(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 025 991**
B1

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **31.07.85**

(51) Int. Cl.⁴: **B 65 D 41/34**

(21) Application number: **80105619.3**

(22) Date of filing: **19.09.80**

(54) **Composite closure.**

(30) Priority: **21.09.79 US 77566**

(43) Date of publication of application:
01.04.81 Bulletin 81/13

(45) Publication of the grant of the patent:
31.07.85 Bulletin 85/31

(84) Designated Contracting States:
DE FR GB IT NL SE

(56) References cited:
CH-A- 464 721
GB-A- 283 447
GB-A-1 384 370
US-A-1 486 937
US-A-2 548 305
US-A-2 654 913
US-A-2 684 774
US-A-2 688 776
US-A-2 696 318
US-A-2 823 422
US-A-2 834 498
US-A-2 840 858

(73) Proprietor: **H-C Industries, Inc.**
P.O. Box 472 100 Harrison Street
Crawfordsville Indiana 47933 (US)

(72) Inventor: **Wilde, Sheldon L.**
R.R.8
Crawfordsville Indiana 47933 (US)
Inventor: **McCandless, Thomas J.**
R.R.6
Crawfordsville Indiana 47933 (US)
Inventor: **Saunders, Robert M.**
R.R.2
Ladoga Indiana 47954 (US)

(74) Representative: **Groening, Hans Wilhelm, Dipl.-Ing. et al**
Siebertstrasse 4 Postfach 860 340
D-8000 München 86 (DE)

(56) *References cited:*
US-A-2 952 035
US-A-3 183 144
US-A-3 278 985
US-A-3 300 072

Courier Press, Leamington Spa, England.

EP 0 025 991 B1

Description

The invention relates to a composite closure for a container including a molded plastic cap having a top wall portion, and an annular skirt portion having an internal thread formation thereon. The plastic cap includes an internal annular lip spaced from the top wall portion of the cap which extends integrally inwardly of the skirt portion. The closure includes a substantially fluid-impervious plastic liner disposed adjacent the top wall portion including an annular sealing portion in engagement with the annular lip of the plastic cap.

One known closure arrangement generally in accordance with the aforementioned construction is shown in U.S.—A—3 425 579. This type of closure includes a liner positioned within the closure cap, with the liner including a central plug which enters the bottle or container opening for closing same. The liner includes a severable portion engaged by cutting means on the cap when the cap is applied to a bottle, which severs the plug portion from the remainder of the liner so that when the cap is removed from the bottle it contains a portion of the sealing member which remains with the cap for repeated reclosing. This type of closure has not found acceptance for use with containers having pressurized or carbonated contents, and is relatively complex in configuration. Notably, the portion of the liner which remains with the cap only contacts an upwardly facing surface of the container opening. Experience has shown that a closure which effects sealing only in this manner can have its sealing characteristics impaired by the presence of pressure within a container, since such pressure can deform the top wall portion of the closure outwardly and negate its sealing. Furthermore, the liner of this closure is inserted into the outer shell after formation of the liner, and thus this patent does not suggest compression molding of a sealing liner within a plastic cap in accordance with the present invention.

Another composite closure construction is shown in CH—A—464 721. This closure includes an outer shell which includes projections on the inner surface of its top wall portion. A liner is formed adjacent the top wall portion in engagement with the projections thereon such that a plug-like liner is provided which fits within the mouth of an associated container. As will be recognized, this patent does not teach an arrangement for effecting a seal at the upwardly and outwardly facing surfaces of the container mouth. When a closure such as in this patent is utilized on a container having pressurized contents, pressure acting against the plug-like seal can urge it out of sealing engagement with the container, thus negating the sealing characteristics of the closure. Furthermore, this patent does not suggest the formation of its liner with a compression molding technique, but rather teaches formation in the nature of an injection-molding process.

In order to provide an improved composite closure construction which is particularly suited for use on a container having pressurized or carbonated contents, the present composite closure is characterized by a plastic cap including a plurality of spaced apart liner-engaging projections which extend integrally from the top wall portion of the cap. The sealing liner of the closure engages the projections for retention of the sealing liner in the plastic cap. The sealing liner includes a disc-shaped central portion connected to an annular sealing bead portion wherein the annular sealing bead portion is relatively thicker than the disc-shaped central portion. The annular sealing portion includes a generally inwardly facing sealing surface for sealingly engaging a generally outwardly facing surface of the container. Significantly, formation of the present closure with this desired sealing configuration is effected by the provision of the annular lip which extends integrally inwardly from the skirt portion of the closure's plastic cap. The annular lip provides a retainer against which the plastic liner is formed during compression molding of the plastic liner in the plastic cap adjacent to the top wall portion.

The present closure is further characterized by the provision of a pilfer-band detachably connected to the skirt portion of the plastic cap by a plurality of circumferentially spaced frangible bridge means. The pilfer band is initially formed with an inward, frusto-conical configuration, and is thereafter outwardly stretched for subsequent interaction with a container by heat-shrinking of the pilfer-band.

In one embodiment of the present closure, the liner-engaging projections are generally mushroom-shaped and define overhanging portions whereby the projections engage and retain the plastic liner in the plastic cap. In alternate embodiments, the liner-engaging projections define heat-concentration zones thermally fused to the plastic liner for retaining the liner in the cap.

Brief Description of the Drawings

FIGURE 1 is a cross-sectional view of a composite plastic closure in accordance with principles of the present invention, that has been screwed onto a container to provide a fluid tight seal with its finish;

FIGURE 2 is a bottom plan view of the underside of the cap of the composite closure with greatly magnified portions broken away for ease of clarity and understanding;

FIGURE 3 is a greatly enlarged perspective view of some of the mushroom-shaped pedestals of the closure, with portions of the cap's top wall shown in cross-section;

FIGURE 4 is a cross-sectional view of some of the mushroom-shaped pedestals of the cap;

FIGURE 5 is a cross-sectional view similar to Figure 4, but showing the liner in interlocking engagement with the mushroom-shaped pedestals;

FIGURE 6 is an enlarged cross-sectional view of another composite plastic closure having fusible

cylindrical pedestals in accordance with principles of the present invention;

FIGURE 7 is a greatly magnified perspective view of some of the fusible cylindrical pedestals of the composite closure of Figure 6; and

FIGURE 8 is a greatly magnified perspective view of some of the fusible pyramid-shaped pedestals of another composite plastic closure in accordance with principles of the present invention.

Detailed Description of the Illustrative Embodiment

Referring to Figure 1 of the drawings, a composite plastic closure 100 is provided to close and fluidly seal the finish of a threaded bottle 102 or other containers filled with a liquid, such as a carbonated beverage. Composite closure has a resilient plastic cap 104, which is sometimes referred to as a shell or crown, and has a resilient fluid-impervious plastic liner or seal 106. Cap 104 is preferably made of moldable thermoplastic, such as polypropylene or polyethylene. Other materials can also be used. Liner 106 is preferably made of moldable thermoplastic, such as polyvinyl chloride (PVC). Other liner materials, such as ethylene vinyl acetate (EVA) can also be used.

In order to increase the strength of the cap, the cap has spun plastic portions that provide a spiral molecular orientation, i.e., spirally orientated molecules 108. The spiral orientation gives the cap greater hoop strength and crack resistance than plastic caps formed without spiral orientation. The spun plastic material provides good impact strength and enables the cap to pass a drop test in the refrigeration temperature range of 32—40 degrees F.

In the preferred embodiment, cap 104 is of a one-piece unitary construction and is made of a polypropylene homopolymer. All the parts and components of the plastic cap 104 are integrally connected to each other. The cap 104 has a top wall disc-shaped portion or surface 110 that is sometimes referred to as the "top", and an annular peripheral skirt 112 depending from the top 110. Top 110 has a generally flat outer surface 110a and an inner surface that provides an underside 110b. The circular edge or corner 110c formed by the intersection of the top and the skirt is rounded or chamfered.

As shown in Figure 6 skirt 112 has internal threads 114 and an internal annular lip 116 that provides a retainer to retain and confine the annular bead portion 106a of liner 106 and serves to support and seal against a cylindrical sleeve during the liner-forming process. As explained later, annular bead portion 106a advantageously seals against the finish of the bottle to fluidly seal any irregularities, such as bumps or unevenness in the finish. Retainer 116 is inclined and converges radially inward away from top 110.

In the illustrative embodiment, the exterior surface of skirt 112 has circumferentially spaced vertical finger-gripping ribs 120 to facilitate gripping of the cap. The vertical ribs terminate in an outer rim 124 spaced below top 110. Rim 124 has an inwardly inclined annular shoulder 126 that provides the end skirt 112.

In order to indicate whether the closure 100 has been opened after the closure 100 has been inserted and screwed onto container 102, a heat-shrinkable detachable pilfer-band or tamper-proof band 128 is provided at the end of the skirt by a plurality of frangible members or bridges 130. When formed, pilfer-band 128 is biased radially inward from skirt 112 to provide a frusto-conical band having a minimum inside diameter that is less than the inside diameter of the skirt. The band is subsequently outwardly stretched and expanded to provide a circumferential or cylindrical portion having an inside diameter approximately equal to the inside diameter of the skirt 112 to enable the cap 104 to be inserted onto the container 102. The cylindrical band has a resilient memory and when reheated will assume its original frusto-conical shape.

After the composite plastic closure 100 has been inserted and screwed onto the container 102, pilfer-band 128 is heated to shrink about and engage the bottleneck. When closure 100 is unscrewed to open the bottle 102, pilfer-band 128 will fracture or break in selected areas. In the preferred embodiment, some of the frangible bridges 130 are thicker than others so that when the closure 100 is removed from the bottle, the pilfer-band will tear into one or more pieces and still be attached to the closure 100 by the thicker bridges. In some circumstances it may be desirable that the bridges 130 all have the same thickness and be only horizontally scored so that the pilfer-band 128 will remain on the bottle 102 when the closure 100 is removed.

In order to provide a secure mechanical interconnection between the liner 106 and the cap 104, the cap has a plurality of liner-engaging pedestals 132 that interlockingly engage liner 106. Pedestals 132 extend vertically from the underside 110b of cap-top 110 so that the free ends of the pedestals 132 are positioned between the underside 110b of cap top 110 and the cap's annular lip 116. As shown in Figures 2—5, the pedestals 132 are spaced apart from each other in a grid-like array or matrix in longitudinal parallel rows and lateral parallel rows to define a plurality of liner-receiving passageways, channels or spaces 134 therebetween to receive the liner-forming plastic 106. Liner-receiving spaces 134 and pedestals 132 are circumferentially bounded and surrounded by skirt 112 (Figure 1).

Each pedestal 132 (Figures 3—5) is formed with a generally upright, vertical body 136 extending in the upright (axial) direction. Pedestal-body 136 has a free end or head 138 that is spaced away from the top 110 of cap 104. In the illustrative embodiment, pedestal-body 136 has a generally square cross-section.

In the process of forming the pedestals 132, the free end 138 (Figures 3—5) of pedestal-body 136 is upset, such as by compression and/or heating, to form a mushroom-shaped head 138 with an

overhang 140 that extends outwardly of the body 136 in a direction generally transverse to the upright direction. Overhangs 140 provide a mechanical interlock between pedestals 132 and liner 106. The holding strength of the pedestals and the tear strength of the mechanical connection between the liner 106 and pedestals 132, is proportional to the diameter and extent of the overhang 140 of pedestals 132, the number of pedestals 132 and the spacing 134 between pedestals. For a given number of pedestals, increasing the diameter and extent of the overhang 140 of the mushroom-shaped head will increase the tear strength (peel strength) of the closure. Therefore, by varying the amount of the overhang, the peel strength of the pedestals can be varied to a desired amount, such as between 0.9 and 2.72 kg. This versatility is important because it permits the liner 106 to be detached or stripped from the pedestals 132 with a minimum amount of effort at a later time. The maximum bond and holding strength between the pedestals 132 and liner 106 occurs when the overhangs 140 of the pedestals contact each other.

Referring now to the plastic liner 106, the liner 106 has a centrally disposed circular disc-shaped portion or membrane 106b (Figure 1) that extends across and is connected to and circumscribed by an annular sealing bead 106a. Disc portion 106b engages the underside 110b of cap-top 110 and extends to a position beneath the mushroom-shaped heads 138 to completely cover and overlie pedestals 132. Annular bead 106a is confined in the channel between top 110 and retainer 116. In the illustrative embodiment, the outer face of bead 106a has a rounded lower portion 142 (Figure 6) that is shaped complementary to the internal rounded corner that connects the top 110 to skirt 112, and has an outer upper frusto-conical portion 144 that is inclined and converges radially inward away from top 110, and engages retainer 116. The inner face of bead 106a has a vertical lower portion or shoulder 146 and an upper frusto-conical sealing portion 148 that is inclined and diverges radially outward from shoulder 146. Upper sealing portion 148 resiliently seals and seats against the finish and rim of the bottle to abut against and fluidly seal any irregularities, such as bumps or unevenness, in the finish.

When certain types of thermoplastic liners 106 are used, such as EVA liners, the liner 106 is thermally fused and bonded to pedestals 132 (Figure 5) as it is compression molded and heated during the liner-forming process. This provides a thermoconnection in addition to the mechanical interlock provided by the mushroom-shaped pedestals 132 (Figure 5). For other materials, such as PVC, the liner may not be fused to the pedestals when it is compression molded and heated, but it is still securely mechanically held by the mushroom-shaped pedestals 132.

Advantageously, the resultant secure mechanical interconnection between cap 104 and liner 106 attributable to the holding strength of the mushroom-shaped pedestals 132 permits the liner to be molded without heating the cap, or at least without heating the non-pedestal portions of the cap, to its melting and plastic deformation temperature, thereby minimizing distortion of the cap when the liner is formed.

It will be appreciated that pedestals having heads or overhangs with other shapes could also be used to provide a mechanical interlock with the liner in accordance with principles of the present invention.

The composite plastic closure 150 shown in Figure 6 is identical to the composite closure 100 shown in Figure 1, except that the pedestals 152 are in the form of fusible cylindrical pedestals and do not have an overhang. Each of the pedestals 152 (Figure 7) has a generally planar or flat end 154 with a circular edge 156 that defines at least part of a fusible heat concentration zone, that becomes thermally fused to liner 106 (Figure 6) when liner 106 is compression molded and heated in cap 104 during the liner-forming process. The thermal bond between liner 106 and pedestals 152 provide a solid thermal interconnection between liner 106 and cap 104. Desirably, the shape and arrangement of the fusible pedestals 152 are such as to permit the pedestals to be heated to their melting and plastic deformation temperature for fusion with the liner 106, while the other portions of the cap 104 are kept cooler, thereby minimizing distortion of the cap when the liner is formed.

The composite plastic closure 160 shown in Figure 8 is identical to the composite closure 150 shown in Figures 6 and 7, except that the fusible pedestals 162 are pyramid-shaped and the bases 164 of the pyramids 162 in each lateral row 166 are contiguous. The apex or peak 168 of each pyramid 162 and the portions immediately adjacent thereto provides a fusible heat concentration zone 170 that becomes thermally fused to the molten liner-forming plastic as the liner is compression molded and heated in the cap during the liner-forming process. The fusible pyramid-shaped pedestals 162 also permit the pedestals to be heated to their melting and plastic deformation temperature for fusion to the liner 106, while the other portions of the cap are kept cooler so as to minimize distortion of the cap 104 when the liner is formed. Because of the shape, arrangement and high heat transfer capabilities of the pyramid-shaped pedestals 162, it is believed that the cap with pyramid-shaped pedestals 162 can be kept even cooler than a cap with cylindrical pedestals 152, when the liner is formed.

It was found that pyramids with a radius at the apex of approximately 0.05 mm had about the same adhesion (thermal connection strength) with a liner as 0.33 mm diameter cylindrical pedestals that were formed with a 50 mesh stainless steel screen. Prior art closures provided only about one-fifth the adhesion (holding strength) of the pyramids and cylinders.

It will be appreciated by those skilled in the art, that fusible pedestals having other configurations can be used in accordance with principles of the present invention.

Claims

1. A composite closure (100; 150; 160) for a container (102), said closure including a molded plastic cap (104) having a top wall portion (110), an annular skirt portion (112) having an internal thread formation (114) thereon, and an internal annular lip (116) spaced from said top wall portion (110) and extending integrally inwardly of said skirt portion (112), said closure including a substantially fluid-impervious plastic liner (106) disposed adjacent said top wall portion (110) including an annular sealing portion (106a) in engagement with said annular lip (116), said closure (100; 150; 160) being characterized by: said plastic cap (104) including a plurality of spaced apart liner-engaging projections (132; 152; 162) extending integrally from said top wall portion (110), said sealing liner (106) engaging said projections (132; 152; 162) for retention of said sealing liner (106) in said plastic cap (104), said sealing liner including a disc-shaped central portion (106b) connected to said annular sealing portion (106a) wherein said annular sealing portion (106a) is relatively thicker than said disc-shaped central portion (106b), said annular sealing portion (106a) including a generally inwardly facing sealing surface (146; 148) for sealingly engaging a generally outwardly facing surface of said container, said annular lip (116) providing a retainer against which said plastic liner (106) is formed during compression molding of said plastic liner (106) in said plastic cap (104) adjacent said top wall portion (110).

2. The composite closure in accordance with claim 1, characterized in that a pilfer-band (128) is detachably connected to said skirt portion (112) of said plastic cap (104) by a plurality of circumferentially spaced frangible bridge means (130).

3. The composite closure in accordance with claim 2, characterized in that said pilfer band (128) is initially formed with an inward, frusto-conical configuration, and is thereafter outwardly stretched for subsequent interaction with said container (102) by heat-shrinking of said pilfer-band (128).

4. A composite closure in accordance with claims 1, 2, or 3, characterized in that said liner-engaging projections (132) are generally mushroom-shaped and define over-hanging portions (140) whereby said projections (132) engage and retain said plastic liner (106) in said plastic cap (106).

5. A composite closure in accordance with claims 1, 2 or 3, characterized in that said liner-engaging projections (152; 162) define heat-concentration zones (156; 170) thermally fused to said plastic liner (106) for retaining said plastic liner (106) in said plastic cap (104).

6. A composite closure in accordance with claim 5, characterized in that said liner-engaging projections (152) are of a cylindrical configuration and include circular edge portions (156) which define said heat-concentration zones (156).

7. A composite closure in accordance with claim 5, characterized in that said liner-engaging projections (162) are of a pyramid-shaped configuration and each include an apex (170) which define said heat-concentration zones.

8. A composite closure in accordance with claims 1, 2, or 3, characterized in that said liner-engaging projections (152) are of a cylindrical configuration.

9. A composite closure in accordance with any one of the preceding claims, characterized in that said plastic cap (104) comprises compression molded plastic.

Patentansprüche

1. Zusammengesetzter Verschluß (100; 150; 160) für einen Behälter (102), wobei der Verschluß eine geformte Kunststoffkappe (104) mit einem oberen Wandteil (110), einem ringförmigen Mantelteil (112) mit einem daran befindlichen Innengewinde (114) und eine innere ringförmige Lippe (116) aufweist, die im Abstand von dem oberen Wandteil (110) angeordnet ist und sich einteilig von dem Mantelteil (112) nach innen erstreckt, wobei der Verschluß eine im wesentlichen flüssigkeitsundurchlässige Kunststoffeinlage (106) umfaßt, die in der Nähe des oberen Wandteils (110) angeordnet ist und einen ringförmigen Dichtungsteil (106a) umfaßt, der an der ringförmigen Lippe (116) anliegt, wobei der Verschluß (100; 150; 160) dadurch gekennzeichnet ist, daß die Kunststoffkappe (104) eine Mehrzahl von im Abstand voneinander angeordneten, an der Einlage angreifenden Vorsprüngen (132; 152; 162) aufweist, die sich einteilig von dem oberen Wandteil (110) erstrecken, daß die Dichtungseinlage (106) die Vorsprünge (132; 152; 162) zum Festhalten der Dichtungseinlage (106) in der Kunststoffkappe (104) erfaßt, daß die Dichtungseinlage einen scheibenförmigen mittleren Teil (106b) umfaßt, der mit dem ringförmigen Dichtungsteil (106a) verbunden ist, wobei der ringförmige Dichtungsteil (106a) verhältnismäßig dikker als der scheibenförmige mittlere Teil (106b) ist, daß der ringförmige Dichtungsteil (106a) eine im allgemeinen nach innen gerichtete Dichtungsfläche (146; 148) für die abdichtende Anlage an einer im allgemeinen nach außen gerichteten Stirnfläche des Behälters aufweist, daß die ringförmige Lippe (116) einen Halter bildet, gegen den die Kunststoffeinlage (106) während des Druckgießens der Kunststoffeinlage (106) in der Kunststoffkappe (104) in der Nähe des oberen Wandteils (110) geformt wird.

2. Zusammengesetzter Verschluß nach Anspruch 1, dadurch gekennzeichnet, daß ein Diebstahl-Band (128) lösbar mit dem Mantelteil (112) der Kunststoffkappe (104) durch eine Mehrzahl von in Umfangsrichtung im Abstand voneinander angeordneten, zerbrechlichen Überbrückungsmitteln (130) verbunden ist.

3. Zusammengesetzter Verschluß nach Anspruch 2, dadurch gekennzeichnet, daß das Diebstahl-Band (128) zunächst in einer nach innen gerichteten, kegelstumpfförmigen Form gebildet

wird und danach im Sinne eines anschließenden Zusammenwirkens mit dem Behälter (102) durch Heißschrumpfen des Diebstahl-Bandes (128) nach außen gestreckt wird.

4. Zusammengesetzter Verschluß nach den Ansprüchen 1, 2 oder 3, dadurch gekennzeichnet, daß die die Einlage erfassenden Vorsprünge (132) im allgemeinen pilzförmig sind und überstehende Teile (140) bilden, wodurch die Vorsprünge (132) die Kunststoffeinlage (106) in der Kunststoffkappe (104) erfassen und festhalten.

5. Zusammengesetzter Verschluß nach den Ansprüchen 1, 2 oder 3, dadurch gekennzeichnet, daß die die Einlage erfassenden Vorsprünge (152; 162) Hitze-Konzentrationszonen (156; 170) bilden, die thermisch an die Kunststoffeinlage (106) zum Festhalten der Kunststoffeinlage (106) in der Kunststoffkappe (104) angeschmolzen werden.

6. Zusammengesetzter Verschluß nach Anspruch 5, dadurch gekennzeichnet, daß die die Einlage erfassenden Vorsprünge (152) eine zylindrische Form aufweisen und kreisförmige Randteile (156) umfassen, welche die Hitze-Konzentrationszonen (156) bilden.

7. Zusammengesetzter Verschluß nach Anspruch 5, dadurch gekennzeichnet, daß die die Einlage erfassenden Vorsprünge (162) pyramidenförmig gestaltet sind und jeder eine Spitze (170) umfaßt, welche die Hitze-Konzentrationszone bildet.

8. Zusammengesetzter Verschluß nach den Ansprüchen 1, 2 oder 3, dadurch gekennzeichnet, daß die die Einlage erfassenden Vorsprünge (152) eine zylindrische Form haben.

9. Zusammengesetzter Verschluß nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Kunststoffkappe (104) aus druckgegossenem Kunststoff besteht.

Revendications

1. Une fermeture composite (100; 150; 160) pour un récipient (102), ladite fermeture comprenant un bouchon en matière plastique moulée (104) comportant une partie formant paroi supérieure (110), une partie formant jupe annulaire (112) comportant un filetage intérieur (114), et une lèvre annulaire intérieure (116) espacée de ladite partie formant paroi supérieure (110) et s'étendant intégralement vers l'intérieur de ladite partie formant jupe (112), ladite fermeture comportant une garniture (106) en matière plastique sensiblement imperméable au fluide, disposée adjacente à ladite partie formant paroi supérieure (110) et comportant une partie annulaire d'étanchéité (106a) en contact avec ladite lèvre annulaire (116), ladite fermeture (100; 150; 160) étant caractérisée en ce que: ledit bouchon plastique (104) comprend plusieurs protubérances espacées (132; 152; 162) entrant en contact avec la garniture et s'étendant intégralement à partir de ladite partie formant paroi supérieure (110), ladite garniture d'étanchéité (106) entrant en contact avec lesdites protubérances (132; 152; 162) pour retenir ladite garniture d'étanchéité (106) dans ledit bouchon plastique (104), ladite garniture d'étanchéité comprenant une partie centrale en forme de disque (106b) reliée à ladite partie annulaire d'étanchéité (106a), en ce que ladite partie annulaire d'étanchéité (106a) est relativement plus épaisse que ladite partie centrale en forme de disque (106b), ladite partie annulaire d'étanchéité (106a) comportant une surface d'étanchéité (146; 148) dirigée dans l'ensemble vers l'intérieur et entrant en contact étanche avec une surface, dirigée dans l'ensemble vers l'extérieur, dudit récipient, ladite lèvre annulaire (116) comportant une partie de retenue contre laquelle ladite garniture en matière plastique (106) est formée au cours du moulage par compression de ladite garniture plastique (106) dans ledit bouchon plastique (104) dans une zone adjacente à ladite partie formant paroi supérieure (110).

2. La fermeture composite selon la revendication 1, caractérisée en ce qu'une bande antivol (128) est reliée de façon séparable à ladite partie formant jupe (112) dudit bouchon plastique (104) par plusieurs languettes cassantes (130) qui sont espacées circonférentiellement.

3. La fermeture composite selon la revendication 2, caractérisée en ce que ladite bande antivol (128) est initialement formée avec une configuration tronconique orientée vers l'intérieur et est ensuite allongée vers l'extérieur en vue d'une interaction ultérieure avec ledit récipient (102) par rétrécissement thermique de ladite bande antivol (128).

4. Une fermeture composite selon les revendications 1, 2 ou 3, caractérisée en ce que lesdites protubérances (132) s'appliquant contre la garniture ont dans l'ensemble une forme de champignon et définissent des parties en surplomb (140) de façon que lesdites protubérances (132) s'appliquent contre et retiennent ladite garniture plastique (106) dans ledit bouchon plastique (106).

5. Une fermeture composite selon les revendications 1, 2 ou 3, caractérisée en ce que lesdites protubérances (152; 162) s'appliquant contre la garniture définissent des zones de concentration de chaleur (156; 170) liées par fusion thermique avec ladite garniture plastique (106) pour retenir cette garniture plastique (106) dans ledit bouchon plastique (104).

6. Une fermeture composite selon la revendication 5, caractérisée en ce que lesdites protubérances (152) s'appliquant contre la garniture ont une configuration cylindrique et comprennent des parties marginales circulaires (156) qui définissent lesdites zones de concentration de chaleur (156).

7. Une fermeture composite selon la revendication 5, caractérisée en ce que lesdites protubérances (162) s'appliquant contre la garniture ont une configuration en forme de pyramide et comprennent chacune un sommet (170) qui définit lesdites zones de concentration de chaleur.

8. Une fermeture composite selon les revendications 1, 2 ou 3, caractérisée en ce que lesdites protubérances (152) s'appliquant contre la garni-

ture ont une configuration cylindrique.

9. Une fermeture composite selon une quelconque des revendications précédentes, caractérisée en ce que ledit bouchon plastique (104) comprend une matière plastique moulée par compression.

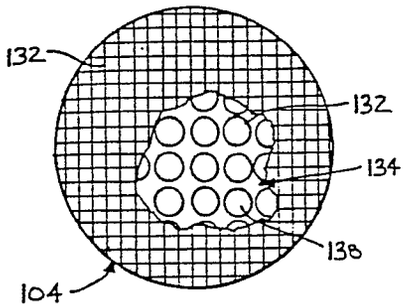


fig. 2

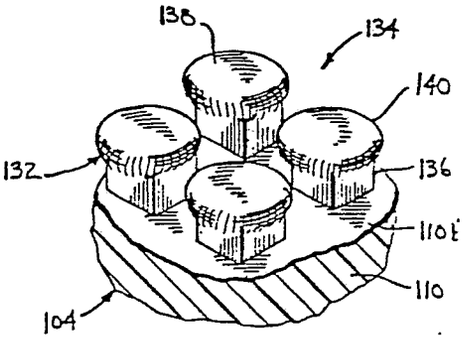


fig. 3

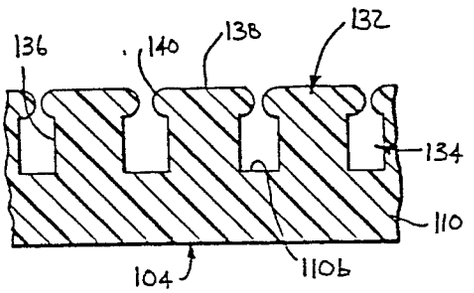


fig. 4

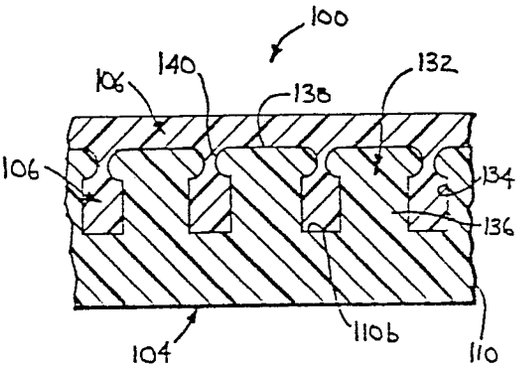


fig. 5

fig. 1

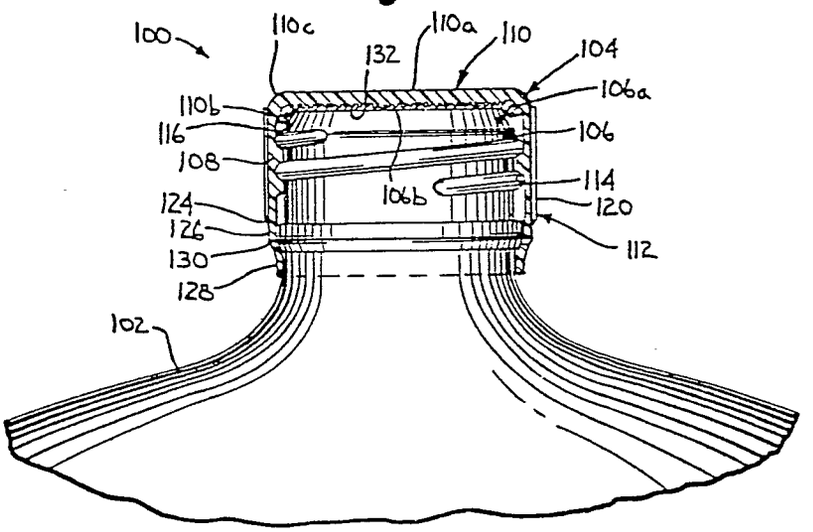
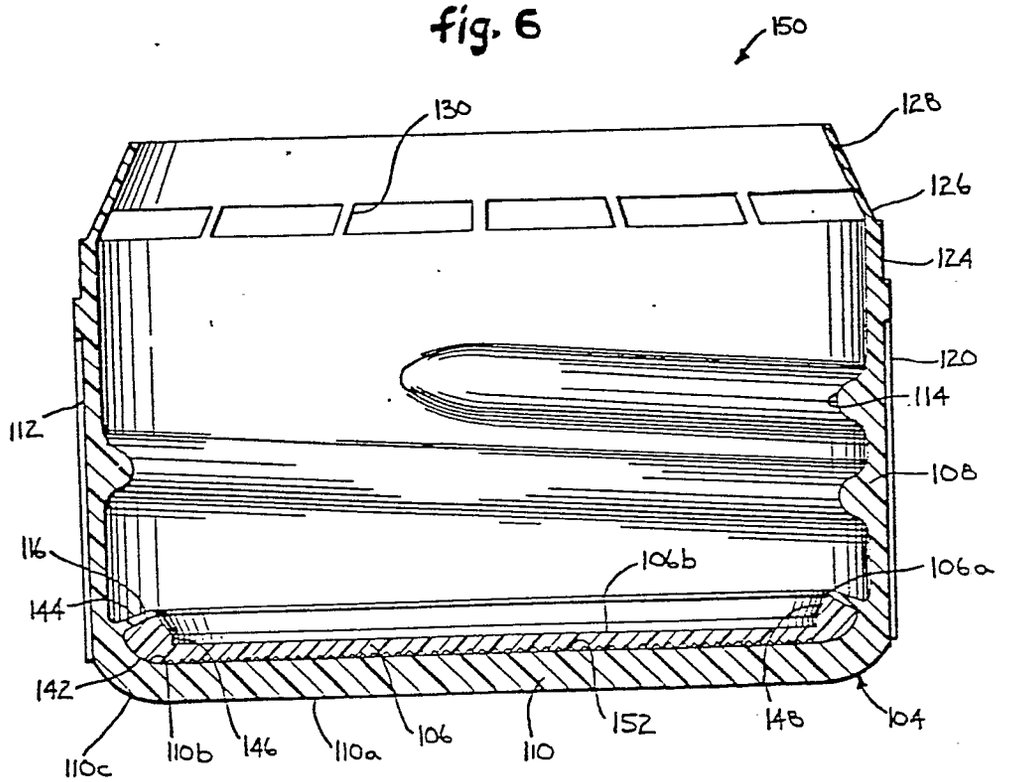


fig. 6



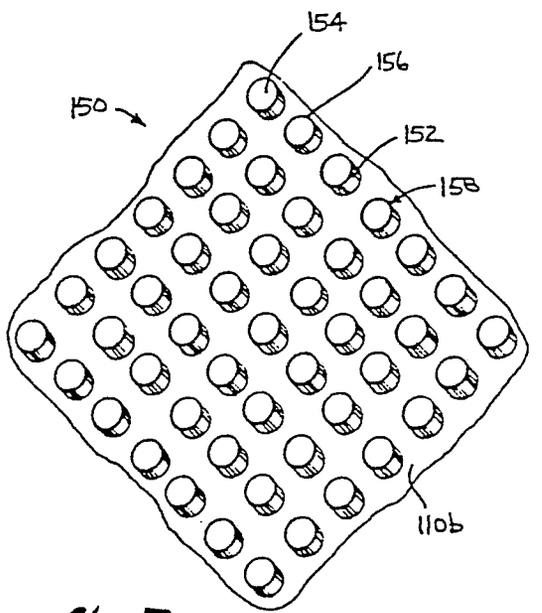


fig.7

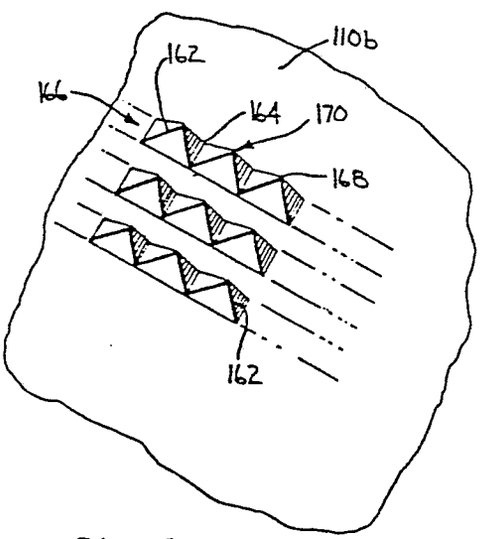


fig.8