A container construction is provided and includes a lid and receptacle. The lid is attachable to the receptacle in an area between lips extending from outer perimeters of the lid and receptacle using a bonding element that is permanently attached to one of the lips and heat sealed to the other of the lips. The lid includes a plug that fits within a mouth allowing resealing of the receptacle. Only one lid element is required to seal the receptacle.
RESEALABLE CONTAINER LID AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority on previously filed provisional application U.S. Ser. No. 60/595,716, filed Jul. 29, 2005.

BACKGROUND OF THE INVENTION

[0002] Containers are commonly used for packaging items and in particular food items. Many types and forms of containers have been used each providing advantages and disadvantages, usually simultaneously. A common type of food package involves a container bottom or receptacle forming a storage chamber with an opening. A lip or flange extends outwardly from the opening and provides a surface for securing a membrane type closure to cover, close and seal the opening. Typically, the membrane is a laminate having a metallic foil layer and a polymeric layer. The membrane is secured to the receptacle, as for example, by forming an adhesive bond or a seal through induction bonding. One problem with such membrane closures is that during the opening process, they often delaminate even though they are not intended to, leaving residue of the membrane on the receptacle or often tear requiring multiple steps to remove the membrane and fully open the container. Additionally, the container cannot be ressealed using the removed membrane.

[0003] To solve the resealing problem, an overcap or lid was provided which generally includes a generally planar wall member with a depending skirt with a portion of the depending skirt and a portion of the peripheral lip interengaging in some manner to retain the lid on the container. Such a multiple closure container though requires additional equipment on the processing line and hence processing time to complete a filled and sealed container. The time to fill and seal the container, herein referred to as packaging time, can take up to two seconds adversely affecting line efficiency. Additionally, a multiple component closure system adds costs to the final product and in particular to the container where margins tend to be low.

[0004] Thus, there is a need for an improved lid and combination lid and receptacle and method of filling and container operation.

SUMMARY OF THE INVENTION

[0005] The present invention provides a lid and container construction utilizing a lid and receptacle wherein the lid provides both peelable removal and mechanical resealability. The construction permits the assembly and sealing of the container using existing online equipment that can effect the joining of the lid and receptacle in a quick and efficient manner.

[0006] A method of manufacturing the container is provided wherein a lid and receptacle are formed and at least one is provided with a bonding element that is permanently adhered to a lip and can be semi-permanently attached to another lip, as by heating, to effect fusion of the bonding element. The bonding element, when it is desired to remove the lid, breaks while still remaining at least substantially permanently attached at its original area of permanent attachment to a lip. The lid may then be moved exposing the contents of the container. The lid includes a plug that can be inserted into the mouth of the receptacle and by use of cooperatively interengageable elements, the lid is removably mounted to the receptacle for rescaling the receptacle. Optionally, the lid may be only partially separated from the receptacle for exposing the contents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a perspective view of a container comprising the present invention.

[0008] FIG. 2 is an exploded perspective view of the container illustrated in FIG. 1.

[0009] FIG. 3 is a sectional view of the container taken along line 3-3FIG. 1.

[0010] FIG. 4 is an enlarged fragmentary sectional view of a portion of the container shown in FIG. 3.

[0011] Like numbers throughout the various Figures designate like or similar parts.

DETAILED DESCRIPTION

[0012] The reference 1 designates generally a container including a container bottom or receptacle 3 and lid 4. The receptacle 3 has a sidewall 6, bottom wall 7 and a product access opening 8. The sidewall 6 and the bottom wall 7 define a storage chamber 10. The lid 4 is secured to the receptacle 3 in an area 5 between overlapping lips or flanges 12, 13 respectively. Securement of the lid 4 to the receptacle 3 can be effected by a bonding element 15. FIG. 4. The bonding element 15 is part of one of the lips 12, 13 and overlies at least a portion of the other of the lips 12, 13.

[0013] The receptacle 3 is in the form of an upwardly opening cup having a mouth portion 18 adjacent the opening 8 and top 9. The mouth portion 18 is at least partially defined by the sidewall 6 and terminates in the chamber 10 at a shoulder 19. As shown, the mouth 18 is generally cylindrical. The sidewall 6 may be any suitable shape or size and is preferably generally circular in transverse cross section and may be in the form of a straight wall or a tapered wall. If the sidewall 6 is tapered, it is usually frusto-conically shaped and if straight walled, it may be generally cylindrical. Both shapes of sidewalls are shown in FIG. 3 with the straight sidewall being shown in phantom. A tapered sidewall can be shaped to provide for nesting of receptacles 3. Preferably, the bottom wall 7 has at least a substantial portion that is generally planar. The receptacle 3, if polymeric, can be suitably molded such as thermoformed, vacuum formed or injection molded from suitable materials as is known in the art. The receptacle 3 may also be formed of other suitable materials for example, polymeric coated paperboard or the like. The construction and material for the receptacle 3 will usually be determined by the product to be stored therein, processing conditions of the contents, e.g., retort, and cost. The product 20, FIG. 3, may be any suitable product and in a preferred embodiment, the container 1 is particularly useful with food products particularly those with a high liquid or semi-liquid content, such as water and/or lipids, for example, yogurt, pudding, fruit, dairy products, high fat (lipid) items such as margarine, butter or the like. The materials forming the receptacle 3 and lid 4 would be impermeable to the product 20 or components of the product.
20. The material comprising the receptacle 3 may be a single layer of material, a multiply layer of material, a coated material or a blend of materials, as for example, a mixture of polymers. Suitable polymers can include polyethylene (low or high density), polypropylene, polystyrene and the like and mixtures or laminates thereof. The material may need to meet regulatory requirements such as FDA requirements. Suitable colorants such as dyes or pigments may be incorporated or applied and the exterior surface 21 may have printing and/or graphics applied thereto either by direct printing or by providing an add on label. Receptacles 3 of the generic type or form as described above are well known in the art as are their methods of manufacture and also the materials used to comprise the same. The lip 13 has a generally upwardly facing surface 23 while the lip 12 has a generally downwardly facing surface 24. The lip 13 extends generally radially outwardly of and peripherally (or circumferentially) about the external wall 6 and hence the receptacle 3 and the lip 12 extends generally radially outwardly of and peripherally (or circumferentially) about the lid 4. The mouth portion 18 is adjacent the lips 12, 13 and includes the opening 8. One of the lips 12, 13 may be provided with a peripherally (or circumferentially) extending rib 25 for assisting in fastening the lid 4 and receptacle 3 together particularly when joining the two together by sonic welding. As shown, the rib 25 projects from the surface 23 and is an integral part of the lip 13 and has a distal or free edge 25E to (later described) contact the lip 12.

[0014] The lid 4 comprises the lip 12 extending outwardly from a plug portion 27. The plug portion 27 includes a bottom wall 28 which is integral with and extends across the bottom end 29 of a sidewall 30 preferably forming an upwardly opening recessed pocket 31. The wall 28 is positioned adjacent the shoulder 19 and may rest thereupon. The sidewall 30 connects the lip 12 to the wall 28. The transverse shape of the sidewall 30 is similar to the shape and size of the mouth 18 and is receivable therein. The receptacle 3 and lid 4 have cooperatively interengageable elements usable to help releasably secure at least a portion the lid 4 to the receptacle 3 after the container 1 is opened to effect resealing of the chamber 10. In the illustrated structure, the cooperatively interengageable elements includes a pair of peripherally (or circumferentially) extending ribs 32, 33 with the rib 32 being a portion of the sidewall 30 and projecting radially outwardly therewith and the rib 33 being a portion of sidewall 6 and projecting radially inwardly therefrom. The rib 33 is positioned at an elevation higher than the rib 32 when the lip 4 is attached to the receptacle 3 providing an interference fit and a snap lock connection between the lid 4 and receptacle 3. The rib 32 and lip 12 form a recess therebetween. The ribs 32, 33 may be substituted with frictional engagement between the sidewall 30 and the sidewall 6 or one of the sidewall 6 and sidewall 30 may be provided with a groove and the other of the sidewalls 6 and 30 be provided with a rib to provide the cooperatively interengageable elements.

[0015] As seen in FIGS. 1, 2 and 3, the lip 4 may be provided with a hinge device 35 which allows flexing of one lid portion 36 relative to a lid portion 37. In the illustrated structure, the sidewall 30 has interruptions or discontinuities 39 forming notches in the sidewall 30 at opposite ends of a groove of channel 40. The groove 40 is defined by a pair of walls 41, 42 joined together at an apex 43 and to the wall 28 as at 44, 45 (FIG. 3). The apex 43 is at a level or height adjacent to the lip 12. By providing the interruptions 39 in the sidewall 30, the portion 36 may hinge about the apex 43 and relative to the lid portion 37. A living hinge is thus provided between walls 41, 42 and between lid portions 36, 37. Further details of the operation and construction of the container are provided below.

[0016] The bonding element 15 is positioned between portions of the lips 12, 13 and is permanently attached to one of the lips 12, 13 to become part of the lip and is attached to the other of the lips. The bonding element 15 is best seen in FIG. 4. In a preferred embodiment, the lid 4 is a laminated structure having a first laminate ply or layer 44 and a second laminate ply or layer 45. Preferably, both plies, 44, 45 at least substantially completely cover their respective side of the lip 4. The formation of such a laminate structure is well known in the art and can be made such as by co-molding, e.g., co-extrusion. The ply 45 is adjacent to the receptacle 3. The ply 45 has a portion thereof forming the bonding element 15 and is readily heat sealable to a portion of the surface 23 and hence the lip 13 at peripherally (or circumferentially) extending rib 25 at its free edge 25E. As shown, the rib 25 and lips 12, 13 are annular. The details of the bonding area are enlarged and not to scale in FIG. 4 to better show detail. The heat sealing temperature and thus the melting point of the ply 45 and bonding member 15 is preferably in the range of about 120°C (248°F) and about 145°C (293°F) and the material of the lip 13 and its rib 25 is fusible with the bonding element 15. This temperature range is particularly useful when the receptacle 3 is made out of polypropylene. It is to be understood that the bonding element 15 may be a portion of the receptacle 3 and, may be a ply similar to the ply 45 wherein the receptacle 3 could also be a laminate structure. It is also to be understood, that the bonding element 15 can be applied in a selected area and made part of on one or the other of the lips 12, 13 and not cover the entirety of either the receptacle 3 or lid 4.

Optionally, the rib 25 may be eliminated but has been found to be beneficial when the heat bonding of the lid 4 to the receptacle 3 is by sonic welding. The bonding element 15 has a break strength, which may be a combination of both tensile and shear, as more fully discussed below, less than the strength of the permanent attachment of the bonding element at as 47 to the ply 44. Thus, when the lid 4 is removed from the receptacle 3, the bonding element 15 breaks but stays joined to at least a substantial portion and preferably completely attached to lip 12 at its area of permanent bonding to ply 44. The break may also occur partially or completely at the heat bond 5 between the rib 25 and bonding element 15 to separate the two components. The bond 5 formed between the lip 4 and receptacle 3 can be characterized by an absence of cut or score lines used in the prior art to assist in separating the lid 4 from the receptacle 3. It may be useful to provide un-joined margins between at least portion of the lips 12, 13 particularly at a pull tab 48. As seen, in FIG. 4, the bond 5 does not extend to the outer edges and inner edges of the lips 12, 13 providing gaps or un-joined margins between the outer and inner edge portions of the lips 12, 13.

[0017] In a preferred embodiment, at least the lip 12 is resiliently deformable, i.e., can be bent at least about 90° and return under its own resilience or elastic deformability substantially to its original position. Preferably all components of the lid 4 and receptacle 3 are resiliently deformable and in particular, the lips 12, 13.
The pull tab 48 preferably is an integral part of the lip 12 and is formed when the lid 4 is formed as for example by die cutting. The tab 48 provides a gripping element for use by a consumer to effect opening of the container 1. To open the container 1, the user will typically bend the tab 48 upwardly and then into a reverse bend to start a fracture (see FIG. 3 where the bent tab 48 is shown in phantom) in the bonding element 15 and then by pulling the tab 48 across the opening 6 of the container will break the bonding element 15 without substantial and preferably no delamination between the plies 44, 45. Preferably, the bonding element 15 breaks within itself and/or the bond 5 formed between the bonding element 15 and the rib 49 of the lip 13. By utilizing the above described construction, the membrane that is typically used on such containers can be eliminated. Preferably the lip 13 is more resistant to bending during opening than the lip 12. This can be accomplished by a combination of material properties and relative thicknesses of the lips.

To manufacture a container 1, a receptacle 3 is suitably formed as for example by thermoforming, vacuum forming or injection molding. In the illustrated structure, wherein the lid 4 is multi-plied, a laminate is first formed which can then be suitably formed into a lid 4 for example by thermoforming or vacuum forming. The outer edge of the lid 4 can be die cut depending upon the forming method of the lid 4. Likewise, and in certain molding methods, the outer edge of the receptacle 3 may also be die cut. Typically, such containers are formed offsite from the filling plant. Thus, the lids 4 and receptacle 3 would be packaged and forwarded to a processing plant. The receptacles 3 and lids 4 are transferred to a processing line and the receptacles 3 are positioned in an upwardly opening direction. As described herein, the positional references to the container construction are those when the container is in its normally upwardly opening condition and the lid is in its normal position for attachment to or attached to the receptacle 3. The receptacle 3 is conveyed through a filling line which has a depositor which will deposit a predetermined amount of product 20 into the chamber 10. It is preferred to prevent product from dripping or trailing onto the lid 13 which might interfere with heat bonding. The thus filled receptacle 3 is transferred to a lid depositing station where a lid 4 is deposited on the receptacle 3. The plug portion 27 is inserted into the mouth 18 wherein the lips 12, 13 are in overlapping orientation. Additionally, the cooperatively interengaging elements, for example the ribs 32, 33 are positioned relative to one another to hold the lip 4 in place during its transfer to a sealing station. A heat seal device 55, including a heated element 55A and a support 55B, which are shown in phantom in FIG. 4, will then apply heat and pressure to the lip 12 to effect a heat seal bond of the bonding element 15 to one of the lips 12, 13. Heat may be applied in my suitable manner, e.g., conduction, radiation convection (e.g., hot air) or may be generated at the bonding area (e.g., sonic welding). In the illustrated construction, the bonding element 15 is heat bonded to the lip 13 at the bond area 5 which is illustrated as an annular area extending around the entirety of the lips 12, 13. Optionally, the sealing force applied and the heat for bonding may be provided separately and by separate devices if desired. The applied bonding force and hence pressure is adequate to reach a so called hard stop, i.e., enough to effect good bonding but preferably not enough to force excessive flow of heated bonding element 15 or adjacent material. One or more gaps 57A, 57B may be provided on one or both of opposite sides of rib 49 between the lips 12, 13 that are not bonded which gaps extend inwardly and outwardly from the rib 49 and preferably at least substantially completely around the perimeters of the lips 12, 13. The gaps 57A or 57B may also be provided on opposite sides of the bond area 5 if a rib 49 is not utilized. The gap 57A extends inwardly from the outer perimeter of the lips 12, 13 a distance of at least about 0.03 inches at least adjacent the tab 48 and preferably at least about 0.06 inches. The rib 49 has a free end 49F engageable with the lip 12 that has downwardly inclined portions, for example, the end 49F may be transversely radiused. The rib 49 and gaps 57A, B are useful when sonic welding are used to effect heat bonding. However, in another embodiment, the gap can be only in the vicinity of the pull tab 48. In still another embodiment, no gaps 57A, B are formed when other than sonic welding is sued to effect heat bonding. By pulling the tab 48 across the top of the receptacle 3, the bonding element 15 breaks and does not substantially separate from the lip to which it is permanently adhered which in the illustrated structure is lip 12. The lip 12 and preferably the remainder of the lip 4 is relatively rigid and has a thickness in the range of between about 0.008 and about 0.016 inches with a thickness of about 0.012 inches having been found workable. It is preferred that the lip 13 have a thickness in the range of between 0.025 and about 0.045 inches with a thickness of about 0.035 inches being workable. Preferably the lip 13 is more rigid than the lip 12. The remainder of the receptacle 3 has a thickness in the range of between about 0.01 and about 0.025 inches with a thickness of about 0.015 inches having been found workable. The thickness described may vary across the particular part depending on the method of part manufacture. For example, in vacuum forming, material is stretched resulting in thinned areas depending on the amount and location of stretch. Membrane closures of the prior art of food containers have a thickness in the range of between 0.002 and about 0.005 inches. The rib 5 has a height in the range of between about 0.01 and about 0.03 inches with a height of about 0.02 inches having been found workable. The filled container 1 with the lid 4 bonded to the receptacle 3, after exiting the filling line, can be stored. After storage and distribution, a consumer can easily open the container 1 (separating the lid 4 from receptacle 3 as by breaking the bonding element 15 most conveniently by pulling the tab 48 across the opening 8. The separation of the lid 4 from the receptacle 3 does not need to be completely around the perimeter of the opening 8 but the lid 4 can be left attached in the area A (FIG. 1) on one side of the apex 43 allowing the lid 4 to remain partially attached to the receptacle 3. Differential bonding of the lid 4 to the receptacle 3 can be used between the lips 12, 13 in the zones A, B to assist in facilitating opening and retaining the lid partially attached. The lid portion in area B (FIG. 1) on the other side of the apex 43 can be bent at the apex 43 allowing access to the chamber 10 and product 20 while still being partially attached to the receptacle 3. The lid 4 can be completely separated from the receptacle 3 as well. To reseal the container 1, the lid 4 is placed back into the mouth 18 whereby the cooperatively interengaging elements, for example the ribs 32, 33 releasably retain the lid 4 mounted to the receptacle 3.

A typical filling line requires just a matter of seconds to fill and effect attachment of a membrane lid and overcap lid to a container bottom. There may be some time
lag during the transfer of a filled receptacle 3 to a capping station and to place a lid 4 into a receptacle prior to bonding. Bonding of a lid has taken about 2 seconds while filling takes less time. The use of the present invention has reduced the 2 second package completion time to a time period on the order of about 0.5 seconds to 1.0 seconds to effect lid to receptacle bonding as by heat sealing with success being had at effecting lid bonding after filling in a time period of about 0.7 seconds or less. The present invention may be used on existing production lines with little or no modifications to the lines.

[0021] Thus, there has been shown and described several embodiments of a novel invention. As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the examples illustrated herein, and it is therefore contemplated that other modifications and applications, or equivalents thereof, will occur to those skilled in the art. The terms “having” and “including” and similar terms as used in the foregoing specification are used in the sense of “optional” or “may include” and not as “required”. Many changes, modifications, variations and other uses and applications of the present construction will, however, become apparent to those skilled in the art after considering the specification and the accompanying drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.

1. A method of making a container said method including:
   forming a receptacle with a product storage chamber and a mouth portion, the
   receptacle also having a generally outwardly extending peripheral first lip with a first surface;
   forming a lid having a generally outwardly extending second lip with a second surface and having a plug portion sized and shaped to be received within the mouth portion;
   depositing product into the chamber in a first time period;
   mounting the lid to the receptacle after the depositing, with said plug being positioned within the mouth portion and the first and second surfaces facing one another; and
   bonding a portion of the first lip to a portion of the second lip in a second time period and thereby sealing the product in the container, said first lip being severable from the second lip for opening the lid, the second time period being less than about 1 second.

2. The method as set forth in claim 1 including forming a rib as part of one of the first and second lips and having a free edge engageable with the other of the first and second lips.

3. The method as set forth in claim 2 including bonding the free edge of the rib to the other of the first and second lips by heat sealing.

4. The method as set forth in claim 3 including forming a tab on the second lip.

5. The method as set forth in claim 4 including forming an unbonded area between the first and second lips extending inwardly from an outer perimeter of the lips to the heat seal at least adjacent the tab.

6. The method as set forth in claim 5 including forming cooperatively interengageable elements on the receptacle and lid in a mouth region of the receptacle.

7. The method as set forth in claim 6 including forming the second lip with a bonding element to engage the free edge of the rib for heat sealing thereto, said second time period being less than about 0.7 seconds.

8. A resealable container comprising:
   a receptacle defining a product storage chamber and having a sidewall portion with a free end portion defining an opening providing access to the chamber and having a generally outwardly extending peripheral first lip with a generally upwardly facing first surface, said sidewall having a mouth portion adjacent the free end portion and first lip;
   a lid having a generally outwardly extending peripheral second lip with a generally downwardly facing second surface overlying a portion of the first surface at least one of the first and second surfaces having a rib projecting therefrom and secured to a portion of the other of the first and second surfaces, said lid having a plug portion depending from the second lip and positioned in the mouth portion and having a hinge member extending across a portion of the plug portion and separating said lid into first and second lid portions with said first lid portion being selectively movable about a portion of the hinge member relative to the second lid portion, said lid being secured to the receptacle at the first and second lips.

9. A resealable container as set forth in claim 8 at least one of the first and second lips including a bonding element securing the lid to the receptacle in an area between the first and second lips at said bonding element said rib being bonded to at least one of said receptacle and lid.

10. The resealable container as set forth in claim 9 wherein said bonding element including a lip portion of one of the lid and receptacle.

11. The resealable container as set forth in claim 8 including a tab member associated with the second lip.

12. The resealable container as set forth in claim 11 wherein at least a portion of the first and second lips each having an outer edge, at least a portion of the first and second lips being unbonded in an area therebetween and extending inwardly of the outer edges.

13. The resealable container as set forth in claim 12 wherein the unbonded area being at least adjacent said tab.

14. The resealable container of claim 13 including cooperatively interengageable elements associated with the lid and the receptacle to permit selectively maintaining the lid in a closed condition after the lid has been moved to an open position.

15. The resealable container of claim 13 wherein the plug portion including a sidewall with a discontinuity at each end of the hinge member permitting flexing of a living hinge portion of the hinge member.

16. The resealable container of claim 8 wherein the plug portion including a sidewall with a discontinuity at each end
of the hinge member permitting flexing of a living hinge portion of the hinge member.

17. The resealable container of claim 16 wherein the hinge member including a pair of walls extending from a bottom wall of the plug portion and having the living hinge portion therebetween.

18. The resealable container of claim 17 wherein the pair of walls defining a groove therebetween.

19. The resealable container of claim 18 wherein the groove opening into said chamber.

20. The resealable container of claim 8 including cooperatively interengagable elements associated with the lid and an upper portion of the receptacle to permit selectively maintaining the lid in a closed condition after the lid has been moved to an open position.

21. The resealable container of claim 20 wherein at least one of the interengagable elements including a rib.