US 20120285963A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0285963 A1**

(43) **Pub. Date: Nov. 15, 2012**

DAVIS et al.

(54) **PRESS-ON CLOSURE WITH TOP SEALING RIB**

(75) Inventors: **Jeffrey S. DAVIS**, DeKalb, IL (US); **Douglas J. HIDDING**, Barrington Hills, IL (US)

(73) Assignee: **BLACKHAWK MOLDING CO., INC.**, Addison, IL (US)

(21) Appl. No.: **13/185,445**

(22) Filed: **Jul. 18, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/484,531, filed on May 10, 2011.

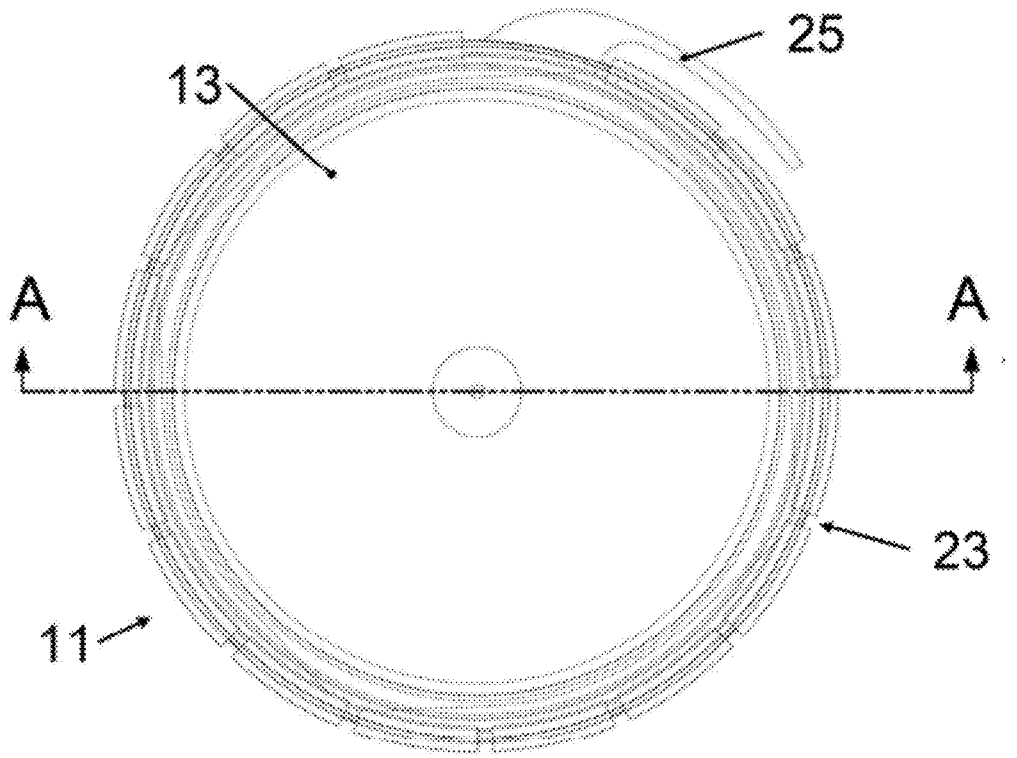
Publication Classification

(51) **Int. Cl.**
B65D 17/34 (2006.01)

(52) **U.S. Cl.** **220/270**

(57) **ABSTRACT**

A closure for glass and polycarbonate bottles. The closure is the press-on and pull off type, i.e., it is unthreaded. The closure has a down-outwardly extending rib on the underside of the lid that forms a seal on the upwardly and outwardly facing surface of the neck of the bottle. The closure has a removable tamper indicating ring connected to the lower portion of the skirt of the closure by a reduced-thickness tear strip. In one embodiment, slits are formed in the tear strip to further increase the sensitivity of the tear strip to tampering. Between the slits, links in the tear strip act to hold the ring in connection with the lower portion of the skirt. The circumferential length of the slits is significantly greater than the circumferential length of the links, and the slit to link length ratio is preferably at least about 20 to 1, but may be increased or decreased depending upon the desired level of tamper evidencing required, and depending upon the amount of interference between the bead on the ring and the corresponding bulge on the bottle to which the closure is applied.



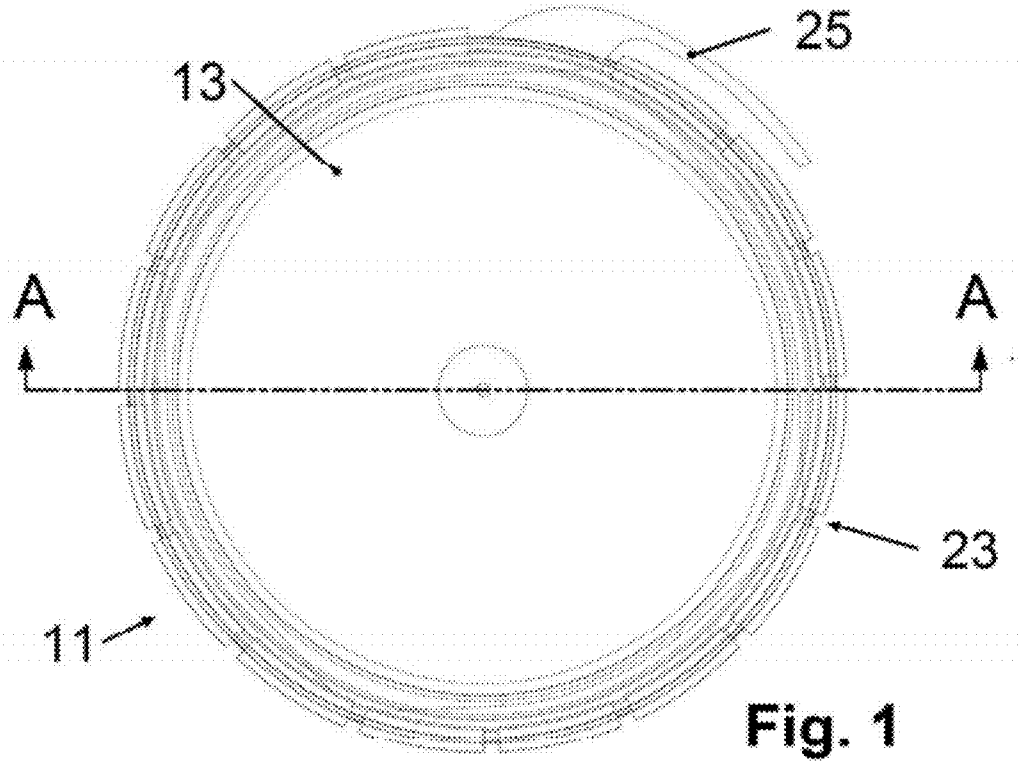


Fig. 1

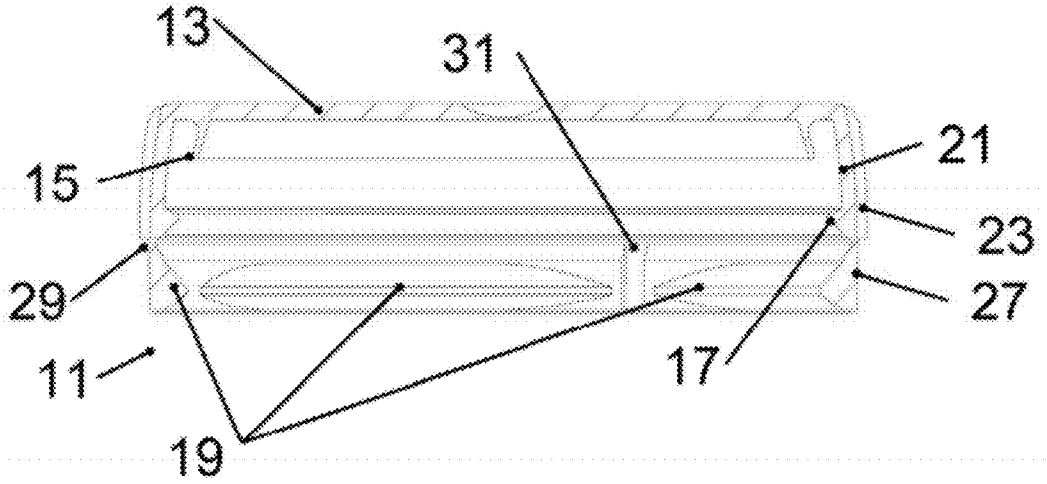


Fig. 2

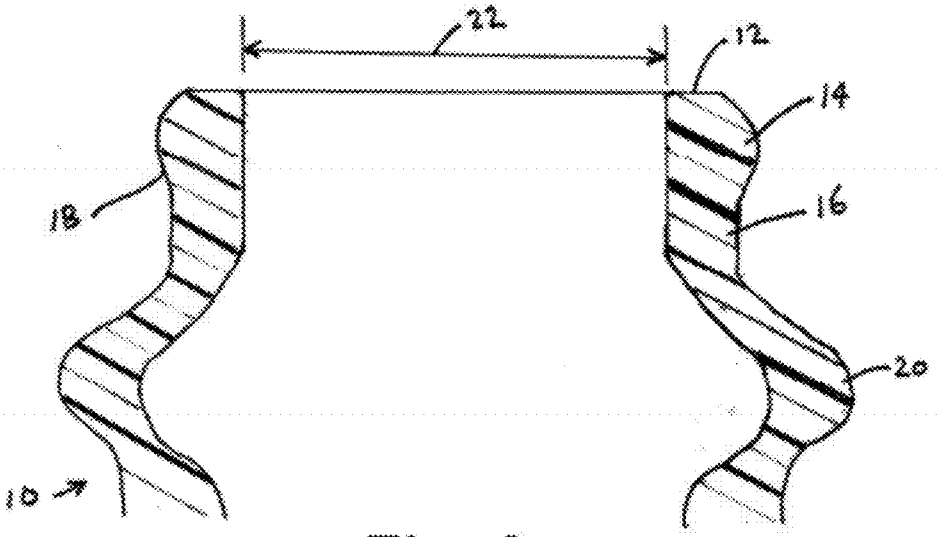


Fig. 3
(PRIOR ART)

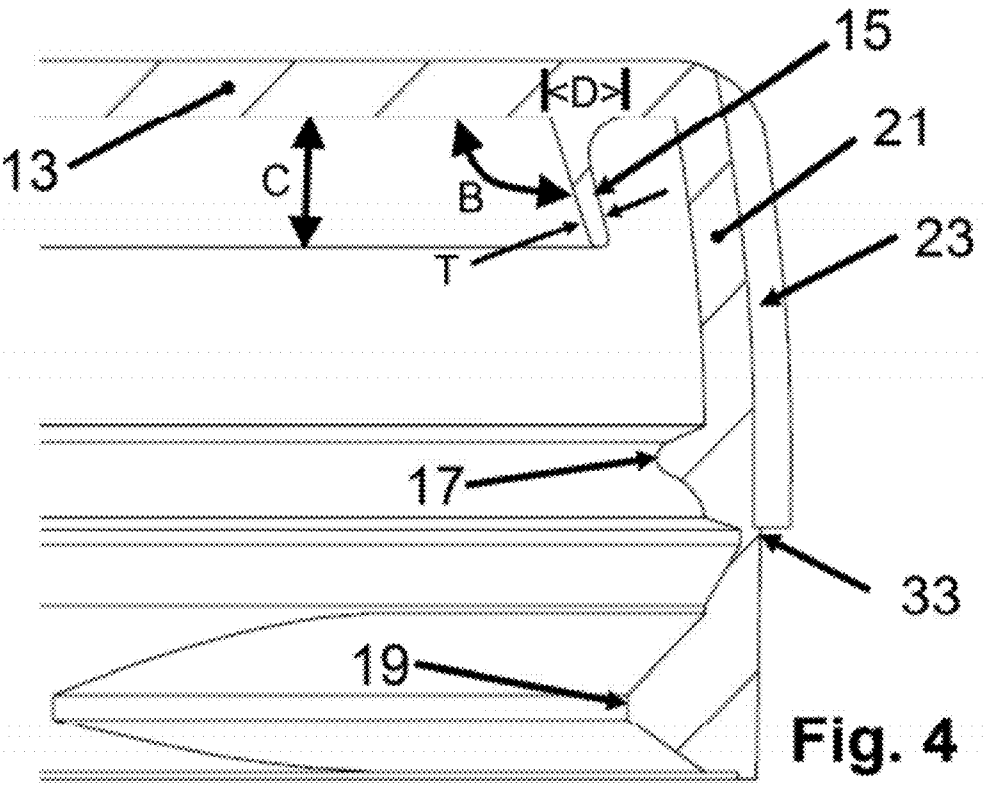


Fig. 4

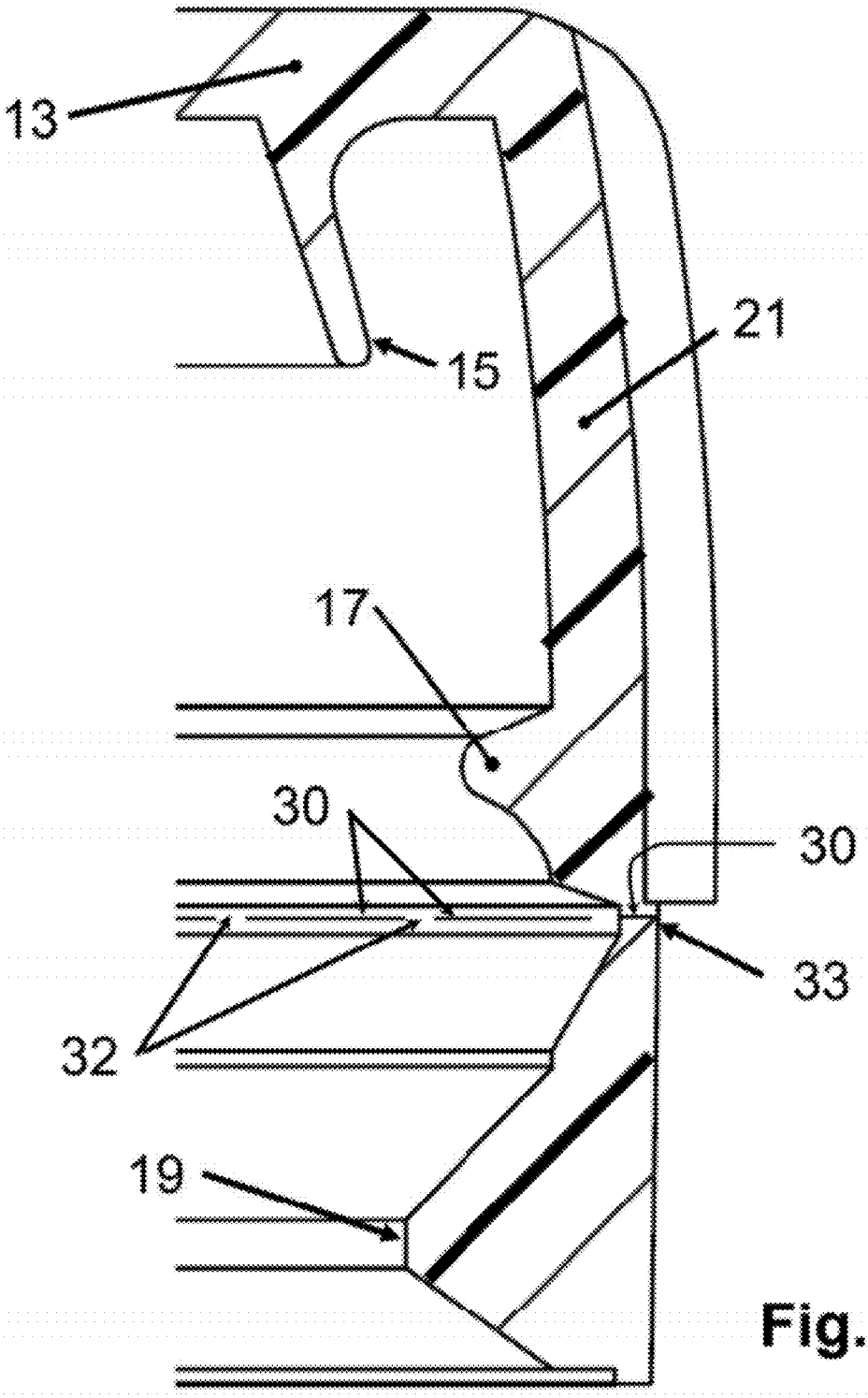


Fig. 5

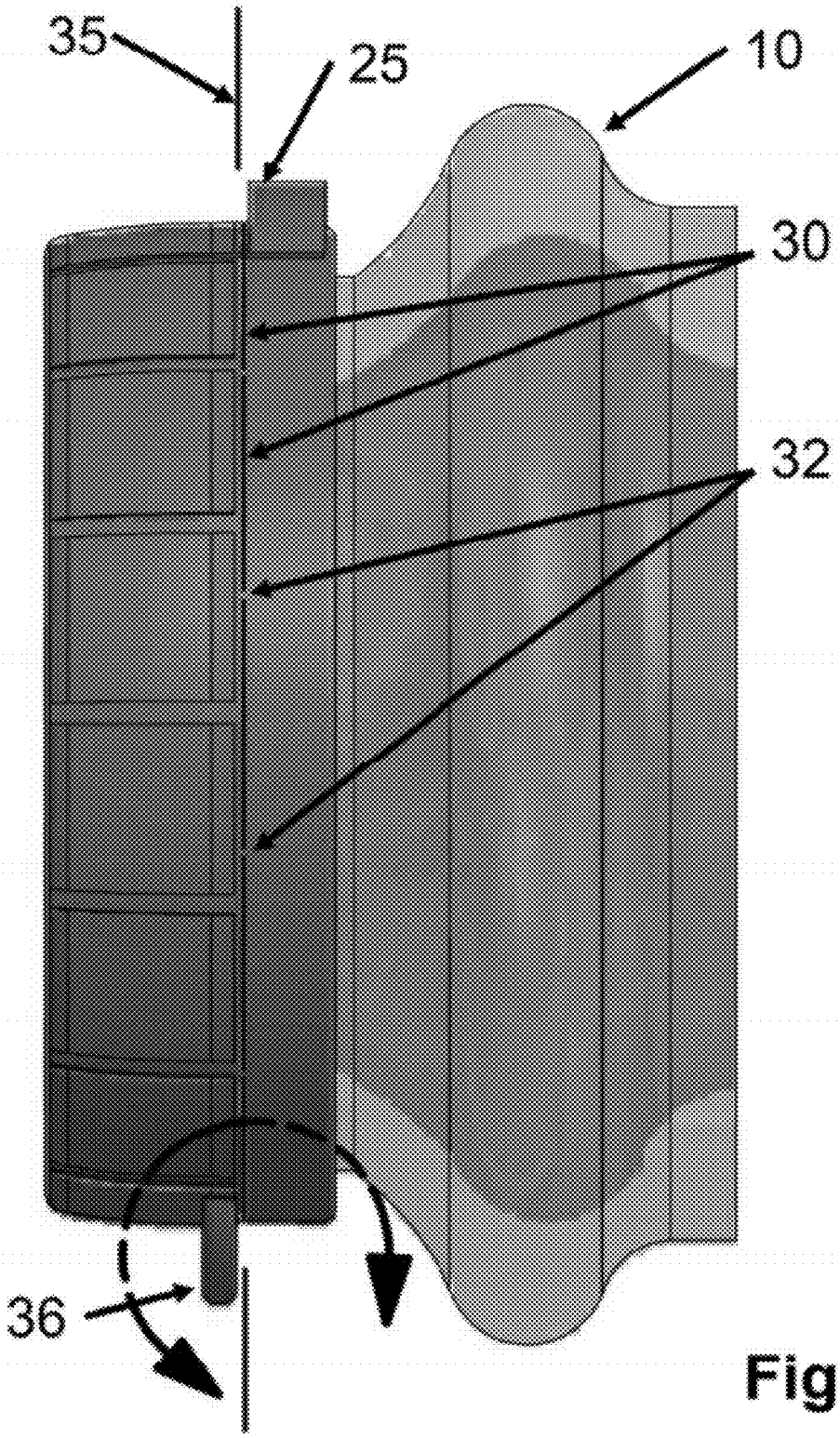


Fig. 6

PRESS-ON CLOSURE WITH TOP SEALING RIB

BACKGROUND AND SUMMARY

[0001] The cap shown and described herein relates to closures for containers for beverages, such and milk, other dairy products and juice, and in particular to containers formed of glass and polycarbonate, as opposed to the more commonly used blow-molded containers made of HDPE (high density polyethylene).

[0002] Caps typically used on glass and polycarbonate containers in the dairy and juice markets (such as ½ gallon bottles), have a plug that seals against the upper portion of the inside surface of the neck of the bottle. A secondary seal is also formed by an outer latch bead that presses against the underside of a bulge near the top of the container.

[0003] Making a closure that is tamper-indicating and that is used on glass bottles (and similarly smooth plastic surfaces) is particularly challenging, because glass is very smooth and has a very low coefficient of friction. Closures applied to glass bottles tend to slide on and off the bottle neck with relative ease without any indication that the closure has been removed and re-installed. The ease with which plastic closures slide on and off very smooth bottle necks makes it difficult to design a reliable closure that shows evidence that a closure has been removed from such necks.

[0004] Many bottles made of glass and polycarbonate are intended to be returnable and re-useable, i.e., the bottlers retrieve the containers, clean them and re-fill them. The array of bottles in systems where bottles are returned and re-used is such that they may be made by different manufacturers or on different forming equipment, and are at least likely to have been made at different times. Furthermore, because the bottles may have been used a number of times, the condition of the surfaces relied upon for sealing and retention may be far less than ideal, and may vary significantly from bottle to bottle. As a result, there is typically significant variation both in the location and condition of the surfaces against which the closures used with such bottles must grip and form an effective seal. Thus, closures used with returnable bottles must be highly accommodating in their design, i.e., they must be able to engage and form an effective seal against surfaces falling within of a relatively wide range of dimensions and a wide range of surface conditions.

[0005] The cap shown and described herein preferably seals against the upper periphery of the neck of the bottle, instead of relying on the inside surface of the neck, as plug-style closures do. It has been found that the dimensional variability in the inside diameter (ID) of the necks of re-useable bottles is such that the inside surfaces of bottle necks is sometimes not the most ideal surface against which to seal.

BRIEF DESCRIPTIONS OF THE DRAWINGS

[0006] FIG. **1** is a top plan view of a first embodiment of a closure as shown and described herein;

[0007] FIG. **2** is a sectional view taken along line A-A in FIG. **1**;

[0008] FIG. **3** is an elevational view of a prior art bottle with which the cap of FIGS. **1** and **2** is designed to be used;

[0009] FIG. **4** is an enlarged cross-sectional view of a portion of FIG. **2**, showing the sealing rib extending down-outwardly from the underside of the lid.

[0010] FIG. **5** is an enlarged sectional view of a second embodiment having slits to enhance the tamper evidencing properties of the closure.

[0011] FIG. **6** is an elevational view of the second embodiment in combination with a bottle.

DETAILED DESCRIPTION

[0012] FIGS. **1** and **2** are plan and cross-sectional views, respectively, of a cap **11** designed for sealing a glass or polycarbonate bottle of the type with a neck configuration shown in FIG. **3**. The cap **11** includes a lid **13**, a skirt **21**, and a removable tamper evidencing ring **27**. The removable tamper evidencing ring **27** is joined to the lower end of the skirt **21** by a thin tear strip tear strip **29** having a wall thickness substantially less than the thickness of the wall of the skirt **23** and the wall of the ring **27**. A circumferentially continuous latch bead **17** extends inwardly from an area just above the lower end of the skirt **23**. A set of four interrupted retaining bead segments **19** extend inwardly from the ring **27**. The inside diameter defined by the set of latch bead segments **19** is smaller than the inside diameter of the continuous latch bead **17**, and the cross-sectional area of a latch bead **19** is greater than the cross-sectional area of the latch bead **17**. The skirt **21** of the cap **11** is unthreaded, such that the interference between latch bead **17** and the bulge **14** is the mechanism by which the cap is held onto the bottle **10** once the tamper evidencing ring is removed from the cap **11**.

[0013] The larger size and greater inward extent of the beads **19**, as compared to the bead **17**, provides the cap with a tamper-evidencing feature, whereby the cap is difficult to remove without breaking the tear strip **29**. The exterior surface of the skirt **21** is divided into segments that are defined by generally vertical spaces **23** at regular intervals about the periphery of the skirt **21**. A pull tab **25** is integrally formed with or otherwise joined or connected to the removable ring **27**, such that when a consumer wants to access the contents of the bottle **11**, the pull tab may be used to remove the ring **27**. After the ring **27** is removed, only the latch bead **17** hold the cap on the bottle **11**, and the cap is easily removed and replaced for storage in the consumer's refrigerator.

[0014] FIG. **3** shows a typical bottle **10** for which the cap **11** in FIGS. **1** and **2** is designed. The bottle **10** includes a transport ring **20** and a cap retaining bulge **14** at the upper margin of the neck of the bottle. An upper generally flat surface **12** merges with and lies above the cap retaining bulge **14**. Between the bulge **14** and the ring **20** is a reduced diameter section **16**. The bulge **14** has a slanted and downwardly and inwardly slanted (i.e., downwardly and outwardly facing) retaining surface **18** that merges with the reduced diameter section **16**. An opening in the top has an inside diameter **22**.

[0015] A top sealing rib **15** extends downwardly and outwardly (i.e., down-outwardly) from the underside of the lid **13** of the cap **11**. The rib **15** presses against an upwardly or upwardly and outwardly facing surface **12** on the bottle **10**, which surface is identified in FIG. **3**. When installed on a bottle, the continuous latch bead **17** presses against a slanted surface **18** on the lower part of the bulge **14** that extends circumferentially at the upper margin of the bottle neck. The ring **27** includes a pull tab **25** (shown in FIG. **1**) extending outwardly from the ring **27** below the elevation of the tear strip **29**, and the pull tab is adjacent to a vertically oriented weakened section **31** that designed to tear or break, thereby facilitating removal of the ring **27**, when the purchaser of a bottle **10** desires to make use of the contents of the bottle **10**.

[0016] FIG. **4** is an enlarged sectional view of the portion of FIG. **2** that includes the top sealing rib **15**. The rib **15** has a thickness T of about 0.02 inches (or about ½ of a millimeter) measured at about the mid-height location, and an axial extent C of about 0.078 inches (or about 2 mm), which is also approximately the distance of the rib **15** from the inside

surface of the skirt **21**. The width D of the base of the rib **15** is about 0.05 inches (or about 1.3 mm). The rib **15** makes an angle B with the inside surface of the lid **13** that is about 110 degrees. While the rib **15** is shown in FIG. **4** as having a slightly tapering form, it's form could have a more pronounced taper, or could have a constant thickness over some or all of its length. As the cap **11** is pressed onto the neck of the container **10**, the rib **15** contacts the upward and outwardly facing surface **12** and deflects outwardly along that surface **12** forming a seal as the cap **11** is placed on the bottle **10**, and the seal is maintained when the latch bead **17** engages the surface **18** on the bottle **10**.

[0017] FIGS. **5** and **6** show a second embodiment of a closure for use with bottle necks like the one shown in FIG. **3**. The cap **12** is similar in construction to the cap **11**, but includes slits **30** formed in the tear strip **29** essentially perforating it and making it even weaker than it would be if the slits are not formed therein. The slits are separated by intact links **32** that hold or maintain the connection between the ring **27** and the lower end of the skirt **21**. The slits **32** are preferably evenly spaced along the full length of the tear strip **29**, and preferably extend through the strip **29**. The purpose of the slits is break when any attempt is made to remove the cap, thus providing visual evidence of tampering with the contents of a bottle to which the cap **12** is applied. The slits **30** render the tear strip very sensitive to tampering in that a relatively small amount of force putting the links **32** in tension or shear will cause those links **32** to break, making it apparent to a consumer that the contents of the bottle **10** may have been tampered with. The slits **30** may be applied by using a sharp slitting tool applied at the elevation of the tear strip, i.e., above the pull tab and below the lift tab **36** (provided to assist the consumer in removing the cap from the bottle for repeated uses after the ring **27** has been removed).

[0018] When standard tamper evidencing caps are applied to very smooth surfaces like glass, it sometimes possible to slide the cap and retaining ring (together) off of the neck of the bottle **10** without breaking the tear strip **29** that connects the ring **27** and bottom of the skirt **21**. This is of particular concern when the contents of the bottle is some form of dairy product, which tends to act as a lubricant and further reduce the friction between the closure and the bottle neck. Thus, the addition of slits **30** in the tear strip **29** make it extremely difficult to remove the cap **12** and ring **27** together and intact, i.e., without breaking the links **32** that join the ring **27** to the skirt **21**.

[0019] The extent to which the tear strip is weakened by the inclusion of slits **30** separated by links **32** may be adjusted by varying the size (i.e., the circumferential length) of the links **32** and the size (i.e., the circumferential length) of the slits **30**. In the embodiment shown in FIGS. **5** and **6**, the circumferential length of the links **32** is a small percentage, i.e., less than about 5%, of the circumferential extent of the slits, making the connection between the ring and the skirt significantly weaker than the same would be without slits. This slit to link length ratio (equal to or greater than about 20 to 1) has been found to be particularly useful for use on caps applied to glass and polycarbonate bottles configured as shown in FIG. **3**. The sensitivity of the connection between the ring **27** and the skirt **21** will also depend on the interference between (primarily the relative diameters of) the bead segments **19** and the bulge **14** on the bottle to which the cap **12** is applied.

[0020] The foregoing descriptions of specific embodiments have been presented for purposes of illustration and description. They are not intended to be exhaustive, and are not intended to limit the scope of the inventions claimed below to the precise forms disclosed. It will be apparent to persons of ordinary skill in the field of closure design that many modifications and variations are possible in light of the above teachings. The embodiments were chosen and described in order to explain the principles of the inventions claimed below and to demonstrate practical application thereof, and to thereby enable others of ordinary skill in the art to best utilize the claimed inventions.

1. A closure for a container of the type having a relatively smooth top surface, a laterally extending bulge and a down-outwardly facing retention surface below the bulge, the closure comprising a lid, a skirt with an inwardly extending latch bead at a lower portion of the skirt, a second retaining bead extending inwardly from a removable tamper-evidencing ring extending from a lower portion of the skirt, the ring being joined to the skirt by a tear strip, a continuous sealing rib extending down-outwardly from the underside of the lid, the rib adapted to flex laterally as the latch bead engages the down-outwardly facing retention surface on the container.

2. A closure in accordance with claim **1** wherein the retaining bead on the ring is divided into segments, the latch bead defining a first inside diameter, and the retaining bead segment defining a second inside diameter, the first inside diameter being larger than the second inside diameter.

3. A closure in accordance with claim **1** wherein the inside surface of the skirt is unthreaded.

4. A closure in accordance with claim **1** wherein the tamper-evidencing ring has pull tab integrally formed thereon, the pull tab lying entirely below the elevation of the tear strip.

5. A closure in accordance with claim **1** wherein slits are formed in the tear strip such that links in the tear strip hold the tamper evidencing ring to a lower portion of the skirt.

6. A closure in accordance with claim **5** wherein the circumferential length of slits and links is such that the circumferential length ratio of slit to link is at least 20 to 1.

7. A closure for a container of the type having a relatively smooth top surface, a laterally extending bulge and a down-outwardly facing retention surface below the bulge, the closure comprising a lid, a skirt with an inwardly extending latch bead at a lower portion of the skirt, a second retaining bead extending inwardly from a removable tamper-evidencing ring extending from a lower portion of the skirt, the ring being joined to the skirt by a tear strip, a continuous sealing rib extending down-outwardly from the underside of the lid, the rib adapted to flex laterally as the latch bead engages the down-outwardly facing retention surface on the container, the tear strip having slits such that links in the tear strip hold the tamper evidencing ring to a lower portion of the skirt.

8. A closure in accordance with claim **7** wherein a lift tab is formed on an external portion of the skirt above the tear strip, and a pull tab is formed on the removable tamper evidencing ring below the tear strip, the slits being formed at an elevation in the tear strip above the pull tab and below the lift tab.

9. A closure in accordance with claim **8** wherein the circumferential length of slits and links is such that the circumferential length ratio of slit to link is at least 20 to 1.

* * * * *