United States Patent

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Dayton, Ohio
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[54] **EASY-OPENING CONTAINER CLOSURE**
6 Claims, 15 Drawing Figs.

[52] U.S. Cl. **215/46, 220/54**
[51] Int. Cl. **B65d 43/02, B65d 17/24**
[50] **Field of Search** 215/46.5, 42; 220/54, 27; 222/541

[56] **References Cited**

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

ABSTRACT: This disclosure describes a dual cap closure assembly for use on the open top of a container. The outer cap is scored to form a removable tear strip to permit the removal and discarding of the outer cap. The outer cap has an end wall and a peripheral wall and the scoring operation is carried out on the outer cap after the cap has been formed to define such end wall and peripheral wall.

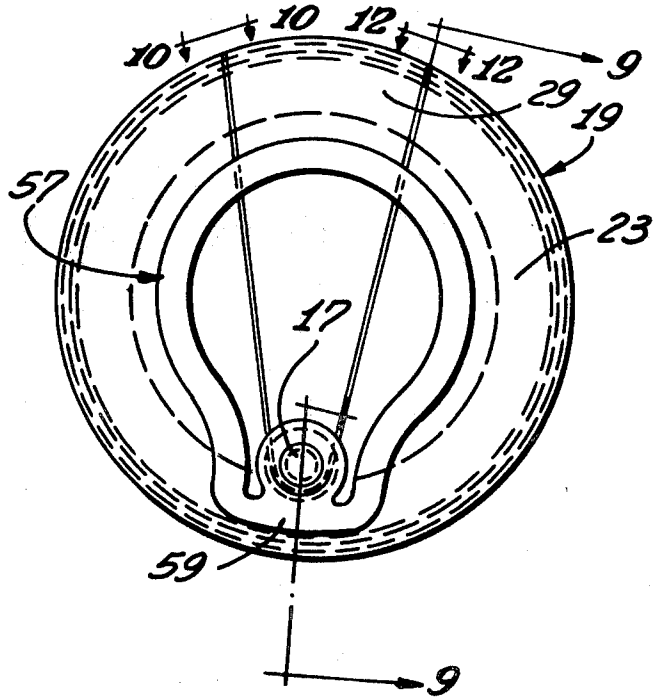


Fig. 1

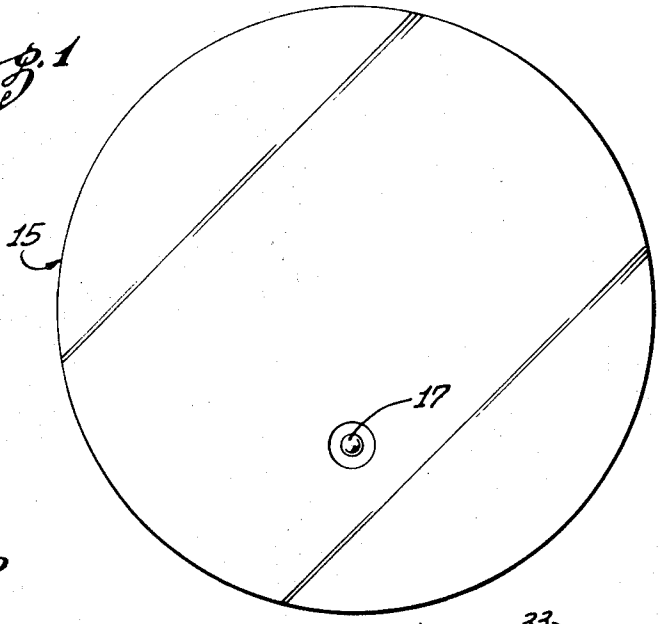


Fig. 2

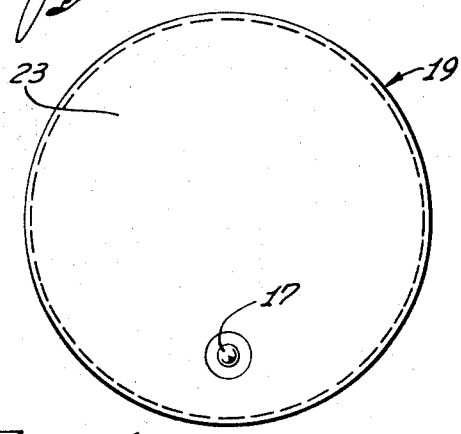


Fig. 3

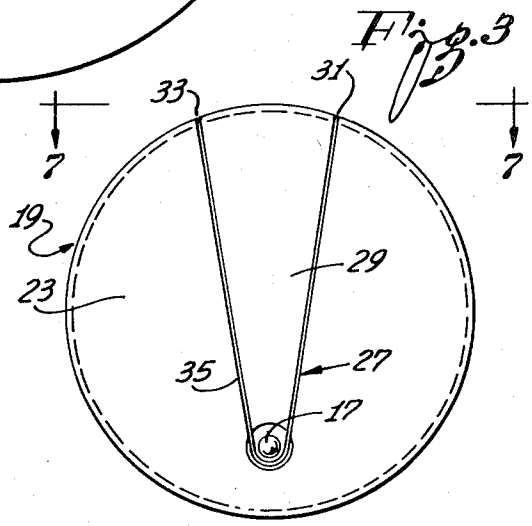


Fig. 4

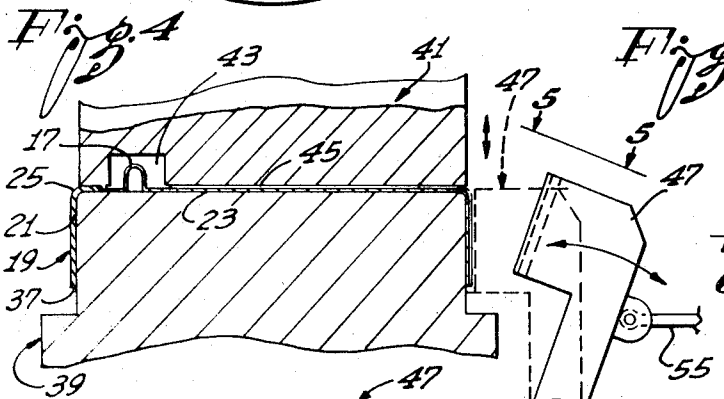


Fig. 5

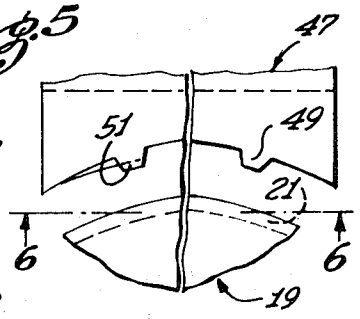
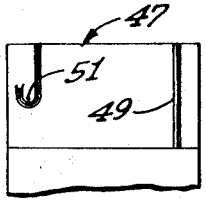


Fig. 6



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Fig. 7

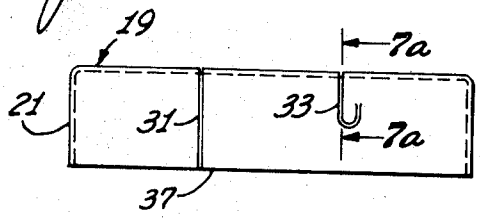


Fig. 7a

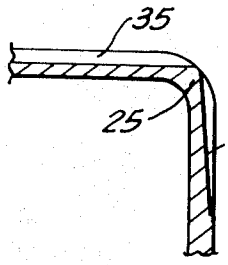


Fig. 8

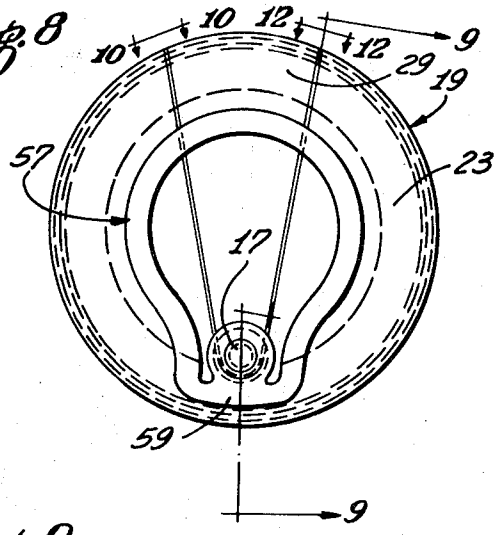


Fig. 9

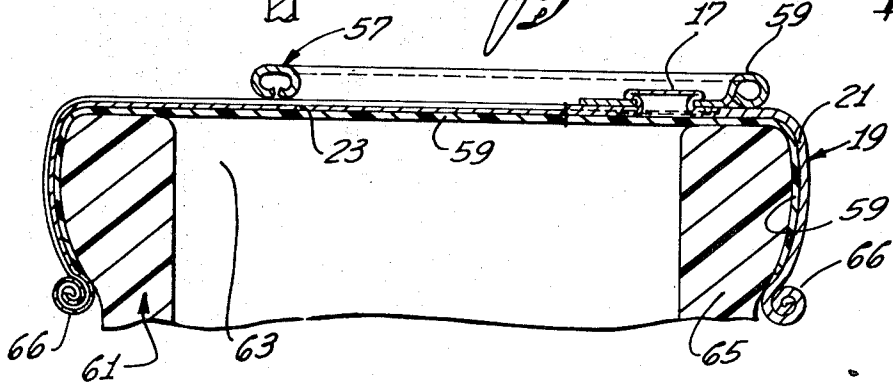


Fig. 9a



Fig. 10

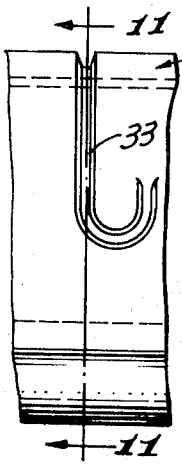


Fig. 11

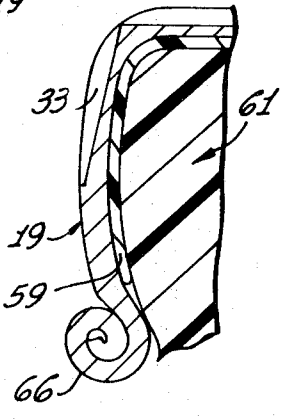


Fig. 13

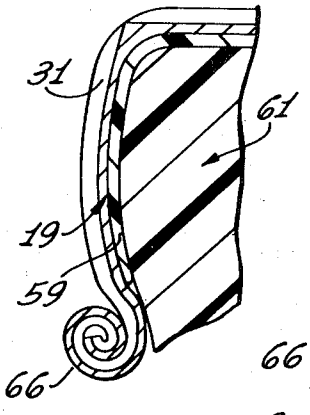
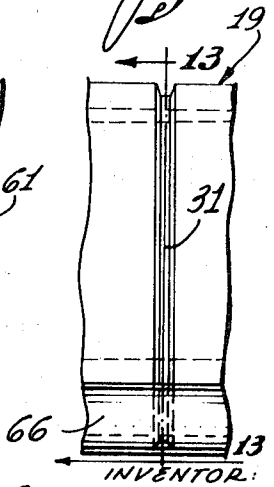


Fig. 12



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EASY-OPENING CONTAINER CLOSURE

This application is a division of application Ser. No. 696,902, filed Jan. 10, 1968, now U.S. Pat. No. 3,485,196.

BACKGROUND OF THE INVENTION

It is known to use an easy-opening dual cap closure assembly to seal the open top of a container. Such closure assembly typically includes a metal outer cap and a plastic insert or inner cap within the outer cap or a sealing agent may be used in lieu of the plastic insert. The outer cap has a line of weakness therein forming a removable tear strip and a tab is attached to, or integral with, the tear strip for the purpose of removing the tear strip. With the tear strip removed, the entire outer cap can be removed and discarded, and thereafter, the inner cap alone is used as a removable closure element.

This type of closure assembly can be used, for example, on a glass jar, bottle, or a special metal can and is particularly adapted for use on the container of a product which is not ordinarily entirely consumed shortly following the opening of the container. The entire closure assembly remains on the product until the consumer desires to use same whereupon the outer closure is removed as described above, and thereafter, the inner cap serves as a reusable closure for the container.

The metal outer cap typically has an end wall which closes the opening of the container and a peripheral wall or flange transverse to the end wall for gripping a portion of the container wall adjacent the opening to secure the closure assembly to the container. The outer cap is scored to form a line of weakness which extends from the peripheral wall over the end wall to define the tear strip. A tab for removal of the tear strip may be formed integrally with the outer cap or formed separately and then attached to the tear strip.

A very difficult problem arises in the scoring of the metal outer cap to form the tear strip. According to the prior art method, the scoring operation is performed in the flat. That is, the closure blank is scored while the blank is in a flat condition and prior to the time that it is shaped to form the peripheral wall. Following the scoring operation, the blank is deformed or bent to form the end wall and the peripheral wall. As the line of weakness extends from the end wall to the peripheral wall, such deformation or bending also bends the material of the outer cap along the line of weakness. This bending of the prescored metal has resulted in fracturing of the outer cap along the line of weakness adjacent the bend portion which integrally joins the end wall and peripheral wall when the flat blank is bent in this manner, the material of the peripheral flange adjacent the bend portion is forced and squeezed together circumferentially because of the inherent nature of forming the generally cylindrical peripheral flange at right angles to the end wall. Simultaneously, at least some of the material of the bend portion is radially stretched. As the cap is weakest along the line of weakness, it deforms along the line of weakness under the influence of these forces and not infrequently completely fractures. This problem is further aggravated when the peripheral wall is rolled to deform the peripheral wall to secure the closure assembly to the container. Generally the results of scoring in the flat and then bending the blank to form the outer cap are quite erratic. In other instances, the squeezing together of the metal adjacent the bend portion along the line of weakness fractures or nearly fractures the metal and also causes the edges of the tear strip to be overlapped by the adjacent portions of the outer cap. This captivates the tear strip and makes removal thereof much more difficult.

SUMMARY OF THE INVENTION

The present invention eliminates the problem heretofore experienced with scoring of the blank for the outer cap. In particular, the present invention teaches that the outer cap blank should be bent to form the outer cap which has an end wall and a peripheral wall and then the outer cap should be scored. By scoring the end wall and the peripheral wall rather than scoring in the flat, the problem of fracture of the outer cap along the line of weakness and captivating of the cap are eliminated. Furthermore, the results of the scoring operation are not erratic and well-controlled results are obtained.

When the outer cap is formed, the end wall and the peripheral wall are interconnected by an integral bend portion having a relatively small radius. The score line or line of weakness formed in the scoring operation extends at least substantially continuously from the peripheral wall over a portion of the end wall to define a tear strip which is at least partially removable from the remainder of the outer cap. The scoring need not be completely continuous at the bend portion, because the metal can be relatively easily torn around such bend portion even without the benefit of a continuous score line.

The present invention is applicable to the scoring of an outer cap in any manner that results in scoring on both the end wall and the peripheral wall and is particularly applicable to scoring of outer caps of the type described and claimed in application Ser. No. 599,124 the subject matter of which is incorporated by reference herein. Preferably, however, the line of score begins on the peripheral wall and extends at least substantially continuously from an initial point at or closely adjacent the outer edge of the peripheral wall to an area on the end wall a substantial distance from such point and then back to the peripheral wall to terminate at a location on the peripheral wall which is close to the initial point. Preferably, the tear strip extends at least substantially completely across the end wall and the score line terminates at a location which is spaced from the outer edge so that a tear strip along one side thereof is not completely separable from the outer cap so that the outer cap may be removed as a complete integral unit.

As the scoring operation is performed after the formation of the outer cap, it is important to assure that the portion of the line of weakness on the end wall will be properly oriented with respect to the portion of the line of weakness on the peripheral wall. Preferably such portions of the score line should be alined. To assure that this alinement is obtained, the present invention teaches scoring of the end wall and of the peripheral wall at the same work station without substantially moving the outer cap. If the cap is maintained stationary, the scores can be alined without the need for providing special indexing means in moving the outer cap from one scoring station to another. To further assure that the portions of the line of weakness are properly alined and to increase the speed of the process, it is preferred to score the end wall and the peripheral wall substantially simultaneously. The peripheral wall may be scored last, if desired, and the peripheral wall may be scored at a separate station if appropriate indexing means are provided.

The scoring operation can be advantageously carried out by positioning the outer cap over a support member and then engaging the end wall and the peripheral wall with first and second movable scoring tools, respectively. The second scoring tool for scoring the peripheral wall can advantageously be moved generally radially of the cap as by a pivoting motion.

The concepts of the present invention can be applied to any outer cap having an end wall and a peripheral wall and is not dependent upon the attachment of a tab to the tear strip in any particular manner. Thus, the tab may be integral with the tear strip or may be formed separately and suitably affixed thereto as by a rivet formed integrally with the outer cap. In the preferred practice of this invention, a rivet is formed integral with the end wall and such rivet is preferably formed at any time prior to the scoring operation. Following the scoring operation, an insert or inner cap which is preferably constructed of a resilient material such as plastic is inserted within the cap. The closure assembly can then be positioned over an opening in a container with the end wall covering such opening, and the peripheral wall is rolled or otherwise formed to grip the surface of the container adjacent the opening to secure the closure assembly to the container.

Another problem with the outer caps of this type is to prevent the tear strip from tearing completely out of the cap.

To prevent this from happening, the present invention teaches gradually decreasing the depth of the score adjacent the end thereof which terminates at a location spaced from the outer periphery of the cap.

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

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a closure blank having a rivet formed integrally therewith.

FIG. 2 is a top plan view of the closure blank after the peripheral region thereof has been bent downwardly to form the peripheral wall to thereby convert the blank into the outer cap.

FIG. 3 is a top plan view similar to FIG. 2 following the scoring operation on the outer cap.

FIG. 4 is a sectional view illustrating the scoring operation.

FIG. 5 is a plan view taken along line 5–5 of FIG. 4 and illustrating one form of scoring tool for scoring the peripheral wall.

FIG. 6 is a front elevational view taken generally along line 6–6 of FIG. 5 with the outer cap removed and illustrating the scoring tool.

FIG. 7 is an elevational view taken along line 7–7 of FIG. 3 and showing the outer cap after the scoring operation has been performed thereon.

FIG. 7*a* is a sectional view taken along line 7*a*–7*a* of FIG. 7 and showing one segment of the line of weakness on the peripheral wall.

FIG. 8 is a top plan view of the outer cap after a tab has been secured to the tear strip and following the insertion of the inner cap therein.

FIG. 9 is a sectional view taken along line 9–9 of FIG. 8 and illustrating the entire closure assembly secured to the open end of a container.

FIG. 9*a* is a fragmentary sectional view of a peripheral region of a slightly modified closure assembly on an open end of a container.

FIG. 10 is an enlarged fragmentary elevational view taken along line 10–10 of FIG. 8 and showing one of the score line segments on the peripheral wall.

FIG. 11 is a sectional view taken along line 11–11 of FIG. 10.

FIG. 12 is an enlarged fragmentary elevational view taken along line 12–12 of FIG. 8 and showing the other score line segment on the peripheral wall.

FIG. 13 is a fragmentary sectional view taken along line 13–13 of FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings and in particular to FIGS. 1—3 thereof reference numeral 15 designates an outer cap blank constructed of aluminum sheet metal or of other suitable material. Preferably, the first step of the operation is to form a hollow rivet 17 integral with the blank 15 by any suitable known method. Secondly, a peripheral region of the outer cap blank 15 is bent to convert the outer cap blank 15 into an outer cap or closure member 19. The bending operation converts the peripheral region of the blank 15 into a peripheral wall 21 (FIG. 4) which extends generally transversely of an end wall 23. Although the outer cap 19 may have different shapes, in the embodiment illustrated the peripheral wall 21 is generally cylindrical and the end wall 23 is circular in plan, and the walls 21 and 23 are connected by an integral bend portion 25 (FIG. 4).

Next, the outer cap 19 is scored to define a line of weakness 27 which in turn defines a tear strip 29. Although the line of weakness 27 may assume various configurations, in the embodiment illustrated the line of weakness 27 has two segments 31 and 33 formed in the peripheral wall 21 (FIG. 7) and a generally U or V-shaped segment 35 formed in the end wall 23 (FIG. 3). The segment 31 begins at an outer edge 37 of the peripheral wall and extends at least substantially completely over the peripheral wall to meet or substantially connect with the segment 35. Similarly, the segment 33 connects or substantially connects with the segment 35, but the outer end thereof is scored in a manner to stop tear-out. For example, the outer end may be turned upwardly to form a U and be spaced some distance from the outer edge 37 to prevent complete separation of the tear strip 29 from the remainder of the cap 19 as more fully described in said U.S. Pat. application Ser. No. 599,124.

As shown by way of example in FIG. 7*a*, the segments 33 and 35 do not interconnect at the bend portion 25 thereby making the line of weakness 27 slightly discontinuous. It will be appreciated, however, that the line of weakness 27 can be properly characterized as substantially continuous notwithstanding such slight interruptions in the score as may occur along the bend portion 25. Of course, the segments 33 and 35 may be made to interconnect, if desired.

The particulars of the scoring operation and tooling are shown in FIGS. 4—6. The outer cap 19 is positioned over a rigid support member 39, which conforms to the interior of the cap, so that the end wall 23 and the peripheral wall 21 are rigidly supported thereby. With the cap 19 held in this position, a first scoring tool 41 having a recess 43 to accommodate the rivet 17, and a scoring element 45 shaped to conform to the segment 35 of the line of weakness 27 is moved toward the end wall 23. The tool 41 is moved so that the scoring element 45 thereof forcibly contacts the end wall 23 to form the segment 35 of the line of weakness 27. The scoring element 45 preferably has sufficient length to extend radially outwardly along the end wall 23 to a point substantially at the periphery of the end wall; however, it is not necessary that the scoring element be curved adjacent the bend portion 25 to score the bend portion. It is sufficient if the scoring element 45 remains flat adjacent the bend portion 25 because once the tearing action along the line of weakness 27 is initiated, it easily progresses around the bend portion 25, even in the absence of a completely continuous score line thereon.

Next, while the cap 19 remains stationary on the support member 39, a second scoring tool 47 is advanced toward the peripheral wall 21. As best seen in FIGS. 5 and 6, the scoring tool 47 has a linear scoring element 49 and a J-shaped scoring element 51. In the embodiment illustrated, the scoring tool 47 is pivotally mounted on a suitably supported shaft 53 for movement by an operating rod 55 toward and away from the peripheral wall 21. The scoring tool 47 is suitably curved to match the curve on the peripheral wall 19. The elements 49 and 51 are otherwise suitably arranged and the location of the shaft 53 is appropriately selected so that the elements 49 and 51 will be substantially parallel to the surface areas of the peripheral wall 21 which they contact at the instant of contact.

The scoring element 51 is preferably constructed so that the score line 33 formed thereby will be of progressively decreasing depth as it extends toward the end thereof (FIGS. 7*a* and 11). To this end the scoring element 51 protrudes a progressively decreasing distance from the body of the scoring tool 47 as it extends toward and through the hooked end thereof as shown in FIG. 5.

Preferably, the scoring tools 41 and 47 are operated simultaneously or substantially simultaneously to reduce the time required for the scoring operation. If the scoring tools 41 and 47 are operated sequentially, either of the two may be first operated. The rivet 17 may be formed while the blank is in the flat and is therefore very easy to work on, however, the rivet could be formed after the cap 19 is formed, if desired.

Next, an apertured tab 57 is placed over the rivet 17 and the latter is staked to secure the tab to the tear strip 29 as shown in FIGS. 8 and 9. The tab may be of any suitable configuration, and in the embodiment illustrated the tab 57 is a ring tab having a nose end 59 which rests on a portion of the end wall 23 outside of the tear strip 29.

Prior to use of the cap **19**, an insert or inner cap **59** (FIG. **9**) is positioned within the outer cap **19**. The inner cap **59** is preferably constructed of a resilient material such as a plastic material which is suitable for use as a reusable removable container closure. The inner cap **59** is shaped similarly to the outer cap **19** and may terminate slightly above the outer edge **37** of the peripheral wall **21**. The cap **19** having the tab **57** affixed thereto and the cap **59** form the closure assembly.

The closure assembly is adapted to use with a container **61** such as a glass jar or bottle or can having an opening **63** therein and a container wall **65** surrounding the opening. The closure assembly is positioned over the opening **63** with the end wall **23** closing the opening and with the peripheral wall **21** lying adjacent the container wall **65**. The peripheral wall **21** and the corresponding portion of the inner cap **59** can then be rolled or otherwise suitably formed to securely grip the container wall **65** to secure the closure assembly to the container **61**. A lower region of the peripheral wall **21** may be rolled outwardly and upwardly into a bead **66** as shown in FIG. **9** to further assist in stopping of the tearing of the material of the cap beyond the end of the score line segment **33**. Alternatively this lower region may be folded upwardly to form a fold portion **66'** as shown in FIG. **9***a* where corresponding parts are designated by corresponding primed reference characters. FIGS. **10—13** illustrate on an enlarged scale the segments **31** and **33** of the line of weakness **27** after the closure assembly has been secured to the container **61** and the relationship of such score line segments to the container and the inner cap **59**. In particular, FIGS. **10—13** show how the curved peripheral wall **21** secures the closure assembly to the container **61**.

To open the container, the tab **57** is raised to initiate rupture of the line of weakness **27** adjacent the rivet **17**. Next, the user exerts an outward pulling force on the tab **57** to continue severance of the material of the outer cap **19** along the line of weakness. Such severance will continue down one side of the tear strip **29** along the segment **31** all the way to the outer edge **37** but will terminate short of the edge **37** along the other side of the tear strip **29** because the J-shaped segment **33** does not continue all the way to the edge **37**. The progressively increased resistance to tearing afforded by the score line segment **33** provides additional insurance against complete tear out of the tear strip **29**. The outer cap **19** may then be removed from the inner cap **59** as an integral unit. Thereafter, the resilient inner cap **59** can be utilized as a removable, reusable closure for the container **61**.

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

I claim:

1. An easy opening closure for use on a container having an opening therein and a container wall around said opening, said closure comprising:

a cap of sheet material having an end wall for closing the opening of the container and a peripheral wall extending generally transverse to the end wall, said peripheral wall having an outer edge and being adapted to at least partially surround the wall of the container;

said cap being scored to define a line of weakness extending at least substantially continuously from a first location at least substantially at the outer edge of the peripheral wall over a region of the end wall and then back generally toward said first location to terminate at a second location which is spaced from said outer edge of said peripheral wall, said line of weakness defining a tear portion which is partially removable from said cap;

an end portion of said line of weakness adjacent said second location being scored to a lesser depth than another region of said line of weakness so that said end portion will offer increased resistance to rupture of the material of the cap therealong; and

a pull member joined to said tear portion.

2. A closure as defined in claim **1** wherein the depth of score of said end portion of said line of weakness is progressively decreased as said line of weakness extends toward said second location.

3. A closure as defined in claim **1** wherein said second location is on said peripheral wall and said end portion includes a generally U-shaped portion opening away from said outer edge.

4. An easy opening closure as defined in claim **1** wherein said end portion of said line of weakness includes a curved region.

5. An easy opening container as defined in claim **1** wherein said end portion of said line of weakness terminates at said second location.

6. An easy opening container as defined in claim **1** wherein a region of said line of weakness adjacent said second location is curved away from an adjacent portion of said outer edge of said peripheral wall.