

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in or relating to Metal Containers Provided with Tear Strips.

We, CONTINENTAL CAN COMPANY, INC., of 633, Third Avenue, New York 17, State of New York, United States of America, a Corporation organized and existing under the laws of the State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in metal containers provided with tear strips.

Container ends are presently being provided with tear strip for effecting the removal of a portion or substantially all of the end panel thereof. However, the score lines, which are in effect weakening lines, result in end panels which do not have the strength of normal end panels. It is, therefore, a primary object of this invention to provide an easy opening container end of the kind which is provided with a removable portion defined by score lines and wherein the end panel is provided with reinforcements in the form of portions thereof offset from the normal plane of the end panel in a manner so as to increase the resistance of the end panel against forces normally applied thereto thereby minimizing the possibility of prematurely fracturing the score lines.

In the forming of container ends of the easy opening kind, heretofore when it was desired to remove substantially all of the end panel, a narrow tear strip was defined on the end panel by means of score lines, the tear strip extending entirely about the periphery of the end panel. As a result, particularly in the case of medium and large diameter containers, the tear strip is of such

a length whereby it is difficult for one to complete the removal of the tear strip in a single pulling operation. The tear strip of the container end of this invention has been made even wider than normal with the result that the inner score line is relatively short as compared to the outer score line, and therefore, when the tear strip is removed, it has a tendency to assume a spiral configuration and the over-all effective length of the tear strip is reduced even though the outer score line length thereof is the same as that in the case of container ends having narrow tear strips. In accordance with this invention, it is further proposed to provide this relatively wide tear strip with a longitudinally extending transverse reinforcement rib while not only serves to strengthen the end panel to prevent accidental fracturing thereof along the score lines, but also to resist the straightening of the tear strip so that the tear strip will be desirably short as compared to previous tear strips and the opening operation will be greatly facilitated.

According to the invention there is provided a container end having an end panel and a peripheral flange for attachment to a container, inner and outer generally concentric weakening lines defining a removable tear strip extending generally around a central portion of the end panel, said tear strip having a starting end defined by portions of the inner and outer weakening lines turned into said central portion and joined by a starting tear line, a rib extending along a major portion of the tear strip between the inner and outer weakening lines to strengthen the tear strip against flexure and premature rupture of said weakening lines, and a pull tab secured to said tear strip starting end.



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[Price 4s. 6d.]

In easy opening container ends, the removable portion of the container end, which is generally referred to as a tear strip, is provided with a pull tab at the starting end thereof to effect the initial rupture of the tear strip from the container end and the final pulling of the tear strip from the container end. In order that containers may be stacked, it is desirable that the pull tab lie flat against the portion of the end panel in which the tear strip is disposed. As a result, it is extremely difficult for one to lift the pull tab, as is necessary in the initial rupture of the tear strip with respect to the container end. In many instances, the only way that the pull tab can be lifted is for one to insert his or her finger nail under the end of the pull tab and apply an upward force on the pull tab therewith. This results in many broken fingernails and such an arrangement has proved to be undesirable. On the other hand, it has been found that if the pull tab does not lie flush with that portion of the container end to which it is secured, the pull tab will possibly be engaged by the seaming apparatus, or by other container handling mechanisms with the result that quite frequently the pull tab is damaged, the pull tab is torn from the tear strip, or the score line defining the tear strip is prematurely ruptured. Accordingly, it is a further object of this invention to provide a container end wherein the end panel thereof has score lines defining a tear strip and the tear strip has secured thereto a pull tab which is flushly mounted with respect to the portion of the end panel to which the pull tab is secured so as to minimize the projection of the pull tab out of the confines of the container end, and at the same time the end of the pull tab which is to be engaged by one's fingers is elevated with respect to the end panel, this being accomplished by downwardly recessing the portion of the end panel which normally underlies the grip end of the pull tab.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a plan view of a container end formed in accordance with this invention, and shows the specific outline thereof.

Figure 2 is a vertical sectional view taken through a container incorporating the container end of Figure 1 generally along the line 2—2 and shows only the upper portion of a lower container and the lower portion of an upper container and the interesting relationship of the container end of the lower container with the bottom of the upper container.

Figure 3 is an enlarged fragmentary sectional view taken generally along the line 3—3 of Figure 1 and shows specifically the contour of the container end.

Figure 4 is an enlarged fragmentary sectional view taken generally along the line 4—4 of Figure 1 and shows further the cross sectional contour of the container end.

Figure 5 is an enlarged fragmentary vertical sectional view taken along the line 5—5 of Figure 3 and shows more specifically the details of the pull tab.

Figure 6 is a fragmentary top perspective view of a can incorporating the can end of this invention and shows the same in a partially opened position, the flat spiral configuration being clearly shown.

Figure 7 is a schematic view of the score line arrangement of the can end.

Figure 8 is an enlarged developed vertical sectional view taken along the outer score line with an intermediate portion thereof being omitted.

Figure 9 is an enlarged fragmentary developed vertical sectional view similar to Figure 8 but along the inner score line.

Referring to the drawings, a container end, and more particularly a can end, is generally referred to by the numeral 5.

The can end 5 is provided with a peripheral curl 6 for effecting the double seaming thereof to a flanged can body in the customary manner. The curl 6 terminates in an inner chuck wall 7 and the area of the can end within the confines of the chuck wall is in the form of an end panel 8. In accordance with this invention, in order to facilitate the opening of a can of which the can end is a part, the end panel 8 is provided with a pair of weakening lines formed by score lines which include an outer score line 9 and an inner score line 10 connected by a starting score line portion 11. For the most part of its length, the score line 9 is circular and concentric with the chuck wall 7. The score line 10 is also for the most part of its length circular and is concentric with the score line 9. However, it will be readily apparent from Figure 1 that the score line 10 does not define a complete circle, as does the score line 9, the score line 10 terminating far short of a complete circle. The score lines 9 and 10, together with the starting score line portion 11, define a tear strip 12, which for the most part is circular, which extends generally around a central portion of the end panel 8, and which includes a starting portion 13 defined by portions of the score lines 9, 10 which are turned into the central portion of the end panel and are joined by the starting score line 11.

In the customary opening of a can of which the can end 5 is a part, the rupture

of the end panel along the score lines 9 and 10 and the score line starting portion 11 is accomplished by means of a pull tab 14 which is secured to a terminal end of the starting portion 13 of the pull tab by means of a rivet 15 which is integrally formed with the tear strip starting portion 13. The pull tab 14 is formed from flat sheet metal stock and, as is best shown in Figure 5, includes a flat central portion 16 through which the rivet 15 passes. The pull tab 14 is reinforced on the opposite sides and around one end of the flat central portion 16 by means of an upstanding flange 17 which terminates in an outwardly directed web 18. The outer edge of the web 18, which web 18 is U-shaped as is shown in Figure 1, is reinforced by a downward and inturned hem 19, Fig. 5. It will be seen that the flange 17, the web 18 and the hem 19 combine to define a generally channel shaped configuration which resists bending. Further, the hem 19 eliminates the exposure of any raw edge which may possibly cut one's fingers during the gripping of the pull tab 14.

Referring now to Figure 3, it will be seen that the end of the pull tab 14 remote from the rivet 15 is upwardly turned to define a terminal grip portion 20. The grip portion 20 is part of the reinforcing described above, but is slightly out of the plane of the main portion of the web 18 and the hem 19 to facilitate the effective gripping thereof.

Should the end panel 8 be of a flush configuration except for the score lines in the rivet 15, it is unduly affected by forces and often there is a premature rupture of the score lines 9 and 10. The forces which act upon the end panel 8 and result in the premature rupture of the score lines include either vacuum or pressure forces, depending upon the contents of the can end and the manner in which the can is filled, as well as the usual forces encountered in the handling of the cans, both prior to filling and after filling, particularly during the shipment of the filled cans. This invention is particularly directed to the reinforcement of the end panel 8 in a manner so as to greatly reduce, if not entirely eliminate, the premature rupture of the score lines.

The outer score line 9 is disposed inwardly of the chuck wall 7, as is best shown in Figure 4. Normally, the score line 9 is disposed as close as possible to the intersection of the end panel 8 and the chuck wall 7. However, in order to strengthen the end panel against any force that may be directed thereto through the dropping of the can on the seam between the can end 5 and the body of the can, or other shocks which are directed against the seam, a shock absorber 21 is formed in the end panel 8 around the outer periphery thereof and im-

mediately adjacent to the circular portion of the score line 9.

There is also a tendency of the end panel 8 to flex in the area of the tear strip 12 with the result that undue forces are directed along the score lines 9 and 10. In order to prevent undue flexing of the end panel 8, the end panel 8 is stiffened in the area of the tear strip 12 by providing the tear strip 12 with a rib 22 which extends a major portion of the length thereof. The rib 22 is arcuate in cross section and is centrally located with respect to the transverse dimension of the tear strip 12, as is clearly shown in Figures 2 to 4. Although the rib 22 is illustrated as being convex in the drawings, it may equally as well be concave.

The end panel 8 is further stiffened by making that portion thereof generally defined by the inner score line 10 of a stepped panel formation. This stepped panel formation includes a lowermost inner panel 23 defined by an upwardly and outwardly sloping wall 24. A next stepped panel 25 is disposed around the wall 24 and is outlined by a second upwardly and outwardly sloping wall 26. The wall 26 intersects the main plane of the end panel 8 inwardly of and closely adjacent to the inner score line 10. Thus, the stepped panel formation serves to reinforce the central portion of the end panel 8 against flexure and greatly reduces the forces applied along the inner score line 10.

The specific configuration of the end panel 8 has advantages other than the stiffening of the end panel and the reducing of the forces thereon which normally tend to effect the premature rupture of the score lines 9 and 10. In the first place, it has been pointed out that the rivet 15 serves to securely clamp the relatively flat pull tab 14 against the main portion of the end panel 8. By providing the stepped panel formation, it will be seen that the end panel 8 is depressed beneath the grip portion or free end 20 of the pull tab 14 so that there is sufficient room for one to engage the end 20 of the pull tab with his or her finger and thus exert an upward force thereon.

Reference is now made to Figures 7, 8 and 9 wherein the details of the score lines 9 and 10 are more specifically shown. It is to be noted that the score line 10 is much shorter than the score line 9 and that the score line 9 includes a complete circular portion whereby when the score line 9 is completely ruptured, a main portion of the end panel 8 is removed.

Referring now to Figures 7 and 8 in particular, it will be seen that the weakening lines formed by the score lines 9 and 10 combine to define a generally intermediate circular starting portion 11 of which one half may be considered a portion of the

score line 9 and the other half a portion of the score line 10. Starting at the centre of the starting portion 11 at the point A and continuing along the score line 9, it will be seen that initially the score line 9 is quite deep between A and B. The depth of the score line 9 then gradually decreases and becomes of a constant depth throughout a major portion thereof. However, near the terminal end of the score line 9, at point C, the score line 9 abruptly becomes shallower until it reaches a minimum depth at 28. Then the score line 9 rapidly increases in depth and terminates in a slightly increasing depth terminal portion 29. The purpose of this specific score line configuration will be set forth in detail hereinafter.

Referring now to the details of the score line 10, as is best shown in Figures 7 and 9, it will be seen that starting at the point A the score line 10 is relatively deep along the starting portion thereof and continues to be relatively deep until point D is reached. At this point the depth of the score line 10 rapidly decreases to a minimum depth and this depth is retained until the termination of the score line 10 at point E. It will be noted that the main portion of the score line 10 is shallower than the main portion of the score line 9.

It will be readily apparent that when it is desired to open a can of which the can end 5 is a part, the initial opening force is reduced to a minimum due to the relatively great depth of the score lines 9 and 10 along the starting portion 11. Once the initial break or rupture of the end panel 8 has been accomplished along the starting line 11, the tear strip 12 may be more readily torn along the score lines 9 and 10. In view of the fact that the score line 9 is of a greater extent than the score line 10 for a given angular movement, a greater amount of work would be required to tear the pull tab 12 along the score line 9 than along the score line 10 for a given angular movement. It is to be understood that in order to assure proper tearing of the tear strip 12, it is desirable that the tearing of the score lines 9 and 10 be uniform. Furthermore, it will be readily apparent that the tendency of pulling the pull tab towards the centre of the can end would impart a greater tearing force along the score line 10 than along the score line 9. Thus, the forming of the score line 10 to a shallower depth than the score line 9 provides for a maximum strength of the end panel 8 and at the same time provides for a uniform tearing of the tear strip 12.

Due to the relatively wide width of the tear strip 12, when it is torn from the end panel 8, the length of the side thereof defined by the inner score line 10 is much less than the length thereof defined by the

score line 9. As a result, the tear strip 12 unlike a much narrower tear strip, resists straightening out and the resultant length of the tear strip 12 is much less than that of a narrow tear strip having the outer length thereof the same as a tear strip. The tear strip 12 would normally tend to assume a generally spiral configuration. By providing the tear strip 12 with the rib 22, the resistance of the tear strip 12 to assume a straight line is further increased and the total effective length of the tear strip 12, that is the distance between the pull tab 14 and the end of the can at the time the tear strip is being removed from the can end 5, is held to a minimum.

Reference is particularly made to Figure 6 wherein there is illustrated a can 30 of which the can end 5 is a part. The can 30 is illustrated in a partially opened state with the tear strip 12 thereof partially torn from the end panel 8. It is to be noted that due to the stiffness or reinforcement imparted to the tear strip 12 by the rib 22, the tear strip 12 resists bending and twisting from its original circular arrangement and as a result, the torn portion of the tear strip 12 assumes a generally flat spiral configuration. It is to be noted that the pull tab 14 is disposed a minimum distance from the main portion of the can end 5 although the tear strip 12 has been torn a relatively greater distance along the score line 9. By minimizing the distance which the pull tab 14 moves away from the can end 5 during the opening operation, it will be seen that the opening operation will be greatly facilitated. It will also be readily apparent that the opening operation may be performed in a single continuous movement without the tendency of one to attempt to obtain a second grip on the tear strip 12, as is the case in existing types of easy opening can ends, and thus injury by cutting along the sharp edges of the tear strip 12 is prevented.

A further advantage is obtainable with the rib formation 22. Referring now to Fig. 2, it will be seen that there are illustrated two cans 30. Each can 30 includes a tapered can body 31 having a bottom wall 32 which is integral with the can body 31 and joined thereto in a manner so as to provide a depending bead 33. The can end 5 is secured to the can body 31 by means of a conventional double seam 34. The relative positions of the rib 22 and the bead 33 are such that there is a nesting and interlocking between the ribs 22 and 33 to facilitate the interlocking of the cans when stacked in the manner shown in Figure 2.

Although the rib and bead formations 22 and 33 are both convex, it is to be understood that the rib 22 could be concave and

the bead 33 could be proportioned for fitting within the rib 23.

The specific tear strip formation 12 has a further advantage in that the termination of the score line 10 well in advance of the termination of the score line 9 and the reinforcement of the end panel 8 by the ends of the score lines 9 and 10 results in that portion of the end panel 8 between the ends of the score lines 9 and 10 being stiff so as to resist downward deflection. Accordingly, in the removal of the tear strip 12, it is torn from the end panel 8 for a major portion of the length of the tear strip 12 after which the tear strip 12 serves to apply an upward lifting force on the end panel 8 and the end panel 8 lifts from its former plane as the end panel 8 continues to be ruptured along the outer score line 9 so that at all times that portion of the end panel 8 which is being removed is disposed above the normal position thereof. Therefore, there is a clean removal of the major portion of the end panel 8 without any dipping of the removed portion of the can into the contents of the can and the splashing thereof.

The opening of the can end 5 with a minimum of splashing of the contents thereof is also greatly facilitated by the specific configuration of the score line 9 adjacent the terminal portion thereof. By decreasing the depth of the score line 9 abruptly at point C to the minimum depth at 28, the resistance to the tearing of the tear strip 12 from the end panel 8 is abruptly increased and there is a tendency to momentarily stop or at least slow down the rapid tearing operation. After the point of minimum score line depth is reached at 28, a renewed effort to tear the tear strip 12 along the score line 9 will result in a relatively slow removal of the tear strip from the end panel 8. Since the final tear strip removing operation is accomplished at a controlled speed, it will be seen that there will be a minimum tendency of the terminal end of the tear strip 12 and the attached portion of the end panel 8 to spring towards the pull tab 14 and thus splashing the contents of the can which may be adhering to the underside of the tear strip 12 and the central portion of the end panel 8, on to the person opening the can.

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

WHAT WE CLAIM IS:—

1. A container end comprising an end panel and a peripheral flange for attachment to a container, inner and outer generally

concentric weakening lines defining a removable tear strip extending generally around a central portion of the end panel, said tear strip having a starting end defined by portions of the inner and outer weakening lines turned into said central portion and joined by a starting tear line, a rib extending along a major portion of the tear strip between the inner and outer weakening lines to strengthen the tear strip against flexure and premature rupture of said weakening lines, and a pull tab secured to said tear strip starting end.

2. A container end according to Claim 1, wherein the end panel is also provided with a shock absorbing peripheral groove extending adjacent to and outwardly of said outer weakening line to additionally prevent the premature rupture of said outer weakening line.

3. A container end according to Claim 1 or Claim 2, wherein the end panel is also reinforced against flexure and premature rupture of said inner weakening line by said central panel portion being of a stepped configuration.

4. A container end according to any one of Claims 1 to 3, wherein the central portion is of a recessed stepped configuration and underlies a free end of said pull tab to facilitate gripping of said pull tab.

5. A container end according to Claim 4, wherein said recessed stepped configuration is generally concentric with said inner weakening line and reinforces said end panel against flexure and premature rupture of said inner weakening line.

6. A container end according to any one of Claims 1 to 5, wherein the central portion includes an offset portion contiguous with a border of which a major portion thereof conforms in outline to said inner weakening line, said offset portion stiffening said can end and thereby resisting parting of said weakening lines, the arrangement being such that the inner weakening line terminates in said offset portion and the offset portion is carried by a terminal portion of the tear strip after the complete separation of the inner weakening line and maintains its normal relationship to the tear strip during the final stages of tear strip removal whereby tilting of the offset portion down into the interior of the container is prevented.

7. A container end according to any one of Claims 1 to 6 wherein weakening lines consist of score lines and the depth of the outer score line immediately adjacent to the last torn portion thereof is so reduced as to facilitate the final removal of said tear strip.

8. A container end according to Claim 7, wherein the depth of the outer score line is least at a position adjacent to but spaced from the end of the last torn portion thereof

the bead 33 could be proportioned for fitting within the rib 23.

The specific tear strip formation 12 has a further advantage in that the termination of the score line 10 well in advance of the termination of the score line 9 and the reinforcement of the end panel 8 by the ends of the score lines 9 and 10 results in that portion of the end panel 8 between the ends of the score lines 9 and 10 being stiff so as to resist downward deflection. Accordingly, in the removal of the tear strip 12, it is torn from the end panel 8 for a major portion of the length of the tear strip 12 after which the tear strip 12 serves to apply an upward lifting force on the end panel 8 and the end panel 8 lifts from its former plane as the end panel 8 continues to be ruptured along the outer score line 9 so that at all times that portion of the end panel 8 which is being removed is disposed above the normal position thereof. Therefore, there is a clean removal of the major portion of the end panel 8 without any dipping of the removed portion of the can into the contents of the can and the splashing thereof.

The opening of the can end 5 with a minimum of splashing of the contents thereof is also greatly facilitated by the specific configuration of the score line 9 adjacent the terminal portion thereof. By decreasing the depth of the score line 9 abruptly at point C to the minimum depth at 28, the resistance to the tearing of the tear strip 12 from the end panel 8 is abruptly increased and there is a tendency to momentarily stop or at least slow down the rapid tearing operation. After the point of minimum score line depth is reached at 28, a renewed effort to tear the tear strip 12 along the score line 9 will result in a relatively slow removal of the tear strip from the end panel 8. Since the final tear strip removing operation is accomplished at a controlled speed, it will be seen that there will be a minimum tendency of the terminal end of the tear strip 12 and the attached portion of the end panel 8 to spring towards the pull tab 14 and thus splashing the contents of the can which may be adhering to the underside of the tear strip 12 and the central portion of the end panel 8, on to the person opening the can.

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

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concentric weakening lines defining a removable tear strip extending generally around a central portion of the end panel, said tear strip having a starting end defined by portions of the inner and outer weakening lines turned into said central portion and joined by a starting tear line, a rib extending along a major portion of the tear strip between the inner and outer weakening lines to strengthen the tear strip against flexure and premature rupture of said weakening lines, and a pull tab secured to said tear strip starting end.

2. A container end according to Claim 1, wherein the end panel is also provided with a shock absorbing peripheral groove extending adjacent to and outwardly of said outer weakening line to additionally prevent the premature rupture of said outer weakening line.

3. A container end according to Claim 1 or Claim 2, wherein the end panel is also reinforced against flexure and premature rupture of said inner weakening line by said central panel portion being of a stepped configuration.

4. A container end according to any one of Claims 1 to 3, wherein the central portion is of a recessed stepped configuration and underlies a free end of said pull tab to facilitate gripping of said pull tab.

5. A container end according to Claim 4, wherein said recessed stepped configuration is generally concentric with said inner weakening line and reinforces said end panel against flexure and premature rupture of said inner weakening line.

6. A container end according to any one of Claims 1 to 5, wherein the central portion includes an offset portion contiguous with a border of which a major portion thereof conforms in outline to said inner weakening line, said offset portion stiffening said can end and thereby resisting parting of said weakening lines, the arrangement being such that the inner weakening line terminates in said offset portion and the offset portion is carried by a terminal portion of the tear strip after the complete separation of the inner weakening line and maintains its normal relationship to the tear strip during the final stages of tear strip removal whereby tilting of the offset portion down into the interior of the container is prevented.

7. A container end according to any one of Claims 1 to 6 wherein weakening lines consist of score lines and the depth of the outer score line immediately adjacent to the last torn portion thereof is so reduced as to facilitate the final removal of said tear strip.

8. A container end according to Claim 7, wherein the depth of the outer score line is least at a position adjacent to but spaced from the end of the last torn portion thereof



whereby during an opening operation there is a momentary slowing down of the opening operation prior to the final removal of said tear strip and springing of said central portion towards the starting end of said tear strip is restricted.

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9. A container comprising a tapered container body having a bottom with a peripheral bead, and a container end according to any one of Claims 1 to 8, closing said container body and secured to the container body by said peripheral flange, said rib and said bead being complementary for interlocking to interlock vertically adjacent stacked containers.

10. A container end substantially as herein described with reference to and as illustrated in Figs. 1 and 3 to 9 of the accompanying drawings.

11. A container including a container end according to Claim 10 substantially as herein described with reference to and as illustrated in Fig. 2 of the accompanying drawings.

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