United States Patent [19]

Hidding

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[54] **TAMPERPROOF CAP**

[76] Inventor: **Walter E. Hidding,** Rt. No. 2, Woodrock Rd., Barrington Hills, Ill. 60010

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[21] Appl. No.: **437,778**

[52] **U.S. Cl.** **215/252**

[51] **Int. Cl.**.. **B65d 41/34,** B65d 41/36, B65d 41/38

[58] **Field of Search** 215/252.7, 258; 220/27

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—George P. Hall

Attorney, Agent, or Firm—Olson, Trexler, Wolters, Bushnell & Fosse, Ltd.

[57] **ABSTRACT**

A tamperproof cap is arranged for use with a container having a threaded neck portion and at least one external tooth extending radially outwardly adjacent the threaded portion. The tamperproof cap includes a cap body, a tamperproof ring and a plurality of breakable connectors coupling the ring to the cap body. A number of triangularly shaped pawls extend inwardly from the tamperproof ring for locking engagement with the container tooth, and the breakable connectors are joined to the tamperproof ring at the pawls.

4 Claims, 4 Drawing Figures

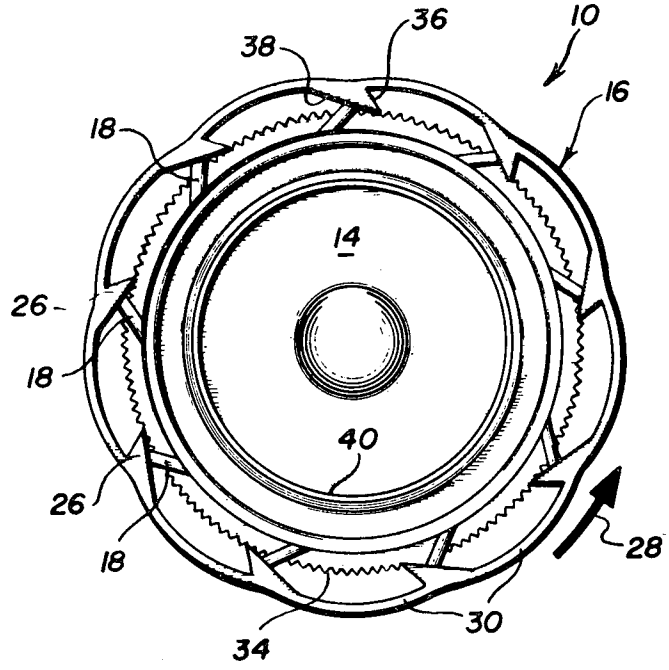


FIG. 1

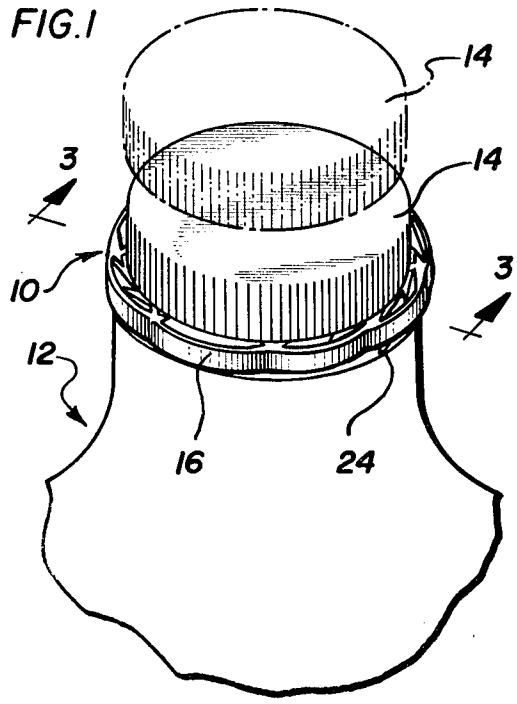


FIG. 2

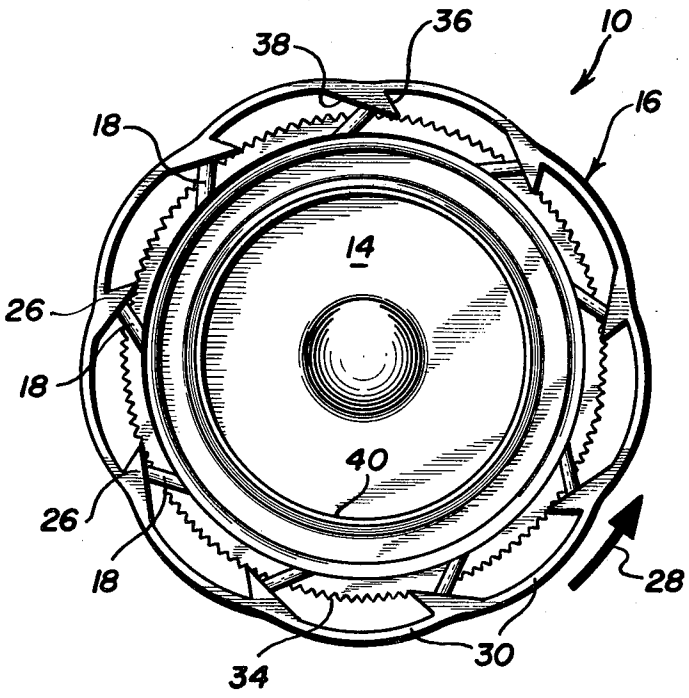


FIG. 3

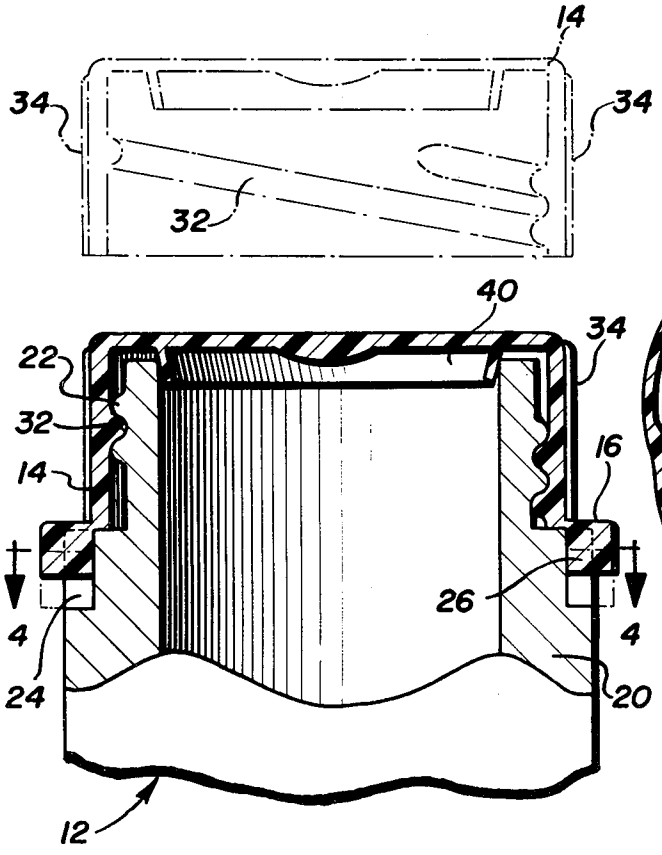
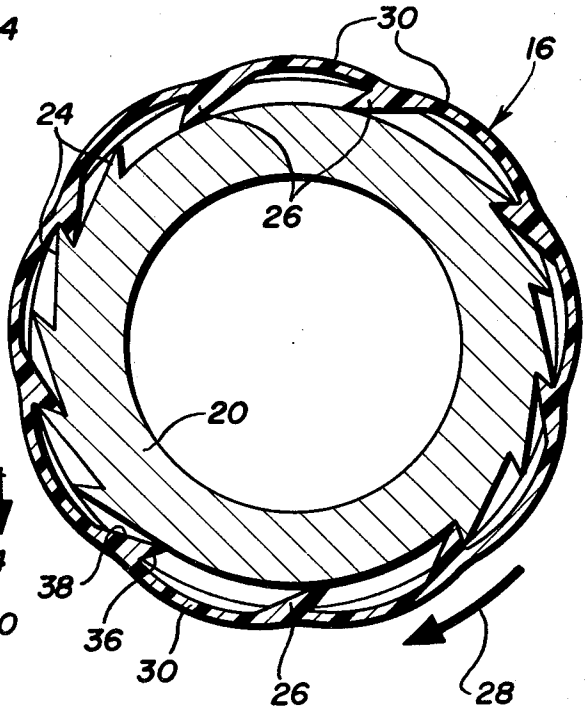


FIG. 4



TAMPERPROOF CAP

BACKGROUND OF THE INVENTION

This invention relates generally to bottle closures and more particularly to tamperproof caps.

Threaded bottle closures have been designed in the past to indicate possible tampering with the bottle contents by means of a ring or seal that is broken away from the cap proper upon turning the cap in the direction of opening. Pawls have been fashioned on the inner surface of the ring to mesh with one or more teeth on the outside surface of the bottle. Of course, either the pawls or the tamperproof ring must flex to permit the pawls to ride over the bottle teeth in the direction of closing; and the amount of resultant freedom or play has permitted turning some of the prior art caps in the direction of opening without breaking the seal. A bottle with such a cap can thus be tampered with and there would be no indication that such had occurred.

The present invention overcomes the foregoing difficulty and takes as its principal object the provision of a new and improved tamperproof cap.

Another object of the invention is to provide a tamperproof cap of the type having locking pawls on a break-away ring, in which the pawls are properly located for sure engagement with the cooperating ratchet teeth on the neck of the container.

These and other objects and features of the invention will become more apparent from a consideration of the following description.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. **1** is a perspective view showing the tamperproof cap of the invention assembled with a bottle;

FIG. **2** is an enlarged bottom plan view of the tamperproof cap of FIG. **1**;

FIG. **3** is an enlarged, central sectional view taken along the line **3—3** of FIG. **1**, the reclosure cap proper being shown in broken outline as it appears upon breaking of the tamperproof seal; and

FIG. **4** is a view taken along the line **4-4** of FIG. **3** to show the locking action of the pawls and the toothed surface of the bottle.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawing, specifically to FIGS. **1** and **2**, a tamperproof cap indicated generally by the reference numeral **10** is shown affixed to a bottle **12.** The cap **10** comprises a cap body **14,** a tamperproof ring **16** and a suitable number of breakable connectors **18,** best seen in FIG. **2.** The entire cap **10** is advantageously fabricated from a suitable resinous plastics material such as polyethylene or acrylonitrile-butadiene-styrene polymers.

With reference to FIGS. **3** and **4,** the bottle **12** has a neck portion **20** having an external thread **32** formed thereon. In addition, a suitable number of triangular ratchet teeth **24** are fashioned on the outside surface of the bottle neck beneath the thread **22** and extending radially outwardly from the neck. While a single ratchet tooth may be employed, it is preferred to have a plurality of such teeth and to arrange these teeth in two or more ratchet sections as is shown in FIG. **4.**

In order that the cap **10** may be locked onto the neck of bottle **12,** a number of circumferentially spaced, triangularly shaped pawls **26** are provided on the inside surface of the ring **16** to extend radially inwardly for engaging one or more of the ratchet teeth **24.** It will be appreciated that when the cap **10** is turned in the direction indicated by arrow **28,** the pawls **26** will ride over the teeth **24;** and in compliance with a feature of the present invention, the ring **16** includes outwardly bending portions **30** disposed between the pawls **26.** These portions **30** are arranged to be relatively thin and more flexible than the pawls **26** to facilitate the riding action of the pawls over the ratchet teeth. The cap body is arranged with an internal thread **32** to coact with the bottle thread **22** so that turning of the cap **10** in the direction of arrow **28** relative to the bottle is in the direction of closing, that is, turning the cap into assembly with the bottle. Thus, the cap body **14** may be assembled to the bottle **12** in continuation of the cap body being coupled to the ring **16.**

In order to insure that the pawls **26** can be engaged in a full locked relationship with the ratchet teeth **24** and to prevent the contents of the bottle **12** from being tampered with, the breakable connectors **18** are joined to the cap body and the pawls **26,** as is shown in FIG. **2.** The connectors **18** thus provide both interruptable connections between the cap body and the ring and define pivot points about which the pawls **26** may rock in passing over the ratchet teeth **24** during assembly of the cap and the bottle. Furthermore, the breakable connectors **18** hold the pawls **26** in engagement with the ratchet teeth upon turning in the opposite direction, whereby to prevent the pawls from riding out of engagement with the ratchet teeth. Vertical ribbing or knurling **34** is fashioned on the outside side wall of the cap body **14** as an aid in transmitting full torque to the connectors **18** on unscrewing the cap. This helps to break the connectors cleanly without leaving a jagged projection which might proove a hazard to a person's fingers.

The breakable connectors **18** desirably comprise angularly disposed arms and may be provided with a semicircular cross-section, the flattened side facing in an upward direction. The connectors **18** are also of lesser dimension axially of the cap **10** than are the pawls **26.** Continuing with reference to FIG. **2,** each of the pawls **26** is fashioned with a first planar surface **36** facing generally in the direction that the cap is unscrewed, that is, generally toward the pointed tips of the ratchet teeth **24.** In addition, each of the pawls **26** is provided with a second planar surface **38** which faces generally in the opposite direction. The connectors **18** are joined to the pawls **26** at a point about midway of the surface **38,** and in order to promote clean breaking of the connectors **18,** they are angled back from the surface **38** at an angle of about 75°.

An annular sealing apron **40** may be provided on the underside of the top plate of the cap body **14** to cooperate with the lip of the bottle as is shown in FIG. **3.**

In use, the cap **10** is turned onto the neck portion of a filled bottle **12** in conventional manner, the pawls **26** riding over the ratchet teeth **24** with the surfaces **38** in engagement with the ratchet teeth. At some later time when it is desired to gain access to the contents of the bottle, the cap body **14** will be grasped and rotated in a direction to unseat the cap thread **32** from the bottle thread **22.** Upon transmission of sufficient torque, with

the surfaces **36** of the pawls in engagement with the ratchet teeth **24**, the connectors **18** will be broken and the ring **16** will drop away providing a visual indication that the bottle has been opened. The cap body **14** may then be turned off the bottle and used afterwards as a reclosure. Of course, the ring **16** may be discarded if desired.

The drawings and the foregoing descriptions are not intended to represent the only forms of the invention in regard to the details of its construction and manner of operation. Changes in form and in the proportion of parts, as well as the substitution of equivalents, are contemplated as circumstances may suggest or render expedient; and although specific terms have been employed, they are intended in a generic and descriptive sense only and not for the purpose of limitation, the scope of the invention being delineated in the following claims.

The invention is claimed as follows:

1. A tamperproof cap for use with a container having a threaded neck portion and at least one external tooth, said cap comprising: an internally threaded cap body; a tamperproof ring having a plurality of circumferentially spaced, radially inwardly extending, triangularly shaped pawls for locking engagement with said container tooth in a first direction of rotation and riding over said container tooth in a second, opposite direction of rotation; and a plurality of breakable connectors coupling said ring to said cap body, said connectors being individually joined to said pawls for holding a said pawl in engagement with said container tooth whereby to insure breaking of said connectors and releasing said ring from said cap body upon rotation of said cap in said first direction, said ring being undulated by outwardly bending portions disposed between said pawls, said portions being relatively more flexible than said pawls to permit said pawls to ride over said container tooth in said second direction.

2. A tamperproof cap according to claim **1** wherein said connectors comprise angularly disposed arms.

3. A tamperproof cap according to claim **1** wherein each of said pawls has a first planar surface facing generally in said first direction and a second planar surface facing generally in said second direction and wherein said connectors are joined to said pawls at said second planar surface.

4. A tamperproof cap according to claim **3** wherein said connectors are joined to said second planar surfaces at an angle of about 75°.

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Disclaimer

3,874,540.—*Walter E. Hidding*, Barrington Hills, Ill. TAMPERPROOF CAP. Patent dated Apr. 1, 1975. Disclaimer filed Nov. 18, 1976, by the inventor.

Hereby enters this disclaimer to claims 2, 3 and 4 of said patent.

[*Official Gazette January 11, 1977.*]