Aug. 29, 1967 G. W. FAULSTICH 3,338,446

PLASTIC CAP AND BOTTLE NECK

Filed Sept. 26, 1966

FIG. 1.

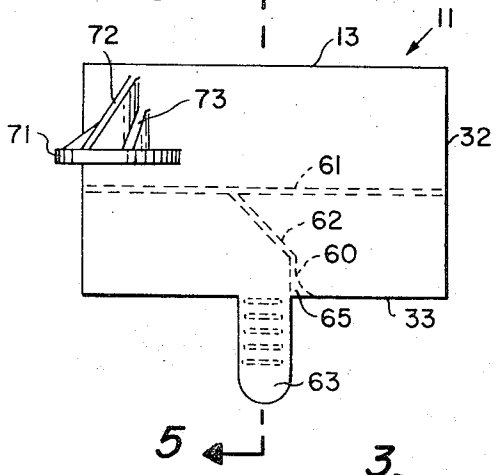
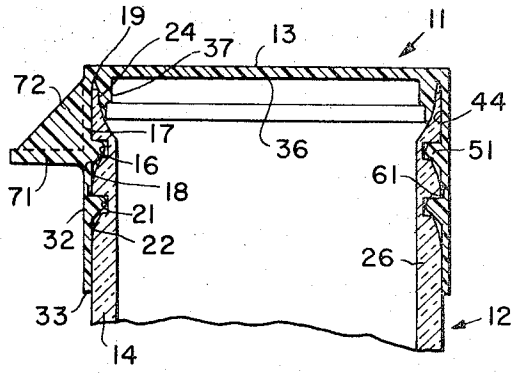


FIG. 3.



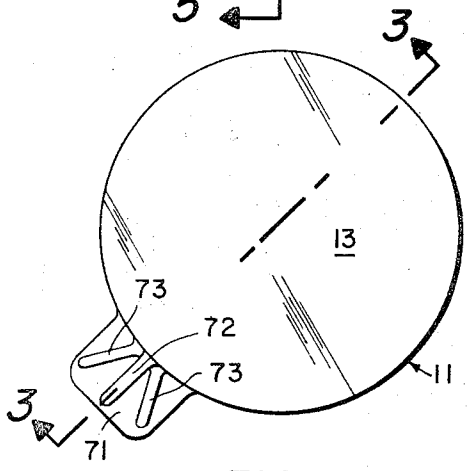


FIG. 2.

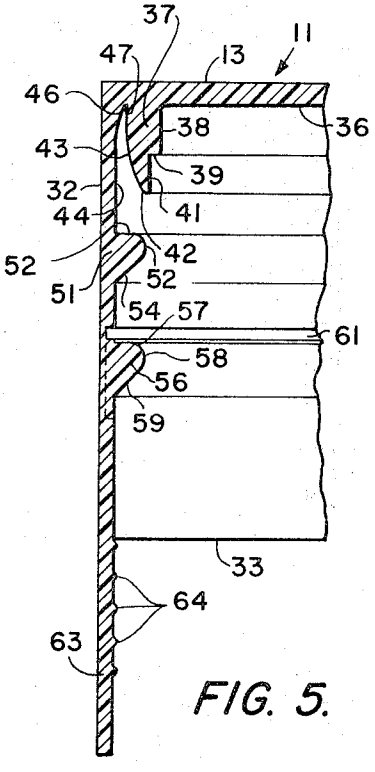


FIG. 5.

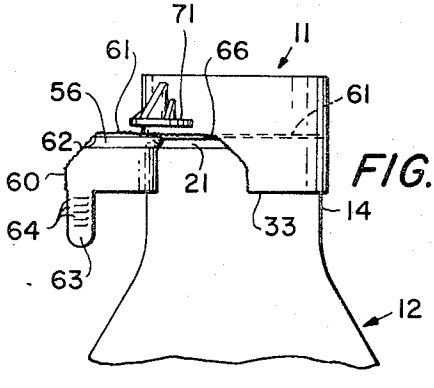


FIG. 4.

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PLASTIC CAP AND BOTTLE NECK

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ABSTRACT OF THE DISCLOSURE

A plastic cap is weakened approximately midway of its cylindrical, thin-walled skirt in a circumferential score line which connects with a spiral score line extending to the bottom edge. Above and below the circumferential score line are internal beads. The bottle neck to which the cap is applied has a pair of grooves to receive the beads. Prior to tearing the skirt the cap is tamper-proof because the interfit of beads and grooves prevents pulling the cap off. When the bottle is to be opened, the skirt is torn along the score lines, the portion above the score line functioning as a reclosure cap.

This application is a continuation-in-part of application S.N. 501,192, filed Oct. 22, 1965.

This invention relates to a new and improved cap and bottle neck. More particularly, the invention relates to a plastic neck and cap combination wherein the cap has a tear strip seal and reclosure features. Reference is made to Patent 3,120,900, of which the present application is an improvement.

In accordance with the present invention there is provided a plastic cap having a depending 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. Prior to tearing of the bottom of the skirt the cap provides means to prevent tampering with the contents of the bottle, it being understood that dishonest persons sometimes fill bottles advertised to contain spring water or distilled water with inferior water unless detection means is provided to prevent substitution. After the skirt has been torn, the upper portion of the cap remains useful and may be used repeatedly for reclosure until the contents of the bottle is exhausted.

Accordingly, a feature of the invention is the provision of a seal-like closure wherein the seal must be broken before access to the bottle is afforded. The cap is provided with a pair of parallel internal circumferential beads spaced vertically and each fitting into a groove in the neck of the container. The shapes of the grooves and beads facilitate installation of the cap on the neck, but make it impossible to remove the cap without tearing a portion of the skirt. Further, the use of two beads and two grooves substantially improves the sealing effect.

This particular feature, an advantage of the invention, is the fact that the cap may be initially installed very easily. The skirt is elongated and of a moderately resilient plastic material and hence fairly flexible to permit such installation. Once it is in place, however, it cannot be removed without tearing the skirt and affording visual evidence of tampering.

A further feature of the invention is the fact that a cap is used with a bottle having a featured or beveled finish to the neck in such manner that a very tight seal is effected between the cap and the bottle to prevent leakage and, also, to prevent ingress of contaminants.

A further feature of the invention is the fact that the cap and neck are so constructed that the cap may be installed either manually, with a minimum of physical effort, or by automatic machinery, the cap snapping into

position and being securely held until intentionally withdrawn.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a side elevation of a cap in accordance with this invention.

FIG. 2 is a top plan thereof.

FIG. 3 is a sectional view of a cap taken substantially along line 3—3 of FIG. 2 and also showing a portion of a neck on which the cap is installed.

FIG. 4 is a fragmentary side elevation of a cap and bottle neck showing partial tearing of the skirt.

FIG. 5 is an enlarged fragmentary sectional view of a cap taken substantially along line 5—5 of FIG. 1.

Cap **11** constructed in accordance with the present invention is preferably made of a thin plastic material which is sufficiently resilient and flexible so that it will deform slightly to snap on and off the container. Polyethylene or polystyrene are satisfactory materials for this purpose. Cap **11** is intended primarily for use with a thin-walled plastic container **12** which also may be formed of polyethylene or polystyrene, it being understood that a variety of plastic materials is available for such purpose. Essentially container **12** is relatively strong and light in weight and resistant to chemical action of most common liquids with which it is likely to be used. Although the walls are reasonably rigid, nevertheless, there is sufficient resiliency in the plastic materials so that they will flex somewhat under pressure.

The shape of the lower portion of container **12** is subject to considerable variation as is well understood in the plastic bottle art. Neck **13** projects upwardly from the main portion of the container. The exterior of neck **13** has an elongated upwardly-inwardly tapered portion **14** having formed therein adjacent its upper end an upper rectangular peripheral groove **16**. A cylindrical surface **17** extends up from groove **16** and terminates in a thin annular top finish **19**. Inwardly of finish **19** is a reverse curve portion **24** extending generally inwardly and joins slightly above the level of groove **16** in a vertical wall **26**. It will be seen particularly with reference to FIG. 3 that the depth of groove **16** is slightly less than the width thereof. Below groove **16** the exterior of neck **14** is formed with an outward-downward arcuate surface **18**. Below groove **16** a distance about twice the width of said groove is a lower rectangular groove **21** similar in shape to groove **16**. Below groove **21** is an arcuate surface **22** similar to surface **18**, which merges with the cylindrical exterior of neck **14**.

Cap **11** has a flat disk top **13** having a substantially planar interior wall **36**. Adjacent the periphery is a depending interior skirt **37** having a vertical upper inner wall **38**, a horizontal, narrow, annular step or shoulder **39** and a vertical lower inner wall **41** terminating in a thin lower edge **42**. The exterior surface **43** of interior skirt **37** curves upward-outward, generally complementary to surface **24**. The interior surface **44** of skirt **32** is cylindrical up to about the level of shoulder **39** and the portion **46** thereabove curves upward-inward, terminating in a very narrow annular groove **47** about the width of finish **19**.

Formed on the interior of wall **44** at the level of groove **16** is upper internal bead **51** having a flat top surface **52**, an arcuate inner surface **53** and a downward-outward slanted surface **54** disposed at about a 45° angle. Below bead **51** is a lower internal bead **56** similar to bead **51** in shape and located at the level of groove **21**. Surfaces

57, 58 and 59 correspond to surfaces 52, 53 and 54, respectively.

When cap 11 and neck 14 are assembled, the cap is pushed down either manually or mechanically. Finish 19 encounters slanted surface 59 and then surface 54, deflecting inward to clear beads 51, 56. Finish 19 then fits outward of edge 42, encountering surface 43, deforming inner skirt 37 inward and nesting in groove 47, all as best shown in FIG. 3.

Bead 51 fits into groove 16, the bead and groove deforming somewhat so that they are substantially complementary. The curved or slanted surfaces 18 and 54 facilitate this sequence. Similarly bead 56 and groove 21 deform to complementary shape.

The seating of the beads in the grooves makes it impossible to pull the cap off the neck so long as skirt 32 is intact. The seating of surfaces 24–43, 19–47, 17–44 and the beads 51, 56 in grooves 16, 21, provides a very tight fit which prevents transmission of fluids either into or from the bottle.

Once the cap 11 has seated on the neck 14 as shown in FIG. 3, it cannot be removed because of the frictional gripping of the lower portion of the skirt with the exterior of the neck. In order to permit removal of the cap, an internal circumferential groove 61 is formed in surface 44 immediately above bead 56. A diagonal or spiral groove 62 extends down to a level above edge 33 with a vertical stretch 60 intersecting edge 33. To one side of the downward terminus of groove 60 is a finger grip 63 formed integrally with the skirt of the cap and of extended length. On the interior of tab 63 are short horizontal beads 64 which assist the user in gripping the tab 63. To facilitate tearing, a wedge shaped weakening 65 of the interior of skirt 32 if formed immediately to the right of tab 63. When the tab 63 is pulled upwardly, the skirt tears along grooves 60 and 62 and when the tear reaches the groove 61, as is best shown in FIG. 4, the skirt is torn so that its terminus is a horizontal line 66.

After the skirt has been torn so that it terminates along line 66, the remaining portion of the cap can be removed. To facilitate removal, a horizontal finger hold 71 which is rectangular in plan, projects out from upper skirt portion 32 above groove 61 and below bead 51. Triangular upwardly-inwardly slanted gussets 72, 73 extend upwardly-inwardly from the top surface of finger hold 26 to rigidify the same. Hence, when the thumb or finger of the user presses upward on the bottom surface of finger hold 71, a considerable prying effort may be applied to the cap sufficient to unseat bead 51 from groove 16 and to pry the cap off the neck.

The upper portion of the cap may be reused repeatedly to keep the bottle covered until the contents are completely used, a feature of considerable advantage when drinking water is the content of the bottle. Nevertheless, because the lower portion of the skirt has been torn away it is apparent to the consumer that there is a possibility of the contents of the container having been contaminated and the user is on guard.

The present invention provides an improved construction which greatly facilitates application of the cap to the container neck as contrasted with Patent 3,120,900 for the reasons previously indicated. Further, there is a very tight seal between the cap and the neck on a plurality of surfaces, many of these surfaces being slanted in such manner as to deform the cap or neck when pressure is applied sufficiently to seat beads 51, 56 in grooves 16, 21. Hence, the cap seal is substantially air-tight and water-tight when properly applied.

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 scope of the appended claims.

What is claimed is:

1. A cap for the purpose described having a central top disk, a cylindrical, thin walled substantially cylindrical outer skirt of uniform depending from the periphery of said disk, said outer skirt scored and weakened in a circumferential first line spaced downwardly from the top of said outer skirt and also in a spiral configuration second line joining said first line and extending down to the bottom edge of said outer skirt, an integral tab extending substantially vertically from the lower edge of said outer skirt adjacent the lower end of said second line, an upper internal circumferential bead on the inside of said outer skirt between said first line and said disk, said upper bead in cross-section having a horizontal flat top edge of extended width, a curved inner edge and a downward-outward slanted lower edge, a lower internal circumferential bead on the inside of said outer skirt located substantially above the lower edge of said outer skirt, below said first line, said lower bead in cross-section being similar to said upper bead, said first line positioned immediately above said lower bead.

2. A cap according to claim 1 in which the corner at which the insides of said disk and outer skirt join is curved inward-upward.

3. A cap according to claim 1 which further comprises a short inner skirt depending from said disk spaced inward from said outer skirt.

4. A cap according to claim 3 in which said inner skirt has an inward-downward curved outer surface, a thin lower edge, a substantially cylindrical upper inner surface, an annular shoulder about midway down said inner surface and a substantially cylindrical lower inner surface of greater diameter than said upper surface.

5. In combination, a container neck having a thin and formed with an external circumferential upper groove of rectangular cross-section spaced downward from the upper edge of said neck, an external circumferential lower groove of rectangular cross-section below said upper groove, and a cap, said cap having a central top disk, a cylindrical, thin walled outer skirt depending from the periphery of said disk, said outer skirt scored and weakened in a circumferential first line spaced downwardly from the top of said outer skirt and also in a spiral configuration second line joining said first line and extending down to the bottom edge of said outer skirt, an integral tab extending substantially vertically from the lower edge of said outer skirt adjacent the lower end of said second line, an internal circumferential upper bead on the inside of said outer skirt between said first line and said disk, said upper bead in cross-section having a horizontal flat top edge, an inner edge and a downward-outward slanted lower edge, an internal circumferential lower bead on the inside of said outer skirt below said first line and of cross-section similar to said upper bead; said cap and neck interfitting in assembled position with the upper end of said neck tight against the underside of said disk and said beads deformed to fill said grooves, the inside of said outer skirt fitting tight around the outside of said neck.

6. The combination of claim 5 in which said cap is further formed with a short cylindrical inner skirt depending from said disk spaced inward from said outer skirt; the upper end of said neck jammed between the outside of said upper wall of inner skirt and the inside of the upper end of said outer skirt to form a tight seal.

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FRANKLIN T. GARRETT, *Primary Examiner.*