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(54) **CONTAINERS WITH DISCONTINUOUS SEAL**

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(57) **ABSTRACT**

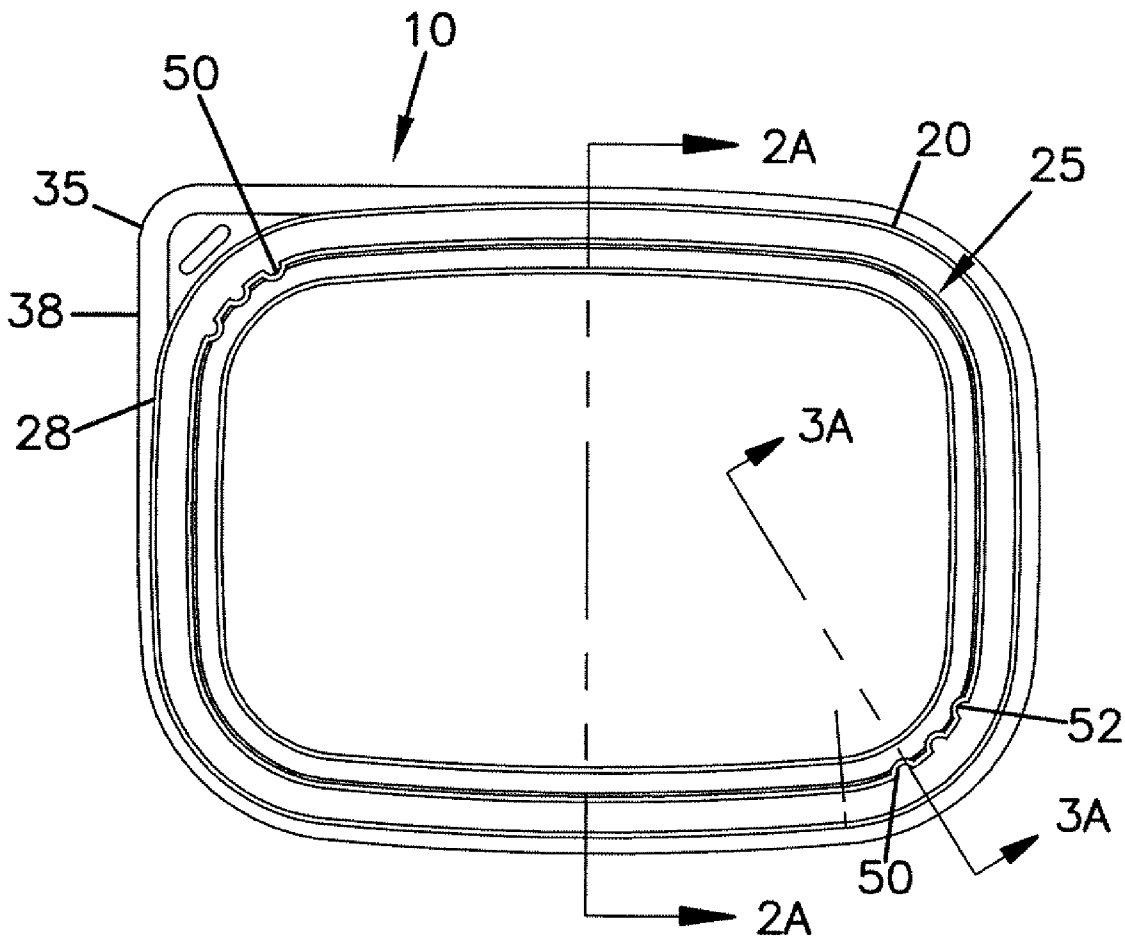
Polymeric containers that have a container body and a removable and replaceable lid configured for sealing engagement with the body. The sealing arrangement between the container body and the lids includes a discontinuity feature that provides a passage for fluid from the exterior of the container to the sealing arrangement, which reduces the forces needed to open (e.g., unseal) or vent the container. The containers are often thermoformed, and might be considered "disposable" containers.

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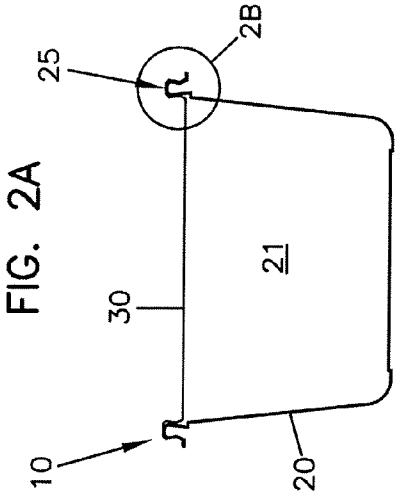
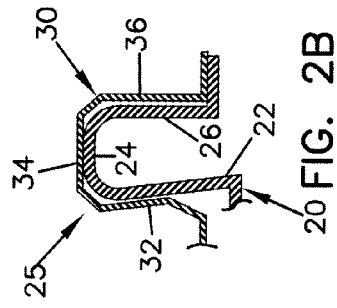
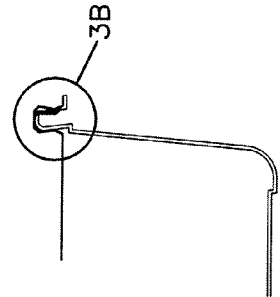
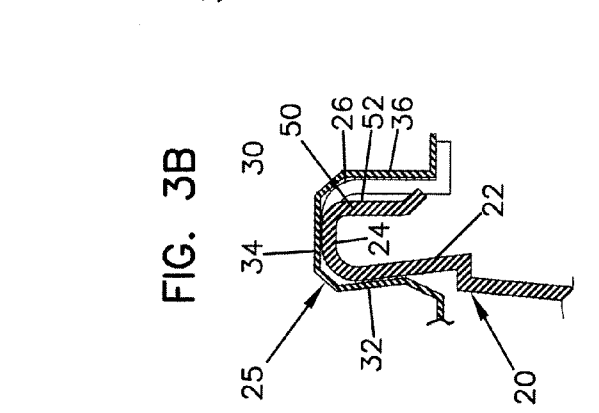
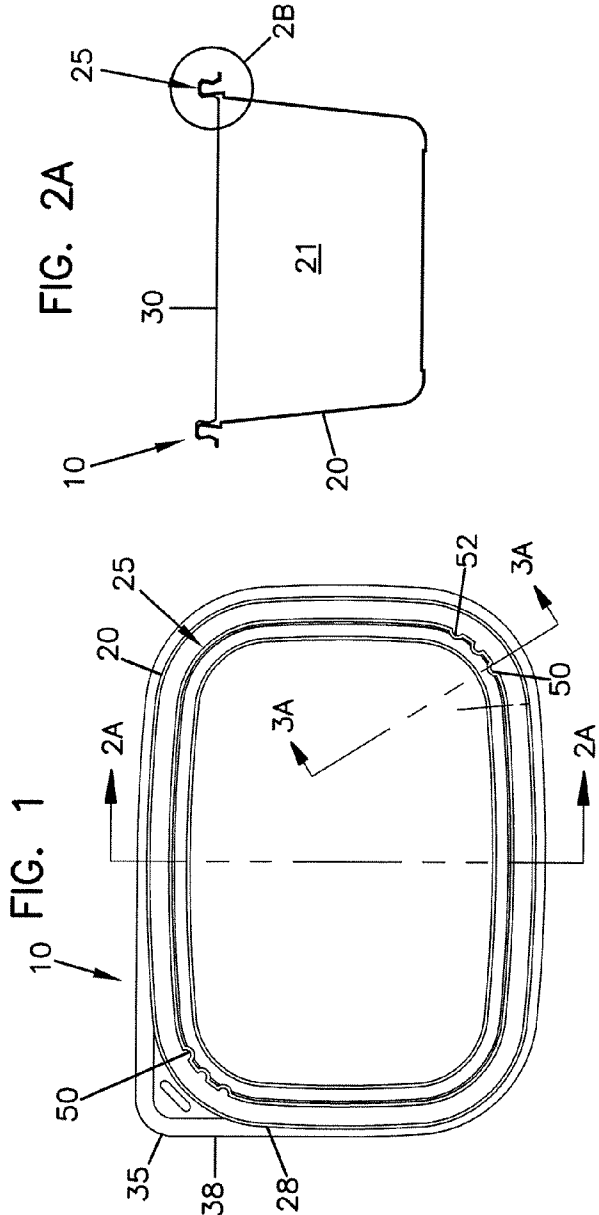


FIG. 3A

FIG. 2B

FIG. 2A

FIG. 1

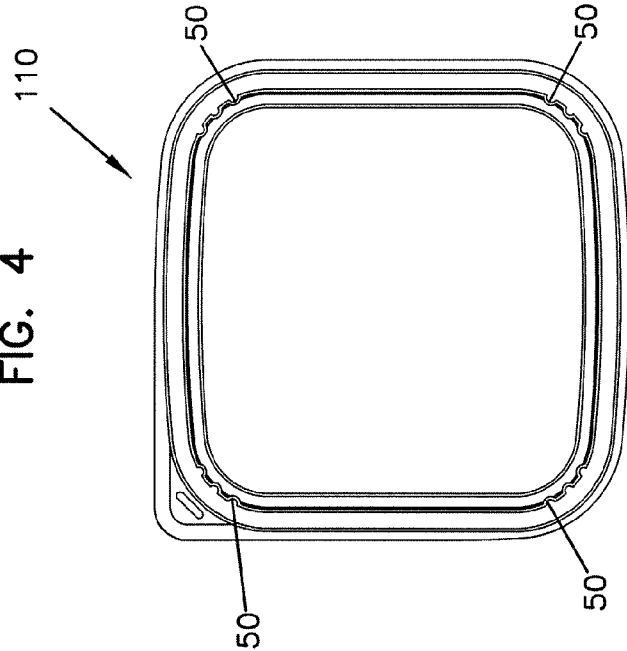
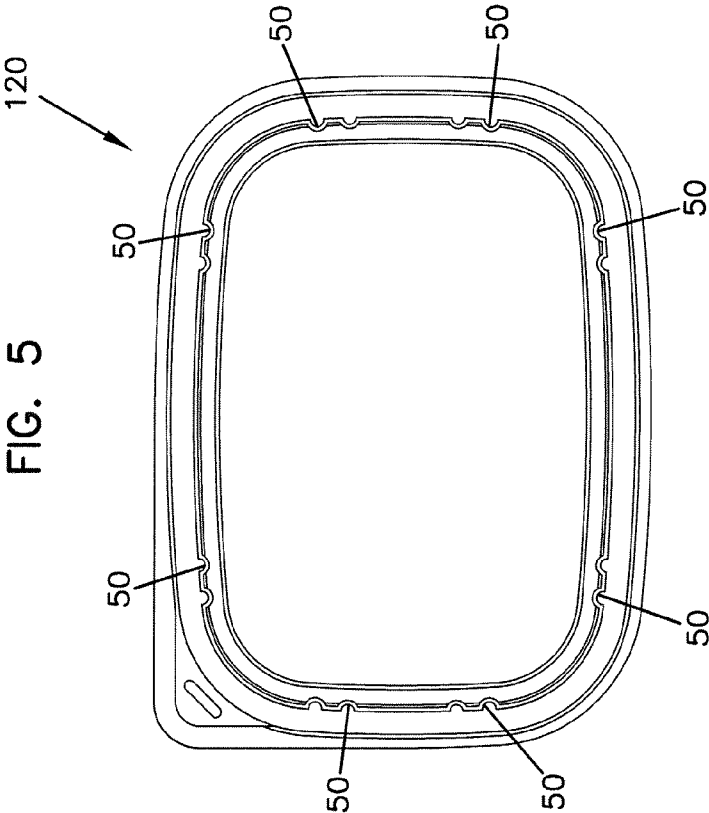


FIG. 9

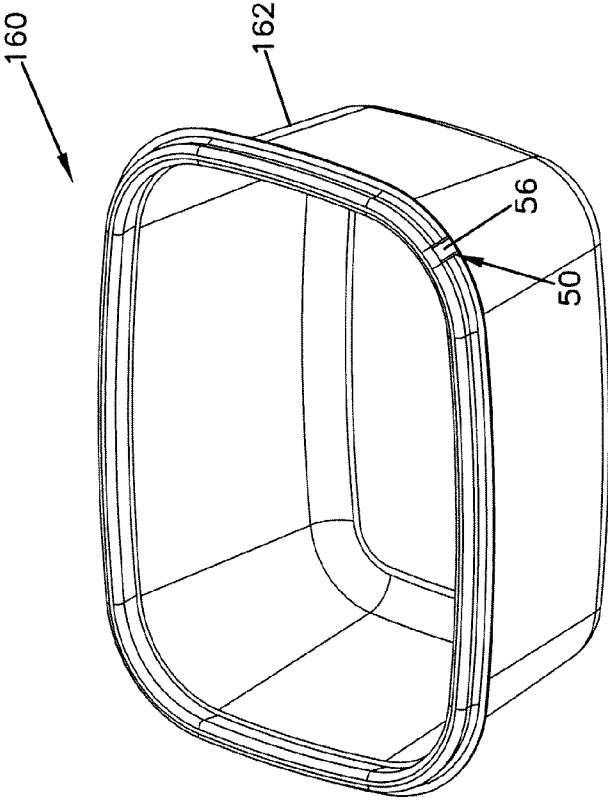


FIG. 6

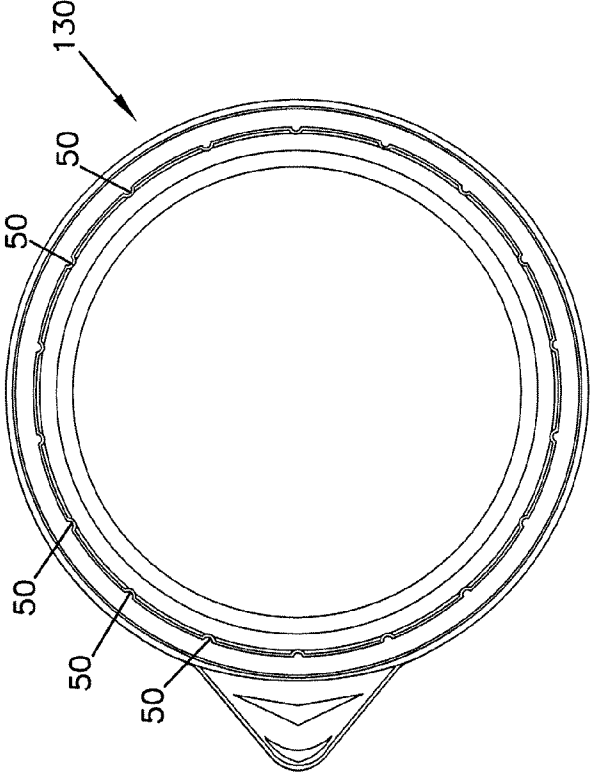


FIG. 7

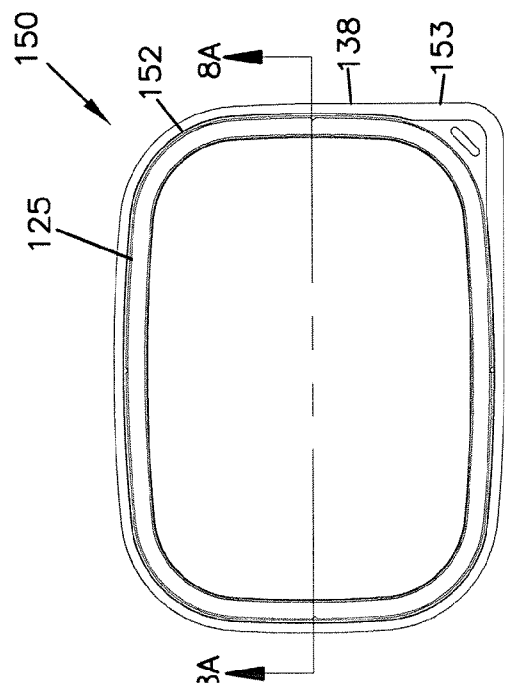


FIG. 8B

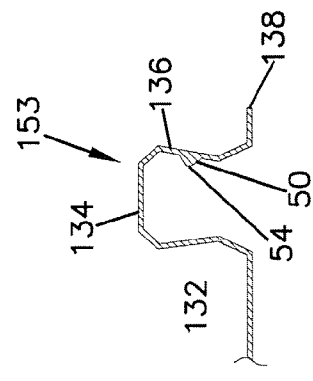
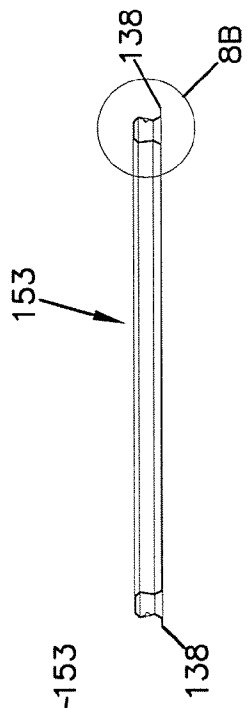


FIG. 8A



CONTAINERS WITH DISCONTINUOUS SEAL

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/823,341, filed Aug. 23, 2006, entitled "Containers with Discontinuous Seal, and Methods", which application is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] This disclosure generally relates to polymeric packages or containers, and, in particular, to rigid polymeric containers having a container body and a removable lid, the lid and container configured to cooperatively close but with at least one discontinuous seal region present around the engageable body and lid.

BACKGROUND

[0003] Enhancing the sealing and opening capabilities of rigid containers, both disposable containers intended for one-time use and those intended for repeated use, is an area of ongoing development.

SUMMARY OF THE DISCLOSURE

[0004] The present disclosure is directed to generally rigid, polymeric containers that have a body and a removable and replaceable lid configured for engagement with the body. The containers are often thermoformed, and are typically considered "disposable" containers, in that they may be discarded after one use, or a limited number of uses, generally dictated by the strength, integrity, and/or quality of the polymeric materials used to form the container.

[0005] The present disclosure is directed to a container design that reduces the forces needed to open (e.g., unseal) or vent a container. The designs of this disclosure facilitate the removal of the lid from the container body. The configuration, in some embodiments, also functions as a drain passage, for example, to assist in water drainage from the container body after washing.

[0006] The container includes a discontinuity feature in the sealing arrangement between the container body and the lid that provides a passage for fluid from the exterior of the container to the sealing arrangement. In some embodiments, the discontinuity feature, instead, provides a passage for fluid from the interior of the container to the sealing arrangement. In either case, the discontinuity features facilitates separating the container body and the lid when opening the container. The discontinuity feature may be present in one or both of the container body or the lid. In some embodiments, multiple discontinuity features are present in the container, and, in some of these embodiments, the features are distributed in more than one area of the container. In addition to the sealing arrangement including its discontinuity feature, the container can also include, for example along a different surface of the sealing arrangement, a leak-proof seal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a top view of a rigid container, in this figure a rectangular container, having a container body and a lid, according to the present disclosure;

[0008] FIG. 2A is a cross-sectional side view of the rigid container of FIG. 1 taken along line 2A-2A of FIG. 1;

[0009] FIG. 2B is an enlarged view of a portion of the rigid container of FIG. 2A, detailing the sealing arrangement;

[0010] FIG. 3A is a cross-sectional side view of the rigid container of FIG. 1 taken along line 3A-3A of FIG. 1;

[0011] FIG. 3B is an enlarged view of a portion of the rigid container of FIG. 3A, detailing the sealing arrangement;

[0012] FIG. 4 is a top view of a second embodiment of a rigid container, in this figure a square container, according to the present disclosure;

[0013] FIG. 5 is a top view of a third embodiment of a rigid container, in this figure a rectangular container, according to the present disclosure;

[0014] FIG. 6 is a top view of a fourth embodiment of a rigid container, in this embodiment a circular container, according to the present disclosure;

[0015] FIG. 7 is a top view of a sixth embodiment of a rigid container according to the present disclosure;

[0016] FIG. 8A is a cross-sectional side view of the lid of the rigid container of FIG. 7 taken along line 8A-8A of FIG. 7;

[0017] FIG. 8B is an enlarged view of a portion of the lid of FIG. 8A; and

[0018] FIG. 9 is a top perspective view of an embodiment of a rigid container body according to the present disclosure.

DETAILED DESCRIPTION

[0019] Many existing rigid containers are designed to inhibit and, in some cases, prevent leakage from the interior volume of the container during storage and use of the container. In many instances, the objective is to create a high strength sealing arrangement between the container body and the lid that is sufficiently secure to inhibit and/or prevent seepage of fluids, including liquids, from the interior of the container. One of the results of high strength seal designs is that the closed sealed container can be difficult to open. As container designs have progressed to stronger and tighter seals, the lids have become more difficult to remove from the container body. Not having access to the product inside the container can be as frustrating, if not more frustrating, than having a liquid leak out from the container. A strong seal can be generally undesirable to users that have weak hand strength or limited range of motion.

[0020] The containers of the present disclosure include a discontinuity in the sealing arrangement between the container body and the lid, the discontinuity allowing the flow of fluid (e.g., air) from the exterior of the container to the sealing arrangement, to interrupt the sealing contact of the container body and the lid surfaces and to facilitate removal of the lid from the container body.

[0021] Referring to the figures, a rigid container is illustrated in FIG. 1, FIGS. 2A and 2B, and FIGS. 3A and 3B. Container 10 includes a container body 20 and a lid 30 that is removable and replaceable onto body 20. Container body 20 includes an interior volume 21 for receiving and storing items therein. Lid 30 inhibits access to interior volume 21.

[0022] Lid 30 attaches on to container body 20 via sealing arrangement 25, generally located proximate a periphery 28 of container body 20 and a periphery 38 of lid 30. Sealing arrangement 25 securably retains lid 30 onto body 20. Sealing arrangement 25, preferably, forms along and between lid 30 and body 20 and secures lid 30 and container body 20 so as to inhibit passage of fluid from interior volume

21 to the exterior of container 10. Lid 30 includes a tab 35 that provides a grasping surface to facilitate removal of lid 30 from container body 20. In accordance with this disclosure, sealing arrangement 25 includes a discontinuity in at least one position along the length of sealing arrangement 25 around periphery 28, 38, that also facilitates removal of lid 30 from container body 20.

[0023] Each of container body 20 and lid 30 includes surfaces that can cooperatively form sealing regions of sealing arrangement 25. These surfaces are configured to engage (e.g., frictionally) with each other. In the specific embodiment illustrated, these surfaces of container body 20 include an inner side wall 22, a top wall 24, and an outer side wall 26, with outer wall 26 being closest to periphery 28. Lid 30 includes corresponding cooperating surfaces, i.e., an inner side wall 32, a top wall 34, and an outer side wall 36, with outer wall 36 being closest to periphery 38. Container body 20 and lid 30 can be manufactured so that one or more of the paired cooperating surfaces inhibit fluid movement as part of sealing arrangement 25. That is, sealing arrangement 25 has at least one pair of walls with sealing regions in contact, preferably in frictional contact (e.g., inner walls 22, 32, top walls 24, 34, or outer walls 26, 36). In many embodiments, walls 22, 24, 26 of container body 20 may be referred to as a lip, and walls 32, 34, 36 of lid 30 may be referred to as a groove. It will be appreciated that the sealing regions may extend along a portion or the entire length of paired body and lid walls.

[0024] Referring to FIGS. 2A and 2B, a portion of container 10 is illustrated where sealing arrangement 25 has three wall pairs with sealing regions, that is, inner walls 22, 32, top walls 24, 34, and outer walls 26, 36, having sealing regions in frictional contact. In accordance with this disclosure, however, sealing arrangement 25 is configured or constructed with a discontinuity in one or both walls of a sealing region to intentionally interrupt the engagement between cooperating surfaces of container body 20 and lid 30.

[0025] Container 10 includes at least one discontinuity feature 50, e.g., an indentation, divot, groove, bump, etc., within sealing arrangement 25 that forms a discontinuity within sealing arrangement 25. That is, feature 50 breaks the continuous nature of sealing arrangement 25 in the sealing region between cooperating surfaces, inner walls 22, 32, top walls 24, 34, and/or outer walls 26, 36, of container body 20 and lid 30 extending around container 10. In the embodiment illustrated in FIG. 1, discontinuity feature 50 is present within container body 20 within the sealing region formed by walls 26, 36. In particular, discontinuity feature 50 is an indent 52 present in outer wall 26 of container body 20.

[0026] In this embodiment of FIG. 1, three indents 52 are present in a corner of container body 20 and three additional indents 52 are present in an opposite corner of container body 20. That is, the two sets of three indents 52 are positioned generally 180° apart. It should be understood that for a rectangular container, such as container 10 of FIG. 1, because lid 30 could be positioned in two different orientations, the discontinuity features are preferably present at two opposite corners. In this embodiment, indents 52 are present proximate lid removal tab 35, when lid 30 is engaged with container body 20. As shown, discontinuity feature 50, such as indent 52, can be formed in a corner of sealing arrange-

ment 25 that is defined by a radius, so that no matter how lid 30 is oriented, the benefits of discontinuity feature 50 are realized.

[0027] Various alternate configurations for placement of discontinuity feature(s) 50 are provided. FIG. 4 illustrates a square container, container 110, having a series of discontinuity features 50 in the sealing arrangement in each of the four corners. With such an arrangement, having four discontinuity features 50 positioned 90° apart, discontinuity feature 50 will facilitate removal of the lid from the container no matter on which corner the removal tab is located.

[0028] FIG. 5 illustrates an alternate placement of discontinuity features 50 in a rectangular container. A series of discontinuity features 50 could additionally or alternately be located in non-radiused portions, e.g., to either side of the corners, as shown on container 120. Such a configuration would be advantageous if the removal tab on the lid were located in a position other than at a corner.

[0029] Yet another alternate embodiment is shown in FIG. 6, as circular container 130, having discontinuity features 50 positioned e.g., generally evenly, around the sealing arrangement of the container, so that no matter where the lid removal tab is seated, the benefits of having the discontinuous seal are realized. In each of the embodiments of FIGS. 4 through 6, discontinuity feature 50 is present in a wall of the container body and breaks the continuous nature of the sealing arrangement in the sealing region between cooperating surfaces of the container body and the corresponding lid.

[0030] Referring to FIG. 7 and FIGS. 8A and 8B, another alternate rigid container having a discontinuous sealing arrangement is illustrated as container 150. Container 150 includes a container body 152 (illustrated only in FIG. 7 in a top view) and a lid 153 that is removable and replaceable onto the container body.

[0031] Lid 153 attaches on to the container body via sealing arrangement 125 proximate lid periphery 138, which securably retains lid 153 onto body 152. Sealing arrangement 125, preferably, forms along and between lid 153 and container body 152 so as to inhibit passage of fluid from the interior volume to the exterior of container 150. In accordance with this disclosure, sealing arrangement 125 includes a discontinuity in at least one position around along the length of sealing arrangement 125.

[0032] Each of container body 152 and lid 153 includes surfaces that can cooperatively form sealing regions of sealing arrangement 125, these surfaces being configured to engage (e.g., frictionally) with each other. In this embodiment, various surfaces of sealing arrangement 125 include 'cut back' or 'negative angle' walls to increase the engagement of lid 153 with container body 152. For lid 153, FIG. 8B, the surfaces that engage with cooperating surfaces on container body 152 includes inner side wall 132, top wall 134, and outer side wall 136. As in other embodiments, cooperating paired surfaces of body 152 and lid 153 have sealing regions that inhibit fluid movement as part of sealing arrangement 125. In accordance with this disclosure, sealing arrangement 125 is configured or constructed with a discontinuity in one or both walls of a sealing region to intentionally interrupt the engagement between cooperating surfaces of container body 152 and lid 153.

[0033] In the embodiment illustrated in FIGS. 8A and 8B, discontinuity feature 50 is present within lid 153 within the sealing region formed by outer wall 136 and the cooperating

wall on body 152 (not illustrated). In particular, discontinuity feature 50 is a rib 54 present in outer wall 136 of lid 153. Rib 54 extends the entire length of sealing arrangement 125 around container 150. Discontinuity feature 50, i.e., rib 54, creates a discontinuity to facilitate easy removal of lid 153 from container body 152. Such a rib 54, or other raised or elevated discontinuity feature 50, may also assist in applying pressure to the opposite side of the sealing arrangement 125, to create a stronger continuous seal via the inner surface of the feature.

[0034] Referring to FIG. 9, yet another alternate rigid container having a discontinuous sealing arrangement is illustrated as container 160. Container 160 includes container body 162 and also a lid (not illustrated in FIG. 9) that is removable and replaceable onto container body 162. The lid inhibits access to the interior volume of container body 162.

[0035] Similar to the previous embodiments, each of container body 162 and its lid includes surfaces that cooperatively engage at sealing regions of a sealing arrangement. These surfaces are configured to engage (e.g., frictionally) with each other. In accordance with this disclosure, the sealing arrangement is configured or constructed with a discontinuity in one or both walls of a sealing region to intentionally interrupt the engagement between cooperating surfaces of container body 162 and its lid.

[0036] In the embodiment illustrated in FIG. 9, discontinuity feature 50 is present within container body 162. In particular, discontinuity feature 50 is an aperture 56 through a portion of the sealing region including outer walls of the sealing arrangement. Aperture 56 is present in a radiused corner of container body 162. Aperture 56 facilitates removal of any lid sealed onto container body 162, by providing a discontinuity in the sealing region. Aperture 56 also allows liquid, e.g., water, to drain from container body 162 when inverted, e.g., for drying after washing, such as in a dishwasher.

[0037] Overall, discontinuity feature 50 is sufficiently sized (e.g., deep, tall, wide) to form a discontinuity in a sealing region between the cooperating surfaces of the lid and the container body to which it seals. For example, indent 52 (see FIGS. 1 and 3B) is sufficiently deep to provide a discontinuity in the sealing region between lid 30 and container body 20. In that embodiment, indent 52 is sufficiently deep so that container outer wall 26 and lid outer wall 36 do not have continuous engagement therebetween. In another example, rib 54 (see FIG. 8B) is sufficiently tall or high to provide a discontinuity in the sealing region between lid 153 and container body 152. In another example, aperture 56 has a sufficient area (width×height) to provide a discontinuity in the sealing region between the lid and container body 162.

[0038] Discontinuity feature 50 is located in a sealing region of a sealing arrangement (e.g., sealing arrangement 25 or 125), such as, for example, in inner side wall 22, top wall 24, outer side wall 26 of container body 20 or inner side wall 32, top wall 34, outer side wall 36 of lid 30. It is understood that other configurations of sealing regions will have different surfaces. Discontinuity feature 50 can extend or occupy only a portion of the wall or surface within a sealing region, the entire height of the wall or surface, or additionally be present in or extend to other surfaces, such as, for example, onto removal tab 35.

[0039] Containers 10, 110, etc. according to this disclosure are plastic containers. The plastic is typically thermoplastic, although thermosetting materials could be used. Examples of suitable plastic materials include polyethylene (both HDPE and LDPE), polyethylene terephthalate (PET), polypropylene, and polystyrene. Materials such as polyvinyl chloride (PVC) may also be used, but are typically more expensive. These polymeric or plastic materials can be made from typical petroleum-based materials (as is conventional), or, these and other materials could be made from natural materials such as corn and other starch sources. Other materials similar to plastic and suitable for the containers of the present invention are paperboard, hardboard, and pressboard. A polymeric film or layer may be present on the surface of the material to enhance resistance to moisture (e.g., increase waterproofing) of non-plastic materials. Plastics, and the other suitable materials, are sufficiently rigid so that the container maintains its shape without collapsing or wrinkling under normal use conditions. In most embodiments, the container body and lid are made from the same polymeric material.

[0040] In most embodiments, depending on the material used for the container, the container is blow molded or press molded. Other suitable forming techniques include injection molding, although this forming technique is typically more expensive.

[0041] For blow molded or press molded containers, both the container body and lid, typically have a thickness that is no more than 2 mm, often no more than 1 mm. Depending on the material used for the container, the thickness could be no more than 0.7 mm or no more than 0.5 mm. Of course, thinner containers would also be suitable. A disposable container should be sufficiently thick and rigid to withstand a single use, including microwave exposure. In some embodiments, the container is sufficiently rigid to withstand use over several days, including repeated daily use, multiple microwave exposures, and dishwasher temperatures.

[0042] The above description and the attached drawings provide a description of various embodiments for improving the openability and operability of a rigid container. It is understood that the various elements and details of the discontinuity features illustrated in the figures and/or discussed above are interchangeable among the various container designs, and that variations of the various elements and details are within the scope of this disclosure. Additionally, the various elements and details of the discontinuity features can be used generally any sealing arrangement and/or sealing region configuration. Since many embodiments of the disclosure can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

What is claimed:

1. A rigid container comprising a container body and an engageable lid,
 - the container comprising a sealing arrangement comprising a sealing region formed by cooperating walls of the container body and the lid, the walls being engaged surfaces engaged in retaining contact,
 - the container including at least one discontinuity within the sealing region interrupting the retaining contact.
2. The container of claim 1, wherein the at least one discontinuity feature comprises an element molded into at least one of the walls of the container body and the lid.

3. The container of claim 2, wherein the at least one discontinuity feature is an indent in the wall of the container body.

4. The container of claim 2, wherein the at least one discontinuity feature is a protrusion in the wall of the lid.

5. The container of claim 4, wherein the at least one discontinuity feature is a rib in the wall of the lid.

6. The container of claim 2, wherein the at least one discontinuity feature is an aperture in the wall of the container body.

7. The container of claim 2, wherein the at least one discontinuity feature is present in a corner at least one of the walls of the container body and the lid.

8. The container of claim 2, wherein the lid includes a tab, and the at least one discontinuity feature is present proximate the tab.

9. The container of claim 8, wherein the container body and the lid are rectangles, the tab is present at a corner of the lid, and the at least one discontinuity feature is present proximate the tab.

10. The container of claim 9, further comprising a second discontinuity feature present in at least one of the walls of the container body and the lid, the second discontinuity feature positioned 180° from the at least one discontinuity feature.

11. A rigid container comprising a container body and an engageable lid with a sealing arrangement including sealing regions having cooperating walls of the body and the lid, with at least one discontinuity feature present in at least one of the cooperating walls of the sealing region.

12. The container of claim 11, wherein the at least one discontinuity feature comprises an element molded in at least one of the cooperating walls of the sealing region.

13. The container of claim 12, wherein the at least one discontinuity feature is an indent in the cooperating wall of the body.

14. The container of claim 12, wherein the at least one discontinuity feature is a protrusion in the cooperating wall of the lid.

15. The container of claim 14, wherein the at least one discontinuity feature is a rib in the cooperating wall of the lid.

16. The container of claim 12, wherein the at least one discontinuity feature is an aperture in the cooperating wall of the body.

17. The container of claim 12, wherein the at least one discontinuity feature is present in a corner of the sealing arrangement.

18. The container of claim 12, wherein the lid includes a tab, and the at least one discontinuity feature is present proximate the tab.

19. The container of claim 18, wherein the container body and the lid are rectangles, the tab is present at a corner of the lid, and the at least one discontinuity feature is present proximate the tab.

20. The container of claim 19, further comprising a second discontinuity feature present in at least one of the cooperating walls, the second discontinuity feature positioned 180° from the at least one discontinuity feature.

21. A rigid container comprising:
a container body comprising a lip,
a lid comprising a groove configured for engagement with the lip, the lip and the groove forming a sealing arrangement,
a sealing region present in the sealing arrangement, the sealing region formed by cooperative surfaces of the lip and the groove, and
at least one discontinuity feature present in the sealing region between the cooperative surfaces.

22. The container of claim 21, wherein the at least one discontinuity feature comprises an element molded into at least one of the lip and the groove.

23. The container of claim 22, wherein the at least one discontinuity feature is an indent in the lip.

24. The container of claim 22, wherein the at least one discontinuity feature is a protrusion in the groove.

25. The container of claim 24, wherein the at least one discontinuity feature is a rib in the groove.

26. The container of claim 22, wherein the at least one discontinuity feature is an aperture in the lip.

27. The container of claim 22, wherein the at least one discontinuity feature is present in a corner at least one of the groove and the lip

28. The container of claim 22, wherein the lid includes a tab, and the at least one discontinuity feature is present proximate the tab.

29. The container of claim 28, wherein the container body and the lid are rectangles, the tab is present at a corner of the lid, and the at least one discontinuity feature is present proximate the tab.

30. The container of claim 29, further comprising a second discontinuity feature present in at least one of the groove and the lip, the second discontinuity feature positioned 180° from the at least one discontinuity feature.

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