CONTAINER CLOSURE

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This invention relates in general to new and useful improvements in container closures, and more particularly to a container closure of the easy opening type.

This invention particularly relates to an easy opening container closure of the type which includes a removable tear strip defined by score lines and to which there is attached a grip member to facilitate the removal thereof. Although numerous container closures of this type have been devised, those which are commercially feasible have obvious deficiencies which will not be discussed here. It is, however, the primary object of this invention to provide a novel container closure of the easy opening type which has all of the advantages of container closures of this type which are presently commercially available and which eliminates substantially, if not all, of the deficiencies of such container closures.

A primary advantage of the container closure of this invention is, therefore, the construction of the grip member and the relationship thereof to the tear strip which permits the tear strip to be initially torn from the end panel of the container closure with an application of force to the grip member which is only a small fraction of that which is required with presently available easy opening container closures.

Another object of the invention is to provide a container closure which may be utilized with beverages which are either carbonated or packed under pressure, the container closure having a tear strip construction and a related grip member which so cooperate whereby in the opening of a container of which the container closure is a part, a small vent opening is initially formed at one end of the tear strip and the compressed gases within the container are vented therethrough.

Another object of the invention is to provide a container closure of the easy opening type wherein the tear strip thereof is provided with a grip member of the ring type which will provide a positive finger grip for the tearing out of the tear strip after the initial rupture of the container closure so as to eliminate accidental slippage of one's fingers with respect to the grip member and thereby prevent the cutting or skimming of one's fingers.

Still another object of this invention is to provide in an easy opening container closure a tear strip and grip member assembly wherein the grip member includes a pair of levers producing cans which straddle one end of the tear strip and rest on a major portion of the can with the grip member being recessed intermediate the cans to provide for an upward bowing of the tear strip between the cans prior to and at the time of the initial rupture of the container closure whereby the grip member in no way works against itself during the rupturing of the container closure to remove the tear strip.

A further object of this invention is to provide in an easy opening container closure of the type which includes a tear strip defined by score lines, a grip member, the grip member having one end portion thereof secured to a starting end of the tear strip and being provided with lifting cams disposed on opposite sides of the tear strip outside of the score lines with the cams resting upon a relatively rigid portion of the container closure and thereby supporting the starting end of the tear strip and preventing the accidental breaking of the container closure along the score lines at the starting end of the tear strip.

Yet another object of this invention is to provide in an easy opening container closure for use with a container for liquids, a tear strip which defines a tear drop shaped opening when removed and with the end of the opening adjacent the outer periphery of the container closure being of a maximum width and generally semi-circular in outline whereby even pouring of the packaged liquid through the opening is greatly facilitated in that liquid has a normal tendency to assume a circular cross section pattern when poured.

A still further object of this invention is to provide in an easy opening container a tear strip arrangement which includes score lines defining a tear strip and with the container closure being beveled on opposite sides of the score lines for the major portion of the periphery of the tear strip to simultaneously depress that portion of the container closure which will have a sharp edge when the tear strip is removed therefrom to thereby prevent the contacting of one's mouth with the sharp edge and to reinforce the end panel of the container closure against undesired buckling and flexing.

Still another object of this invention is to provide in a container closure of the easy opening type a depression generally aligned with one end of the grip member of a tear strip portion of the container closure, the depression providing the necessary clearance for the engagement of one's finger beneath the grip member and at the same time reinforcing the container closure end panel against undesired buckling and flexing.

A still further object of this invention is to provide in a container closure of the easy opening type a novel tear strip arrangement wherein the tear strip is defined by score lines and the score lines at the starting end of the tear strip are of a greater depth than adjacent portions thereof whereby the use of this invention is not restricted to container closures formed of aluminum and other soft metals, but may be utilized in harder metals, such as steel, including the thin work hardened steels which are presently being developed for container construction.

Yet another object of this invention is to provide a novel method of forming a container closure having a tear strip therein wherein the necessary scoring and recessing of the container closure end panel may be accomplished to define a readily removable tear strip without undue buckling and other distortion of the container closure end panel.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:
FIGURE 1 is a top perspective view of a can having the upper end thereof closed by means of a closure formed in accordance with this invention.
FIGURE 2 is a plan view of the can of FIGURE 1 and shows the specific details of the easy opening feature of the closure thereof.
FIGURE 3 is a perspective view of the grip member or opening ring carried by the can closure.
FIGURE 4 is an enlarged plan view of a can closure or end as it appears prior to the securement thereof to the can body and prior to the attachment of the opening ring thereto.
FIGURE 5 is an enlarged fragmentary transverse vertical sectional view taken along the line 5—5 of FIGURE 4 and shows the specific cross section of the end panel of the can end through the tear strip portion thereof.
FIGURE 6 is an enlarged fragmentary vertical sectional view taken generally along the line 6—6 of FIG-
URE 4 and shows the specific differential scoring of the end panel to define the tear strip.

FIGURE 7 is an enlarged fragmentary longitudinal vertical sectional view taken along the line 7-7 of FIGURE 4 and shows the specific details of the recess formed in the end panel in alignment with the tear strip.

FIGURE 8 is an enlarged fragmentary transverse vertical sectional view taken along the line 8-8 of FIGURE 4 and shows the transverse cross section of the recess of a can end showing the initial step in the forming of the easy opening features therein.

FIGURE 10 is a plan view similar to FIGURE 9 and shows the second step in the forming of the easy opening features in the can end, the formation of the score lines defining the tear strip being completed.

FIGURE 11 is an enlarged fragmentary vertical sectional view taken along the line 11-11 of FIGURE 2 and shows the specific details of the easy opening features of the can end.

FIGURE 12 is a vertical sectional view similar to FIGURE 11 and shows the opening ring lifted to the position where rupture of the end panel at the starting end of the tear strip occurs.

FIGURE 13 is a fragmentary vertical sectional view taken generally along the line 13-13 of FIGURE 12 when the opening ring is in the position shown in FIGURE 12.

FIGURE 14 is a sectional view similar to FIGURE 11 and shows the opening ring lifted to a fully upright position wherein the rupture of the starting end of the tear strip from the end panel is completed.

FIGURE 15 is an enlarged fragmentary plan view of the can end of FIGURE 14 showing the specific details of the vent opening formed in the end panel at the time of the rupture of the starting end of the tear strip from the end panel.

FIGURE 16 is another vertical sectional view similar to FIGURE 11 and shows the opening ring being pulled and the tear strip being torn from the end panel of the can end.

It is to be understood that the principles of this invention may be readily applied to closures for any suitable type of container which is adaptable to the use of an easy opening closure. However, for descriptive purposes only, the invention will be specifically described with respect to a beverage can, such as a beer can.

Referring now to the drawings in particular, reference is first made to FIGURE 1 wherein there is illustrated a conventional beer can which is generally referred to by the numeral 20. The beer can 20 includes a can body 21 of a conventional type. The can body 21 has the upper end thereof closed by means of a can end which is generally referred to by the numeral 22.

The can end 22, except for the easy opening features thereof, is of a conventional construction and is secured to the can body 21 by means of a conventional double seam 23.

The can end 22, as is shown in FIGURE 11, is provided immediately adjacent the double seam 23 with an inwardly or downwardly directed shock absorbing bead 24 which surrounds an end panel 25 of the can end 22.

The shock absorbing bead 24 functions to prevent undue stressing of the end panel 25 should the can 20 be dropped and it hits upon the double seam 23 with sufficient impact to break the double seam 23.

In order to facilitate the dispensing of the contents of the can 20, the end panel 25 is provided with a removable tear strip 26 which, when removed, defines a combined pouring and vent opening in the can end 22. It is to be noted that the tear strip 26 is of a tear drop outline and the inner end thereof is defined by a small radius curve 27 while the outer end thereof is defined by a large radius curve 28. The curve 27 has an extent slightly less than 180° while the curve 28 has an extent slightly greater than 180°. The tear strip 26 is defined intermediate the curves 27 and 28 by a pair of straight lines 29 which extend tangential to the curves 27 and 28. It is to be noted that the large radius curve 28 is disposed closely adjacent the shock absorbing bead 24 to facilitate the pouring of liquid through the opening which results when the tear strip 26 is removed. On the other hand, the small radius curve is disposed slightly beyond the center of the end panel 25.

In accordance with this invention, the tear strip 26 is to be removed by first rupturing the end panel 25 along the small radius curve 27 and then pulling the tear strip 26 towards and around the large radius curve 28. In order to facilitate the tearing out of the tear strip 26, the curves 27 and 28 and the straight lines 29 are in the form of score lines. It will be readily apparent that since the outline of the tear strip 26 includes no sharp corners, after the initial rupturing of the end panel 25, the tear strip 26 may be readily torn from the end panel 25 by applying an even pressure pull thereon.

The particular outline of the tear strip 26 has other advantageous features. Although theoretically when pressure is applied to an article defined by a curved weakening line, the rupture of the material will occur at one point along the curved weakening line, the radius of curvature of the weakening line is material as far as the pressure required to effect the initial rupture is concerned. This is because the metal has a tendency to flex and the rupturing pressure is more choral than concentrated. It has been found that by holding the radius of the starting end of the tear strip to a minimum, the rupturing force required is greatly reduced. It has been also found that a radius of 1/8 of an inch for the small radius curve 27 provides a commercially feasible arrangement although radii between 1/16 of an inch and 1/8 of an inch are commercially feasible. It will be readily apparent that larger radii can be utilized, but that as the radius of the curve 27 increases, the rupturing force will also increase.

The radius that the large radius curve 28 is part of a circle and extends at least 180° also is advantageous.

While at first glance it may not appear that the particular shape of the pouring portion of the dispensing opening is critical, it is pointed out that a falling stream of liquid tends to assume a circular cross section and that when liquid flows over a relatively flat surface it produces a curtain as opposed to a stream. When the can 20 is a beverage can, it will be desirable to either drink directly from the can or pour into a relatively small opening container, such as a glass, and as a result, a stream-like flow of the liquid from the can 20 is much more desirable than the usual curtain-type flow now found in existing easy opening containers.

The formation of the tear strip 26 includes another advantageous feature. As will be readily apparent in FIGURES 4 and 5, the end panel 25 is inwardly recessed entirely along the large radius curve 28 and along major portions of the straight lines 29. It will be seen that the end panel 25 is of a V-shaped cross section along these portions of the above-mentioned lines. Accordingly, the end panel 25 may be considered as having an inwardly or downwardly directed V-shaped bead 30 along the entire large radius curve 28 and major portions of the straight lines 29. The primary purpose of the V-shaped bead 30 is to effect an inwardly beveling of the can end 25 around the major portion of the tear strip 26 so that when the tear strip 26 is removed from the end panel 25 the resultant raw edge of the metal defining the dispensing opening in the end panel 25 will be inwardly recessed so as to prevent the accidental contact thereof with the inside of the mouth when one drinks from the can 20. However, the formation of the V-shaped bead 30 also produces an unexpected and highly desirable result. While the V-shaped bead 30 is relatively shallow, as is clearly shown in FIGURE 5, it reinforces the end panel 25 beyond all expectations so that undesired flexing of the end panel 25 and accidental rupture thereof around the tear strip 26 is prevented.
Reference is now made to FIGURES 4 and 6 wherein it will be clearly seen that the several lines defining the tear strip 26 are actually in the form of score lines. It will also be readily apparent from FIGURES 4 and 6 that the scoring of the end panel 25 along the small radius curve 27 and adjacent portions of the straight lines 29 is deepening along the remainder of the perimeter of the tear strip 26. The purpose of the differential scoring which provides for a deep score 31 and a shallower score 32, is to provide for easy rupture of the end panel along the small radius curve 27 followed by easy internal tearing of the tear strip from the end panel along the straight lines 29 by utilizing scoring of different depths, the formation of the can end 22 is not restricted to aluminum and other relatively soft metals, but may be utilized with cheaper and stronger metals, such as steel. In fact, the differential scoring has permitted the use of hard relatively thin steel which has only recently become available to the can making industry and with which it was not heretofore feasible to form easy opening closure members.

It is pointed out at this time that although the end panel 25 is deeply scored along the deep score 31, that portion of the tear strip 26 defined by the deep score 31 is insufficient to prevent the force exerted by the can end 22 with this small area of the tear strip 26 is insufficient to effect any accidental rupture of the end panel 25 under normal handling conditions. On the other hand, the end panel 25 is protected against an impact blow so that portion of the tear strip 26 which is defined by the deep score in a manner to be described hereinafter. At this time it is pointed out that the portion of the tear strip 26 defined by the deep score 31 may be considered the starting portion or starting end of the tear strip 26 for descriptive purposes.

Reference is now made to FIGURE 9 wherein it will be seen that in making the can end 22 of the easy opening type, the relatively deep score line 31 may be formed in one operation and the shallower score line 32 in another operation.

It is to be understood that when the can end 22 is formed of a relatively strong and hard metal, such as a work hardened steel, not only is accuracy of scoring necessary, but also steps must be taken to assure that there will be no undue stressing of the metal which will cause premature fracture thereof. Accordingly, the different depth scores may be formed in a single or successive stages, to better control resistance to the force required for initiating the opening operation, and depending on the type of metal used in the can end.

After the score lines defining the tear strip 26 have been formed, the beading of the end panel 25 around the tear strip 26 takes place to produce the reshaped bead 30 of FIGURES 4 and 5. It is to be understood that this beading is formed between a pair of dies and at the time the bead 30 is formed, further forming of the end panel 25 takes place in a manner which will be described hereinafter.

In order to facilitate the removal of the tear strip 26, an opening ring, which is generally referred to by the numeral 33, is provided. The opening ring 33 is formed of wire and is best illustrated in FIGURE 3. It is to be noted that the opening ring 33 includes a loop portion 34 which includes a semi-elliptical rear portion 35 and a pair of convex portions 36. The legs 36 meet and terminate in a generally W-shaped forward portion 37. The W-shaped forward portion includes a pair of relatively short legs 38 which may be parallel or which may slightly diverge and which are connected to the legs 36 by intermediate curved portions 39. The opposite ends of the legs 38 terminate in sharply reversely turned portions 40 which may be broadly considered as cans. The cans 40 are spaced apart and are connected together by a generally inverted U-shaped portion which includes two short legs 41 connected together by a bight portion 42. It is to be noted that the bight portion 42 is flattened so as to provide a greater area for a reason to be described in more detail hereinafter.

The opening ring 33 is secured to the bight portion 42 as a continuation thereof. When the opening ring 33 is properly positioned with respect to the tear strip 26, the center of the bight portion 42 is disposed slightly towards the large end of the tear strip 26 from the center of curvature of the small radius curve 27. The flattened bight portion 42 is suitably secured to the starting portion of the tear strip 26 in this position. It is to be understood that the manner in which the bight portion is secured to the tear strip starting portion is not a part of this invention. However, it has been found that it may be readily secured in place by conventional spot welding although other types of welding may be utilized.

It is to be noted from FIGURE 2 in particular that the flattened bight portion 42 substantially overlies the starting end of the tear strip 26, particularly the small radius curve 27 defining the same. The legs 41 continue across the tear strip and project outwardly of the tear strip on opposite sides thereof so that the cans 40 are definitely positioned in overlying relation to the end panel 45 in a spaced relation to the tear strip 26 on opposite sides thereof. Also, it will be seen that the legs 41 bear upon the end panel 25 outwardly of the tear strip 26. Thus, substantially the entire W-shaped forward portion 37 of the opening ring 33 serves to support the starting end of the tear strip 26 against inward deflection resulting from an accidental blow struck thereon, thereby preventing the accidental fracturing of the end panel 25 along the deep score line 31. It is this combined supporting of the starting end of the tear strip and the projection of the deep score 31 around the small radius curve 27 which makes the extremely deep scoring of the end panel 25 possible from a practical standpoint.

Referring now to FIGURE 11 in particular, it will be seen that the part of the loop portion 34 remote from the tear strip 26 is upwardly offset so as to provide clearance between it and an associated portion of the end panel 25. This facilitates the placing of one's finger beneath the loop portion 34 to effect an upwardly directed force on the opening ring 33.

In order to further facilitate the proper engagement of the rear portion 35 of the loop portion 34, the end panel 25 is also provided with a recess 43 which is best shown in FIGURES 4, 7 and 8. The recess 43 is preferably aligned with the rear portion 35 of the opening ring. It is to be noted that transversely to the axis of the tear strip 26, as is shown in FIGURE 8, the recess 43 includes a bottom 44 and a pair of downwardly sloping flanges 45. On the other hand, along a section line extending along the longitudinal axis of the tear strip 26, as is best shown in FIGURE 7, the recess is defined along the inner side thereof by a downwardly sloping flange 47, like the flanges 45, but on the outer boundary thereof, the recess is bordered by a small upstanding rib 48. The rib 48 separates the recess 43 from the shock absorbing bead 24 and prevents flexing of the end panel 25 along a line through the longitudinal axis of the tear strip 26. It will also be apparent that the flanges 45 and 47, together with the offset bottom wall 44 also greatly stiffen the end panel 25 against flexure. Thus, the recess 43 has the dual function of providing clearance for one's finger beneath the rear portion 35 of the opening ring 33 and reinforcing the end panel 25 against undue flexure. The reinforcement provided by the recess 43, coupled with the reinforcement provided by the V-shaped bead 36, provides for an extremely rigid end panel construction.

The recess 43 may be formed at the time the V-shaped bead 30 is formed.

The advantages of the shapes of the opening ring 33 and the tear strip 26 are much greater than those which would appear at first glance. The normal easy opening can which is presently in use and which utilizes a pull tab
which is secured to the tear strip by means of a rivet requires approximately 12 to 15 pounds pressure to effect the lifting of the pull tab to a position where rupture of the starting end of the tear strip occurs. Furthermore, because of this relatively great opening force and the force applied on the tear strip by the compressed gases within the associated can when the product is a pressure packed product, the initial rupture of the end panel is not restricted to a very small portion thereof, but entirely around the rivet and into the straight portions of the tear strip. This rapid opening of the can end is undesirable for two reasons. In the first place, the sudden formation of a large opening in the end panel does not provide for a sloven venting of the gases from within the can with the result that there is a sudden outward flow of a large quantity of the gases with these gases carrying liquid with them in many instances. Secondly, because the initial opening action extends beyond the mere rupture of the end panel and in part becomes a tearing operation with respect to the removal of the tear strip, due to the pressure exerted on the tear strip by compressed gases within the can, this tearing action oftentimes continues uncontrolled with the result that the entire tear strip and its associated pull tab are blown from the can end in a highly undesirable manner.

With the opening ring 33 and the tear strip 26, after the initial fracture of the end panel 25 along the small radius curve 27, due to the relationship of the opening ring 33 and the starting end of the tear strip 26, the starting end of the tear strip is folded upwardly as the opening ring 33 is pivoted upwardly to define a small vent opening 49, as is clearly shown in FIGURES 14 and 15. It is to be noted that the vent opening 49 is formed prior to the exertion of any tearing force which would effect the tearing out of the tear strip 26 from the end panel 25. Furthermore, it is to be noted that the vent opening 49 is completely formed while the cams 40 of the opening ring 33 are still bearing on the end panel 25 in a manner so as to prevent accidental tearing out of the tear strip 26 beyond the mere forming of the vent opening 49. It is further to be noted that when the opening ring 33 is moved beyond the initial rupture position shown in FIGURE 12 to a fully operative position shown in FIGURE 14, which may possibly quickly occur after the initial rupture, no tear strip removable tearing force can be applied with the opening ring 33.

Referring to FIGURES 12 through 16 in particular with reference to the sequence of the opening of the can 26, it will be seen that when the opening ring 33 is initially lifted, cracking of the end panel 25 along that portion of the deep score line 31 around the small radius curve 27 will occur when the opening ring 33 is lifted to an approximately 45° position. Prior to the time the cracking occurs, due to the leverage of the opening ring 33, it will be seen that a lifting force is exerted on the starting end of the tear strip 26 by the legs 41 and the bight portion 43 due to the pivoting of these portions with the remaining portions of the opening ring 33 about the cams 40. This lifting force on the starting end of the tear strip 26 results in an upward bulging of the starting end of the tear strip. This upward bulging is permitted due to the spacing of the cams 40, as is clearly shown in FIGURE 13. As a result, the opening ring 33 exerts only an upwardly directed force on the starting end of the tear strip and in no way directs a downward force thereagainst as in the case of an opening device which extends entirely across the tear strip in contact therewith. The provision of the clearance for the bulging tear strip greatly reduces the force required to effect the initial rupture of the end panel 25 and the force less than two pounds has proved to be sufficient.

After the initial rupture of the end panel 25 takes place, as is shown in FIGURE 12, the opening ring 33 is continued to be pivoted until it reaches an upright position and the vent opening 49 is definitely defined. During this pivoting of the opening ring 33, the pull is exerted by one's finger, preferably one's forefinger, towards the person opening the can. As a result, the vent opening opens away from the individual and any liquid spray that may pass through the vent opening 49 will be directed away from the person opening the can. After the opening ring 33 has been lifted to its upright position, it is merely necessary for the person opening the can to then slip his or her finger through the loop portion 34 of the opening ring and continue to pull the opening ring towards himself or herself. This results in the tearing of the end panel 25 along the straight lines 29 in a smooth manner and with a minimum of force being required. With respect to the amount of force required, it is pointed out that the deep score 31 extends beyond the position where the opening ring is in its upright position of FIGURE 14 so that the initial tearing by pulling on the opening ring is along a relatively weak portion of the end panel 25.

It will be readily apparent that as the tearing of the tear strip 26 from the end panel 25 continues, as is shown in FIGURE 13, since the straight lines 29 smoothly converge into the relatively large radius curve 28, there will be no momentary increase in the force necessary to tear out the tear strip 26 and the complete tearing out operation will be a smooth one. Making further reference to the opening ring 33, it is here pointed out that it may be economically formed from readily available steel wire and that due to the specific configuration of the opening ring, particularly the W-shaped portion 37 thereof and the relationship of the W-shaped portion to the legs 36, there is a resistance to the bending of the wire from which the opening ring 33 is formed. It has been found in practice that the size wire required to resist the bending forces is much less than that required to provide for the comfortable engagement of one's fingers with the opening ring 33. As a result, no bending problem occurs with the opening ring 33 and all possibilities of accidental finger slippage with respect thereto and the cutting of one's finger is eliminated.

Although only a preferred embodiment of the invention has been specifically illustrated and described, it is to be understood that minor variations may be made in the disclosed easy opening container construction within the spirit and scope of the invention, as defined by the appended claims.

We claim:
1. A tear strip assembly comprising a panel, a tear strip defined in said panel by spaced score lines in said panel, said score lines including a small radius curve portion at least in part defining a starting end of said tear strip, and a pull member fixedly and rigidly connected to said tear strip starting end for facilitating the removal of said tear strip from said panel, at least said small radius curve portion of said score lines being of a maximum depth to present a line of least resistance to tearing to facilitate the starting of the removal of said tear strip, and said pull member having a generally W-shaped forward portion including an inverted generally V-shaped central part and a pair of outer legs connected to said generally V-shaped central part by curved portions defining cams, said generally V-shaped portion extending across said tear strip with said cams being disposed outwardly of said tear strip and overlapping said panel for supporting said tear strip starting end against inward displacement to thereby resist accidental rupturing of said panel at said tear strip starting end.
2. A tear strip assembly comprising a panel, a tear strip defined in said panel by spaced score lines in said panel, said score lines including a small radius curve portion at least in part defining a starting end of said tear strip, and a pull member securely connected to said tear strip starting end for facilitating the removal of said tear
strip from said panel, at least said small radius curve portion of said score lines being of a maximum depth to present a line of least resistance to tearing to facilitate the starting of the removal of said tear strip, said pull member being formed of wire and including a generally W-shaped forward portion which includes a generally inverted V-shaped central part and a pair of outer legs connected to said generally V-shaped central part by arcuate portions in the form of cams, said generally V-shaped portion being formed by two diverging legs connected together by a flattened bight portion which directly overlies said tear strip starting end and is rigidly secured thereto, said generally V-shaped portion legs extending across said score lines with said cams being disposed in overlying relation to said panel outwardly of said tear strip and being restable on said panel to resist accidental rupturing of said panel by an inward displacement of said tear strip starting end.

3. The tear strip assembly of claim 2 wherein the rigid connection between said pull member and said tear strip is in the form of a weld.

4. In a container panel, a tear strip for defining a combined dispensing and vent opening for liquids, said tear strip being defined by score lines including a large radius curve and a spaced small radius curve joined by two generally straight lines, said large radius curve primarily defining a pour portion whereby a liquid stream flow is facilitated and said small radius curve primarily defining a vent portion, said large radius curve being of an extent greater than 180 degrees and said small radius curve being of an extent less than 180 degrees, said panel having an inwardly directed bend extending along said large radius curve and major portions of said straight lines to both reinforce said panel around said tear strip and to recess major portions of said score lines to prevent accidental engagement of raw edges of said panel defining the opening when said tear strip is removed.

5. In a container panel, a tear strip for defining a combined dispensing and vent opening for liquids, said tear strip being defined by score lines including a large radius curve and a spaced small radius curve joined by two generally straight lines, said large radius curve primarily defining a pour portion whereby a liquid stream flow is facilitated and said small radius curve primarily defining a vent portion, said large radius curve being of an extent greater than 180 degrees and said small radius curve being of an extent less than 180 degrees, said panel having an inwardly directed bend extending along said large radius curve and major portions of said straight lines to both reinforce said panel around said tear strip and to recess major portions of said score lines to prevent accidental engagement of raw edges of said panel defining the opening when said tear strip is removed, said score lines being of a maximum depth along said small radius curve to facilitate the initial rupture of said panel.

6. A pull member for securement to a tear strip, said pull member being formed of wire-like material and including a generally W-shaped forward portion and a rear grip portion, said W-shaped forward portion including a central inverted generally V-shaped portion and two legs connected to said V-shaped portion by arcuate portions defining cams, said V-shaped portion having means for facilitating the welding of said pull member to a tear strip.

7. A pull member for securement to a tear strip, said pull member being formed of wire-like material and including a generally W-shaped forward portion and a rear grip portion, said W-shaped forward portion including a central inverted generally V-shaped portion and two legs connected to said V-shaped portion by arcuate portions defining cams, said V-shaped portion having means for facilitating the rigid securement of said pull member to a tear strip including a central securement portion in the form of a flattened bight portion.

8. A pull member for securement to a tear strip, said pull member being formed of wire-like material and including a generally W-shaped forward portion and a rear grip portion, said W-shaped forward portion including a central inverted generally V-shaped portion and two legs connected to said V-shaped portion by arcuate portions defining cams, said grip portion being in the form of a loop including converging portions connected to said legs by outturned arcuate portions which rigidly the connections between said loop and said W-shaped portion and prevent bending of said pull member at said connections.

9. A panel having opening facilitating means including a removable tear strip for defining a dispensing opening and a pull member, said pull member being formed of wire-like material and including a generally W-shaped forward portion and a rear grip portion, said W-shaped forward portion including a central inverted generally V-shaped portion and two legs connected to said V-shaped portion by arcuate portions defining cams, said tear strip having a starting end, and said V-shaped portion being permanently and rigidly secured to said starting end with said cams being disposed outwardly of said tear strip for bearing on said panel to effect a lifting of said tear strip starting end with the configuration of said V-shaped portion providing clearance for an upward bulging of said tear strip between said cams.

10. The opening facilitating means of claim 9 wherein in said pull member forms an extension of said tear strip.

11. A panel having opening facilitating means including a removable tear strip for defining a dispensing opening and a pull member, said pull member being formed of wire-like material and including a generally W-shaped forward portion and a rear grip portion, said W-shaped forward portion including a central inverted generally V-shaped portion and two legs connected to said V-shaped portion by arcuate portions defining cams, said tear strip having a starting end, and said V-shaped portion being secured to said starting end with said cams being disposed outwardly of said tear strip for bearing on said panel to effect a lifting of said tear strip starting end with the configuration of said V-shaped portion providing clearance for an upward bulging of said tear strip between said cams, said grip portion being in the form of a loop including converging portions which rigidly the connections between said loop and said W-shaped portion and prevent bending of said pull member at said connections.

12. The opening facilitating means of claim 9 wherein in said tear strip is tear strip in outline to define a combined vent and dispensing opening particularly adapted for dispensing liquids, said tear strip being defined by score lines including a large radius curve and a spaced small radius curve joined by two generally straight lines, said small radius curve being at said starting end, the configuration of said tear strip facilitating both the removal thereof and pouring of a liquid through the resultant opening when said tear strip is removed.

13. A can end for cans containing liquids comprising a peripheral seaming flange and an end panel, a tear strip in said end panel defined by score lines, said tear strip being tear shaped in outline and including an outer large radius curve adjacent said seaming flange and an inwardly spaced small radius curve joined by two generally straight lines, a pull member welded to the inner end of said tear strip for facilitating the tearing thereof from said end panel and forming an extension thereof, said pull member including a lifting end remote from said tear strip and cam means adjacent said tear strip and engageable with said end panel outwardly of said tear strip on opposite sides thereof to effect a lifting of the inner end of said tear strip on rupture of said cam means being located along a line traversing said tear strip intermediate the welded connection be-
being tear shaped in outline and including an outer large radius curve adjacent said flange and an inwardly spaced small radius curve joined by two generally straight lines, a pull member secured to the inner end of said tear strip for facilitating the tearing thereof from said end panel and forming an extension thereof, said pull member being formed of wire and including a lifting end remote from said tear strip and cam means adjacent said tear strip engageable with said end panel outwardly of said tear strip on opposite sides thereof to effect a lifting of the inner end of said tear strip to rupture said end panel, said end panel being recessed below said pull member lifting end to facilitate the engagement thereof, said panel recess being defined by upstanding walls and rigidifying said end panel against flexure.

15. A can end for cans containing liquids comprising a peripheral seaming flange and an end panel, a tear strip in said end panel defined by score lines, said tear strip being tear shaped in outline and including an outer large radius curve adjacent said seaming flange and an inwardly spaced small radius curve joined by two generally straight lines, a pull member secured to the inner end of said tear strip for facilitating the tearing thereof from said end panel and forming an extension thereof, said pull member being formed of wire and including a lifting end remote from said tear strip and cam means adjacent said tear strip engageable with said end panel outwardly of said tear strip on opposite sides thereof to effect a lifting of the inner end of said tear strip to rupture said end panel, said end panel being recessed below said pull member lifting end to facilitate the engagement thereof, said panel recess being defined by upstanding walls and rigidifying said end panel against flexure, said panel having an inwardly directed bead extending along said large radius curve and major portions of said straight lines to both reinforce said panel around said tear strip and to recess major portions of said score lines to prevent accidental engagement of raw edges of said panel defining the opening when said tear strip is removed.

16. A can end for cans containing liquids comprising a peripheral seaming flange and an end panel, a tear strip in said end panel defined by score lines, said tear strip being tear shaped in outline and including an outer large radius curve adjacent said seaming flange and an inwardly spaced small radius curve joined by two generally straight lines, a pull member secured to the inner end of said tear strip for facilitating the tearing thereof from said end panel and forming an extension thereof, said pull member being formed of wire and including a lifting end remote from said tear strip and cam means adjacent said tear strip engageable with said end panel outwardly of said tear strip on opposite sides thereof to effect a lifting of the inner end of said tear strip to rupture said end panel, said end panel being recessed below said pull member lifting end to facilitate the engagement thereof, said panel recess being defined by upstanding walls and rigidifying said end panel against flexure, a peripheral shock absorbing bead surrounding said end panel closely adjacent said recess, and one of said recess walls being in the form of an upward rib separating said recess from said bead.

17. A can end for cans containing liquids comprising a peripheral seaming flange and an end panel, a tear strip in said end panel defined by score lines, said tear strip being tear shaped in outline and including an outer large radius curve adjacent said seaming flange and an inwardly spaced small radius curve joined by two generally straight lines, a pull member secured to the inner end of said tear strip for facilitating the tearing thereof from said end panel and forming an extension thereof, said pull member being formed of wire and including a lifting end remote from said tear strip and cam means adjacent said tear strip engageable with said end panel outwardly of said tear strip on opposite sides thereof to effect a lifting of the inner end of said tear strip to rupture said end panel, said end panel being recessed below said pull member lifting end to facilitate the engagement thereof, said panel recess being defined by upstanding walls and rigidifying said end panel against flexure, a peripheral shock absorbing bead surrounding said end panel closely adjacent said recess, and one of said recess walls being in
the form of an upstanding rib separating said recess from said bead.

21. An easy opening panel construction including a tear strip defined by score lines, said tear strip having a starting end defined by a small radius curve, a pull member forming an extension of said tear strip, said pull member having a connecting portion welded to said starting end and portions on opposite sides of said connecting portion terminating in cam means, said cam means being disposed on opposite sides of said tear strip and along a line traversing said tear strip.

22. The panel construction of claim 21 wherein said small radius curve has a radius ranging between \( \frac{1}{2} \) inch and \( \frac{3}{8} \) inch.