

[54] **FULL EASY OPEN AND RECLOSABLE METAL CONTAINER**

[75] Inventor: **William Thomas Saunders**, Weirton, W. Va.

[73] Assignee: **American Can Company**, Greenwich, Conn.

[22] Filed: **June 30, 1971**

[21] Appl. No.: **158,402**

[52] U.S. Cl. **220/47, 220/42 C, 220/46 R, 215/46 R**

[51] Int. Cl. **B65d 43/04, B65d 17/16**

[58] Field of Search **220/47, 42 C, 53, 46 R, 74; 215/46 R, 46 A**

Primary Examiner—Robert S. Ward, Jr.
Attorney—Robert P. Auber et al.

[57] **ABSTRACT**

A plastic release strip is included in a seam formed between a metal end closure and a metal container body to serve as a seam holding and release element, the plastic strip being manually removable without destruction or mutilation of either the container body or the end closure. The seam release strip, at its top edge, abuts a projection or bead formed by an inner marginal portion of a doubled-back longitudinal end section of the body side wall, exteriorly to the side wall, to preclude displacement of the seam release strip and thereby ensure seam integrity particularly for products contained under pressure. The end closure has a skirt extending longitudinally from the open end of the container body and having an inwardly indented annular portion which compresses the portion of the strip that abuts the bead to thereby facilitate sealing of the open end of the container body by the end closure and further enhance the integrity of the seam. The skirt of the end closure also has a peripheral, annular, inwardly-directed curled hem which compresses the portion of the strip that engages an exterior annular surface of the body side to thereby cause that portion to further frictionally engage the sharp raw metal edge on an outer marginal portion of the double-back end section of the container side wall which further facilitates sealing of the open end of the container body by the end closure and still further enhance the integrity of the seam.

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7 Claims, 5 Drawing Figures

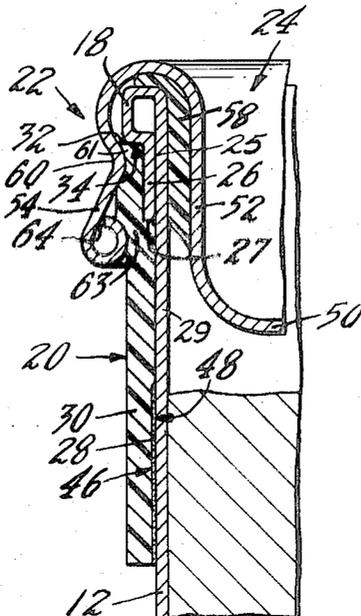


Fig. 1

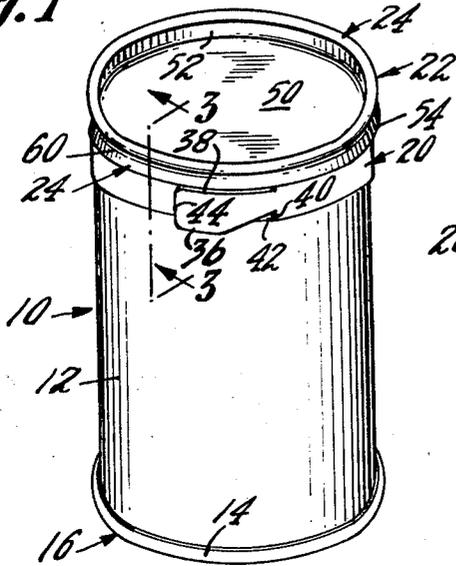


Fig. 2

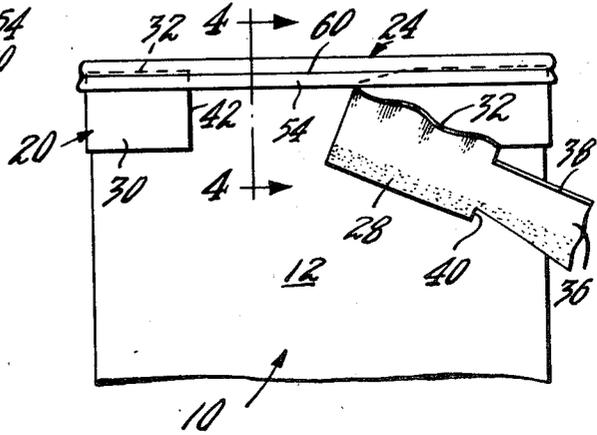


Fig. 3

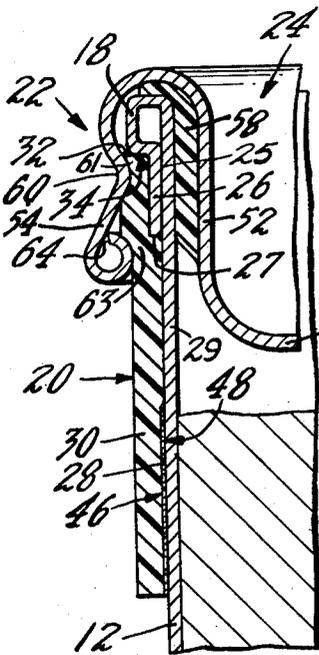


Fig. 4

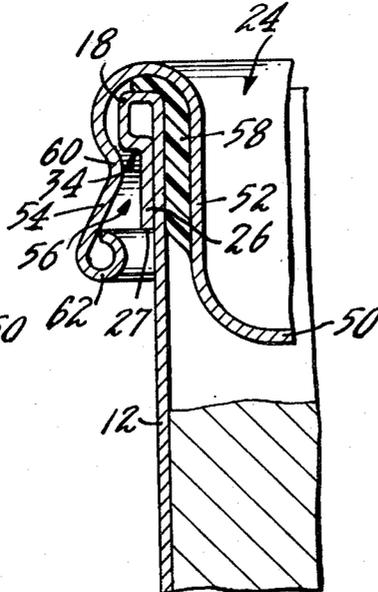
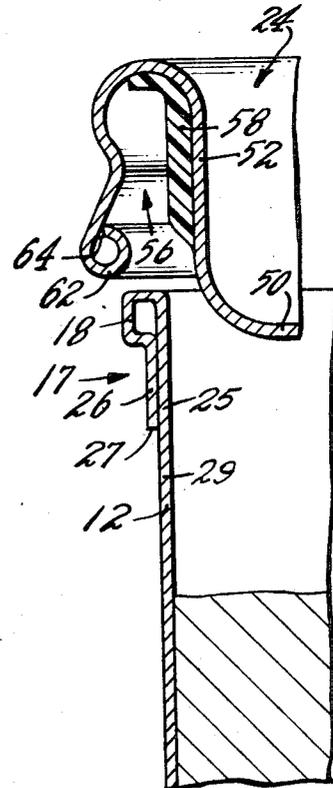


Fig. 5



INVENTOR.
WILLIAM THOMAS SAUNDERS
BY
John R. Flanagan
ATTORNEY

FULL EASY OPEN AND RECLOSABLE METAL CONTAINER

BACKGROUND OF THE INVENTION

This invention relates to easy-opening containers and has particular reference to a container construction wherein a removable plastic strip is incorporated in the end seam of a container to provide for the complete detachment of the end closure member of the container without destruction or mutilation of either the container body or the top closure member.

In present-day packaging technology, great emphasis is placed on the development of containers which incorporate self-contained, easy-opening features in order to relieve the consumer of the burden of having to use separate opening devices or tools to effect the opening of the container.

Substantial success has been attained in this area by providing cans and containers wherein removable pre-cut or pre-scored portions are formed in metal end closure members in order to provide access to the container contents. In such containers, the non-removed portion of the metal end remains secured to the container body after the container has been opened. While this type of opening feature has been well received and is excellent for many products, it is in some instances not completely satisfactory since it does result in raw metal edges and in somewhat restricted dispensing openings in the containers.

The present invention utilizes a plastic seam release strip to provide an easy-opening container construction which avoids all of the disadvantages of these other constructions in that it makes possible a full-open container in which the complete top closure member can be readily detached by the consumer without tools and without any mutilation or tearing of either the container body or the top closure member. The arrangement also permits ready reclosure during the useful life of the container.

Heretofore, a plastic seam release strip of this type has been used in connection with the seaming of a metal end closure to a container body which is used for holding non-pressurized products and made of compressible or non-rigid materials, for example, fiber or plastic materials, wherein, after assembly of the seam, a portion of the plastic strip is indented into the compressible material of the container body by a flange portion of the metal end closure, thereby causing a compression thinning of a portion of the container body and of a portion of the plastic strip in area of the seam. As a result, the metal end closure is securely locked in place on the end of the container body in what may be designated as an indented or crimped seam. A plastic seam release strip incorporated in a seam of this type on a container body made of compressible material is disclosed in U.S. Pat. Nos. 3,330,436, 3,336,269 and 3,409,200.

Also, heretofore, sealing rings of resilient materials have been incorporated into the seam between a metal end closure and a metal container body, for example, as disclosed in British Patent Specification Nos. 523,202 and 955,579 and Japanese Utility Model Publication No. 10362/1923.

The present invention, which discloses novel structural features over the prior art, is particularly useful for containers made of materials not generally con-

sidered compressible, for example, sheet metal, and which may be used for holding pressurized products, including products temporarily pressurized during processing as is conventional in food canning.

The novel structural features of the present invention and the novel cooperation between those features ensure the integrity of the seam formed by the end closure and the container body under pressurized conditions. Seam integrity under pressurized conditions is ensured by a projection or bead formed by an inner marginal portion of a doubled-back longitudinal end section of body side wall, which serves as an abutment or stop for the plastic seam release strip to prevent the latter from sliding out of position on the container body. The projection also serves to align the seam release strip and maintain its proper position during assembly. Further, when used with sheet metal containers, the projection or bead functions to eliminate exposure of sharp edges after opening.

Seam integrity is further enhanced by the frictional engagement of a portion of the seam release strip with the sharp raw metal edge formed on an outer marginal portion of the doubled-back longitudinal end section of the body side wall when this portion of the strip is compressed by a peripheral, inwardly-directed curled hem formed on a skirt of the end closure.

Still, further, seam integrity is enhanced by an inwardly indented annular portion of the skirt on the end closure which compresses the portion of the strip that abuts the bead formed by the inner marginal portion of the doubled-back end section of the body side wall.

Seam integrity and subsequent reclosure of the end closure on the container body is also enhanced by a possible interference contact occurring between the bead formed by the inner marginal portion of the doubled-back end section of the body side wall and the inwardly indented annular portion of the skirt on the end closure when the respective portions displace toward one another under pressurized conditions within the container body.

SUMMARY OF THE INVENTION

The present invention relates to a container body, having a longitudinally-extending body side wall, with an open end in the container body being defined by a longitudinal end section of the body side wall doubled-back onto a portion of the remaining side wall and partially engaged with an annular exterior surface portion of the side wall. An inner marginal portion of the doubled-back end section in the form of a projection or bead extends annularly and exteriorly about the open end of the container body. An outer marginal portion of the doubled-back end section is displaced from the open end of the container body and engaged with the annular exterior surface portion of the body side wall, the outer marginal portion having a sharp raw edge on its periphery. Further, a plastic seam release strip is securely maintained about, and in a predetermined position displaced longitudinally from, the open end of the container body. This position of the strip is maintained by one annular portion of the strip being releasably adhered to another exterior surface portion of the side wall and another annular portion of the strip being abutted with the inner marginal portion of the doubled-back end section of the side wall. Still further,

an end closure having a container end defining portion which merges into an annular peripheral skirt, is seamed to the open end of the container body with the plastic strip serving as an integral holding member being novelly incorporated therebetween. The skirt of the end closure extends longitudinally from the open end of the container body and has a radially inwardly-indented portion which compresses the annular portion of the strip that abuts the inner marginal portion of the doubled-back end section of the body side wall to thereby facilitate the sealing of the open end of the container body by the end closure. Further, the skirt as a peripheral, inwardly-curved hem which compresses the portion of the strip that engages the sharp raw edge of the outer marginal portion of the doubled-back end section to cause frictional engagement of this strip portion with the sharp raw edge and thereby further facilitate sealing of the open end of the container body by the end closure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a completed container having a plastic seam release strip formed as an integral holding member securing the top end closure to the container body;

FIG. 2 is an enlarged side elevation of the upper portion of the container shown in FIG. 1 showing the seam release strip partially pulled out of the seam during the container opening operation;

FIG. 3 is an enlarged sectional detail taken substantially along the line 3—3 in FIG. 1 showing a cross-section of the assembled unit;

FIG. 4 is an enlarged sectional detail taken substantially along the line 4—4 in FIG. 2; and

FIG. 5 is similar to FIG. 4 but shows the end closure after it has been lifted from the container body.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As a preferred and exemplary embodiment of the present invention, FIG. 1 shows a container body 10 having a tubular body side wall 12 which is formed of sheet metal such as tin plate or aluminum. The body side wall 12 may have a side seam or it may be seamless. While the body side wall 12 is shown as being cylindrical, it may be of any cross-sectional configuration. It may also be formed of any other non-compressible material.

In the case where the body side wall 12 is of the type having a longitudinal side seam (not shown), the lower end of the body side wall 12 may be closed by an imperforate metal bottom end closure 14 which is secured to the side wall 12 in a conventional double seam 16. In another case (not shown) where the body side wall is of the seamless type, the lower end of the body side wall will be closed by a bottom end wall which is integrally formed with the body side wall. In either of the above cases, the upper open end of the body side wall 12 is defined by a longitudinal end section 17 which is doubled-back onto the side wall 12 and partially engaged therewith. An inner marginal portion of the doubled-back end section 17 is in the form of a projection or bead 18. An outer marginal portion of the doubled-back end section in the form of lower extension 26 is displaced from the open end of the container body 10

and engaged with, and conformed to the shape of, an annular exterior surface portion 25 of the body side wall 12. The lower extension 26 has a sharp raw metal edge 27 on its periphery. The doubled-back longitudinal end section 17 of the body side wall 12 is thereby adapted to be incorporated, along with a thin plastic strip 20 into an end seam, generally designated 22, in a manner to be described hereinafter in greater detail, which secures an imperforate metal top end closure 24 to the container body side wall 12.

Prior to the application of the top end closure member 24, the thin plastic strip 20, which for the purpose of this specification is sometimes referred to as a seam release strip, is secured to an annular, exterior surface portion 29 of the body side wall 12 displaced remote from the open end of the container body 10 by a layer of adhesive 28 (see FIG. 3) at the lower longitudinal edge portion 30 of the strip 20. The adhesive 28 may be of any suitable type, such as a pressure-sensitive adhesive or a thermoplastic adhesive, and should have a low-peel-resistance characteristic relative to the surface of the body side wall 12 to which it adheres. As shown in FIG. 3, the upper edge 32 of the seam release strip 20 abuts the lower edge 34 of the bead 18.

The length of the strip 20 is shown as slightly greater than the circumference (periphery, in the case of a non-cylindrical body) of the body side wall 12 so that the strip 20 not only extends around the body in adhesive attachment thereto, but also overlaps itself a short distance to provide a grasping tab 36. The upper edge 38 of the tab 36 is cut down from the remainder of the upper edge 32 of the strip 20 to insure against this edge 38 being enclosed within the end seam 22 in a manner more fully described hereinafter. Thus, the ends 40, 42 of the strip 20 which are enclosed in the seam 22 are in substantially abutting relationship even though the tab 36 does overlap the opposite end 42 of the strip 20. While the overlapping tab construction is preferred, it is not absolutely necessary. In other words, the length of the strip 20 may be equal to or slightly less than the circumference of the body side wall 12 whereby the end 44 of the tab 36 may meet or just fall short of the opposite end 42 (FIG. 2) of the strip 20.

The purpose of the tab 36 is to permit initial grasping and pulling of the strip 20. To this end the tab 36 may be free of any adhesive attachment to the subjacent surface, but preferably it is weakly adhered to the subjacent surface. By this weak adherence the tab 36 is held in substantial conformity to the contour of the body side wall 12, i.e., it is prevented from extending outwardly from the body side wall 12, thereby minimizing damage to the tab 36 or container body 10 during shipment or handling. This weak adherence is accomplished by continuing the bond of adhesive 28 onto the free end of the tab 36 to adhere the lower inside surface 46 of the tab 36 to the subjacent side wall surface 48. Pulling the tab 36 outwardly subjects this adhesive bond 28 to peel stress under which it ruptures readily.

The end closure 24 comprises a central panel 50 merging at its periphery with an upstanding counter-sink wall 52, thence generally but substantially horizontally outwardly over the upper periphery of the bead 18 and thence generally downwardly in a hemmed skirt 54 to provide a substantially U-shaped channel 56. A sealing compound 58 is introduced into the U-shaped

channel before attachment of the end closure 24 to the body side wall 12. The skirt 54 has a radially, inwardly-indented portion 60 which compresses the portion 61 of the strip 20, adjacent to the upper edge 32 of the strip 20 whereat the strip 20 abuts the lower edge 34 of the bead 18, to lock the end closure 24 to the body side wall 12 in the end seam 22. To provide this frictional lock, the seam release strip 20 is adapted to have some degree of resiliency or compressibility to enable the skirt 54 to bite into and obtain a grip on the contiguous material. The indentation 60 also enhances the rigidity of the skirt 54, while further providing a smooth gripping surface which, along with a similar smooth gripping surface on the hem 62 of the skirt 54 insures a good gripping action without cutting into the material of the strip 20. As shown in FIG. 3, the strip 20 is thinned out in the area where pressure is applied by the indentation 60 and hem 62.

The inwardly-curved hem 62 on the skirt 54 compresses the annular portion 63 of the strip 20, which engages the sharp raw metal edge 27 of the lower extension 26, to cause further frictional engagement of strip portion 63 with the sharp raw metal edge 27, or, in effect, to cause the sharp edge 27 to bite the strip portion 63. This engagement further enhances the locking of the end closure 24 to the body side wall 12 in the end seam 22.

The strip 20 is made of a tough, flexible, tear-resistant thermoplastic resinous material, such as high, medium, or low density polyethylene, polypropylene, or copolymers of ethylene with monomers such as vinyl acetate or ethylacrylate, and may vary in thickness, depending on the specific container dimensions and requirements and on variables in the other container components. In addition to being deformable and extensible, the strip 20 should also have a tear resistance sufficiently high so that it does not tear during the opening operation. Its surfaces should preferably be smooth and have a relatively low coefficient of friction. It will be understood that the strip 20 may be formed of a single type of plastic or may comprise a lamination of one or more materials which can be selected to tailor the strip to specific container applications.

In the manufacture of the container shown in FIGS. 1 through 5, the bead 18 is first formed on the body side wall 12. The strip 20 with the bond of adhesive 28 on a lower longitudinal section 30 thereof is then secured to the body side wall 12, adjacent to bead 18 in the position shown in FIG. 3. It is also possible to apply the adhesive 28 to the body side wall 12 rather than to the strip 20. Thereafter, the end closure 24 with the sealing compound 58 in its inverted U-shaped channel 56 is attached to the body side wall 12 and the strip 20 by means of the end seam 22, the latter being formed, for example, by seaming rolls (not shown) in cooperation with a seaming chuck (not shown). The container may then be filled through the bottom end which is remote from the end closure 24, after which the bottom end closure 14 is secured to this lower end by conventional means to completely close the package.

It is also within the purview of the present invention to fill the container through the top end adjacent to the seam release strip 20. In such a case, the bottom end closure 14 remote from the seam release strip 20 is secured on the body side wall 12 before the container

10 is filled, but the seam release strip 20 may be placed on the body side wall 12 before or after the filling operation. After the container 10 has been filled and the seam release strip 20 has been adhered to the body side wall 12, the open end is fitted with the end closure 24 which is joined to the body side wall 12 by the seam 22 which encloses the seam release strip 20. While it will be realized that the filling operation may be effected in a factory other than the one in which the strip 20 is applied to the body side wall 12, thus necessitating shipment of the container 10 with the strip 20 thereon prior to the formation of the seam 22, this presents no problem since the adhesive 28 accurately and positively retains the strip 20 in place on the body side wall 12 until such time as the top end closure member 24 is applied.

To open the package thus formed, the tab 36 is grasped and pulled outwardly, as indicated in FIG. 2, around the can to peel the interface of the strip 20 and the body side wall 12 and simultaneously disengage the upper edge 32 and adjacent portion from the end seam 22. This action is continued until the portion of the strip 20 within the end seam 22 is completely withdrawn therefrom, thereby loosening the attachment of the top end closure 24 to the body side wall 12. The top end closure 24 can then be easily lifted, also manually, off the body side wall 12 thereby providing a full opening of the container 10 for removal of the product therein. The removal of the strip 20 is facilitated by the fact that the adhesive 28 has low-peel characteristics which cause it to offer little resistance to the stripping action, which in the main is a peeling action. It is, of course, very desirable that the adhesive 28 be selected so that it strips cleanly away from the outer surface of the body side wall 12 without tearing out or mutilating any portion of this surface, which may be a label surface which should remain intact after the opening operation to insure a clean, attractive appearance in the opened container. To insure the clean stripping of the adhesive 28, the exterior surface of the body side wall 12 may be coated with a suitable varnish or lacquer which is selected to provide the desired degree of adhesion between the adhesive 28 and the body side wall 12. If desired, the adhesive 28 may be omitted from all or a portion of the tab 36 to facilitate its engagement by the fingers. When the pull tab 36 is grasped and pulled in the manner just described, pressure is applied to cause the material of the plastic strip 20 adjacent its thinned portion (i.e., opposite the indentation 60 and hem 62) to be pulled downwardly. Downward movement of the strip 20 is resisted by the portions of the strip 20 within the seam 22 which are of greater thickness than are its thinned portions. However, the plastic material from which the strip 20 is formed is extensible or elongatable, and thus the pulling pressure has the effect of causing the strip 20 to elongate and to thin down to substantially the thickness of the available gap so that it passes downwardly between the hem 62 and the body side wall 12 and thereby is removed from the end seam 22. Removal of the strip 20 from the seam 22 is facilitated by the fact that the surfaces of the indentation 60 and hem 62 which contact the strip 20 are rounded and smooth and that the raw edge 64 of the hem 62 is spaced away from the strip 20.

The stretching or thinning out of the strip 20 usually results in its being distorted into a thin, wavy configuration (see FIG. 2) which is indicative of a permanent distortion of the material of the strip 20. The degree of distortion will, of course, vary with the material from which the strip 20 is made.

After the strip 20 has thus been removed from the end seam 22, an open gap remains between the skirt 54 and the body side wall 12, as best seen in FIG. 4. The end closure 24 can then be readily removed by merely pulling it upwardly over the bead 18 and allowing the skirt 54 or the body side wall 12 to flex to overcome any interference between the bead 18 and skirt 54. This interference is desirable since it does not appreciably hinder removal of the end closure 24, but does provide a somewhat loose snap fit engagement between the end closure 24 and the body side wall 12 which is very desirable when the former is used as a reclosure.

The provision of a full-opening container is advantageous for all products, but especially for products containing all or some solid substances since no end closure is left on the body to act as an obstruction to the removal of the solids, and the fit between the closure and the body, after opening, permits ready reclosure during the useful life of the container.

The invention is useful for all products and particularly pressurized products, including food products temporarily pressurized during processing as is common in food canning, because the projection or bead 18 insures seam integrity, particularly under such pressurized conditions, in that it serves as an abutment or stop to prevent the plastic seam release strip 20 from sliding up on the container body side wall 12. The bead 18 also facilitates proper alignment of the seam release strip 20 as the latter is applied to the container body side wall 12 and also functions to maintain the proper position of the strip 20 during assembly of the end seam 22. It will also be observed that the construction of the bead 18 is such that the raw edge 27 on the lower extension 26 is carried externally of the container 10 out of any contact with the container contents and further, that the bead 18 eliminates exposure of sharp edges and protects the consumer, particularly enhancing reclosure conditions.

It is to be understood that the expression "upper," "lower," "top," and "bottom" used hereinbefore are for the purpose only of describing the relative orientation of the parts and are not to be construed as limitations on the structure disclosed.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the forms hereinbefore described being merely preferred embodiments thereof.

I claim:

1. In a container body having a longitudinally-extending body side wall, the improvement which comprises:

a longitudinal end section of said side wall doubled-back onto said side wall and partially engaged with an annular exterior surface portion of said side wall to thereby define an open end of said container body;

an inner marginal portion of said doubled-back end section in the form of a bead which extends annularly and exteriorly about the open end of said container body;

an outer portion of said doubled-back end section displaced from the open end of said container body and engaged with said annular exterior surface portion of said side wall, said outer marginal portion having a sharp raw edge on the periphery thereof; and

a plastic strip, the separate annular portions of which being respectively releasably adhered to another annular exterior surface portion of said side wall, engaged with still another annular exterior surface portion of said side wall with said still another portion being between, and merging with, the other annular exterior surface portions of said side wall, engaged with the exterior surface of said outer marginal portion of said doubled-back end section, and abutted with said inner marginal portion of said doubled-back end section, to thereby securely maintain said plastic strip annularly about, and in a predetermined position displaced longitudinally from, the open end of said container body.

2. In a container body, according to claim 1, wherein said container body is made of a substantially non-compressible material.

3. In a container body, according to claim 1, wherein said container body is made of a metal material.

4. In a container body having a longitudinally-extending body side wall, the improvement which comprises:

a longitudinal end section of said side wall doubled-back onto said side wall and partially engaged with an annular exterior surface portion of said side wall to thereby define an open end of said container body;

an inner marginal portion of said doubled-back end section in the form of a bead which extends annularly and exteriorly about the open end of said container body;

an outer marginal portion of said doubled-back end section displaced from the open end of said container body and engaged with said annular exterior surface portion of said side wall, said outer marginal portion having a sharp raw edge on the periphery thereof;

a plastic strip, the separate annular portions of which being respectively releasably adhered to another annular exterior surface portion of said side wall, engaged with still another annular exterior surface portion of said side wall with said still another portion being between, and merging with, the other annular exterior surface portions of said side wall, engaged with the exterior surface of said outer marginal portion of said doubled-back end section, and abutted with said inner marginal portion of said doubled-back end section, to thereby securely maintain said plastic strip annularly about, and in a predetermined position displaced longitudinally from, the open end of said container body; and

an end closure having a container end defining portion which merges into an annular peripheral skirt, said skirt extending longitudinally from the open end of the container body and having a radially inwardly indented portion which compresses the one

of said separate annular portions of said plastic strip that abuts said inner marginal portion of said doubled-back end section to thereby facilitate sealing of said open end of said container body by said end closure.

5. In a container body, according to claim 4, wherein said skirt of said end closure further has a peripheral, radially, inwardly-directed curled hem which compresses the one of said separate annular portions of said plastic strip that engages said still another annular exterior surface portion of said side wall to frictionally engage said one of said separate annular portions of said plastic strip with said sharp raw metal edge on said outer marginal portion of said doubled-back end section of said side wall, and to thereby further facilitate sealing of said open end of said container body by said end closure.

6. In a container body, according to claim 4, wherein

the circumference of the inside surface of said indented portion of said skirt of said end closure is slightly less than the circumference of the outside surface of said inner marginal portion of said doubled-back end section of said body side wall to thereby cause a slight interference between said respective portions upon removal, and reclosure, of said end closure from, and to, said open end of said container body.

7. In a container body, according to claim 4, further comprising:

a sealing compound disposed between the annular interior surface portion of said side wall adjacent the open end of said container body and the marginal peripheral portion of said container end defining portion of said end closure to thereby further facilitate sealing of said open end of said container body by said end closure.

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