

[54] **METHOD FOR FORMING PROTECTIVE
EDGE ON EASY OPENING CONTAINER**

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Related U.S. Application Data

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3,696,961, which is a continuation-in-part of Ser. No.
815,043, April 10, 1969, abandoned.

[52] U.S. Cl. **113/121 C, 113/15 A**

[51] Int. Cl. **B21d 51/26**

[58] Field of Search **113/121 C, 15 A, 15 R,
113/121 A; 220/54**

[56] **References Cited**

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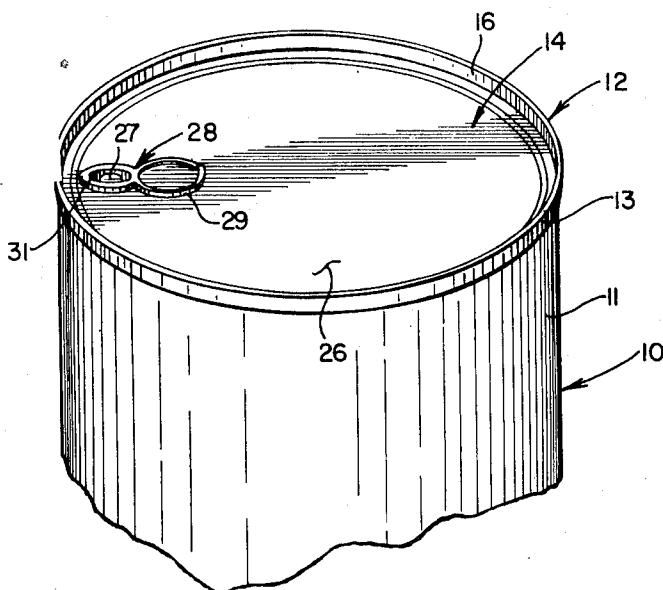
Attorney, Agent, or Firm—Diller, Brown, Ramik &
Wight

[57]

ABSTRACT

A method for forming a protective edge on an easy opening container having an end closure including a chuck wall and a panel. The panel is formed with an annular folded band adjacent to the chuck wall and a weakening line is formed in the panel prior to completely folding the annular folded band.

7 Claims, 12 Drawing Figures



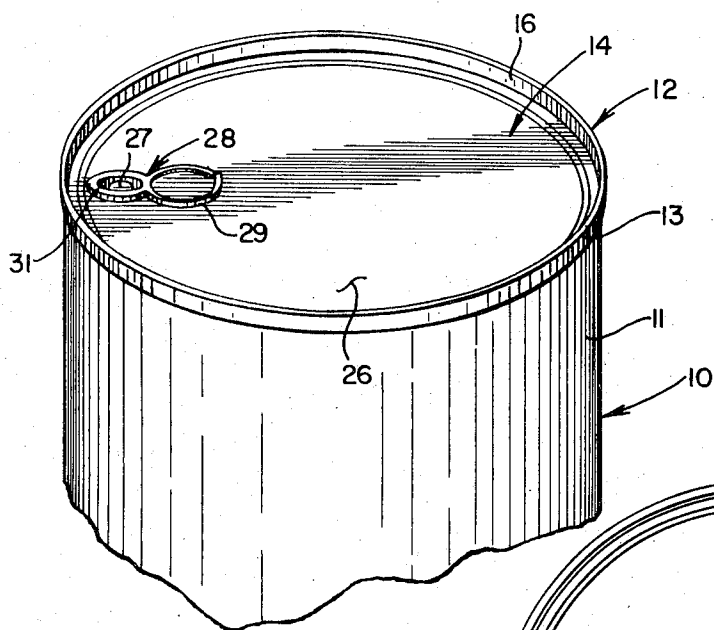


FIG. 1

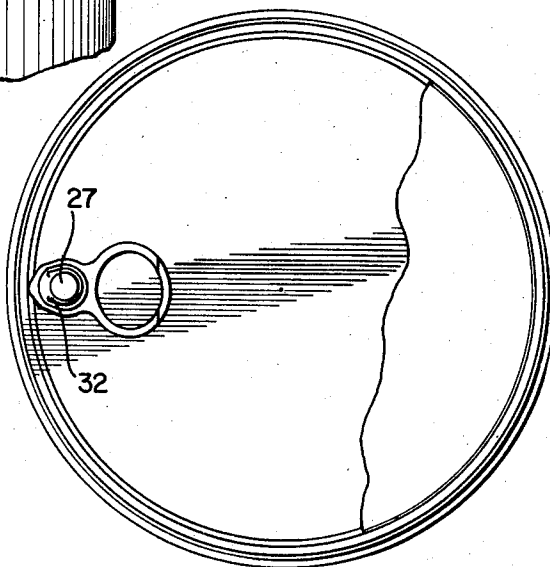


FIG. 2

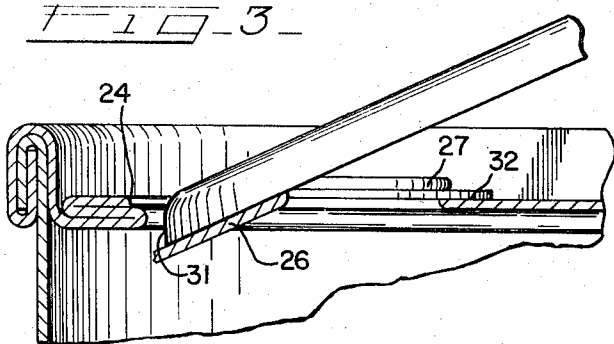


FIG. 3

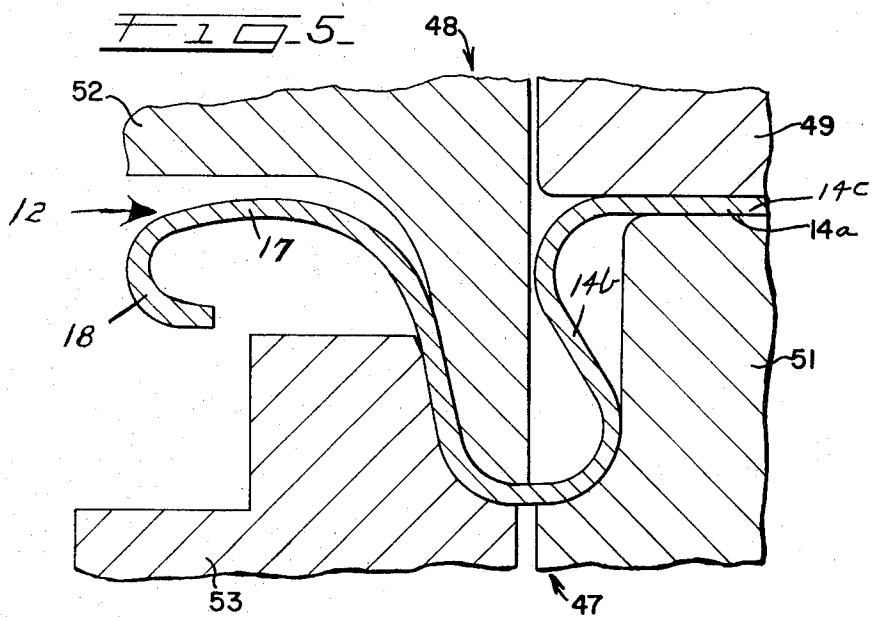
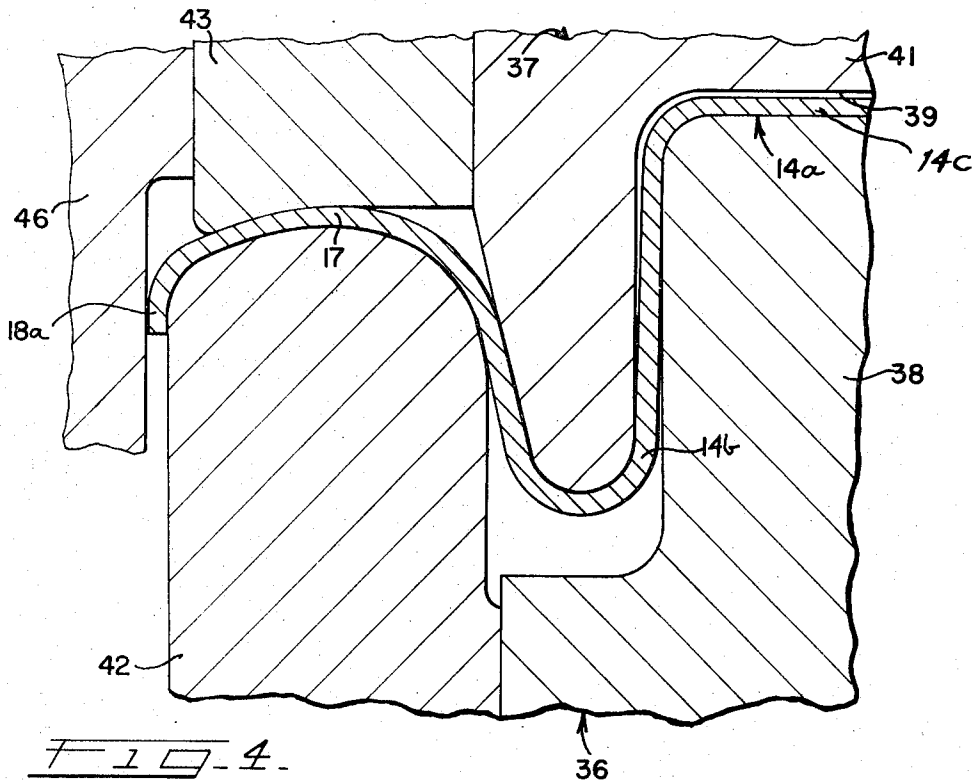


FIG-6-

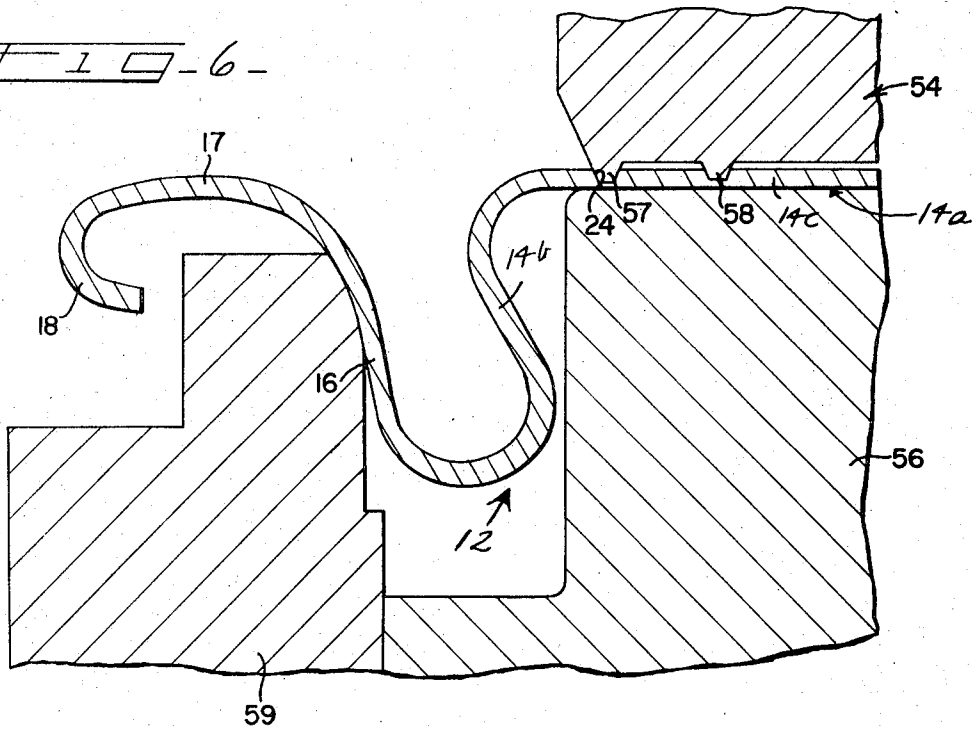


FIG-7-

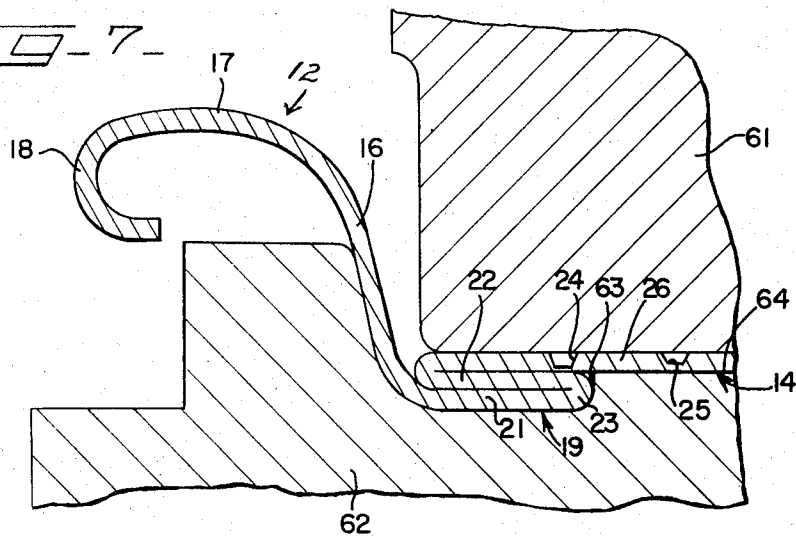


FIG. 8

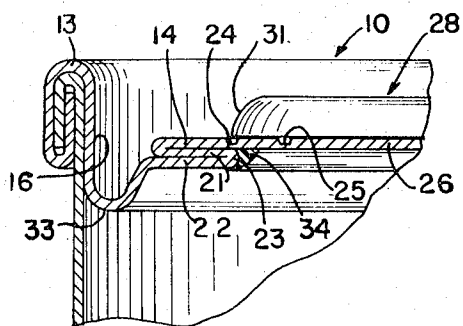


FIG. 9

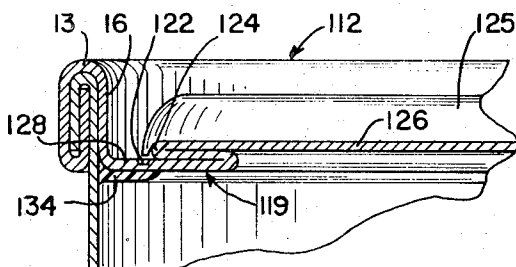


FIG. 10

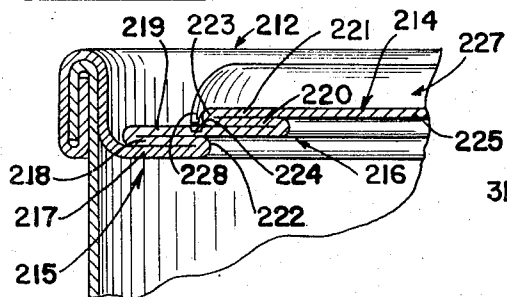


FIG. 11

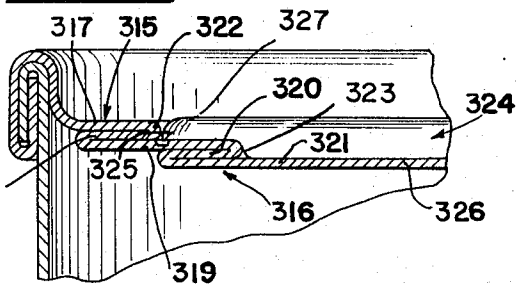
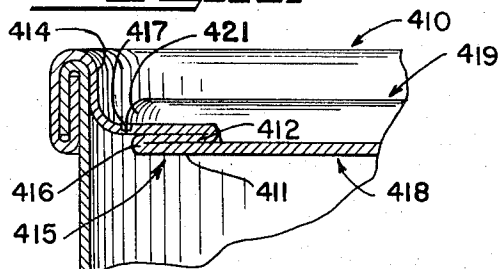


FIG. 12



METHOD FOR FORMING PROTECTIVE EDGE ON EASY OPENING CONTAINER

BACKGROUND OF THE INVENTION

This application is a division of U.S. Pat. application Ser. No. 82,260 filed Oct. 20, 1970 said application Ser. No. 82,260, having granted as U.S. Pat. No. 3,696,961 on Oct. 10, 1972 which is a continuation-in-part of U.S. Pat. application 815,043 filed Apr. 10, 1969, now abandoned.

The present invention relates to new and improved easy opening containers of the full panel opening type and more particularly to the method of forming the same.

Full opening containers of the type to which the present invention relates include an end closure of which the end panel is formed with a weakening line located closely adjacent to the chuck wall. The weakening line is formed by scoring and defines a removable panel section to which there is attached a pull tab. The pull tab is mounted so that upon initial lifting thereof the nose of the tab penetrates the weakening line to initiate the severance of the removable panel section from the end panel. Thereafter, the pull tab is pulled upwardly so that the remainder of the weakening line is ruptured and the removable panel portion separated from the remainder of the panel substantially in the form of a disc.

The opening thus formed in the end closure is bounded by a horizontal ledge which terminates in a sharp raw edge caused by the severance of the removable panel portion therefrom. This sharp edge is somewhat objectionable because it may cause injury by cutting the users hand or otherwise damage an article which may be inserted through the opening.

The edge on the removable portion is also sharp and is a hazard if carelessly discarded.

SUMMARY OF THE INVENTION

By the present invention it is proposed to provide a new and novel method for forming a full easy opening end closure constructed with an annular fold panel having a folded edge located adjacent to a score line to guard against cutting along the severed edge after removal of the removable panel portion.

In carrying out the method of constructing the end closure of the present invention, the annular fold panel is formed in stages and the weakening line is formed by scoring prior to the final fold step. More specifically the center panel of the end is formed with a side wall and a top wall. The side wall is partially folded and the panel is then scored prior to completely folding the side wall.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary perspective view of an easy opening container incorporating the easy opening structure of the present invention;

FIG. 2 is a top plan view of an easy opening container end closure with a portion of the panel being broken away to show underlying details of the annular fold band;

FIG. 3 is a fragmentary cross-sectional view of the container taken generally along the lines 3-3 of FIG. 2 and showing the rupture of the panel along the weakening line upon initial lifting of the pull tab;

FIGS. 4, 5, 6 and 7 are greatly enlarged fragmentary sectional views showing sequentially how dies are employed to form the annular folded portion and in FIG. 6 showing the scoring die performing the weakening line prior to the final folding of the annular band by the final folding dies shown in FIG. 7;

FIG. 8 is a fragmentary cross-sectional view of another form of the invention showing a plastic band disposed for separation with the removable panel portion to provide a protective edge;

FIG. 9 is a fragmentary sectional view of a third embodiment of the invention showing the folded annular panel formed on the removable panel portion;

FIG. 10 is a fragmentary cross-sectional view of a fourth embodiment of the invention showing annular fold panels formed on both the ledge and the removal panel portion of the end closure; and

FIG. 11 is a fragmentary cross-sectional view of a fifth embodiment of the invention in which the fold panels are arranged somewhat differently from that shown in FIG. 10.

FIG. 12 is an enlarged cross-sectional view of still another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing in particularly FIGS. 1 to 3, there is shown a sheet metal can 10 having a tubular sheet metal body 11. Secured to the upper end of the metal body 11 as by means of a double seam 13 is an easy opening end closure 12 embodying the structure of the present invention. The lower end, not shown, of the body 11 is also provided with an end closure which is fixed thereto by a double seam.

The container body or can body 11 is formed from a metal blank which is formed into tubular configuration and its marginal edges bonded into a longitudinally extending side seam.

The upper end closure 12 may be formed from either tin plate or aluminum and includes a substantially horizontally extending central panel 14 which extends over and covers the open end of the can body. The central panel is recessed within the body 11 so that the horizontal plane in which it lies is below the level of the lower edge of the double seam 13 as shown in FIG. 3. At its periphery, the panel 14 is formed with a chuck wall 16 which terminates in a horizontal flange 17 and a curled end 18. The horizontal flange 17 and curled end are double seamed into the can body 11.

In accordance with the present invention as shown in FIG. 3, the central panel 14 is bent back upon itself outwardly away from the center and again inwardly toward the center of the body 11 to form an annular fold 19 adjacent to the chuck wall 16. The fold band 19 thus comprises two layers 21 and 22 which are disposed below the panel 14. It is to be particularly noted that the fold provides a turned smooth or hemmed edge 23 facing along the interior of the container. Moreover, the panel portion 14 superimposed over the annular fold 19 is in close proximity to the chuck wall 17 and extends substantially planar toward the center of the container body 11.

Formed in the panel portion 14 inwardly of the turned edge 23 is a weakening line 24 along which a removable panel portion 26 is separated from the panel. The weakening line 24 is formed by means of scoring or the like as more fully to be described hereinafter.

The weakening line 24 extends substantially continuously about and substantially concentric with the chuck wall 16. Disposed closely adjacent to the primary weakening line may be a second concentric score 25 which serves as an anti-fracture score to relieve the stresses in the weakening line.

Fixed to the removable panel portion 26 as by a rivet 27 which may be formed integral with the panel is a pull tab 28. The pull tab 28 is substantially rigid along the length thereof and is formed at one end with a ring or finger grip portion 29 and the other end with a penetrating nose 31. The nose 31 is disposed over the weakening line 24 so as to penetrate the latter upon initial tilting upwardly of the pull tab 28. As shown, the pull tab 28 is tiltable about an attachment ear 32 defined by a lance formed in the tab body. Upon tilting of the tab 28, the nose 31 is operative to initially sever the removable panel portion along the weakening line 24 as shown in FIG. 3. It is to be noted that the weakening line 24 lies inwardly of and in close proximity to the smooth hemmed edge 23 of the annular fold band 19 so that upon downwardly movement into the severing position there is no interference to resist the downwardly bending of the removable panel portion 26.

It is also to be noted that the annular bank 19 tends to render the area in which the score line is located more rigid by reducing the flexibility of the relatively thin gauge metal from which the end closure 12 is made. This increased rigidity at the score line aids in facilitating the removal of the removable panel portion 26 because downward bending of the panel is resisted and thereby minimizes the amount of force which must be applied on the pull tab 28 to initially sever the weakening line 24. Moreover, upon upward pulling of the pull tab 28 to separate the remainder of the removable panel 26 from the panel 14 along the weakening line 24, the annular fold band also serves to resist upward bending and facilitates the further separation.

Referring now to FIGS. 4, 5, 6 and 7 illustrating the stations for forming the end panel closure 12 of the present invention, in FIG. 4 there is illustrated a first station for forming the same. The end closure 12 is initially in the form of a disc and is positioned between a lower male die set 36 and an upper female die set 37. The lower male die set 36 includes a drawing punch 38 which is received within an axial recess 39 of a draw die 41 of the upper female die set 37. Concentrically disposed about the draw die 41 and the draw punch 38 respectively is a lower flange forming member 42 and an upper flange forming member 43. A forming punch 46 concentric with the upper flange forming die 43 serves to form a downwardly depending lip 18a on the flange 17.

Initially, the flat disc is placed between the lower male die set 36 and the upper female die set 37. As the upper and lower dies close together, the flange forming members 42 and 43 clamp the disc therebetween along the marginal edge portions thereof. Thereafter, the lip forming member or punch 46 may descend to form the depending lip 18a to provide a shell. The female die 41 and draw punch 38 also close to form a hat section 14a by which projects substantially above the flange 18. The hat shaped section 14a includes a horizontal top 14c which defines the central panel 14 and an upstanding flange 14b from which the annular fold band 19 is formed as more fully to be explained hereinafter.

The partially formed end unit as formed in FIG. 4 is then transferred to a second station as shown in FIG. 5 wherein a second set of dies 47 and 48 including an upper die member 49 in the form of a hammer and a lower die member 51 in the form of an anvil. Disposed concentrically about the hammer 49 and anvil 51 is a pair of clamping rings 52 and 53 which when closed clamp the chuck wall 16 adjacent the lower end hereof. Thereafter, the hammer 49 strikes the horizontal web 14 and forces the latter downwardly into engagement with the anvil 51. This causes the vertical wall 14b of the hat section to be reformed into a partially loosely folded condition, as shown, in the annular space provided between the hammer 49 and the upper ring clamp 52. It is to be noted that the horizontal wall or panel 14c is then at substantially the same level as the flange 17.

Thereafter, the second stage end closure is transferred to a third station as shown at which FIG. 6 the previous reformed hat section 14a is scored by a scoring die set including a scoring tool 54 and an anvil 56. The scoring tool 54 includes a primary scoring rib 57 and an anti-fracture scoring rib 58. The anti-fracture scoring rib 58 serves to reduce the stresses on the primary score and may be omitted if the metal from which the end closure is made is not subject to fracture causing stresses on the primary score at the primary score 24. For supporting the partially folded end closure, there is provided a nesting block 59 which accommodates and supports the chuck wall 16 therein. It is to be noted that the end closure is supported so that no further bending occurs during the scoring operation when the anvil 56 and scoring tool 54 are closed. The scoring of the end closure 12 in this manner permits an accurate control of the residual thickness of the weakening line 24. This control of the thickness is not possible if the scoring is formed after the annular bank 19 is formed because of the multiple thickness of the fold band structure 19. Obviously, it is not possible to always maintain a consistent and exact thickness of the fold layers 21 and 22 and the overlying panel 14 when the end closures are made on a mass production basis.

The partially formed and scored end closure 12 is thereafter transferred to the fourth station for final bending as shown in FIG. 7. The fourth station includes an upper die set including a hammer 61 and a lower die set providing a nesting block 62 into which the partially formed and scored end closure 12 is positioned. The lower nest block 62 includes an annular groove 63 in which the fold 19 is received when the upper and lower die set are closed. As shown, the hammer and nesting blocks 61 and 62, respectively are shaped so that upon closing the layers 21 and 22 are guided to be received within the groove 63.

In connection with the final folding operation, it is to be noted that the partially and loosely folded vertical web 14b, makes it possible to complete the fold 19 into the nesting block 62 without causing a fracture along the score or weakening line 24. This is of significance, because in the absence of forming a partially folded side wall 14b to complete the fold at the second station it has been found impractical to form the weakening line 24 prior to forming the fold band 19.

Referring now to FIG 8, there is shown a modified arrangement of the structure shown in FIGS. 1-3. The central panel 14 is formed with a circumferential down-

wardly depressed bead 33. The annular folded panel portion 19 is folded inboard and adjacent to the bead 33. The score line 24 is located relative to the folded edge 23 in the same manner as described heretofore in connection with FIGS. 1-3.

Attached to the underside of the removable panel portion 26 is a band 34 of a pliable plastic such as plastisol. The plastisol band 34 is adhered by a suitable adhesive coating such as vinyl resin which may be applied by spot coating on the removable panel portion 26.

The remainder of the underside of the panel 14 including the fold portion 23 may be coated with a coating non-adherent to the plastisol as for example a thermo setting resin. The plastisol band 34 may be applied by spin lining so that the fold edge 23 restricts the outward flow of the plastisol.

The removable panel portion 26 is separated from the panel similar to the manner explained in connection with FIGS. 1-3. When the removable panel portion 26 is separated, the portion of the band 34 laying in the path of movement of the pull tab nose is initially also depressed downwardly with the removable panel portion 26 past the folded edge 23. Thereafter, upon pulling of the pull tab 28 to complete the separation of the removable panel portion 26, the band 34 which is adhered to the removable panel portion and not to the folded edge 223 is removed therewith. The plastisol band 34 is of such width as to project radially outwardly of the cut edge bounding the removable panel 26 upon removal thereby to protect the cut edge from contact by the user.

A third embodiment of the protective structure is shown in FIG. 9. As shown, the panel 14 of the end closure 112 is formed with a fold band 119 disposed a greater distance from the chuck wall 16 than the fold band 19 in the embodiment of FIGS. 1-3. This permits a score line 122 to be formed in the annular space between the chuck wall 16 and an inner folded edge 122. The score line 124 is located such that upon severance by a pull tab 125 in the manner described in connection with FIGS. 1-3, the folded edge projects outwardly of the severed edge of the sufficient amount to prevent free contact therewith. In this manner, the cut edge of the removable panel portion 126 is protected.

If desired, the edge on the ledge 128 may be protected by a plastisol band 134. The plastisol band 134 is adhered to the underside of the ledge 118 as by a spot coating by a band of an adhesive such as a vinyl resin coating. The vinyl resin coating may be applied on a non-adherent coating such as a thermo-setting resin coating covering the underside of the panel. The portion of band overlying the thermo-setting coating is not adherent thereto so that upon severance of the removable panel portion 126, the band 134 remains adhered to and projects outwardly of the cut edge of the ledge 128.

Referring now to FIG. 10, there is shown a fourth embodiment of the invention. The end closure 212 includes a central panel 214 which is formed with a pair of radially spaced annular fold panels 215 and 216. The panel 215 includes fold layers 217, 218 and 219. The fold layer 218 is common to the fold panel 216 which also includes fold layers 220 and 221. The fold layers 217 and 218 are connected by a folded edge 222 and the fold layers 220 and 221 by a folded edge 223. Provided on the fold layer 219 is a score line 224. The score line 224 is located so that upon separation of the

removable panel portion 225 defined by the score line 224, the raw or cut edges contiguous to the fold layers are protected by the folded edges 222 and 223, respectively.

For removing the removable panel portion 225, there is provided a pull tab 227. The pull tab 227 is mounted in substantially the same manner as the pull tab of FIGS. 1-3. The pull tab 227 includes a downwardly projected nose 228 which overlies the score line 224. Upon tilting of the pull tab 227, the pull tab nose 228 severs the score line 224 and the folded panel 228 is depressed downwardly past the folded edge 224. Thereafter, the pull tab 227 is pulled upwardly so that the removable panel 225 is completely separated. In this matter, the fold panel 216 is removed with the removable panel portion and fold panel 215 remains attached to the container. The cut edge overlying the folded edge 224 is protected thereby and the folded edge 223 protects the cut edge on the removable panel portion 225.

Referring now to FIG. 11, there is shown another embodiment of the invention differing from the embodiment of FIG. 10 by the fact that annular folded panels 315 and 316 are folded toward the interior of the container rather than the exterior. The folded panel 315 includes an outer layer 317, an intermediate layer 318 and a bottom layer 319. The bottom layer 319 forms the upper layer of the folded panel 316. Underlying the layer 319 are fold layers 320 and 321. The fold layers 317 and 318 are folded along a folded edge 322 while the fold layers 320 and 321 are folded along the folded edge 323.

A score line 327 is formed in the panel 319 between the fold edges 322 and 323. The score line 323 is severed by tilting of the pull tab 324 so that a nose 325 engages the weakening line 327 so that the portion of the fold panel 316 adjacent thereto is depressed downwardly into the container body. Thereafter, upward pulling of the pull tab 324 causes the remainder of the removable panel portion 326 to be separated from the end closure.

It is to be noted that upon separation of the removable panel portion that the folded edge 322 protects the cut edge of the score line remaining on the end closure, while the folded edge 323 protects the cut edge on the removable panel portion 326.

Referring now to FIG. 12 there is shown a still further embodiment of the invention in which an end closure 410 has fold layers 411 and 412 underlying a marginal panel 413 extending from the chuck wall 414. The fold layers 411 and 412 define an annular fold panel 415. Connecting the fold layers 411 and 412 is a folded edge 416. Disposed closely to the folded edge 416 on the panel portion 413 is a score line 417 which defines a removable panel portion 418. Mounted on the removable panel portion similar to the manner described in connection with the prior embodiments is a pull tab 419 having a nose 421. Upon tilting of the pull tab 419 the score line is severed and upward pulling thereafter completely separates the removable panel. When the removable panel portion 418 is completely separated, the folded edge 416 of the fold panel 419 protects the cut edge bounding the portion 418.

If desired the cut edge of the ledge may be protected by a plastisol band (not shown) applied to the underside of the end closure so as to remain adhered to the end after removal of the removable panel portion.

What is claimed is:

1. A method of forming an easy opening end closure comprising forming a shell having an upstanding chuck wall about a panel, drawing a major portion of said panel into a substantially hat shaped section having a transverse wall and a side wall, partially folding said side wall, scoring said panel to form a weakening line at least after said partially folding of said side wall has been initiated, and thereafter completely folding said side wall to form a double thickness annular folded band about said transverse wall.
2. The method as defined in claim 1 wherein said annular folded band is formed to underlie said panel.
3. The method as defined in claim 1 wherein said annular folded band is formed to overlie said panel.
4. The method as defined in claim 1 wherein said weakening line is formed in said panel so as to be disposed along the outer edge of said annular folded band.
5. The method as defined in claim 1 wherein said weakening line is formed along the inner edge of said annular folded band.
6. A method of forming an easy opening end closure from a shell having a panel, forming said panel into a substantially hat shaped section including a transverse wall and a side wall, displacing the opposite ends of said

side wall relatively to each other so that the end remote from said transverse wall of said side wall is disposed inwardly of the marginal edge of said transverse wall, pressing said side wall into tight engagement with said panel to form an annular folded band, and scoring said panel along a line adjacent a folded edge of said folded annular band at least subsequent to the initiation of the displacing of the opposite ends of said side wall relative to each other and prior to pressing said side wall into tight engagement with said panel.

7. A method of making an easy opening container wall comprising:

providing a piece of sheet material including axially offset sections joined by a connecting section; partially deforming said connecting section to form a prefold having a plurality of angularly transaxially extending portions including end portions and a connecting inclining portion, then scoring at least one of said axially offset sections in the region of the respective end portion, then closing said prefold to provide a fold contiguous to said scoring to protect the user against injury from the sharp edge upon rupture of the sheet material along the line of the score.

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