

[54] TAMPER-PROOF BOTTLE CAP AND CONTAINER

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[22] Filed: Feb. 13, 1975

[21] Appl. No.: 549,512

[52] U.S. Cl. 215/256; 215/258

[51] Int. Cl.² B65D 49/12; B65D 41/32

[58] Field of Search 215/256, 258, 344

[56] References Cited

UNITED STATES PATENTS

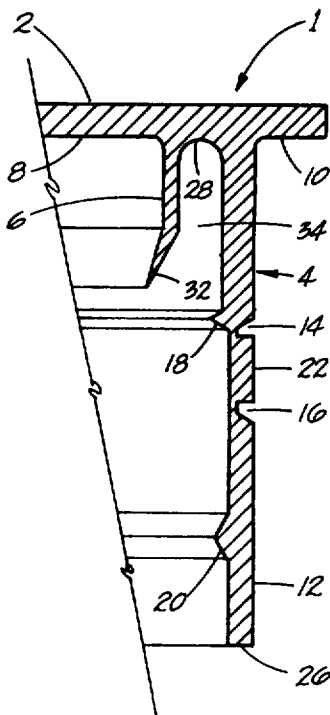
3,235,117	2/1966	Mason	215/258 X
3,338,446	8/1967	Faulstich	215/256
3,672,528	6/1972	Faulstich	215/256

Primary Examiner—George T. Hall
 Attorney, Agent, or Firm—Michael D. Nelson

[57] ABSTRACT

An improved bottle cap and container are disclosed. The cap is composed of a top disk, a thin-walled outer skirt and a thin-walled inner skirt both attached to the disk. The outer skirt is weakened along two circumferential score lines to form a weakened cylindrical band around the outer skirt. A tab is attached to the cylindrical band and extends outwardly to provide a means whereby a person may grasp the tab between the fingers and tear the band from the cap. The outer skirt also has two circumferential beads attached to the inside of the skirt with one bead being disposed above the band and one below the band. These beads fit in grooves in the container neck. Prior to tearing the band from the skirt, the cap is tamper-proof. When the band is removed the portion above the band functions as a reclosure cap.

7 Claims, 9 Drawing Figures



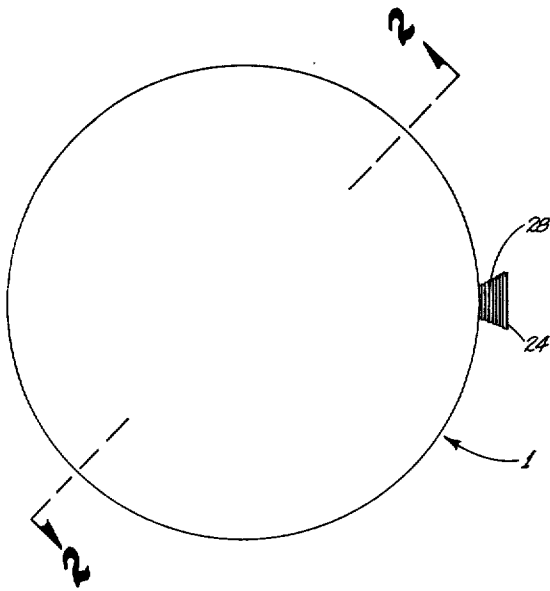


FIG. 1

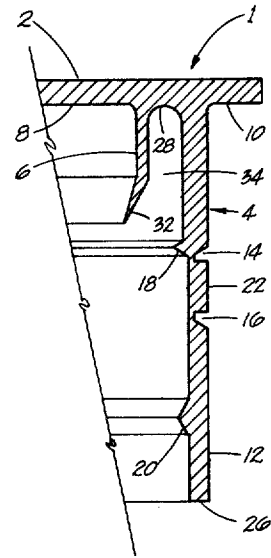


FIG. 2

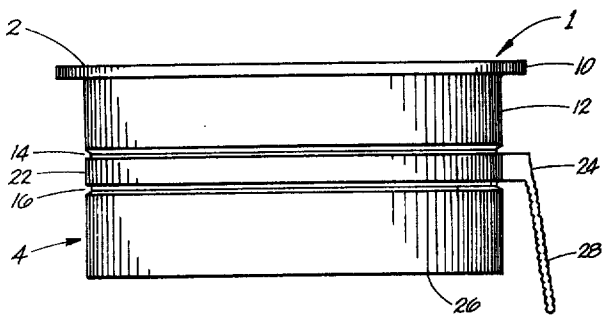


FIG. 3

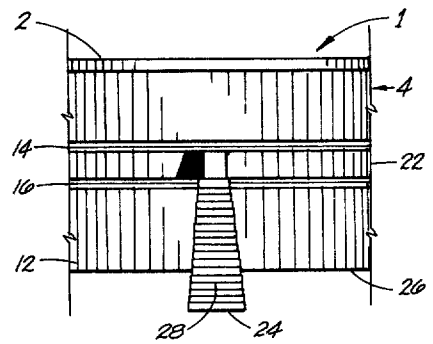


FIG. 4

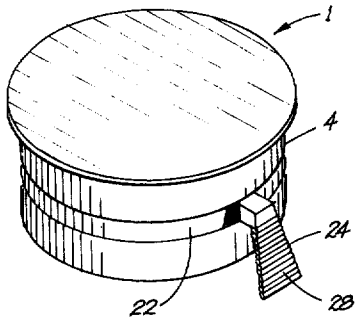


FIG. 5

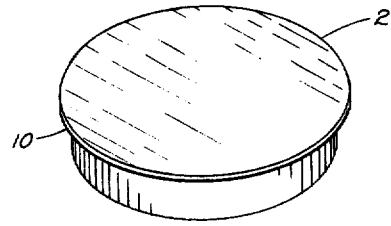


FIG. 6

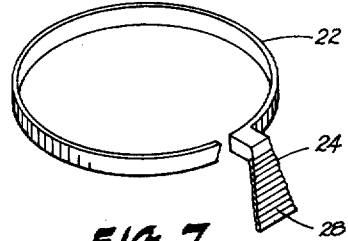


FIG. 7

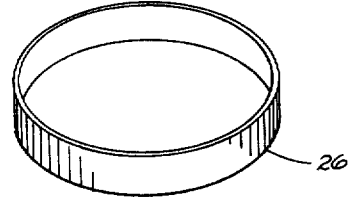


FIG. 8

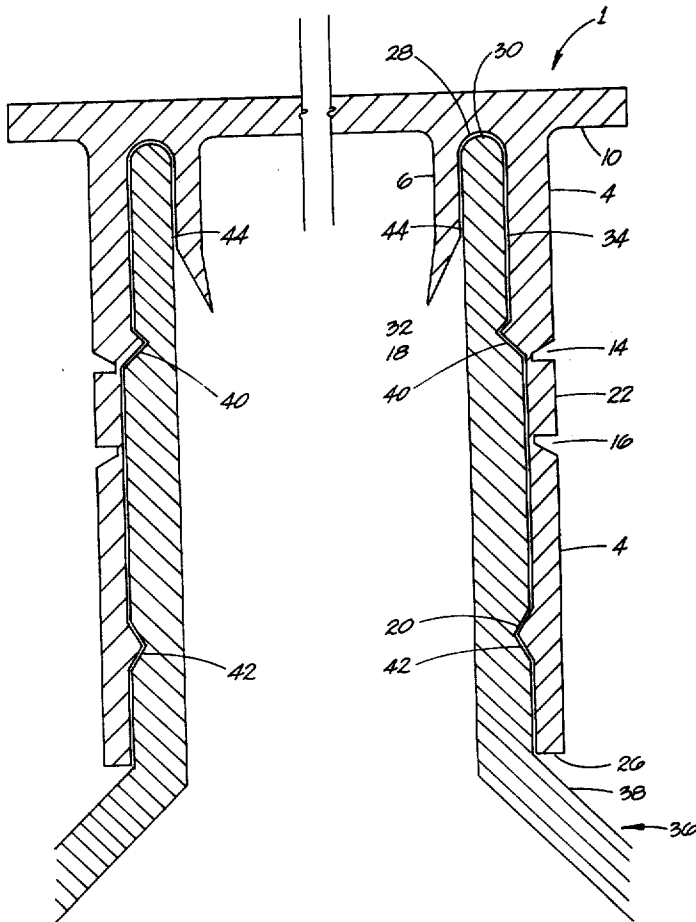


FIG. 9

TAMPER-PROOF BOTTLE CAP AND CONTAINER

This invention relates to a new improved bottle cap. More particularly, this invention relates to an improved recloseable plastic bottle cap.

BACKGROUND OF THE INVENTION

Plastic caps for narrow necked plastic bottles are typically of the type disclosed in U.S. Pat. No. 3,338,446. The caps have a depending thin-walled skirt weakened approximately midway of its length with a circumferential score line so that the portion of the skirt below the score line may be torn off. The cap has two beads which extend circumferentially around the inside of the cap. These beads fit into grooves in the bottle neck and prevent the cap from being removed from the container. When both beads are in place the cap cannot be removed thereby preventing any tampering with the bottle contents. The lower bead is torn away when the lower skirt is removed. This then allows the cap to be easily pried over the upper bead to allow access to the contents. The upper bead remains with the cap thereby allowing the cap to be used repeatedly for reclosure until the contents of the bottle are exhausted.

There are several problems with the plastic caps of the prior art. A major problem is the splitting of the lower portion of the cap when it is forced onto bottle neck. The score line for the tear-away lower section extends diagonally through the lower portion of the cap skirt and terminates at its rim. This score line weakens the cap rim and when pressure is exerted in an attempt to push the cap onto the bottle, the cap rim often tears along this score line. Bottles with torn rims must be removed from the packaging line, the cap manually removed and the bottle and contents recycled. This tearing problem, referred to as a cap splitting, is a substantial burden and significantly increases operating expenses.

Another problem with the prior art caps is the difficulty by the consumer in tearing the lower skirt from the cap. The problem is caused, in part, by the manufacturer when it strengthens the score line for the purpose of reducing cap "splitting" as discussed supra. By strengthening the score line, the amount of force or "difficulty" required to tear the lower skirt from the cap is proportionately increased.

In addition, the score line as it extends diagonally through the lower skirt of the cap, must penetrate the lower bead which extends circumferentially around the inside of the cap. Because the bead increases the thickness of the skirt at this point, the score line does not cut into the skirt as deeply thereby increasing the difficulty in tearing the lower skirt from the cap.

Another problem existant with the prior art caps is the loose fit of the cap onto the bottle. A tight fit between the cap and the bottle is essential for a good seal. Although the prior art caps could be made to fit more tightly on the bottle, such an improvement would result in a greater number of cap splitting. Thus an improvement in fit or seal is off-set by an increase in split caps and operating costs.

A need thus exists for a tamper-proof cap which can be used repeatedly for reclosure, which can be inserted onto the bottles without cap splitting, which can be removed from the bottle by the consumer without great difficulty, which has a tight fit or good seal and which

is relatively easy to produce and inexpensive to manufacture.

It is therefore an object of this invention to provide an improved plastic cap.

5 It is an additional object of this invention to provide an improved plastic cap which does not split when inserted onto a container.

10 It is a further object of this invention to provide an improved plastic cap which may be removed from the container without difficulty.

Another object of this invention is to provide an improved plastic cap which fits tightly on the container neck and provides improved sealing of the container contents.

15 It is a further and additional object of this invention to provide a container and improved cap combination.

SUMMARY OF THE INVENTION

The aforementioned objects and their attendant advantages can be realized by a deformable plastic cap comprising (1) a top disk, (2) a cylindrical thin-walled outer skirt integrally attached to and extending substantially perpendicularly from said disk and (3) a cylindrical inner skirt integrally attached to and substantially perpendicular to the disk positioned inward and enclosed within said outer skirt and substantially coaxial therewith and extending for a shorter distance than the outer skirt. The outer skirt is scored and weakened along a circumferential first score line downwardly spaced from the disk. The outer disk is also scored and weakened along a circumferential second score line downwardly spaced from the first score line to form a weakened cylindrical band within the outer skirt. A tear tab is attached to the cylindrical band and extends outwardly from the outer skirt and downwardly from the cylindrical band. An area connecting the first and second score lines, adjacent the tear tab, is weakened to allow easy tearing of the cylindrical band from the cap. In order to hold the cap to the container neck, two narrow radial beads are provided which extend circumferentially around the inside and integrally attached to the outer skirt. One bead is positioned above the cylindrical band and one bead is positioned below the band.

45 This cap is not burdened with the splitting problem of its prior art caps since there is no score line extending to the bottom of the cap. The cap of this invention can be manufactured with a strong lower skirt without increasing the difficulty of removing the tear band by the consumer. Also, the cap can be inserted onto a container with a tighter fit thereby realizing an improved seal for the container contents. Moreover, since the score line in the cap of this invention does not bisect the lower bead, this cap is not burdened by the difficulty in tearing the lower skirt from the cap as experienced with many of the prior art caps.

Other related and additional objects of this invention will be apparent from the drawing, the following description of the invention and appended claims.

50 In the drawings:

FIG. 1 is a top view of a cap in accordance with this invention.

FIG. 2 is a sectional view of a cap taken substantially along line 2—2 of FIG. 1.

65 FIG. 3 is a side view of the cap showing the skirt.

FIG. 4 is a fragmentary side view of a cap showing the connection of a tear tab to the skirt.

FIG. 5 is a perspective view of the cap.

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FIG. 6 is a perspective view of the top portion of the cap with the tear band and lower skirt removed.

FIG. 7 is a perspective view of the tear band after its removal from the cap.

FIG. 8 is a perspective view of the lower skirt after its removal from its cap.

FIG. 9 is a cross-sectional view of the cap on a container neck.

DETAILED DESCRIPTION OF THE INVENTION

When references are made to the accompanying drawings the similar characters of reference represent corresponding parts in each of the several views.

Cap 1 is constructed in accordance with the present invention from a resilient and moderately flexible plastic substance so that it will deform slightly to snap on and off of the container. Exemplary plastic materials which may be employed include polyethylene, polystyrene, polyvinyl chloride, polyacrylates, polyamides, polypropylene, etc. The preferred plastics are polyethylene and polystyrene.

Cap 1 is comprised of three different sections, a top disk 2, an outer skirt 4 and an inner skirt 6. The top disk 2 is preferably a flat circular plate having a substantially planar exterior surface. This flat exterior surface provides a convenient place for labels or instructional material. It should be recognized that the disk can have a shape other than circular. For example the disk can be rectangular, oval, or other. In a preferred embodiment the disk is circular and extends beyond the cylindrical outer skirt to form a circumferential lip 10 around the cap. This lip thereby provides a convenient means for facilitating the removal of the upper portion of the cap from the container. Thus, the consumer, after removing the tear band from the cap, can open the container by applying pressure upwardly on the lip 10 by the thumb or finger. This action will unseat the upper bead from the upper groove and allow the cap to slide off the container neck.

The outer skirt 4 of Cap 1 is integrally attached to the top disk 2 and extends substantially perpendicularly from the planar surface of the disk. The outer skirt 4 is a thin-walled cylindrical shell and is composed of the thin shell, an upper score line 14, a lower score line 16, tear tab 24, an upper circumferential bead 18 and a lower circumferential bead 20. The thickness of the skirt is not critical to the practice of this invention as long as the cap is sufficiently resilient to allow the internal beads 18 and 20 to expand over the wide areas of the container neck and snap into the container grooves without tearing of the cap or container. Generally, however, the skirt thickness is governed by economics with the thinnest functional cap being preferred. Usually the thin shell will have a thickness ranging from 0.3 millimeters (mm) to 1.5 millimeters and more usually from 0.5 mm to 1 mm.

The upper score line 14 extends circumferentially around the skirt 4 forming a circular weakened line entirely enclosing the skirt. The score line 14 may be made on either the inner or outer surface of the skirt.

The lower score line 16 is the same as the upper score line except that it is disposed at a lower position around the skirt. Like the upper score line, the lower score line may be made on either the inner or outer surface of the skirt. The portion of the outer skirt between score line 14 and score line 16 is the tear band 22. This band is removed when the consumer wishes to open the container and after it is removed from the cap it is dis-

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carded. Because it is discarded, it is preferred to make the band as narrow as possible without weakening the band to the point where it could break during removal. Generally, the tear band will range in width from 2 mm to 10 mm.

A tear tab 24 is attached to the tear band 22 and provides a means for the tear band to be torn from the cap by the consumer. The tear tab 24 may be any projecting tab which allows the consumer to easily grasp the tab by the fingers. In a preferred embodiment, the tab 24 extends outwardly from the tear band 22 and then downwardly terminating a position below the rim 26 of its outer skirt. By extending the tab below the rim of the skirt, the tab may be used as a guide in automatic capping machines to guide the cap within the machine and onto the container. In order to increase the friction between the fingers and tear tab, the tab is preferably grooved with serrates 28 or the like.

A weakened area extends from the lower score line 16 to the upper score line 14 substantially adjacent to tear tab 24. The weakened area is provided so that the tear band may be a gap in the band such as shown in the drawings or may be a score line extending vertically between the two circumferential score lines 16 and 14.

Upper and lower internal circumferential beads are provided around the interior of the outer skirt which fit into grooves in the container and hold the cap firmly onto the container neck. The upper bead 18 is disposed above the first score line between the score line 14 and the top disk 2. The lower bead 20 is disposed below the second score line between the score line 16 and the rim 26. The beads 18 and 20 are substantially uniform raised surfaces projecting inwardly from the skirt. In one embodiment, the raised surface has a semi-circular cross-section; in another it may be triangular. In another embodiment, the raised surface may extend substantially horizontally at its upper area and curve downwardly and outwardly to the skirt at its lower area. The type, shape and size of the beads can be the same as the beads discussed in U.S. Pat. Nos. 3,338,446 and 3,672,528, which patents are herein incorporated by reference.

The inner skirt 6 of cap 1 is integrally attached to the top disk 2 inward from the outer disk and extends substantially perpendicular to the planar surface of the disk. The inner skirt 6 is disposed inward and enclosed within the chamber of the outer skirt and substantially co-axial therewith. The inner skirt 6 extends for a distance shorter than the outer skirt and preferably terminates before the first score line 14. More preferably the inner skirt 6 terminates adjacent to or before the upper bead 18. The inner skirt 6 and the outer skirt 4 form an annular chamber in which the container neck is held. The inner skirt is disposed so that it tightly fits into the opening of the container neck, and the outer skirt is disposed so that it tightly fits along the outside of the container neck. The annular chamber 34 is preferably shaped at its top with rounded interior surface 28 to provide a seal with the rounded exterior surface 30 of the container neck lip. The terminus of the inner skirt 6 is preferably slanted inward such as by inwardly curving exterior surface 32. Terminating the inner skirt in this manner allows the inner skirt to guide the top of the container neck into the annular chamber 34.

The caps are conveniently prepared by an injection mold technique. Although the injection mold is by far the most convenient, it is recognized that other methods for making the cap can be used.

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The cap 1 is primarily for use with a thin-walled plastic container 36. The container is usually fairly strong and lightweight. Although the walls are reasonably rigid, there is generally sufficient resiliency in the plastic materials so that they will flex slightly under pressure.

The shape of the lower portion of the container 36 is subject to considerable variation as is well understood in the plastic bottle art. Neck 38 projects upwardly from the main portion of the container. Neck 38 is an elongated upwardly-inwardly shaped cylindrical thin-walled shell. At the upper end of neck 38 are two peripherally disposed circumferential grooves 40 and 42. A cylindrical shell 44 extends up from the upper groove 40 and terminates, in a preferred embodiment, in a smooth rounded container lip 30. The upper groove 40 is disposed so that it encounters bead 18 of cap 1 when the cap is inserted onto the container. The lower groove 42 is disposed so that it encounters bead 20 of cap 1 when the cap is inserted onto the container. The circumferential grooves may be of triangular, circular, rectangular or other cross-section and are preferably of the same cross-section as the cap beads. The type, size and shape of the container can be as shown and described in U.S. Pat. No. 3,338,446.

In using the cap and the combination of this invention, after the container 36 has been filled with a product, the cap 1 is installed. Automatic machinery may be used for this purpose. Outer skirt 4 is slipped on outside neck 38 and a downward pressure is applied. The top rim of the container neck encounters slanted surface 32 which guides the lip 30 between skirts 4 and 6. As the downward pressure is continued, the beads 18 and 20 slide over the surface of neck 38 and snap into grooves 40 and 42. The flexible nature of the plastic material of which the cap is fabricated, permits this temporary deformation of the parts. Thus assembled, the container is sealed since the cylindrical shell 44 is held tightly between skirts 4 and 6 and the rounded lip 30 is contacted by the rounded interior surface 28 of the cap. It is nearly impossible to remove the cap 1 while skirt 4 is intact.

When the consumer wishes to open the container, he grips the tear tab 24 and pulls outwardly tearing tear band 22 from the outer skirt 4. The lower portion of the outer skirt remains on the container completely severed from cap 1. The portion of the cap above the tear band comprises a re-closure cap for the container 36. Such re-closure cap may be pried off by lifting on lip 10. This operation is possible where there is only a single bead 18 in position in groove 40. When skirt 4 is intact before the tear band is removed, it is almost impossible for a consumer to dislodge both bead 18 and bead 20. The closure portion of cap 1 may be replaced by pushing downwardly on disk 2. The bead 18 then snaps into groove 40 and the cap is again positioned. The closure may be performed as many times as desired.

Although the foregoing invention has been described in some detail, by way of illustration and example, for purposes of clarity and understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and such are within the scope of the invention as defined by the appended claims.

I claim:

1. A deformable plastic cap comprising (1) a top disk, (2) a cylindrical thin-walled outer skirt integrally attached to and extending substantially perpendicularly

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from said disk and (3) a cylindrical inner skirt integrally attached to and substantially perpendicular to said disk positioned inward and enclosed within said outer skirt and substantially co-axial therewith and extending for a shorter distance than said outer skirt; said outer skirt scored and weakened along a circumferential first score line downwardly spaced from said disk, and score and weakened along a circumferential second score line spaced downwardly from said first score line to form a weakened cylindrical band within said outer skirt, a tab attached to said cylindrical band and extending from said band and outwardly from said outer skirt, a weakened area extending between said first score line and said second score line immediately adjacent said tab, a narrow radial first bead extending circumferentially around the inside and integrally attached to said outer skirt between said first score line and said disk, and a narrow radial second bead extending circumferentially around the inside and integrally attached to said outer skirt below said second score line.

2. The deformable cap defined in claim 1 wherein said first bead and said second bead have a semi-circular cross-sectional area.

3. The deformable cap defined in claim 1 wherein said top disk has a flat circular lip extending outwardly beyond said outer skirt.

4. The deformable cap defined in claim 1 wherein said cap is made of polyethylene or polystyrene.

5. The deformable cap defined in claim 1 wherein said weakened area is a score line connecting said first score line with said second score line.

6. The deformable cap defined in claim 1 wherein said first score line and said second score line are made along the outside of said outer skirt.

7. In combination, (1) a container with a cylindrical neck having an opening through said neck to said container, said neck having an circumferential upper groove around the outside of said neck and a circumferential lower groove around said neck spaced downward from said upper groove, and (2) a deformable plastic cap comprising a top disk, a cylindrical thin-walled outer skirt integrally attached and substantially perpendicular to said disk and of a sufficient diameter so as to fit around the exterior of said neck, a cylindrical inner skirt integrally attached and substantially perpendicular to said disk inwardly spaced from said outer skirt and co-axial therewith so as to fit within said opening; said outer skirt scored and weakened along a circumferential first score line downwardly spaced from said disk, and scored and weakened along a circumferential second score line spaced downwardly from said first score line to form a weakened cylindrical band within said outer skirt, a tab attached to said cylindrical band and extending downwardly from said band and outwardly from said outer skirt, a weakened area extending between said first score line and said second score line immediately adjacent said tab, a narrow first bead extending circumferentially around the inside and integrally attached to said outer skirt between said first score line and said disk and spaced so as to fit into said upper groove, and a narrow radial second bead extending circumferentially around the inside and integrally attached to said outer skirt below said second score line and spaced so as to fit into said lower groove.

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