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H. C. WILKE

3,023,926

CONTAINER AND CLOSURE THEREFOR

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Fig. 2

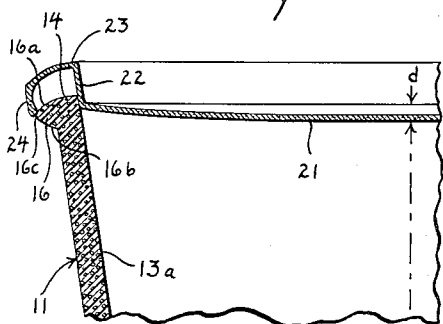


Fig. 1

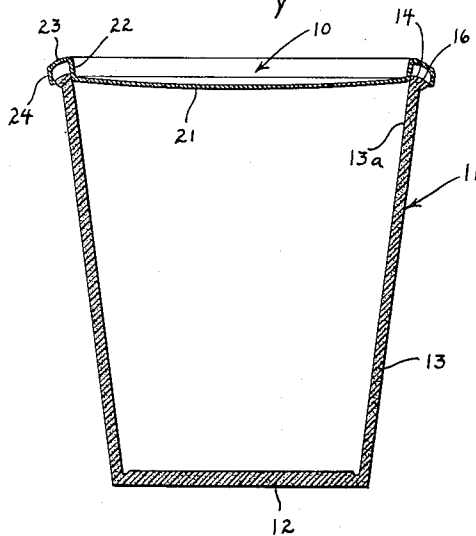


Fig. 3

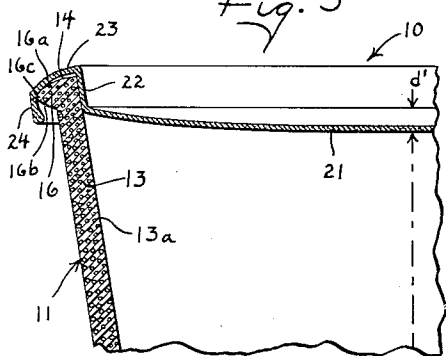


Fig. 4

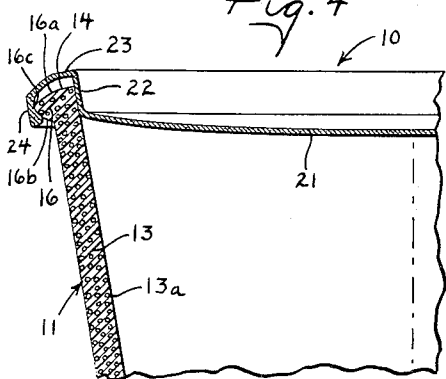
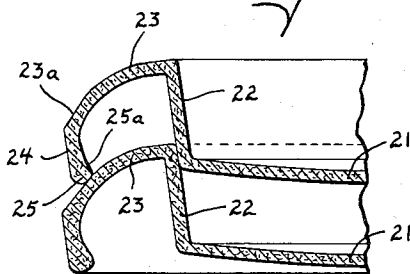


Fig. 5



Inventor
Howard C. Wilke

By McConna, Morschach & Pillote

Atty's

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CONTAINER AND CLOSURE THEREFOR

Howard C. Wilke, Belvidere, Ill., assignor to Mid-West-Pak Corporation, Belvidere, Ill., a corporation of Illinois

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4 Claims. (Cl. 220-60)

This invention relates to improvements in closures for containers and to an improved combination closure and container.

An important object of this invention is to provide a preformed closure for a container of the type having a downwardly tapered inner wall and a peripheral bead on the outer edge of the container mouth, which closure has an improved arrangement for sealing against the tapered inner wall to inhibit leakage from the container and for engaging the bead on the outer edge of the container to detachably lock the closure on the container.

Another object of this invention is to provide a preformed closure which is adapted to nest when stacked on other closures and in which the nesting is controlled to prevent the closures from sticking together.

A further object of this invention is to provide a preformed closure which can be easily and rapidly applied to the cup by hand.

A more particular object of this invention is to provide a closure having a frusto-conical inner wall formed around the central mouth spanning portion and cooperable with the tapered inner wall of the container to form a seal therebetween, and a peripheral outer wall having a thickened bead at its lower edge which cooperates with the cup bead to detachably lock the cover on the cup.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings wherein:

FIGURE 1 is a sectional view through the cup and cover showing the cover resting loosely on the cup;

FIG. 2 is a fragmentary enlarged view of the cup and cover of FIG. 1;

FIGS. 3 and 4 are fragmentary enlarged sectional views illustrating the cover applied to the cup; and

FIG. 5 is a fragmentary sectional view through the covers on a larger scale than shown in FIGURE 1 and illustrating the manner in which the covers stack upon each other.

The covers 10 are specifically designed for use with containers 11 of the type herein illustrated and which are formed of an expanded plastic material, it being understood, however, that the cover or closures may be used with cups formed of other materials and having the specific configuration hereinafter described. The cups include a bottom wall 12 and an integral upwardly extending side wall 13 which terminates in a mouth 14 at its upper end. The side wall tapers downwardly to facilitate nesting of the cups and define an inner surface 13a which is smooth and straight in longitudinal section and free from cover locking grooves or recesses. A thickened bead 16 is formed on the mouth end of the side wall and extends outwardly therefrom. In cross-section, the upper surface 16a of the bead curves downwardly and the lower surface 16b curves upwardly and defines an apex 16c of the bead which is spaced outwardly from the side walls 11 of the cup. The cups, when formed of an expanded plastic material, have a wall thickness of the order of one-sixteenth of an inch and are thus relatively stiff and shape retaining. However, the expanded plastic material is relatively frangible and the cups cannot be subjected to very high radial pressures or substantial deformation without causing breakage of the

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cup. For this reason, the use of covers of the type which snap into an internal locking groove or recess inside the cup are not practicable.

The cover 10 of the present invention includes a central mouth expanding portion 21, an inner wall 22 which extends upwardly from the periphery of the outstanding portion, an outwardly extending rim 23 which is adapted to overlie the mouth end of the cup, and a depending outer wall 24 which extends downwardly from the rim 23. The inner wall 22 is arranged to form a seal with the inner surface 13a of the cup side wall and for this purpose is formed with a downward taper which is equal to or slightly greater than the downward taper of the inner surface 13a of the cup. The outer diameter of the inner wall 22 of the cover at its lower or minor end is made slightly smaller than the diameter of the inner surface 13a of the cup at the upper or major end of the latter so that the lower portion of the cover is adapted to extend into the mouth end of the cup when the cover rests loosely on the cup as shown in FIGS. 1 and 2. However, the outer diameter of the inner wall 22 adjacent its upper or major end is made slightly greater than the diameter of the inner surface 15a of the cup at its mouth end, so that the cover must be pressed into the cup. The cover is formed of a resilient and deformable material, such as compressed paper stock which is lightly waxed, and, when the cover is pressed onto the cup, the inner wall 22 of the cover conforms to the contour of the inner surface 13a of the cup so as to form a relatively long sealing area therebetween. This wide sealing area spans any minor irregularities and pores or pits in the inner surface of the cup, such as are inherent in cups formed of an expanded plastic material, and provides an effective seal between the cup and container without necessitating a high radial pressure. The tapered inner wall 22 of the cup does produce a wedging effect which tends to radially expand the cup. However, by selecting the taper of the inner wall 22 so as to be approximately equal to the taper of the inner surface 13a of the cup, the amount of expansion is minimized. Further, the mouth spanning portion 21 of the cover is made slightly concavo-convex so that the amount of "dish" indicated by the letter *d* in FIG. 2 tends to increase to a relatively greater amount indicated by *d'* in FIG. 3, as the cover is pressed onto the cup, and permits some radial contraction of the rim of the mouth spanning portion. This dish-shaped mouth spanning portion thus controls the radial pressure on the cup and maintains a proper seal therebetween while preventing the application of excessive radial pressures which may break the cup. The rim 23 of the cover curves outwardly from the upper edge of the inner wall 22 and downwardly to a level 23a which is substantially below the upper edge of the inner wall 22 and above the level of the mouth-spanning portion 21 of the cover. The outer wall 24 has substantially less axial depth than the inner wall 22 and extends from the outer end of the rim 23 downwardly to a level at or below the level of the mouth-spanning portion 21. The outer wall 24 is preferably formed with a small downward taper and has a thickened bead 25 at its lower end, which thickened bead extends inwardly of the outer wall 24 and forms a downwardly and inwardly beveled surface 25a thereon. As is apparent from FIG. 3, the inner surface of the outer wall 24 extends closely adjacent the apex of the cup bead 16, when the cover is pressed fully onto the cup, and the bead 25 on the cover extends inwardly and defines an inner diameter which is smaller than the outer diameter of the cup bead. When the cover is pressed from its loose position shown in FIGS. 1 and 2 to its seated position shown in FIG. 3, the cover bead 25 snaps past the cup bead 16. The cover bead 25 is spaced below the upper

edge of the inner wall 22 a distance greater than the thickness of the cup bead 16 so that the cover bead 25 moves inwardly to underlie the cup bead when the cover is pressed onto the cup. When the downward pressure on the cover is removed, the taper on the cup and inner wall of the cover together with the radial pressure acting therebetween tends to move the cover upwardly and unseat the same. The cover bead 25, however, engages the underside of the cup bead as shown in FIG. 4, and prevents accidental detachment of the cover from the cup.

The specific cover construction also provides controlled nesting of the covers when stacked upon each other. As shown in FIG. 5, the taper of the inner walls 22 of the covers is such that the outer diameter of the lower end of the inner wall is slightly smaller than the inner diameter of the upper end of the inner wall so that the inner wall of the upper cover is adapted to partially nest in the inner wall of the lower cover. The outer wall 24 of the covers are arranged to engage the rim 23 of the cover therebelow and control the nesting of the covers. Since the rims 23 curve downwardly below the upper edge of the inner wall 22, the inner walls 22 will nest partially as shown in FIG. 5, when the outer wall 24 engages the rim 23 of the cover therebelow.

From the foregoing it is apparent that the covers are arranged to partially nest when stacked upon each other to provide more compact storage and transportation of the caps. When the covers are loosely applied to the cups, the lower portion of the inner wall extends into the open mouth of the cup, as shown in FIGS. 1 and 2, to facilitate locating the covers on the cups, and when pressure is applied to the rim of the cover, the bead 25 on the cover snaps past the cup bead 16. The downward pressure on the cover forces the frusto-conical inner wall 22 thereof into the tapered inner surface 13a of the cup and tends to expand the same slightly. However, by reason of the concavo-convex configuration of the mouth spanning portion of the cover, the cover is arranged to diametrically contract slightly to control the radial pressure on the cup. The inner wall 22 of the cover conforms to the inner surface 13a of the cup and provides a wide area seal therebetween. In addition, the expanded plastic material is deformable slightly under the pressures applied thereto by the cover so that any minor irregularities in the inner surface are pressed or ironed out of the cup. When the applying pressure is removed from the rim of the cover, the tapered on the cover and cup tends to move the cover away from its fully seated position to a position such as shown in FIG. 4 wherein the cover bead 25 engages the cup bead 16. This prevents accidental detachment of the cover from the cup. In the event the cup is inverted or tipped on its side, the liquid pressure applied to the mouth spanning portion will tend to decrease the amount of "dish" from the mouth spanning portion and thus radially expand the cover to more firmly press the same against the walls of the cup. In addition, there is some expansion of the paper cover in response to contact with the liquid in the cup and, in the case of hot liquids, there is also some thermal expansion of the expanded plastic material which further augments the cover-cup seal.

I claim:

1. A container closure comprising a circular mouth spanning portion, an inner wall extending upwardly

around the mouth spanning portion and tapering downwardly to a outer diameter adjacent said mouth spanning portion which is smaller than its inner diameter adjacent the upper edge thereof whereby one inner wall is adapted to receive the lower portion of the inner wall of a cover stacked thereon, a rim on the upper edge of said inner wall extending outwardly and downwardly to a level intermediate the upper and lower edges of the inner wall, an outer wall extending downwardly from the outer edge of said rim to a level adjacent the lower edge of the inner wall, said outer wall being adapted to engage the outwardly extending rim of a cover there below to support the upper cover thereon and control nesting of the tapered inner walls of the covers.

2. The combination of claim 1 wherein said outer wall tapers downwardly.

3. The combination of claim 1 wherein said outer wall has a thickened bead extending inwardly from the lower edge thereof.

4. In combination with a cup having the mouth end of its side wall formed with a downwardly and inwardly tapering frusto-conical seating surface and a peripheral bead extending outwardly from the mouth end of the side wall with the apex of the bead spaced below the upper edge of the side wall, the upper edge of the cup curving outwardly and downwardly to the apex of the bead on the cup, a cover formed of a resilient material having a central mouth spanning portion of shallow concavo-convex configuration, an inner frusto-conical wall extending upwardly and outwardly from the concave side of said mouth spanning portion and having a major outer diameter larger than the major inner diameter of the cup mouth to form a press fit therewith whereby the cover radially expands the mouth end of the cup when it is pressed thereinto and the cup radially compresses the mouth spanning portion of the cover to maintain a snug seal between the inner wall of the cover and the inner surface of the cup, a rim extending outwardly and downwardly to a level intermediate the upper and lower edges of said inner wall of the cover and overlying the upper edge of the cup, an outer wall extending downwardly from the outer edge of the rim to a level adjacent the lower edge of the inner wall and closely surrounding the apex of the bead on the cup, said outer wall having a thickened head spaced below said rim a distance greater than the spacing of the apex of the bead on the cup below the upper edge of the cup, said bead on the cover having an inner diameter smaller than the outer diameter of the bead on the cup measured at its apex to snap past the bead on the cup and detachably retain the cover on the cup.

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