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(54) **CONTAINER**

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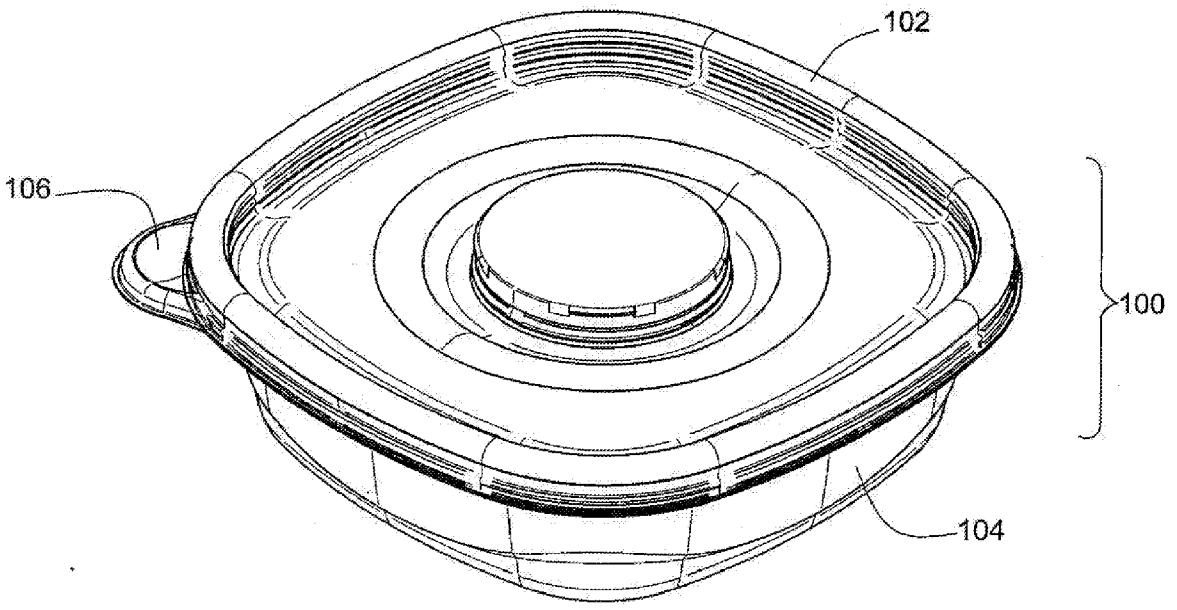
(52) **U.S. Cl.** **206/503**

(57) **ABSTRACT**

Containers having a cover and a base provide covers that may be locked together. In addition the container covers may be locked to a sidewall of the container base. The container cover includes a first closure portion and a cover engagement portion. The base includes a second closure portion and a base engagement portion. The first closure portion of the cover is sealingly engageable with the second closure portion of the base to define a sealed storage area. The cover engagement portion of a cover is releaseably lockable with the cover engagement portion of a second cover to form a locked cover stack. The cover engagement portion of the cover is also releaseably lockable with the base engagement portion of the base.



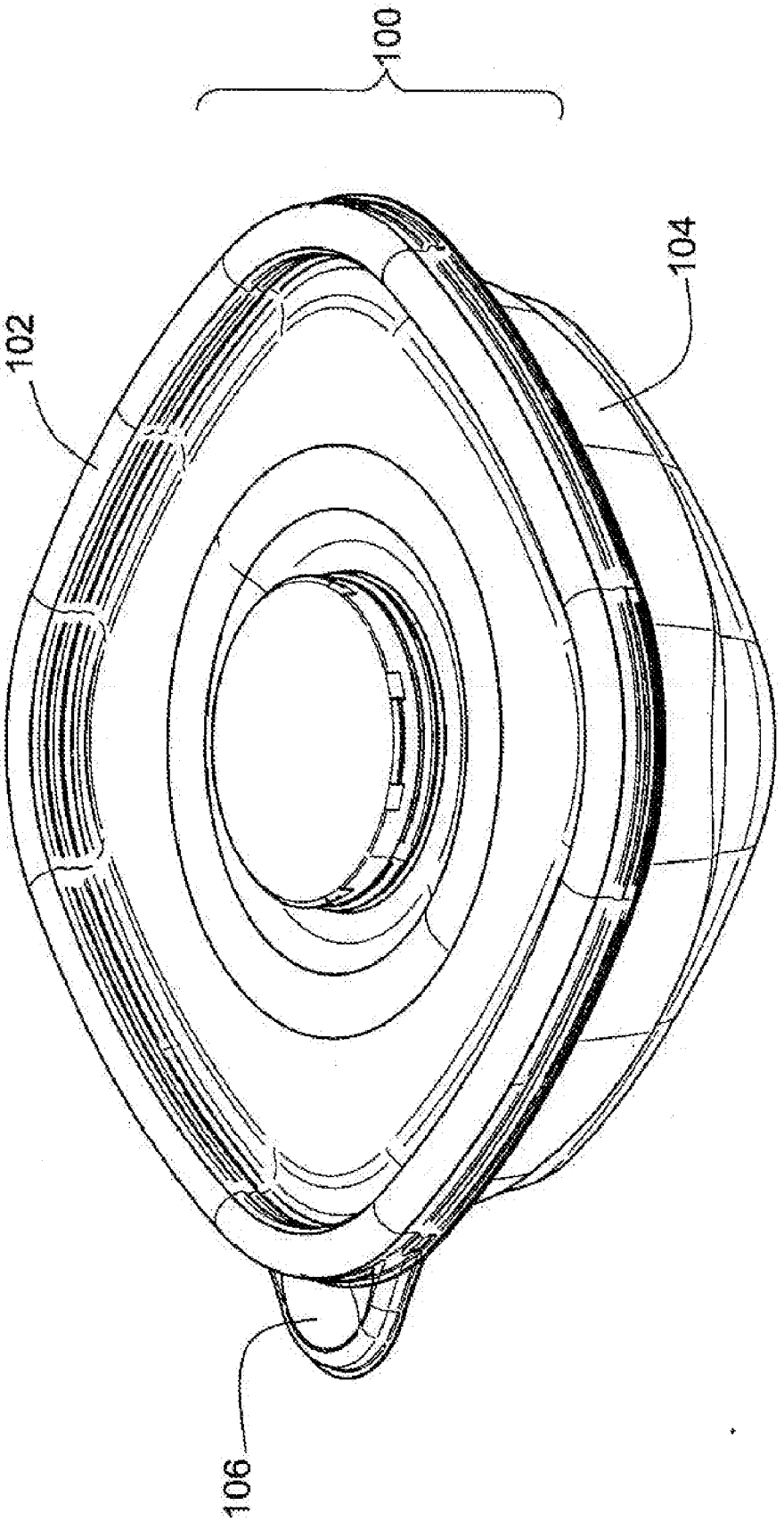


FIG. 1

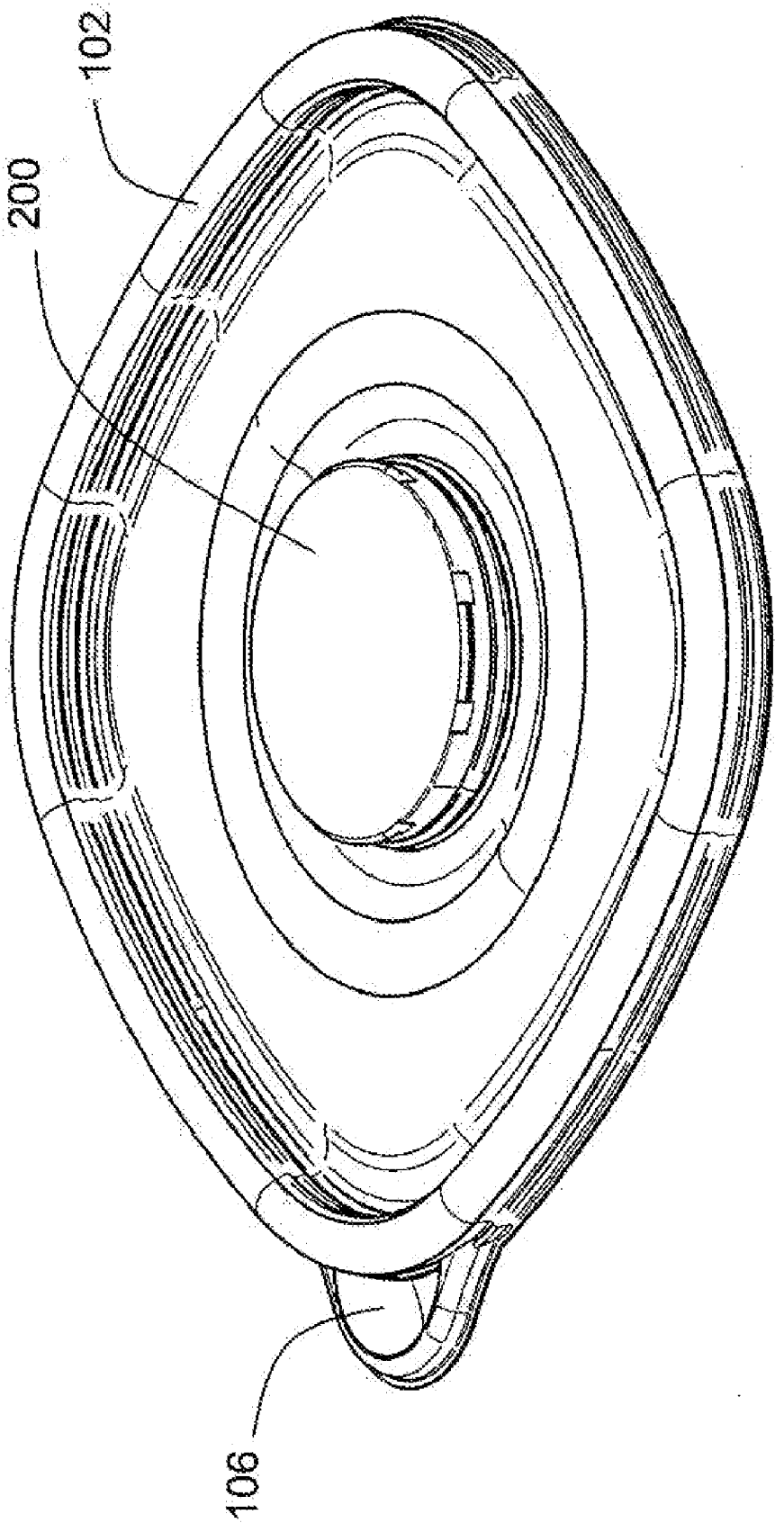


FIG. 2

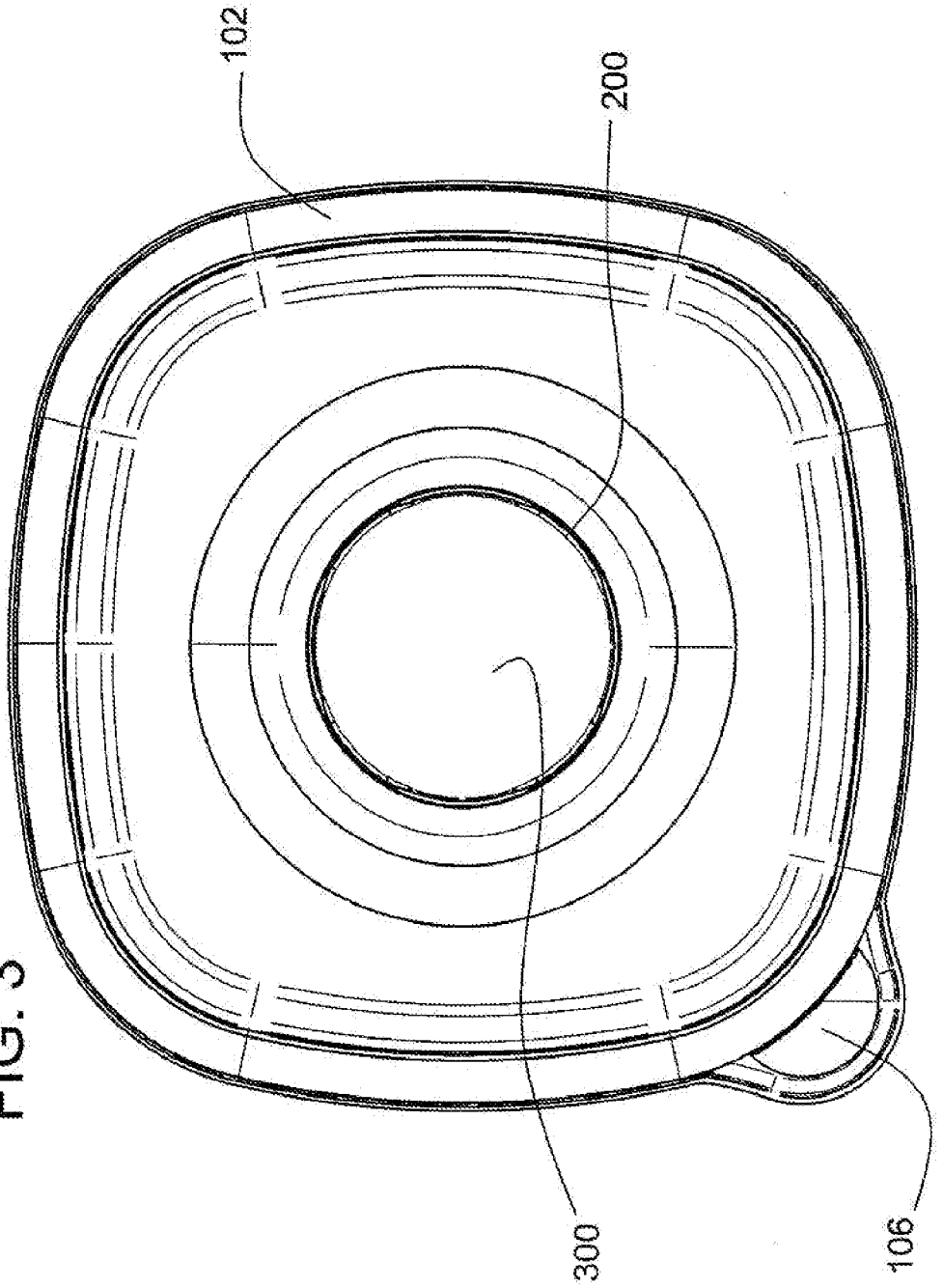


FIG. 3

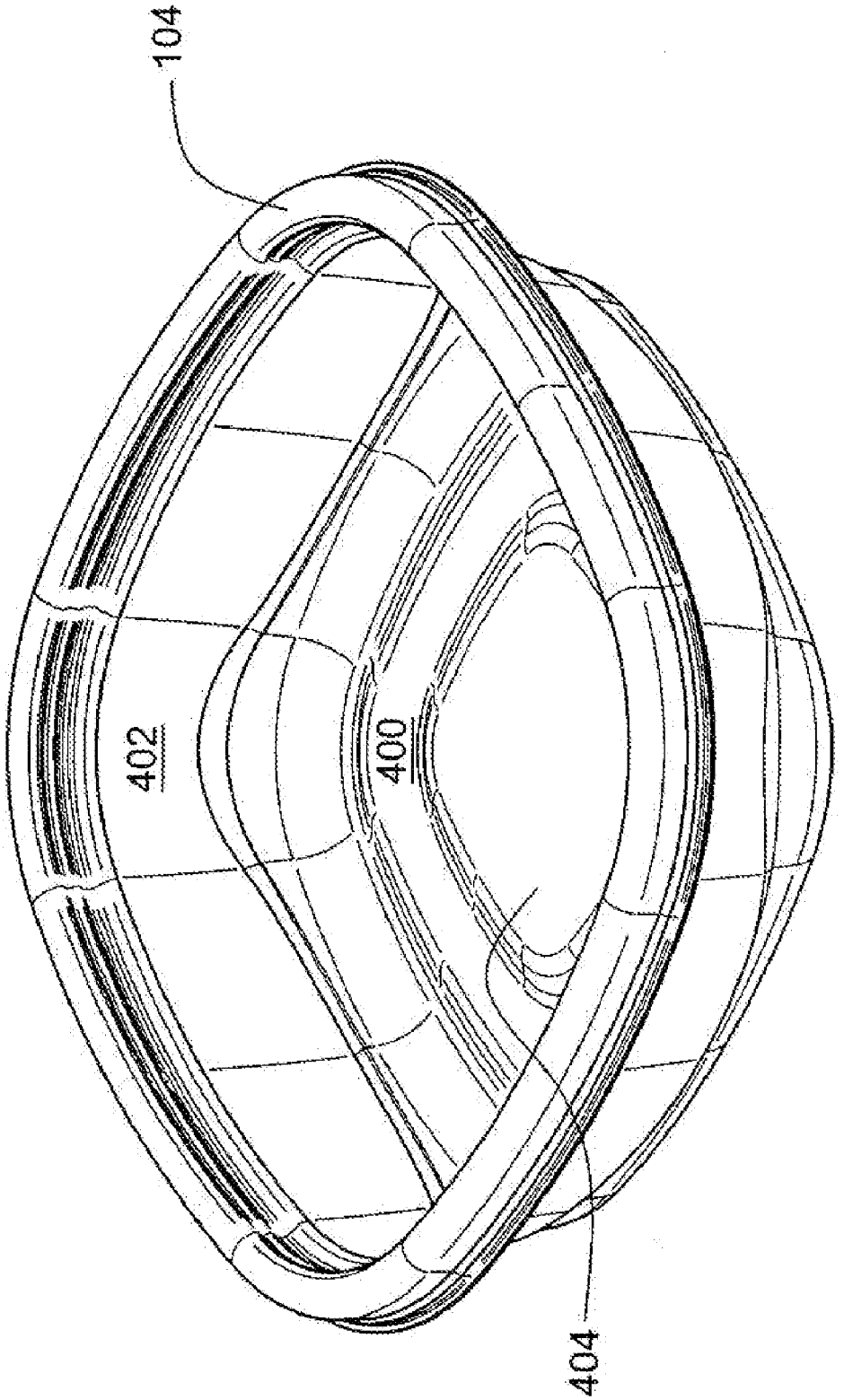


FIG. 4

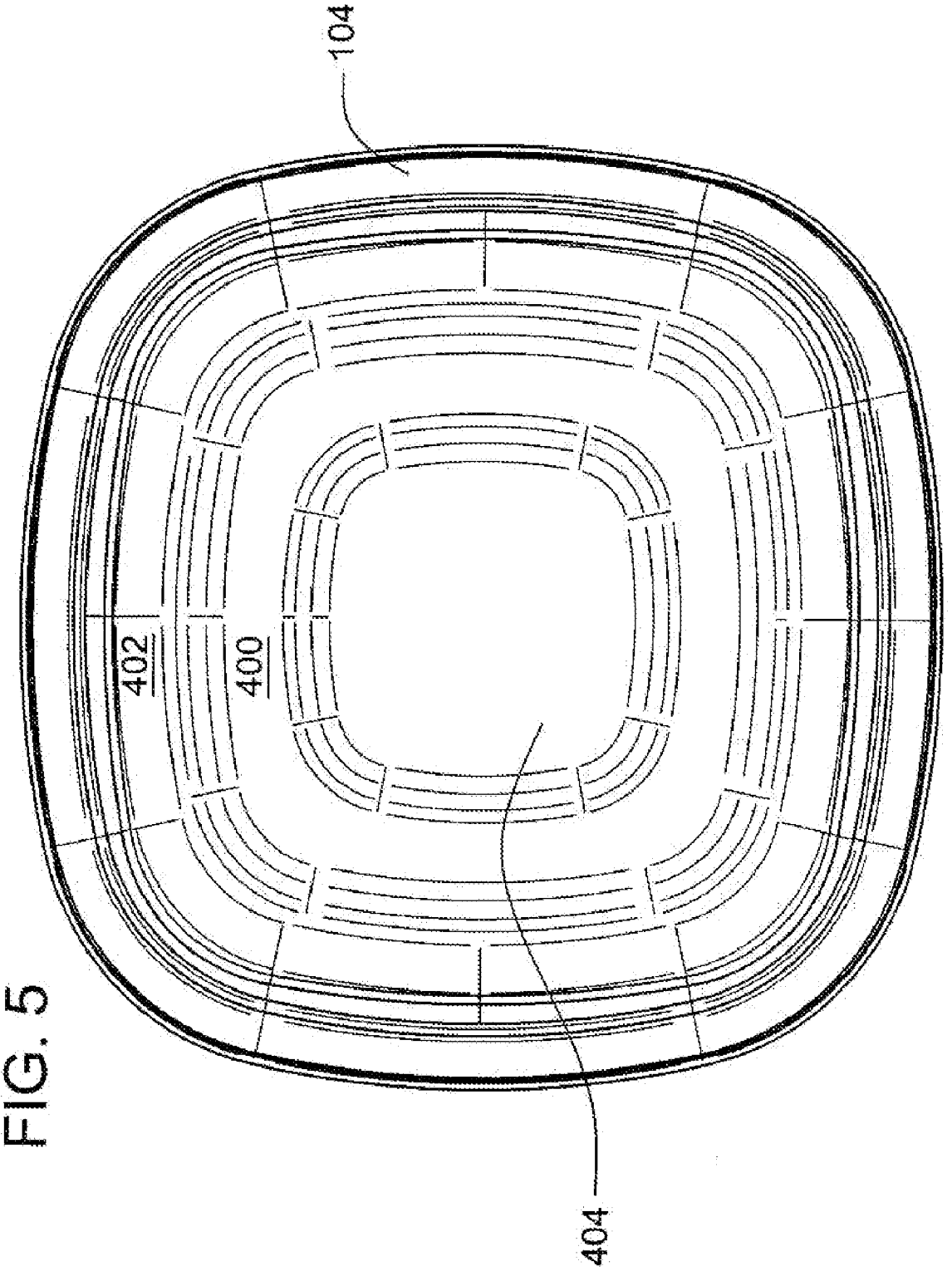


FIG. 5

FIG. 6

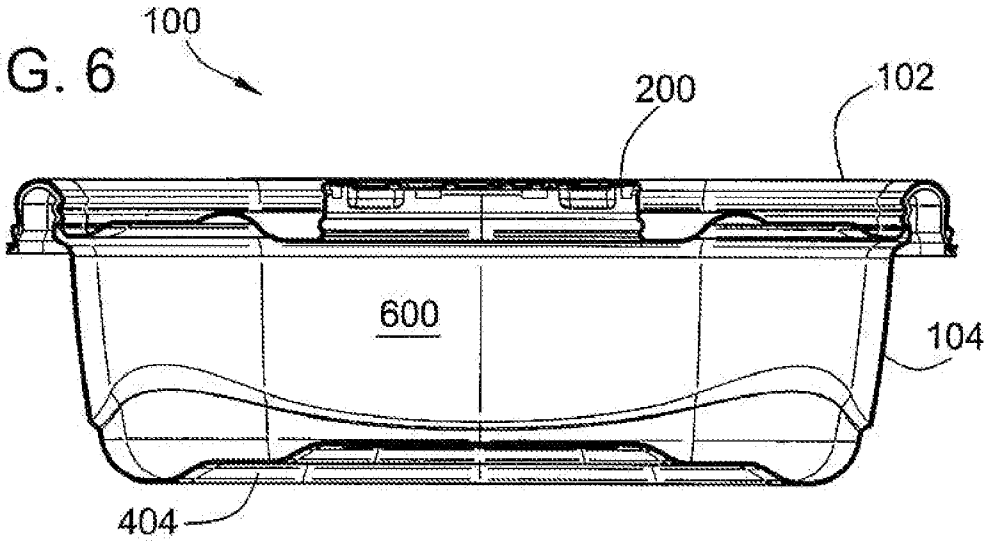
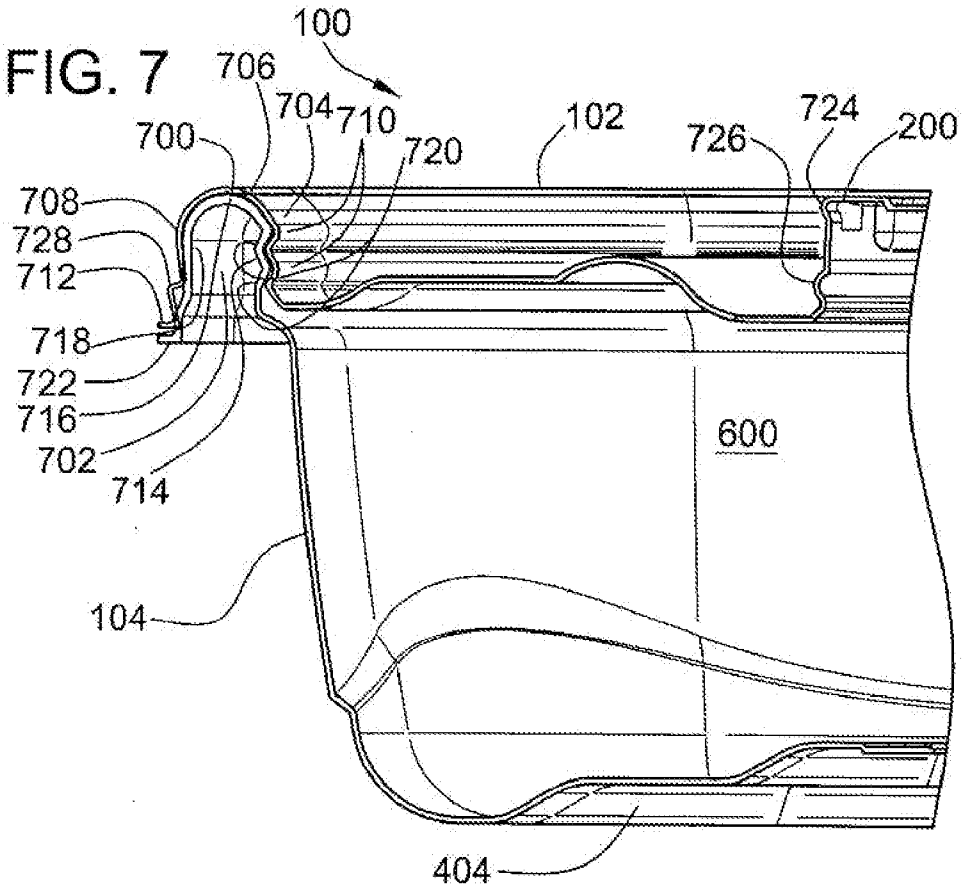

100
200
102
600
104
404

FIG. 7


100
706
704
710
700
720
102
726
724
200
708
728
712
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722
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702
714
600
104
404

FIG. 8

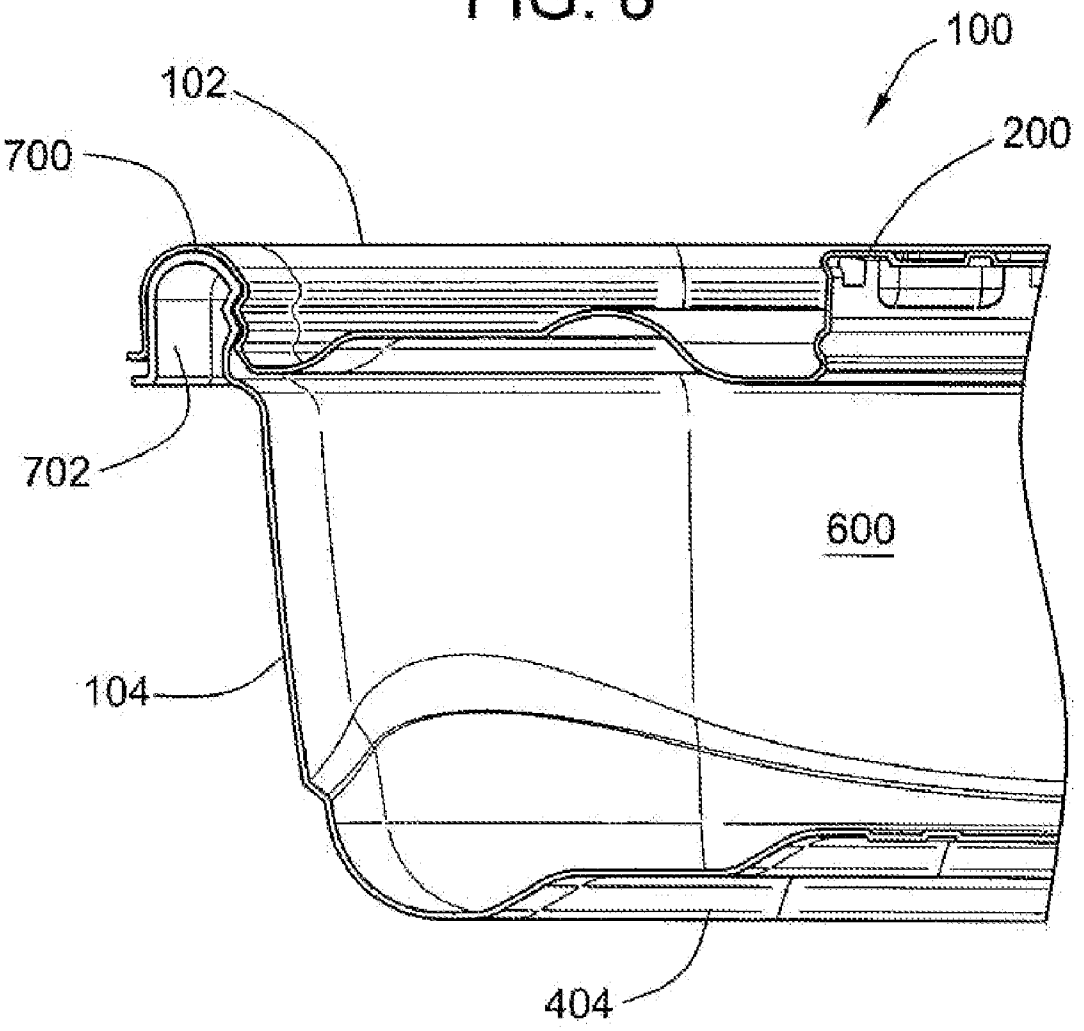


FIG. 9

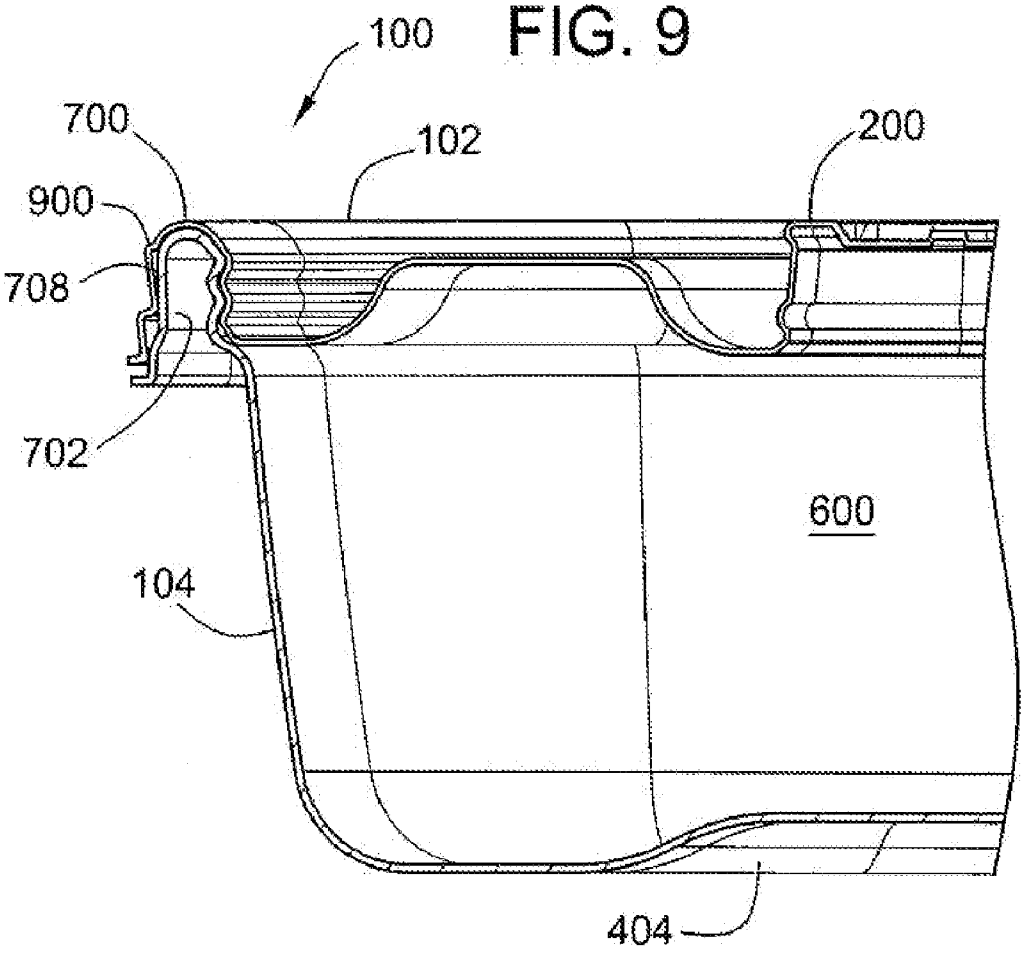


FIG. 10

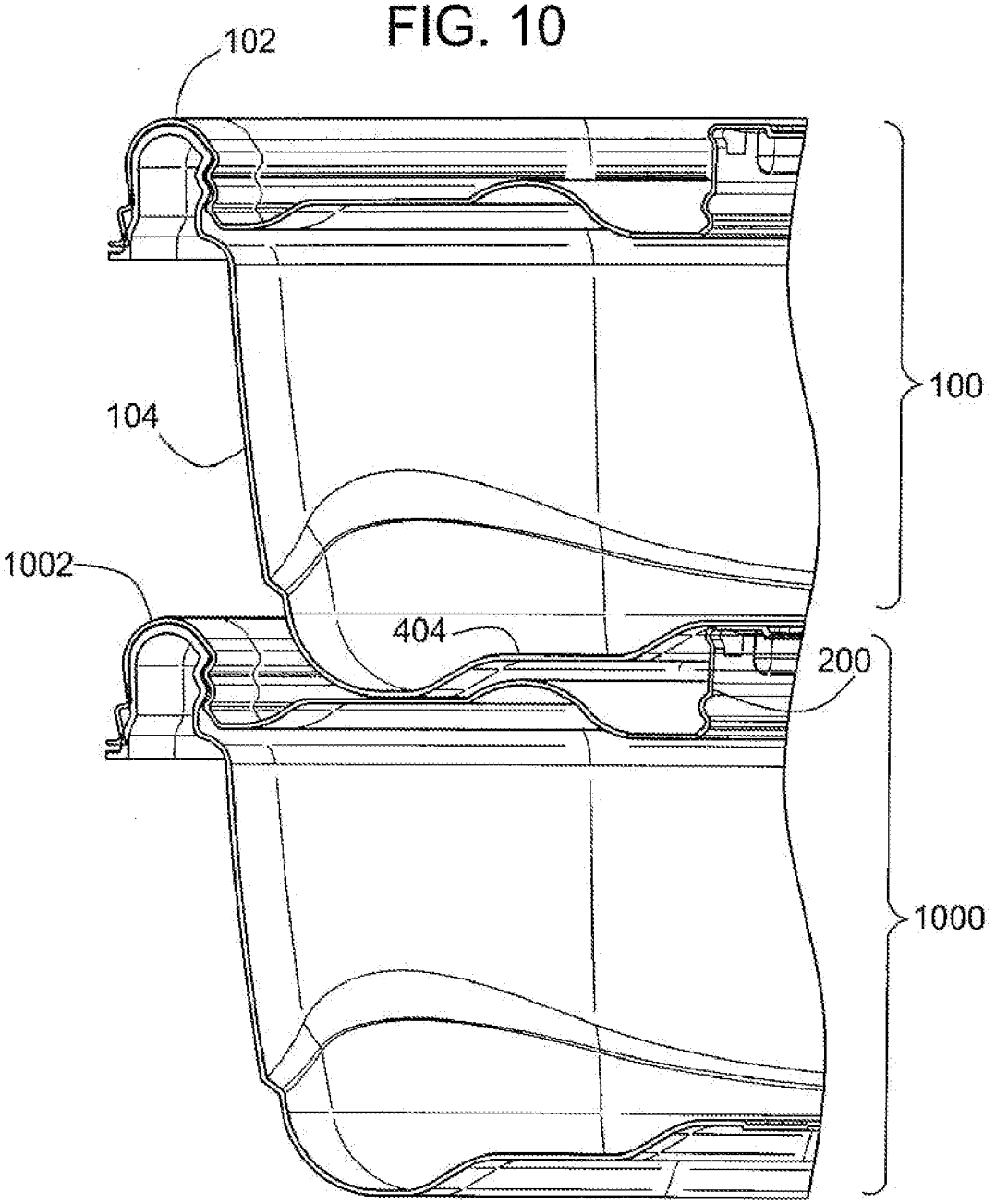


FIG. 11

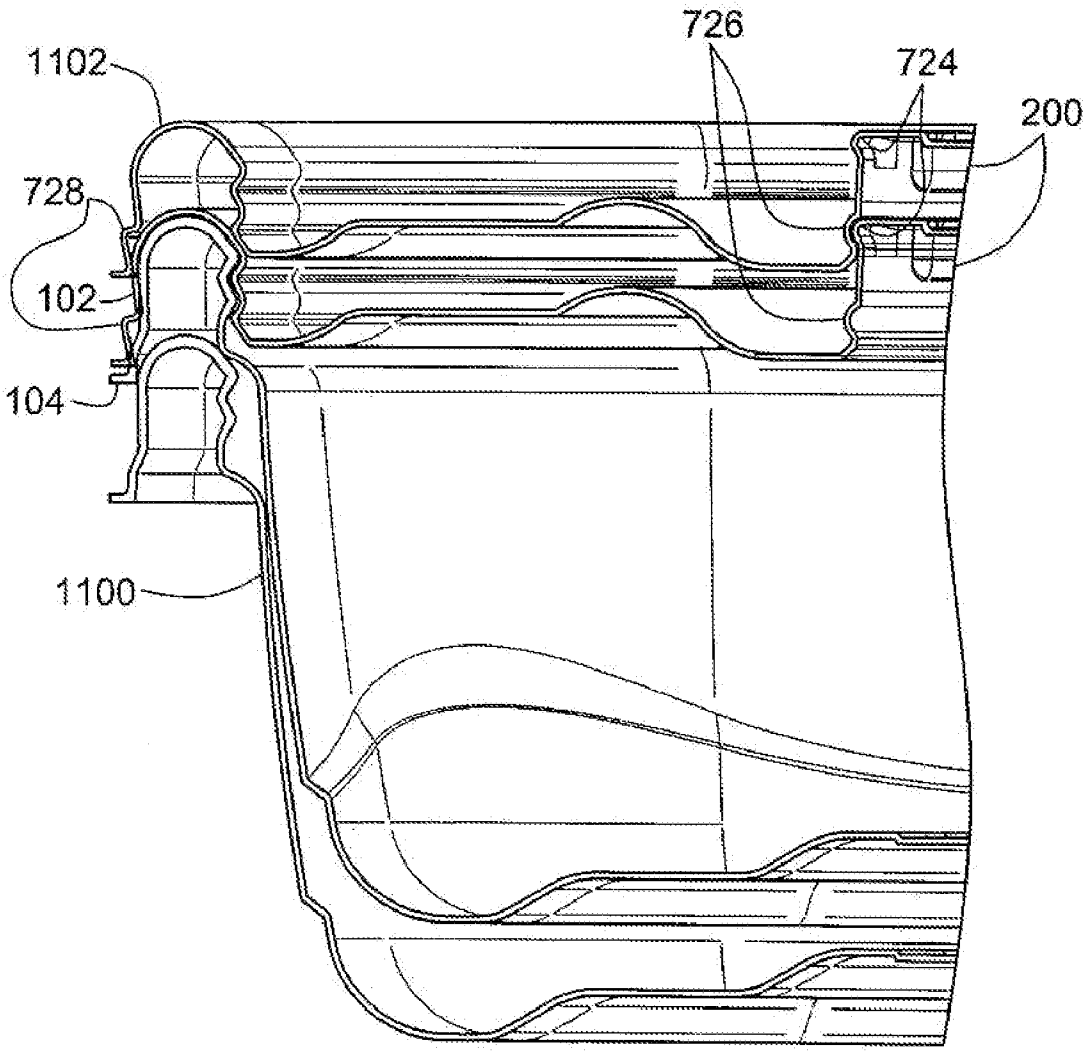


FIG. 12

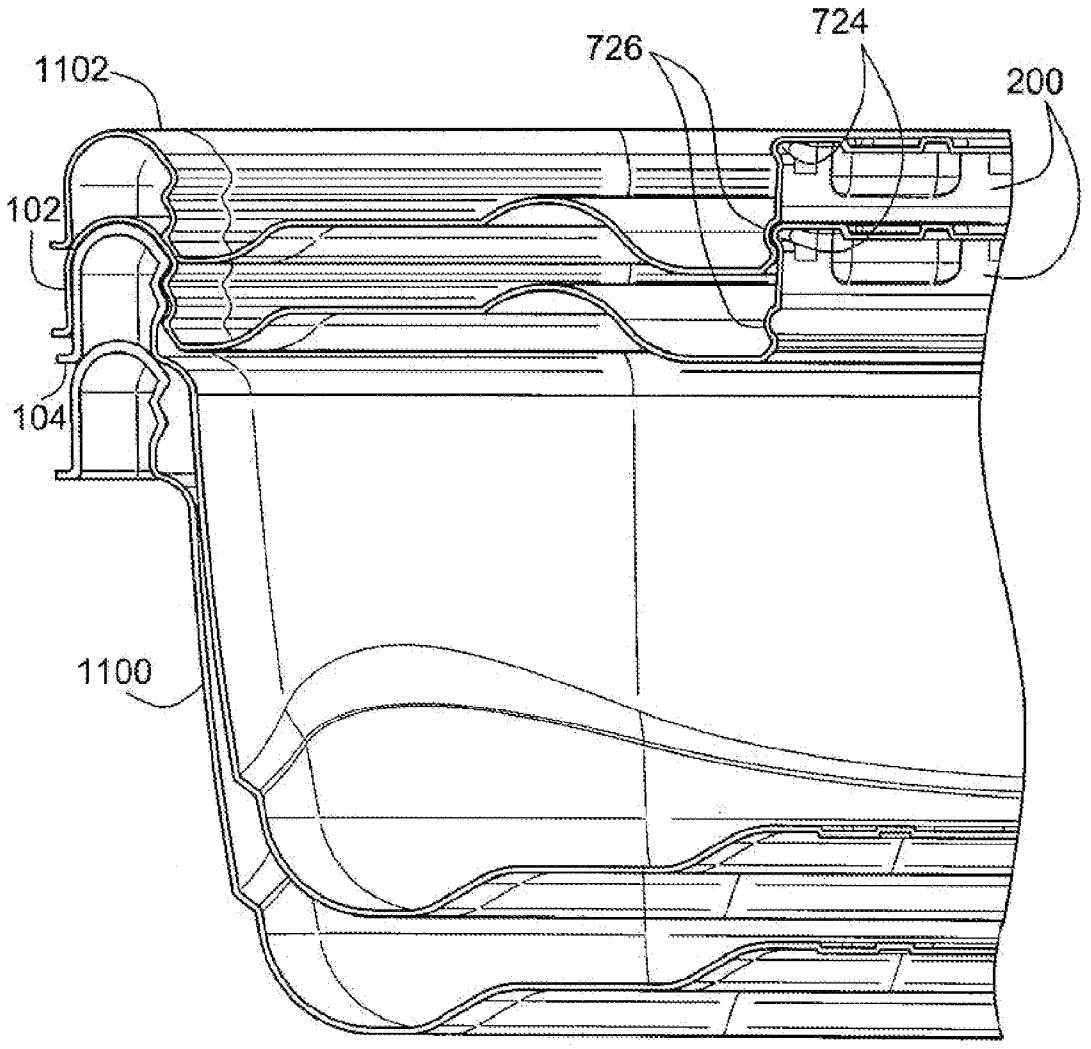


FIG. 13

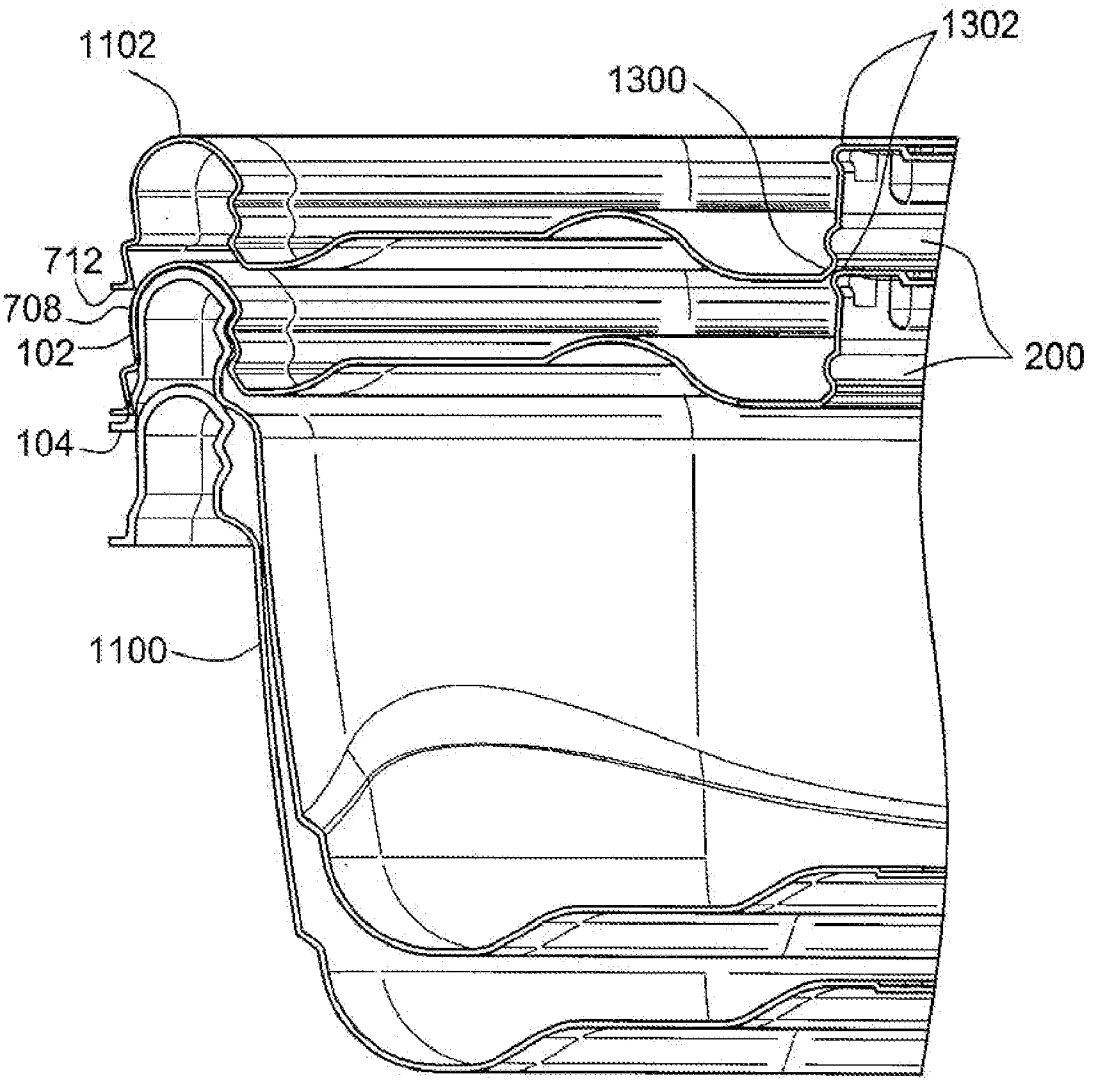


FIG. 14

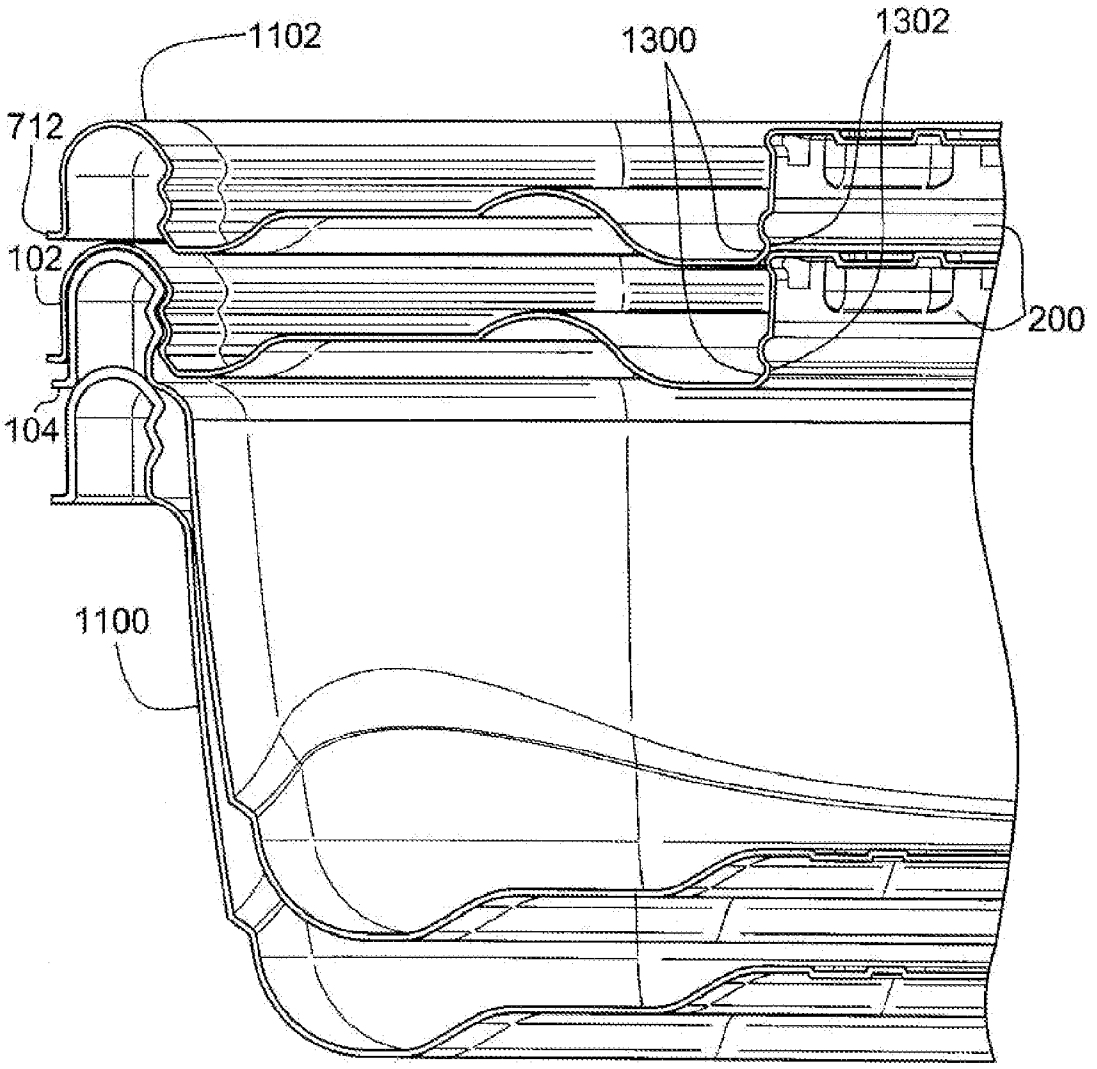


FIG. 15

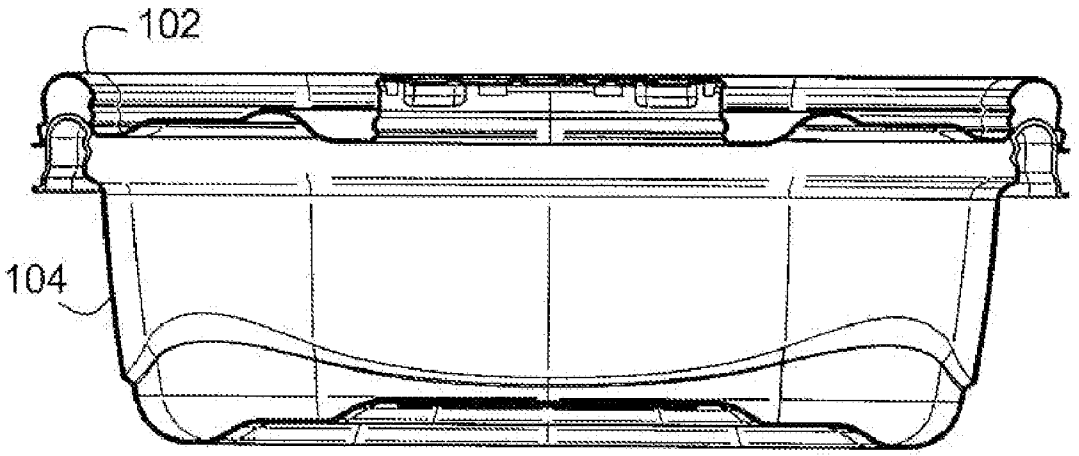


FIG. 16

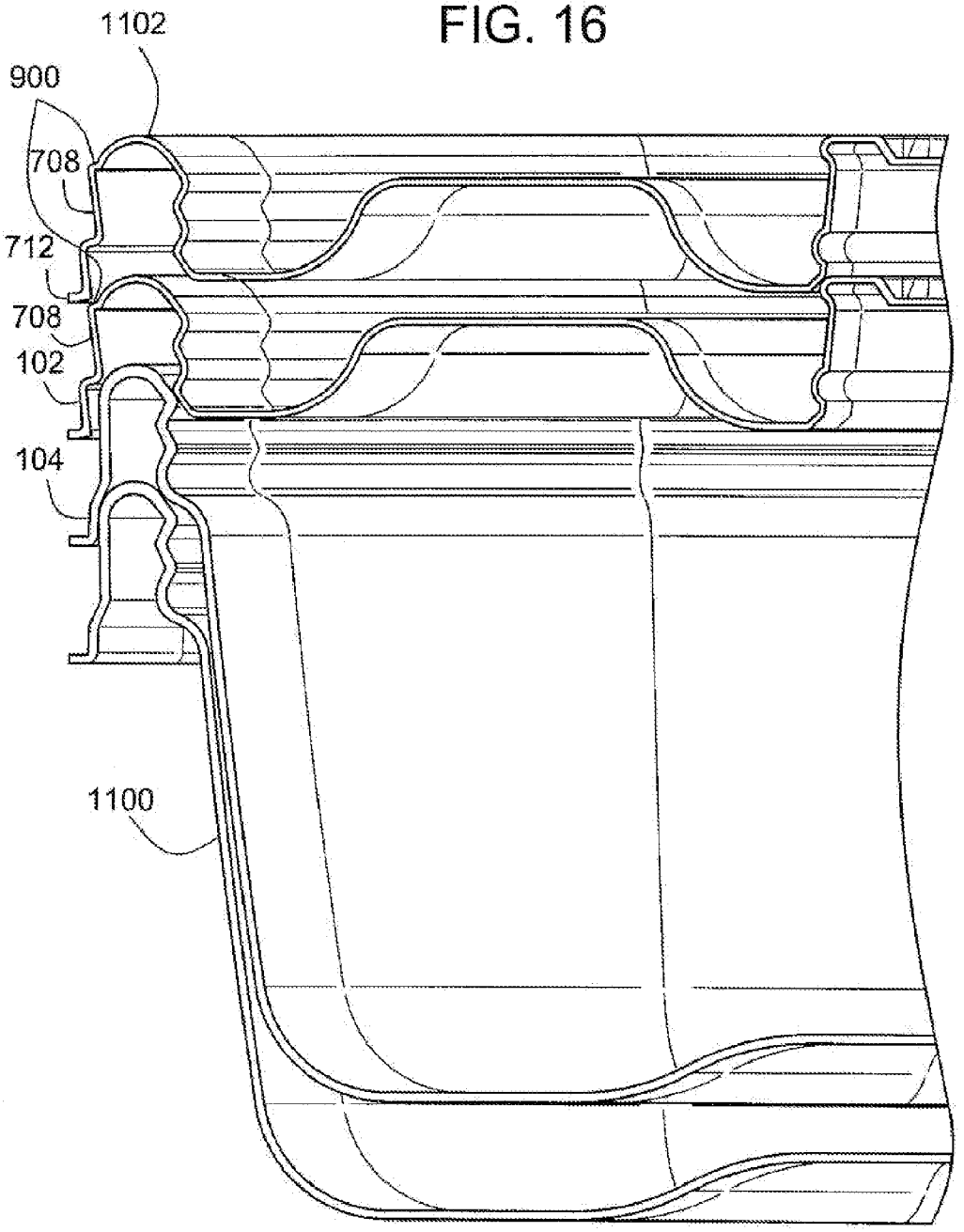


FIG. 17

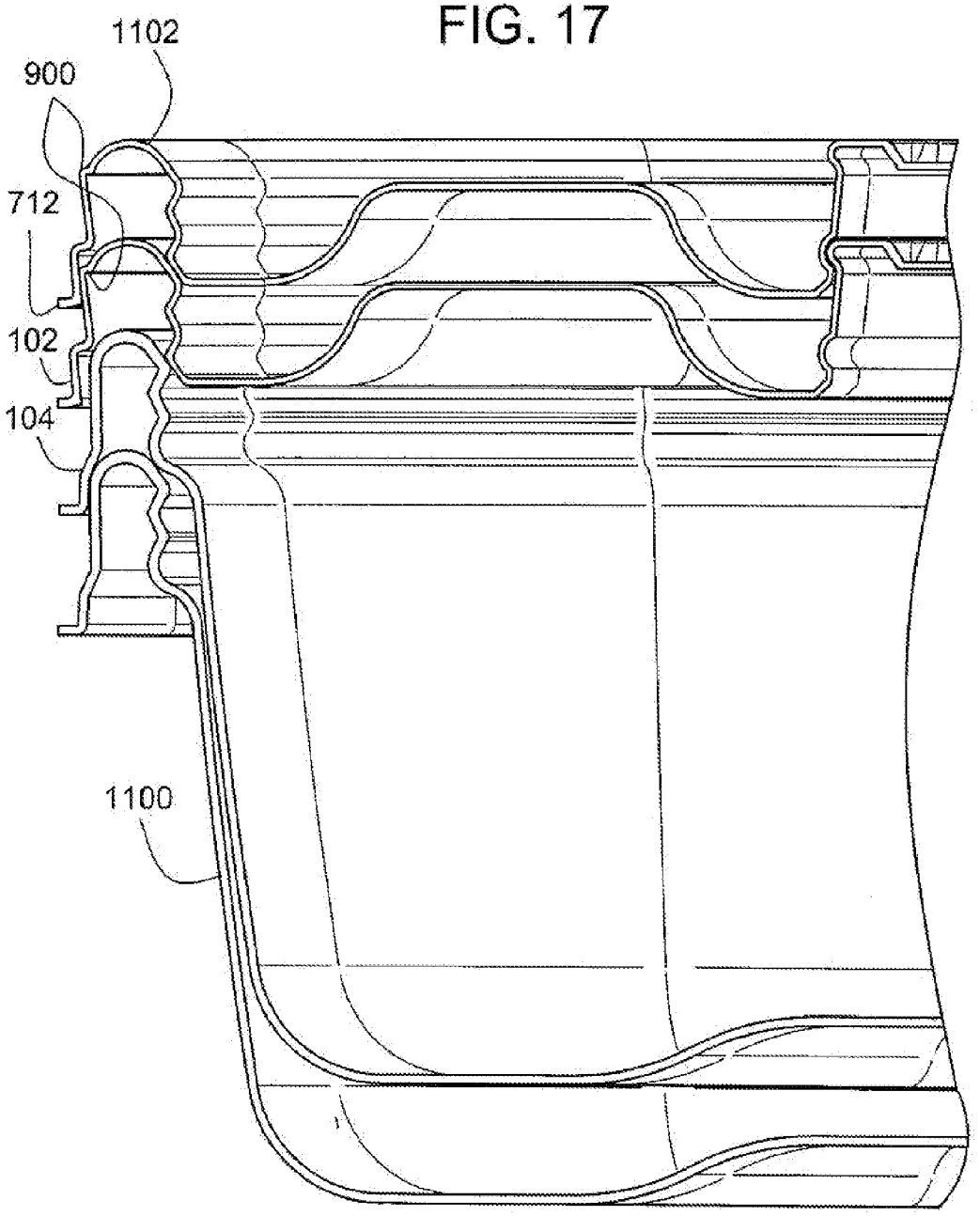


FIG. 18

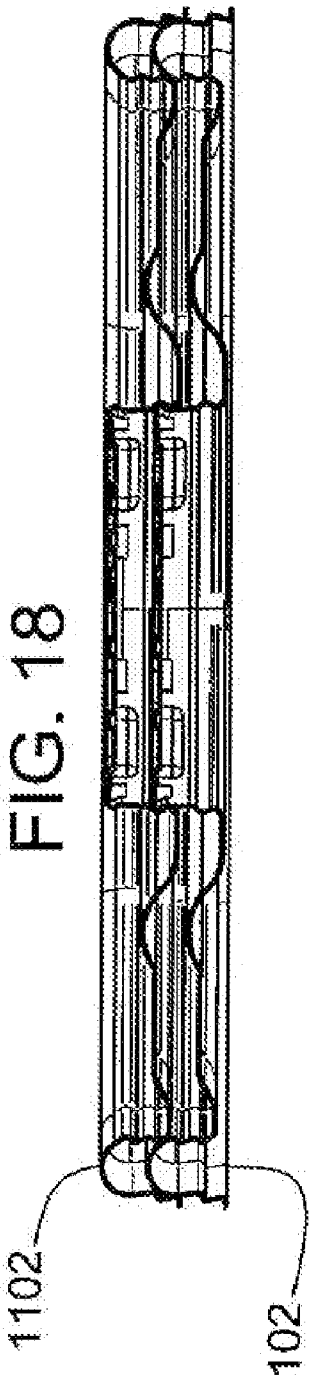


FIG. 19

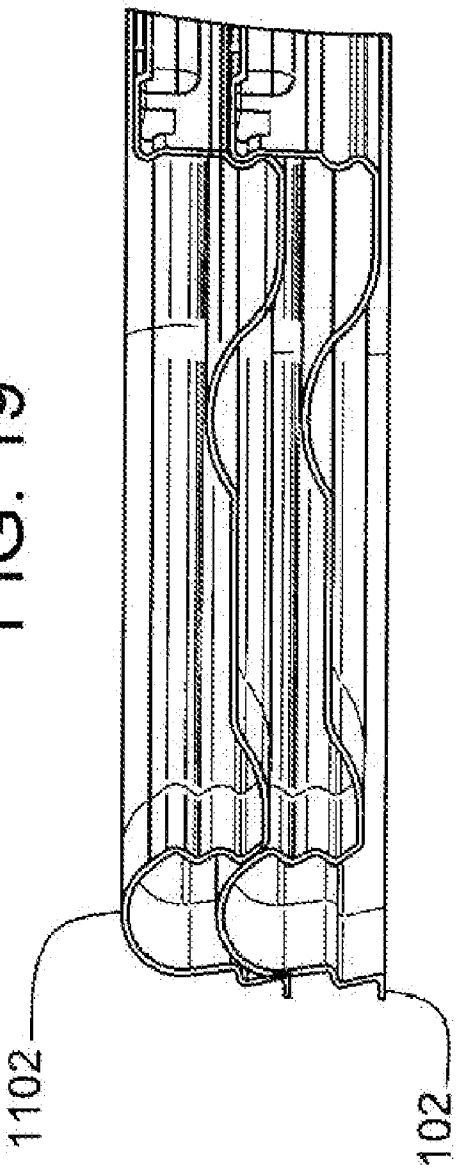


FIG. 20

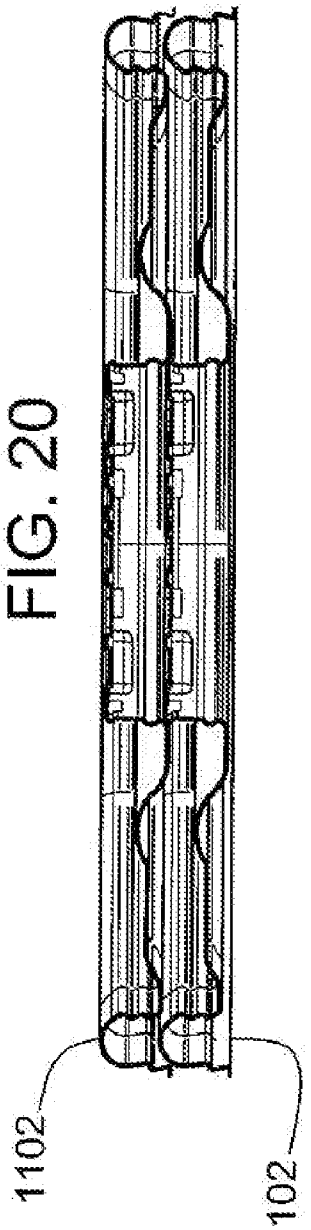
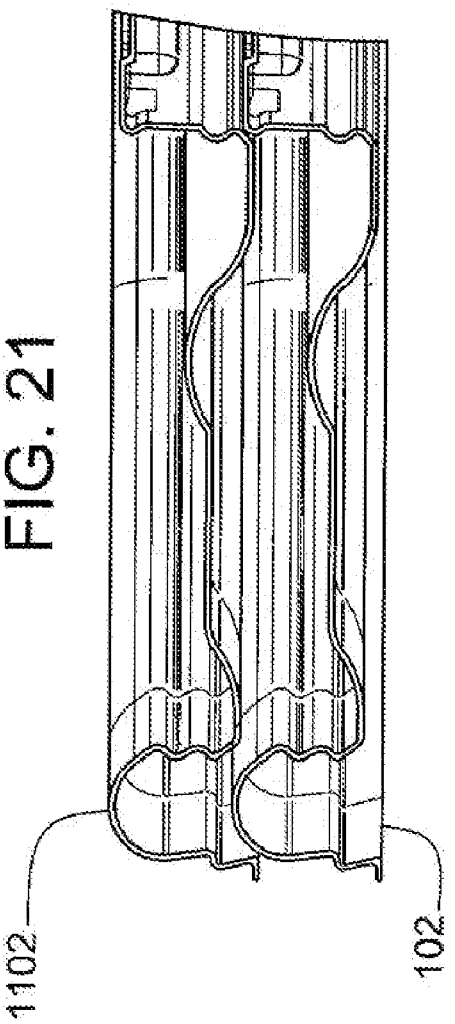


FIG. 21



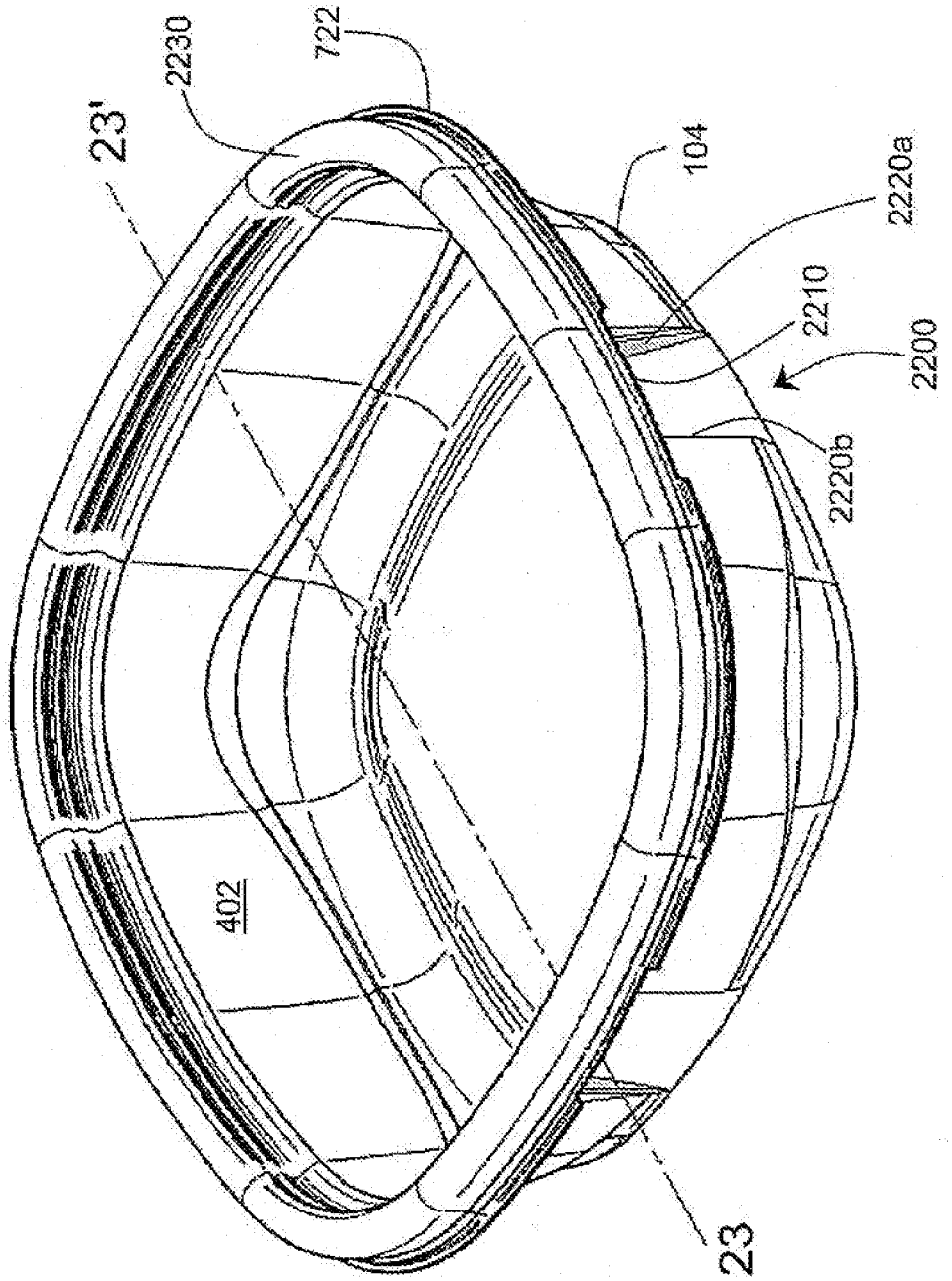


Figure 22

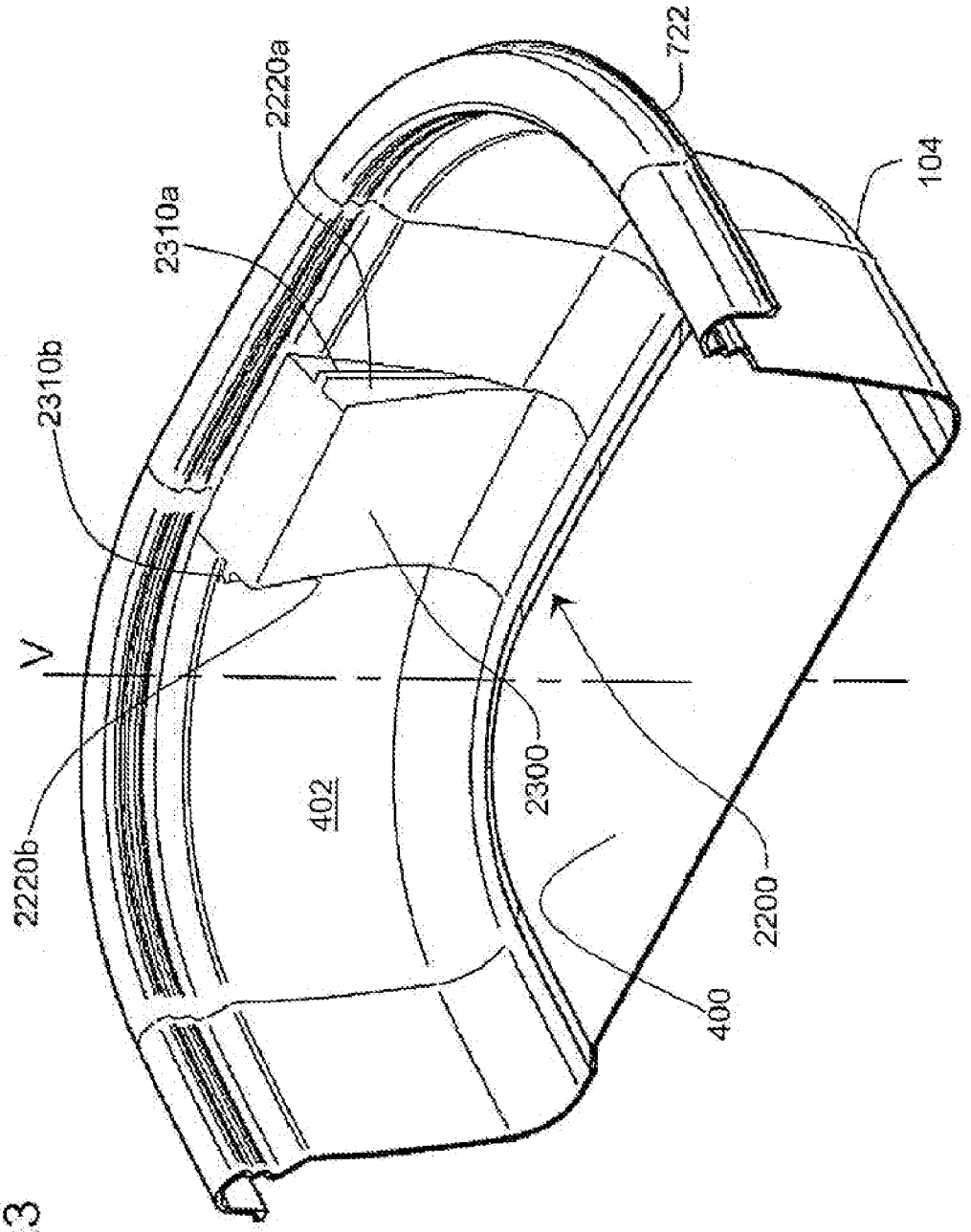


Figure 23

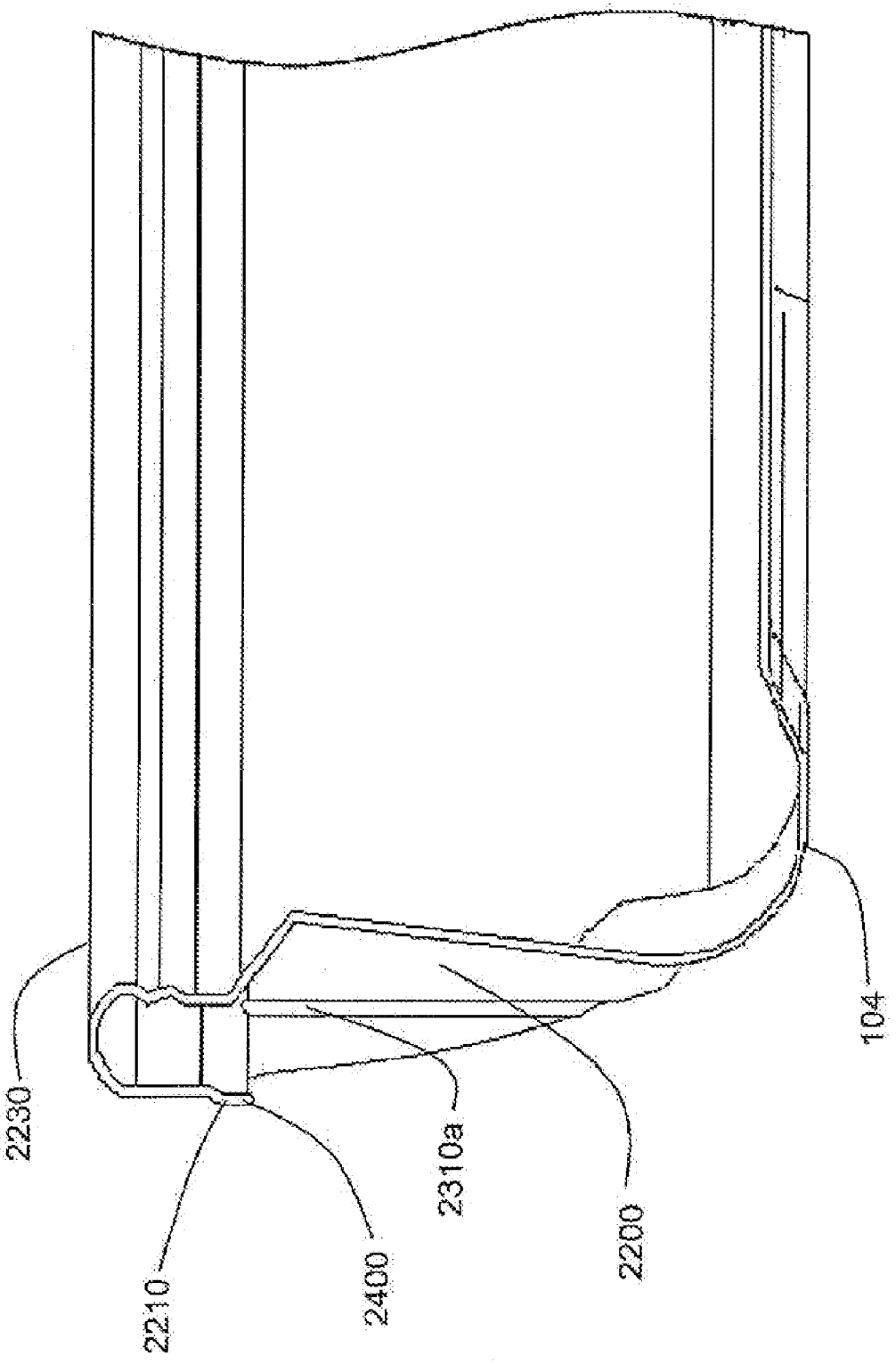


Figure 24

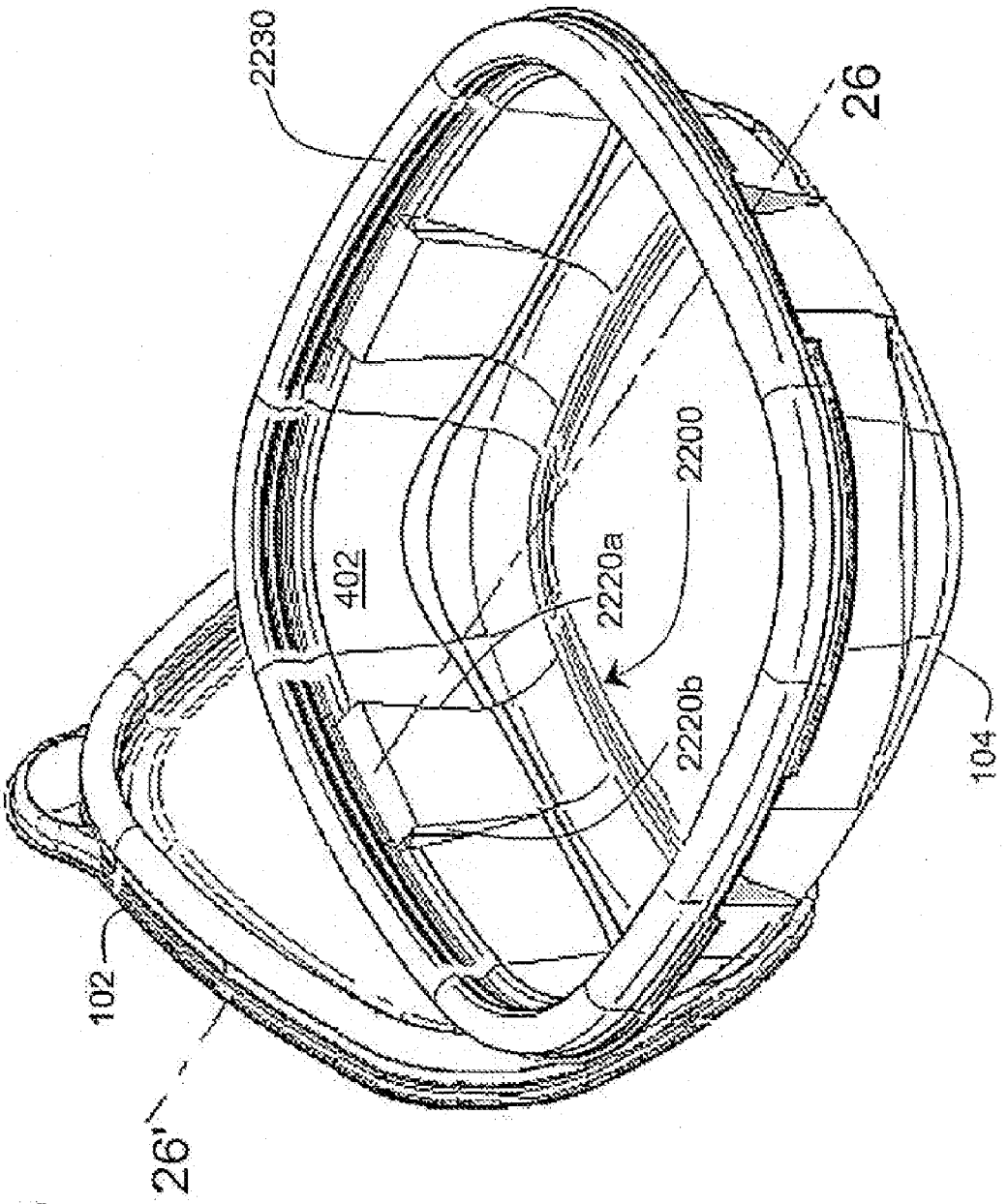


Figure 25

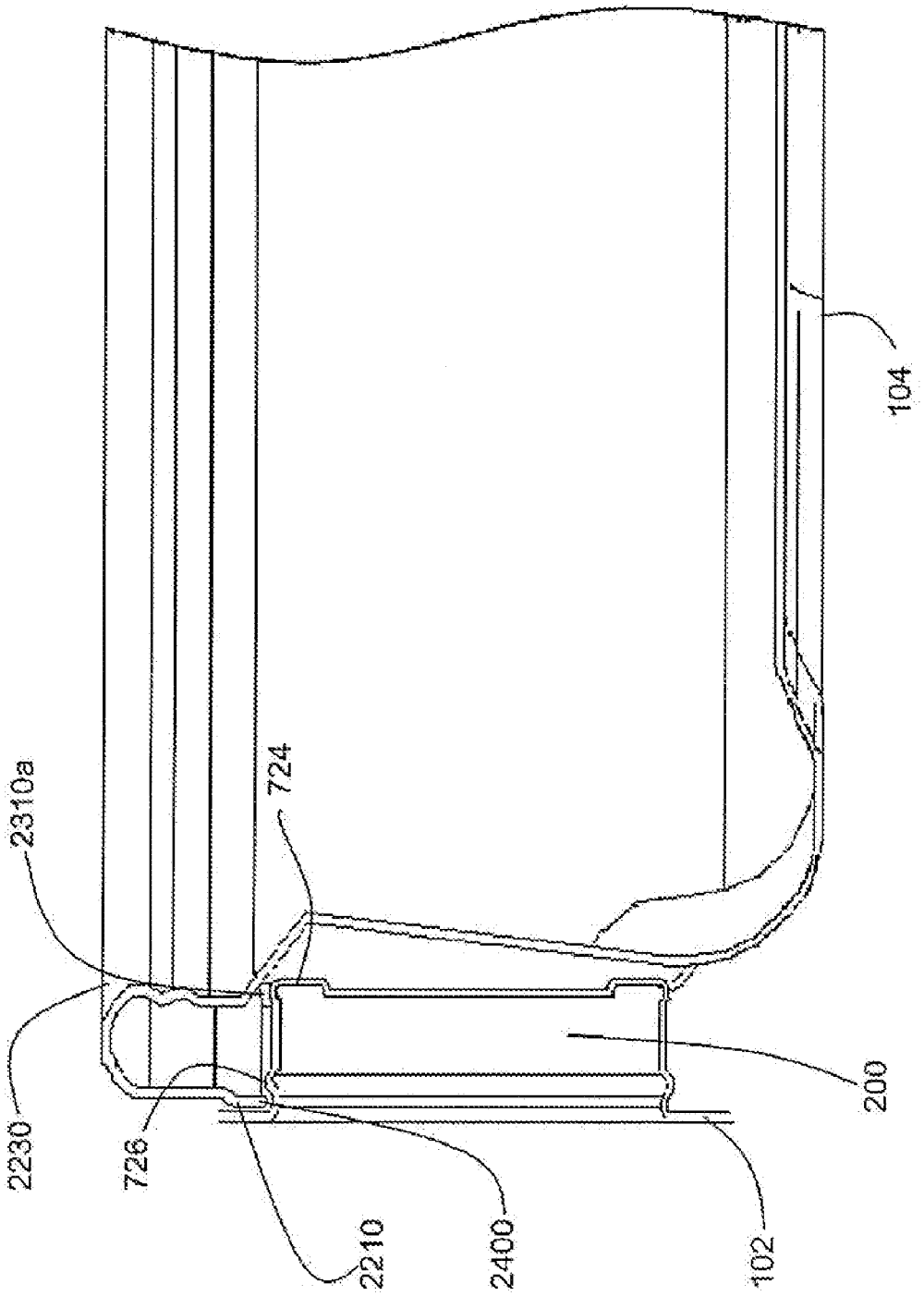


Figure 26

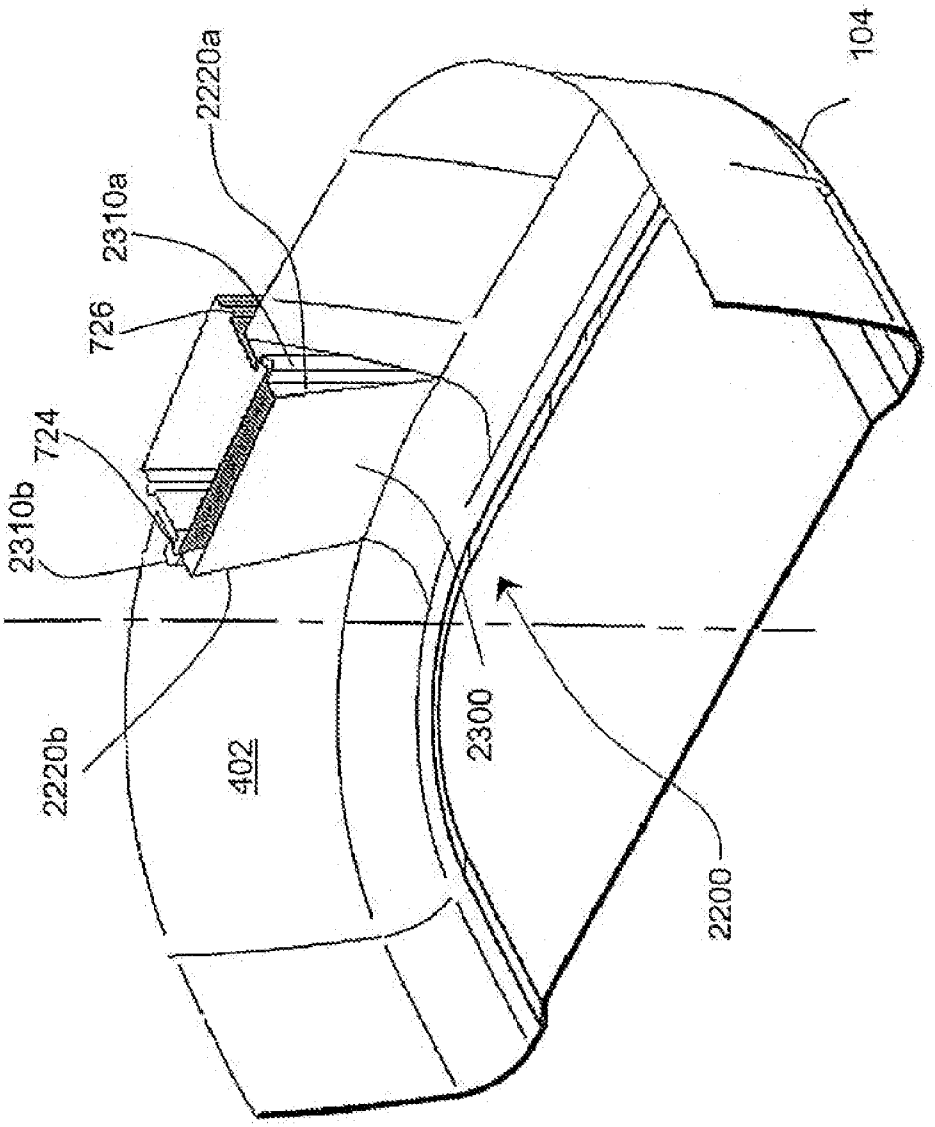


Figure 27

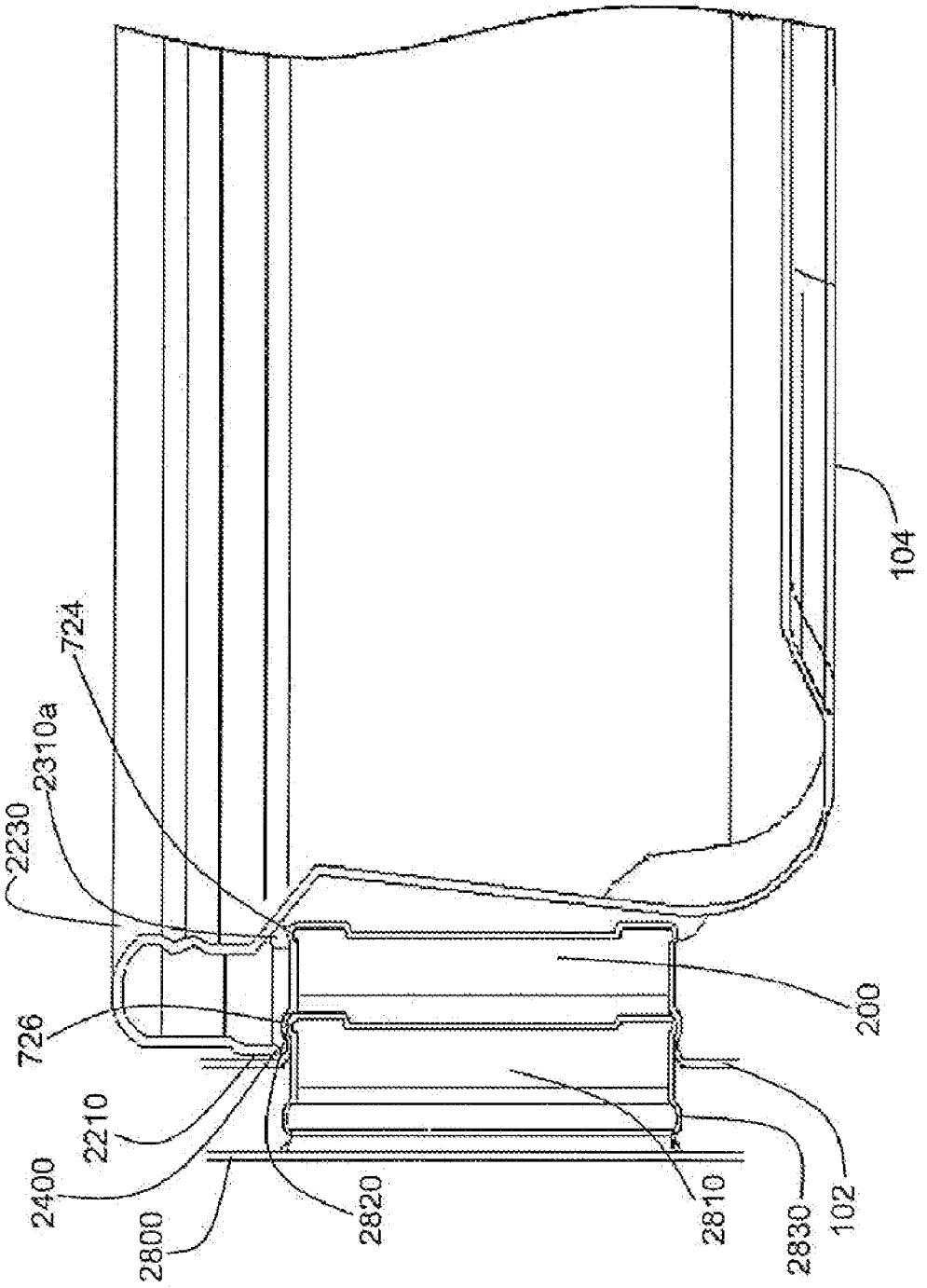


Figure 28

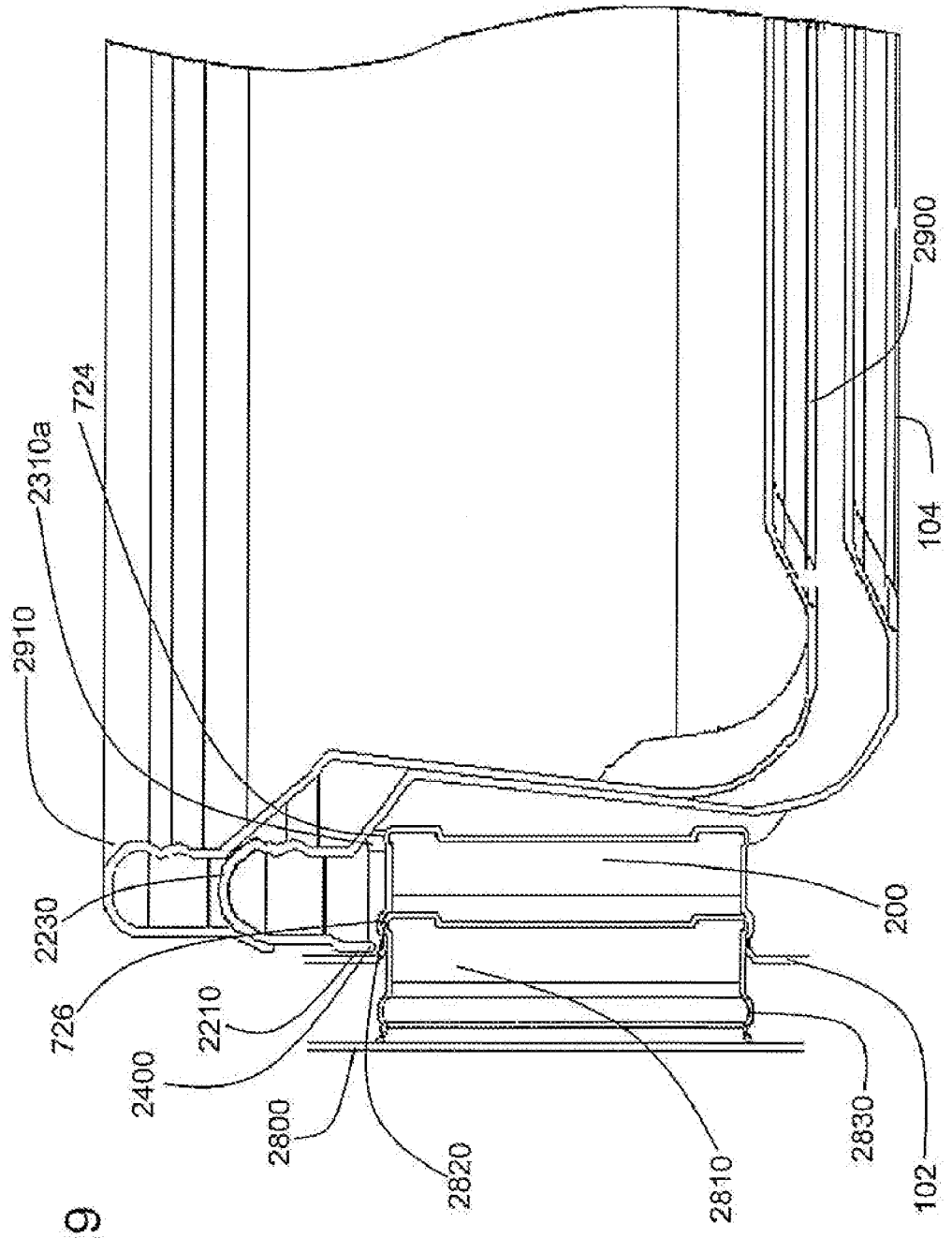

2900
724
2310a
104
2910
2230
200
726
2210
2400
2800
2820
2810
2830
102

Figure 29

CONTAINER

[0001] This application is a continuation in part of International Application No, PCT/US 06/06263, filed Feb. 22, 2006, which claims benefit of U.S. Provisional Application No. 60/655,830, filed Feb. 23, 2005.

FIELD OF THE INVENTION

[0002] The present invention relates generally to containers, and, more particularly, to containers whose covers may be locked together and further whose covers may be locked to the bases of the containers.

BACKGROUND OF THE INVENTION

[0003] Rigid, thermoplastic food containers are generally known. Users often accumulate a large number of these containers in different sizes and shapes. When not in use, the containers are often stored haphazardly into drawers. In this case, the unused containers take up a great deal of room, and finding a matching base and cover in a disarranged drawer may be difficult. To avoid this, some users stack the containers in cabinets. While the bases of the containers usually nest and therefore take up less room than in a disorganized drawer, it may still be difficult to match a base with a cover. In addition, the covers may not stack and the covers may tend to topple down. When the containers are in use to store food, the containers are often stacked one on top of another in cabinets or in a refrigerator. These stacks may be precarious, and their fall may cause food to spill from the containers. Many users would find it desirable if the containers, whether empty or in use, could be stored in a manner space efficient, less precarious, and more structurally rigid.

[0004] During large-scale manufacturing, the covers may be transported in bulk before being separated out for individual packaging. During bulk handling, manufacturers would find it desirable if the covers would form a stack stable enough to resist the vertical and lateral movements caused by forces typically encountered during manufacturing operations.

[0005] The present invention has as a general aim to provide containers that satisfy both users and manufacturers.

SUMMARY OF THE INVENTION

[0006] In view of the foregoing, the present invention provides containers whose covers can be stacked together in different ways. First, the covers can be stacked into an "aligned" stack. The aligned stack provides enough structural rigidity for bulk handling during manufacturing. Second, the covers can be stacked into a "locked" stack. The locked stack provides even more structural rigidity than does the aligned stack and is useful when storing unused covers. Another embodiment of the invention is a container with a cover engaged to the sidewall of a base. The cover can be engaged to its corresponding base. The engaged structure is firm enough to keep the cover and the base together while storing the unused container. In other embodiment of the invention, multiple covers can be engaged to a stack of multiple bases. The system of multiple covers and bases is rigid enough to keep the system intact and organized during storage of unused containers.

[0007] In some embodiments, the container cover includes a first closure portion, an engagement portion, and an alignment portion. The base includes a second closure portion. The first closure portion of the cover is sealingly engageable with the second closure portion of the base to define a substantially sealed, leak-proof, and re-sealable storage area for items such as food. The alignment portion of the cover is engageable with the alignment portion of a second cover to form an aligned cover stack. The engagement portion of the cover is engageable with the engagement portion of a second cover to form a locked cover stack. In other embodiments of the invention, the base includes a base engagement portion. The engagement portion of the cover is engageable with the base engagement portion of the base, to keep the cover attached to the sidewall of the base. When the engagement portion of the cover engages with the engagement portion of the second cover, the cover and the second cover are firmly attached to the sidewall of the base or a stack of multiple bases.

[0008] The covers and bases can be economically constructed from relatively thin-gauge plastic so that the user can either wash them after use or dispose of them with the view that their purchase price allows them to be used as a consumable good. The container can be readily manufactured, for example, with conventional thermoforming equipment. The cover can be made from a semi-transparent material to ensure satisfactory visibility of the container's contents. The container can be suitable for refrigerator, freezer, microwave, and machine dishwasher use.

[0009] The features of the present invention will become apparent to one of ordinary skill in the art upon reading the detailed description, in conjunction with the accompanying drawings, provided herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is an isometric view of a container with a cover and a base according to an embodiment of the present invention;

[0011] FIG. **2** is an isometric view of the container cover of FIG. **1**;

[0012] FIG. **3** is a top plan view of the container cover of FIG. **1**;

[0013] FIG. **4** is an isometric view of the container base of FIG. **1**;

[0014] FIG. **5** is a top plan view of the container base of FIG. **1**;

[0015] FIG. **6** is a side sectional view of the container of FIG. **1**;

[0016] FIG. **7** is an enlarged, detail view of a portion of FIG. **6**;

[0017] FIG. **8** is side sectional view of another embodiment of the container shown in FIG. **7**;

[0018] FIG. **9** is a side sectional view of another embodiment of the container shown in FIG. **7**;

[0019] FIG. **10** is a side sectional view of a stack of two sealed containers;

[0020] FIG. **11** is a side sectional view of a stack of two nested container bases with two locked container covers;

[0021] FIG. **12** is a side sectional view of another embodiment of the stack of FIG. **11**;

[0022] FIG. **13** is a side sectional view of a stack of two nested container bases with one locked container cover and with one aligned cover;

[0023] FIG. **14** is a side sectional view of another embodiment of the stack of FIG. **13**;

[0024] FIG. **15** is a side sectional view of an aligned stack of a container cover and a base;

[0025] FIG. **16** is a side sectional view of a stack of two nested container bases with two aligned container covers;

[0026] FIG. **17** is a side sectional view of a stack of two nested container bases with one aligned container cover and with one locked container cover;

[0027] FIG. **18** is a side sectional view of a locked stack of two container covers;

[0028] FIG. **19** is an enlarged, detail view of a portion of FIG. **18**;

[0029] FIG. **20** is a side sectional view of an aligned stack of two container covers;

[0030] FIG. **21** is an enlarged, detail view of a portion of FIG. **20**;

[0031] FIG. **22** is an isometric view of the base of another embodiment of the container of FIG. **1**;

[0032] FIG. **23** is an enlarged, detailed isometric sectional view of the base of FIG. **22**;

[0033] FIG. **24** is an enlarged, detailed plane sectional view of the base of FIG. **22** along section line **23-23'**;

[0034] FIG. **25** is an isometric view of an embodiment of the present invention;

[0035] FIG. **26** is an enlarged sectional view of the embodiment of FIG. **25** along axis **26-26'**;

[0036] FIG. **27** is an isometric cross-sectional view of the embodiment of FIG. **25**;

[0037] FIG. **28** is another embodiment of the present invention; and

[0038] FIG. **29** is another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0039] Turning to the drawings, wherein like reference numerals refer to like elements, a first embodiment of the present invention is illustrated in FIGS. **1** through **5**. A container **100** includes a flexible cover **102** sealingly engaged to a base **104**. In the example of FIGS. **1** through **5**, the container **100** is depicted as substantially square with rounded corners. In other embodiments of the present invention, the container **100** has other shapes such as rectangular, circular, or elliptical.

[0040] The container cover **102** can include at least one gripping tab **106** to facilitate removal of the cover **102** from the container base **104**. In some embodiments, the gripping tab **106** includes one or more cross-ribs or a textured surface to improve a user's grip on the tab **106**.

[0041] The container cover **102** illustrated in FIGS. **2** and **3** includes an engagement portion **200** that allows the cover **102** to engage with the engagement portion **200** of a second cover **102** to form a locked stack of covers **102**. This locking feature makes the resultant stack of covers more structurally rigid and thus less precarious than a traditional, non-interlocked, stack of covers.

[0042] The engagement portion **200** of FIGS. **2** and **3** is depicted as circular but, as with the shape of the container **100** itself, other shapes are possible. In some embodiments, a standard shape and configuration of the engagement portion **200** is used with covers **102** of various shapes and sizes. This enhances storage flexibility by allowing different types of covers **102** to be stored together in a locked stack. The engagement portion **200** can also be chosen to have a shape or otherwise include elements that provide an aligned or locked stack of covers **102** with rotational alignment where rotation is defined about an axis normal to the point **302** at which midlines **304** and **306** of the cover **102** intersect as shown in FIG. **3**. For instance, shapes that inherently require alignment prior to engagement or that may be self-aligning during the process of connecting engagement portions would be shapes with linear or curvilinear sides, vertices or lobes such as triangular, square, rectangular, or multi-petal shapes. Additionally, the cover may have one or more elements on or about the engagement portion that require alignment prior to connection of engagement portions or elements that may be self-aligning during the process of connecting engagement portions.

[0043] The container cover **102** may have a central field **300**, shown in FIG. **3** on the top of the engagement portion **200**. The central field **300** may include an embossed symbol such as a manufacturer's mark or may allow a user to attach a label or to write information, such as the date or user's name. When the central field **300** includes a writeable area, that area could be of an opaque color which would receive a contrasting color from a writing instrument. The writeable area could be incorporated into the material for the container cover **102** or could be applied to that material by printing.

[0044] The container cover **102** of FIGS. **1** through **3** can be constructed with a wall thickness thinner than that of a container base **104**. The cover **102** can be made from any suitable plastic and can be made by any suitable technique, such as thermoforming. In one embodiment, the cover **102** can be formed from polypropylene. Due to the thermoforming process, the wall thickness of the cover **102** can vary. A thinner container cover **102** reduces material costs and increases flexibility to more easily accommodate its removal from, and engagement with, a container base **104**. The cover **102** can maintain adequate flexibility for proper sealing even during typical freezer temperatures.

[0045] The container base **104** of FIGS. **4** and **5** includes a bottom **400** and a sidewall **402** extending from the periphery of the bottom **400**. The bottom **400** includes a raised lower section **404** to accommodate the engagement portion **200** of a container cover **102** when containers **100** are stacked together. This feature is further discussed and illustrated below. Just as the engagement portion **200** of FIG. **3** can include a central field **300**, a similar field for a manufacturer's mark or for user information could be included in the raised portion **404** of the base **104**.

[0046] The container base **104** of FIGS. **1**, **4**, and **5** can be made from any suitable plastic with sufficient thickness to

withstand without deforming the heat of microwave cooking and of top-shelf dishwashing. It should also remain sturdy during lifting while laden with hot food. The base **104** can be made from any suitable plastic and can be made by any suitable technique, such as co-extrusion, lamination, injection molding, blow-molding, thermoforming, or overmolding. In one embodiment, the container base **104** is formed from polypropylene. The wall thickness of the container base **104** can vary due to the manufacturing process.

[**0047**] FIGS. **6** through **9** present embodiments of a container **100** whose cover **102** is sealingly engaged with its base **104**. FIG. **6** shows the cover **102** cooperating with the base **104** to define a sealed storage compartment **600**. The cover **102** can be sufficiently flexible to allow a user to create a vacuum in the container **100** upon sealing. In order to create a vacuum, the user could, for example, depress the cover **102** during the closing of the container **100**. A return force imparted upon the cover **102** by the resiliency of the material of the cover **102** will urge the cover **102** to return to its normal position, thereby creating a vacuum. To facilitate convenient sealing engagement of the cover **102** with its base **104**, the users can, at their discretion, apply downward force to only the engagement portion **200** of the container cover **102**. The engagement portion **200** is located to accept and distribute the force to the first closure portion **700** of the cover **102** during sealing to the base **104**. The engagement portion **200** may also act as a convenient handle for grasping the cover **102**.

[**0048**] In the embodiments of FIGS. **6** through **9**, the container **100** uses a locking rim design that includes both inside and outside seals as will be described. The present invention can be embodied with a variety of closure designs including outer closures and/or inner closures.

[**0049**] FIG. **7** depicts an embodiment of the closure portions used to engage the cover **102** with the base **104** of the container **100**. The cover **102** includes a first closure portion **700** in the form of a raised locking ring. The first closure portion **700** of the cover **102** can be engaged with a second closure portion **702** of the base **104** to provide a leak-resistant, re-sealable closure.

[**0050**] The first closure portion **700** includes an inner wall **704**, a retention bead **706**, and an outer wall **708**. The inner wall **704**, the retention bead **706**, and the outer wall **708** define a first sealing surface, which is part of the lower surface of the cover **102**. The first closure portion **700** can include one or more locking ridges **710**. The outer wall **708** extends between the retention bead **706** and a flange **712**. The flange **712** can provide a convenient gripping surface to facilitate the removal of the cover **102** from the base **104**.

[**0051**] As illustrated in FIG. **7**, the second closure portion **702** of the base **104** is a raised locking ring that extends from an upper edge of the sidewall of the base **104**. The second closure portion **702** includes an inner wall **714**, a retention bead **716**, and an outer wall **718**. The inner wall **714**, the retention bead **716**, and the outer wall **718** define a second sealing surface, which is part of the upper surface of the base **104**. The second closure portion **702** can include one or more locking ridges **720**. The outer wall **718** extends between the retention bead **716** and a flange **722**. The flange **722** can provide a convenient gripping surface to facilitate the removal of the cover **102** from the base **104**.

[**0052**] The first and second closure portions **700** and **702** can be configured to be slightly different in size to form an interference fit therebetween. The interference fit between the first and second closure portions **700** and **702** can provide a sealing engagement between the closure portions. As a result, when the two pieces are engaged, a positive seal can be formed between the first and second sealing surfaces around the perimeters of the base **104** and of the cover **102**.

[**0053**] The engagement of the first and second closure portions **700** and **702** can be accompanied by an audible "snap" indicating that the container is securely closed.

[**0054**] In the example of FIG. **7**, the inner wall **704** of the first closure portion **700** of the cover **102** extends to the engagement portion **200**. This engagement portion **200** includes an upper protrusion **724** and a lower protrusion **726**.

[**0055**] In the embodiment of FIG. **7**, the cover **102** includes a ridge **728** on the outer wall **708** of the first closure portion **700**. FIG. **8** presents another embodiment without this ridge. In general, the first and second closure portions **700** and **702** and the engagement portion **200** shown in FIGS. **6** through **9** are examples only, and many other types of closure and engagement portions could be used with the present invention. For example, the engagement portion **200** could include complementary locking rings. As these and many other types of closure and engagement portions are well known in the art, they need not be discussed at length here.

[**0056**] FIG. **9** shows another embodiment of the cover. The cover **102** of FIG. **9** includes an alignment ridge **900** located on the outer wall **708** of the first closure portion **700**. This alignment ridge **900** is discussed in detail below.

[**0057**] In FIG. **10**, the sealed container **100** rests on top of a second sealed container **1000**. The raised lower section **404** of the base **104** of the upper container **100** accommodates the engagement portion **200** of the cover **1002** of the lower container **1000**.

[**0058**] FIGS. **11** and **12** show the utility of an embodiment of the invention when the containers are in storage. In the Figures, a stack of two nested container bases **104** and **1100** is joined to a locked stack of covers **102** and **1102**. The lower cover **102** is sealingly engaged with the upper base **104** to form a structurally rigid stack.

[**0059**] In the embodiment of FIGS. **11** and **12**, the two covers **102** and **1102** are locked together by their engagement portions **200**. As described in relation to FIG. **7**, the engagement portions **200** can each include an upper protrusion **724** and a lower protrusion **726**. Each protrusion **724**, **726** is convex on one side and concave on the other. The lower protrusion **726** of the upper cover **1102** fits over and receives the upper protrusion **724** of the lower cover **102**, thus locking the covers **102** and **1102** together. In this manner, the covers **102** and **1102** are held together and form a structurally stable cover stack. Other embodiments of the engagement portion may include one or more of the following features to enable engagement: convex portions or ribs, concave portions or ribs, linear or curvilinear undercuts, discrete snap elements or buttons, interference fits, textured surfaces, or elements that modify surface friction or tackiness at or around the point of engagement. The engaging areas that create a locking condition can be continuous about the engagement portion or discretely segmented about the engagement portion. In some embodiments, the force required to connect the covers may differ substantially from

the force required to disengage the covers. For instance, it may be beneficial during manufacturing that the force needed to connect the covers is less than the force required to separate the covers. As a result, the covers are relatively easy to connect during manufacturing, yet they will lock securely and not undesirably separate during the manufacturing process. To accomplish this, the protrusions on the engagement portion may be designed where, for a given protrusion, the upper protrusion edge comprises a gradual taper whereas the lower protrusion edge comprises a more abrupt shape. For example, in one embodiment, the shape of the protrusion may be similar to a barbed hook with gradual taper on the upper edge of the barb that would impart little resistance during engagement and with an abrupt shape on the lower edge of the barb that would impart relatively high resistance during disengagement. Conversely, it may be beneficial to design the engagement portion so that the force that needs to be applied to connect the covers is more than the force required to separate the covers, since the user may perceive that a high connecting force equates to satisfactory locking integrity, whereas a weak connecting force may lead the user to perceive that the cover stack lacks the integrity required to insure the expected organizational benefit. Thus the high connecting force provides the perceived benefit, yet a lower disengagement force does not require that the user untowardly struggle during separation of covers. To accomplish this, the protrusions on the engagement portion may be designed where, for a given protrusion, the upper protrusion edge comprises an abrupt shape whereas the lower protrusion edge comprises a more gradual taper. For example, in one embodiment, the shape of the protrusion may be a reversed barb with an abrupt shape on the upper edge of the barb that would impart relatively high resistance during engagement and with a gradual taper on the lower edge of the barb that would impart little resistance during disengagement. Furthermore, during the process where the user applies force to aligned covers in a direction normal to the general cover plane so as to lock the covers together, the engagement portion can provide tactile or audible feedback upon locking. In this way the user would sense that the covers are connected and that no further force need be applied.

[0060] The container bases **104** and **1100** are shown nested in FIGS. **11** and **12** but are not locked together. In many applications, nesting the container bases without locking them together provides sufficient structural rigidity to a stack of bases. It is possible, however, to apply the techniques of the present invention to the bases themselves and to thus provide a mechanism for locking the bases together. The same types of closure and engagement portions available for locking the covers together or for locking the covers to the bases can be adapted to locking the bases together.

[0061] The container covers **102** and **1102** of FIG. **11** include the ridge **728** described in relation to FIG. **7**, while the covers in FIG. **12** do not include this feature. The ridge **728** provides a rigidifying function to the outer wall **708** and also provides a retaining ledge to assist de-nesting of covers during manufacture.

[0062] FIGS. **13** and **14** present another position for the stack of covers in FIGS. **11** and **12**. The container bases **104** and **1100** are nested together and the lower cover **102** is locked onto the upper base **104**. However, the upper cover **1102** is not locked to the lower cover **102**. Instead, the upper cover **1102** is resting on, and aligned with, the lower cover **102**. In this configuration, the two covers **102** and **1102** are said to form an "aligned" stack to distinguish it from the locked stack of FIGS. **11** and **12**. The ability to form an aligned, but not locked, stack is important in manufacturing because it allows the covers to be transported in bulk before being separated out for individual packaging. The aligned stack is stable enough to resist the vertical, lateral, or rotational movements caused by forces typically encountered during manufacturing operations, but the covers are not so strongly connected that they hinder de-nesting when necessary.

[0063] The tab **106** (see FIG. **1**) can be designed so that the tabs nest in an interdigitating fashion when in a stack of covers so that the covers are kept in an aligned configuration. In one embodiment, the design of the tab **106** permits stable cover-to-cover stacking in the immediate vicinity of the tab **106** in the locked state, such that a portion of the tab **106** comes to rest on a portion of the cover below it in the stack to provide resistance to further stack compression.

[0064] In the embodiment of FIG. **13**, the covers **102** and **1102** align by touching in two areas. First, the engagement portions **200** of the covers **102** and **1102** each includes a lower shoulder **1300** and an upper shoulder **1302**. The lower shoulder **1300** of the upper cover **1102** rests on the upper shoulder **1302** of the lower cover **102**. Second, the flange **712** of the upper cover **1102** rests on the outer wall **708** of the lower cover **102**. These two contact areas serve to align the covers **102** and **1102** into a stack less structurally rigid than a locked stack, but sufficiently rigid for many purposes. Comparing FIGS. **11** and **13** shows how an aligned stack can be converted into a locked and rotationally aligned stack by an application of pressure upon the stacked items. FIG. **11** shows that when force is applied to the aligned stack of FIG. **13** to create a locked stack, the flange **712** of the upper cover **1102** is pushed farther down the outer wall **708** of the lower cover **102**. Cover alignment is further rigidified by the touching of covers **102** and **1102** at the inside wall of the closure portions. In the embodiment of FIG. **11**, the cover inner wall **704** includes an upper shoulder **1104** located just above the uppermost locking ridge **710** and a lower shoulder **1106** located just below the lowermost locking ridge **710**. Thus, in this pair of locked covers, the lower shoulder **1106** of the cover **1102** rests on the upper shoulder **1104** of the cover **102**. Considering both FIGS. **11** and **13**, the flange **712** that creates an aligned condition can be continuous along the perimetric path of the first closure portion **700** or discreetly segmented along the perimetric path of the first closure portion **700**. Considering FIG. **12**, the contacting shoulders **1104** and **1106** of the inside wall **704** that create an aligned condition between locked covers can be continuous along the perimetric path of the first closure portion **700** or discreetly segmented along the perimetric path of the first closure portion **700**. In some embodiments, this alignment feature may be desirable to ensure that the connected covers are aligned rotationally about an axis normal to the center of the covers, especially when the covers include engagement portions that permit rotation between the covers. In some embodiments, if the alignment feature were absent, then the covers would be free to rotate. Free rotation could have undesirable consequences because the cover stack may be inadequately organized to facilitate manufacturing or may inadequately provide an organizational benefit to the user.

[0065] The embodiment of FIG. **14** differs from that of FIG. **13** in that the flange **712** of the upper cover **1102** does not come down far enough to touch the lower cover **102** when the covers **102** and **1102** are in an aligned stack. Variations such as those between the embodiments of FIGS. **13** and **14** can be chosen to alter the amount of rigidity present in an aligned stack. Even though the flange **712** of the upper cover **1102** does not come down far enough to touch the lower cover **102** in this less rigid aligned stack, the contact between the lower shoulder **1300** of the engagement portion **200** of the upper cover **1102** and the upper shoulder **1302** of the lower cover **102** can provide concentric or rotational alignment to assist the user in aligning the engagement portions **200** during the process of connecting covers. Comparing FIGS. **12** and **14** shows how an aligned stack can be converted into a locked and rotationally aligned stack by an application of pressure upon the stacked items. FIG. **12** shows that when force is applied to the aligned stack of FIG. **14** to create a locked stack, the cover alignment is further rigidified by the touching of covers **102** and **1102** in two areas. First, the flange **712** of the upper cover **1102** rests on the outer wall **708** of the lower cover **102**. Second, the lower shoulder **1106** of the upper cover **1102** rests on the upper shoulder **1104** of the lower cover **102**. In some embodiments, this alignment feature may be desirable to ensure that the connected covers are aligned rotationally about an axis normal to the center of the covers, especially when the covers may include engagement portions that permit rotation between the covers.

[0066] FIG. **15** shows that containers cover **102** can be aligned, without locking, onto the top of a container base **104**. FIG. **16** shows an aligned stack of two covers **102** and **1102** on top of a nested stack of bases **104** and **1100**. FIG. **17** differs from FIG. **16** in that the upper cover **1102** is locked onto the lower cover **102**. Comparing FIGS. **16** and **17** shows how an aligned stack can be converted into a locked stack by an application of pressure upon the stacked items.

[0067] FIG. **16** also shows another embodiment of the alignment portion of the container covers **102** and **1102**. An alignment ridge **900** is located on the outer wall **708** of the covers **102** and **1102**. When in an aligned stack, the flange **712** of the upper cover **1102** rests on the alignment ridge **900** of the lower cover **102** increasing the rigidity of the stack. FIG. **17** shows that when pressure is applied to the aligned stack to create a locked stack, the flange **712** of the upper cover **1102** is pushed past the alignment ridge **900** of the lower cover **102**.

[0068] FIGS. **18** and **19** emphasize the compactness of a locked stack of container covers **102** and **1102**, while FIGS. **20** and **21** emphasize the compactness of an aligned stack of container covers. While the aligned stack is not quite as compact as the locked stack, the compactness of either stack is a significant benefit of the present invention when covers are stored for future use.

[0069] FIG. **22** shows another embodiment of the container **100** of FIG. **1**. As mentioned above, the container **100** has the cover **102** and the base **104**. As mentioned earlier, the base **104** and the cover **102** are made from a process selected from the group consisting of thermoforming, blow molding, injection molding, and combinations thereof. As shown in FIG. **22**, the base **104** of the container **100** includes a base engagement portion **2200** and an upper retaining edge **2210**. The base engagement portion **2200** comprises a first sidewall **2220***a* and a second opposing sidewall **2220***b*. The flange **722** (see also FIG. **7**) is notched to remove a part of the flange **722** in an area adjacently above the base engagement portion **2200** thereby defining the upper retaining edge **2210**. As best seen in FIG. **26**, the base engagement portion **2200** is receivingly engageable with the upper protrusion **724** of the cover engagement portion **200** of the cover **102**. The upper retaining edge **2210** is engageable with the lower protrusion **726** of the cover engagement portion **200** of the cover **102**. FIG. **22** shows another base engagement portion disposed on the sidewall **402**. In another embodiment of the present invention, four base engagement portions may be present on the sidewall **402** of the base **104**. The base **104** shown in FIG. **22** also comprises an open top **2230**.

[0070] FIG. **23** illustrates the base engagement portion **2200** in a more detailed manner. FIG. **23** illustrates an isometric sectional view of the base **104** shown in FIG. **22** along section line **23'-23'**, in accordance with an embodiment of invention. The base engagement portion **2200** comprises a backwall **2300**, a first sidewall **2220***a* and a second opposing sidewall **2220***b*. The backwall **2300** extends from the bottom **400** of the tub **104** and joins the first sidewall **2220***a* and the second opposing sidewall **2220***b*. The first sidewall **2220***a* and the second opposing sidewall **2220***b* each include a groove **2310***a* and **2310***b*, respectively. In the present embodiment of the invention, the grooves **2310***a* and **2310***b* are concave surfaces and disposed parallel to a vertical axis V normal to the plane of bottom **400**, as shown in FIG. **23**. The grooves **2310***a* and **2310***b* are flexible and elastic enough to engage with a convex protrusion portion of similar size and curvature, present on the cover engagement portion **200** of the cover **102**. In an embodiment of the present invention, the grooves **2310***a* and **2310***b* are engageable with the upper protrusion **724** of the cover engagement portion **200** of the cover **102**. When the cover engagement portion **200** is engaged with the base engagement portion **2200** of the base **104**, the grooves **2310***a* and **2310***b* are engaged with the upper protrusion **724** of the cover engagement portion **200**, and the upper retaining edge **2210** is engaged with the lower protrusion **726**. In other embodiments of the present invention, the first sidewall **2220***a* and the second opposing sidewall **2220***b* can have one or more grooves of same or different kinds, which are engageable with their corresponding upper protrusions present on the cover engagement portion of the cover. In yet another embodiment, grooves **2310***a* and **2310***b* need not be continuous along the entire length of first sidewall **2220***a* and the second opposing sidewall **2220***b*, respectively, but rather may be formed as one or more discrete sections. In the present embodiment of the invention, the shape of the base engagement portion **2200** has a rectangular wedge shape. However, in other embodiments of the present invention, any other shape of the base engagement portion is possible. In the present embodiment of the invention, the first sidewall **2220***a* and the second opposing sidewall **2220***b* are shown parallel and opposite. However, in other embodiments of the present invention, curved and non-parallel sidewalls are also possible.

[0071] FIG. **24** illustrates an enlarged plane sectional view along the vertical axis V, shown in FIG. **22**, of the base engagement portion **2200**, in accordance with an embodiment of the present invention. In this embodiment of the

present invention, the upper retaining edge **2210** comprises a convex peripheral edge **2400**. The convex peripheral edge **2400** is engageable with the lower protrusion **726** of the cover **102**. In other embodiments of the present invention, other mechanisms for engaging between an upper retaining edge of a base and a cover engagement portion of a cover are possible. For example, the upper retaining edge may comprise a detent groove and the cover engagement portion may comprise a rib, the rib being engageable with the detent groove. In other embodiments of the present invention, the strength of snap fit between the upper retaining edge and the cover engagement portion can be improved by providing an undercut with protrusions on the upper retaining edge and a lower protrusion on the cover engagement portion. In one embodiment, backwall **2300** need not protrude into base **104** to the extent depicted in FIG. **24**. Backwall **2300** need only extend just past grooves **2310***a* & **2310***b*, allowing for adequate space for cover **102** to travel and lock within grooves **2310***a* & **2310***b*. Further, Grooves **2310***a* and **2310***b* need not be linear. They may be shaped in concave patterns to allow for positive placement and fit of covers **102** when engaged

[**0072**] FIG. **25** illustrates one embodiment of the present invention, in which the cover **102** is engaged with the base **104** on the sidewall **402**. In this embodiment of the invention, the cover engagement potion **200** (see also FIG. **7**) is receivingly engaged with the base engagement portion **2200** of the base **104**. Base engagement portion **2200** may be developed to accommodate a variety of cover engagement portions either by shape, size or groove patterns. Engagement between base and cover may be snap fit or friction fit. Lids may be rotationally aligned if upper lid engagement protrusion is shaped other than circular. The embodiment of the present invention shown in FIG. **25** is helpful in organizing the base **104** and the cover **102** of the container **100**, when the cover **102** is not sealingly engageable with the base **104** to define a sealed storage volume. The embodiment of invention shown in FIG. **25** is also helpful in reducing the effort of a user to search for the cover **102** of the base **104** in a storage area, as the cover **102** can be engaged with the base **104**. Another application of the present embodiment may be to avoid the intermixing and misplacing of the different covers and bases of different containers, as the covers are engageable to corresponding bases. The transportation and storage of containers with the covers engaged with a sidewall of the corresponding bases is organized. A snap fit between the cover and the base is firm enough to keep the system rigid, and the cover is releaseably lockable and may be removed from sidewall of the base by applying force when required.

[**0073**] FIG. **26** illustrates a plane sectional view of the FIG. **25** along axis **26-26'**, in accordance with an embodiment of the present invention. The cover engagement portion **200** and the base engagement portion **2300** are engaged with each other. In an embodiment of the present invention, the upper protrusion **724** is engaged with the grooves **2310***a* and **2310***b* of the base engagement portion **2200** and the lower protrusion **726** of the cover engagement portion **200** engages with the convex peripheral edge **2300** of the base **104**. The engaging feature of the cover **102** and the base **104** is firm enough to keep the cover **102** engaged in a vertical position on the sidewall **402** of the base **104**. The convex peripheral edge **2400** of the upper protrusion **724** is about the same size of the grooves **2310***a* and **2310***b*. When the cover **102** and the base **104** are engaged together, the convex surface of the upper protrusion **724** and the concave surface of the grooves **2310***a* and **2310***b* may be snap-fitted due to the flexible and elastic nature of the cover **104**. In other embodiments of the present invention, there may be more than one upper protrusion on the cover engagement portion with corresponding number of grooves on the base engagement portion. In yet other embodiments of the invention, the cover engagement portion can comprise a groove in place of the upper protrusion and a corresponding convex protrusion on the base engagement portion. In other embodiments of the present invention, the cover can be attached at an angle to the sidewall of the base.

[**0074**] FIG. **27** illustrates an isometric sectional view of the embodiment of present invention shown in FIG. **25**. The cover engagement portion **200** is engaged with the base engagement portion **2200** of the base **104**. In present embodiment of the invention, the upper protrusion **724** of the cover engagement portion **200** is engaged with the grooves **2310***a* and **2310***b* of the base engagement portion **2200**. The upper protrusion **724** of the cover engagement portion **200** is a convex surface of same size and curvature as that of the grooves **2310***a* and **2310***b*. In other embodiments of the invention, there can be one or more grooves on the base engagement portion of the base and corresponding number of upper protrusions on the cover engagement portion of the cover. The flexible and elastic material of the cover **102** and the base **104** provides a snap fit between the upper protrusion **724** and the grooves **2310***a* and **2310***b*. The cover **102** is releaseably lockable and can be removed by applying force. In the embodiment shown in FIG. **25**, the base engagement portion **2200** has a rectangular wedge shape, but in other embodiments of the present invention, other shapes are possible.

[**0075**] FIG. **28** illustrates another embodiment of the present invention. The embodiment of the present invention shown in FIG. **28** comprises the cover **102**, a second cover **2800** and the base **104**. In an embodiment of the present invention, the cover **104** comprises the cover engagement portion **200**. The cover engagement portion **200** comprises the upper protrusion **724** and the lower protrusion **726**. The second cover **2800** comprises a second cover engagement portion **2810**. The second cover engagement portion **2810** of the second cover **2800** comprises a second upper protrusion **2820** and a second lower protrusion **2830**. The base engagement portion **2200** of the base **104** comprises grooves **2310***a* and **2310***b*. When the cover **102** is engaged with the base **104**, the upper protrusion **724** engages with the grooves **2310***a* and **2310***b*, and the lower protrusion **726** engages with the upper retaining edge **2210** of the base **104**. FIG. **28** shows the second cover **2800** being engaged with the cover **102**, wherein the second upper protrusion **2820** of the second cover **2800** is engaged to the lower protrusion **726** of the cover **102**. In other embodiments of the present invention, additional covers can be engaged to the embodiment shown in FIG. **28** with an upper protrusion of a third cover engaging to the second lower protrusion **2830** of the second cover **2800** and so on for yet additional covers. In another application of the present invention, multiple covers engaged with a base will be helpful in organizing a set of similar containers. In other embodiments of the present invention, a set of containers having different sizes of covers and bases, but having cover engagement portions of the covers of a

standard size, may engage to a single base. This may help save both time and space for organizing containers.

[0076] FIG. **29** illustrates another aspect of the present invention. The embodiment of the present invention shown in FIG. **29** comprises the base **104** a second base **2900**, the cover **102** and the second cover **2800**. In other embodiments of the present invention, multiple bases of similar shape and size can be stacked together to form a stack of bases as described in FIG. **11**. In the present embodiment of the invention, the open top **2230** (FIG. **22**) of the base **104** is engaged with a second open top **2910** of the second base **2900**. The cover **102** and the second base **2800** are stacked together to help in organizing containers **100** in a space saving manner. The cover **102** and the second cover **2800** are engageable with each other as shown in FIG. **11**. In present embodiments of the invention, the cover **102**, the second cover **2800**, the base **104** and the second base **2900** are arranged in an organized and space saving manner. In other embodiments of present invention, one or more covers and bases of similar containers can be stacked together and a system of multiple covers engaged to a stack of multiple bases is possible. The present embodiment of the invention saves the effort of a user searching for covers and bases of containers and saves the space for storage of containers. In other embodiments of the present invention, during packaging of the multiple containers, the covers are first stacked together and then the bases stacked together, the stack of covers and stack of bases being snapped together. This allows efficient packing of the containers thus reducing the requirement of packaging material.

[0077] In various embodiments of the present invention, a container comprises a base and a cover, wherein the engaging feature of the cover to a sidewall of the base helps in arranging the container in an organized and ordered manner. Further, in the case of multiple covers and bases, traditional random storage and misplacement of covers and bases can be avoided by engaging the covers to the respective bases. During transportation of the containers, the stack of the covers and stack of bases can be further engaged together to save packaging material and space requirement during transportation.

[0078] The container can be reusable, but it can also be constructed cheaply enough that consumers see it as a disposable item, with replacement covers and bases available separately for retail sale. The base and the cover can be fabricated by thermoforming a clarified polypropylene homopolymer material. In another embodiment, the container may be fabricated by thermoforming a clarified random copolymer polypropylene material. Other plastic materials which would be suitable for fabricating the container by thermoforming include PS (polystyrene), CPET (crystalline polyethylene terephthalate), LDP (low-density Polythenes), APET (amorphous polyethylene terephthalate), HDPE (high density polyethylene), PVC (polyvinyl chloride), PC (polycarbonate), and foamed polypropylene. The material used can be generally transparent to allow a user to view the contents of the container.

[0079] The container may include a visual indication of closure between the container cover and the container base. The visual indication may be a color change in the area where the cover engages the base. In one embodiment, the closure portion on the cover may be a first color and the closure portion on the base may be a second color. When the closure portions are engaged, the first and second colors produce a third color which is visible to the user to indicate that the container is sealed.

[0080] The container may include a rough exterior surface to reduce slipping and to improve grasping by the user, especially if the user's hands are wet or greasy.

[0081] The container may include a self-venting feature. The pressure in the sealed container may increase when the sealed container and contents are heated in a microwave oven. Thus, the container cover may include a self-venting mechanism which opens when the pressure in the container exceeds a predetermined value.

[0082] The container may be divided to separate foods in the container. A divider may be integral with the container or may be a separate component. Either the base only may include a divider or both the base and the cover may each include a divider. The divider located in the cover may only partially engage the divider in the base so as to provide splash protection, or it may fully engage the divider in the base to provide varying degrees of inter-compartmental leak resistance.

[0083] The container may include a strip indicating the temperature of the container and its contents.

[0084] The gripping tab can include a relieved portion that provides less interference contact with the base during the removal or engagement of the cover while still providing an adequate closure portion to maintain proper sealing of the container. The relieved portions of the gripping tab permit venting by allowing a portion of the cover to be unsealed from the base while still maintaining a seal around the remaining perimeter of the container. This feature is useful in microwave cooking where the cover prevents food from splattering onto the inside surface of the microwave while still allowing the container to vent. By using the gripping tab, less force is required to remove the cover from the base. This lower opening force also reduces the possibility of container failure from stress and fatigue. The lower opening force can improve the ability of the user to maintain control over the container components while removing the cover from the base and thus to reduce the possibility of spilling the contents stored in the container.

[0085] The use of the terms "a,""an,""the," and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise indicated.

[0086] While the invention is described herein in connection with certain preferred embodiments, there is no intent to

limit the present invention to those embodiments. On the contrary, it is recognized that various changes and modifications to the described embodiments will be apparent to those skilled in the art upon reading the foregoing description, and that such changes and modifications may be made without departing from the spirit and scope of the present invention. Skilled artisans may employ such variations as appropriate, and the invention may be practiced otherwise than as specifically described herein. Accordingly, the intent is to cover all alternatives, modifications, and equivalents included within the spirit and scope of the invention. Moreover, any combination of the above described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

We claim:

1) A container comprising:

a cover comprising a first closure portion, a cover engagement portion, the first closure portion being sealingly engageable with a second closure portion of a base so that when the first and second closure portions are engaged with each other, the cover and the base define a substantially sealed storage area, the cover engagement portion of the cover being engageable with the cover engagement portion of a second cover; and

the base comprising an open top, a bottom, a sidewall extending from the bottom, a base engagement portion disposed along the sidewall and the second closure portion, the cover engagement portion being receivingly engageable by the base engagement portion.

2) The container of claim 1 wherein:

a) the cover engagement portion comprises an upper protrusion and a lower protrusion;

b) the second closure portion of the base includes a flange, the flange being notched to remove a part of the flange in an area adjacent to the base engagement portion thereby defining an upper retaining edge;

c) the base engagement portion comprising a first sidewall and an opposing second sidewall, each sidewall comprising a groove disposed thereon; and

d) upon engagement of the cover engagement portion with the base engagement portion, the upper protrusion engages with the groove of the each of the first and second sidewalls and the lower protrusion engages with the upper retaining edge.

3) The container of claim 1, wherein the base and the cover are made from a process selected from the group consisting of thermoforming, blow molding, injection molding, and combinations thereof.

4) The container of claim 1, wherein the base and the cover are made from a material selected from the group consisting of polystyrene, Crystalline Polyethylene Terephthalate (CPET), Amorphous Polyethylene Terephthalate (APET), Low Density Polyethylene (LDPE), High Density Polyethylene (HDPE), Polyvinyl Chloride (PVC), Polycarbonate (PC), and foamed polypropylene.

5) A cover of a container, the cover comprising a first closure portion, a cover engagement portion, the first closure portion being sealingly engageable with a second closure portion of a base of the container, the cover engagement portion being receivingly engageable by a base engagement portion disposed along a sidewall of the base.

6) The cover of claim 5, wherein the cover engagement portion of the cover comprises:

an upper protrusion, the upper protrusion being sealingly engageable with grooves disposed on each of the first sidewall and an opposing second sidewall of the base engagement portion; and

a lower protrusion, the lower protrusion being engageable with an upper retaining edge of the base, the upper retaining edge being defined by removing a part of a flange in an area adjacent to the base engagement portion.

7) The cover of claim 6, wherein the lower protrusion of the cover is engageable with the upper protrusion of a second cover.

8) A base of a container, the base comprising:

an open top;

a bottom;

a sidewall extending from the bottom;

a base engagement portion disposed along the sidewall;

a second closure portion;

a flange disposed along the second closure portion; and

an upper retaining edge defined by removing a part of the flange in an area adjacent to the base engagement portion,

wherein the base engagement portion is receivingly engageable by a cover engagement portion of a cover of the container.

9) The base of claim 8, wherein the base engagement portion comprises:

a first sidewall and an opposing second sidewall;

a groove disposed on each of the first and second sidewalls; and

a backwall extending from the bottom, the backwall joining the first sidewall and an opposing second sidewall.

10) The base of claim 9, wherein the groove of the each of pair of the first and second sidewalls is engageable with an upper protrusion of the cover engagement portion and the upper retaining edge is engageable with a lower protrusion of the cover engagement portion.

11) The base of claim 8, wherein the open top of the base of the container is engageable with the open top of the base of a second container to stack the base of the container and the second container together.

12) A system of containers, the system comprising:

a cover, the cover comprising a cover engagement portion, the cover engagement portion being receivingly engageable with a base engagement portion disposed along a sidewall of a base;

the base comprising an open top, a bottom, the sidewall extending from the bottom, a second closure portion, a flange disposed along the second closure portion, and the base engagement portion; and

a second cover, the second cover comprising a second cover engagement portion, the second cover engagement portion of the second cover being engageable with the cover engagement portion of the cover.

13) The system of claim 12, wherein the cover engagement portion comprises an upper protrusion and a lower protrusion.

14) The system of claim 13, wherein the base engagement portion comprises:

a first sidewall and an opposing second sidewall;

a groove disposed on each of the first and second sidewalls; and

a backwall extending from the bottom, the backwall joining the first sidewall and an opposing second sidewall.

15) The system of the claim 14, wherein the base further comprises an upper retaining edge, the upper retaining edge being defined by removing a part of the flange in an area adjacent to a base engagement portion.

16) The system of claim 15, wherein when the cover engagement portion engages with the base engagement portion, the upper protrusion engages the groove of each of the pair of the first and second sidewalls and the lower protrusion engages the upper retaining edge.

17) The system of claim 16, wherein the lower protrusion of the cover is engageable with the upper protrusion of the second cover.

18) The system of claim 17, wherein the open top of the base is engageable with the open top of a second base to stack the base and the second base together.

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