United States Patent [19]

Feldman

[11] **3,812,994**

[45] **May 28, 1974**

[54] **TAMPER-PROOF CLOSURE CAP**

[75] Inventor: **Jerome M. Feldman,** Great Neck, N.Y.

[73] Assignee: **Dairy Cap Corporation,** Jamaica, N.Y.

[22] Filed: **May 18, 1972**

[21] Appl. No.: **254,393**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 215,562, Jan. 5, 1972, abandoned.

[52] **U.S. Cl.** **215/256**

[51] **Int. Cl.** **B65d 41/34**

[58] **Field of Search** ..... 215/42, 46 A

[56] **References Cited**

UNITED STATES PATENTS

2,162,712	6/1939	Hamberger	215/42
2,172,159	9/1939	Conner	215/42
3,352,448	11/1967	Livingston	215/41 UX
3,441,161	4/1969	Van Baarn	215/40
3,650,428	3/1972	Miller	215/42

Primary Examiner—Donald F. Norton

Attorney, Agent, or Firm—Pennie & Edmonds

[57] **ABSTRACT**

A closure cap for the neck of a bottle or other container, includes a cap body having internal thread means designed to engage external threads on the neck, and a ratchet ring connected to the body by means of a shoulder. A continuous tear line formed at the junction of the body and the shoulder is provided for separating the body and ring, the shoulder and ring being adapted to pivot on the tear line which serves as a hinge to allow the ring to pivot slightly away from the bottle neck while seating the closure on said neck.

11 Claims, 5 Drawing Figures

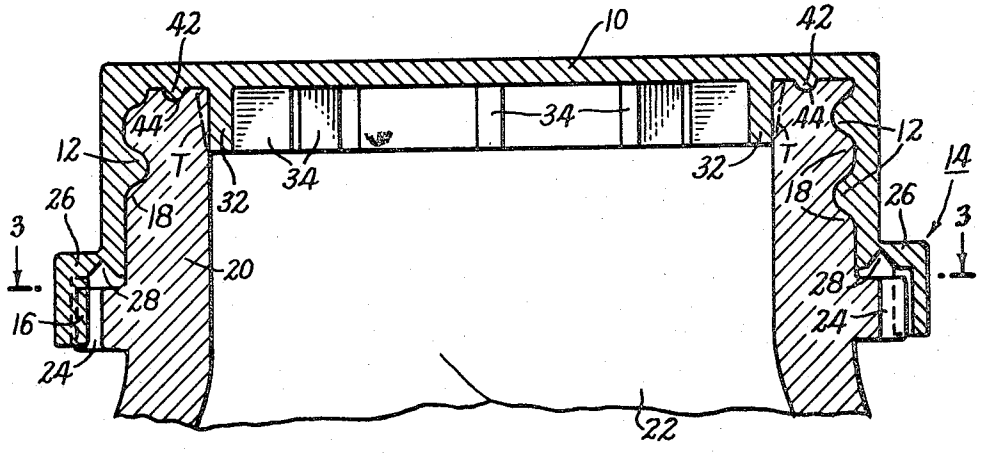


Fig 1

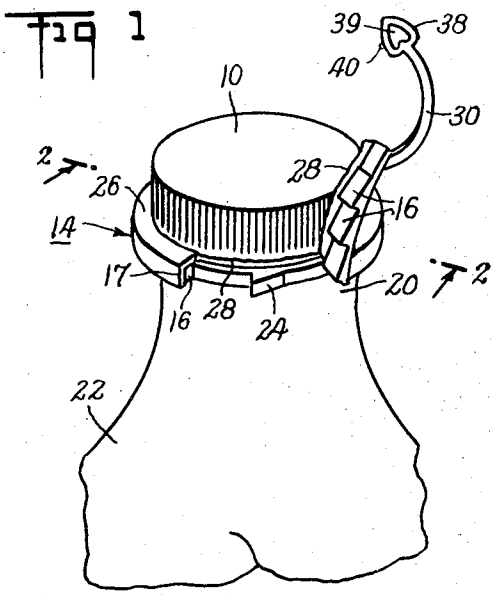


Fig 3

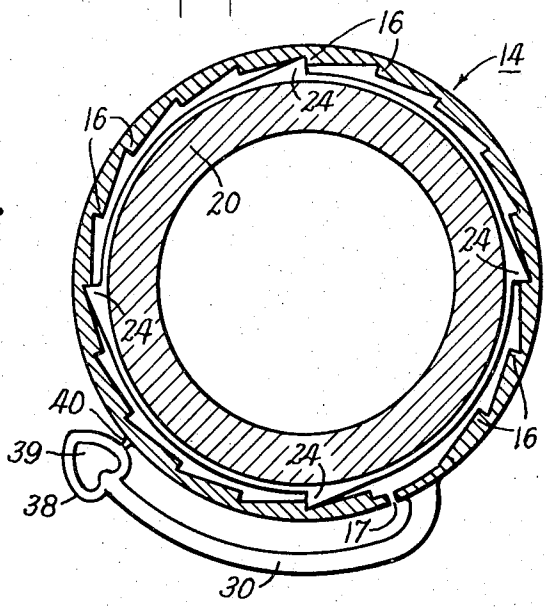


Fig 2

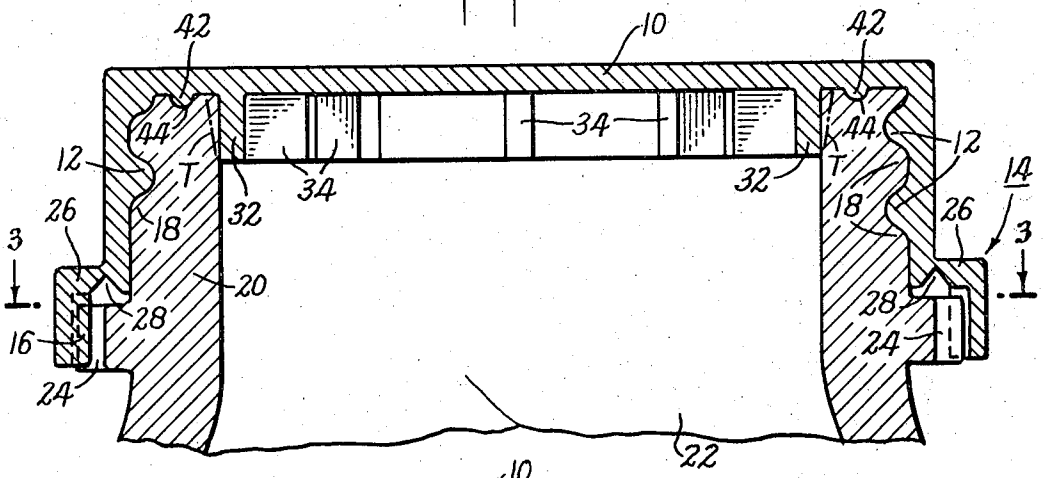


Fig 4

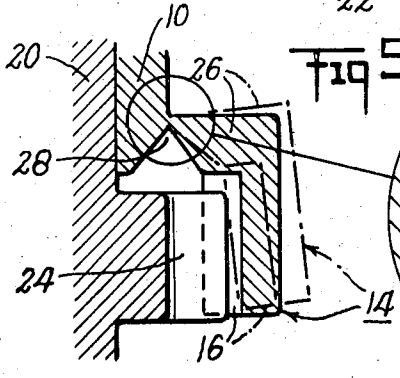
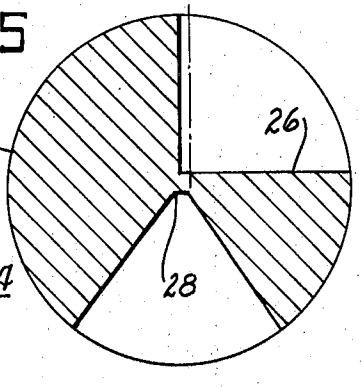


Fig 5



TAMPER-PROOF CLOSURE CAP

This application is a continuation-in-part of application Ser. No. 215,562 filed Jan. 5, 1972, now abandoned.

BACKGROUND OF THE INVENTION

With the so-called tamper-proof caps there is ever present the problem of properly seating the cap on the container due to the presence of such encumbrances as beads, ratchet teeth, etc., which serve to prevent tampering as by altering its construction prior to its removal by the intended user. Tamper-proof container caps as shown, for example, in Crisci, U. S. Pat. No. 3,504,818, employ a separable ring member having ratchet teeth to prevent such tampering. A discontinuous connection between the cap and the ring is provided by frangible elements located at discrete points about the cap. With this type of connection, an opening is present between the cap and ring permitting collection of dirt or other particulate matter.

With the prior art type of cap, flexing of the portions of the ring between the frangible connections is relied upon for permitting assembly of the cap onto the container. Further, with prior art types of bottle caps employing spaced frangible elements for connecting the toothed ring to the body of the cap, turning of the cap in a loosening direction will cause breaking of the frangible elements. This is the result desired if one is purposely attempting to remove the cap. However, this type of construction is disadvantageous if the cap is accidently or inadvertently turned in a loosening direction.

SUMMARY OF THE INVENTION

The present invention relates to container closures and more particularly to a closure for a bottle and the like having components the removal of which in the normal manner provides visual evidence of tampering.

In the construction of applicant's closure cap, ratchet teeth are employed to prevent tampering, the teeth being formed on the inner surface of a tamper-proof ring which is joined to the cap proper by a shoulder in which is formed a tear line along which the ring is severed from the cap prior to opening the container by the user. The tear line is substantially continuous and uninterrupted which provides some protection against particulate contaminants in the vicinity of the container opening.

The tear line in the cap of the present invention also serves as a flex line to permit the ring to yield pivotably to some extent without rupturing which serves to facilitate the desired engagement of the ratchet teeth on the ring and bottle neck as the cap is initially seated in place. With applicant's invention, the cap cannot inadvertently be turned in a loosening direction. A separately operable rip cord must first be pulled to release the tamper-proof ring section of the cap. Only then can the cap be turned in a loosening direction and removed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an action perspective view of the cap in position on a bottle and showing the rip cord in the process of removing the tamper-proofing;

FIG. 2 is an enlarged vertical cross section of the cap and bottle of FIG. 1 and taken on line 2—2 of FIG. 1;

FIG. 3 is a horizontal cross section on a smaller scale showing the cap in seated engagement with the bottle neck taken on line 3—3 of FIG. 2;

FIG. 4 is a detail section of a portion of FIG. 2 showing the respective ratchet teeth riding over each other during installation of the cap on the bottle; and

FIG. 5 is a magnified view of a portion of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the cap structure basically comprises a body portion **10** with internal threads **12** and a tamper-proof ring **14** having plurality of internal ratchet teeth **16.**

The threads **12** are adapted to engage external threads **18** on the neck portion **20** of bottle **22.** The bottle provides ratchet teeth **24** designed to engage the teeth **16** of the ring **14** in such a manner as to prevent the entire cap structure from being screwed off the bottle neck as one member.

Removal of the cap ring serves to afford visual evidence that the bottle may have been opened. To that end, the ring is severably connected to the cap portion by means of pivotal shoulder **26.** At the junction of the shoulder and cap body **10** is located tear or flex line **28** which is V-shaped. The tear line has sufficient strength to prevent the two portions of the cap structure from severing when normal pressure is applied to threadably remove the cap. A rip cord extension **30** is connected to the ring **14** with a finger grip **38** having a heart shaped cutout **39** formed therein. The grip **38** being breakably connected by tab **40** to the ring **14** at a point where it has a thin split **17** and is used to tear away the shoulder and ring from the rest of the cap structure on the tear line **28** as shown in FIG. **1,** whereupon the ring is discarded. When this is done, turning the cap in the counterclockwise direction permits its removal.

In the presently preferred embodiment of the invention shown in the drawings, the cap is made of flexible plastic material such as polyethylene having a density of about 0.940 gm/cm. The depending walls of the body **10** and ring **14** have a thickness of between about 0.04 and 0.05 inch. The flex line **28** connecting the ring to the body has a thickness of between about 0.001 and 001. inch. This flex line is defined by a weakened, tearable membrane extending continuously around the cap at a location just outside the outer periphery of the body **10.** The location of the flex line is most clearly shown in FIG. **5.** Its location is such that if the closure cap is viewed from above, the membrane appears as a zone of small width immediately adjacent the depending wall of the body section **10** of the cap.

With the above construction, the ring **14** can pivot outwardly about the flex line **28** as the cap is turned onto the bottle and the teeth **16** slid over the teeth **24** without damaging the cap or tearing the membrane which forms the flex line. Also, with the present construction the continuous nature of the membrane provides enough strength so that the cap cannot be rotated in a loosening direction without first disconnecting the ring. In other words, inadvertent turning of the cap before the ring **14** is removed will not automatically sever the body from the ring.

As shown in FIG. **4**, the bottle cap in being seated on the neck of the bottle causing the shoulder **26** to pivot upwardly and outwardly so that the ratchet teeth are in position to engage when the cap is seated. The teeth will permit such engagement with extremely little pivotal motion and without undue flexing of the cap structure as is required in known structures.

There is provided within the body portion **10** of the cap a seal ring **32** which is downwardly tapered, as shown at T in FIG. **2**, to increase the gripping action for sealing purposes between the bottle neck **20** and the seal ring. A seal bead **42** is annularly disposed within the cap **10** between the outer wall and the seal ring **32.** A groove **44** is formed in the top of the bottle neck **20** by means of the bead **42** on capping the bottle in the event that the material of the bead is harder than that from which the bottle is fabricated. The seal ring **32** is provided with radial support ribs **34** to minimize distortion of the ring which might otherwise impair its sealing function.

I claim:

1. A closure cap for a container comprising:

a. a cap body having internal threads adapted to cooperate with corresponding threads on the container;

b. a tamper-proof ring severably connected to the body and having internal projections adapted to cooperate with external projections on the container for preventing unthreading motion of the ring on the container, said ring having a shoulder extending radially outwardly from the lower end of the body and a wall depending downwardly from the outer periphery of the shoulder; and

c. connecting membrane means connecting the ring to the body, said membrane means extending continuously around said body and being located immediately radially outwardly of the periphery of said body, said membrane further being of reduced thickness relative to the thickness of said body and ring to provide a flex line about which said ring can flex outwardly relative to said body, without tearing the membrane, upon threading of the cap onto the container and movement of the projections of the ring over the projections on the container, and said membrane being defined solely by a groove formed in the underneath surface of the shoulder and in the radially aligned portion of the body so as to be hidden from view when the closure is on the container.

2. A closure cap as defined in claim **1** wherein:

a. there is provided within said cap body a sealing ring adapted to engage an inner surface of the container opening; and

b. radially oriented support ribs for said seal ring.

3. A closure cap as defined in claim **2** wherein:

a. there is disposed an annular bead within the cap body between the outer wall thereof and the sealing ring, whereby there is provided additional seal on seating the cap on said container.

4. A closure cap for a container comprising:

a. a cap body having internal threads adapted to cooperate with corresponding threads on the container;

b. a tamper-proof ring severably connected to the cap body and having internal projections adapted to cooperate with external projections on the container for preventing unthreading motion of the ring on the container;

c. connecting membrane means connecting the ring to the cap body, said membrane having a strength preventing severance of the ring from the body upon turning of the cap in an unthreading direction, said membrane further defining a weakened, tearable flexing zone permitting flexing of said ring relative to said body and about said zone upon threading of the cap onto the container and movement of the projections of the ring over the projections on the container; and

d. grasping means connected to said ring for tearing it from said body along said zone.

5. A closure cap as defined in claim **4** wherein:

a. said connecting membrane means extends continuously around the cap body and is of reduced thickness relative to the thickness of said body and ring.

6. A closure cap as defined in claim **5** wherein:

a. said ring includes a shoulder extending radially outwardly from the lower end of said body and a wall extending downwardly from the outer periphery of the shoulder; and

b. said membrane means is located immediately radially outwardly of said body.

7. A closure cap as defined in claim **6** wherein:

a. the body, ring and membrane means is an integral molded construction of flexible plastic material;

b. the thickness of said body and ring is between about 0.04 and 0.05 inch; and

c. the thickness of the membrane means is between about 0.001 and 0.010 inch.

8. A closure cap as defined in claim **7** wherein:

a. said plastic material is polyethylene having a density of about 0.940 gm/cc.

9. A closure arrangement for a container comprising:

a. a cap body having internal threads;

b. a tamper-proof ring severably connected thereto and having internal ratchet teeth;

c. a pivotal shoulder between the cap body and the ring; and

d. a tear line located at the junction of said shoulder and said body and formed by a continuous and relatively thin protective membrane along which said shoulder together with said ring is adapted to be severed from said cap body prior to the normal uncapping of said container and additionally serving as a line of flexure for seating said closure on said container, said shoulder being adapted to pivot slightly on said line as the closure is initially seated on the container, and said protective membrane having sufficient strength to prevent severance of the ring from the body upon attempted turning of the closure in an unthreading direction.

10. A closure arrangement as defined in claim **9** wherein:

a. said shoulder extends radially outwardly from the lower end of the body with the ring extending downwardly from the outer periphery of the shoulder; and

b. said membrane is defined solely by a groove formed in the underneath surface of the shoulder and in the radially aligned portion of the body so as to be hidden from view when the closure is on the container.

11. A closure arrangement as defined in claim **10** wherein:

a. the wall thickness of the body, shoulder and ring is about equal.

* * * * *