CONTAINER COVER AND METHOD
OF APPLICATION
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ABSTRACT OF THE DISCLOSURE
A container cover for sealing the open mouth of a container comprising an outer rim forming a side wall, a top wall integral with the outer rim, an inner wall extending downwardly from the top wall and a central frusto-conically shaped portion. The combination of the side wall and inner wall provides a groove, and a replaceable sealing compound is located within the groove. When the cover is put into place, the top rim of the container is received within the groove, and the central frusto-conical portion is then pressed downwardly to press the sealing compound into sealing engagement with the adjacent wall of the container.

This invention relates to a closure or cover for use in effecting a hermetic seal with containers having necks of various shapes and slight variations in dimension and it relates to a method for mounting the closure in sealing relationship onto the open mouth of the container.

Containers of the type with which closures of this invention may be employed have open mouths or openings which may be circular, cylindrical, frusto-conical or which may be provided with an annular lip of different cross-sections.

It is an object of this invention to provide a closure and a method for mounting same onto the open end of a container to effect a strong hermetically sealed relationship, notwithstanding the fact that the container opening may not be of constant dimension, by reason of the wear on the dies and apparatus used in the manufacture of same. In some instances, the differences in dimension between container outlets may be as great as several millimeters.

It is also desirable and it is, therefore, an object of this invention to produce a closure which is capable of use on containers of various shapes, such as containers having surfaces which converge towards the opening, such as in round-bottomed flasks, conically shaped containers or flasks, and the like.

It is an object of this invention to produce a closure of the type described which is simple in construction, which is easy to apply to effect a sealing relationship about the open end of a container; which is capable of reuse to re-establish a sealing relationship with the container for the protection of content material remaining in the container; which effects a strong bonding relationship with the container to hold the closure in sealed relationship thereon; and which can be formed of readily available, low cost materials for use as an economical closure independent of the wide tolerances in dimension of the container.

These and other objects and advantages of this invention will hereinafter appear and for purposes of illustration, but not of limitation, embodiments of the invention are shown in the accompanying drawings, in which:

FIG. 1 is a perspective view in elevational of a closure embodying the features of this invention;

FIG. 2 is a sectional elevational view of a portion of the closure shown in FIG. 1;

FIG. 3 is a sectional elevational view similar to that of FIG. 2 but showing the closure mounted in sealing relationship on the open end of a container;

FIG. 4 is a top plan view of a portion of the closure shown in FIG. 1 with the section S3 illustrating the closure before use, as in FIG. 2, and the section S2 showing the closure after use, as in FIG. 3;

FIG. 5 is an elevational view, partially in section, showing a modification in the construction of a closure embodying the features of this invention before deformation for mounting onto the container;

FIG. 6 is a top plan view of the closure shown in FIG. 5;

FIG. 7 is an elevational view, partially in section, showing the elements in FIG. 5 with the closure in sealing relationship on the container;

FIG. 8 is a top plan view of the closure shown in FIG. 7;

FIG. 9 is a sectional elevational view showing a further modification in a closure embodying the features of this invention and adapted for use on a round bottom flask; and

FIG. 10 is a view similar to that of FIG. 9 showing the closure mounted in sealing engagement on the container.

With reference now to the modification shown in FIGS. 1—4, illustration is made of a container R having a mouth portion about the opening in the form of an upper flat rim 1, an inner wall 2 of frusto-conical shape which extends upwardly and outwardly, and an outer wall 4 of frusto-conical shape which terminates at its upper end in a cylindrical portion 3. The container is subject to wide tolerances in manufacture and is of the type which usually has an irregular inner surface 2.

The closure or cover is formed of a sheet metal stamping having a lateral side wall portion and an upper top wall portion with a section of sealing material B on the inner face thereof.

The side wall portion is in the form of a frustoconical member having a vertically disposed, cylindrical section 5 terminating in an outwardly flaring lower edge portion 6 with an inwardly curled upturned edge 7. A plurality of circumferentially spaced apart elongate slots 8 are provided in the cylindrical section 5 with the slots being dimensioned to have a length in the circumferential direction of more than 4 centimeters and preferably in the range of 5—7 centimeters with the slots circumferentially spaced one from the other with a solid area in between of less than 5 centimeters and preferably between 3 to 4 centimeters. The sheet material stuck from the cylindrical section to form the slots 8 are turned inwardly and offset along their lower edge parallel to the axis X—X of the closure and with the portion located immediately beneath each slot being offset inwardly over a distance which increases from zero offset at the ends m, p to a maximum at the center n. When viewed perpendicularly to the axis X—X, the offset portion increases gradually for a short distance from the ends m, p and thereafter remains constant along an arc of a circle having the axis X—X as its center whereby the intermediate portion of the offset conforms to the curvature of the outer wall of the cylindrical container R when the cover is in position of the mouth of the container. Thus the edge of the inwardly offset portion 9 will operate resiliently to engage the outer wall 4 of the container R, not withstanding slight differences in shape or dimension within the conventional tolerances.

The top wall is integral with the side wall along its peripheral edge and is formed of a central frusto-conically shaped portion 10 joined with an outer peripheral flat rim portion 11. The central frusto-conical portion 10 comprises a central flat disc section 12 connected by a downwardly curved stiffening portion 14 integral with its outer
edge to a narrow, flat annular band 15 which is substantially parallel with the plane of the central disc portion 12. Integral with the band 15 and extending angularly downward and outwardly therefrom to a base 18 is a frusto-conical section 17 having a plurality of circumferentially spaced apart, substantially U-shaped lateral recesses 19 offset therein with the maximum offset at the base portion and gradually decreasing to the rim and which enables the outer base portion 18 to be displaced outwardly to the position 18a with an increase in diameter from the original value of 2r1 to a value or 2r2 in response to depression of the base portions 12, 14 and 15 of the cover 16, as will hereinafter be explained.

The groove beneath the annular rim 11 and between the side wall 5 and the inner wall 21, joining the base 18 with the rim 11, increases in cross-section from the upper portion downwardly to provide a groove 20 of trapezoidal shape which is at least partially filled with sealing material B. The sealing material B, which may be of a rubber base composition or the like, can be bonded at the inner surfaces of the cover defining the groove or it can merely be cast into the groove.

The central base portion 12 is adapted to extend beyond the level of the rim 11, when in normal position, to enable displacement of the said base portion downwardly during operation to effect sealing engagement in mounting or dismounting of aluminum or other relatively inelastic material in the construction of the cover. A “staying” effect can be superimposed on the described relatively permanent deformations, as will be described with reference to the modification shown in FIGS. 9 and 10.

In the modification shown in FIGS. 5 to 8, the container is illustrated in the form of a box of cylindrical shape having a lip in the form of a ring 24 rolled inwardly from the material making up the upper edge. The cover comprises a vertically disposed outer side wall 5e, free of slots, and with an inwardly turned lip or rim 7a at its lower edge.

The upper portion is somewhat the same as in the previous modification except that the recesses 19 in the frusto-conical portion 17 are arranged in separate groups, such as the four groups shown, with equally spaced apart sections along each of the sides thereof, 25 and 26, into which the rim 11 is received. The cover includes a member 23 of greater width for receiving the sealing material B.

In this modification, a portion has been placed on the container to receive the lip 24 within the groove 23 and after pressure has been applied to the rim 11 and then to the flat base portion 12 for displacement from the position shown in FIG. 5 to the flattened portion 12c shown in FIG. 7. The frusto-conical portion 17 is flattened to the position 17c and engages the underside of the lip 24. The portions radially aligned with the sections 25, free of the offset sections 19, are incapable of the same amount of extension and thus are only slightly deformed to the position 18b.

To remove the cover, it is only necessary to apply a lifting force to portions of the cover opposite the sections 25, as by the insertion of a blade or tool between the outer surface of the container and the flat edge 7e. Since engagement is not effected beneath the rolled edge 18b, the cover is less firmly held at these flattened zones.

In the modification shown in FIGS. 9 and 10, the container is in the form of a round-bottomed flask having a curvilinear side wall extending to the open mouth with the inner surface being designated by the numeral 26.

The cover is of the construction described in the previous modifications with the central base portion 12 projecting upwardly beyond the edge when placed in position of use and with the central base portion depressed to 12b when actuated to effect the desired sealing engagement. Depression of the base portion produces a braking effect as the base portion is displaced radially outwardly to the position 18b into resilient engagement with the crosswise aligned portion of the inner, upwardly converging surface 26 adjacent the upper edge of the container R. It will be apparent from the application of the cover previously described forms no part of this invention and that other means may be employed, manually or otherwise, for the application of the cover onto the container.

It will be further understood that changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:
1. A closure for hermetically sealing the open mouth of a container comprising an integral member including a top wall portion and a lateral side wall portion, said top wall portion comprising a central frusto-conically shaped base portion, an annular rim portion spaced outwardly from the frusto-conically shaped base portion and spaced upwardly from the outer edge thereof, an inner wall integrally joining the inner edge of the rim portion
with the outer edge of the frusto-conically shaped base portion, said side wall portion being integrally joined at its upper edge with the outer edge of the rim portion to define a groove between said rim portion, side wall portion and inner wall, and a sealing compound filling at least a portion of the said groove between the opposed surfaces defined by said side wall portion and said inner wall, said sealing compound normally extending away from the top wall short of the downward extent of said inner wall at least when said closure is initially placed on a container whereby said inner wall will extend downwardly in overlapping relationship with respect to the mouth of the container.

7. A closure as claimed in claim 6 in which the inner wall connecting the outer edge of the frusto-conically shaped base section and the inner edge of the rim slopes in the direction away from the outer side wall portion to define a groove of trapezoidal shape therebetween.

8. A closure as claimed in claim 6 in which the central frusto-conically shaped base portion comprises a raised central section and a skirt section extending angularly outwardly and downwardly from the central raised section, and wherein said skirt portion is formed with a plurality of circumferentially spaced apart downwardly offset portions, an annular rim portion spaced outwardly from the frusto-conically shaped base portion and spaced upwardly from the outer edge thereof, an inner wall integrally joining the inner edge of the rim portion with the outer edge of the frusto-conically shaped base portion, said side wall portion being integrally joined at its upper edge with the outer edge of the rim portion to define a groove between said rim portion, side wall portion and inner wall, and a sealing compound filling at least a portion of the said groove.

9. A closure as claimed in claim 6 in which the side wall portion comprises a substantially cylindrical section, an outwardly flaring section integral with the lower edge of the cylindrical section and a lip on the lower edge of the flared portion.

10. A closure as claimed in claim 6 in which the side wall portion is formed with a plurality of circumferentially spaced, circumferentially extending narrow slots with the portions struck away to form the slots being inverted inwardly towards the interior of the closure, and in which the inwardly turned portions are offset perpendicularly to the axis of the cover by an amount which increases gradually from the ends of the slot for a short distance and then remains substantially concentric with the contour of the cover for the remainder of the distance in between.

11. A closure as claimed in claim 6 in which the central frusto-conically shaped base section comprises a raised central section and a skirt section extending angularly outwardly and downwardly from the central raised section, and wherein said skirt portion is formed with a plurality of circumferentially spaced apart downwardly offset portions, an annular rim portion spaced outwardly from the frusto-conically shaped base portion and spaced upwardly from the outer edge thereof, an inner wall integrally joining the inner edge of the rim portion with the outer edge of the frusto-conically shaped base portion, said side wall portion being integrally joined at its upper edge with the outer edge of the rim portion to define a groove between said rim portion, side wall portion and inner wall, and a sealing compound filling at least a portion of the said groove.

12. A closure as claimed in claim 6 in which the slots are dimensioned to have a length greater than 4 centimeters and spaced one from the other by an amount less than 5 centimeters.

13. A closure as claimed in claim 12 in which the slots are dimensioned to have a length within the range of 5 to 7 centimeters and in which the space between the slots is between 3 to 4 centimeters.

14. A closure as claimed in claim 6 in which the lower edge of the side wall is formed with an inwardly rolled lip.

15. The method of applying a cover onto the open mouth of a container, said cover comprising an integral member including a top wall portion and a lateral side wall portion, said top wall portion comprising a central frusto-conically shaped base portion, an annular rim portion spaced outwardly from the frusto-conically shaped base portion and spaced upwardly from the outer edge thereof, an inner wall integrally joining the inner edge of the rim portion with the outer edge of the frusto-conically shaped base portion, said side wall portion being integrally joined at its upper edge with the outer edge of the rim portion, side wall portion and inner wall, and a sealing compound filling at least a portion of the said groove, said method comprising the steps of positioning the cover over the mouth of the container about the open mouth seated within the groove, pressing the rim portion in the direction towards the container to seat the edge of the container within the sealing material in the groove and then flattening the frusto-conically shaped central base portion whereby the outer edge thereof is displaced outwardly, said inner wall also being displaced outwardly in response to flattening of the central base portion to decrease the cross-sectional dimension of the groove and to cause the sealing compound therein more intimately to grip the container.

16. The method of applying the cover claimed in claim 6 onto the open mouth of a container comprising the steps of positioning the cover over the mouth of the container with the edge of the container about the open mouth seated within the groove, pressing the rim por-
tion in the direction towards the container to seat the edge of the container within the sealing material in the groove and then flattening the frusto-conically shaped central base portion whereby the outer edge thereof is displaced outwardly with corresponding decrease in the cross-sectional dimension of the groove to press the sealing material into sealing engagement with the adjacent wall of the container.

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