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(54) **TAMPER EVIDENT LID AND METHOD OF MAKING SAME**

MANIPULATIONSSICHERER DECKEL UND VERFAHREN ZUR HERSTELLUNG DAVON
COUVERCLE À INDICATEUR D'EFFRACTION ET SON PROCÉDÉ DE FABRICATION

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Description**FIELD OF THE INVENTION**

[0001] The invention relates generally to lids for containers and particularly to tamper-resistant, tamper-evident lids for containers for products that present significant concerns for the consumer about unauthorized tampering with the product (e.g. food products and other consumables). The invention relates in particular to a closure according to the preamble of claim 1, to a closure member according to the preamble of claim 10, to a system for forming a tamper resistant push-on closure according to claim 11, to a mould for forming a closure, and to methods of moulding a closure.

BACKGROUND OF THE INVENTION

[0002] In the ice cream packaging industry, a variety of closure arrangements are used to hold a paperboard, plastic or composite lid in place on the paperboard container or tub holding the ice cream. Examples include U.S. Patent No. 6,772,901 (Witt), U.S. Patent No. 7,703,626 (Witt), and U.S. Patent No. 6,053,353 (Helms).

[0003] Previous solutions involve complex processes for incorporating a paperboard top within a closure. For example, U.S. Patent No. 6,772,901 (to the present inventor Witt) describes that a paper top is peripherally sealed to a downwardly-recessed annular ridge of a plastic rim by induction heating, ultrasonic welding or spin welding. U.S. Patent No. 6,772,901 (to the present inventor Witt) describes that in the alternative, the paper top may be sealed to the annular ridge by applying a coating of adhesive to either side of the face surfaces prior to insertion of the paper lid. U.S. Patent No. 7,703,626 (to the present inventor Witt) describes the pre-assembly heating of the closure components with directed hot air to partially melt the thermoplastic surfaces and allow the parts to be immediately assembled sealingly, and describes a paperboard composite closure in which the plastic rim is of a two-piece snap-fit construction where the paperboard is compressed between first and second annular flanges of the two-piece plastic rim.

[0004] It is of great and increasing importance that the consumer, at the point of purchase of a product, be confident that the package that he or she intends to purchase has not been compromised. If there is a problem with the packaging which cannot be spotted until the consumer opens it for use, he or she may well never purchase that product again and consumer confidence is reduced generally.

[0005] WO2010053462A1 discloses storage boxes, enabling the preservation of foodstuffs against external environmental conditions, comprising a main body having a cavity with a closed bottom part and an open top part, a lid which covers the top opening of the said main body and radial surfaces formed on the brim edges of the said main body; characterized in that, it comprises a

lid lock-notch which ensures that the lid is locked onto the body every time after the bottom ring is broken during first use and the sealing notch which hold the said main body from the radial surfaces and the internal surface. US20010015341A1 discloses a tamper evident closure.

SUMMARY OF THE INVENTION

[0006] There is provided a tamper resistant push-on closure according to claim 1, a tamper resistant push-on closure member according to claim 10, a system for forming a tamper resistant push-on closure according to claim 11, a mould for forming a tamper resistant push-on closure or closure member according to claim 13, a method of moulding a tamper resistant push-on closure according to claim 14, and a method of moulding a tamper resistant push-on closure member according to claim 15.

[0007] The container closure (lid) can be used to resist and make readily detectable tampering of the products at the point of sale. Particular examples include dairy products, cosmetics, granular or powdered food products such as tubs for bread crumbs, hardware product tubs for screws, nuts and bolts, and so on.

[0008] The tamper-resistant tamper-evident container closure may be provided for ice cream, dairy and other food products that are commercially practical and provides the level of tamper evidence needed for food safety.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Reference will be made, by way of example, to the accompany drawings which show example embodiments of the present application, and in which:

FIG. 1 is a plan view of the top of an example closure; and

FIG. 2 is a cross-sectional view of another example closure, with a plastic top cover panel;

FIG. 3 is a cross-sectional portion view of the example closure of FIG. 2;

FIG. 4A is a perspective view of the example closure of FIG. 1 with a container;

FIG. 4B is a perspective view of the example closure of FIG. 1 attached to a container;

FIG. 5 is a outer side view of the example closure of FIG. 1;

FIG. 6A is a cross-sectional view of a further example closure with a container;

FIG. 6B is a cross-sectional portion view of the example closure of FIG. 6A with a container;

FIG. 7A is a cross-sectional view of the example closure of FIG. 6A attached to a container; and

FIG. 7B is a cross-sectional portion view of the example closure of FIG. 6B attached to a container.

DESCRIPTION OF EXAMPLE EMBODIMENTS

[0010] FIG. 1 shows an example closure 10 in accordance with the present disclosure. The closure 10 is a snap-on closure such as a lid, and may be suitable for use to close an opening of a food container such as a plastic or paperboard container (e.g., an ice cream container). The closure 10 of FIG. 1 has a top cover panel 20 and may be manufactured using a molding process, as described further below.

[0011] As shown in FIG. 2, the closure 10 may include a top cover panel 20, a top cylindrical band portion 30 with upper and lower margins 30a and 30b, respectively, and a bottom cylindrical band portion 40 with upper and lower peripheral margins 40a and 40b, respectively. The top cylindrical band portion 30 and the bottom cylindrical band portion 40 are integrally formed and connected, and these portions 30, 40 as a single unit may be referred to in the application as the cylindrical closure portion (closure member) 15. The top cylindrical band portion 30 and the bottom cylindrical band portion 40 are connected by a line of weakness 50 as described below.

[0012] As shown in FIGS. 2 and 3, at the top peripheral margin 30a the top cylindrical band portion 30 has a top cover panel 20 that is recessed from the outer side of the top cylindrical band portion 30 and extends upwardly and inwardly. Beneath the top cover panel 20, the closure 10 provides an annular ledge 18.

[0013] As shown in FIG. 1, the top cover panel 20 may consist of a paper disk or the like that may be printed on its upper side for product identification, marketing information, graphics etc. Particularly for use with ice-cream and food products, the cover panel 20 will have a polymer layer attached to the underside for keeping moisture from the product from entering through the paper. In the embodiment illustrated in FIGS. 6A, 6B, 7A and 7B, the top cover panel 20 is continuous with the annular ledge 18.

[0014] As shown in FIG. 2, the bottom cylindrical band portion 40 has a plurality of circumferentially spaced tamper evident tooth systems 70 (may also be referred to herein as tamper resistant teeth). Extending upwardly and inwardly from the lower peripheral margin 40b of the bottom cylindrical band 40 at the plurality of tamper evident tooth system 70 are a plurality of circumferentially spaced teeth 60. The plurality of teeth 60 lock under the rim of the container when the closure 10 is first pushed downwardly to seal the container. The plurality of teeth 60 act as a tamper resistant mechanism on the closure 10.

[0015] As shown in FIG. 2, the plurality of teeth 60 may include notches 64, 66 located at the right and left sides of a top edge 62 of the teeth 60. The notches 64,66 may

further facilitate the locking engagement of the plurality of teeth 60 of the rim of the container.

[0016] As shown in FIGS. 3 and 4B, for each tamper evident tooth system 70, between the plurality of teeth 60 and the lower peripheral edge 30b of the top cylindrical band portion 30 is an open space. Each tamper evident tooth system 70 further has a plurality of projections 72 that connect the plurality of teeth 60 to the bottom peripheral area 30b of the top cylindrical band portion 30. The plurality of projections 72 may be seen when viewing the outer side of the closure 10, providing an effective means for determining if the closure 10 has been tampered with. Additionally, the plurality of projections 72 may function to increase the force of engagement of the plurality of teeth 60 against the lip of the container.

[0017] As shown in FIGS. 2 and 3, along the inner side of each tamper evident tooth system 70 there are two or more projections 76 that are connected to the bottom of the plurality of teeth 60 and to the lower peripheral margin 40b of the bottom cylindrical band portion 40. The projections 76 may provide additional rigidity to the plurality of teeth 60 and also may assist in increasing the force of engagement of the plurality of teeth 60 against the lip of the container.

[0018] As shown in FIG. 2, the upper peripheral margin 40a of the bottom cylindrical band portion 40 is thinned and weakened. In the embodiments shown in FIGS. 2, 3, 4B, and 5, the line of weakness 50 includes one or more of a circumferential notch 52, the plurality of projections 72, and open spaces that are viewable from the outer side of the bottom cylindrical band portion 40. Legitimate opening of the container by a consumer starts by separating the top cylindrical band portion 30 from the bottom cylindrical band portion 40 by tearing away the bottom cylindrical band portion 40 along the line of weakness 50.

[0019] For convenience in legitimately opening the container, the bottom cylindrical band portion 40 is provided with a gripping means. In an embodiment, as shown in FIGS. 1, 4A, 4B and 5, the bottom cylindrical band 40 is formed with an accessible edge portion 45 disposed at a location along the outwardly facing surface. The accessible edge portion 45 may include projections or ridges on its outer surface that assist a user's ability to grip and hold the portion 45. By exerting moderate force on the accessible edge portion 45, the bottom cylindrical band portion 40 below the line of weakness 50 can be removed with the plurality of teeth 60 as a tear-away strip. That is, the line of weakness 50 is ruptured and the bottom cylindrical band portion 40 having the plurality of teeth 60 is easily removed from the closure 10 and from the container (not shown).

[0020] In some embodiments, as shown in FIGS. 3, 6A, 6B, 7A, and 7B, the closure 10 has a multi-snap closing. The inner surface 32 of the top cylindrical band portion 30 may have a plurality of continuous annular ridges 38 extending inwardly along the circumference of the inner surface 32. As shown in FIGS. 7A and 7B, the plurality

of continuous annular ridges 38 provide multiple contact points against a paperboard or cardboard rim 102 of a container 100. As paperboard and cardboard rims are flexibly irregular, the plurality of continuous annular ridges 38 provide multiple places to contact the paperboard rim 102, thereby improving the seal of the closure 10 on the container 100. As well, when the bottom cylindrical band portion 40 has been removed, the plurality of continuous annular ridges 38 provide an improved mechanism for resealing the container 100.

[0021] The top cylindrical band 30 and the bottom cylindrical band 40 of the closure 10 may be manufactured by a one-piece molding process, such as injection-molding, using a single mold. This one-step process may help to simplify manufacturing and/or reduce manufacturing costs. The closure 10 may be molded using any suitable polymer, for example any suitable food-grade plastic when used as a closure for a food container (e.g., used as a lid on a yogurt or ice cream container).

[0022] As well, in another embodiment, the cover panel 20 may be made of the same plastic material as the top cylindrical band portion 30 and the bottom cylindrical band portion 40. Accordingly, in this embodiment, the cover panel 20, the top cylindrical portion 30 and the bottom cylindrical portion 40 may be manufactured by a one-piece molding process, such as injection-molding, using a single mold.

[0023] The closure 10 of the present application has specific elements that facilitate the molding process. As shown in FIGS. 1 and 2, the closure 10 has one or more openings or gates 80 located on the upper peripheral portion 30a of the top cylindrical band portion 30. The gates 80 act as an opening for the plastic resin to enter a mold and fill the mold cavity.

[0024] As shown in FIGS. 3, 4B and 5, the upper peripheral portion 40a of the bottom cylindrical band portion 40 has multiple tooth channels that allow the plastic to flow into the tamper evident tooth system 70. The tamper evident tooth system 70 includes the plurality of teeth 60 that is formed on the bottom cylindrical band 40 and the plurality of projections 72. The plurality of projections 72 define and/or delineate the tooth channels in the corresponding mold. The tooth channels improve the process of filling the mold cavity and also increases the speed by which the tamper evident tooth system 70 that includes the plurality of teeth 60 and the projections 72 are formed. As well, the tooth channels reduce the amount of defects in the tamper evident tooth system 70. Also, the tooth channels further facilitate the creation of larger and thicker tamper resistant bands than conventional solutions, thereby increasing the rigidity of the plurality of teeth 60.

[0025] As shown in FIG. 2, the tamper evident tooth system 70 has edges 64, 66 that slope inwardly. In the embodiment shown in FIG. 1, 4, and 5, during the injection molding process, the cover panel 20 is inserted into the mold. The mold is filled with resin by injection. The resin covers the edge of the paper cover panel 20, creating the lid. The mold then collapses at the edges of the

tamper evident tooth system 70 to facilitate the ejection of the part from the mold.

[0026] FIG. 4A illustrates the closure 10 with a container 100 and FIG. 4B illustrates the closure 10 attached to the container 100. In an embodiment as shown in FIGS. 4A and 4B, the cover panel 20 (e.g. a disc) is inserted into the mold and then plastic resin is molded around the top and bottom to hold it in place. In other embodiments, a coating of suitable adhesive may be applied to either of the outer edge of the facing surfaces prior to insertion of cover panel 20 onto the annular ledge 18 located on the bottom of the projection 34. Alternatively, heating, ultrasonic welding, or spin welding may be used. In another embodiment, the cover panel 20 is secured to the top cylindrical band 30, by the interference fit in recess 19. The cover panel 20 is secured to the cylindrical closure portion 15 prior to attaching the closure 10 to the container 100 (FIG. 4B). The closure 10 is attached to the container 100 by applying a downward force to the top to the closure 10 onto the top of the container 100. As previously discussed, the plurality of teeth 60 of the closure 10 lock under the rim of the container when the closure 10 is pushed downwardly to seal the container.

[0027] FIGS. 6A and 6B illustrate a further embodiment for incorporating the cover panel 20 into the cylindrical closure portion 15. As shown in FIGS. 6A and 6B, during assembly the cover panel 20 may be positioned above the container 100. For example, the cover panel 20 may be placed to sit and rest on the circumferential paperboard rim 102 of the container 100. As well, the cylindrical closure portion 15 is positioned above the cover panel 20. At this stage of assembly, the closure (i.e. cover panel 20 and cylindrical closure portion 15) has not yet been assembled, and the container 100 would contain a material or food product to be sealed.

[0028] To seal the container 100 with the cylindrical closure portion 15 and the cover panel 20, downward force is applied to attach the cylindrical closure portion 15 onto the cover panel 20 and the top of the container 100. As shown in FIGS. 7A and 7B, the cylindrical closure portion 15 snaps onto the paperboard rim 102 and in this process, the cover panel 20 is secured to the cylindrical closure portion 15, creating an assembled closure. For example, the cover panel 20 is pushed into position in the upper cylindrical band portion 30 and is secured within an annular recess 19 located along the inner circumference of the upper peripheral margin 30a of the top cylindrical band portion 30. In some embodiments, the cover panel 20 may also have an adhesive applied to its top circumference to further secure the cover panel 20 to annular ledge 18 of the top cylindrical band portion 30.

[0029] As shown in FIGS. 7A and 7B, the plurality of teeth 60 lock under the rim of the container when the closure 10 pushed downwardly to seal the container. As well, as shown in FIGS. 7A and 7B once the closure 10 is attached to the container 10, the plurality of continuous annular ridges 38 provide multiple contact points against the paperboard rim 102 of a container 100, providing an

improved interference fit. This improves the seal of the closure 10 on the container 100. As well, when the bottom cylindrical band portion 40 has been removed, the plurality of continuous annular ridges 38 provide an improved mechanism for resealing the container 100.

[0030] In the embodiments shown in the figures, the lid is circular. In other embodiments, it is rectangular, oval, square, or other shapes.

[0031] Although particular embodiments of the invention have been illustrated and described herein, one of ordinary skill in the art will appreciate that changes or additions may be made to the design of the closure without departing from the scope of the invention, which is defined in the claims attached hereto. For example, a solid resilient band might be used on the tear-away strip portion of the closure instead of individual tamper-evident teeth. In lieu of paperboard, different flexible sheet materials might be used, according to the final intended application. The inside wall of the top cylindrical band could be formed with threads to adapt the closure for use on a threaded container.

Claims

1. A tamper resistant push-on closure (10) for a container (100) having an opening with a peripheral outwardly extending lip formation (102), the closure (10) comprising:

a top cover panel (20);
 a top cylindrical band portion (30) having an upper peripheral margin (30a) extending from the top cover panel (20), and a lower peripheral margin (30b);
 a bottom cylindrical band portion (40) having an upper peripheral margin (40a) and a lower peripheral margin (40b);
 a rupturable line of weakness (50) between the lower peripheral margin (30b) of the top cylindrical band portion (30) and the upper peripheral margin (40a) of the bottom cylindrical band portion (40);
 a plurality of rigid teeth (60) extending from the lower peripheral margin (40b) of the bottom cylindrical band portion (40) in an upward and inward direction for locking engagement against the lip (102) of the container when the closure member (10) is secured on the container (100); and

characterized in that the plurality of rigid teeth (60) are connected directly to the lower peripheral margin (30b) of the top cylindrical band portion (30) by a plurality of projections (72) for providing a visual tamper evident indication, for increasing the force of engagement of the plurality of teeth against the lip of the container, and for facilitating the flow of plastic

resin through a plurality of tooth channels of a complementary mould during the production of the plurality of rigid teeth.

2. The closure according to claim 1, wherein the top cylindrical band portion (30) has a plurality of continuous annular ridges (38) extending inwardly along the circumference of an inner surface each of said ridges for contacting a side surface of the container (100) in an interference fit.
3. The closure according to claim 1 or claim 2, wherein a bottom of the plurality of teeth (60) are connected to the lower peripheral margin (40b) of the bottom cylindrical band portion (40) by a plurality of inwardly extending projections (76) for increasing the rigidity of the plurality of teeth and for increasing the force of engagement of the plurality of teeth against the lip of the container.
4. The closure according to any one of claims 1 to 3, wherein the top cylindrical band portion (30), the bottom cylindrical band portion (40), the rupturable line of weakness (50), the plurality of rigid teeth (60), and the plurality of projections (72) of the closure (10) are formed of plastic material in a single injection molding step.
5. The closure according to any one of claims 1 to 4, wherein the rupturable line of weakness (50) is an apex of a circumferential groove along an outer wall of the bottom cylindrical band portion (40).
6. The closure according to any one of claims 1 to 5, wherein an accessible edge portion (45) is formed in the bottom cylindrical band portion (40) to permit ready gripping and tearing a part of the bottom band below the line of weakness.
7. The closure according to any preceding claim, wherein the top cover panel comprises a pre-formed top cover panel (20), and wherein the top cylindrical band portion (30) comprises a recess (19), and the pre-formed top cover panel (20) is secured to the top cylindrical band portion (30) by an interference fit in the recess (19).
8. The closure according to any one of claims 1 to 6, wherein the top cover panel comprises a pre-formed top cover panel (20) that is held in place in the top cylindrical band portion (30) by plastic resin moulded around the edge of the pre-formed top cover panel (20) or moulded around the top and bottom of the pre-formed top cover panel (20).
9. The closure according to any one of claims 1 to 6, wherein the top cover panel comprises a moulded top cover panel (20), the top cylindrical band portion

(30) and the bottom cylindrical band portion (40) are made of the same plastic resin by a one-piece moulding process.

10. A tamper resistant push-on closure member for forming a tamper resistant push-on closure (10) for a container (100) having an opening with a peripheral outwardly extending lip formation (102), the closure member (10) comprising:

a top cylindrical band portion (30) having an upper peripheral margin (30a) for receiving a pre-formed top cover panel (20), and a lower peripheral margin (30b);

a bottom cylindrical band portion (40) having an upper peripheral margin (40a) and a lower peripheral margin (40b);

a rupturable line of weakness (50) between the lower peripheral margin (30b) of the top cylindrical band portion (30) and the upper peripheral margin (40a) of the bottom cylindrical band portion (40);

a plurality of rigid teeth (60) extending from the lower peripheral margin (40b) of the bottom cylindrical band portion (40) in an upward and inward direction for locking engagement against the lip (102) of the container when the closure member (10) is secured on the container (100); and

wherein top cylindrical band portion (30) comprises a recess (19), and the top cylindrical band portion (30) is configured for the pre-formed top cover panel (20) to be pushed into the recess (19) during assembly of the top cylindrical band portion (30) onto the rim (102) of a container (100),

characterized in that the plurality of rigid teeth (60) are connected directly to the lower peripheral margin (30b) of the top cylindrical band portion (30) by a plurality of projections (72) for providing a visual tamper evident indication, for increasing the force of engagement of the plurality of teeth against the lip of the container, and for facilitating the flow of plastic resin through a plurality of tooth channels of a complementary mould during the production of the plurality of rigid teeth.

11. A system for forming a tamper resistant push-on closure (10) for a container (100) having an opening with a peripheral outwardly extending lip formation (102), comprising:

the closure member according to claim 10; and a pre-formed top cover panel (20) configured to be received into the recess (19) of the closure member.

12. The closure of any one of claims 1 to 7 or the system of claim 11, wherein the top cover panel comprises a pre-formed top cover panel (20), and wherein adhesive is provided on a face of the pre-formed top cover panel (20) to secure the pre-formed top cover panel (20) to an annular ledge (18) of the top cylindrical band portion (30).

13. A mould for forming a tamper resistant push-on closure (10) for a container (100) according to any one of claims 1 to 9 and 11, or for forming a tamper resistant push-on closure member according to claim 10 or claim 12, the mould comprising:

a plurality of tooth channels positioned between the portions of the mould for forming the lower peripheral margin of the top cylindrical band portion and the upper peripheral margin of the bottom cylindrical band portion for facilitating the flow of plastic resin during the production of the plurality of rigid teeth to form a plurality of projections (72).

14. A method of moulding the tamper resistant push-on closure (10) for a container (100) according to any one of claims 1 to 6 and 8 to 9, the method comprising:

filling the mould with a resin to form the top cylindrical band portion (30), the bottom cylindrical band portion (40), the rupturable line of weakness (50), and the plurality of rigid teeth (60); and either

i. wherein the top cover panel comprises a pre-formed top cover panel (20), placing the pre-formed top cover panel (20) in the mould before filling the mould with resin; or

ii. wherein the top cover panel comprises a moulded top cover panel (20), filling the mould with resin additionally forms the moulded top cover panel (20) in a one-piece moulding process with the top cylindrical band portion (30), the bottom cylindrical band portion (40), the rupturable line of weakness (50), and the plurality of rigid teeth (60).

15. A method of moulding a tamper resistant push-on closure member according to claim 10, the method comprising:

filling the mould with a resin to form the top cylindrical band portion (30), the bottom cylindrical band portion (40), the rupturable line of weakness (50), and the plurality of rigid teeth (60).

Patentansprüche

1. Manipulationssicherer Aufsteckverschluss (10) für einen Behälter (100) mit einer Öffnung mit einer sich umfanglich nach außen erstreckenden Lippenformation (102), wobei der Verschluss (10) Folgendes

umfasst:

- eine obere Abdeckplatte (20);
 einen oberen zylindrischen Bandabschnitt (30) mit einem oberen Umfangsrand (30a), der sich von der oberen Abdeckplatte (20) erstreckt, und einem unteren Umfangsrand (30b);
 einen unteren zylindrischen Bandabschnitt (40) mit einem oberen Umfangsrand (40a) und einem unteren Umfangsrand (40b);
 eine zerreibare Schwachungslinie (50) zwischen dem unteren Umfangsrand (30b) des oberen zylindrischen Bandabschnittes (30) und dem oberen Umfangsrand (40a) des unteren zylindrischen Bandabschnittes (40);
 eine Vielzahl von starren Zahnen (60), die sich von dem unteren Umfangsrand (40b) des unteren zylindrischen Bandabschnittes (40) in einer Aufwarts- und Einwartsrichtung zum verriegelnden Eingriff gegen die Lippe (102) des Behalters erstrecken, wenn das Verschlusselement (10) an dem Behalter (100) befestigt ist; und
dadurch gekennzeichnet, dass die Vielzahl von starren Zahnen (60) direkt mit dem unteren Umfangsrand (30b) des oberen zylindrischen Bandabschnittes (30) durch eine Vielzahl von Vorsprungen (72) verbunden sind, um eine visuelle Angabe fur Manipulationsbeweis bereitzustellen, um die Kraft des Eingriffs der Vielzahl von Zahnen gegen die Lippe des Behalters zu erhohen, und um den Fluss von Kunststoffharz durch eine Vielzahl von Zahnkanalen einer komplementaren Form wahrend der Herstellung der Vielzahl von starren Zahnen zu erleichtern.
2. Verschluss nach Anspruch 1, wobei der obere zylindrische Bandabschnitt (30) eine Vielzahl von durchgehenden ringformigen Rippen (38) aufweist, die sich entlang des Umfangs einer Innenflache von jeder der Rippen nach innen erstrecken, um eine Seitenflache des Behalters (100) in einer Presspassung zu kontaktieren.
 3. Verschluss nach Anspruch 1 oder Anspruch 2, wobei eine Unterseite der Vielzahl von Zahnen (60) mit dem unteren Umfangsrand (40b) des unteren zylindrischen Bandabschnittes (40) durch eine Vielzahl von sich nach innen erstreckenden Vorsprungen (76) verbunden ist, um die Steifigkeit der Vielzahl von Zahnen zu erhohen und um die Eingriffskraft der Vielzahl von Zahnen gegen die Lippe des Behalters zu erhohen.
 4. Verschluss nach einem der Anspruche 1 bis 3, wobei der obere zylindrische Bandabschnitt (30), der untere zylindrische Bandabschnitt (40), die zerreibare Schwachungslinie (50), die Vielzahl von starren Zahnen (60) und die Vielzahl von Vorsprungen (72) des Verschlusses (10) aus Kunststoffmaterial in einem einzigen Spritzguss Schritt gebildet werden.
 5. Verschluss nach einem der Anspruche 1 bis 4, wobei die zerreibare Schwachungslinie (50) ein Scheitel einer Umfangsnut entlang einer Auenwand des unteren zylindrischen Bandabschnittes (40) ist.
 6. Verschluss nach einem der Anspruche 1 bis 5, wobei ein zuganglicher Kantenabschnitt (45) in dem unteren zylindrischen Bandabschnitt (40) gebildet ist, um leichtes Greifen und Reien eines Teils des unteren Bandes unterhalb der Schwachungslinie zu ermoglichen.
 7. Verschluss nach einem vorhergehenden Anspruch, wobei die obere Abdeckplatte eine vorgeformte obere Abdeckplatte (20) umfasst und wobei der obere zylindrische Bandabschnitt (30) eine Aussparung (19) umfasst und die vorgeformte obere Abdeckplatte (20) an dem oberen zylindrischen Bandabschnitt (30) durch eine Presspassung in der Aussparung (19) befestigt ist.
 8. Verschluss nach einem der Anspruche 1 bis 6, wobei die obere Abdeckplatte eine vorgeformte obere Abdeckplatte (20) umfasst, die in dem oberen zylindrischen Bandabschnitt (30) durch Kunststoffharz an Ort und Stelle gehalten wird, das um die Kante der vorgeformten oberen Abdeckplatte (20) geformt ist oder um die Oberseite und die Unterseite der vorgeformten oberen Abdeckplatte (20) geformt ist.
 9. Verschluss nach einem der Anspruche 1 bis 6, wobei die obere Abdeckplatte eine geformte obere Abdeckplatte (20) umfasst, wobei der obere zylindrische Bandabschnitt (30) und der untere zylindrische Bandabschnitt (40) durch einen einteiligen Formprozess aus dem gleichen Kunststoffharz hergestellt sind.
 10. Manipulationssicheres Aufsteckverschlusselement zum Bilden eines manipulationssicheren Aufsteckverschlusses (10) fur einen Behalter (100) mit einer offnung mit einer sich umfanglich nach auen erstreckenden Lippenformation (102), wobei das Verschlusselement (10) Folgendes umfasst:
 einen oberen zylindrischen Bandabschnitt (30) mit einem oberen Umfangsrand (30a) zum Aufnehmen einer vorgeformten oberen Abdeckplatte (20), und einem unteren Umfangsrand (30b);
 einen unteren zylindrischen Bandabschnitt (40) mit einem oberen Umfangsrand (40a) und einem unteren Umfangsrand (40b);
 eine zerreibare Schwachungslinie (50) zwischen dem unteren Umfangsrand (30b) des

oberen zylindrischen Bandabschnittes (30) und dem oberen Umfangsrand (40a) des unteren zylindrischen Bandabschnittes (40);

eine Vielzahl von starren Zähnen (60), die sich von dem unteren Umfangsrand (40b) des unteren zylindrischen Bandabschnittes (40) in einer Aufwärts- und Einwärtsrichtung zum verriegelnden Eingriff gegen die Lippe (102) des Behälters erstrecken, wenn das Verschlusselement (10) an dem Behälter (100) befestigt ist; und wobei der obere zylindrische Bandabschnitt (30) eine Aussparung (19) umfasst und der obere zylindrische Bandabschnitt (30) so konfiguriert ist, dass die vorgeformte obere Abdeckplatte (20) während der Montage des oberen zylindrischen Bandabschnittes (30) auf der Umrandung (102) eines Behälters (100) in die Aussparung (19) gedrückt wird,

dadurch gekennzeichnet, dass die Vielzahl von starren Zähnen (60) direkt mit dem unteren Umfangsrand (30b) des oberen zylindrischen Bandabschnittes (30) durch eine Vielzahl von Vorsprüngen (72) verbunden sind, um eine visuelle Angabe für Manipulationsbeweis bereitzustellen, um die Kraft des Eingriffs der Vielzahl von Zähnen gegen die Lippe des Behälters zu erhöhen, und um den Fluss von Kunststoffharz durch eine Vielzahl von Zahnkanälen einer komplementären Form während der Herstellung der Vielzahl von starren Zähnen zu erleichtern.

11. System zum Bilden eines manipulationssicheren Aufsteckverschlusses (10) für einen Behälter (100) mit einer Öffnung mit einer sich umfänglich nach außen erstreckenden Lippenformation (102), umfassend:

das Verschlusselement nach Anspruch 10; und eine vorgeformte obere Abdeckplatte (20), die konfiguriert ist, um in die Aussparung (19) des Verschlusselements aufgenommen zu werden.

12. Verschluss nach einem der Ansprüche 1 bis 7 oder System nach Anspruch 11, wobei die obere Abdeckplatte eine vorgeformte obere Abdeckplatte (20) umfasst und wobei Klebstoff auf einer Seite der vorgeformten oberen Abdeckplatte (20) bereitgestellt ist, um die vorgeformte obere Abdeckplatte (20) an einer ringförmigen Leiste (18) des oberen zylindrischen Bandabschnittes (30) zu befestigen.

13. Form zum Bilden eines manipulationssicheren Aufsteckverschlusses (10) für einen Behälter (100) nach einem der Ansprüche 1 bis 9 und 11 oder zum Bilden eines manipulationssicheren Aufsteckverschlusselements nach Anspruch 10 oder Anspruch 12, wobei die Form Folgendes umfasst: eine Vielzahl von Zahnkanälen, die zwischen den

Abschnitten der Form positioniert sind, zum Bilden des unteren Umfangsrandes des oberen zylindrischen Bandabschnittes und des oberen Umfangsrandes des unteren zylindrischen Bandabschnittes, um den Fluss von Kunstharz während der Herstellung der Vielzahl von starren Zähne zu erleichtern, um eine Vielzahl von Vorsprüngen (72) zu bilden.

14. Verfahren zum Formen des manipulationssicheren Aufsteckverschlusses (10) für einen Behälter (100) nach einem der Ansprüche 1 bis 6 und 8 bis 9, wobei das Verfahren Folgendes umfasst:

Füllen der Form mit einem Harz, um den oberen zylindrischen Bandabschnitt (30), den unteren zylindrischen Bandabschnitt (40), die zerreibare Schwächungslinie (50) und die Vielzahl von starren Zähnen (60) zu bilden; und entweder

i. wobei die obere Abdeckplatte eine vorgeformte obere Abdeckplatte (20) umfasst, Platzieren der vorgeformten oberen Abdeckplatte (20) in der Form, bevor die Form mit Harz gefüllt wird; oder

ii. wobei die obere Abdeckplatte eine geformte obere Abdeckplatte (20) umfasst, das Füllen der Form mit Harz zusätzlich die geformte obere Abdeckplatte (20) in einem einteiligen Formprozess mit dem oberen zylindrischen Bandabschnitt (30), dem unteren zylindrischen Bandabschnitt (40), der zerreibaren Schwächungslinie (50) und der Vielzahl von starren Zähnen (60) bildet.

15. Verfahren zum Formen eines manipulationssicheren Aufsteckverschlusselements nach Anspruch 10, wobei das Verfahren Folgendes umfasst:

Füllen der Form mit einem Harz, um den oberen zylindrischen Bandabschnitt (30), den unteren zylindrischen Bandabschnitt (40), die zerreibare Schwächungslinie (50) und die Vielzahl von starren Zähnen (60) zu bilden.

Revendications

1. Fermeture à pression inviolable (10) pour un récipient (100) ayant une ouverture avec une formation périphérique de lèvre s'étendant vers l'extérieur (102), la fermeture (10) comprenant :

un panneau haut de couverture (20) ;
une partie haute de bande cylindrique (30) ayant une marge périphérique supérieure (30a) s'étendant depuis le panneau haut de couverture (20), et une marge périphérique inférieure (30b) ;
une partie basse de bande cylindrique (40) ayant une marge périphérique supérieure (40a)

- et une marge périphérique inférieure (40b) ;
 une ligne de faiblesse rupturable (50) entre la
 marge périphérique inférieure (30b) de la partie
 haute de bande cylindrique (30) et la marge pé-
 5 riphérique supérieure (40a) de la partie basse
 de bande cylindrique (40) ;
 une pluralité de dents rigides (60) s'étendant de-
 puis la marge périphérique inférieure (40b) de
 la partie basse de bande cylindrique (40) dans
 10 une direction vers le haut et vers l'intérieur pour
 un engagement de verrouillage contre la lèvre
 (102) du récipient lorsque l'élément de fermetu-
 re (10) est fixé sur le récipient (100) ; et
caractérisé en ce que la pluralité de dents ri-
 gides (60) sont directement raccordées à la mar-
 ge périphérique inférieure (30b) de la partie hau-
 te de bande cylindrique (30) par une pluralité de
 saillies (72) pour fournir une indication visuelle
 d'inviolabilité, pour augmenter la force d'enga-
 20 gement de la pluralité de dents contre la lèvre
 du récipient, et pour faciliter l'écoulement de ré-
 sine plastique à travers une pluralité de canaux
 de dent d'un moule complémentaire pendant la
 production de la pluralité de dents rigides.
2. Fermeture selon la revendication 1, dans laquelle la
 partie haute de bande cylindrique (30) a une pluralité
 de nervures annulaires continues (38) s'étendant
 vers l'intérieur le long de la circonférence d'une sur-
 face intérieure, chacune desdites nervures desti-
 nées à venir en contact avec une surface latérale du
 récipient (100) dans un ajustement serré.
 3. Fermeture selon la revendication 1 ou la revendica-
 tion 2, dans laquelle le bas de la pluralité de dents
 (60) est raccordé à la marge périphérique inférieure
 (40b) de la partie basse de bande cylindrique (40)
 par une pluralité de saillies s'étendant vers l'intérieur
 (76) pour augmenter la rigidité de la pluralité de dents
 et pour augmenter la force d'engagement de la plu-
 40 ralité de dents contre la lèvre du récipient.
 4. Fermeture selon l'une quelconque des revendica-
 tions 1 à 3, dans laquelle la partie haute de bande
 cylindrique (30), la partie basse de bande cylindrique
 (40), la ligne de faiblesse rupturable (50), la pluralité
 de dents rigides (60), et la pluralité de saillies (72)
 de la fermeture (10) sont formées de matière plasti-
 que dans une étape unique de moulage par injection.
 5. Fermeture selon l'une quelconque des revendica-
 tions 1 à 4, dans laquelle la ligne de faiblesse rup-
 turable (50) est un sommet d'une rainure circonfé-
 rentielle le long d'une paroi externe de la partie basse
 de bande cylindrique (40).
 6. Fermeture selon l'une quelconque des revendica-
 tions 1 à 5, dans laquelle une partie de bord acces-
 5 sible (45) est formée dans la partie basse de bande
 cylindrique (40) pour permettre une saisie et un dé-
 chirage aisés d'une partie de la bande basse sous
 la ligne de faiblesse.
 7. Fermeture selon l'une quelconque des revendica-
 tions précédentes, dans laquelle le panneau haut de
 couverture comprend un panneau haut de couver-
 ture préformé (20), et dans laquelle la partie haute
 de bande cylindrique (30) comprend un évidement
 (19), et le panneau haut de couverture préformé (20)
 est fixé à la partie haute de bande cylindrique (30)
 par un ajustement serré dans l'évidement (19).
 8. Fermeture selon l'une quelconque des revendica-
 tions 1 à 6, dans laquelle le panneau haut de cou-
 15 verture comprend un panneau haut de couverture
 préformé (20) qui est maintenu en place dans la par-
 tie haute de bande cylindrique (30) par une résine
 plastique moulée autour du bord du panneau haut
 de couverture préformé (20) ou moulé autour du haut
 et du bas du panneau haut de couverture préformé
 (20).
 9. Fermeture selon l'une quelconque des revendica-
 tions 1 à 6, dans laquelle le panneau haut de cou-
 25 verture comprend un panneau haut de couverture
 moulé (20), la partie haute de bande cylindrique (30)
 et la partie basse de bande cylindrique (40) sont fai-
 tes de la même résine plastique par un processus
 de moulage en une seule pièce.
 10. Élément de fermeture à pression inviolable pour for-
 30 mer une fermeture à pression inviolable (10) pour
 un récipient (100) ayant une ouverture avec une for-
 mation périphérique de lèvre s'étendant vers l'exté-
 rieur (102), l'élément de fermeture (10) comprenant :
 une partie haute de bande cylindrique (30) ayant
 une marge périphérique supérieure (30a) pour
 recevoir un panneau haut de couverture préfor-
 40 mé (20), et une marge périphérique inférieure
 (30b) ;
 une partie basse de bande cylindrique (40)
 ayant une marge périphérique supérieure (40a)
 et une marge périphérique inférieure (40b) ;
 une ligne de faiblesse rupturable (50) entre la
 marge périphérique inférieure (30b) de la partie
 haute de bande cylindrique (30) et la marge pé-
 45 riphérique supérieure (40a) de la partie basse
 de bande cylindrique (40) ;
 une pluralité de dents rigides (60) s'étendant de-
 puis la marge périphérique inférieure (40b) de
 la partie basse de bande cylindrique (40) dans
 une direction vers le haut et vers l'intérieur pour
 un engagement de verrouillage contre la lèvre
 (102) du récipient lorsque l'élément de fermetu-
 55 re (10) est fixé sur le récipient (100) ; et

- dans laquelle la partie haute de bande cylindrique (30) comprend un évidement (19), et la partie haute de bande cylindrique (30) est configurée pour que le panneau haut de couverture préformé (20) soit poussé dans l'évidement (19) pendant l'assemblage de la partie haute de bande cylindrique (30) sur la lèvre (102) d'un récipient (100),
- caractérisée en ce que** la pluralité de dents rigides (60) sont directement raccordées à la marge périphérique inférieure (30b) de la partie haute de bande cylindrique (30) par une pluralité de saillies (72) pour fournir une indication visuelle d'inviolabilité, pour augmenter la force d'engagement de la pluralité de dents contre la lèvre du récipient, et pour faciliter l'écoulement de résine plastique à travers une pluralité de canaux de dent d'un moule complémentaire pendant la production de la pluralité de dents rigides.
11. Système de formation d'une fermeture à pression inviolable (10) pour un récipient (100) ayant une ouverture avec une formation périphérique de lèvre s'étendant vers l'extérieur (102), comprenant :
- l'élément de fermeture selon la revendication 10 ; et
- un panneau haut de couverture préformé (20) configuré pour être reçu dans l'évidement (19) de l'élément de fermeture.
12. Fermeture selon l'une quelconque des revendications 1 à 7 ou système selon la revendication 11, dans lequel le panneau haut de couverture comprend un panneau haut de couverture préformé (20), et dans lequel un adhésif est prévu sur une face du panneau haut de couverture préformé (20) pour fixer le panneau haut de couverture préformé (20) à une baguette annulaire (18) de la partie haute de bande cylindrique (30).
13. Moule pour former une fermeture à pression inviolable (10) pour un récipient (100) selon l'une quelconque des revendications 1 à 9 et 11, ou pour former un élément de fermeture à pression inviolable selon la revendication 10 ou la revendication 12, le moule comprenant :
- une pluralité de canaux de dent positionnés entre les parties du moule pour former la marge périphérique inférieure de la partie haute de bande cylindrique et la marge périphérique supérieure de la partie basse de bande cylindrique pour faciliter l'écoulement de résine plastique pendant la production de la pluralité de dents rigides pour former une pluralité de saillies (72).
14. Procédé de moulage de la fermeture à pression inviolable (10) pour un récipient (100) selon l'une quel-
- conque des revendications 1 à 6 et 8 à 9, le procédé comprenant :
- le remplissage du moule avec une résine pour former la partie haute de bande cylindrique (30), la partie basse de bande cylindrique (40), la ligne de faiblesse rupturable (50) et la pluralité de dents rigides (60) ; et soit
- i. dans lequel le panneau haut de couverture comprend un panneau haut de couverture préformé (20), le placement du panneau haut de couverture préformé (20) dans le moule avant de remplir le moule de résine ; soit
- ii. dans lequel le panneau haut de couverture comprend un panneau haut de couverture moulé (20), le remplissage du moule avec de la résine forme en outre le panneau haut de couverture moulé (20) dans un processus de moulage en une seule pièce avec la partie haute de bande cylindrique (30), la partie basse de bande cylindrique (40), la ligne de faiblesse rupturable (50) et la pluralité de dents rigides (60).
15. Procédé de moulage d'un élément de fermeture à pression inviolable selon la revendication 10, le procédé comprenant :
- le remplissage du moule avec une résine pour former la partie haute de bande cylindrique (30), la partie basse de bande cylindrique (40), la ligne de faiblesse rupturable (50) et la pluralité de dents rigides (60).

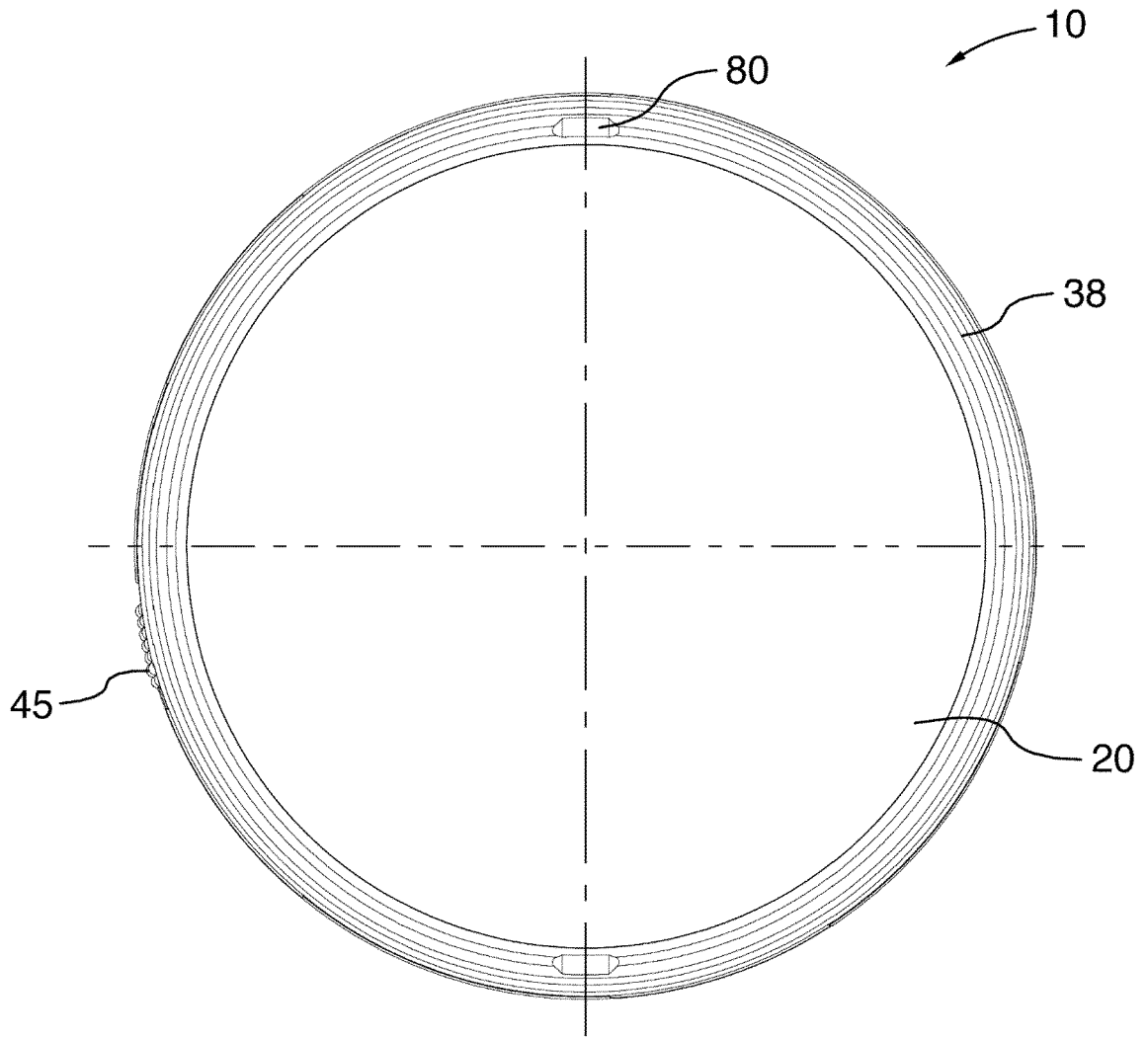


FIG. 1

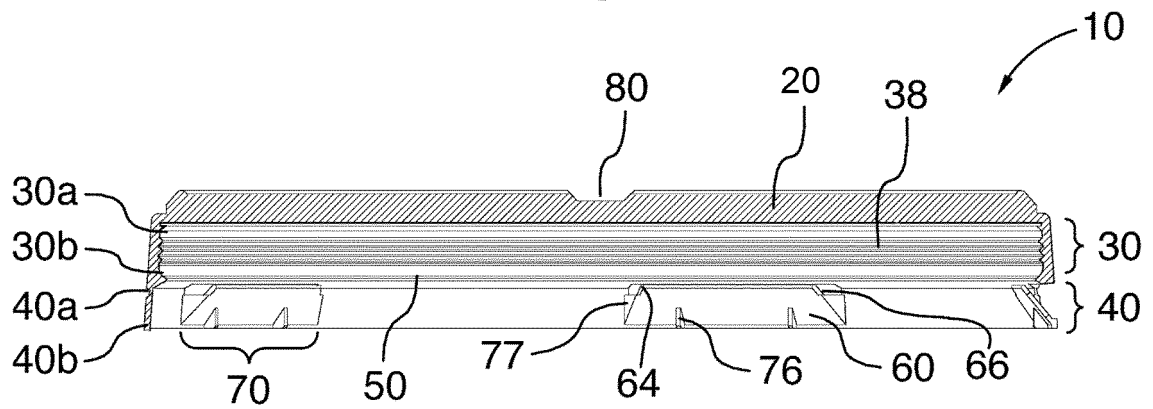


FIG. 2

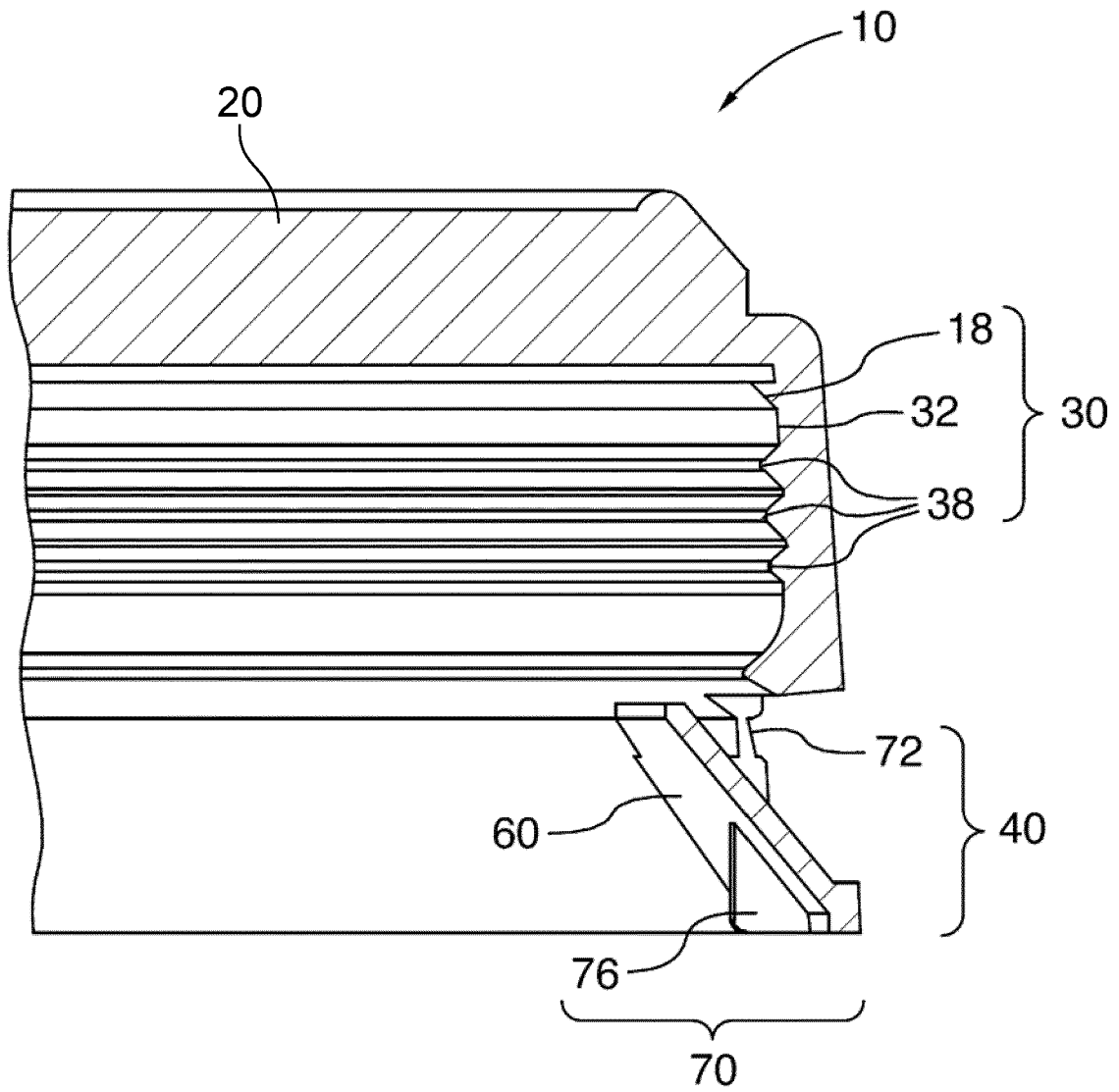


FIG.3

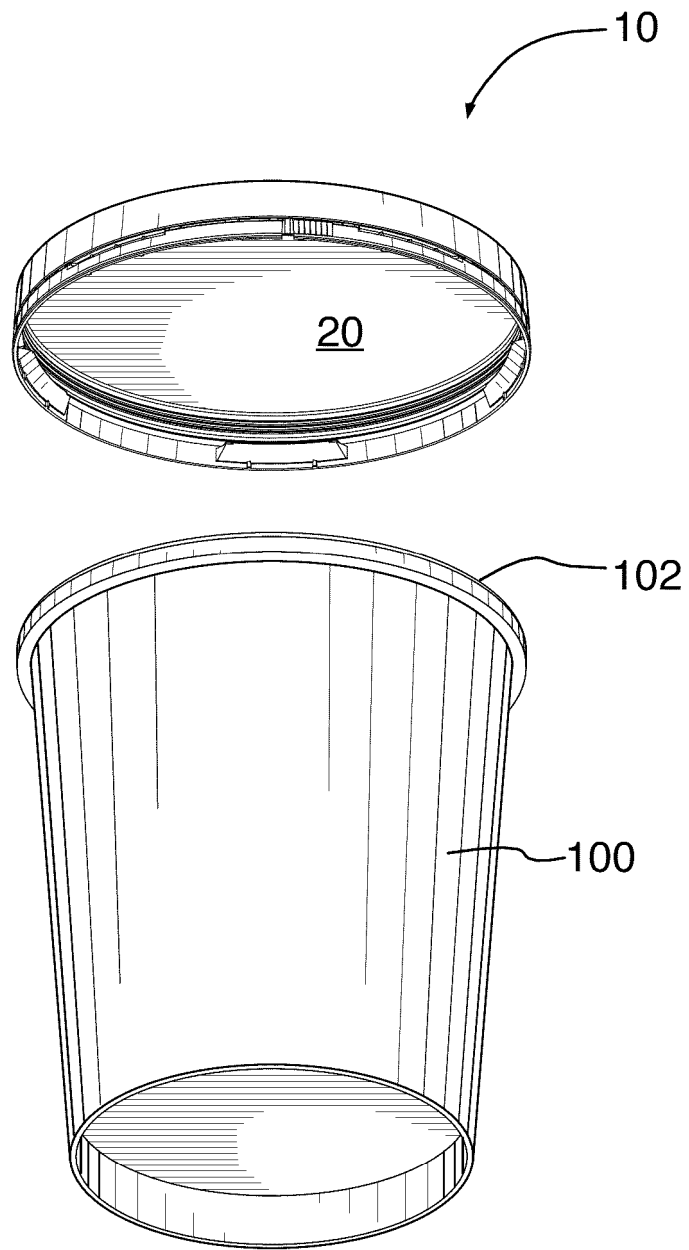


FIG.4A

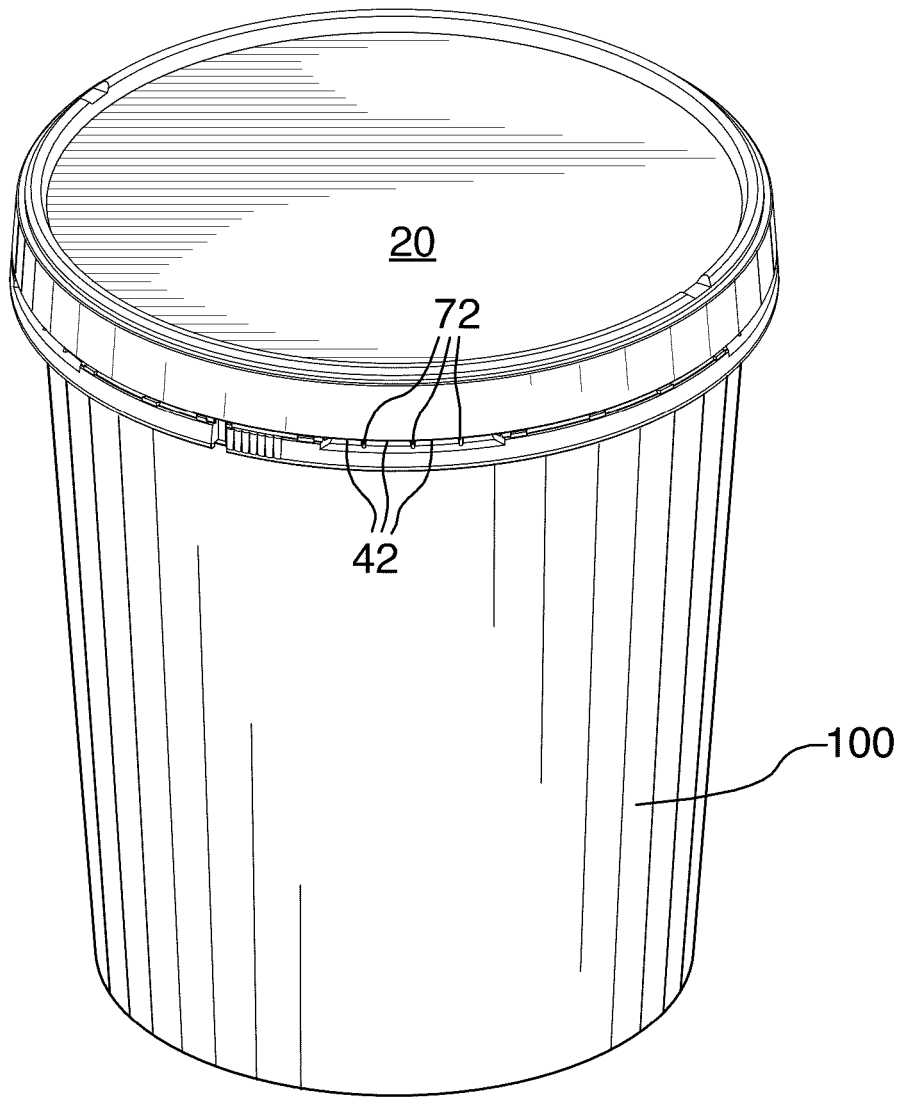


FIG. 4B

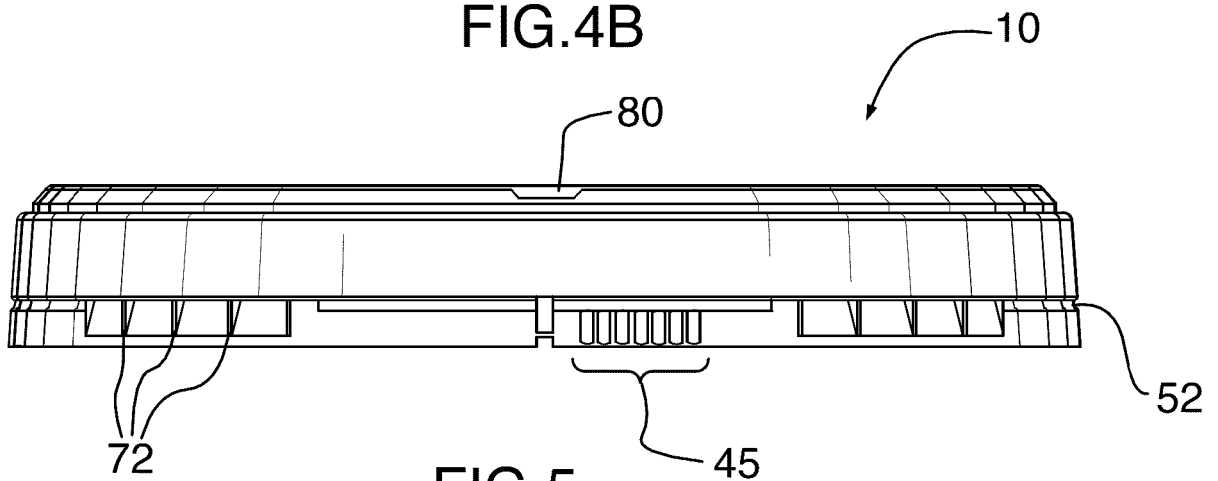


FIG. 5

FIG.6B

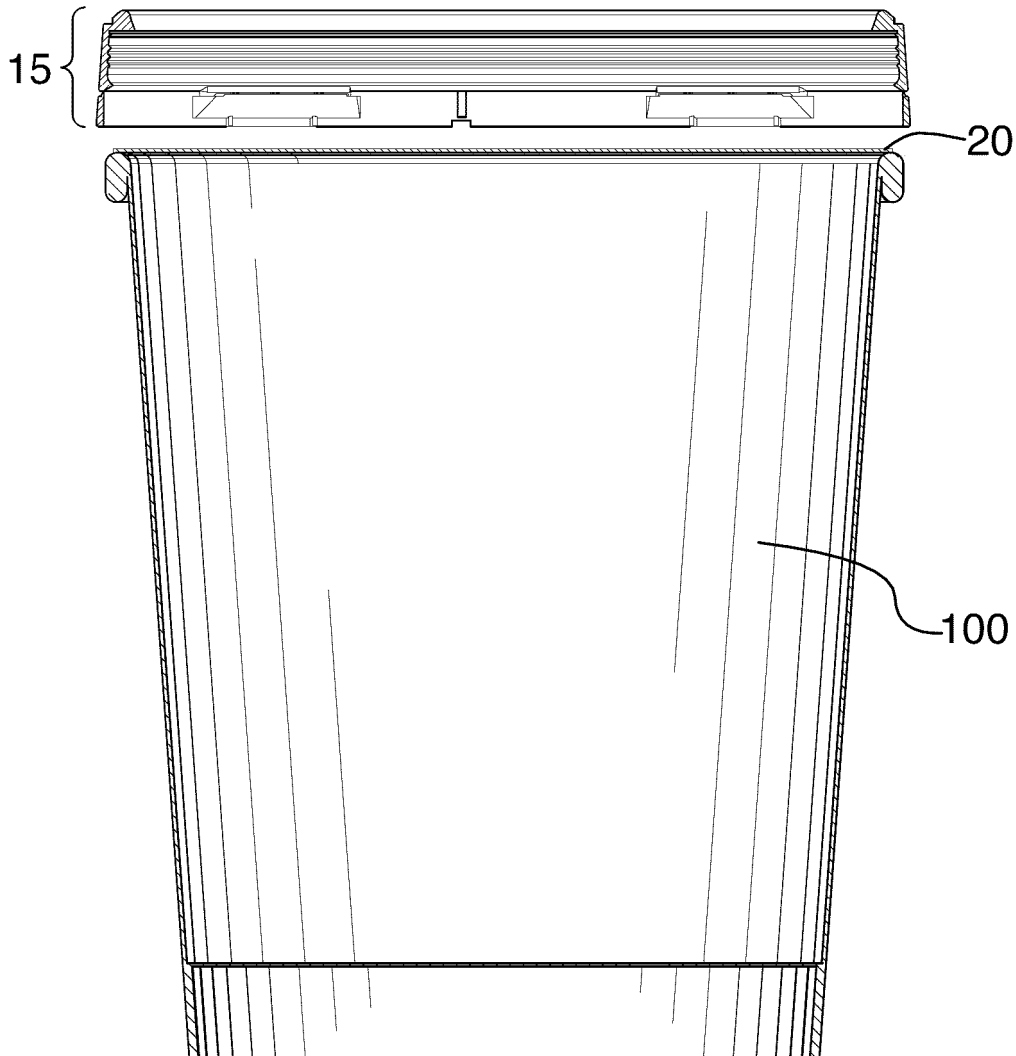
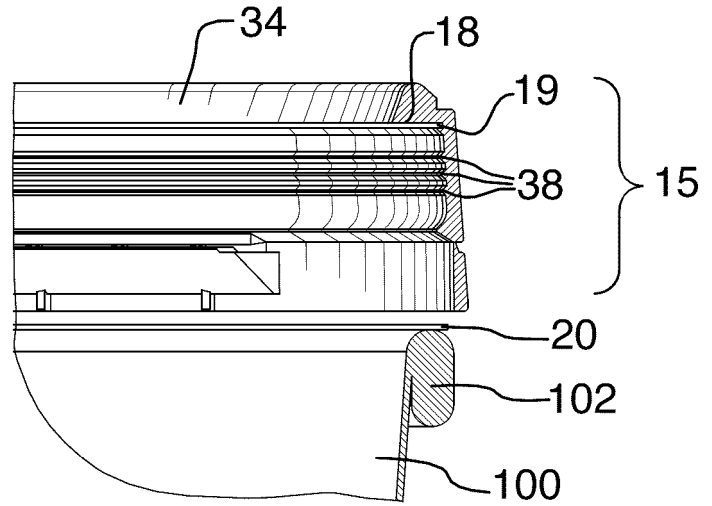


FIG.6A

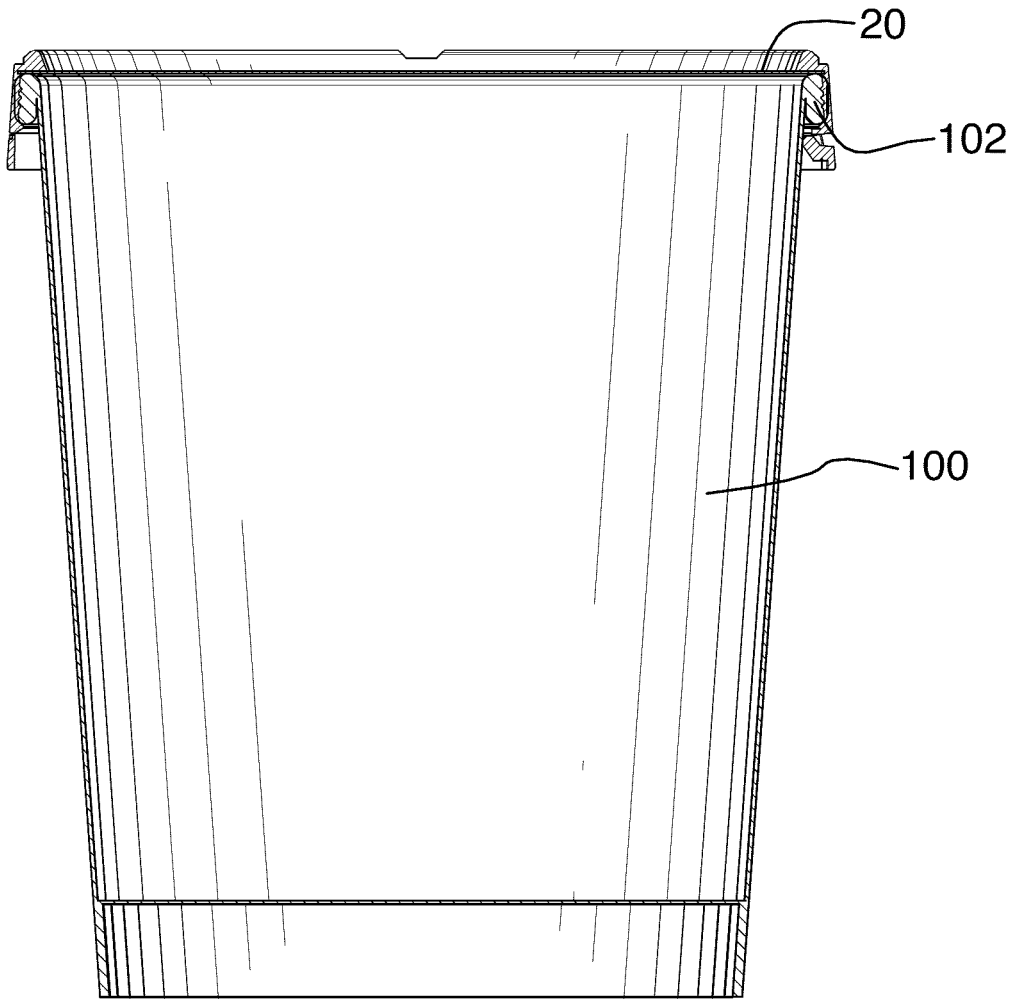


FIG. 7A

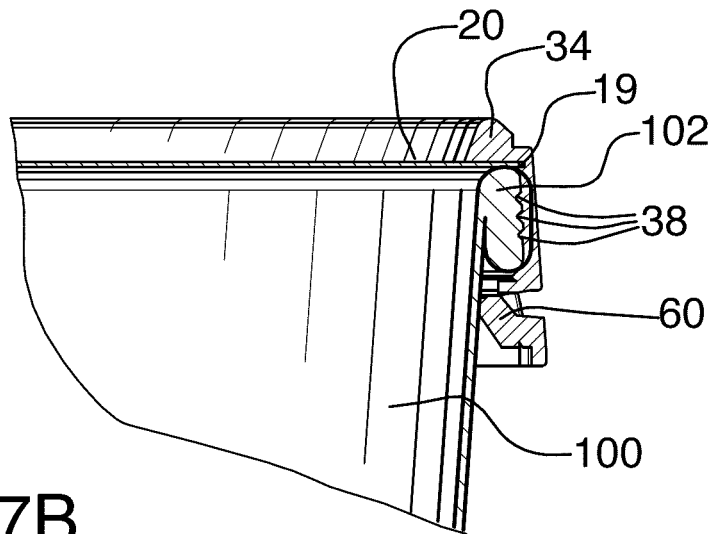


FIG. 7B

REFERENCES CITED IN THE DESCRIPTION

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