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(54) **CONTAINER OR PLATTER ASSEMBLY HAVING LOCKING AND RELEASE FEATURES**

(71) Applicant: **Waddington North America, Inc.**, Chelmsford, MA (US)

(72) Inventors: **Matthew J. Wichmann**, Crescent Springs, KY (US); **Ashish K. Mithal**, Chelmsford, MA (US); **Malcolm Harris**, LaFayette, GA (US); **William A. Gallop**, Westminster, MA (US)

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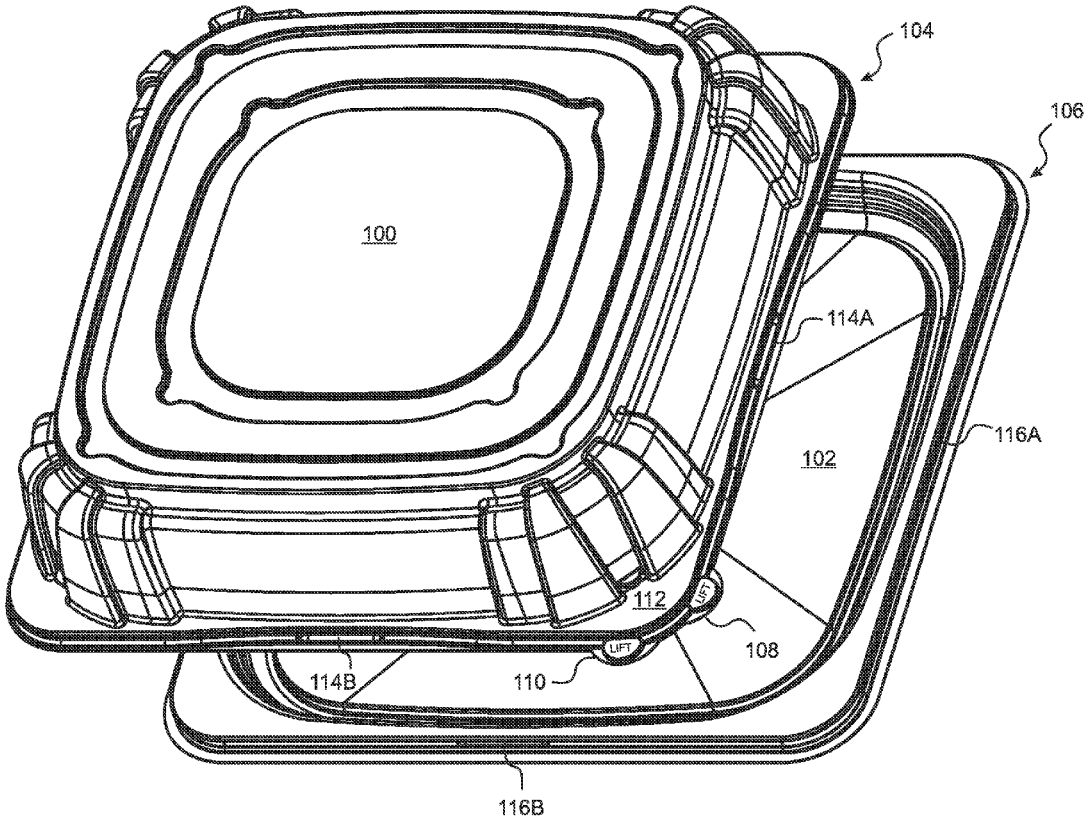
(57) **ABSTRACT**

A polygonal lid and container base provide secure and reliable engagement therebetween, while also facilitating removal of the lid without disturbing contents and without applying undue stress to the lid. The lid includes at least one graspable member near or at a designated "release" vertex that facilitates disengagement of the lid from the container base at the release vertex. The lid further includes regions of enhanced engagement that enhance the attachment of the lid to the container base at least along the two sides of the lid that adjoin the release vertex, causing the overall attachment to be less dependent on attachment at the release vertex. As a result, the strength of attachment at the release vertex can be made weaker than at the other vertices, for easy release of the release vertex, without undue weakening of the overall attachment of the lid to the container base.



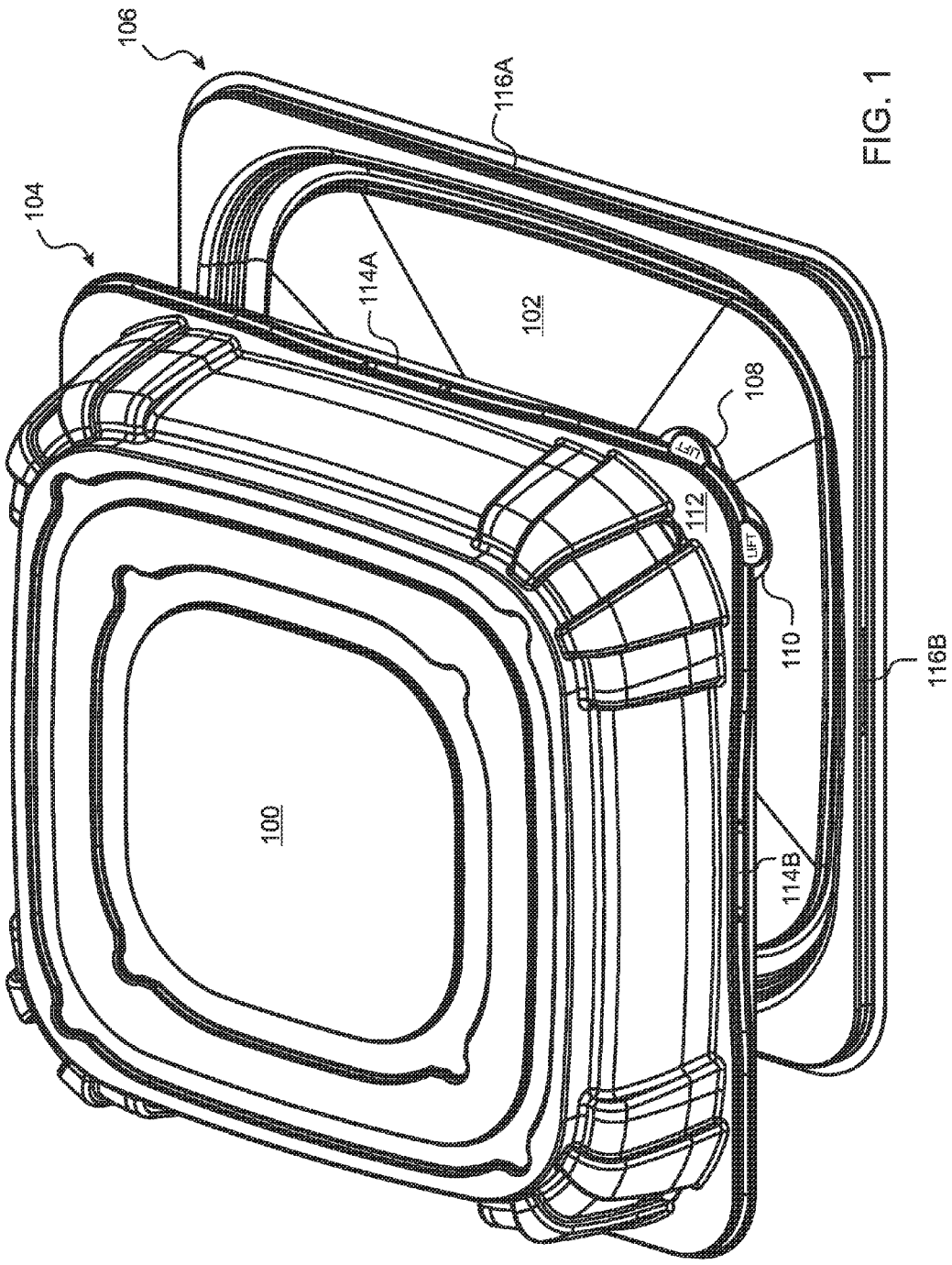


FIG. 1

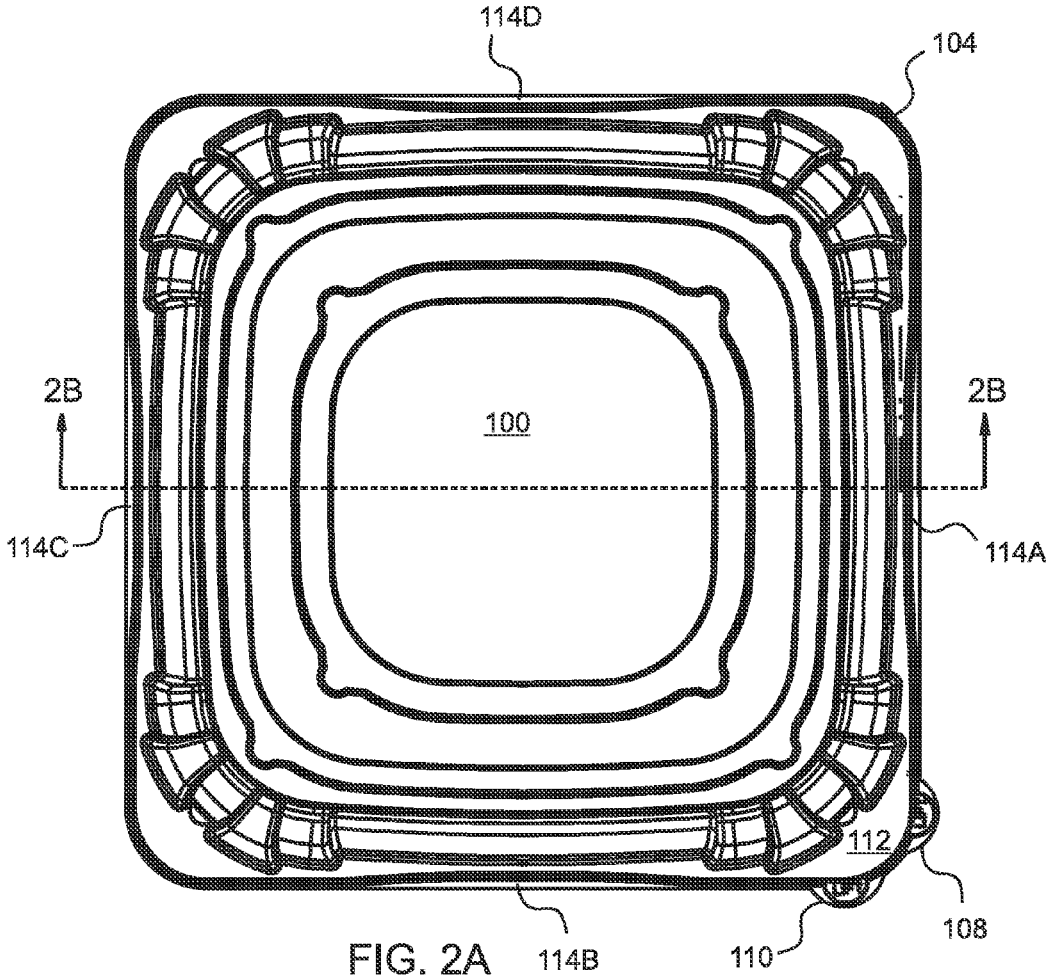


FIG. 2A

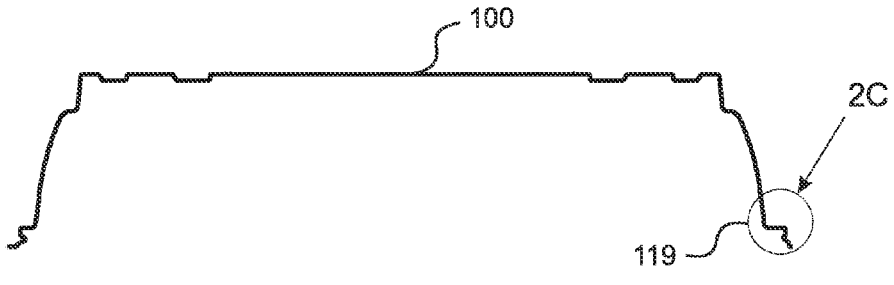


FIG. 2B

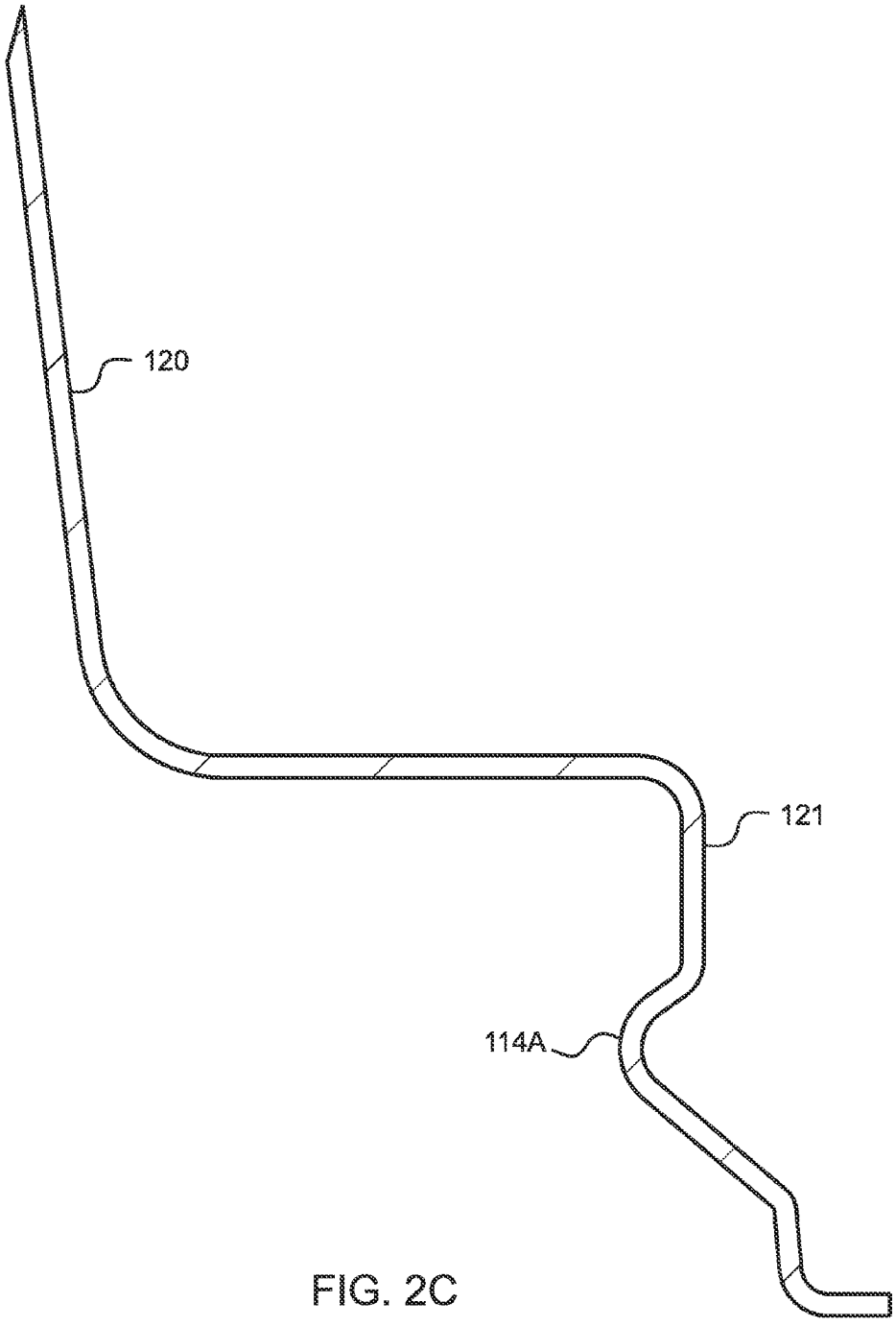


FIG. 2C

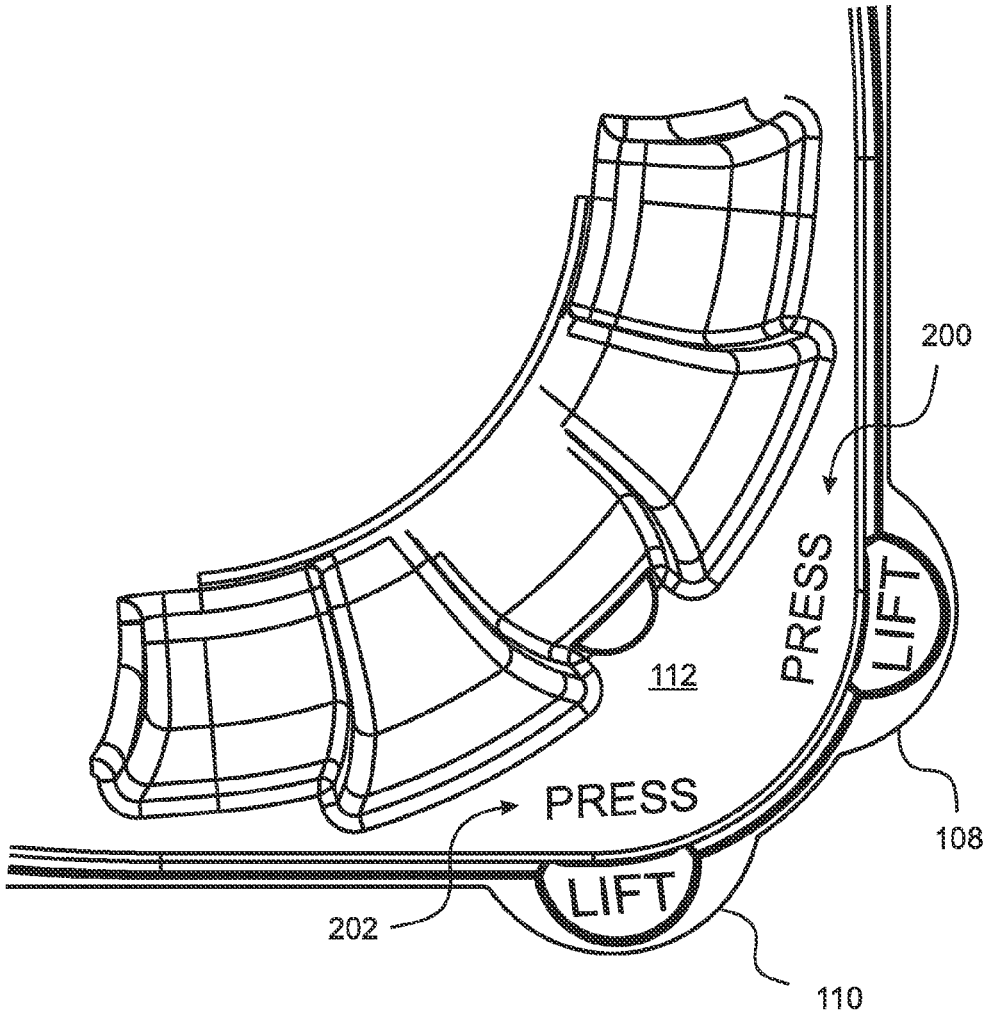


FIG. 2D

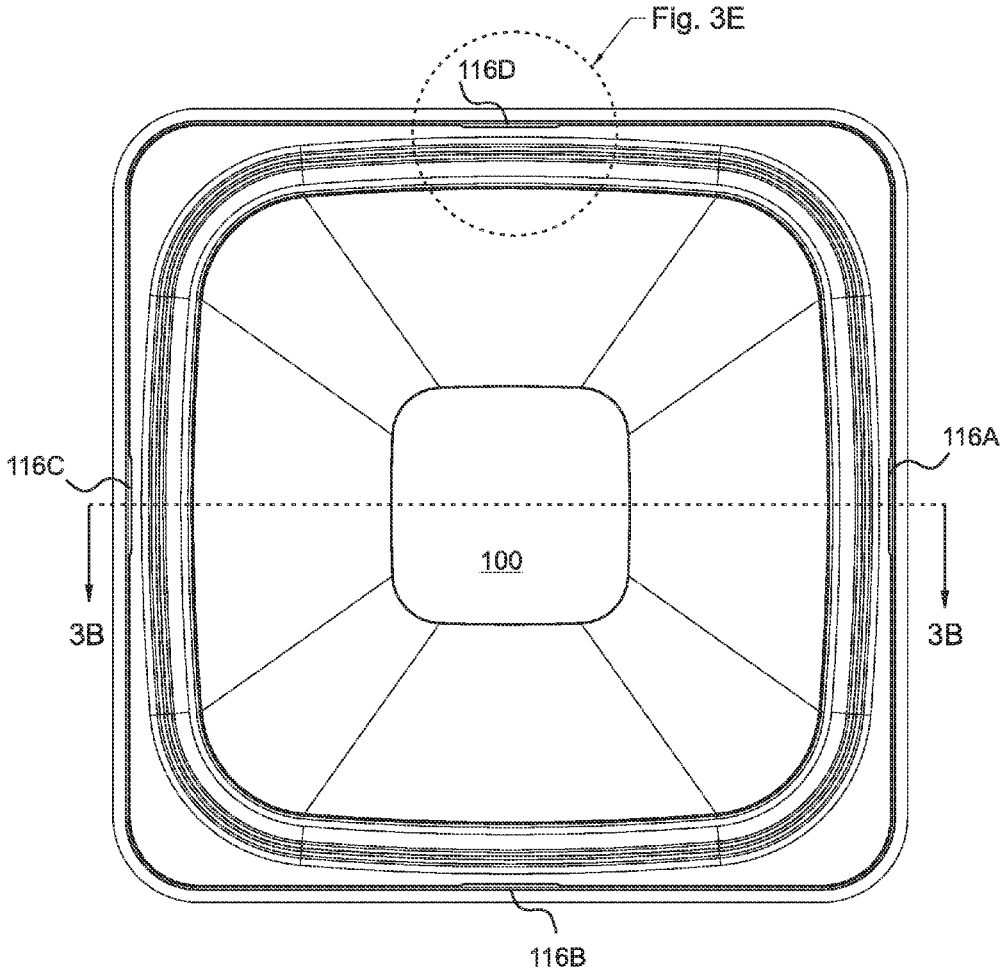


FIG. 3A

FIG. 3B

FIG. 3C

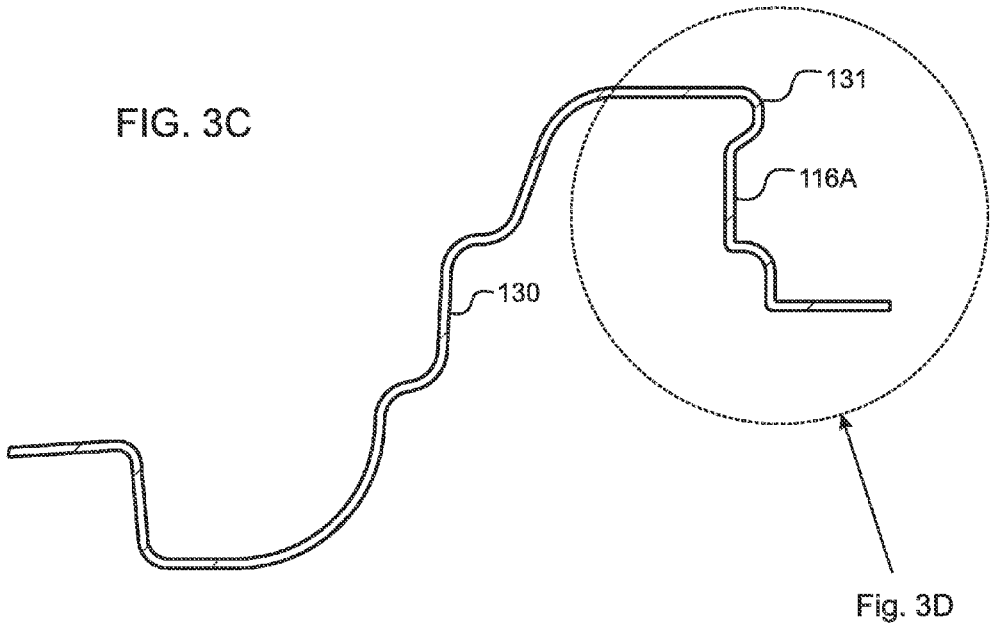


Fig. 3D

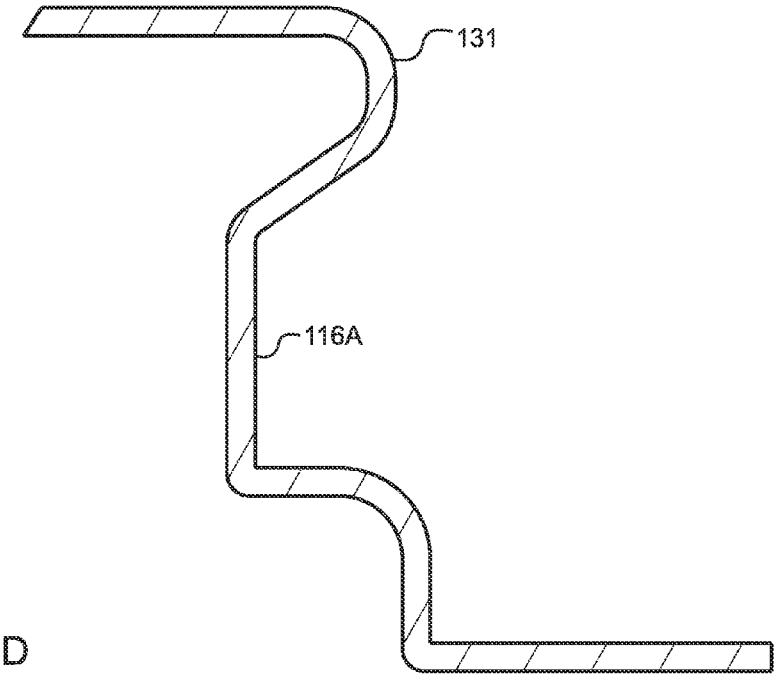


FIG. 3D

FIG. 4A

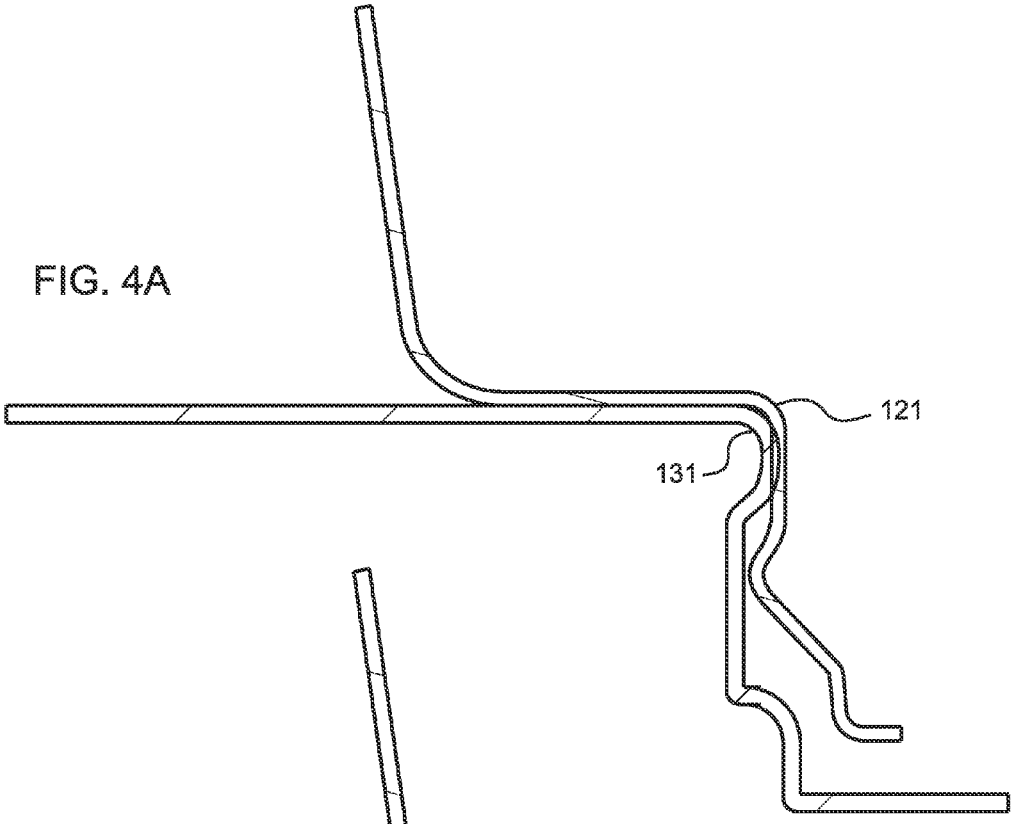
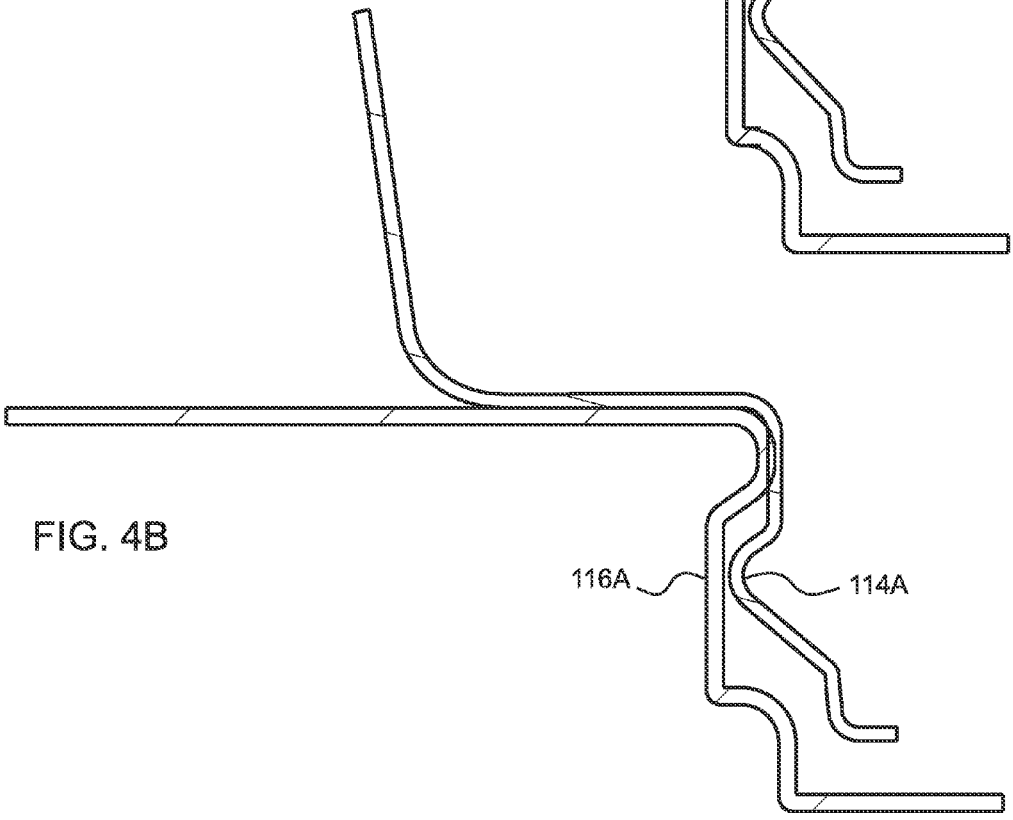


FIG. 4B



CONTAINER OR PLATTER ASSEMBLY HAVING LOCKING AND RELEASE FEATURES

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 62/061,800, filed Oct. 9, 2014, which is herein incorporated by reference in its entirety for all purposes.

FIELD OF THE INVENTION

[0002] This invention relates generally to container assemblies, such as tray or platter assemblies comprising a base and a lid, and more particularly to container assemblies having locking and release features for ensuring a secure assembly between the base and the lid, while offering improved release of the lid from the base.

BACKGROUND OF THE INVENTION

[0003] Container assemblies are sometimes referred to simply as "containers." Containers with detachable and re-attachable lids, including disposable food containers, trays, and platters with compatible lids, are well known and are commonly employed in many industries, including food related industries such as restaurants, caterers, institutional food service establishments, cafeterias, and households.

[0004] A tray, serving platter, or container base for use in catering and other food service applications frequently features a lid or cover that is cooperatively engageable therewith for presenting, handling, transporting, and/or protecting a variety of food items. The tray or base usually has an upwardly projecting sidewall that terminates in a rim. The base or tray rim may simply feature a lip area, or may include sealing ridges, channels, or other locking mechanisms that are adapted for cooperative engagement with corresponding grooves, inverted channels, or other cooperative features integrated with the lid. Note that the terms "tray" and "base" are used generically herein to refer to any type of tray, serving platter, container base, or other support base which is attachable to a lid or cover. Note also that the term "lid" is used generically herein to refer to any type of lid or cover that is compatible with and attachable to a "tray", a "platter", or a "base".

[0005] Most disposable lids for use with food containers and platters are thermoformed from a sheet of Polyethylene Terephthalate (PET) or Oriented Polystyrene (OPS), although other plastic materials may be employed. The lid is configured to fit the base, and may include an elevated and/or dome-shaped central portion to allow for comfortably accommodating a certain quantity or height of foods or other contents, and to preserve the shape, form, decorative appearance and/or the general presentation of items such as certain food preparations, including desserts, cakes, sandwiches, and other foods. Or the lid may be substantially flat, and may be attachable to a container which has sufficient depth to fully surround food items or other contents to be contained therein.

[0006] In some designs, once a lid has been engaged with a tray to form a first tray-lid assembly, a second tray-lid assembly can be stacked on top of the first tray-lid assembly, and thus a plurality of tray-lid assemblies can be stacked on top of each other for compact storage and for ease of transportation and handling.

[0007] For the purposes of food containment in a commercial setting, it is paramount that food preparations be protected, and that inadvertent disengagement or removal of the lid from the tray be avoided. Therefore, in many cases one or more locking features and/or undercuts are provided at the periphery of the tray and/or the lid, resulting in a relatively tight interference fit between the lid and the tray. However, this tight interference fit can make it difficult for a user to disengage and/or remove the lid at the time of use, resulting in an inconvenience to the user at best, and spilling of the food at worst, as the user struggles to remove the lid from the tray. Depending on the material of construction of the lid, the lid may even tear or rip during removal, thereby rendering subsequent reengagement of the lid with tray or container ineffective or futile.

[0008] A typical method for disengaging a generic container-lid assembly is by holding the container with one hand and pulling the lid off with the other hand. Sometimes a tab or an indent is provided in either the lid or the container so as to facilitate creating an initial separation or opening between the lid and the container at the location of the tab or indent, and then separating the lid from the container around the entire periphery of the container-lid assembly. However, this method of disengaging or separating a lid from a container can be difficult if the container is shallow, for example if the container is in the form of a tray, a platter, or a plate.

[0009] Typically, a lid having a raised portion, herein referred to generically as a "dome lid" regardless of whether the lid is round, rectangular, or some other shape, features a downwardly projecting peripheral skirt that overhangs beyond the perimeter of the tray or container base. As will be appreciate by those skilled in the art, for a relatively shallow tray the overhang of the peripheral skirt of the lid can typically be almost as tall as the tray, making it difficult for a user to slide his or her fingers underneath the peripheral skirt of the lid for lifting the tray-lid assembly. Instead, it is typically necessary for a user to lift the tray-lid assembly by the peripheral edge of the lid without touching the tray. In this situation, the entire weight of the tray and its contents is borne by the locking or engagement mechanism between the tray and the lid, further necessitating that the tray and lid have a tight fit, and making it even more difficult to remove the lid from the tray.

[0010] A particular difficulty for removing lids from tray-lid assemblies of the type described above is encountered due to the fact that in many cases the lid is flexible, and the periphery of the tray-lid assembly is relatively large compared to the size of the tab or indent that is provided with the lid or the tray for initiating separation of the lid from the tray. Consequently, when a user exerts an upward or downward force on the tab or indent provided in the lid or tray for pulling the tray-lid assembly apart, the rim of the lid tends to press opposingly inwardly at other locations, causing the lid to grip onto the tray even more tightly at those locations, and thereby rendering removal of the dome from the tray base extremely difficult, or at least cumbersome.

[0011] One approach to making lid removal from a container base easier is described in U.S. Pat. No. 8,701,930, also by the present applicant. In this approach, separation of the lid from the tray-lid assembly is facilitated by providing at least two tabs or indentations at two separate locations on the outer periphery of the lid that are not opposite to each other, thereby providing at least two distinct locations for initial disengagement of the lid from the tray. By disengaging the lid from the

tray at two or more separated locations about the rim, the tendency of the elastic lid to responsively grip the tray is overcome, and the lid is released from the tray without the user applying undue effort. In some implementations, the initial disengagements at the two tabs propagate toward each other and merge, thereby creating a large area of disengagement that greatly facilitates removal of the lid from the tray.

[0012] This approach works very well for substantially round trays and lids, but can be problematic when applied to square, rectangular, or otherwise polygonal lids and trays having three or more vertices. It has been observed that a container assembly with a polygonal periphery exhibits engagement between the base and the lid mostly in the corners, while the sides of the base and the lid which make up the majority of the periphery show relatively weaker engagement, due at least in part to the flexible nature of the lid. In a typical polygonal container assembly, the lid corners have to be stretched over the corresponding corners in the base so as to engage the base and the lid in a reasonably secure manner, with the lid being held in tension in the assembled state. Thus, in contrast to a round container assembly, only a relatively small portion of the periphery of a typical polygonal container assembly is available for actual engagement, leading to concerns regarding inadvertent disengagement between the base and the lid.

[0013] As a result, it is challenging and difficult to fully utilize the food-holding capacity of a polygonal container assembly. It will be realized that a large polygonal container assembly is particularly susceptible to disengagement when it is lifted and carried, in comparison to a round container assembly of similar construction.

[0014] In addition, each vertex of a square or rectangular container assembly, holding a certain weight of food, contributes significantly (25% on average) to the overall engagement strength between the base and the lid. In contrast, a round peripheral section on a round container assembly comparable in size to the vertex of a typical square or rectangular container contributes a much smaller percentage of the total engagement. Consequently, release of a square or rectangular polygonal lid from a tray will typically require greater force so as to overcome at least 25% of the overall engagement force at a selected vertex, referred to herein as the "release" vertex. If one or more tabs or indentations are provided, they will typically be located at or near the release vertex, for example on either side of a corner of a square or rectangular lid. Accordingly, to facilitate the initial release of the lid from the tray, it may be beneficial to weaken the attachment of at least one release vertex as compared to the other vertices. However, weakening of the release vertex or vertices can create yet another undesirable side effect, in that a weak release vertex could also make the container assembly more susceptible to unintentional disengagement.

[0015] To address the problems relating to engagement of container assemblies with polygonal peripheries, a few approaches have been used in the prior art. One of the approaches is to make the fit extremely tight at the corners or vertices of a polygonal container base to overcome the tendency of the base to detach from the lid. However, this approach can lead to a container assembly that is very difficult to open.

[0016] Another approach that has been utilized in the prior art is to construct quasi-square trays with rounded sides; such container shapes are frequently described by the blend word squround (or scround).

[0017] Still another approach that has been used in the prior art is to incorporate a protruding button in proximity to the corners of one of the lid and the base, and equipping the opposing member of the container assembly with a corresponding mating recess. Such a button-recess locking feature included at or near the corners of the container can provide a more aggressive engagement, but can also pose a shortcoming in that substantial effort may be required to open the container assembly and separate the lid from the base.

[0018] Accordingly, these approaches do not simultaneously address the need for firm, reliable attachment and the need for ease of opening or separating the lid from the container base without disturbing the contents of the container.

[0019] Thus, there is a need for a square, rectangular, or otherwise polygonal lid that is securely engageable with a corresponding square, rectangular, or otherwise polygonal tray or container base, and yet can be conveniently removed from the tray or container base with relative ease, and without disturbing the contents of the tray or container base. These and other needs are met by the lid and container base of the present invention.

BRIEF SUMMARY OF THE INVENTION

[0020] At the heart of the present invention is the observation that a polygonal container assembly holding food is most susceptible to disengagement when it is being lifted and carried by a user, and that disengagement is not a single event but rather an event that propagates through a series of steps. When a food-filled container assembly is lifted, the entire weight of the food is supported by the container base, which causes the container base to flex. It will be realized that the tray or container base is usually made quite thin to conserve material and to provide an economical article, and that this thinness can further exacerbate the flexing.

[0021] During handling and carrying of a square or rectangular container assembly, two sides of the container assembly are typically held or supported by the user's hands, while the other two sides remain unsupported. The unsupported portions of the container base are thereby naturally subject to sagging under the weight of food contained in the tray. This flexing of the container base due to content weight first initiates moderate amounts of disengagement between the lid and the container base, usually along a region of the unsupported sides. As the container assembly is transported or carried, the flexing may be intensified, and the container base may progressively flex enough to create significant disengagement, initially at the unsupported sides, and then at one or more of the corners. Once one of the corners is compromised, the flexing typically extends to the other corners, and the entire container assembly may be compromised, causing food to spill from the container assembly.

[0022] In accordance with the present invention, a polygonal container assembly comprising a container base and a lid is provided with at least a supplemental, auxiliary, or secondary locking feature in addition to the primary lid-base engagement features. The secondary locking feature inhibits initial flexing of the container base, thereby impeding or averting unintentional disengagement between the container base and the lid. A polygonal lid and container base (where the base is also referred to generically herein as a "tray," unless the context requires otherwise), according to the invention, thereby enables secure and reliable engagement between the lid and the container base, while also enabling easy removal of the lid from the container base without disturbing contents

supported by the container base, and without applying undue stress to the lid. In particular, the present invention enables removal of the lid from a tray-lid assembly in a reversible manner, i.e. without damaging the lid during removal.

[0023] The container base and lid according to the present invention are configured to facilitate separation of the lid from the base-lid assembly by providing at least one graspable member, such as a tab or an indentation, at or adjacent to at least one designated "release" vertex of the polygonal lid, thereby providing for initial disengagement of the lid from the container base at the release vertex. The container base and the lid further include mutually-cooperating regions of enhanced or secondary engagement that provide strengthened engagement therebetween along at least the two sides of the lid that extend from the release vertex.

[0024] Preferably, the enhanced-engagement features are provided along all sides of the polygonal lid. It will be realized that these secondary or enhanced engagement features provided in the sides do not necessarily extend along the entire lengths of the sides, and may be localized to small segments of the sides. The regions of enhanced engagement strengthen the attachment of the lid to the container base along the sides of the lid, so that the overall attachment of the lid to the container base is not as strongly dependent on the attachment at the vertices. As a result, the attachment at the release vertex can be made weaker than at the other vertices, without reducing the overall lid-tray attachment to an unacceptable degree. Thus by employing a secondary locking feature and a release vertex, inadvertent detachment of the lid is rendered unlikely, while the lid can be intentionally released from the container base without requiring the user to apply undue effort, without subjecting the lid to undue stress, and without unduly disturbing the contents of the tray-lid assembly.

[0025] Note that except where the context requires a more specific definition, the terms "tray" and "base" are used herein to refer generically to a tray, platter, dish, container, plate, or any other container base that is compatible with a lid or cover; and that the term "lid" is used generically herein to refer to any sort of lid or cover that is compatible with a "tray," or "base," including flat lids and "dome" lids that include raised portions so as to have cross sectional profiles that are rectangular, rounded, or any other raised shape.

[0026] Note also that while the following discussion is presented in the context of describing enhanced engagement feature(s) of a polygonal container assembly comprising a container base and a lid, whereby the feature(s) enable enhanced engagement between the container base and the lid to prevent inadvertent removal of the lid from the container base, the roles of the lid and the container base can be reversed without departing from the scope of the invention. In other words, a specific engagement feature or features ascribed herein as pertaining to the "lid" (or upper element or cover component) can be incorporated instead into the "tray" (or lower element or food holding receptacle or container base) of the tray-lid combination, and vice versa. Therefore, the invention applies generally to separable halves of a container assembly comprising a first half and a second half, whereby terms used for convenience to describe one half of the container assembly, such as "lid" and "cover," can generally be exchanged herein with terms used to describe the other half of the container assembly, such as "tray," "container base," and "support base," without departing from the meaning or scope of the invention.

[0027] In certain embodiments, secondary locking or enhanced engagement is provided by incorporating one or more protruding elements or cleats near the periphery of the lid or cover which cooperate with the regions of enhanced engagement that are provided in the rim of the container base, or at least in a location proximate thereto.

[0028] In certain embodiments, the lid is provided with at least two graspable members located on either side of a release vertex at the outer periphery of the lid.

[0029] In some of these embodiments, a pressing area is provided adjacent to each of the graspable members, which can be pressed while the graspable member is lifted. In certain embodiments, the graspable members are in the form of first and second lifting tabs that are cooperative with first and second pressing areas respectively. During the process of removing the lid from the container base, a user can press the first pressing area and lift the first lifting tab with one hand, while concurrently pressing the second pressing area and lifting the second lifting tab with the second hand. Once a release vertex of the lid has been released from the container base, the entire lid can be readily removed from the container base.

[0030] In embodiments, at least one region of enhanced or secondary engagement is provided on each side of the polygonal periphery of the container assembly. In various embodiments, the regions of enhanced engagement are located midway between adjacent vertices. And in some embodiments, each of the regions of enhanced engagement extends over between 5% and 50% of the length of the corresponding side of the polygonal lid.

[0031] The present invention is a container assembly including a polygonal lid and a polygonal container base, the lid being adapted for engagement with and easy release from the container base. The container assembly includes a container base having a container bottom wall, a container sidewall that extends upwardly and outwardly from said container bottom wall, and a peripheral container rim that is substantially polygonal in shape; a lid having a lid top and a lid engagement feature proximal to a peripheral lid rim, said peripheral lid rim being substantially polygonal in shape, said lid engagement feature being configured for mutual cooperation and attachment with the peripheral container rim of the container base, thereby forming a container assembly, the peripheral lid rim including a vertex that is designated as a release vertex; at least one graspable member provided in said lid proximal to the release vertex of the peripheral rim, said graspable member being configured for disengaging the release vertex from the peripheral container rim; and at least one region of enhanced engagement included in each side of the peripheral lid rim and at least one cooperating region of enhanced engagement included in each side of the peripheral container rim, said regions of enhanced engagement in the peripheral lid rim along with said cooperating regions of enhanced engagement in the peripheral container rim collectively ensuring a secure attachment between the container base and the lid, thereby avoiding or impeding unintentional disengagement between the tray and the lid during at least one of handling, transporting, and carrying said container assembly.

[0032] In embodiments, the lid engagement feature provides weaker engagement with the container base in a region encompassing the release vertex of the peripheral rim, as compared to regions of the engagement feature that encompass other vertices of the peripheral rim.

[0033] In some embodiments, said lid engagement feature comprises a peripheral groove extending substantially continuously about the peripheral rim, said peripheral groove being configured for mutual cooperation and attachment with the container base by receiving said peripheral container lip of the container base therein. And in some of these embodiments the peripheral groove is deeper in the enhanced engagement regions of the peripheral rim as compared to other regions of the peripheral rim.

[0034] Other embodiments further include regions of modified shaping of the lip of the container base that cooperate with the regions of enhanced engagement of the peripheral rim of the lid to strengthen the engagement of the lid with the container base in the regions of enhanced engagement.

[0035] In various embodiments, the graspable member is provided in a peripheral skirt of the lid. In some of these embodiments, the peripheral skirt is configured for guiding said base peripheral container lip into cooperation with said lid engagement feature and facilitating formation of said container assembly, and the peripheral skirt is sufficiently short to enable a user to lift the container base from below when the lid is engaged with the container base. In certain of these embodiments the peripheral skirt extends between 0.1" and 0.3" below said peripheral container lip of said container base. And in other of these embodiments the peripheral skirt extends about 0.2" below said peripheral container lip of said container base.

[0036] In embodiments, the graspable member is a lift tab. And some embodiments further include a visible indication cooperative with the graspable member, said visible indication being an indication that suggests lifting of the graspable member.

[0037] Various embodiments further include a press area proximate to said graspable member and located relatively inwardly from said lid engagement feature, said press area being downwardly pressable by a hand of a user while said hand is lifting said graspable member, thereby disengaging the release vertex from the lip of the container base. And some of these embodiments further include a visible indication cooperative with the press area, said visible indication being an indication that suggests pressing on the press area while lifting the graspable member.

[0038] In certain embodiments, said lid is dome shaped. In some embodiments, the graspable member is located at the release vertex of the lid.

[0039] In various embodiments, a pair of graspable members are located adjacent to either side of the release vertex. In some of these embodiments, the graspable members are simultaneously operable with a user's left and right hands respectively. In other of these embodiments, the graspable members are sequentially operable with at least one of a user's hands.

[0040] In embodiments, the container base is a substantially flat tray. In some embodiments, the material of construction of the lid is one of: polypropylene (PP), oriented polystyrene (OPS), polyethylene terephthalate (PET), styrene butadiene copolymer, and rubber modified styrene.

[0041] In various embodiments, the lid is made by a thermoforming process. And in certain embodiments the lid is thermoformed from an oriented polystyrene sheet.

[0042] The features and advantages described herein are not all-inclusive and, in particular, many additional features and advantages will be apparent to one of ordinary skill in the art in view of the drawings, specification, and examples of claims. Moreover, it should be noted that the language used in the specification has been principally selected for readability and instructional purposes, and not to limit the scope of the inventive subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] The invention will be better understood upon reading the following Detailed Description in conjunction with the drawings, in which:

[0044] FIG. **1** is a perspective view from above, drawn to scale, of a lid and corresponding tray according to an embodiment of the present invention;

[0045] FIG. **2**A is a view from above, drawn to scale, of the lid of FIG. **1**;

[0046] FIG. **2**B is a cross-sectional view of the lid of FIG. **2**A, drawn to scale, taken along a line that intersects regions of enhanced engagement on the rim;

[0047] FIG. **2**C is an enlarged cross-sectional view, drawn to scale, of the shaping in the region of enhanced engagement of the lid of FIG. **2**B;

[0048] FIG. **2**D is an enlarged view from above, drawn to scale, of a release vertex region of a lid similar to the lid of FIG. **2**A, which includes press areas associated with each of the graspable members, and further includes visible indications of the press areas;

[0049] FIG. **3**A is a view from above, drawn to scale, of the tray of FIG. **1**;

[0050] FIG. **3**B is a cross-sectional view of the tray of FIG. **3**A, drawn to scale, taken along a line that intersects regions of modified shaping of the lip of the tray that cooperate with the regions of enhanced engagement in the rim of the lid;

[0051] FIG. **3**C is an enlarged view, drawn to scale, of the modified shaping of the lip of FIG. **3**B that cooperates with the regions of enhanced engagement of the lid of FIG. **2**C;

[0052] FIG. **3**D is an enlarged view from above, drawn to scale, of the region of the tray of FIG. **3**A that includes the region of modified shaping;

[0053] FIG. **4**A is an enlarged cross-sectional view, drawn to scale, of the shaping of the lid rim and tray lip of the embodiment of FIG. **3**A in a region that lies outside of the region of enhanced engagement; and

[0054] FIG. **4**B is an enlarged cross-sectional view drawn to scale of the regions of enhanced engagement and modified shaping of FIG. **2**C and FIG. **3**D shown in engagement with each other.

DETAILED DESCRIPTION OF THE INVENTION

[0055] The present invention is generally directed to a container assembly comprising a container base and a cooperating lid that enables secure and reliable engagement between the lid and the container base, while also enabling easy removal of the lid from the container base without disturbing contents supported by the container base, and without applying undue stress to the lid. The container base can be sized and shaped according to the application for which it is used, including the type of food and the amount of food to be placed thereon. For example, the container base can be in the form of a tray or a platter. In particular, the present invention enables removal of the lid from a polygonal tray-lid assembly in a reversible manner, i.e. without damaging the lid during removal.

[0056] The tray and lid components of the polygonal tray-lid assembly are configured to facilitate separation of the

polygonal lid from the tray-lid assembly by providing at least one graspable member on the outer periphery of the lid near or at a designated "release" vertex, thereby facilitating initial disengagement of the lid from the container base at the release vertex. The lid and tray further include regions of enhanced or secondary engagement that enhance the attachment of the lid to the tray or container base, so that the overall attachment of the lid to the container base is less dependent on the attachment at the vertices. As a result, the strength of attachment of the lid to the container base at the release vertex can be made weaker than at the other vertices, for easy release of the release vertex, without undue weakening of the overall attachment of the lid to the container base.

[0057] Note that, except where the context requires a more specific definition, the term "tray" is used herein to refer generically to a tray, platter, dish, container base, plate, or any other support base compatible with a lid or cover, and the term "lid" is used generically herein to refer to any sort of lid or cover that is compatible with a container base, including flat lids and "dome" lids that are round, rectangular, or any other shape.

[0058] Note also that while the discussion that follows is presented in the context of describing features of a lid that enable removal of the lid from a tray or container base, the roles of the lid and the container base can be reversed without departing from the scope of the invention, so that the features ascribed herein to the "lid" (or upper element) can be incorporated into the "tray" (or lower element) of the tray-lid combination. Therefore, the invention applies generally to separable halves of a container assembly, whereby terms used for convenience to describe one half of the containing assembly, such as "lid" and "cover," can generally be exchanged herein with terms used to describe the other half of the container assembly, such as "tray," "container base," and "support base," without departing from the meaning or scope of the invention.

[0059] FIG. **1** illustrates a polygonal lid **100** and tray **102** in an embodiment of the present invention. The lid **100** is surrounded by a lid rim **104**, and the tray **102** is surrounded by a tray rim **106** that engages with the lid rim **104** of the lid **100**. In the embodiment of FIG. **1**, two release tabs **108**, **110** are located on either side of a designated "release" vertex **112** of the lid. In similar embodiments, a single release tab or other graspable member is located at or near the release vertex. Although not readily visible in the figure, the attachment of the release vertex to the tray **102** is weaker than at the other three vertices, so as to facilitate initial release of the release vertex of the lid **100** from the tray **102**. Note that each of the release tabs **108**, **110** includes a visual indication in the form of the word "LIFT" imposed on the release tab, indicating that the release tabs **108**, **110** should be lifted to initiate release of the release vertex of the lid **100** from the tray **102**.

[0060] With reference to FIG. **2**A, each of the sides of the lid **100** includes an inwardly protruding region of enhanced engagement, denoted by cleats **114**A, **114**B, **114**C and **114**D, which increase the engagement between the lid **100** and the tray **102** when assembled to form a tray-lid assembly, as is discussed in more detail below. Similarly, each of the sides of the tray **102** includes a receiving region of enhanced engagement, denoted by recessions **116**A, **116**B, **116**C, and **116**D, which cooperate with cleats **114**A, **114**B, **114**C and **114**D of the lid **100**, respectively. It will be noted that only cleats **114**A and **114**B, and recessions **116**A and **116**B are visible in FIG. **1**.

[0061] FIG. **2**A is a view from above of the lid **100** of FIG. **1**. It can be seen in FIG. **2**A that all four sides of the lid **100** include inwardly protruding regions of enhanced engagement or cleats **114**A, **114**B, **114**C and **114**D that strengthen the attachment of the sides of the lid **100** to the tray **102**. A dotted line in FIG. **2**A indicates the location of the cross-sectional illustration of FIG. **2**B.

[0062] FIG. **2**B is a cross-sectional view of the lid **100** of FIG. **2**A, where the cross-section intersects two opposing cleats **114**A and **114**C of the lid **100**. The cross-sectional profile which includes cleat **114**A is shown in a dotted circle **119** on the right side of FIG. **2**B.

[0063] FIG. **2**C is an enlarged view of the circled region **119** of FIG. **2**B. It can be seen that the shaping of the rim in this region includes lid sidewall **120** and the primary engagement peripheral groove **121** that terminates in cleat **114**A. FIG. **2**C clearly shows that cleat **114**A protrudes inwardly towards the interior of the lid, and is configured for engagement with recession **116**A in the tray **102**, as is described in more detail below.

[0064] FIG. **2**D is an enlarged view from above of the release vertex **112** of an embodiment similar to FIG. **2**A. It can be seen from the figure that in this embodiment press areas **200**, **202** are provided with visual indications suggesting that a user should press on the press areas **200**, **202** while lifting the lift tabs **108**, **110**, where the visual indications in this embodiment are the word "PRESS" appearing on the press areas **200**, **202**.

[0065] FIG. **3**A is a top view of the tray **102** of FIG. **1**. It can be seen in FIG. **3**A that all four sides of the tray **102** include receiving regions of enhanced engagement or recessions **116**A, **116**B, **116**C and **116**D that cooperate with the protruding regions of enhanced engagement or cleats **114**A, **114**B, **114**C and **114**D in the lid **100** respectively, and thereby strengthen the attachment of the sides of the tray **102** to the sides of the lid **100**. It can also be seen in the figure, which is drawn to scale, that the receiving regions of enhanced engagement or recessions **116**A, **116**B, **116**C and **116**D extend along about 10% of each side of the tray **102**. In similar embodiments, the recessions **116**A, **116**B, **116**C and **116**D extend along up to 50% of the respective lengths of each of the sides of the tray **102**. A dotted section line in FIG. **3**A indicates the location of the cross-sectional illustration of FIG. **3**B.

[0066] FIG. **3**B is a cross-sectional view of the tray **102** of FIG. **3**A, where the cross section intersects the two opposing sides that include recessions **116**A and **116**C respectively. The tray rim region that includes recession **116**A is shown in a dotted circle on the right side of the figure.

[0067] FIG. **3**C is an enlarged view of the circled region of FIG. **3**B, and FIG. **3**D is an enlargement of the region of modified shaping of FIG. **3**C. FIG. **3**C shows tray sidewall **130**, while both FIGS. **3**C and **3**D show the tray rim, which includes a primary engagement lip **131** that is adapted to engage with primary engagement channel **121** of the lid **100**. Recession **116**A is provided below primary engagement lip **131**, and is adapted for engagement with cleat **114**A.

[0068] FIG. **4**A is a cross-sectional enlarged view of the rim of the lid **100** engaged with the lip of the tray **102**, where the cross-section does not intersect any of the regions of enhanced engagement. It can be seen that the primary engagement groove **121** of lid **100** is engaged with the primary engagement lip **131** of tray **102**.

[0069] FIG. **4**B is a cross-sectional enlarged view of the rim of the lid **100** engaged with the lip of the tray **102**, where the

cross-section intersects the regions of enhanced engagement provided by cleat **114**A and recession **116**A. In the figure, a relatively large indentation or cleat **114**A in the rim of the lid **100** engages with a relatively large recession **116**A in the lip of the tray **102**.

[0070] It will be understood by persons skilled in the art that the embodiments illustrated by FIGS. **4**A and **4**B assume that tray **102** is resting on a generally horizontal table surface with the lid **100** engaged therewith.

[0071] Based on the views shown in various figures herein, it should be readily apparent that relative terms such as "horizontal" are used only for illustrative purposes in describing embodiments of the invention, and that more general terms such as "planar" can be substituted without departing from the scope of the invention. Furthermore, modifiers such as 'generally' and 'substantially' are intended to be construed liberally. Thus, for example, 'generally planar' and 'substantially planar' are intended to allow for irregular deviations from perfectly flat surface and to reasonably broaden terms such as "planar" so as to encompass curved and other non-planar surfaces.

[0072] A typical method of removing the lid **100** of the embodiment of FIG. **1** from the tray **102** will now be described. With reference to FIG. **2**D, during removal of the lid **100** from the tray **102**, a user presses on press area **200** and lifts lift tab **108** with one hand, and concurrently presses on press area **202** and lifts lift tab **110** with the second hand. This lifting action with both hands serves to rotate the tabs **108**, **110** upward, thereby disengaging the rim at the release vertex **112** of lid **100** from the peripheral tray lip of the cooperatively engaged tray **102** or container base **102**. Once the lid **100** is released from the tray **102** at the release vertex **112**, the lid **100** is easily pulled away from the tray **102**, at least as far as the protruding and receiving regions of enhanced engagement denoted by cleats **114**A-**114**D and recessions **116**A-**116**D, which are centered in the sides of the lid **100** and tray **102** respectively. But since the cooperating cleat and recessions along each of the sides are separated by some distance from the release vertex, further lifting of the corner of the lid **100** applies leverage that easily separates these regions of enhanced engagement from each other. This allows removal of the entire lid **100** from the tray **102**.

[0073] Note that press areas **200**, **202** may be indicated by integrally forming or molding the word "PRESS" therein, and lift tabs **108**, **110** may be indicated by integrally forming or molding the word "LIFT" therein for the purposes of providing simple lid removal instructions to a user.

[0074] For various embodiments that include more than two lift tabs, for example on larger trays and lids, or on polygonal trays and lids that include more than four vertices, sequentially applied lifting actions may be required, by which more than one vertex of the lid is disengaged from the tray. Similarly, embodiments may include more than one release vertex.

[0075] According to embodiments of the invention, the tray and lid are constructed of suitable materials that allow engagement and subsequent reengagement therebetween if desired by the user.

[0076] It will be apparent to those skilled in the art that the lids and trays of the present invention can be made of a suitable thermoplastic material, which can be processed by common polymer processing methods known in the art, such as thermoforming or injection molding. The choice of a thermoplastic resin is typically governed by a variety of factors, including cost, resin processability, and other functional requirements of the tray and lid. Accordingly, lids and trays of the present invention can be manufactured by thermoforming and/or injection molding. In some embodiments of the present invention, the lid and tray are thermoformed from a polyethylene terephthalate (PET) sheet material. According to other embodiments of the present invention, the lid and tray are injection molded from a suitable grade of polypropylene resin.

[0077] It will be realized that the lid and tray can be constructed from different materials. In addition, the lid and tray can be produced by different processes.

[0078] The exemplary embodiments discussed above all include lids that incorporate lift tab features of the present invention for facilitating separation of a lid from a tray. However, it will be understood by anyone skilled in the art that the same purpose can be accomplished by providing any appropriate graspable member, such as indentation features or recessed locations in the tray for allowing access to a user's hands for grasping and manipulating the lid periphery. Therefore, the graspable members can be created for example by indentations provided in either the tray or the lid. Furthermore, graspable members for manipulating separation of a tray-lid assembly may be configured in the form of lift tabs, push tabs, indentations, or combinations thereof. In addition, it will be understood by those skilled in the art that the features of the present invention can be included in the lower, or "tray" portion of a tray-lid assembly, rather than in the lid.

[0079] The foregoing description of the embodiments of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Accordingly, the drawing and description are to be regarded as illustrative in nature, and not as restrictive. Many modifications and variations are possible in light of this disclosure. The advantages of the invention may be further realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended example of claims.

[0080] Although the present application is shown in a limited number of forms, the scope of the invention is not limited to just these forms, but is amenable to various changes and modifications without departing from the spirit thereof. The disclosure presented herein does not explicitly disclose all possible combinations of features that fall within the scope of the invention. The features disclosed herein for the various embodiments can generally be interchanged and combined into any combinations that are not self-contradictory without departing from the scope of the invention. In particular, the limitations presented in dependent claims below can be combined with their corresponding independent claims in any number and in any order without departing from the scope of this disclosure, unless the dependent claims are logically incompatible with each other.

What is claimed is:

1. A container assembly including a polygonal lid and a polygonal container base, the lid being adapted for engagement with and easy release from the container base, the container assembly comprising:

a container base having a container bottom wall, a container sidewall that extends upwardly and outwardly from said container bottom wall, and a peripheral container rim that is substantially polygonal in shape;

a lid having a lid top and a lid engagement feature proximal to a peripheral lid rim, said peripheral lid rim being

substantially polygonal in shape, said lid engagement feature being configured for mutual cooperation and attachment with the peripheral container rim of the container base, thereby forming a container assembly, the peripheral lid rim including a vertex that is designated as a release vertex;

at least one graspable member provided in said lid proximal to the release vertex of the peripheral rim, said graspable member being configured for disengaging the release vertex from the peripheral container rim; and

at least one region of enhanced engagement included in each side of the peripheral lid rim and at least one cooperating region of enhanced engagement included in each side of the peripheral container rim, said regions of enhanced engagement in the peripheral lid rim along with said cooperating regions of enhanced engagement in the peripheral container rim collectively ensuring a secure attachment between the container base and the lid, thereby avoiding or impeding unintentional disengagement between the tray and the lid during at least one of handling, transporting, and carrying said container assembly.

2. The container assembly of claim **1**, wherein said lid engagement feature provides weaker engagement with the container base in a region encompassing the release vertex of the peripheral rim, as compared to regions of the engagement feature that encompass other vertices of the peripheral rim.

3. The container assembly of claim **1**, wherein said lid engagement feature comprises a peripheral groove extending substantially continuously about the peripheral rim, said peripheral groove being configured for mutual cooperation and attachment with the container base by receiving said peripheral container lip of the container base therein.

4. The container assembly of claim **3**, wherein the peripheral groove is deeper in the enhanced engagement regions of the peripheral rim as compared to other regions of the peripheral rim.

5. The container assembly of claim **1**, further comprising regions of modified shaping of the lip of the container base that cooperate with the regions of enhanced engagement of the peripheral rim of the lid to strengthen the engagement of the lid with the container base in the regions of enhanced engagement.

6. The container assembly of claim **1**, wherein the graspable member is provided in a peripheral skirt of the lid.

7. The container assembly of claim **6**, wherein said peripheral skirt is configured for guiding said base peripheral container lip into cooperation with said lid engagement feature and facilitating formation of said container assembly; and the peripheral skirt is sufficiently short to enable a user to lift the container base from below when the lid is engaged with the container base.

8. The container assembly of claim **6**, wherein said peripheral skirt extends between 0.1" and 0.3" below said peripheral container lip of said container base.

9. The lid according to claim **6**, wherein said peripheral skirt extends about 0.2" below said peripheral container lip of said container base.

10. The container assembly of claim **1**, wherein the graspable member is a lift tab.

11. The container assembly of claim **1**, further comprising a visible indication cooperative with the graspable member, said visible indication being an indication that suggests lifting of the graspable member.

12. The container assembly of claim **1**, further comprising a press area proximate to said graspable member and located relatively inwardly from said lid engagement feature, said press area being downwardly pressable by a hand of a user while said hand is lifting said graspable member, thereby disengaging the release vertex from the lip of the container base.

13. The container assembly of claim **12**, further comprising a visible indication cooperative with the press area, said visible indication being an indication that suggests pressing on the press area while lifting the graspable member.

14. The container assembly of claim **1**, wherein said lid is dome shaped.

15. The container assembly of claim **1**, wherein the graspable member is located at the release vertex of the lid.

16. The container assembly of claim **1**, wherein a pair of graspable members are located adjacent to either side of the release vertex.

17. The container assembly of claim **16**, wherein said graspable members are simultaneously operable with a user's left and right hands respectively.

18. The container assembly of claim **16**, wherein said graspable members are sequentially operable with at least one of a user's hands.

19. The container assembly of claim **1**, wherein said container base is a substantially flat tray.

20. The container assembly of claim **1**, wherein the material of construction of the lid is one of: polypropylene (PP), oriented polystyrene (OPS), polyethylene terephthalate (PET), styrene butadiene copolymer, and rubber modified styrene.

21. The container assembly according to claim **1**, wherein said lid is made by a thermoforming process.

22. The container assembly according to claim **1**, wherein said lid is thermoformed from an oriented polystyrene sheet.

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