

[72] Inventor Egon Kern
Graz, Austria
[21] Appl. No. 747,998
[22] Filed July 26, 1968
[45] Patented Feb. 2, 1971
[73] Assignee Dart Industries Inc.
Los Angeles, Calif.
a corporation of Delaware

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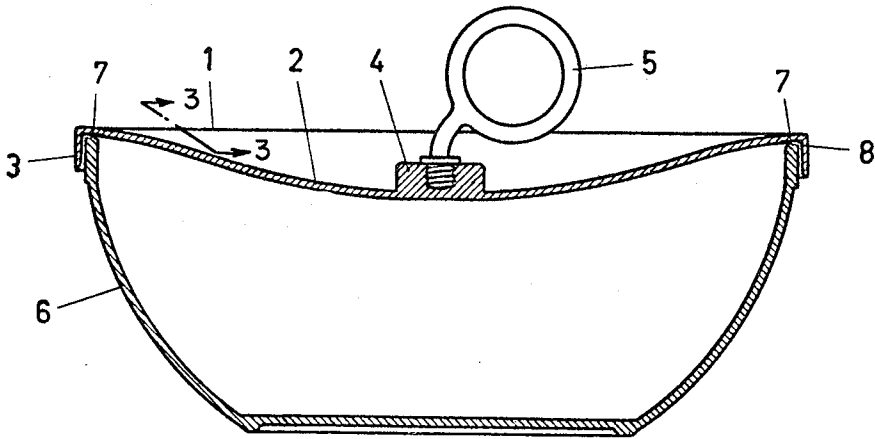
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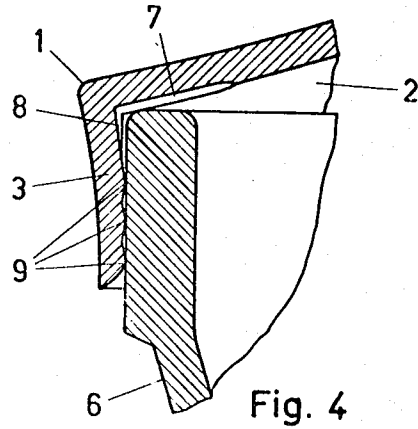
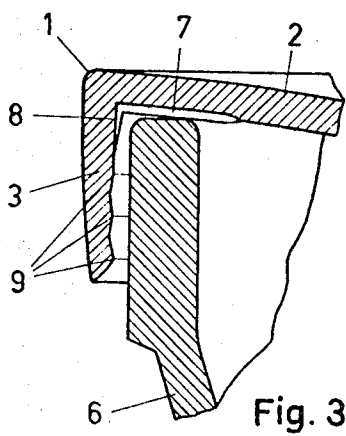
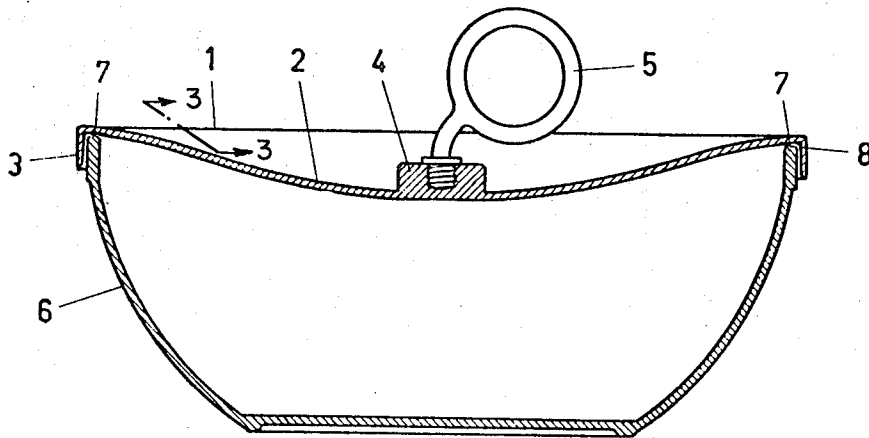
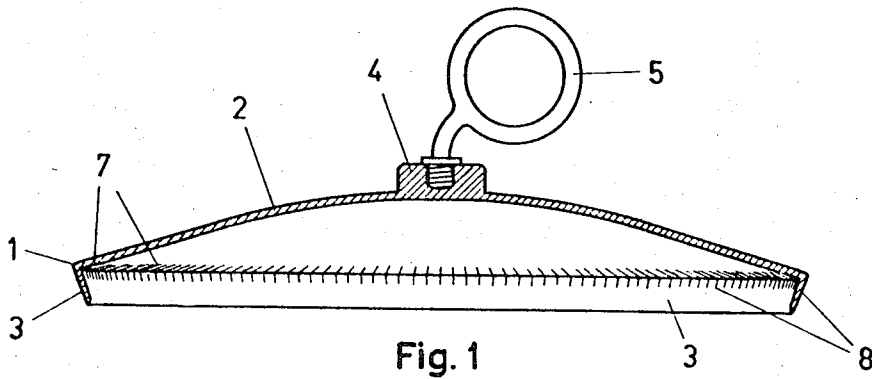
Primary Examiner—Joseph R. Leclair
Assistant Examiner—James R. Garrett
Attorneys—Paul R. Wylie, Robert P. Whipple and Harold R.
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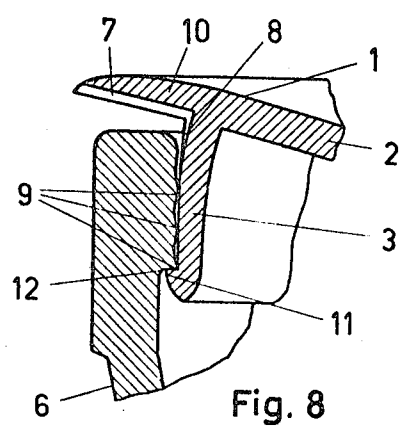
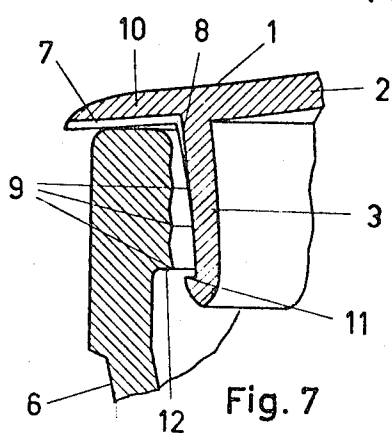
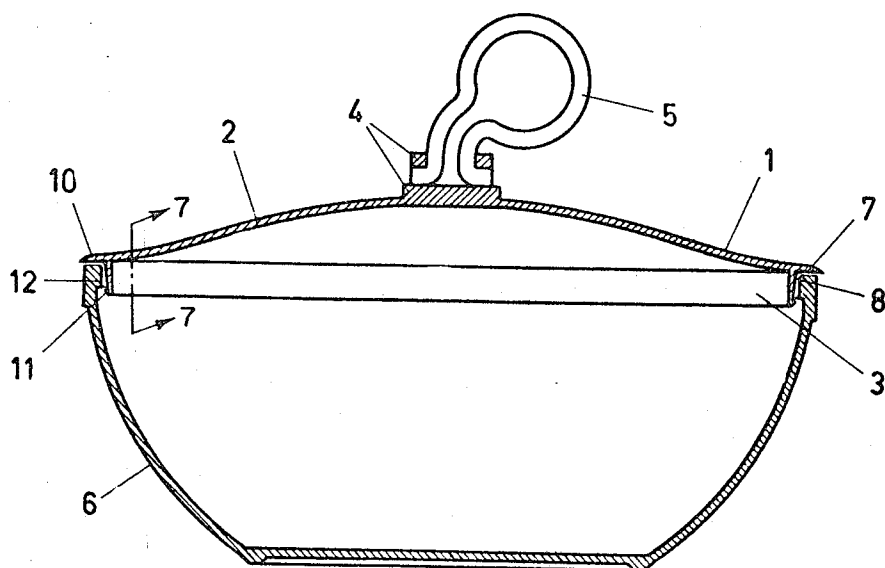
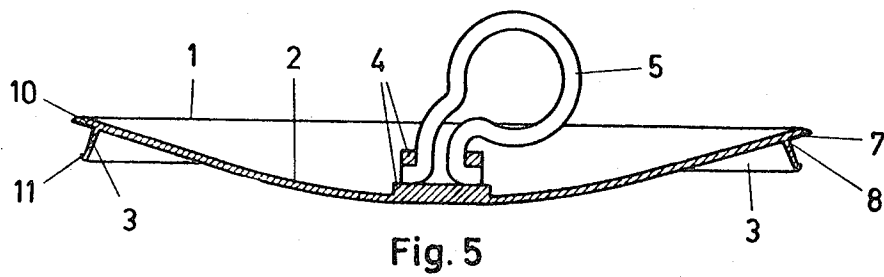
[54] CLOSURE FOR CONTAINERS
6 Claims, 12 Drawing Figs.
[52] U.S. Cl. 220/60,
215/41
[51] Int. Cl. B65d 43/10
[50] Field of Search 220/60, 44;
215/41, 52

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ABSTRACT: A container and a closure therefore adapted to form a moisture-tight seal and wherein the closure has a skirt that expands or contracts from the normal position to contact the sidewalls of the container as the top of the closure is flexed from one to another of two stable convex configurations.







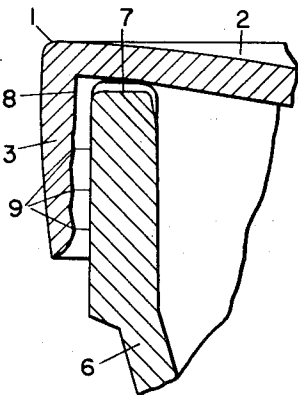


Fig. 9

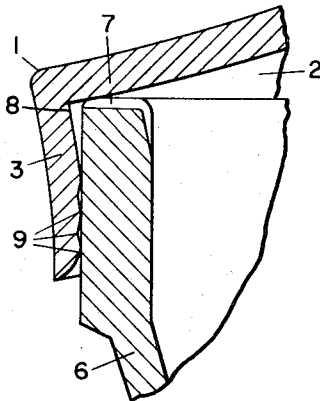


Fig. 10

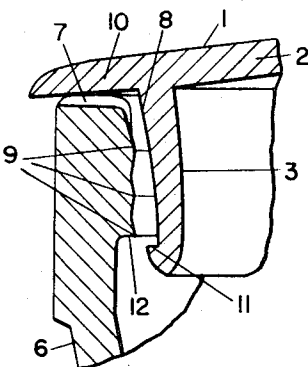


Fig. 11

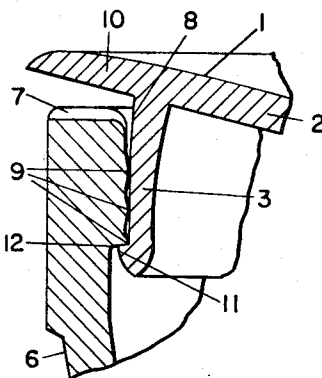


Fig. 12

CLOSURE FOR CONTAINERS

The invention concerns a plastic storage container and closure, which are quickly and simply operable and which simultaneously produces a reliable and lasting hermetic seal.

Plastic storage containers employing substantially airtight closures have for some time been available for use in the preservation of all types of food. They generally have consisted of a bowl, cylinder or other similarly shaped vessel and a separate lid made of relatively soft, flexible, but still elastic material. These lids normally employed a groove around their edges that could be pulled over the edge of the container and which in most cases was slightly wider towards this upper edge. Correspondingly, these grooves are slightly more narrow in the downward direction. Apart from this, of course, if such are to provide the desired tight seal, they must be so dimensioned that it sits as tightly as possible on the container, the tightness of the seal therefore being better, the tighter the lid fitted on the container.

It follows from the above that the lids of the above-mentioned containers must be stretched when they are placed on the container. Further depending upon this fit between the lid and the container the closing of the container becomes a relatively troublesome and time-consuming procedure. If, on the other hand, the fit is not tight, the desired airtight features may not be obtained. Such prior art containers are therefore adapted for improved sealing through a construction that enables the already closed container lid to be vigorously pressed down in the center, while the groove is simultaneously and temporarily loosened in any desired spot by lifting the edge of the lid, the pressure exerted on the lid tends to expel the excess air in the container. After the groove has again been pressed back and the lid has been released, the pressure in the container is reduced and consequently the lid is more forcefully pressed against the edge of the container by the outside surrounding air. Although such containers are very satisfactory in most respects the additional, pneumatic closing effect is reduced over a period of time as air from the outside filters back into the container in addition, the described manipulative process of expelling air from the container is sometimes considered to be a nuisance to the female user. Also, since the user may be unaware of the physical effect to be obtained, many of them may not perform this manipulative process, thus negating the value that is obtained from it.

In comparison, the present invention concerns a construction which not only greatly simplifies the closing of the container, but also self-produces a permanent and reliable hermetic seal. This is achieved in the following manner:

The lid of the storage container in question is, in contrast to the known containers of this type, not generally flat but assumes a relatively pronounced curved configuration. Since it is also made of a flexible, relatively soft, but still elastic material, the assumed curvature can be easily reversed from concave to convex and vice versa as may be desired. Sealing the lid is accomplished by a simple, short sleeve or flange which extends in an approximately vertical relationship from the peripheral surface area of the lid. Depending upon the direction in which the lid is pressed or flexed the sleeve or flange assumes either a cylindrical or a conical attitude with respect to the plane of the peripheral edge of the surface area. In order to close a container of this invention, the lid is first manipulated so that its sleeve or flange assumes a cylindrical orientation. When so oriented, the lid can be loosely placed on the container or the bowl, whatever its particular shape, and then by pulling or pressing in the central area of the lid it can be forced to assume the opposite curvature. Thus, the sleeve or flange tends to settle either from the outside or on the inside against the wall of the container and in this way produces the required, airtight seal.

Since the reversal of positions or shape of the surface of the lid (i.e., concave or convex) either enlarges or reduces the air space within the container, a certain reduced pressure or excess pressure is created in the container, which acts in the sense of an additional pressing of the sleeve against the container wall and thus reinforces the tightness of the closure. It is

assured, however, that entirely independent of this, the deformation of the sleeve alone produces a sufficiently hermetic seal which is reliable even if in the course of time the additionally active pressure difference should be lost because of air migration into or out of the container.

The particular lid construction is dependent upon whether the lid is to seal internally or externally of the container.

The noted and additional advantages of the invention will become more apparent upon reference to the following description, claims and appended drawings wherein:

FIG. 1 is a partial cross-sectional side view of one embodiment of the lid incorporating this invention;

FIG. 2 is a partial cross-sectional side view of a lid and container showing the lid in its unsealed relationship thereon;

FIG. 3 is an enlarged partial cross section of FIG. 2 taken along line 3-3;

FIG. 4 is an enlarged partial cross section similar to FIG. 3 except that the lid is shown in its sealing relationship with the container;

FIG. 5 is a partial cross-sectional side view of another embodiment of the lid of this invention;

FIG. 6 is a partial cross-sectional side view of a lid and container showing the lid in its unsealed relationship thereon;

FIG. 7 is an enlarged partial cross section taken along line 7-7 in FIG. 6;

FIG. 8 is an enlarged partial cross section similar to FIG. 7 except that the lid is shown in its sealing relationship with the container;

FIGS. 9 and 10 are enlarged partial cross sections similar to those of FIGS. 3 and 4 showing a grooved container wall construction; and,

FIGS. 11 and 12 are enlarged partial cross sections similar to those of FIGS. 7 and 8 showing a grooved container wall construction.

As indicated, FIGS. 1-4 illustrate an example of one of the preferred embodiments of the invention and FIG. 1 represents a section of the lid as it would appear upon removal from the pressure or extrusion mold at the time of manufacture. The surface or top portion 2 of the lid is curved upward (i.e., convex) and the sleeve or flange 3 which extends around and downwardly from the extreme edge of the surface 2 narrows conically in the downward direction. In order to keep the sleeve 3 sufficiently elastic, its wall must not be too thick, and in the cross section it may become slightly thinner towards the downward end.

In order to close the container, the lid 1, unless it is not already in this shape, is first pressed in to produce a concave shape as may be seen in FIG. 2. To accomplish this, the lid may be gripped in both hands and pressed in the downward direction from its upper side, with the thumb placed near the support 4 and handle 5. This operation may be carried out without any trouble even if the lid is of a large diameter.

Although the lid assumes the shape shown in FIG. 2 it is so constructed that its peripheral edge does not assume a shape that is too strongly opposed to the shape of the central surface area. In fact, it is advisable that the initial shape of the surface or top portion 2 of the lid is not circularly domed so as present a ball shape, but that it be given a more conical shape, as shown in FIG. 1.

The shape of the lid according to FIG. 2 has a sleeve 3, which, as is seen, approximates a cylindrical configuration. In this form, the lid can be easily placed on the container 6, the walls of which at their upper open ends are also substantially cylindrical.

Once the lid has been placed on the container, its peripheral edge is held down with one hand while the other hand grips and pulls the ring-shaped handle 5 upward. Lids of large diameter containers, if they are to be pulled upward into the convex position, may be held around a portion of the edge with one hand while the other hand is used to manipulate the handle in a manner similar to that described.

When the lid 1 is pulled up, it again assumes the convex shape shown in FIG. 1 and in so doing settles sleeve or flange 3

at its lowermost extremity tightly against the outer face of the wall of the bowl 6. This may best be seen in FIG. 4, which illustrates the lid and container in a sealed relationship. Since in operation the sleeve or flange 3 is in substantially all around sealing contact with the wall of bowl 6 even before the lid has been entirely pulled up, and a reduced pressure forms simultaneously in the inside of the container. Because of this reduced inside pressure the sleeve 3 is subjected to the additional sealing pressure that the air exerts on the outside of the sleeve.

The enlargement to the interior of the container that is produced by the pulling up of the lid creates a pressure differential with a reduced inside pressure that has been mentioned. Thus, in addition to there being exterior pressure exerted on the sleeve, such pressure is also exerted the surface or top portion 2 of the lid tending to press the lid against the uppermost edge of the bowl 6. If the edge of the bowl and the interior of the peripheral edge of the lid were completely smooth in this location, passage of air into the container would be prevented during the initial phase of the lid inversion process. If such were the case, however, the pressure difference produced would generally preclude the inversion of the lid. In order to prevent this, either the underside of the lid at its peripheral edge adjacent flange 3 or the upper container edge should be constructed with radial or similar grooves to enable some air to pass. In the example shown in the FIGS. such grooves 7, are arranged on the underside of the lid surface 2. As can be seen these grooves 7 are also continued into the inside of sleeve 3 in the form of the short grooves 8. These grooves function to facilitate introduction of a sufficient amount of air as the sleeve 3 is pressed around the bowl or container 6, so that an effective seal may be produced. FIGS. 3 and 4 each show one of the grooves 7 and 8 in a sectional view, however, showings thereof have been omitted from the remainder of the cover for the sake of clarity.

In the embodiment shown in FIGS. 1—4, the grooves 7 and 8 should be constructed as to number and shape, so that the air cannot penetrate too easily. This will enhance the ease of operability of this lid in that it needs to be held with the fingers only in a few places.

Inversion of the lid is considerably facilitated by the fact that the handle of the lid 5, which as has been mentioned, is shaped as a ring with a crooked threaded stem which attaches the ring to the lid so that in its assembled condition with the lid it is asymmetrical or eccentrically located with respect to the center of the lid as is shown in FIGS. 1 and 2. If this was not the case, the lid would initially oppose the inversion process rather strongly and then would suddenly pop into the opposite curvature. This, however, would not only make the inversion troublesome, and might, because of the jerky movement, prevent the lid from becoming firmly seated upon the container. Because of the asymmetrical form and position of the handle 5, the support 4 tends to be twisted angularly when the handle is pulled and thus without a conscious effort quite naturally initially begins the inversion of the lid in one half of its surface.

From this start it spreads like a wave successively across the entire lid surface is completed in seconds and requires hardly more than one movement of the hand. The inversion is thus effected in a trouble-free and convenient manner with an even movement, corresponding to the influx of air through the grooves 8 and 7.

In order to reinforce the hermetic closure of the container, either the sleeve 3 of the lid or the container can be equipped with some ring-shaped narrow bulges along the contact surface between the two. FIGS. 3 and 4 illustrate a model which has such narrow bulges 9 on the sleeve 3.

In order to open the container, the seal need only be broken by pressing the handle 5 downward after which the lid may be lifted off. The asymmetrical shape and position of the handle 5 here also produces a similar wavelike effect as is described except in an opposite sense. Of course, once the container has been opened, the lid again assumes the shape required to repeat the closing step.

A second embodiment of the storage container is shown in FIGS. 5—8 and is similar in its operation to 5—8 described above. In this instance, however, the lid in its tension-free initial shape is curved downward, as shown in FIG. 5. The applicable discussions relative to lid curvature are analogous to what has been said concerning the embodiment shown in FIGS. 1—4. The sleeve 3 widens conically in the downward direction contra to the previous embodiment and, of course, the curved portions of the lid are reversed with respect to the open and closed positions. In addition, here the sleeve 3 is positioned inwardly of the outermost peripheral edge of the lid surface or top portion 2, thus leaving an edging 10. This edging, after the lid has been inverted upwards, is placed on the upper edge of container 6 with the sleeve 3 lying adjacent the inside surface of the wall of the container. FIGS. 6 and 7 clearly shown this arrangement in which the lid loosely rests on the container. FIGS. 7 and 8 also show that the grooves 7 which permit the necessary exchange of air during opening and closing of the container, however, here these are arranged along the underside of the edging 10 and the grooves 8 from which the grooves 7 on the sleeve 3 are continued, are correspondingly located on the outside sleeve surface. In this particular embodiment the grooves 7 and 8 can be more numerous or deeper than is practical with the earlier described embodiment.

In this instance to achieve a substantially airtight seal between the container and lid 1, the lid is pressed downward by way of the handle 5, so that the sleeve 3 settles tightly against the interior surface of the wall of the container 6, as can be best seen in FIG. 8. In view of the fact that the volume within the container is somewhat reduced thereby, an incremental excess pressure is created in the interior of the container. In order to assure that this excess pressure does not lift the lid off the container, the sleeve or flange 3 of this embodiment has a projection 11 with the profile of a nose, which during lid inversion is adapted to engage the underside of projection 12 at the wall of the container 6. Again closing can be accomplished in a particularly quick and convenient manner but it still should be done with a relatively smooth movement. Without such a smooth movement the possibility exists that the lid, especially on the side away from the handle 5 may jump out of the container before its projection 11 has a chance to engage the projection 12. The excess pressure created by the closing inversion, here also supports the tightness of the closure which has already been achieved by the concave formation of the sleeve.

In order to show another alternative, FIGS. 7 and 8 show the bulges 9 not on the closing sleeve 3, but on the inside upper edge of the container wall rather than on the sleeve 3.

Further, FIGS. 5 and 6 illustrate a handle 5 on the lid and its support 4 in a manner which permits the handle ring 5 to be folded down after closing, a feature that may be desirable to effect space-saving.

The latter described embodiment of the present storage container, besides the fact that it requires less space, has a greater safety advantage in comparison to the first embodiment (FIGS. 1—4). This advantage is provided not only by the engageable elements 11 and 12, but also because it cannot be accidentally opened by unintentionally exerting pressure on the lid. This may be important when the container is used for travel and camping, etc. It should be noted, however, that the projection 12 which butts into the interior of the container 6 may create difficulties in manufacturing if the container and the lid, are made of a hard material rather than a flexible material.

Thus, it is advantageous to manufacture the embodiment shown in FIGS. 5—8 from a flexible material. If, however, the containers are made of a hard material, for example of metal, glass porcelain, etc. it may be more suitable to employ the construction of FIGS. 1—4.

In conclusion, it should be pointed out that the described closures may be used for other than circular containers, so long as the container edges are sufficiently rounded and the lateral walls are slightly concave. For rectangular or similarly

shaped containers the sleeve of the lid can give only slightly in the corner areas and the lid in the initial or sealing shape can be only slightly angled in this location, while in the center of the sides it can be just as slanted as is the case with circular containers. Further, since the pressure tends to be equally distributed along the sleeve, a reliable seal is still assured around the whole circumference of even a rectangular sleeve. The center portion of the curved lid surface in this instance will assume a ball shape.

I claim:

1. A container for the storage of foodstuffs and comprising a bowl and a removable and deformable lid, said bowl including an upper open ended wall construction that is of substantially cylindrical configuration, said lid being comprised of a flexible top portion which is movable to two positions of stable convex configuration and from which there depends a flange that is adapted to assume a cylindrical configuration in one of said two positions of said flexible top portion such that it can be placed upon said bowl with the flange in telescoping relation with the upper open ended wall construction and is further adapted to assume a conical shape in the other of said two positions of said flexible top portion such that the flange tightly presses against the upper open ended wall construction, a plurality of connected grooves extending radially in the underside of said flexible top portion and downwardly along the sealing side of said flange to a point of termination immediately below the interconnection between said flange and flexible top portion, and a handle attached to the outer face of the flexible top portion so that it may be employed to move said top portion from each to another of said positions.

2. A container according to claim 1, wherein said flange further includes a projection that engages a mating projection in the upper open ended wall construction of said bowl when the lid is in sealed relationship with said bowl.

3. A container according to claim 1, wherein said handle is hinged in such manner that it can be rotated to an out of the

way position.

4. A container for the storage of foodstuffs and comprising a bowl and a removable and deformable lid, said bowl including an upper open ended wall construction that is of a substantially cylindrical configuration and that has formed therein a plurality of grooves extending radially across the upper edge of the wall and downwardly in the sealing side thereof to a point immediately below the upper edge, said lid having a flexible top portion which is movable to two positions of stable convex configuration and from which there depends a flange that is adapted to assume a cylindrical configuration in one of said two positions of said flexible top portion such that it can be placed upon said bowl with the flange in telescoping relation with the upper open ended wall construction and is further adapted to assume a conical shape in the other of said two positions of said flexible top portion such that the flange tightly presses against said upper open ended wall construction, and a handle attached to the outer face of the flexible top portion so that it may be employed to move said top portion from each to the other of said positions.

5. A container according to claim 4, characterized in that the top portion of the lid in its position in which the depending flange is cylindrical is upwardly convex from the bowl rim and the depending flange is disposed at the periphery of the lid and externally grips around the rim of the bowl.

6. A container according to claim 4, characterized in that the top portion of the lid in its position in which the depending flange is cylindrical is convex downwardly from the bowl rim and the depending flange is disposed radially inwardly from the periphery of the lid and reposes inside the rim of the bowl and has at its lower end an externally projecting protrusion which lockingly grips under a corresponding protrusion of the inner face of the side wall of the bowl when the container is closed.

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