United States Patent

[11] 3,593,876

[72] Inventor **Ermal C. Fraze**
355 W. Stroop Road, Dayton, Ohio 45429

[21] Appl No **874,622**
[22] Filed **Nov. 6, 1969**
[45] Patented **July 20, 1971**

[54] **EASY OPENING CONTAINER WALL WITH VENT OPENING**
15 Claims, 13 Drawing Figs.

[52] **U.S. Cl.** **220/54,** 220/44, 220/48
[51] **Int. Cl.** **B65d 17/24**
[50] **Field of Search** 220/54, 44, 48; 215/56

[56] **References Cited**
UNITED STATES PATENTS

3,221,924	12/1965	Harvey et al.	220/54
3,499,573	3/1920	Adams	220/54

Primary Examiner—George T. Hall
Attorney—Smyth, Roston & Pavitt

ABSTRACT: An easy opening container wall including a container wall having a line of weakness therein defining a tear portion. The container wall has a rupturable region other than the line of weakness. A tab is attached to the container wall and movable to initiate severance of the tear portion. The tab includes a rupturing element which is movable generally toward the rupturable region prior to manipulation of the tab to rupture the rupturable region and form a vent opening in the container wall.

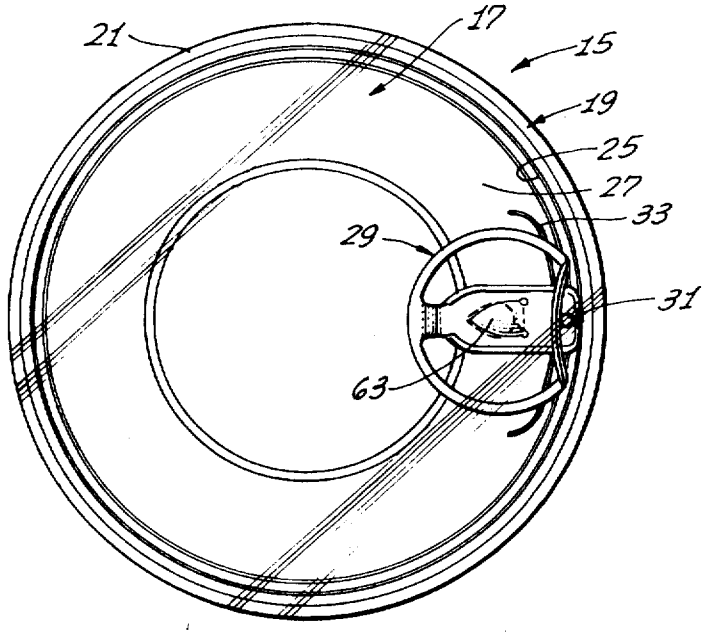


Fig. 1

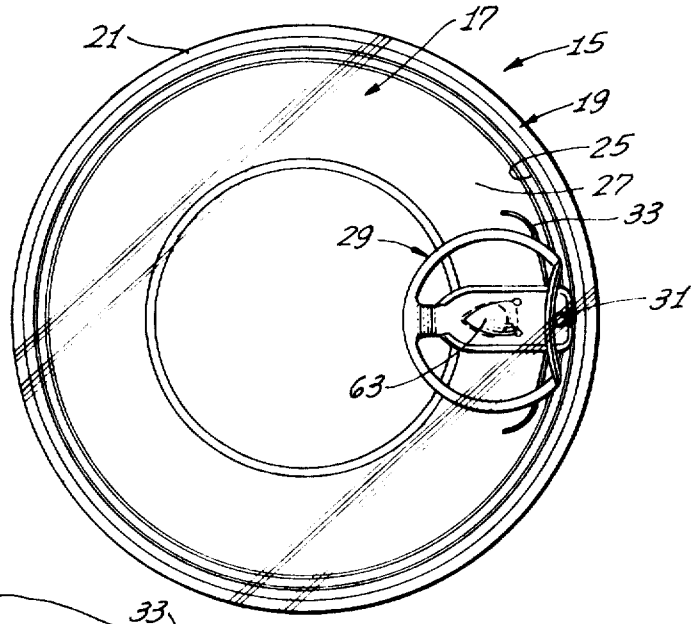
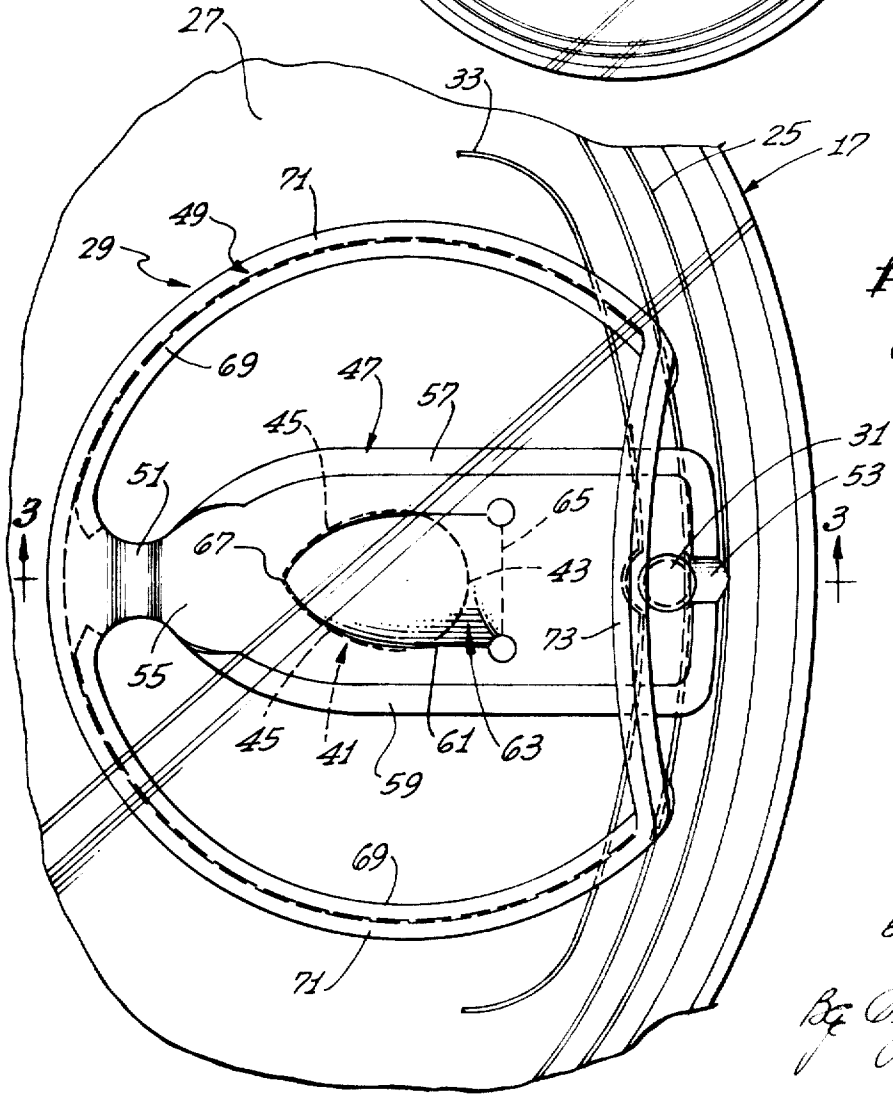


Fig. 2



INVENTOR:
Ermal C. Fraze

By Smyth, Roston & Smith
ATTORNEYS

Fig. 3

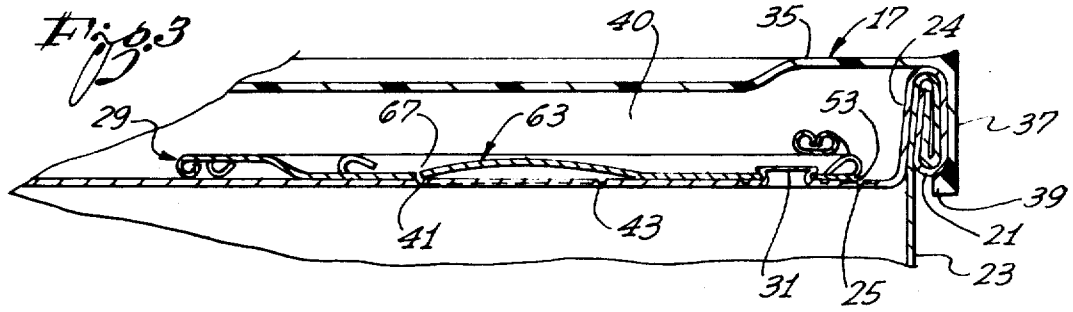


Fig. 4

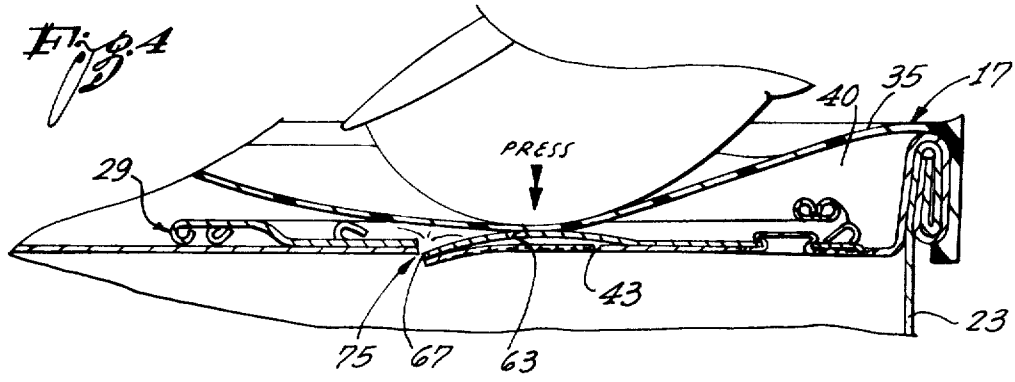
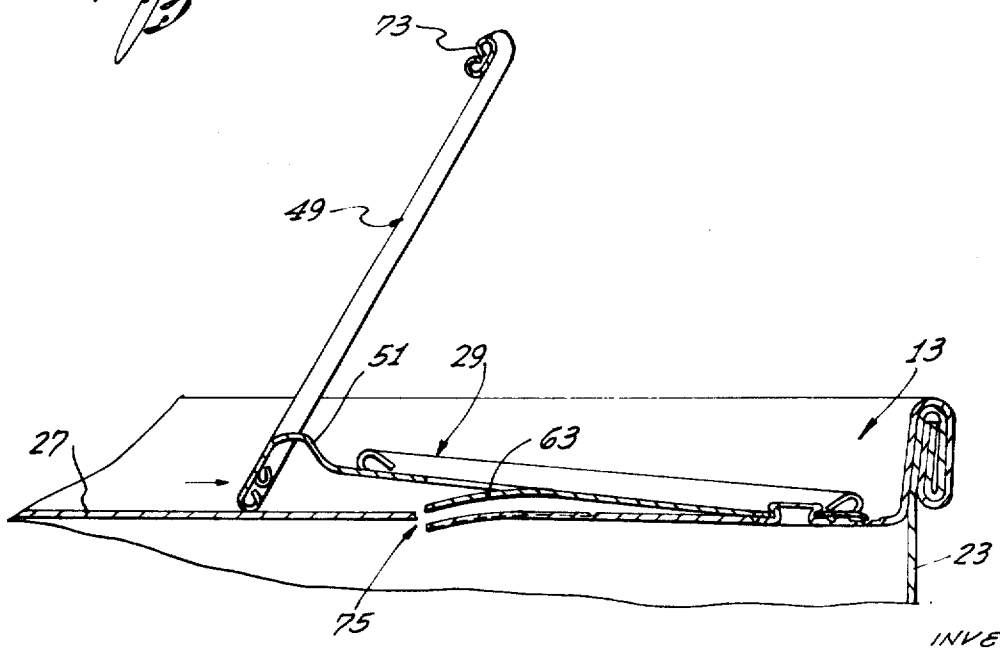


Fig. 5



INVENTOR:
Ermal C. Fraze

By Smyth, Roston & Pavitt,

ATTORNEYS

Fig. 6

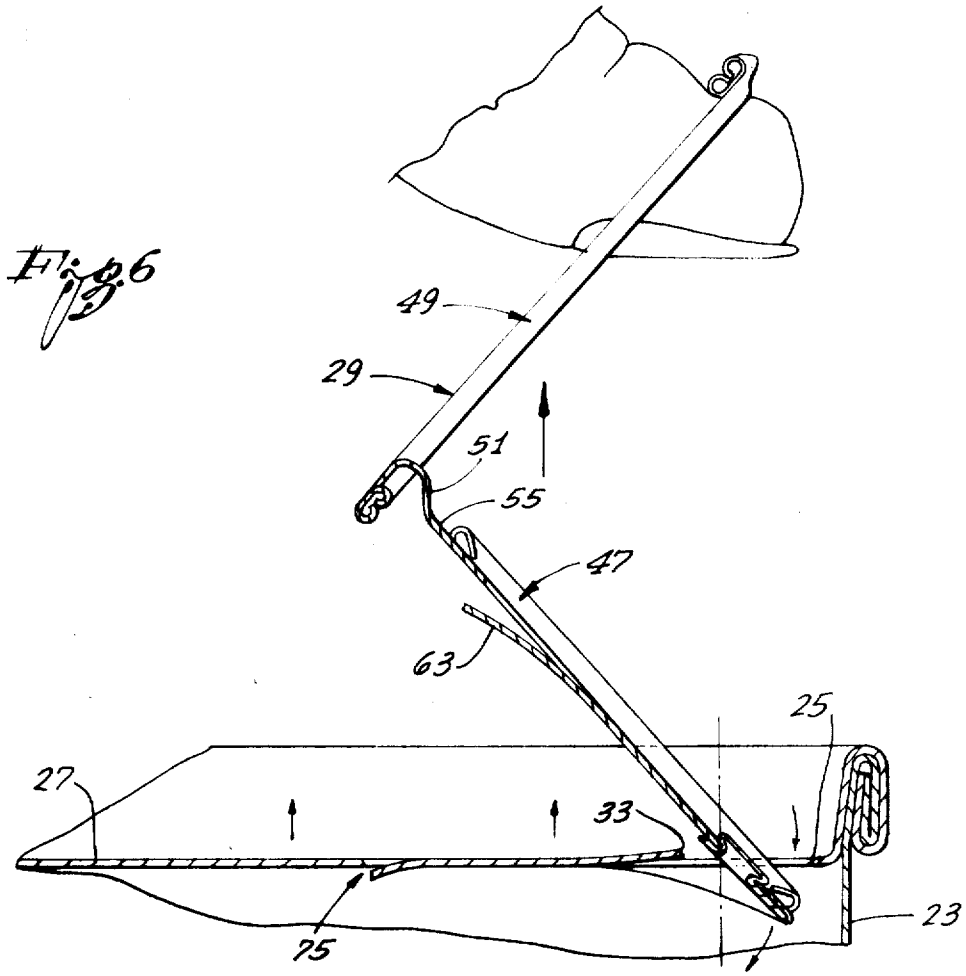


Fig. 7

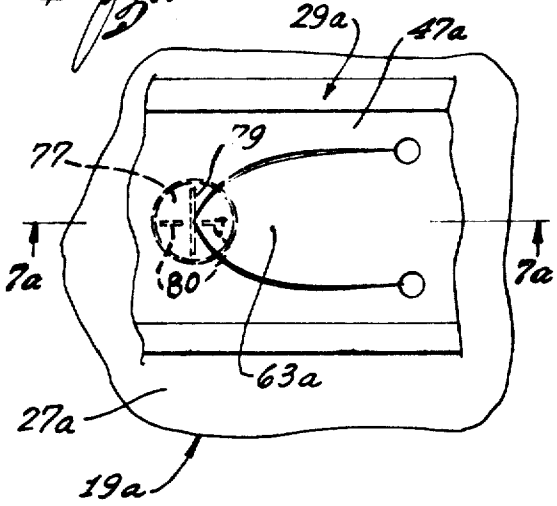


Fig. 7a

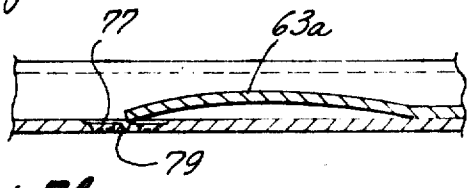
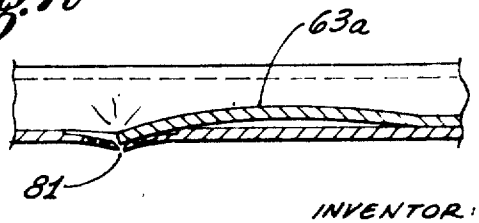


Fig. 7b



INVENTOR:
Ermal C. Fraze

By Smyth, Roston & Pavitt,
ATTORNEYS

Fig. 8

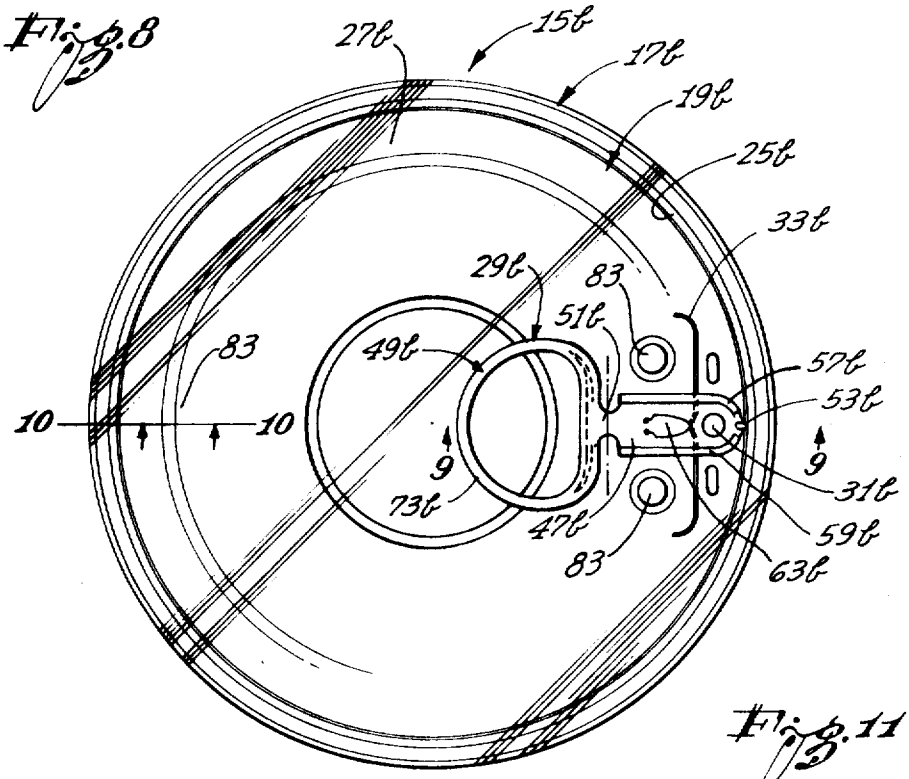


Fig. 11

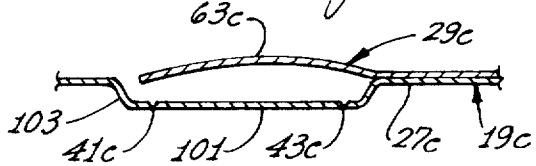


Fig. 9

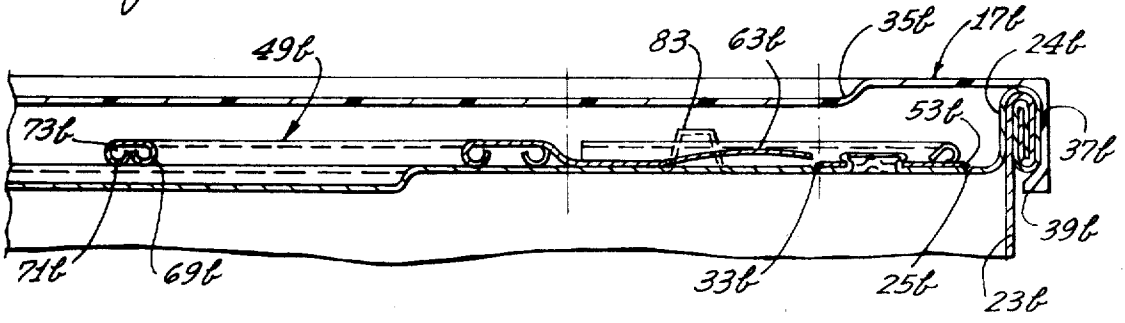
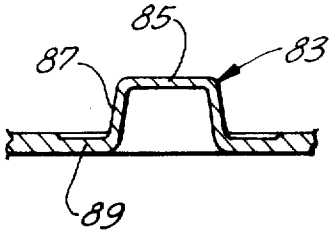


Fig. 10



INVENTOR:
Ermal C. Fraze

By Smyth, Roston & Pavitt
ATTORNEYS

EASY OPENING CONTAINER WALL WITH VENT OPENING

BACKGROUND OF THE INVENTION

Containers for certain products contain positive or negative pressure and when such containers are provided with easy opening container walls, it is desirable to vent the container to atmosphere prior to initiation of severance of the main score line which defines the removable tear portion. As used herein the term "vent" has reference to the creation of an opening in the container wall through which fluid can flow to cause the pressure within the container to be substantially atmospheric. Thus, venting occurs whether the interior of the container is initially above or below atmospheric pressure.

Prior art easy opening container walls which embody a venting principle involve forming the vent opening as a result of the initial lifting of the tab. Continued lifting of the tab in the same general direction results in rupture of the main score line. Typically this is the result of rapid and unidirectional pivotal movement of the tab so that the vent opening and the rupture of the score line occur in rapid sequence.

A problem with these easy opening container walls is that insufficient time between the formation of the vent opening and the rupturing of the main score line is provided to fully vent the container especially when the initial pressure within the container differs substantially from atmospheric. Accordingly, there is a pressure differential across the removable tear portion at the instant that the severance of the sheet material along the main score line is initiated. This pressure differential may be sufficient to rapidly completely sever the tear portion from the container wall with consequent danger to, or frightening of, the user. Another problem is that the rapid movement of gas through the vent opening may cause some of the product to be sprayed through the vent opening.

SUMMARY OF THE INVENTION

The present invention eliminates the disadvantages by providing an easy opening container wall in which first and second elements must be separately manually operated in order to obtain venting and initial rupture of the score line, respectively. Thus, the formation of the vent opening is a result of a separate manual function other than tab manipulation in a manner to rupture the sheet material along the score line. As two separate openings are necessary, the user must reposition his hand prior to manipulation of the tab to initiate severance of the score line thereby giving sufficient time for venting to occur through the vent opening. According to the present invention, the container wall is formed with a weakened region which can be ruptured to form the vent opening. The weakened region should be a region other than the main score line itself because venting should occur prior to rupture of the main score line. The rupturable or weakened region in the container wall is ruptured by a rupturing element which is preferably operable before the usual lifting movement of the tab.

The rupturing element can be advantageously formed integrally with the tab and positioned to overlie the weakened region. The rupturing element is preferably integrally joined to the tab with a pliable region of sheet material and freed from the tab along a major portion of the length of its periphery. With this construction, the rupturing element is manually depressible against the weakened region to rupture same. After the vent opening is formed, the user must reposition his hand to manipulate the tab in the usual way to remove the tear portion. This gives ample time for venting of the container.

A lever tab of sheet material may be used to initiate severance of the tear portion. The tear portion may have a secondary score line therein near the rivet of the type which ruptures upon lifting of the tab and before rupturing of the main score line. This facilitates manipulation of the tab. The rupturing element may initiate rupture of this score line to form the vent opening with the additional advantage that lifting of the tab is made still easier.

As the rupturing element is a depressible element positioned above a weakened region of the container wall, there is potential danger that the rupturing element may be inadvertently depressed when the containers are stacked. The present invention obviates this problem by providing one or more protective members on the container wall and/or by substantially spacing the rupturing element and the weakened region.

As is well known, some containers such as coffee containers are provided with reusable plastic closures or convenience closures. An advantage of the present invention is that it can be used with a convenience closure and the rupturing element can be operated without removing the convenience closure from the container. Another advantage is that the convenience closure serves as a baffle to positively prevent expulsion of the product from the container.

The invention, both as to its organization and method of operation together with further features and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying illustrative drawings:

FIG. 1 is a top plan view of one form of easy opening container wall constructed in accordance with the teachings of this invention.

FIG. 2 is an enlarged fragmentary plan view of a portion of FIG. 1.

FIG. 3 is a fragmentary sectional view taken along line 3–3 of FIG. 2 prior to depression of the rupturing element to rupture the weakened region.

FIG. 4 is a fragmentary sectional view similar to FIG. 3 illustrating how the rupturing element can be operated.

FIG. 5 is a fragmentary sectional view similar to FIG. 3 after the initial pivotal movement of the tab.

FIG. 6 is a fragmentary sectional view illustrating how the tab may be pulled outwardly to initiate severance of the main score line.

FIG. 7 is an enlarged fragmentary plan view of a can end and a tab with the can end having another form of weakened region formed therein.

FIG. 7*a* is a sectional view taken along line 7*a*–7*a* of FIG. 7.

FIG. 7*b* is a sectional view similar to FIG. 7 following rupturing of the weakened region by depression of the rupturing element.

FIG. 8 is a top plan view of another form of container wall constructed in accordance with the present invention.

FIG. 9 is an enlarged fragmentary sectional view taken along line 9–9 of FIG. 8.

FIG. 10 is an enlarged fragmentary sectional view taken along line 10–10 of FIG. 8.

FIG. 11 is a fragmentary sectional view similar to a portion of FIG. 3 showing a modification of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings and in particular to FIG. 1 thereof, reference numeral 15 designates an easy opening container wall constructed in accordance with this invention and having a reclosure cap or convenience closure 17 releasably mounted thereon. The easy opening container wall 15 includes a container wall 19 of sheet material such as aluminum alloy. The container wall 19 has a peripheral attaching flange 21 for attaching the container wall 19 to a container body 23 (FIG. 3). The attaching flange has a chuck wall 24 (FIG. 3). The container wall 19 has a line of weakness 25 therein defining a tear portion or panel 27 which is removable from the container wall. Although other configurations may be utilized, in the embodiment illustrated, the line of weakness 25 and the tear portion 27 are circular with the latter covering substantially all of the area in plan of the container wall 19.

A tab 29 is affixed to the tear portion 27 by suitable means such as a rivet 31 formed integrally with the sheet material of the tear portion. A secondary score line 33 is formed in the

container wall and lies between the rivet 31 and a central portion of the container wall.

With reference to FIG. 3, the convenience closure 17 is preferably constructed of a pliable and substantially clear plastic material. The convenience closure has an end wall 35 and a peripheral wall 37 integral with the end wall. The peripheral wall 37 has an integral circumscribing bead 39 which is adapted to engage the lower end of the attaching flange 21 to releasably mount the convenience closure 17 on the container wall 19. Of course, other mounting arrangements for the convenience closure 17 can be used. The closure 17 and the container wall 19 define a chamber 40.

With reference to FIG. 2, the tear portion 27 is formed with a score line 41 which defines a weakened or rupturable region of the tear portion 27. The score line 41 is spaced at all points thereof from the score line 25. Although various configurations may be utilized, in the embodiment illustrated the score line 41 is generally teardrop-shaped. The residual along an end of the score line 41 is relatively high to form a bend line 43, and the residual along the sides 45 of the score line is relatively low to define a relatively easily rupturable web.

The tab 29 is preferably integrally constructed of sheet material and includes a lever portion 47 and a handle portion 49 integrally joined to the lever portion by a pliable connecting portion 51. The lever portion 47 has a rupturing end 53 which overlies the score line 25 and a lifting end 55 which is contiguous the connecting portion 51. The rivet 21 projects through an aperture in the lever portion 47 and firmly attaches same to the tear portion 27 with the rivet lying closely adjacent the rupturing end 53. The rupturing end is bent downwardly as shown in FIG. 3 to more effectively rupture the score line 25. The lever portion 47 is stiffened longitudinally by reinforcing beads or curls 57 and 59 which, in the embodiment illustrated, extend from locations closely adjacent the connecting portion 51 to locations closely adjacent the rupturing end 53.

The lever portion 47 has been lanced along a line 61 to define a rupturing element 63. The rupturing element 63 is freed from the lever portion along a major portion of the periphery thereof. The rupturing element 63 is completely surrounded by the sheet material of the lever portion 47 and is integrally connected thereto along a relatively straight bend line 65. The sheet material of the lever portion 47 along the bend line 65 is sufficiently pliable to permit pivotal movement of the rupturing element relative to the lever portion 47.

The rupturing element 63 has a rupturing point 67 which overlies the juncture between the sides 45 of the score line 41. As shown in FIG. 2, the sides 45 of the score line 41 are generally coextensive with or lie outside of the corresponding edges of the rupturing element 63 for a substantial distance. As shown in FIG. 3, the rupturing element 63 is preferably deformed upwardly at central regions thereof to facilitate depressing of the rupturing element against the tear portion 27.

The handle portion 49 in the embodiment illustrated includes an inner bead 69 and an outer bead 71 with the outer bead completely circumscribing the tab and with the inner bead terminating adjacent the connecting portion 51. The handle portion 49 is ringlike and circumscribes a substantial segment of the lever portion 47. The handle portion 49 has a lifting end 73 which has been deformed radially inwardly toward the connecting portion 51 and away from the attaching flange 21 so as to facilitate gripping of the handle portion.

FIGS. 4 through 6 illustrate the operation of the device. With the convenience closure 17 in position on the container, the user depresses the end wall 35 thereof at a location immediately above the rupturing element 63. The plastic material of the end wall 35 is sufficiently flexible to yield thereby causing pressure to be applied through the end wall 35 to the rupturing element 63. The depression of the rupturing element 63 tends to pivot the latter downwardly generally about the line 65 with the result that the rupturing point 67 firmly engages and initiates severance of the portion of the score line 41 lying immediately therebelow as shown in FIG. 4 to form a vent opening 75.

Assuming that the interior of the container body 23 is at some pressure other than atmospheric, gas can pass through the vent opening 75 between the interior of the container and the chamber 40. This will cause the pressure in the container to approach atmospheric by an amount which is a function of the volume of gas within the container and the volume of the chamber 40. Depending upon the tightness with which the convenience closure 17 fits over the container wall 19, gas may leak into, or out of, the chamber 40 to cause the gas within the chamber 40 to be at substantially atmospheric pressure. In any event, once the convenience closure 17 is manually removed, any pressure differential between the interior of the container body and atmospheric will be rapidly reduced to zero. The convenience closure 17 serves as a baffle to prevent the product within the container from being ejected from the chamber 40.

After removing the convenience closure 17, the user lifts upwardly on the lifting end 73 of the tab 29 to thereby cause pivotal movement of the handle portion 49 generally about the pliable connecting portion 51 with the end of the handle portion opposite the lifting end bearing against the container wall 19 as shown in FIG. 5. After pivoting the handle portion 49 to the position shown in FIG. 5, the user exerts an outward pulling force as generally illustrated in FIG. 6 to thereby raise the lifting end 55 of the lever portion 47 with consequent rupture of the score lines 25 and 33 as shown in FIG. 6 with the score line 33 rupturing first to facilitate further upward lifting of the lever portion. To completely remove the panel, the user continues to exert an upward pulling force on the tab 29 but in a slightly different direction.

Because of the time necessary to remove the convenience closure 17 and then to manipulate the tab as shown in FIGS. 5 and 6, there is more than ample time to completely vent the container through the vent opening 75. Although the present invention is particularly adapted for use with a convenience closure such as the closure 17, the features of the present invention are clearly applicable when no such closure is used and accordingly the illustration of the convenience closure 17 should not be regarded as limiting.

FIG. 7 shows a second embodiment of the invention which is identical to that described in FIGS. 1—6 except for the weakened region and corresponding parts are designated by corresponding reference numerals followed by the letter *a*. In the form shown in FIG. 7, the weakened region includes a coined region 77 having a score line 79 and score line segments 80 extending therethrough. Scoring through a coined region has been found to make the sheet material along the score line relatively easy to rupture and accordingly, one advantage of FIG. 7 is that the score line 79 is easily ruptured. Although various configurations may be utilized, in the embodiment illustrated, the coined region 77 is generally circular and the score line 79 extends diametrically of the coined region. In all other respects, the embodiment of FIGS. 7—7*b* is identical to the embodiment of FIGS. 1—6.

The operation of the embodiment of FIGS. 7—7*b* is identical to the embodiment described above. Thus, by depressing of the rupturing element 63*a* from the position shown in FIG. 7*a* to that shown in FIG. 7*b*, the weakened region is ruptured along the score line 79 to form a vent opening 81.

FIGS. 8—12 show a third embodiment of the invention. Parts of the embodiment shown in FIGS. 8—12 corresponding to parts shown in FIGS. 1—6 are designated by corresponding reference numerals followed by the letter *b*. The convenience closure 17*b* may be identical to the convenience closure 17 and the easy opening container wall 15*b* is identical to the easy opening wall 15 in all respects not specifically shown or described herein.

The container wall 19*b* is identical to the container wall 19 in that it has a score line 25*b* defining a tear portion 27*b* and a secondary score line 33*b*. It differs from the container wall 19*b* in that the weakened region upon which the rupturing element

63*b* operates is the score line 33*b* and in the provision of a plurality of protecting dimples 83. The protective dimples 83 are preferably formed integrally with the sheet material of the tear portion 27 and include a transverse end wall 85 and a peripheral wall 87 integrally joining the end wall 85 to a surrounding region of the tear portion 27*b*. The end wall 85 is preferably substantially flat so as to form a relatively good supporting surface, and the dimple 83 may be advantageously formed in a coining operation in which the sheet material around the base thereof is coined to form a coined region 89 as shown in FIG. 10.

The primary function of the protective dimples 83 is to prevent accidental depression of the rupturing element 63*b* sufficiently to rupture the score line 33*b*. Accordingly, the height, number and placement of the dimples 33 should be governed by the protective characteristics which are desired. Specifically, the outer surface of the end wall 85 of the dimple 83 should lie above the uppermost surface of the rupturing element 63*b* as shown in FIG. 9 to prevent depression of the rupturing element. Preferably, the protective dimples 83 should be provided on the opposite sides of the rupturing element 63*b* and at least one additional dimple 83 may be provided across the tear portion 87 to provide good support for any object which may be placed on the can end and which is not fully and completely supported by the chuck wall 24*b*.

The tab 29*b* is quite similar to the tab 29 in that it includes a lever portion 47*b*, a connecting portion 51*b* and a handle portion 49*b*. The lever portion 47*b* is made longitudinally stiff by peripheral beads 57*b* and 59*b*, and the lever portion has a rupturing end 53*b* and a lifting end at the end opposite the rupturing end. The primary difference between the lever portions 47 and 47*b* is that the rupturing element 63*b* is directed radially outwardly whereas the rupturing element 63 is directed radially inwardly.

The handle portion 49*b* is ringlike and substantially identical to the handle portion 49 except that the former is positioned 180° out of phase with the latter. Thus, the handle portion 49*b* extends away from the rivet 31*b* or radially inwardly to define a lifting end 73*b*. The handle portion 49*b* is stiffened by beads 69*b* and 71*b* with the inner bead extending completely around the handle portion and with the outer bead terminating adjacent the connection portion 51*b*.

In use of the easy opening container wall 15*b*, the rupturing element 63*b* can be depressed to rupture the score line 33*b* in the manner described hereinabove with reference to FIG. 4. After removing the convenience closure 17*b*, the user exerts an upward lifting force on the handle end 73*b* to thereby pivot the handle portion 49*b* about the connecting portion 51*b*. This can be accomplished easily because the connecting portion 51*b* is readily bendable. When an appropriate lifting angle has been reached, the user exerts an outward pulling force on the handle portion 49 which tends to lift the lifting end of the lever portion 47*b* in much the same manner as described hereinabove with reference to FIGS. 5 and 6. Lifting of the lifting end of the lever portion 47*b* continues the rupture of the score line 33*b* and ultimately forces the nose or rupturing end 53*b* against the score line 25*b* with sufficient force to rupture the latter. By changing the direction of the outward pulling force, the tear portion 27*b* can then be completely removed from the container body 23*b*.

The embodiment of FIGS. 8—10 possesses the advantages described hereinabove which are attributable to the protective dimples 83. In addition, by utilizing the rupturing element 63*b* to rupture the secondary score line 33*b* prior to lifting of the tab 29*b*, the lifting of the tab is made much easier.

FIG. 11 shows a modification of the present invention in which alternate means for protecting of the weakened region are provided. The embodiment of FIG. 11 is identical to the embodiments of FIGS. 1—6 except as expressly shown or described herein. Portions of FIG. 11 corresponding to portions of FIG. 1 are designated by corresponding reference numerals followed by the letter *c*.

In FIG. 11, a zone of the sheet material of the tear portion 27*c* has been offset downwardly to form a relatively broad dimple having an end wall 101 and a peripheral wall 103 with the peripheral wall surrounding the end wall and integrally joining the latter to the remainder of the tear portion 27*c*. The score line 41*c* is formed entirely in the end wall 101 and it may be identical to the score line 41. The formation of the dimple will ordinarily result in the thinning of the sheet material forming the dimple so that the end wall 101 may be of a lesser thickness than the surrounding regions of the tear portion 47*c*.

A tab 29*c* which may be identical to the tab 29 has a rupturing element 63*c* which is identical to the rupturing element 63. The rupturing point 67*c* generally overlies the score line 41*c* in the manner illustrated in FIG. 2. Thus, by manually depressing the rupturing element 63*c*, the rupturing point 67*c* is forced against the score line 41*c* to initiate severance thereof to form a vent opening.

The advantage of the embodiment of FIG. 11 is that by locating the score line 41*c* in the end wall 101, a substantial space is provided between the rupturing point 63*c* and the score line 41*c*. Thus, minor pressures which might be exerted downwardly against the rupturing element 63*c* would be insufficient to deflect the rupturing element sufficiently to rupture the score line 41*c*. In this manner, some protection against inadvertent rupture of the score line 41*c* is provided. Of course, the protective features illustrated in FIG. 11 could also be applied to the other embodiments of this invention.

Although exemplary embodiments of the invention have been shown and described, many changes, modifications, and substitutions may be made by one having ordinary skill in the art without necessarily departing from the spirit and scope of this invention.

I claim:

1. An easy opening container wall comprising:
   - a container wall of sheet material having a line of weakness therein defining a tear portion at least partially removable therefrom;
   - said container wall having a rupturable region therein other than said line of weakness;
   - tab means attached to the container wall and movable to initiate severance of the tear portion from the container wall; and
   - said tab means including rupturing means movable generally toward said rupturable region prior to said movement of said tab means to rupture said rupturable region and to form a vent opening in said container wall whereby a substantial period of time is provided for pressure equalization through said vent opening prior to the severance of the line of weakness by said tab means.

2. An easy opening container wall as defined in claim 1 wherein said tab means includes a first segment movable to rupture the line of weakness and a handle portion manually grippable to move said first segment, said rupturing means forming a portion of said first segment and being manually movable to rupture the rupturable segment.

3. An easy opening container wall as defined in claim 1 wherein said rupturable region is offset downwardly to space the rupturable region from the rupturing means.

4. An easy opening container wall as defined in claim 1 including means on said container wall radially inwardly of the periphery thereof having a surface above the rupturing means to prevent an object placed above said rupturing means from moving said rupturing means toward the rupturable region sufficiently to rupture the latter.

5. An easy opening container wall comprising:
   - a container wall of sheet material having a line of weakness therein defining a tear portion at least partially removable therefrom;
   - said container wall having a weakened region thereon other than said line of weakness; and
   - a tab attached to the container wall to initiate severance of the tear portion from the container wall, said tab includ-

ing a rupturing element, at least a portion of said rupturing element generally confronting at least a portion of the weakened region, said rupturing element being movable generally toward said weakened region and being capable of applying sufficient force to said weakened region to rupture same to provide a vent opening in said container wall whereby upon manipulation of said tab the tear portion can be at least partially severed from said container wall.

6. An easy opening container wall defined in claim 5 wherein said weakened region includes a score line.

7. An easy opening container wall as defined in claim 5 wherein said weakened region includes a coined region.

8. An easy opening container wall as defined in claim 5 wherein said tear portion is in the form of a relatively large area panel, said tab including a lever portion, said lever portion being attached to the container wall at an attachment location with one end of the lever portion being closely adjacent the line of weakness, said other end of said lever portion being movable away from the container wall to initiate severance of the line of weakness, said weakened region including a score line in the container wall closely adjacent the attachment location and between the attachment location and said other end of said lever portion whereby following initiation of rupture of the score line by the rupturing element said score line is further ruptured in response to movement of said other end of said lever portion away from the container wall to thereby facilitate such movement of the lever portion and consequent rupture of the line of weakness.

9. An easy opening container wall comprising:

a container wall of sheet material having a line of weakness therein defining a tear portion at least partially removable therefrom;

tab means attached to the container wall and movable to initiate severance of the tear portion from the container wall; and

said tab means including rupturing means movable generally toward the container wall and relative to the remainder of said tab means to rupture a region of said container wall to form a vent opening prior to said movement of said tab means to initiate severance of said line of weakness.

10. A tab of the type useable to initiate severance of a tear portion of an easy opening container wall comprising:

a lever segment of sheet material attachable to the easy opening container wall and manually movable to initiate severance of the tear portion therefrom, said lever segment having means to stiffen the lever segment longitudinally;

a rupturing element of sheet material integrally joined to said lever segment, said rupturing element being freed of said lever segment along a substantial length of the periphery thereof, the sheet material at the juncture of the rupturable element and the lever segment being sufficiently pliable to permit movement of the rupturable element toward the container wall relative to the lever segment; and

said rupturing element having an outwardly facing surface which can be manually pushed to push the rupturing element toward the easy opening container wall, said rupturing element having a relatively sharp rupturing nose engageable with the container wall to form an opening therein in response to the manual pushing on said surface.

11. A tab as defined in claim 10 wherein said lever segment circumscribes said rupturing element.

12. A tab as defined in claim 10 including a ringlike handle segment joined to said lever segment by a pliable connecting segment whereby the pliable connecting segment facilitates movement of the handle segment away from the easy opening container wall to permit easy gripping thereof.

13. A container comprising:

a container body;

a container end affixed to one end of said container body, said container end including a line of weakness defining a tear portion at least partially removable therefrom;

a tab affixed to the container end to initiate severance of said tear portion;

a reclosure cap removably mounted over said container end, said reclosure cap having an end wall which covers at least a major part of the container end, at least a portion of said end wall being movable inwardly toward the container end; and

means on said container end responsive to the inward movement of said portion of said reclosure cap to form a vent opening in the container end.

14. A container as defined in claim 13 wherein said vent opening is formed in said container end at a location other than at the line of weakness.

15. A container as defined in claim 13 wherein said tab includes a depressible rupturing element, said rupturing element being movable toward the container end by said portion of said end wall to thereby rupture the container end to form said vent opening.