112 and from end closure 110.

FIG. 5 also shows opening tab 120 having a nose 122 at one end and a handle 124 at its other end. Tab 120 is affixed to removable second panel section 119 of central panel 112 by means such as rivet 126 formed integral with the second panel section and extending through a circular rivet hole (not shown) formed in the forward portion of tab 120. Tab 120 is aligned for effecting a partial-opening in end closure 110. Nose 122 can be arcuately shaped to help effect initial rupture of second score line 118 adjacent rivet means 126 in a manner to be later explained.

FIG. 6 shows container end closure 110 after partial-open second panel section 119 defined by second score line 118, has been removed from the end closure and from central panel 112. First panel section 117, with most of tear strip 132 intact, remains integral with central panel 112 on end closure 110. Second panel section 119 is removed from the rest of end closure 110 by raising tab handle 124 upwardly in the conventional manner such that nose 122 is forced downwardly onto an underlying portion of second panel section 119. As in FIG. 3, the upward pulling force exerted on tab 120 is transferred through rivet means 126 and causes an initial rupture and tearing of second score line 118 adjacent the rivet and detaches a portion of second panel section 119 surrounding the rivet. As previously explained in relation to FIG. 3, continued upward pulling on tab 120 tears all of second score line 118 and detaches and removes the teardrop-shaped partial-open second panel section 119 from end closure 110. The length of second score line 118 from adjacent rivet 126 where tear strip score line 130 departs therefrom at least to the point where it intersects tear strip score line 128 is a tracking score. That is, it is not impressed or indented as deeply into first panel section 117 of central panel 112 as the rest of second score line 118 or of tear strip score line 130. The tracking portion of line 118 therefore has more residual panel material therein and second score line 118 prevents the score line from becoming accidentally ruptured when handle 124 is manipulated to effect tearing tear strip 132.

FIG. 7 shows opening tab 120 of container end closure 110 of FIG. 5 rotated upwardly in a clockwise direction about 45° and aligned with tear strip 132 for

rupturing and tearing thereof and for removal of full-open first panel section 117 from end closure 110. The portion of tear strip score line 128 running from adjacent one side of rivet 126 where it departs from second score line 118 at least to the point where it intersects second score line 118 again on another side of rivet 134, also is a tracking score which prevents tear strip score line 128 from becoming accidentally ruptured when tab 120 is manipulated to tear second score line 118 and effect removal of second panel section 119 from end closure 110. As previously mentioned in relation to FIG. 5, when tab handle 124 is lifted, nose 122 is forced onto a portion of tear strip 132 defined by tear strip score lines 128 and 130 and mostly within second panel section 119, and the force transferred through rivet 125 effects an initial rupture of second score line 118 adjacent rivet 126 and surrounding second panel section 119. Continued pulling on tab handle 120 in the conventional heretofore explained manner causes a gradual rather simultaneous tearing along tear strip score lines 128 and 130 to where score line 128 adjoins first score line 116 from which point tearing is along tear strip score line 130 and first score line 116 until tearing of scoreline 130 terminates at hook 134, leaving an integral central panel portion or first panel section between hook 134 and tear strip score line 128. Tearing of tear strip score line 128 continues through the entirety of first score line 116 to allow for removal of the entire panel area within that line including first and second panel sections 117 and 119 and tear strip 132. The aforementioned score line configurations and integral arrangement allows the entire panel area to be removed in one piece by manipulation of handle 124.

FIG. 8 shows container end closure 110 after the entire integral full-open first panel section 117 defined by first score line 116 including second panel section 119 and tear strip 132, has been removed from central panel 112 of end closure 110.

FIG. 9 is an enlarged partial cross section of full-open first panel section 117 taken along line 9—9 of FIG. 5 and shows that, at the cross section, tear strip score line 128 and second score line 118 are tracking scores and are not indented as deeply into first panel section 117 as are tear strip score line 130 and second score line 118.

The thickness of residual panel material left in the tracking scores can be any thickness sufficient to resist external or internal pressures such as from container contents, e.g. gas pressures from carbonated beverages. For example, for aluminum easy-open container end closures having central panels about 0.012 inch thick, regular score lines with residuals of about 0.004 inch and tracking scores with residuals of about 0.006 inch have been found suitably resistant for end closures having scored configurations as shown in FIGS. 5-8, used on containers of low volume carbonated fruit drinks. For contents with higher carbonation such as beer beverages, regular score residuals can be say about 0.001 inch thicker to resist the increased pressure but residuals should not be too thick that forces required for initial rupture and tearing of the score lines become impractical.

If desired as a means to prevent inadvertent rupturing of second score lines 118 and 118 when first score lines 116 and 116 are respectively initially ruptured, a stepped score pattern can be utilized in the arcuate portion of the second score lines adjacent rivet means

26 or 126. A stepped score pattern is, like a tracking score, one in which there is more residual material therein than in the adjacent rest of the score line.

Score patterns utilizable with rivet means 26 or 126 can be any pattern or configuration that will provide a dual opening feature according to this invention. The rivet can be positioned at the junction of full and partial open tear strips which run in various directions at various angles from the rivet. As examples, the respective partial and full open tear strips can run from the rivet in a V shape or in an L shape or they can run 180° in opposite directions from each other. The configuration can be Y shaped, wherein the rivet is positioned at the lowermost point in the lower leg of the Y and a single tear strip proceeds away from the rivet and then splits into the respective full and partial open tear strips. Still another configuration is one where the full and partial open tear strips have a common score line and run alongside each other from the rivet. In these configurations, tracking scores are utilized adjacent the rivet to allow selective tearing of a desired tear strip without accidental tearing of the other tear strip.

The full-open first score pattern or line preferably includes or covers as large a central panel area as possible and therefore preferably its score line is peripheral to central panel 112 or 112, though first score lines less than fully peripheral and having a radius of curvature less than as shown in the drawings can be utilized.

The dual opening feature of this invention can be utilized on any conventional steel or aluminum end closure having a substantially flat or slightly concave or convex central panel profile. The opening tab can be circumferentially rotated a full 360° or 180°, 45°, 30° or any degree angle such that it allows the tab and its nose to be suitably aligned with the particular score lines or panel sections desired to be ruptured and detached from the end closure. For the end closure of FIGS. 5-8, rotation preferably is 45°. Stopping means such as beads protruding from the undersurface of the tab cooperating with dimples in the underlying central panel, can be employed to limit the circumferential rotation of the opening tab to a particular degree angle required to provide a desired alignment. The opening tab can be of any suitable substantially rigid material and can be of any suitable configuration, though it is advantageous to provide means such as a protruding nose, as in FIGS. 1-4, for direct rupturings of underlying score lines, and an arcuate nose, as in FIGS. 5-8, when the nose is to be forced downwardly onto and to cause rupturing of a tear strip along its defining score lines.

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. The form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. An easy-open container end closure comprising:
 - a substantially flat central panel;
 - a first score line in said central panel defining a removable first panel section;
 - a second score line in said central panel positioned wholly within said first score line and defining a removable second panel section;

a substantially rigid opening tab having a rivet hole therein, a nose at one end and a handle at the other end thereof; and

rivet means integral with said second panel section extending through said tab rivet hole and securing said tab to said second panel section, said rivet means and said tab being adapted and said rivet means being positioned such tha said tab can be circumferentially rotated about said rivet and said tab can be manipulated to effect initial rupture of either of said first or second score lines and to effect removal of either of said first or second panel sections, at least one of said initial rupturings not being effectable by said tab nose directly rupturing a portion of one of said score lines when said tab handle is lifted in a direction substantially perpendicular to the direction of said portion of said score lines, but being effectable adjacent said rivet means when said tab nose is forced downwardly onto a portion of said removable second panel section when said tab handle is lifted upwardly away from said central panel.

2. The easy-open container end closure of claim 1 wherein one of said initial rupturings is effectable by said tab nose directly rupturing a portion of one of said first or second score lines and the other of said rupturings is effectable by said tab nose being forced down-

wardly onto a portion of said removable second panel section.

3. The easy-open container end closure of claim 1 wherein both of said initial rupturings are effectable by said tab nose being forced downwardly onto a portion of either of the respective removable panel sections and, wherein a pair of score lines defining a tear strip runs from adjacent said rivet means in said second panel section to said substantially peripheral first score line, one line of said pair intersecting as portion of said second score line and adjoining said first score line, the other line of said pair having a shorter radius of curvature, and running substantially equidistantly from and alongside said adjoined substantially peripheral first score line and terminating in said removable first panel section, said intersecting lines, at least from adjacent the rivet to the intersecting points, having less residual end closure material therein than other portions of said other score lines, the configuration of said pair of score lines being such that said tear strip remains integral with and is removed with said removable first panel section when said tab handle is lifted and pivoted adjacent its rivet and said tab is manipulated to effect a complete tearing of said pair of score lines defining said tear strip.

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