

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO A CLOSURE

(71) We, DART INDUSTRIES INC., a Corporation organized and existing under the laws of the State of California, United States of America, of 8480 Beverly Boulevard, Los Angeles, California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a closure for a container or to a closure for a member having an opening therein which closure is formed from a distortable material. More particularly, the invention concerns reusable, plastics material container closures for use with open-mouthed containers and specifically relates to a closure similar to that described in U.S. Patents 3,679,088 and 3,679,089, and British Patent 1,352,253, which quickly and easily effects and assures a lasting reliable hermetic seal.

British Patent 1 352 253 in particular relates to a resilient distortable integrally constructed closure for hermetically sealing an open mouthed member when said closure is in use.

Food storage containers, including those formed of plastics materials, have been available for many years and have generally employed a bowl, cylinder or similarly shaped tubular vessel and a separate closure or lid made of a relatively flexible material. Several types of closure for such vessels have been used. A closure of one of these types has an inverted peripheral groove that may be placed upon the top edge or rim of a container wall and is pressed onto or expanded over that edge to form a hermetic seal between the two parts. The application of such a closure usually requires that the user apply pressure all around the periphery of the closure to effectively seat the closure upon

the container. A different type of closure is the so-called "two position" type which may be flexed to either of two stable positions. In one of these positions, the closure may be easily placed over the rim or within the open-mouth of a container, and then may be flexed to the second position. This flexing action either expands or contracts the peripheral portions of the closure and forces the closure into tight locking contact with the rim of the container or the inside of the container wall. Other types of closures include the cork-like and toggle action closures which loosely fit into the open mouth of a container and which are thereafter expanded into contact with the container inside wall surfaces.

As might be expected, all of these closures as well as those described and claimed in the above-mentioned patents, have been generally satisfactory in operation and construction. It should be noted, however, that each is not wholly satisfactory. Since the various deficiencies of most are discussed in U.S. Patent Specifications 3,679,088 and 3,679,089, and British Patent Specification 1 352 253, a further review thereof here is unnecessary. Furthermore, it has also been found that larger sized closures disclosed in U.S. Patent Specifications 3,679,088 and 3,679,089, and British Patent Specification 1 352 253, when mounted on their containers, left microscope openings between the container wall and the closure inner sealing wall. Accordingly, such larger closures permitted small quantities of fluid, for example, contained in a container sealed by the closure to escape and did not effect a lasting hermetic seal for the container.

This invention seeks to provide a closure which incorporates advantageous features of the closures mentioned above.

According to this invention there is provided a locally distortable closure hav-

ing an elasticity such that it is adapted to seal hermetically an open-mouthed member, said closure comprising: a centre main wall including a corrugated area 5 emanating from a centre thereof toward a peripherally extending wall, said centre main wall being adapted for the application of pressure to the centre portion thereof in such manner that said corrugated area tends to collapse upon itself 10 and substantially uniformly displace said peripherally extending wall until said closure is positionable on an open-mouthed member; and, a plurality of integral sealing 15 beads extending around said peripherally extending wall, said sealing beads being displaceable with said peripherally extending wall such that at least a portion of said sealing beads is closely engageable 20 with and sealable against the walls of said open-mouthed member due to the resiliency and elasticity of said closure upon the discontinuance of applied pressure to said centre main wall.

25 A preferred closure in accordance with the invention is such that the user may apply a closure to a container simply by applying pressure at the centre of the closure top wall.

30 A closure in accordance with the invention may include several distinctive construction features which enhance its applicability for use with large containers.

In preferred embodiments of the invention a secondary sealing bead on the 35 outside surface of the peripherally extending wall compliments the sealing effect of a primary bead and completely effects the desired hermetic seal.

40 In order that the invention may be more readily understood the invention will now be described by way of example with reference to the accompanying drawings in which:

45 Figure 1 is a top plan view of a closure in accordance with this invention.

Figure 2 is a bottom plan view of the closure shown in Figure 1.

50 Figure 3 is a cross-sectional view of the closure taken along line 3-3 in Figure 1.

Figure 4 is an enlarged partial cross-section of the centre main wall area of the closure taken along line 4-4 in Figure 1.

55 Figure 5 is a partial enlarged cross-section of the closure area bounded by line 5-5 in Figure 3.

Figure 6 is a partial enlarged cross-section of the closure area bounded by line 6-6 in Figure 3.

60 Figure 7 is a partial enlarged cross-section of the closure taken along line 7-7 of Figure 5, and

65 Figure 8 is a partial enlarged cross-section of the closure area bounded by line 8-8 in Figure 2.

Figures 1 and 2, show a closure member 10 which is formed of a resilient plastics material so that the closure is locally distortable, the closure being adapted to seal a container and being elastic in nature. 70 The closure member 10 includes three functional parts, namely a peripheral inverted substantially U-shaped groove in a lip 12, a centre main wall 14, including flutes or corrugations 16, and a centrally 75 positioned substantially planar or button area 18 in that centre main wall. The flutes or corrugations 16 emanate from the substantially planar area 18 and terminate at, in or as an inner wall 20 as shown in 80 Figure 3. The seal wall 20 forms a part of the lip 12 and it is portions of this lip that effect the seal between the closure 10 and a container (not shown) when the closure is in use. 85

As described above, the inner seal wall 20 forms a portion of the lip 12 in closure member 10. This lip and the inverted U-shaped groove are completed by an outer wall 22 and an interconnecting top wall 24 90 as shown in Figure 3. Referring to Figure 5 the outer surface 26 of inner seal wall 20 is adapted for mating engagement with the inner wall of the open mouth of a suitable container (not shown). This engagement, of 95 course, creates a hermetic seal and thus produces a highly desirable storage container especially suited for the storage of foodstuffs. Likewise, the outer and top walls 22 and 24, respectively, function to 100 properly position the closure on the container.

The structural aspects of the centre main wall 14 are virtually identical to those described in the above noted U.S. and British 105 Patents. Accordingly, upon the application of pressure to the planar area 18, the flutes will tend to collapse upon one another thus displacing the inner seal wall 20 inwardly with them. Furthermore, the 110 diameter of at least a section of the inner seal wall 20 is larger than that of a container on which the closure is to be used so that the subsequent sealing relationship can be formed therebetween. The entire 115 centre main wall 14 would continue to collapse with an umbrella-like result if it were not for the reinforcing and stiffening effect of the inner seal wall 20 of lip 12. Despite this restraining effect, the centre main wall 120 14 continues to function as described and, in fact, the resilient return to the closure substantially to its original size and shape after each distortion is aided by the said inner seal wall 20. 125

Referring to Figures 3, 5 and 6, the inner seal wall 20 also includes an outwardly protruding bead 28 which extends around the periphery of outer surface 26 of inner seal wall 20. When the closure is 130

manufactured in large sizes (10 inch diameters and above), this bead 28 has a tendency to distort slightly. Such distortion is thought to be due to variances in the shrinkage of the centre main wall 14. The end result of that distortion is the creation of microscopic openings between the container wall and sealing bead 28.

To alleviate this problem, a secondary sealing bead 30 is provided above the first or primary bead 28. This secondary bead is also integral with inner seal wall 20 of lip 12, and is preferably positioned on that wall in an area where the effect of shrinkage distortion is minimized. Similarly, in another embodiment of the invention, the primary bead 28 is also positioned above the uppermost point of intersection of the centre main wall 14 and inner seal wall 20. Accordingly, in such an embodiment both beads 28, 30 would be positioned so as to be affected to the least extent by the effect of shrinkage on inner seal wall 20.

Referring to Figures 5 and 6, the relationship between the beads 28 and 30 will be described. These two beads 28, 30 form separate spaced apart, continuous annular rings around the exterior surface of inner seal wall 20. These beads 28, 30 also, as is readily apparent, lie within the bounds of the other walls 22 and 24 of the inverted U-shaped groove. Further, it is thus apparent that bead 28 is constructed to provide a maximum sealing surface, while the bead 30 is designed as a more flexible supplementary element. This secondary bead 30 projects downwardly towards the inverted U-shaped groove opening, making an angle, which in the presently described embodiment is a 45° angle, with respect to inner seal wall 20, and has a cross-sectional configuration narrow with respect to the cross-sectional configuration of bead 28. The configuration of bead 30 provides for a bending moment to be created therein upon the application of closure 10 to a container and this bending moment forces bead 30 into sealing engagement with the container inner wall. In addition, the lower primary sealing bead 28 takes a considerable hydrostatic pressure off the secondary bead 30 so that even if microscopic openings are present along both sealing areas, the pressure within the container is insufficient to force liquids past the sealing bead and the secondary bead.

Another aspect of construction which may be employed with closures of this type is clearly illustrated in Figures 2, 5, 7 and 8. There, ribs 32 are provided which are exposed and which extend from inner seal wall 20 along the underside of wall 24 and then downwardly along the inside of outer wall 22. These ribs are spaced at selected intervals around the lip so that air

can be easily expelled from the container (not shown) as the closure 10 is applied. By extending the ribs 32 down the outer wall 22, sealing between that wall and the container is prevented during the application of the closure. This enables a maximum quantity of air to be displaced from the container whilst the closure is being secured to the container and thus creates a more desirable condition in the container subsequent to its being sealed by closure wall 22 and beads 28 and 30.

In utilising closures in accordance with this invention, it has been found that there is a tendency to experience a lateral displacement within the fluted area 16 as pressure is applied to the planar area 18 in the centre of the main wall 14. The fluted construction accentuates this displacement as the centre main wall 14 folds upon itself in an accordion-like or umbrella-like fashion. This, then, similarly tends to enable the inner seal wall 20 to draw inwardly, thereby facilitating entry of the centre main wall 14 into the open-mouth end of a container or tubular member. After insertion and upon release of the applied pressure, the resilient closure due to the elasticity of the material forming the closure, attempts to assume its relaxed or original shape and thus expands the inner seal wall 20 against the inner portion of the container wall to seal the container hermetically. To remove the closure, it is only necessary to apply an upward pressure against the U-shaped seal lip 12 thus prying the closure off from a projecting edge of the container.

WHAT WE CLAIM IS:—

1. A locally distortable closure having an elasticity such that it is adapted to seal hermetically an open-mouthed member, said closure comprising: a centre main wall including a corrugated area emanating from a centre portion thereof toward a peripherally extending wall, said centre main wall being adapted for the application of pressure to the centre portion thereof in such manner that said corrugated area tends to collapse upon itself and substantially uniformly displace said peripherally extending wall until said closure is positionable on an open-mouthed member; and, a plurality of integral sealing beads extending around said peripherally extending wall, said sealing beads being displaceable with said peripherally extending wall such that at least a portion of said sealing beads is closely engageable with and sealable against the walls of said open-mouthed member due to the resiliency and elasticity of said closure upon the discontinuance of applied pressure to said centre main wall.

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To alleviate this problem, a secondary sealing bead 30 is provided above the first or primary bead 28. This secondary bead is also integral with inner seal wall 20 of lip 12, and is preferably positioned on that wall in an area where the effect of shrinkage distortion is minimized. Similarly, in another embodiment of the invention, the primary bead 28 is also positioned above the uppermost point of intersection of the centre main wall 14 and inner seal wall 20. Accordingly, in such an embodiment both beads 28, 30 would be positioned so as to be affected to the least extent by the effect of shrinkage on inner seal wall 20.

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Another aspect of construction which may be employed with closures of this type is clearly illustrated in Figures 2, 5, 7 and 8. There, ribs 32 are provided which are exposed and which extend from inner seal wall 20 along the underside of wall 24 and then downwardly along the inside of outer wall 22. These ribs are spaced at selected intervals around the lip so that air

can be easily expelled from the container (not shown) as the closure 10 is applied. By extending the ribs 32 down the outer wall 22, sealing between that wall and the container is prevented during the application of the closure. This enables a maximum quantity of air to be displaced from the container whilst the closure is being secured to the container and thus creates a more desirable condition in the container subsequent to its being sealed by closure wall 22 and beads 28 and 30.

In utilising closures in accordance with this invention, it has been found that there is a tendency to experience a lateral displacement within the fluted area 16 as pressure is applied to the planar area 18 in the centre of the main wall 14. The fluted construction accentuates this displacement as the centre main wall 14 folds upon itself in an accordion-like or umbrella-like fashion. This, then, similarly tends to enable the inner seal wall 20 to draw inwardly, thereby facilitating entry of the centre main wall 14 into the open-mouth end of a container or tubular member. After insertion and upon release of the applied pressure, the resilient closure due to the elasticity of the material forming the closure, attempts to assume its relaxed or original shape and thus expands the inner seal wall 20 against the inner portion of the container wall to seal the container hermetically. To remove the closure, it is only necessary to apply an upward pressure against the U-shaped seal lip 12 thus prying the closure off from a projecting edge of the container.

WHAT WE CLAIM IS:—

1. A locally distortable closure having an elasticity such that it is adapted to seal hermetically an open-mouthed member, said closure comprising: a centre main wall including a corrugated area emanating from a centre portion thereof toward a peripherally extending wall, said centre main wall being adapted for the application of pressure to the centre portion thereof in such manner that said corrugated area tends to collapse upon itself and substantially uniformly displace said peripherally extending wall until said closure is positionable on an open-mouthed member; and, a plurality of integral sealing beads extending around said peripherally extending wall, said sealing beads being displaceable with said peripherally extending wall such that at least a portion of said sealing beads is closely engageable with and sealable against the walls of said open-mouthed member due to the resiliency and elasticity of said closure upon the discontinuance of applied pressure to said centre main wall.



2. A closure according to claim 1 of plastics material.

3. A closure according to claim 1 or claim 2 wherein said closure is provided with a substantially inverted U-shaped lip that is adapted to overlies the projecting walls forming the open mouth of said member, said sealing beads being within the cross-sectional area defined by said inverted U-shaped lip.

4. A locally distortable closure member adapted for use with an open-mouthed container and comprising: a substantially wholly fluted centre wall which extends outwardly from a centrally positioned first area to an outer peripherally extending wall, said centre wall being collapsible upon itself so that said peripherally extending wall is substantially uniformly displaceably responsive to substantially centrally applied pressure enabling said closure to be positionable on an open-mouthed container; and a plurality of sealing beads extending around said peripherally extending wall of the centre wall, said sealing beads being within a cross-sectional area defined by a substantially inverted U-shaped lip that is adapted to overlies the projecting walls forming the open mouth in a container and further which are adapted to engage with said projecting walls to effect a hermetical seal between the closure and a container.

5. A closure according to any one of the preceding claims wherein said sealing beads form continuous separate, primary and secondary annular rings on the outer surface of said peripherally extending wall.

6. A closure member according to claim 5 wherein said secondary annular ring is angularly disposed with respect to said peripherally extending wall and is of narrow cross sectional configuration relative to the primary annular ring.

7. A closure according to any one of claims 3 or 4 or any claim dependent thereon wherein ribs are provided which extend radially across the interior of said inverted U-shaped lip.

8. A closure substantially as herein described with reference to and as illustrated in the accompanying drawings.

9. A container in combination with a closure according to any one of the preceding claims.

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