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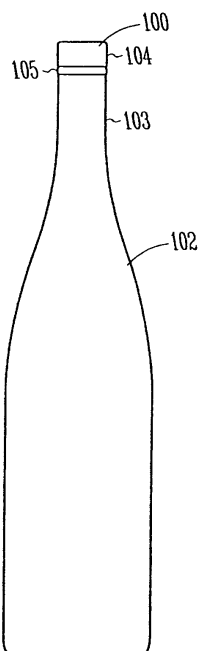
AL BA HR MK YU(30) Priority: **21.02.2005 US 654631 P****19.04.2005 US 109610**(71) Applicant: **Penn-Wheeling Closure LLC****Glen Dale, WV 26038 (US)**

(72) Inventors:

- **Reed, David F.**
Wheeling, WV 26003 (US)
- **Comadena, Louis E**
Burr Ridge, IL 60527 (US)

(74) Representative: **Vieillefosse, Jean-Claude****Cabinet Hirsch
58, Avenue Marceau
75008 Paris (FR)**(54) **Bottle cap and method therefor**

(57) A closure assembly (100) includes an inner cap (202) with threading along an inner surface. A threading profile extends along an outer surface of an inner cap sidewall (300). An outer cap (200) is coupled with the inner cap. The outer cap includes an outer cap sidewall (400) extending along at least a portion of the inner cap sidewall (300), and the outer cap sidewall is substantially cylindrical and uniformly smooth along at least an exterior face. The outer cap sidewall (400) is sized and shaped to conceal the threading profile. An annular rim (208) of the outer cap extends from an open end of the outer cap, and the annular rim is inwardly bent toward the inner cap. In another example, the annular rim extends over the inner cap sidewall and couples the outer cap with the inner cap with an interference fit.

*Fig. 1***EP 1 695 917 A1**

Description**Technical Field**

5 [0001] Closures for vessels and in particular closures for drinking vessels such as bottles.

Background

10 [0002] Fluid containers, such as bottles, cans and the like are closed for storage, transportation and the like with closures, including bottle caps and corks. Corks, for instance, are deformable and pushed into the openings of containers (e.g., wine bottles) to seal a liquid, such as wine, away from the atmosphere to prevent spoiling of the liquid. One disadvantage of a cork is that a cork will allow leaking if it is improperly fitted in a bottle or if the cork prematurely dries and thereby shrinks and/or cracks in the bottle opening. Additionally, an improperly fitted cork or dried cork may allow premature spoiling of the liquid within, for instance, if the liquid is wine, exposure to the atmosphere will prematurely oxidize the wine. Another disadvantage with corks is the difficulty of replacing them in a bottle. To obtain a tight seal, the cork must be placed over the bottle opening and forced into the opening. Improper alignment of the cork with the opening or insufficient pushing force prevent adequate resealing of the bottle and can cause leakage and/or spoiling of the contents. Additionally, a cork will sometimes impart its own taste to liquids, such as wine, and taint the aroma and flavor of the liquids kept in a bottle.

20 [0003] In other examples, closure assemblies are used to seal containers. One disadvantage of many closure assemblies is the complex method of coupling an inner cap and an outer cap. Some examples of closure assemblies have features, such as threading, ratchet grooves and the like, along the exterior of the inner cap and corresponding features along the interior of the outer cap. The outer and inner caps are coupled together by engaging the corresponding features together. Using features (e.g., threading) to couple the outer and inner caps requires time consuming and expensive additional manufacturing steps to form the features. Additionally, extra assembly is needed to engage the features of the inner cap with the threading of the outer cap. Further, forming such features sometimes roughens the exterior of the outer cap with the profiles of the features and/or knurling needed for tooling to grasp the outer cap and form the threading. The profiles and/or knurling create a rough and unappealing appearance for the outer cap exterior. Moreover, some closure examples roll a portion of the open end of a cap to form a ring around the bottom of the closure. The ring extends from the cap and has a diameter larger than the cap itself thereby further roughening the appearance of the cap exterior.

30 [0004] What is needed is a closure assembly that provides a container with a tight and consistent seal that prevents leaking and spoiling of contents. What is further needed is a closure assembly with a smooth and aesthetically appealing exterior that is inexpensive and easy to manufacture.

35 **Brief Description of the Drawings**

[0005]

40 Figure 1 is a side elevational view showing one example of a closure assembly coupled with a container.
 Figure 2 is a cross sectional view showing the closure assembly.
 Figure 3 is a cross sectional view showing one example of the inner cap.
 Figure 4 is a cross sectional view showing one example of the outer cap.
 Figure 5 is a perspective view showing one example of a closure assembly with printing.
 Figure 6A is a perspective view showing one example of a closure assembly with embossing.
 45 Figure 6B is a cross sectional view showing another example of a closure assembly with embossing.
 Figure 7 is a side elevational view showing one example of a closure assembly coupled with a container and at least partially surrounded by a wrap.
 Figure 8 is a block diagram showing one example of a method for making a closure assembly.

50 **Description of the Embodiments**

[0006] In the following detailed description, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural changes may be made without departing from the scope of the present invention. Therefore, the following detailed description is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims and their equivalents.

[0007] Figure 1 shows one example of a closure assembly 100 coupled to a container 102. The container 102 includes,

but is not limited to, a liquid containing vessel, such as a wine or liqueur bottle. In another example, the container 102 includes a can, a jar and the like sized and shaped to hold contents (e.g., liquids, solids and the like). The container 102 includes, in yet another example, a neck 103. The closure assembly 100 is coupled with the neck 103 of the container 102. A neck ring 105 extends at least part way around the neck 103. In one option, the neck ring 105 is made of the same material as the container 102 and integral to the container 102. As shown in Figure 1, the closure assembly 100 has a substantially smooth sidewall 104. The smooth sidewall 104 of the closure assembly 100 continues the smooth profile of the container 102 and provides an attractive appearance to the assembly 100 coupled with the container 102. In another option, the smooth sidewall 104 flushly mates with the neck ring 105 to provide a substantially smooth and continuous profile between the neck ring 105 and the closure assembly 100. Additionally, as described further below, the smooth sidewall 102 mates well with wraps, for instance, tamper proofing foils, shrink wraps and the like. The smooth sidewall 102 does not interfere with the application of the wrap to the container 102 or the closure assembly 100. The smooth sidewall 102 and the profile of the container 102 assist in providing a corresponding attractive appearance for the wrap.

[0008] Figure 2 shows one example of the closure assembly 100. The closure assembly 100 includes an outer cap 200 that at least partially surrounds an inner cap 202. The outer cap 200 is coupled to the inner cap 202 so rotation of the outer cap 200 (e.g., to rotate the assembly 100 relative to the container 102) correspondingly rotates the inner cap 202. The closure assembly 100, optionally includes, but is not limited to, aluminum, steel and the like. In one example, the closure assembly 100 includes tin-plated steel. In another example, the closure assembly 100 includes tin-free steel.

[0009] Figure 3 shows the inner cap 202 prior to coupling with the outer cap 200 (Figure 2). The inner cap 202 includes an inner cap sidewall 300 extending between an inner cap lid 302 and an inner cap opening 304. The inner cap sidewall 300 includes threading 306 extending along at least a portion of an inner surface 308 of the inner cap sidewall 300. The threading 306, in one example, is sized and shaped to engage with corresponding threading on the container 102 (Figure 1) to seal the container 102 when the closure assembly 100 is coupled thereto. A threading profile 310, corresponding to the threading 306, extends along at least a portion of an outer surface 312 of the inner cap sidewall 300. The threading 306 is formed, in one example, by a continuous threading process. The inner cap 202 is interposed between male and female tooling that have tooling surfaces sized and shaped to form the desired threading pattern on the inner cap 202. The female tooling closes around the inner cap 202 and the male tooling and forms knurls around the inner cap lid 302. The knurls assist the female tooling to grasp the inner cap 202 while the male tooling turns with respect to the cap 202. When turned, the profiles of the male and female tooling deform the inner cap sidewall 300 and thereby form the threading 306.

[0010] In another option, the inner cap 202 includes a liner 314. The inner cap 202 is sized and shaped to receive the liner 314 adjacent to the inner cap lid 302. In one example, the liner 314 has slightly more area than the area defined by the inner cap sidewall 300 and thereby engages with the sidewall 300 by way of an interference fit. As shown in Figure 3, the threading 306 provides a surface for the liner 314 to rest upon once the liner 314 is positioned adjacent to the inner cap lid 302, in another example. The threading 306 thereby retains the liner 314 within the inner cap 202. In still another example, the liner 314 is retained within the inner cap 202 with an adhesive, a mechanical fitting and the like.

[0011] In one option, the liner 314 includes, but is not limited to, SARANEX™ a registered trademark of the Dow Chemical Company. In another option, the liner 314 includes at least one material (e.g. polymers and the like) configured to prevent the passage of gases, water vapor and aromas when the closure assembly 100 is coupled with the container 102 (Figure 1). The liner 314, in yet another option, includes a laminate having a layer of SARANEX™ coupled with a layer of compressible foam membrane. The foam membrane allows the lip of the container 102 to deform the liner 314 when the container 102 is coupled with the closure assembly 100. Deforming the liner 314 tightly seals the liner 314 against the container 102 and substantially prevents the ingress of gases, water vapor and aromas around the liner 314.

[0012] In yet another option, the inner cap 202 is a stand-alone cap 202 that acts as a closure assembly without the outer cap 200. The cap 202 is substantially smooth at the juncture between the cap lid 302 and the cap sidewall 300. For example, when the threading 306 and threading profile 310 are formed the area between the threading profile 310 and the inner cap lid 302 is substantially free of knurling. The tooling used to form the threading 306 (described above) grasps the cap 202 as described without forming pronounced knurls on the inner cap sidewall 300 or the inner cap lid 302.

[0013] As shown in Figure 3, the cap 202 includes a blunt annular rim 316. The blunt annular rim 316 extends from the cap sidewall 300 and is substantially adjacent to the inner cap opening 304. The blunt annular rim 316 is outwardly bent and provides a blunt surface to easily handle the cap 202. Additionally, the blunt annular rim 316 minimizes the presence of burrs, snags and the like extending along the leading edge 318 of the cap sidewall 300 by providing the blunt surface for handling instead of using the leading edge 318. Moreover, the blunt annular rim 316 is free of curling toward the cap side wall 300. For instance, the annular rim 316 does not curl back over itself to form a ring around the cap 202.

[0014] Optionally, the blunt annular rim 316 is sized and shaped so at least a portion of the blunt annular rim profile, for instance, the leading edge 318, is substantially flush with the profile of the neck ring 105 (Figure 1). The annular rim 316 and the neck ring 105 thereby provide a smooth continuous profile therebetween. As a result, the cap 202 smoothly

transitions into the container 102 (Figure 1) to provide a smooth overall appearance for the container 102 and the cap 202. In another example, the annular rim 316 and the neck ring 105 cooperate to provide the smooth continuous profile and facilitate positioning of a wrap (e.g., wrap 700, described below) around at least portions of the cap 202 and the neck 103 of the container 102. At least a portion of the blunt annular rim 316 and the neck ring 105 are visible through the wrap and at least the leading edge 318 and the neck ring 105 are substantially flush thereby presenting a smooth attractive appearance for the wrap, container 102 and the cap 202.

[0015] Figure 4 shows the outer cap 200 including the outer cap sidewall 400 extending between an outer cap lid 402 and an outer cap opening 404. The outer cap sidewall 400 has an interior face 406 sized and shaped to be slightly larger than the outer surface 312 of the inner cap 202. The outer cap 200 is thereby configured to slidably couple over the threading profile 310. In one example, the outer cap 200 slides over the threading profile 310 in a direction parallel to an inner cap vertical axis 204 (Figure 2). The outer cap 200 is moved over the inner cap 202 (Figure 3) until the inner cap lid 302 engages the outer cap lid 402. The outer cap 200 is free of features, such as threading corresponding to the threading profile 310 of the inner cap 200. Assembly of the inner cap 200 and the outer cap 202 is expedited because there are no features, such as threading, grooves and the like to mate between the caps 200, 202 and rotation of one cap with respect to the other is thereby not needed (See Figure 4).

[0016] The outer cap sidewall 400 has a substantially uniformly smooth exterior face 408. As described above the outer cap 200 slides over the threading profile 310. The substantially smooth exterior face 408 conceals the threading profile 310. The substantially smooth exterior face 408 provides a smooth profile for the closure assembly 100 that is aesthetically appealing while the closure assembly 100 provides a seal for the container 102. As described below, the substantially smooth exterior face 408 assists in providing a smooth appearance to wraps and the like used to tamper proof the container 102 and the closure assembly 100.

[0017] Referring again to Figure 2, the inner cap 202 is coupled with the outer cap 200. The inner cap 202 is engaged against the outer cap 200 so the inner cap lid 302 (Figure 3) is engaged to the outer cap lid 402 (Figure 4). As described above, the interior face 406 is free of features and the inner cap 202 slides into engagement with the outer cap 200 along the inner cap vertical axis 204. In one option, an adhesive 206 is interposed between the inner cap lid 302 and the outer cap lid 402. The adhesive 206 couples the inner cap 202 with the outer cap 200. In one example, the adhesive 206 includes, but is not limited to, an FDA approved adhesive that provides a metal-to-metal bond. For instance, a cyanoacrylate based adhesive including, but not limited to, 430 SUPER BONDER™ instant adhesive. SUPER BONDER™ is a registered trademark of the Loctite Corporation of Connecticut. In another example, the adhesive 206 extends across only portions of the inner cap lid 302 and the outer cap lid 402. The adhesive 206 extends across the inner cap lid 302 and the outer cap lid 402 and between portions of the inner cap sidewall 300 and the outer cap sidewall 400, in yet another example.

[0018] As shown in Figure 2, in another option, an annular rim 208 extends from the outer cap sidewall 400 around the outer cap opening 404. The outer cap sidewall 400, in one example, includes the annular rim 208. The annular rim 208 includes, but is not limited to, similar materials used to form the outer cap 200 (e.g., aluminum, steel and the like). The annular rim 208 is bent toward the inner cap 202 (e.g., the inner cap sidewall 300). The bent annular rim 208 provides a blunt inwardly extending surface that assists easy gripping of the closure assembly 100. The closure assembly 100 is thereby easily handled during coupling with the container 102 and after the assembly 100 is uncoupled from the container 102. Additionally, the bent annular rim 208 minimizes burrs and edges at the leading edge of the rim 208 (i.e., the edge closest to the inner cap sidewall 300) because of the inward bend of the rim 208. The annular rim 208 extends over at least a portion of the inner cap sidewall 300, in one example, as shown in Figure 2. The inner circumference of the annular rim 208 is smaller than the circumference of the inner cap 202, in another example, and the annular rim 208 creates an interference fit between the outer cap 200 and the inner cap 202 thereby coupling the caps 200, 202. Optionally, a portion of the annular rim 208 extends over the inner cap sidewall 300 to create the interference fit. In yet another example, the annular rim 208 extends over at least a portion of the inner cap sidewall 300 and the rim 208 is engaged against the sidewall 300 to securely retain the inner cap 202 within the outer cap 200. The bent annular rim 208 cooperates with the adhesive 206, in still another example, to couple the inner cap 202 with the outer cap 200.

[0019] In another option, the annular rim 208 is bent at around the same time the inner cap 202 is coupled with the outer cap 200. For instance, tooling is adapted to couple the inner cap 202 with the outer cap 200 and adapted to engage the annular rim 208 and inwardly bend it as described above. Coupling the caps 200, 202 and forming the bent annular rim 208 at the same time shortens manufacturing times and decreases costs by performing two operations at a single time.

[0020] Figure 5 shows one example of the closure assembly 100 including an outer cap 200 with printing 500A, B. The printing 500A is on the outer cap lid 402 and the printing 500B is on the outer cap exterior face 408. Optionally, the closure assembly 100 includes at least one of printing 500A or 500B. In another option, the printing 500A, B includes multiple or single features that are merged between the outer cap lid 402 and the exterior face 408. The printing 500A, B includes, but is not limited to, colored coatings (e.g., for at least a portion of the outer cap 200), printed on designs, labels, logos and the like. For example, the colored coatings include paints, polymers and the like configured to provide a different color than the base material of the outer cap 200. In another example, the printing 500A, B includes a design,

label or logo (e.g., decorative artwork, winery emblems, company emblems, text, and the like).

[0021] Figures 6A, B show another example of a closure assembly 100 with embossing 600. The embossing 600 extends from the outer cap lid 402. In one option, as shown in Figure 6B, the outer cap 200 is embossed and the inner cap 202 is free of embossing. The inner cap 202 is not embossed because it is substantially concealed by the outer cap 200. In another option, both the outer and inner caps 200, 202 include embossing. For instance, the caps 200, 202 are embossed after coupling the outer cap 200 with the inner cap 202. The embossing 600 includes, but is not limited to, designs, labels, logos and the like. As described above with the printing 500, the embossing 600 includes, for instance, decorative artwork, winery emblems, company emblems, text, and the like. In another example, the embossing 600 and printing 500A cooperate to provide an embossing 600 that includes the printing 500A.

[0022] Figure 7 shows one example of the closure assembly 100 coupled with the container 102. A wrap 700 is coupled between the closure assembly 100 and the container 102. For instance, the wrap 700 at least partially surrounds a portion of the closure assembly 100 and the container 102. In one option, the wrap 700 includes, but is not limited to, foils, shrink wraps, plastic films and the like. The wrap 700, in another option, serves as a tamper indication device (e.g., removal or damage to the wrap 700 indicates tampering). In one example, the wrap 700 is slipped around the closure assembly 100 and the container 102 the assembly 100 is coupled with. Because the closure assembly 100 is free of an outwardly curled ring and flushly mates with the neck ring 105, the wrap 700 has an inner circumference slightly larger than the closure assembly 100 to permit sliding of the wrap 700 over the closure assembly 100 and the neck 103. The wrap 700 thereby uses less material and is easier to couple around the closure assembly 100 and the neck 103. For instance, the wrap 700 does not snag on the closure assembly 100 or the neck ring 105.

[0023] As described above, in one option, the wrap 700 is a shrink wrap. The shrink wrap is positioned around at least a portion of the closure assembly 100 and the neck 103 and heat is applied to shrink the wrap 700 and couple it with the neck 103 and the assembly 100. In another option, the wrap 700 is a film or foil that is compressed and/or wrapped around the closure assembly 100 and the neck 100. The profile of the substantially uniformly smooth exterior face 408 shows through the wrap 700 and thereby presents an aesthetically appealing appearance. Additionally, the flush mating of the neck ring 105 and the closure assembly 100 shows through the wrap 700 to present a smooth and appealing profile across the neck ring 105 and the assembly 100.

[0024] Figure 8 shows a method 800 for making a closure assembly. One example of a closure assembly is assembly 100, shown in Figures 1-4 and referred to below. At 802, an inner cap 202 (Figure 2) is formed. The inner cap 202 includes threading 306 (Figure 3) extending along the inner surface 308 of the inner cap sidewall 300. A threading profile 310 correspondingly extends along the outer surface 312 of the inner cap sidewall 300. At 804, the outer cap 200 is formed. The outer cap includes an outer cap sidewall 400 (Figure 4) that is substantially cylindrical and uniformly smooth along at least an exterior face 408. At 806, the outer cap 200 is coupled with the inner cap 202. As shown at 808, at least the threading profile 310 is concealed. In one example, the threading profile 310 is concealed by the uniformly smooth exterior face 408 of the outer cap 200. At 810, the annular rim 208 (Figure 2) is bent toward the inner cap 202. The annular rim 208 extends from an open end of the outer cap 200, for instance, the outer cap opening 404 (Figure 4). In another example, the method 800 includes extending the annular ring 208 over the inner cap sidewall 300.

[0025] Several options for the method 800 follow. In one option, the outer cap 200 is embossed and the inner cap 202 is free of embossing. For example, the outer cap 200 is embossed prior to assembly with the inner cap 202. Coupling the outer cap 200 with the inner cap 202 occurs at around the same time as bending the annular rim 208 toward the inner cap 202, in another option. In yet another option, coupling the outer cap 200 with the inner cap 202 includes adhering the caps 200, 202, for instance with an adhesive, such as adhesive 206.

Conclusion

[0026] Using examples described above, a number of advantages are realized. One advantage includes a closure assembly that provides a tight and consistent seal with a container. The closure assembly substantially prevents spoiling of a liquid, such as wine, because of premature oxidation. Additionally, the closure assembly substantially prevents leaking of the container contents. Moreover, the closure assembly allows for easier resealing of a container by, for instance, screwing the closure assembly onto the container. Further the closure assembly does not taint the contents of the container (e.g., wine) with the taste of the assembly, thereby substantially preventing alteration of the flavor and aroma of the contents.

[0027] Furthermore, the closure assembly is easy to manufacture and assemble because the outer cap sidewall moves over the threaded profile of the inner cap and the adhesive and/or the bent annular rim is used to couple the inner and outer cap together. In one option, the bent annular rim is formed at the same time the inner cap is engaged to the outer cap, thereby further expediting manufacturing. Because the outer cap is coupled to the inner cap with an adhesive and/or bending of the annular rim, expensive features such as mated threading, grooves, ratcheting and the like are unnecessary to couple the inner and outer caps together. The bent annular rim provides a blunted surface around the opening of the closure assembly for easy coupling and removal of the assembly with the container.

[0028] The outer cap conceals the threading profile of the inner cap and thereby provides a smooth aesthetically appealing appearance for the closure assembly. The smooth cylindrical surface of the outer cap mates well with tamper proofing foils, wraps and the like to provide a tamper proof and attractive seal to containers. Further, because the annular rim is inwardly bent the ridge does not alter the attractive appearance of the closure assembly with the tamper proofing features described above because the closure assembly exterior is smooth.

[0029] In another option, the outer cap is personalized with different colors, printed on designs, labels, logos and the like. Optionally, the outer cap is embossed without correspondingly embossing the inner cap that is substantially concealed. For example, the outer cap is embossed prior to assembly with the inner cap to leave the inner cap free of embossing.

[0030] Although selected advantages are detailed above, the list is not intended to be exhaustive. Although specific examples have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the present invention. It is to be understood that the above description is intended to be illustrative, and not restrictive. Combinations of the above examples, and other examples will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention includes any other applications in which the above structures and fabrication methods are used.

Claims

1. A closure assembly comprising:

an inner cap with threading along an inner surface and a threading profile along an outer surface of an inner cap sidewall;

an outer cap coupled with the inner cap, wherein the outer cap has an outer cap sidewall extending along at least a portion of the inner cap sidewall, wherein the outer cap sidewall is substantially cylindrical and uniformly smooth along at least an exterior face, and the outer cap sidewall conceals the threading profile; and wherein an annular rim of the outer cap extends from an open end of the outer cap, and the annular rim is inwardly bent toward the inner cap.

2. The closure assembly of claim 1, further comprising a liner engaged against an inner cap lid, and the inner cap sidewall extends around the liner.

3. The closure assembly of claim 2, wherein the inner cap sidewall grasps the liner.

4. The closure assembly of claim 1, wherein the outer cap sidewall is substantially cylindrical and uniformly smooth along an interior face.

5. The closure assembly of claim 1, wherein the annular rim extends over the inner cap sidewall and couples the outer cap with the inner cap with an interference fit.

6. The closure assembly of claim 1, wherein an inner cap lid is adhered to an outer cap lid.

7. The closure assembly of claim 1, wherein the outer cap includes printing along at least one of the outer cap sidewall and an outer cap lid.

8. The closure assembly of claim 1, wherein the outer cap includes embossing along an outer cap lid and the inner cap is free of the embossing.

9. The closure assembly of claim 1, wherein the closure assembly is coupled with a container, and the closure assembly substantially seals the container.

10. The closure assembly of claim 9, further comprising a wrap extending between the closure assembly and the container, wherein the wrap extends around at least a portion of the closure assembly and around at least a portion of the container.

11. A closure assembly comprising:

an inner cap with threading along an inner surface and a threading profile along an outer surface of an inner cap sidewall;

an outer cap having an outer cap sidewall extending along at least a portion of the inner cap sidewall, wherein the outer cap sidewall is uniformly smooth along at least an exterior face, and an interior face of the outer cap sidewall is sized and shaped to slidably couple over the threaded profile parallel to an inner cap vertical axis; and

wherein an annular rim of the outer cap extends from an open end of the outer cap sidewall, and the annular rim is inwardly bent over at least a portion of the inner cap sidewall, and the annular rim is engaged against the inner cap sidewall.

12. The closure assembly of claim 11, wherein the outer cap sidewall is substantially cylindrical and uniformly smooth along an interior face.

13. The closure assembly of claim 11, wherein an inner cap lid is adhered to an outer cap lid.

14. The closure assembly of claim 11, wherein the outer cap includes embossing along an outer cap lid and the inner cap is free of the embossing.

15. The closure assembly of claim 11, further comprising a liner engaged against an inner cap lid, and the inner cap sidewall extends around the liner.

16. The closure assembly of claim 15, wherein the inner cap sidewall grasps the liner.

17. A closure assembly comprising:

a cap with threading along an inner surface and a threading profile along an outer surface of a cap sidewall, wherein the cap is substantially smooth at the juncture between a cap lid and the cap sidewall;

a blunt annular rim of the cap extending from an open end of the cap sidewall, wherein the blunt annular rim is outwardly bent away from at least a portion of the cap sidewall, and the blunt annular rim is free of curling toward the cap sidewall.

18. The closure assembly of claim 17, further comprising a liner engaged against the cap lid, and the cap sidewall extends around the liner.

19. The closure assembly of claim 18, wherein the cap sidewall grasps the liner.

20. The closure assembly of claim 17, wherein the closure assembly is coupled with a container including a neck ring substantially adjacent to the blunt annular rim, and at least a portion of a blunt annular rim profile is substantially flush with a neck ring profile.

21. The closure assembly of claim 20, further comprising a wrap extending between the closure assembly and the container, wherein the wrap extends around at least a portion of the closure assembly and around at least a portion of the container, and the at least the portion of the blunt annular rim profile and the neck ring profile are visible through the wrap and substantially flush.

22. A method comprising:

forming an inner cap, wherein the inner cap includes threading along an inner surface and a threading profile along an outer surface of an inner cap sidewall;

forming an outer cap, wherein the outer cap has an outer cap sidewall, and the outer cap sidewall is substantially cylindrical and uniformly smooth along at least an exterior face;

coupling the outer cap with the inner cap;

concealing at least the threading profile; and

bending an annular rim toward the inner cap, wherein the annular rim extends from an open end of the outer cap.

23. The method of claim 22, further comprising embossing the outer cap and the inner cap is free of embossing.

24. The method of claim 22, wherein concealing at least the threading profile includes covering the threading profile

with the outer cap sidewall.

25. The method of claim 22, wherein bending the annular rim toward the inner cap includes extending the annular ring over the inner cap sidewall.

5 26. The method of claim 22, wherein coupling the outer cap with the inner cap is at the same time as bending the annular rim toward the inner cap.

10 27. The method of claim 22, wherein coupling the outer cap with the inner cap includes adhering the outer cap to the inner cap.

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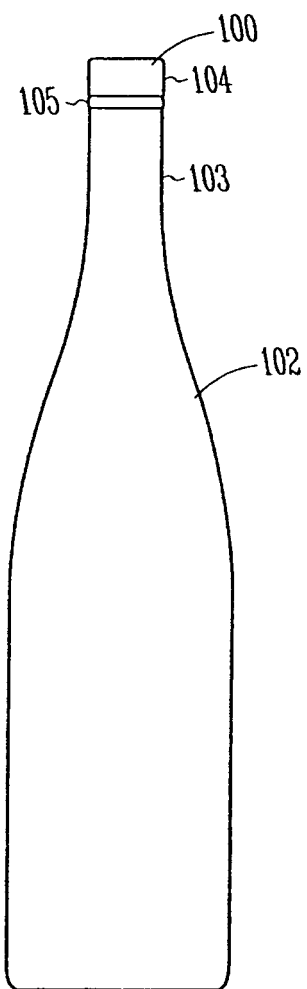


Fig. 1

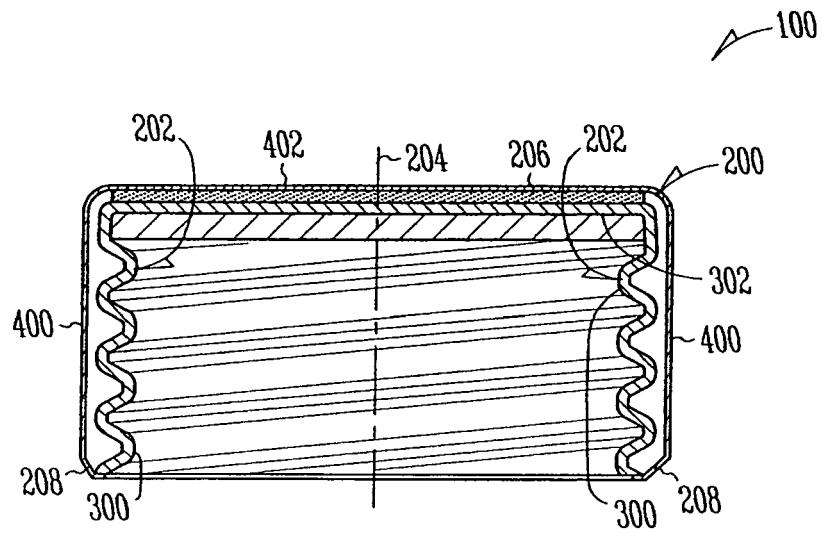


Fig. 2

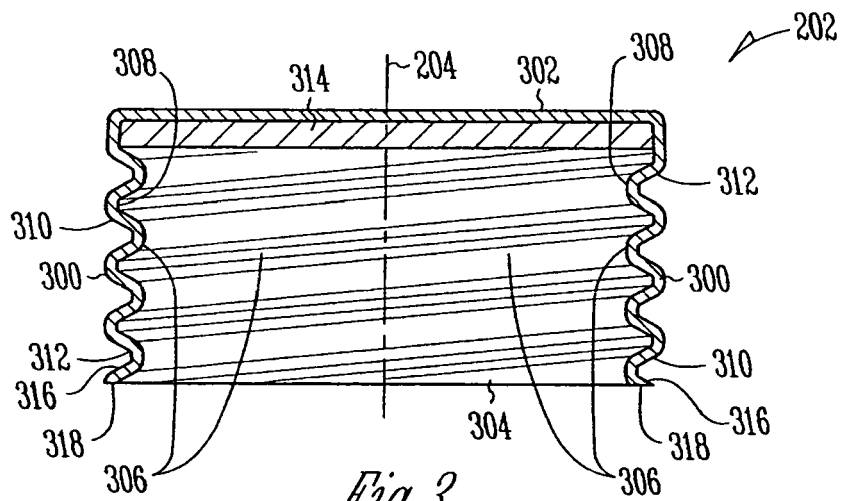


Fig. 3

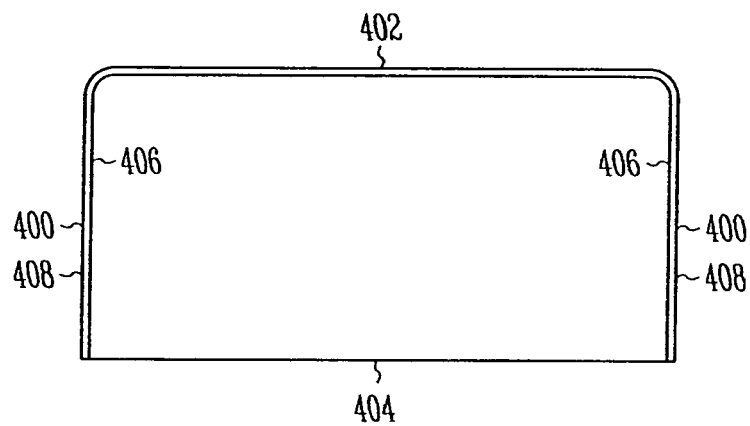


Fig. 4

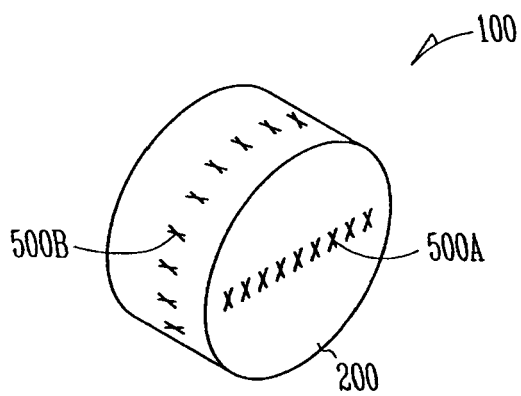


Fig. 5

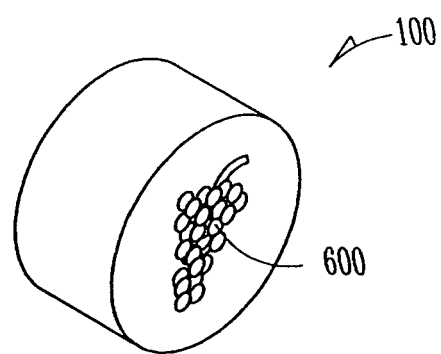


Fig. 6A

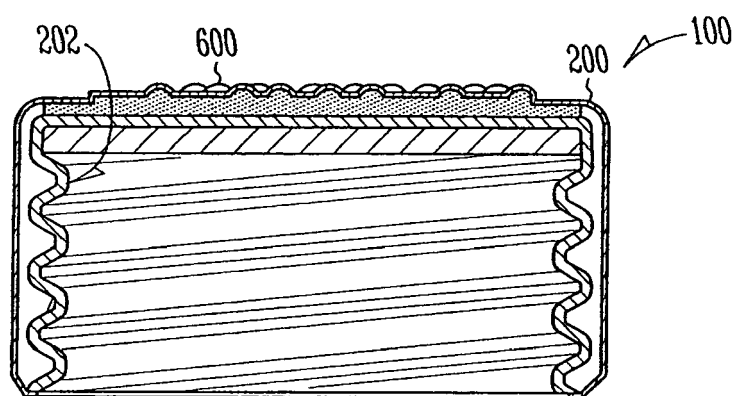


Fig. 6B

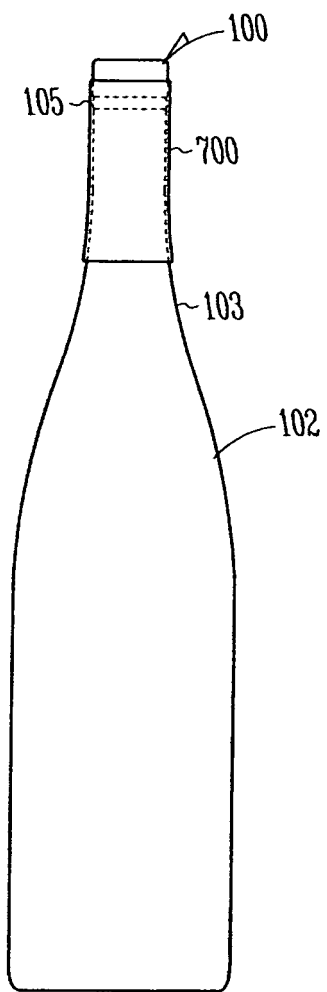
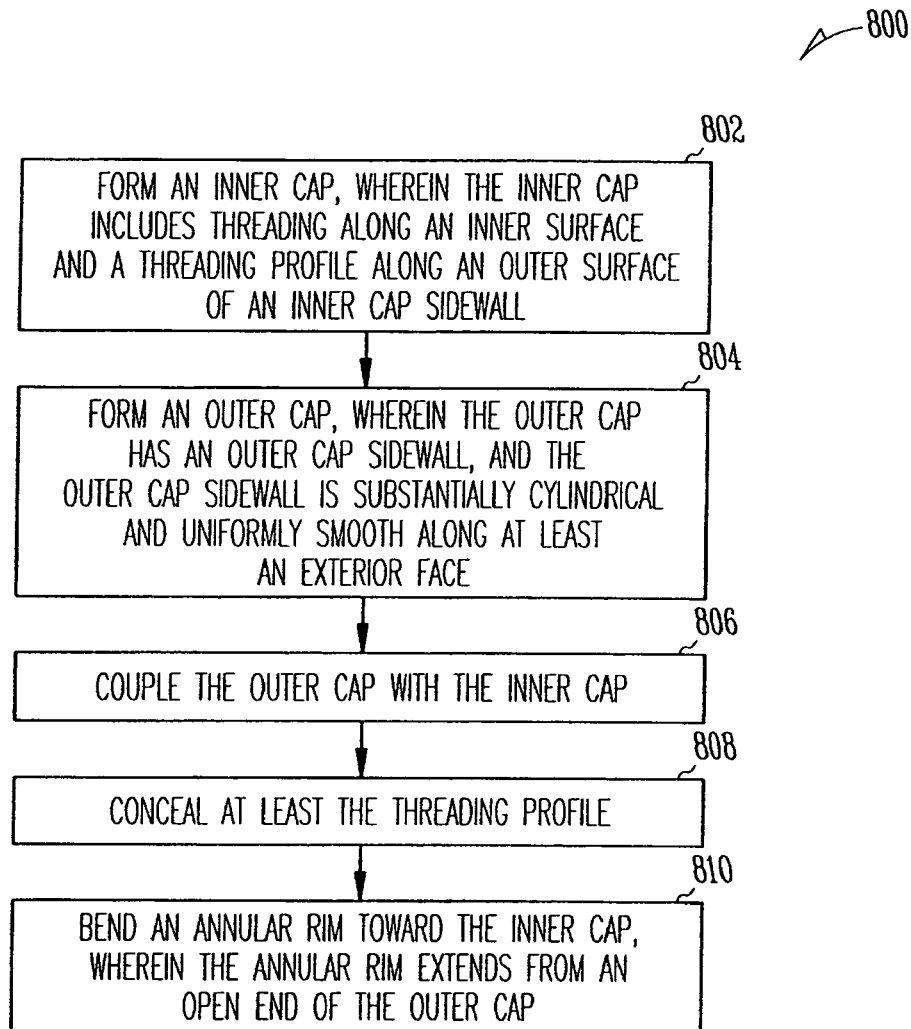


Fig. 7

*Fig. 8*



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 29 1978

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