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(54) COTAINER LID

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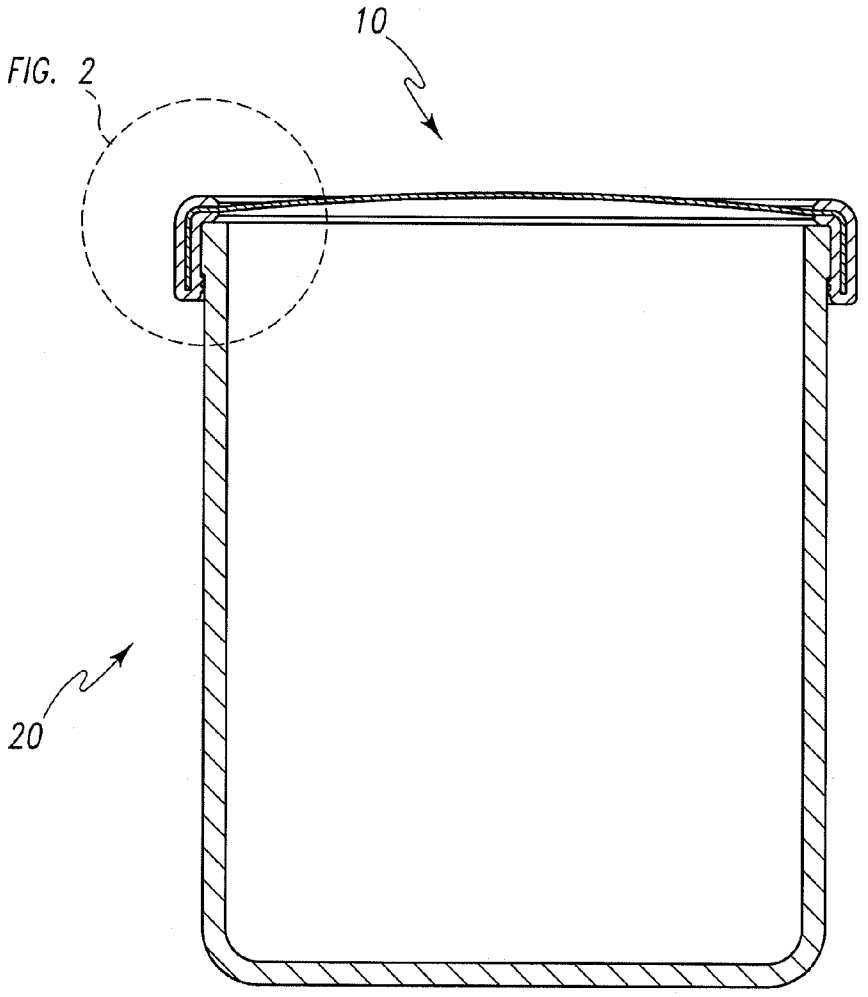
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(57) **ABSTRACT**

A container lid which seals about a peripheral lip contacting a corresponding container is disclosed. A flexible material, such as a silicone rubber, thermoplastic elastomer, or the like, is attached to at least a peripheral lip formed in a flexible substrate, such as a flexible metal or plastic material, having a first and second surface. The peripheral lip includes notches or slots to create individual sections in the lip to allow inward and outward flexing of the sections. When fitted to a container, the coated flexible substrate forms a seal between the container and the container lid. Preferably, the flexible substrate is formed in such a way that it is bi-stable, thus capable of existing in either a convex or concave state. In one embodiment of the container lid the flexible substrate includes a plurality of grasping teeth (i.e., specialized flexing sections) distributed about the periphery of the flexible substrate.



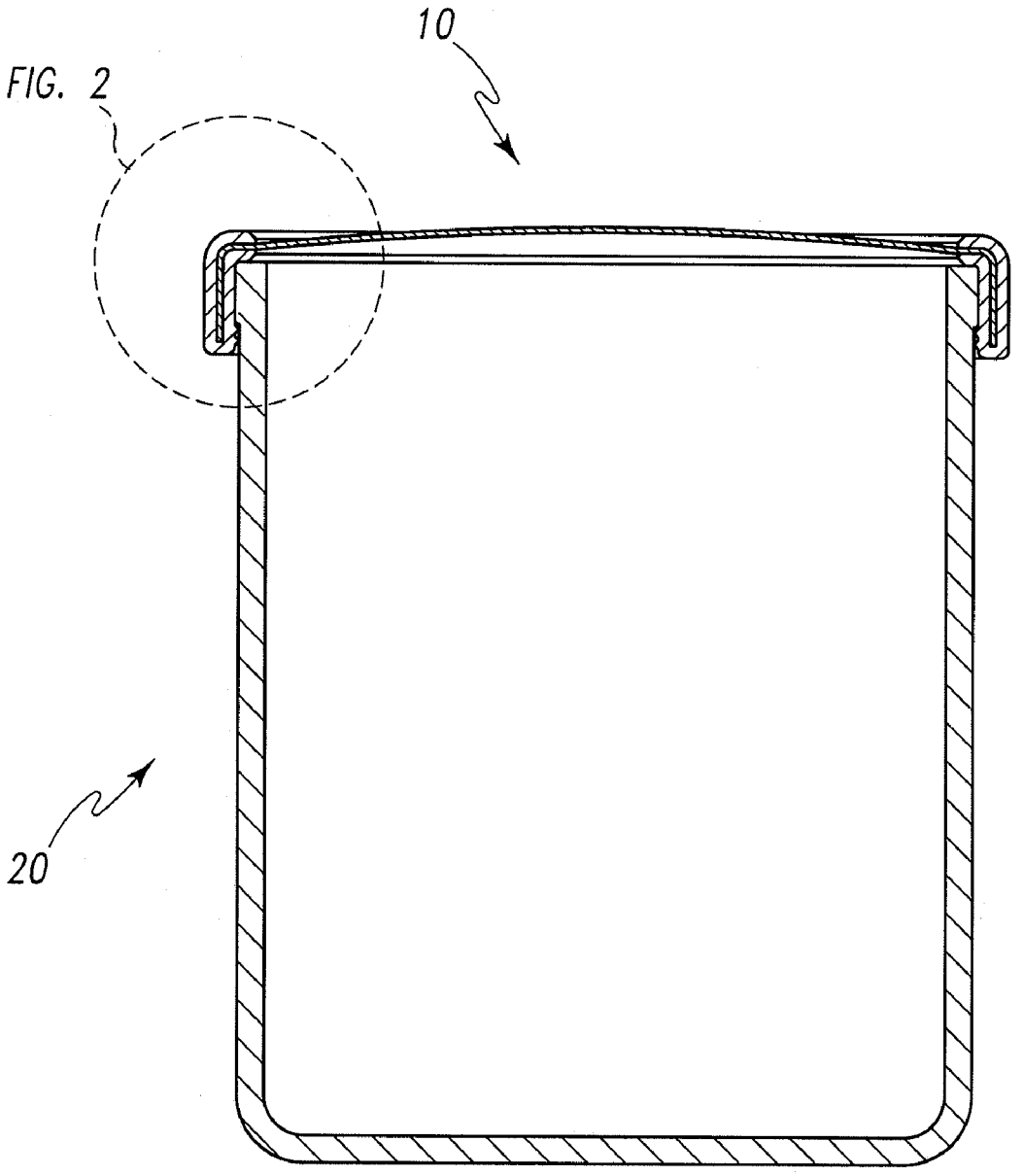


Fig. 1

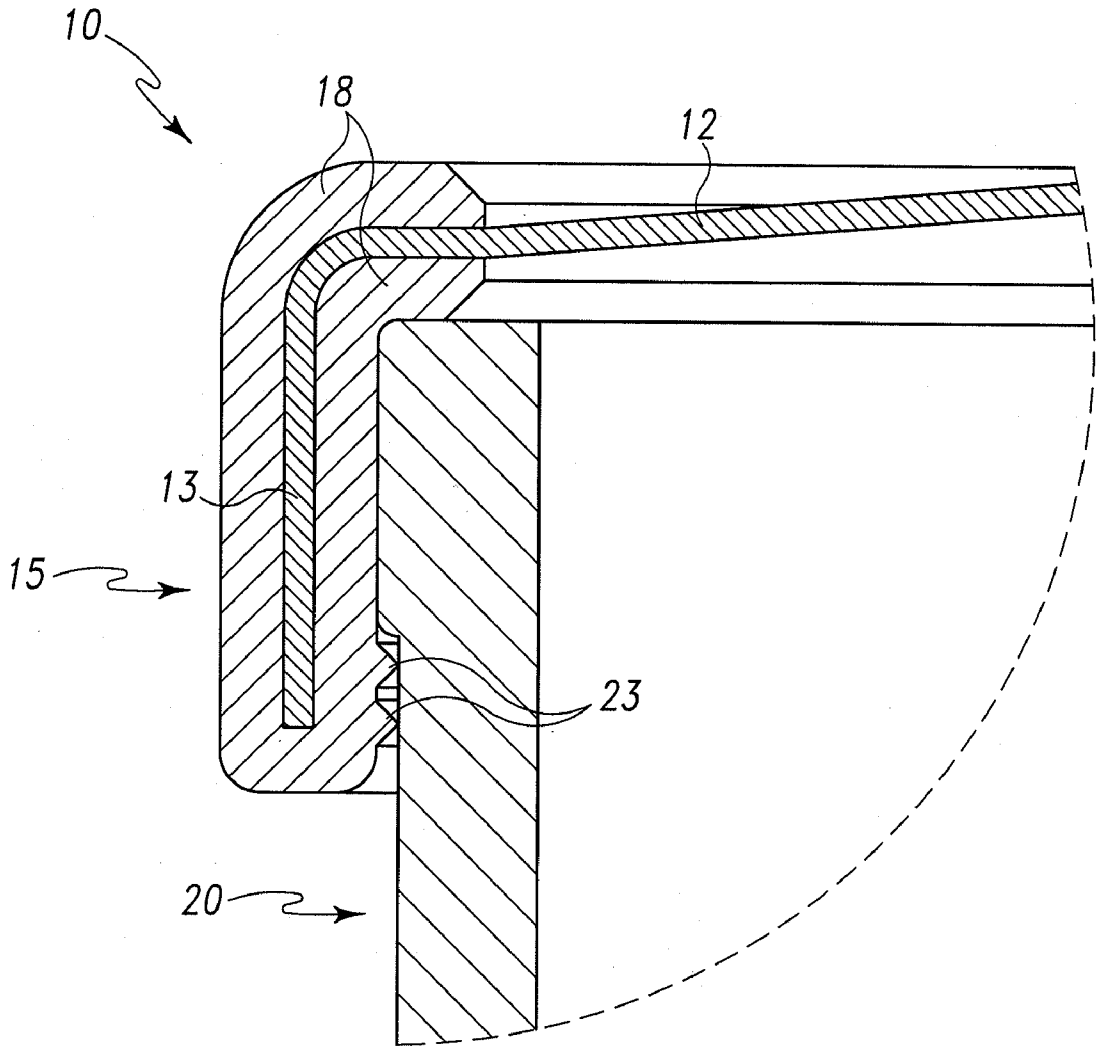


Fig. 2

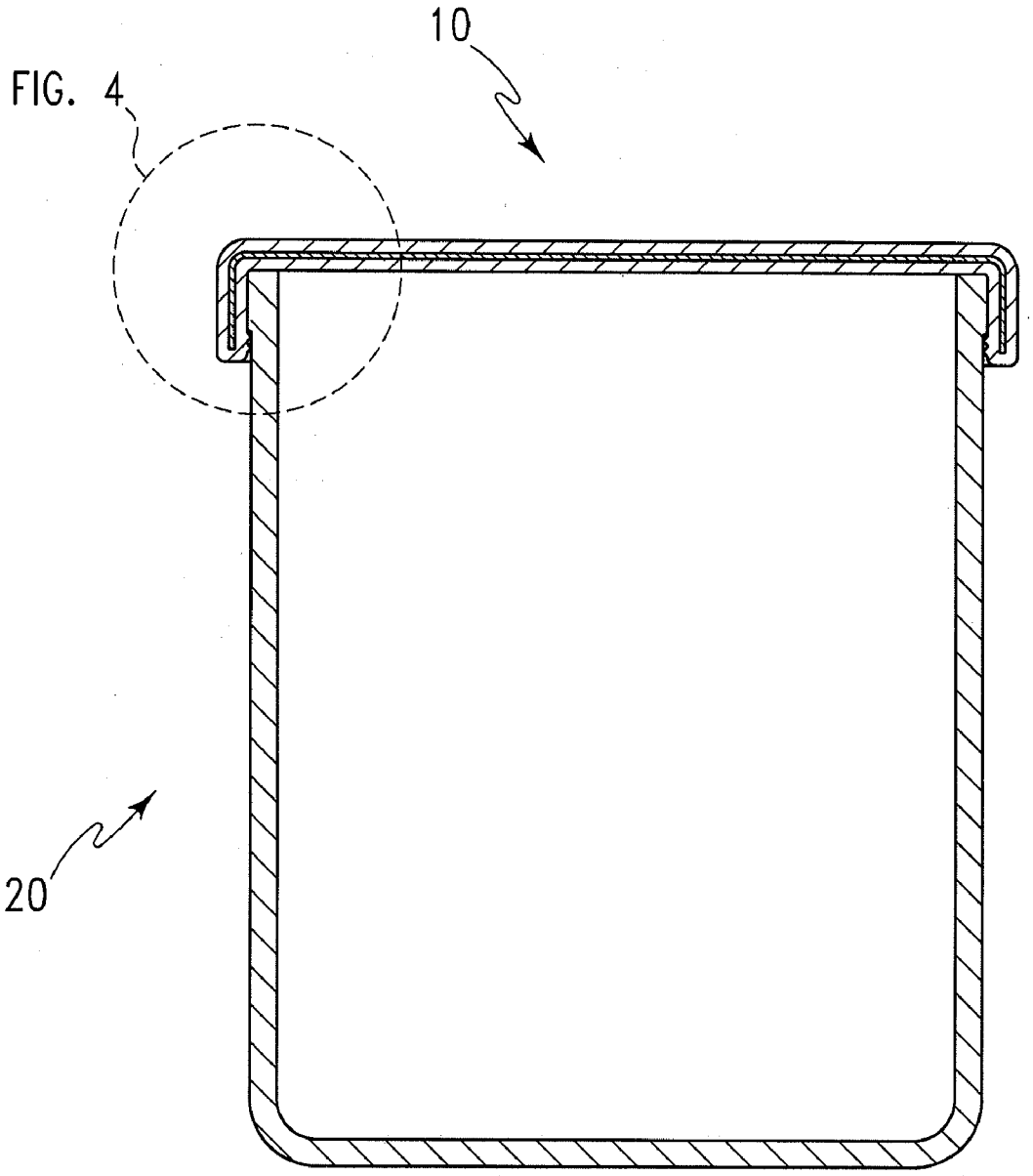


Fig. 3

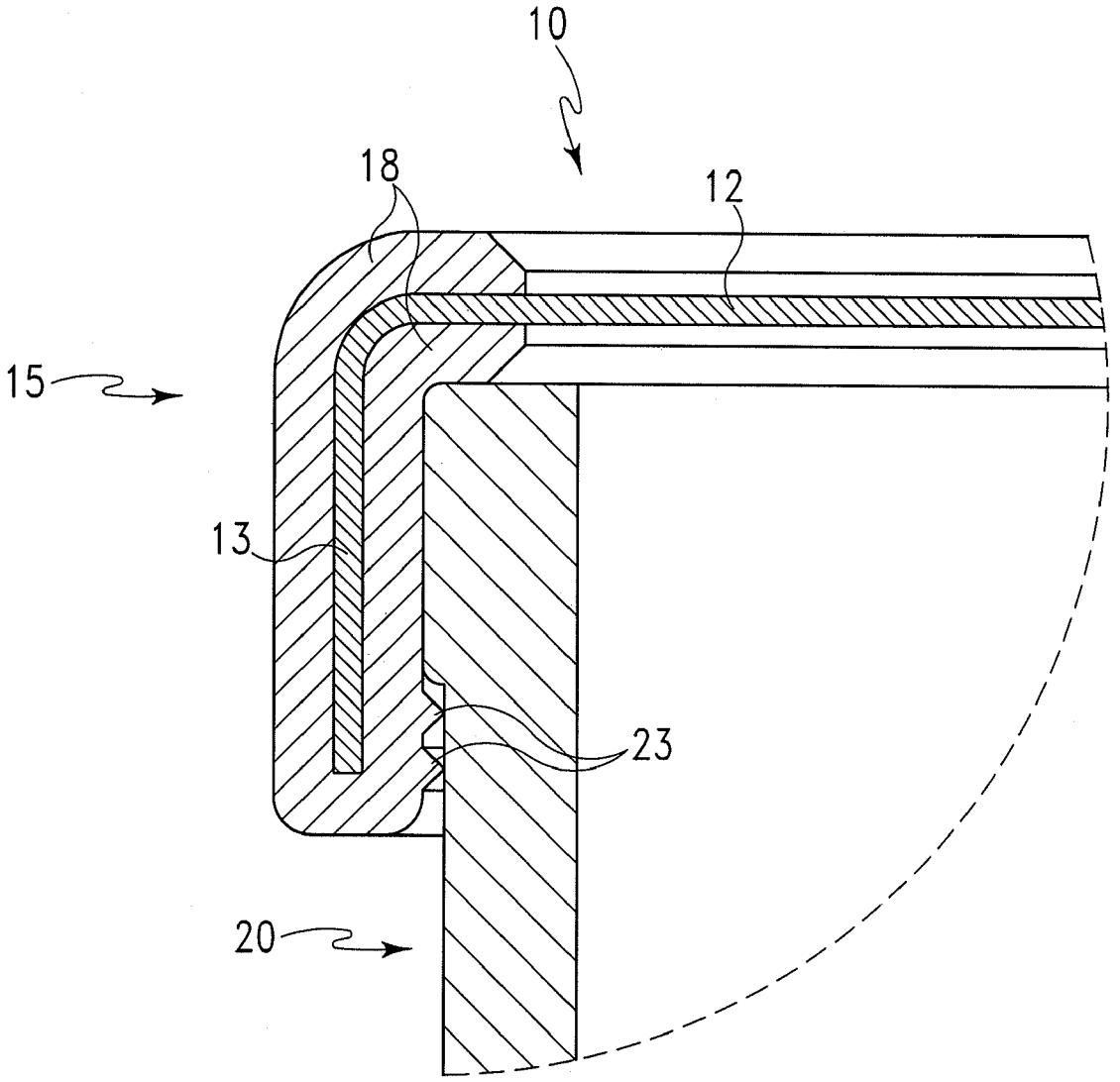


Fig. 4

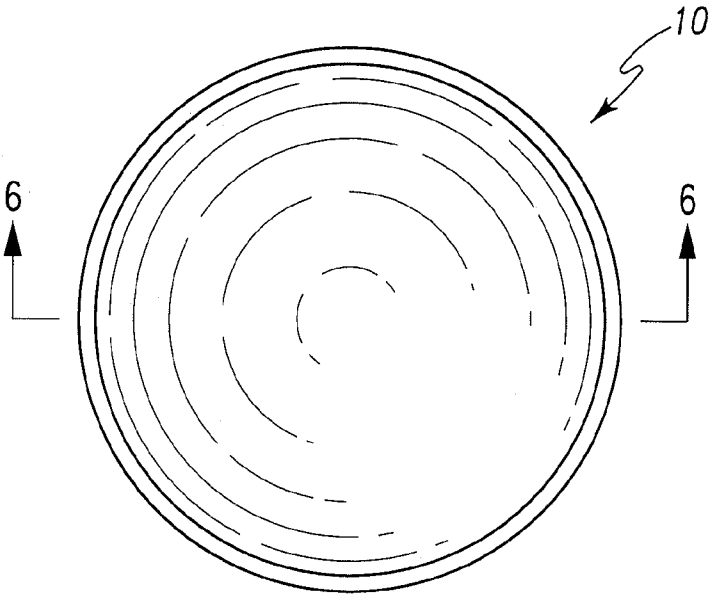


Fig. 5

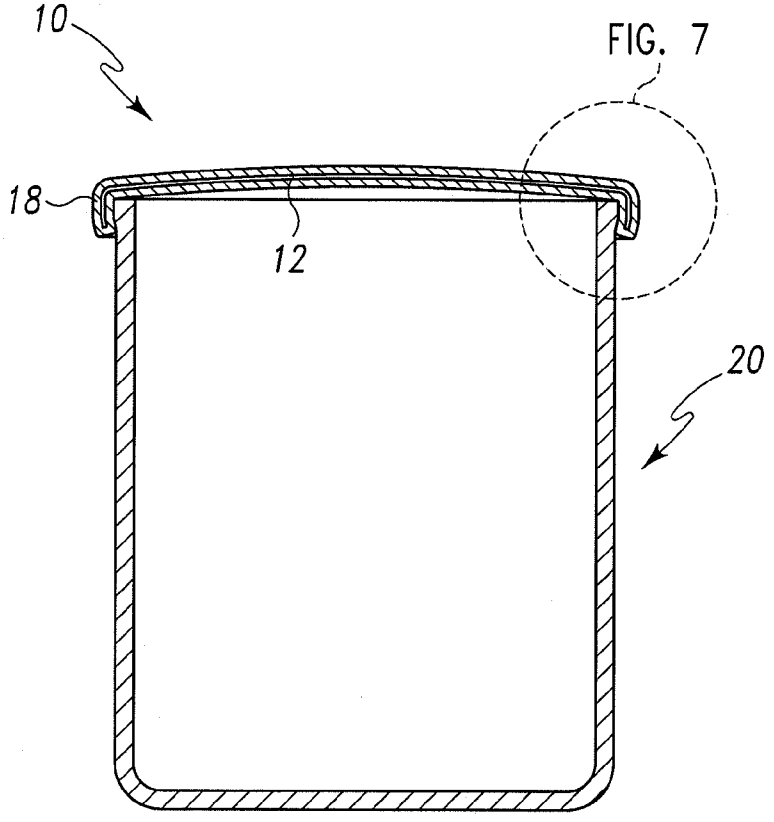


Fig. 6

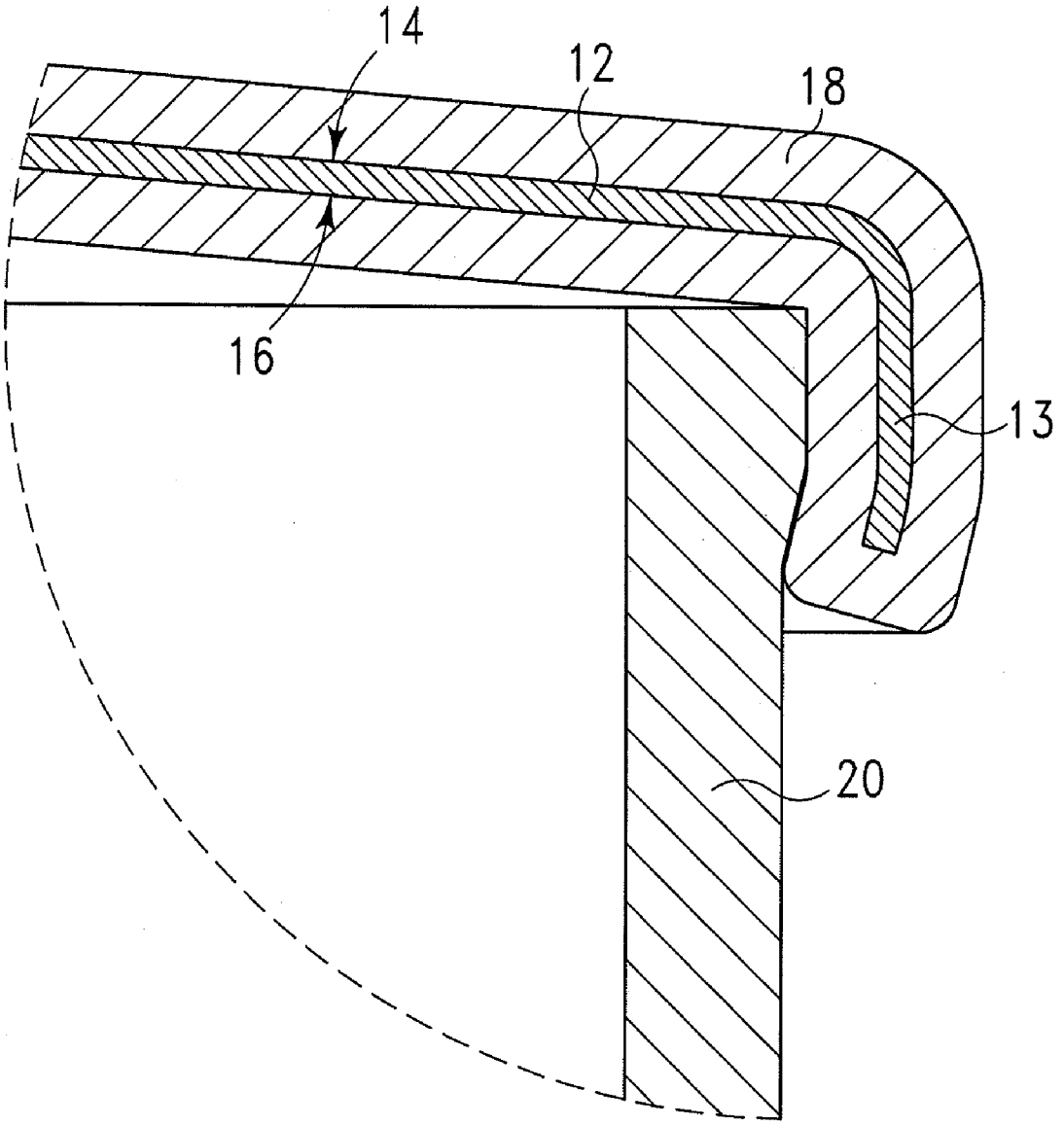


Fig. 7

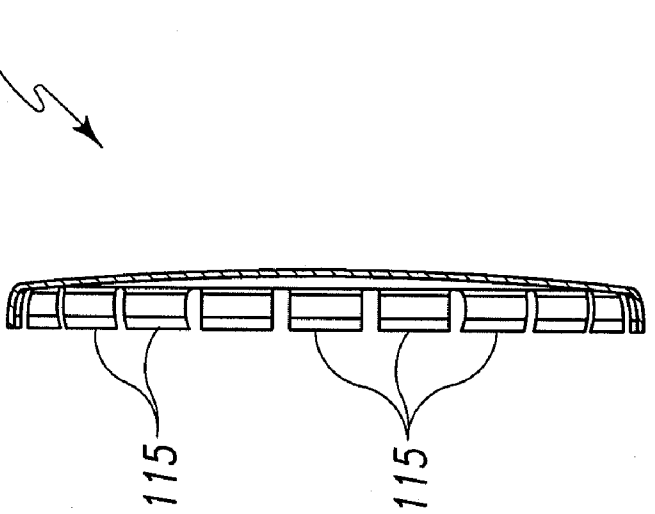


Fig. 9

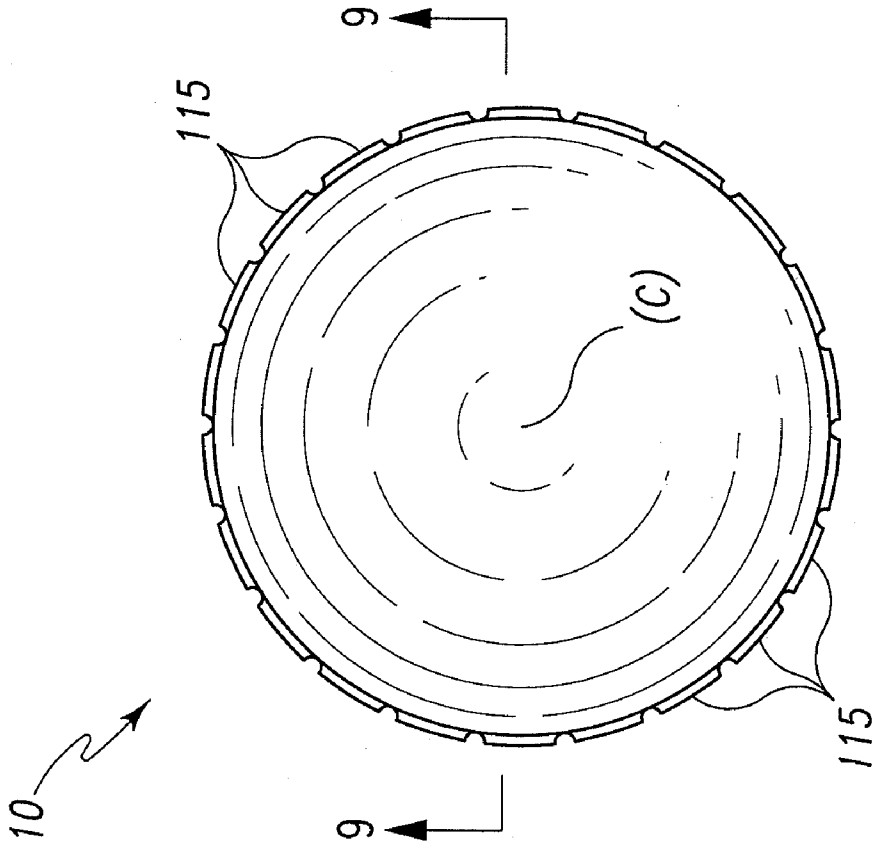


Fig. 8

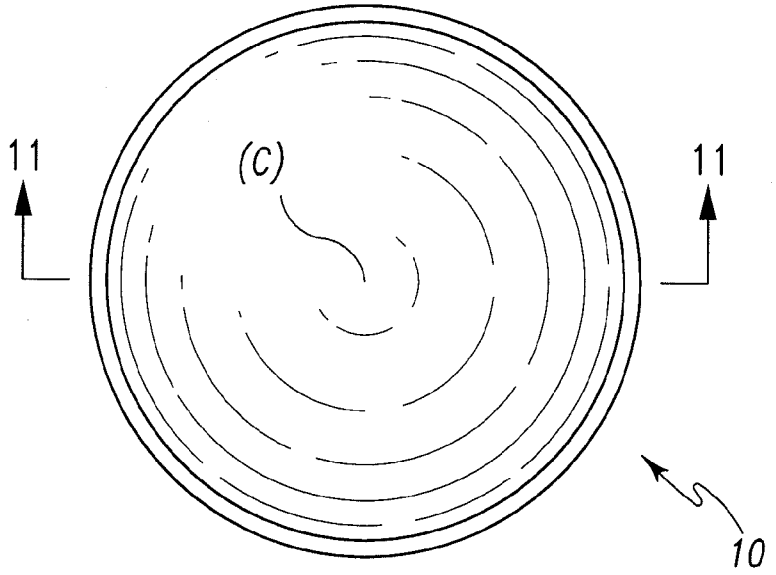


Fig. 10

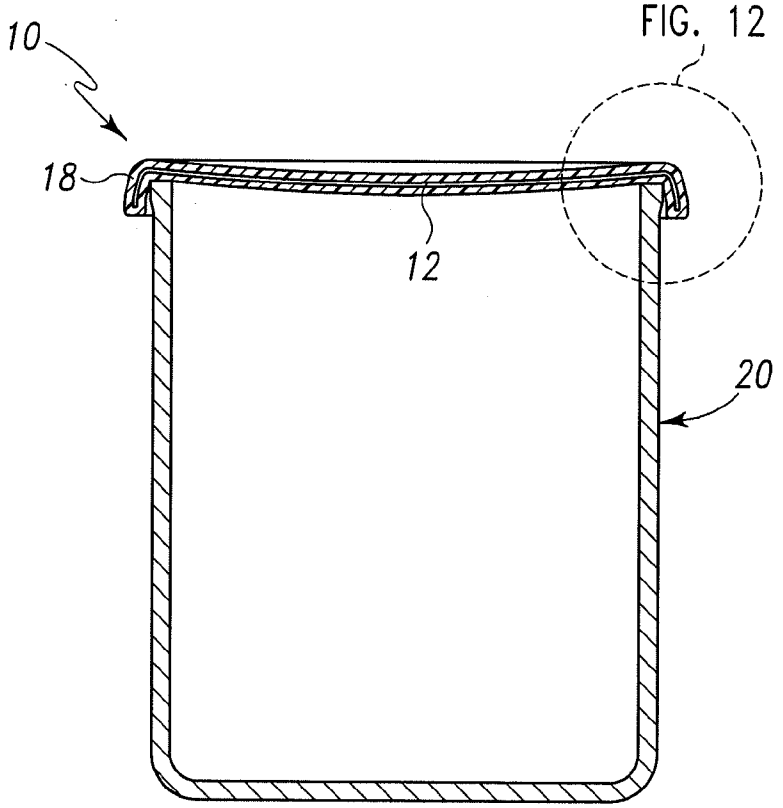


Fig. 11

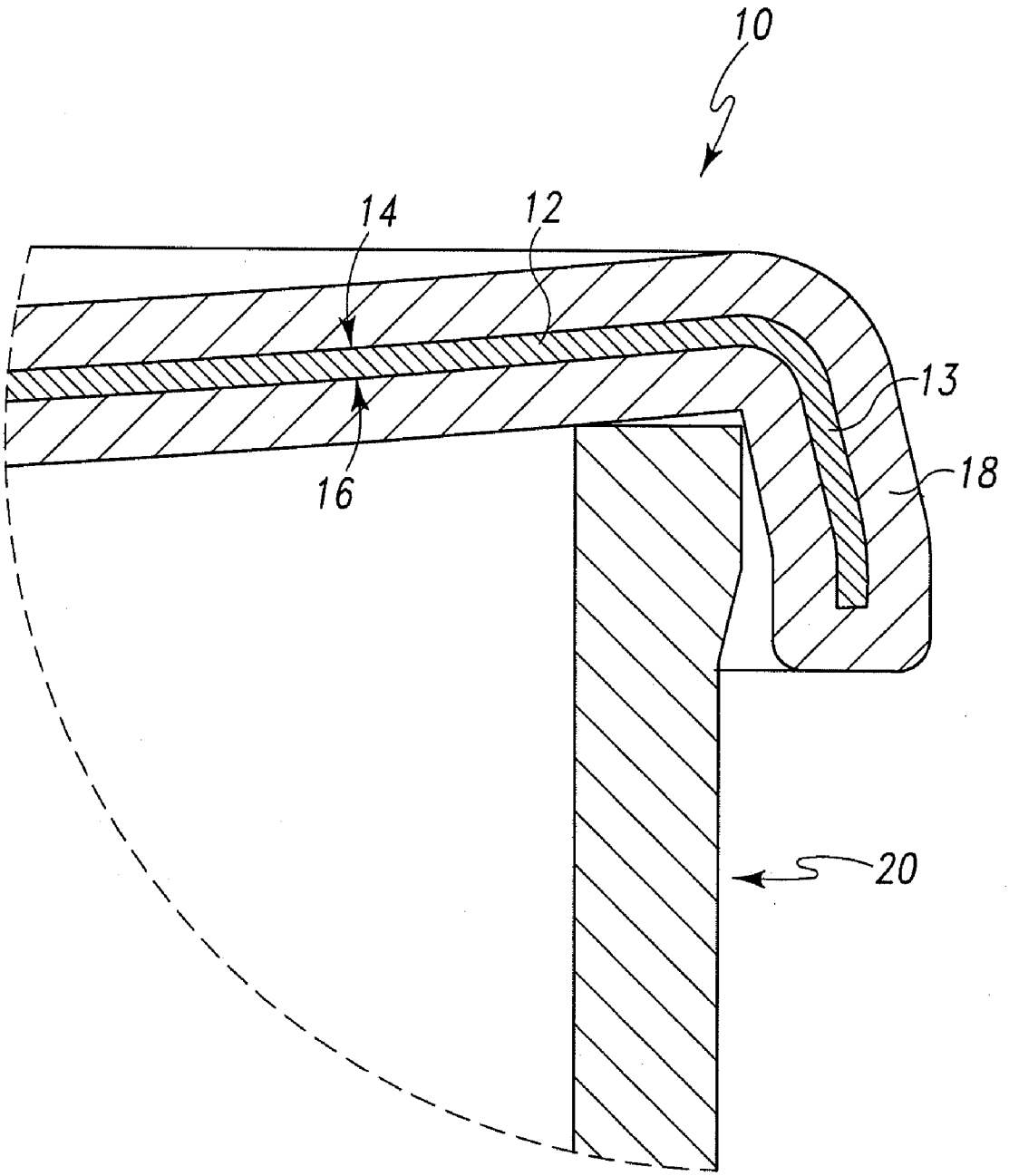


Fig. 12

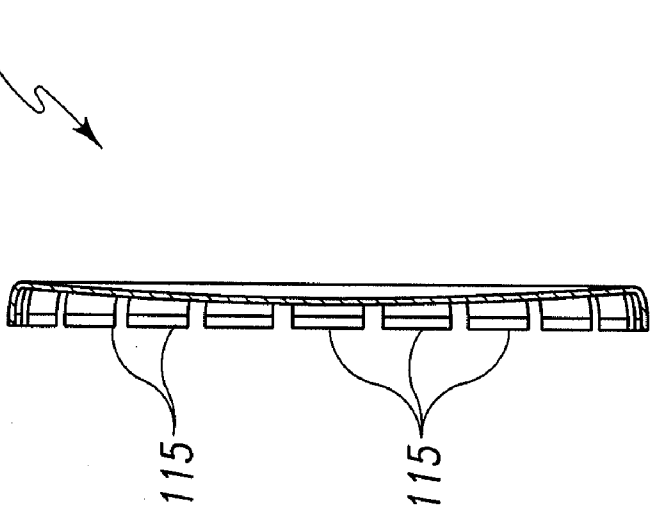


Fig. 14

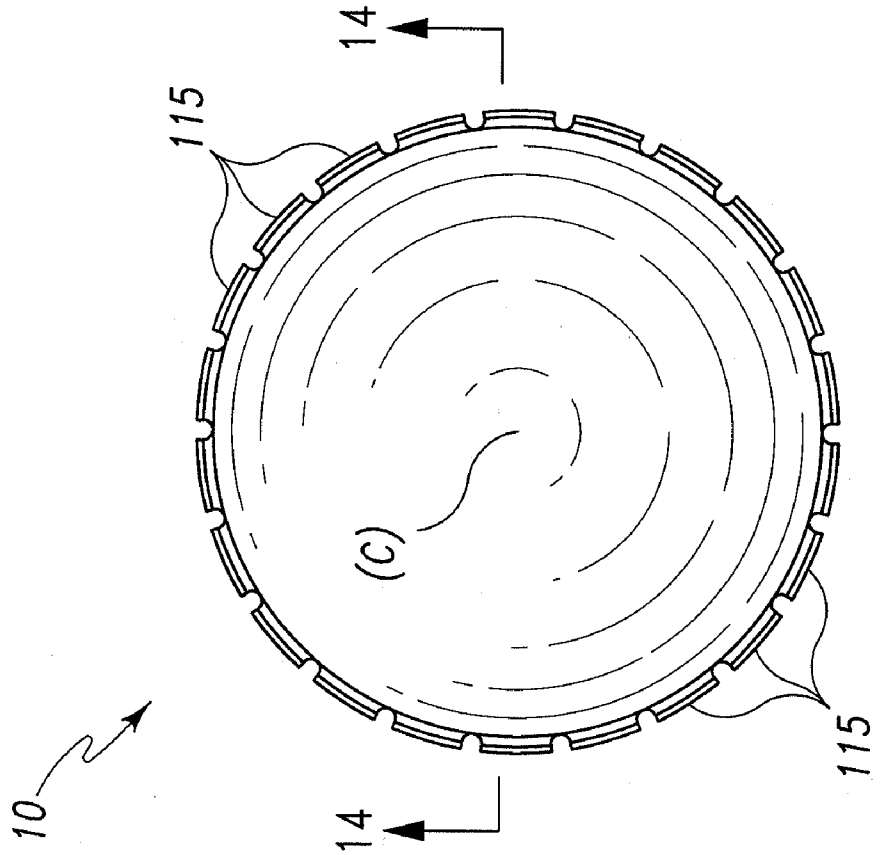


Fig. 13

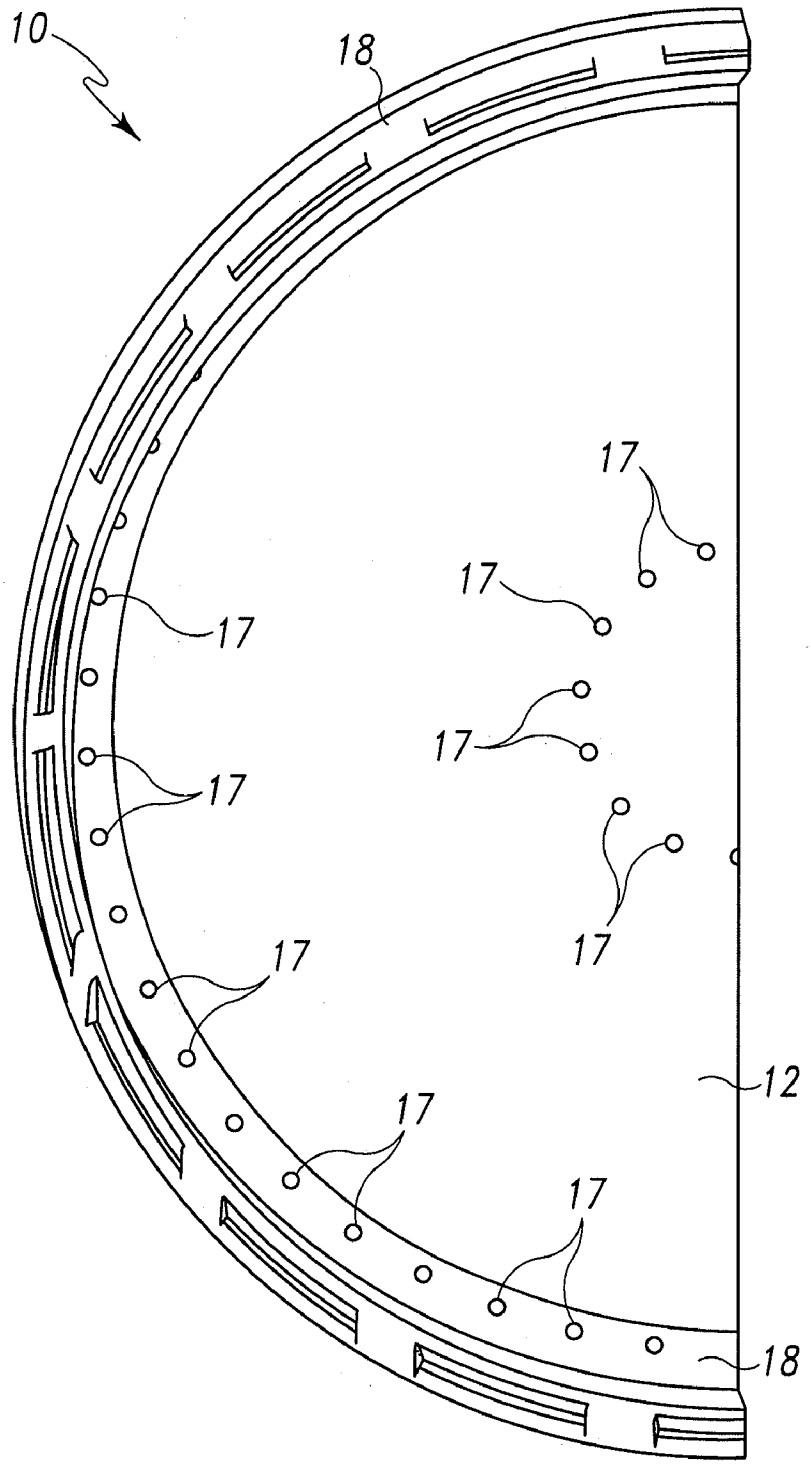


Fig. 15

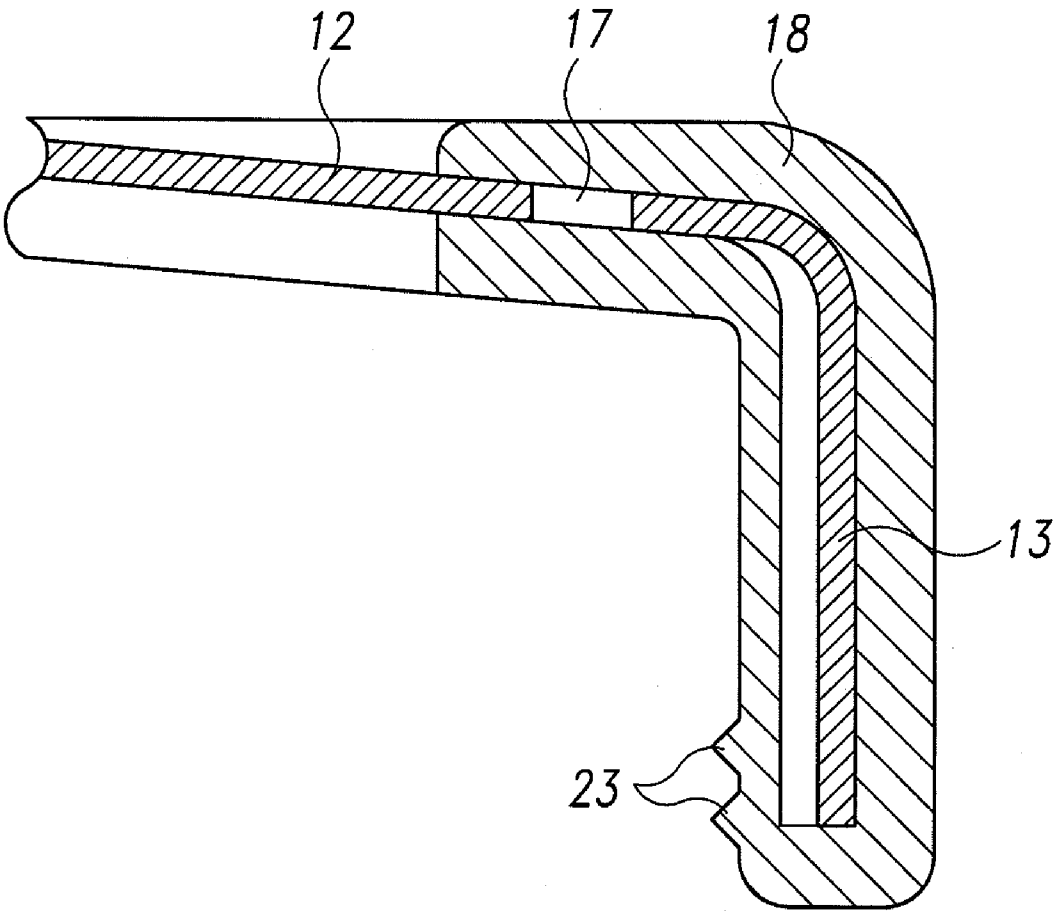


Fig. 16

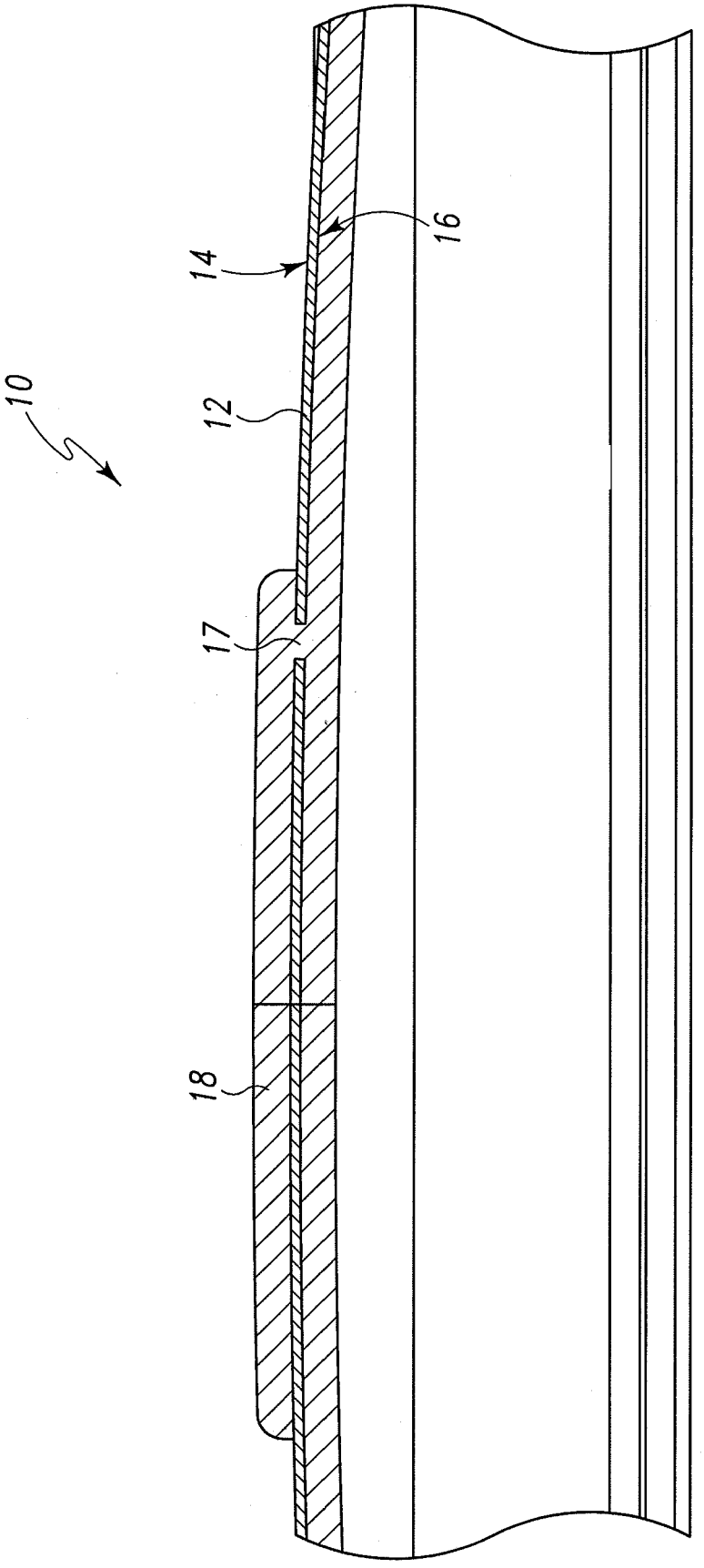


Fig. 17

COTAINER LID

RELATED APPLICATIONS

[0001] The present application claims the filing priority of U.S. Provisional Application No. 61/128,723 filed on Jun. 23, 2008.

TECHNICAL FIELD OF THE INVENTION

[0002] The present device relates to a container lid. Specifically, the present device relates to a flexible container lid coated with a flexible material which secures container contents by forming a seal between the container and the periphery of the container lid while allowing for ease of access to the contents upon activation of the lid by a user.

BACKGROUND OF THE INVENTION

[0003] Container lids are common devices designed to enclose containers, preserving freshness of foodstuffs, hiding contents from view, or preventing spillage of contents. Unfortunately, however, many container lids—by virtue of their ability to form a seal with the containers—are difficult to remove. Such container lids require the user to separate the container and lid with two hands, or even pry the lid from the container, potentially jeopardizing the structural integrity of the container and lid.

[0004] Alternatively, a container lid which fails to successfully form a seal with the container may too easily become detached, even upon a user's inadvertent contact with the lid. Such detachability can cause frustration when the container's contents spill. Further, a dislodged container lid can cause spoilage of edible contents, or allow impurities to enter the container and contaminate contents. In some instances, even where a container lid is properly in place but no seal is formed with the container, air, moisture, dust, or other impurities may seep into the container—the presence of which may significantly degrade the quality of the container's contents.

[0005] The present invention is intended to address these and other possible problems associated with existing container lids.

SUMMARY OF THE INVENTION

[0006] There is disclosed herein an improved container lid which avoids the disadvantages of prior devices while affording additional structural and operating advantages. Generally speaking, the lid includes a flexible material held to a flexible substrate, such as a flexible steel or plastic, having first and second opposing surfaces and a peripheral lip. When fitted to a container, the coated flexible substrate forms a seal between a sidewall of the container and the periphery of the container lid.

[0007] In an embodiment of the container lid, the flexible substrate is formed in such a way that it is bi-stable, thus capable of achieving and existing in either a convex or concave state. It is an aspect of at least one embodiment of the container lid that the flexible substrate, being manufactured of a flexible steel, comprises a plurality of flexing or grasping sections distributed about the periphery of the flexible substrate. Such sections may range in quantity, with as few as three providing the necessary outward flex for the peripheral lip.

[0008] In an embodiment of the invention, the flexible material is molded to the substrate using a flow through process for encapsulating the substrate. Such a substrate comprises a plurality of holes, allowing material to flow from one opposing surface to the other.

[0009] It is an alternative embodiment of the container lid, a primer is applied to the flexible substrate prior to application of the flexible material. The flexible material adhered to the flexible substrate preferably comprises silicone rubber, but may include any such flexible material which may be secured to the substrate to provide a peripheral seal.

[0010] These and other aspects of the invention may be understood more readily from the following description and the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] For the purpose of facilitating an understanding of the subject matter sought to be protected, there are illustrated in the accompanying drawings embodiments thereof, from an inspection of which, when considered in connection with the following description, the subject matter sought to be protected, its construction and operation, and many of its advantages should be readily understood and appreciated.

[0012] FIG. **1** is a cross-section of one embodiment of a lid and container assembly;

[0013] FIG. **2** is a partial view of the cross-section of the lid and container assembly shown in FIG. **1**;

[0014] FIG. **3** is a cross section of another embodiment of a lid and container assembly;

[0015] FIG. **4** is a partial view of the cross-section of the lid and container assembly shown in FIG. **4**;

[0016] FIG. **5** is a top view of one embodiment of the present container lid in a convex state;

[0017] FIG. **6** is a cross section along line **6-6** of the embodiment of FIG. **5** of the present container lid enclosing a container, the lid being in a convex state;

[0018] FIG. **7** is an enlarged view of the section indicated in FIG. **6** illustrating the formed seal between the present container lid and a container;

[0019] FIG. **8** is a top view of another embodiment of the flexible substrate of the present container lid in a convex state;

[0020] FIG. **9** is a cross section along the line **9-9** of the embodiment of FIG. **8** of the present container lid in a convex state;

[0021] FIG. **10** is a top view of an embodiment similar to that of FIG. **5** showing the present container lid in a concave state;

[0022] FIG. **11** is a cross section along line **11-11** of the embodiment of FIG. **10** of the present container lid enclosing a container, the lid being in a concave state;

[0023] FIG. **12** is an enlarged view of the section indicated in FIG. **11** illustrating the broken seal between the present container lid and a container;

[0024] FIG. **13** is a top view of an embodiment similar to that of FIG. **11** showing the lid in a concave state;

[0025] FIG. **14** is a cross section along the line **14-14** of the embodiment of FIG. **13** of the present container lid in a concave state;

[0026] FIG. **15** is a partial top view of an embodiment of the present lid including through holes at the periphery and center area for molding;

[0027] FIG. **16** is a partial cross-section of the lid of FIG. **15**; and

[0028] FIG. **17** is a partial cross-section of another embodiment of the present lid including through holes for molding.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0029] While this invention is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail a preferred embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to embodiments illustrated.

[0030] To the extent additional or alternative embodiments are disclosed herein, such additional or alternative components are consistently referenced using the same two digit number or, in some cases, by adding a leading third digit to the corresponding reference number. Otherwise, like components are consistently numbered in the following description and in each of the appended drawing figures.

[0031] Referring to FIGS. **1-17**, there is illustrated several embodiments of a container lid **10**. Generally speaking, the container lid **10** is comprised of a thin, flexible, substrate **12** having a first surface **14** and a second surface **16**. The flexible substrate **12**, or at least a part of the substrate **12** including the periphery, is preferably encapsulated by a flexible material **18**. In the embodiment of FIGS. **1** and **2**, only the peripheral lip **13** is encapsulated by the flexible material **18**, while FIGS. **3** and **4** have the entire substrate **12** encapsulated. In both embodiments, when used with a container **20**, the container lid **10** friction fits to the container **20** at a periphery to thereby form a seal along the periphery. As shown in FIGS. **2** and **4**, small projections **23** may be formed as part of the flexible material to facilitate the formation of a seal between the lid **10** and the container **20**.

[0032] As shown in FIGS. **6** and **11**, the flexible substrate **12** is comprised of a slightly cupped surface with a peripheral lip **13** extending substantially perpendicularly about the periphery of the lid **10**. The flexible substrate **12** is preferably formed of a metal, such as spring steel. It may, however, be formed of stainless steel, aluminum, plated steel, or many other metals having the ability to be so formed. The substrate may also be formed of most any flexible plastic, including numerous thermoplastic and thermoform polymers, composites, and laminate material capable of being flexed and formed while retaining a certain amount of rigidity, as is known by persons having ordinary skill in the art.

[0033] A flexible or resilient material may be applied directly to the flexible substrate **12**, such as preferably through compression molding, but including such processes as over-molding, bonded assembly and other processes known in the art. Regardless of how the material is attached to the substrate, it is more the placement of the material to form a seal which is of importance.

[0034] In a preferred compression-molding process, for example, the substrate may be formed with holes **17** in a single area about the periphery, as illustrated in FIGS. **15** and **16**. The resulting lid would then include flexible material **18** encapsulating only the lip **13**. Alternatively, additional areas of holes **17** may be provided as well (see FIGS. **15** and **17**). The flexible material **18** could then be applied to the substrate in a single step, as above, or in multiple steps, as necessary to achieve the desired encapsulation of the lid **10**. That is, the compression molded material would spread to fill the first and subsequent holes **17** to thereby encapsulate the lip and the remainder of the substrate **12** with material **18**. When done in consecutive steps, the molding process is used to cover the lid periphery in a first step, and then the remaining bottom or under surface of the substrate **12** is covered in a second step. The two materials may bond to one another, for example, at an area where they interface on the lid under surface. As shown in FIG. **17**, a small button of material at the center of the top or upper surface of the substrate **12** helps anchor the material to the substrate much like the holes **17** about the periphery.

[0035] Similarly, the same embodiments can be achieved through the use of a bonding agent or primer in lieu of the through holes **17**. The primer (not shown) would be applied to the desired area of coverage (e.g., the periphery) and the flexible material **18** could then be compression molded to that area. A primer may first be applied to the flexible substrate **12** so as to cause the flexible material **18** to bond more aggressively to the flexible substrate **12**. The primer is best used when the flexible material it to be applied to the entirety of the flexible substrate **12** (see FIG. **11**), including the peripheral lip **13**, as careful metering of the primer is less critical. That is, where only a portion of the lid **10** is to be coated and primer "overspray"—the accidental application of primer to any area which is not being coated—is unsightly and, therefore, undesirable, application of primer to such a small area exclusively may be difficult. Thicker (i.e., more viscous) primer coatings which can be more accurately applied by, for example, a brush may help alleviate this application problem.

[0036] Where "overspray" is of no concern, the primer and flexible material may be applied to less than the entire lid **10**. As several alternative examples, primer may be applied to (1) the second container-facing surface **16** and the container-facing portion of the peripheral lip **13** of the flexible substrate **12**, (2) the periphery and peripheral lip **13** of the first and second surfaces **14**, **16** of the flexible substrate **12**, or (3) the contact points of the flexible substrate **12** between the container lid **10** and the container **20**.

[0037] In an alternative process, the flexible material **18** may be molded separately, in one or several pieces, and then chemically or heat bonded to the substrate **12**.

[0038] Combinations of these manufacturing processes are also possible and may be effective for certain applications.

[0039] The flexible material **18** itself may be comprised of any number of polymers, copolymers, polymer blends and the like. Suitable materials include, but are not limited to, silicone rubber, thermoplastic elastomers, waxes, resins or any other resilient and malleable material capable of being flexed, formed, and attached to or about the flexible substrate **12** in any of the manners described above.

[0040] In a preferred embodiment of the present invention, the flexible substrate **12** is formed such that it is bi-stable. That is, the substrate **12** is capable of existing in either a stable convex (FIGS. **5-9**) or a stable concave (FIGS. **10-14**) state. A user causes the flexible substrate **12** of the container lid **10** to alternate from a convex to a concave state by applying an inward force at the center (C) of the container lid **10**. The peripheral lip **13** includes a plurality of notches **19** to create sections **15** which allow outward and inward flexing of the lip **13**. There should be at least three, but preferably four or more flexing sections **15**, and as many as **30** sections, to allow the lid **10** to properly function. The flexing sections **15** press the encapsulating flexible material **18** against the container **20** to effect a seal when the flexible substrate **12** exists in its convex state, as depicted in FIG. **7**. Similarly, a user causes the flexible substrate **12** of the container lid **10** to alternate from

a concave to a convex state by applying force to at least two points along the peripheral lip **13** of the container lid **10**. The flexing sections **15** of the peripheral lip **13** release pressure on the container **20** when the flexible substrate **12** exists in its concave state, as depicted in FIG. **12**.

[0041] The flexing sections **15** may be formed to more aggressively grasp the periphery of the container **20** by adding, for example, a slight bend **25** at the section end **27**. The bend **25** may create a different pressure point for forming a seal against the container **20** than the straight flexing sections **15**, which may be preferable for certain applications. In most other respects, the grasping sections **115** are functionally equivalent to the flexing sections **15** of the previous embodiment, though for purposes of this disclosure the grasping sections **115** are typically greater in number. The grasping sections **115** preferably number from about **10** to an amount which achieves the desired and intended peripheral seal.

[0042] Section width and the gap between adjacent flexing sections **15** and between adjacent grasping sections **115** may all be varied to achieve the desired peripheral sealing. When provided in a greater number, the grasping sections **115** may have the effect of increasing flexibility and durability of the container lid **110**. As noted, the embodiment of the container lid **10** including the grasping sections **115** operates similarly to the embodiment of the container lid **10** comprising the flexing sections **15**. For example, as depicted in FIGS. **8** and **9**, the grasping sections **115** grasp the container **20** when the flexible substrate **12** exists in its convex state, and release the container **20** when the flexible substrate **12** exists in its concave state, as depicted in FIGS. **13** and **14**.

[0043] Additionally, as detailed above, a primer, flexible material, or both may be solely applied to the grasping sections **115**, to the grasping sections **115** and the rest of the flexible substrate **12**, or to any combination of the grasping sections **115**, the first and second surfaces of the flexible substrate **12**, and the container-facing and container-reversing portions of the grasping sections **115**. The primer, when used, could be applied in any of the noted processes previously described.

[0044] The container lid **10** illustrated in FIGS. **1-17** is shown to be circular. However, persons having ordinary skill in the art will understand that the container lid **10**, including the flexible substrate **12** and the associated flexible material **18**, can be formed to accommodate containers of a variety of shapes and sizes. In one embodiment of the present container lid **10**, a circular flexible substrate is formed of stainless steel to be bi-stable, coated entirely with a primer, and compression molded with a thin layer of a flexible silicone rubber material to entirely cover the flexible substrate.

[0045] The container **20** onto which the container lid **10** fits may similarly be formed of a variety of materials (see list for container lid above) and in numerous shapes, as is known by persons having ordinary skill in the art. One embodiment of the container, as illustrated in FIGS. **1** and **3**, is of cylindrical shape featuring a continuous cylindrical wall and a circular bottom. The container **20** may be formed of any material stated above, and need not be formed of the same material as the container lid.

[0046] The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only and not as a limitation. While particular embodiments have been shown and described, it will be apparent to those skilled in the art that changes and modifications may be made without departing from the broader aspects of applicant's contribution. The actual scope of the protection sought is intended to be defined in the following claims when viewed in their proper perspective based on the prior art.

What is claimed is:

1. A container lid comprising:

a flexible substrate having a body with first and second opposing surfaces and a peripheral lip substantially perpendicular to the body and divided by notches into at least three flexing sections; and

a flexible material attached to at least the flexing sections of the peripheral lip.

2. The container lid of claim **1**, wherein the flexible substrate is bi-stable.

3. The container lid of claim **1**, wherein the flexible substrate further comprises a plurality of openings defined therein through which the flexible material attaches to the substrate.

4. The container lid of claim **1**, wherein the flexible material is attached to the flexing sections and at least one of the first and second surfaces of the flexible substrate.

5. The container lid of claim **1**, wherein the flexible material is attached to only the peripheral lip of the flexible substrate.

6. The container lid of claim **5**, wherein the flexible substrate further comprises a plurality of holes defined therein through which the flexible material attaches to the substrate.

7. The container lid of claim **1**, wherein the flexible material is attached to the entire substrate.

8. The container lid of claim **7**, wherein the flexible material is chemically adhered to the substrate.

9. The container lid of claim **8**, wherein the material is adhered to the substrate using a primer coating.

10. The container lid of claim **1**, wherein the flexible material comprises a synthetic polymer.

11. The container lid of claim **5**, wherein the flexible material comprises silicone rubber.

12. A container lid comprising:

a flexible substrate having a first surface, a second surface, and a peripheral lip substantially perpendicular to the first and second surfaces, wherein the peripheral lip comprises a plurality of grasping sections disposed about the periphery of the flexible substrate; and

a flexible material attached to at least the peripheral lip of the flexible substrate.

13. The container lid of claim **12**, wherein the flexible substrate is bi-stable.

14. The container lid of claim **12**, wherein the flexible material is attached to the plurality of grasping sections and at least one of the first and second surfaces of the flexible substrate.

15. The container lid of claim **12**, wherein the flexible material is attached to the entire flexible substrate.

16. The container lid of claim **15**, wherein the flexible material is attached using a primer applied to the flexible substrate.

17. A container lid comprising:

a flexible stainless steel substrate having a first and second surface; and

a plurality of grasping sections disposed about the periphery of the flexible substrate;

wherein a primer is applied to the plurality of grasping sections and the first and second surface of the flexible substrate; and

wherein a silicone rubber is adhered to the primer-treated plurality of grasping sections and the first and second surface of the flexible substrate.

18. The container lid of claim **17**, wherein the flexible stainless steel substrate is bi-stable.

19. A combination container and container lid comprising:

a container body having at least one side wall, defining an open end, and a bottom wall opposite the open end;

a lid formed of a flexible, bi -stable substrate having a peripheral lip and dimensioned to enclose the open end of the container body; and

a flexible material adhered to at least the peripheral lip of the flexible substrate, wherein the substrate is capable of changing configurations between a convex and a concave state relative to the container and the flexible material forms a seal against the container body when the lid is in the concave state and connected to the container body.

* * * * *