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A. FLACK ET AL

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FLEXIBLE THERMOPLASTIC NESTABLE CLOSURE LIDS

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Fig. 1.

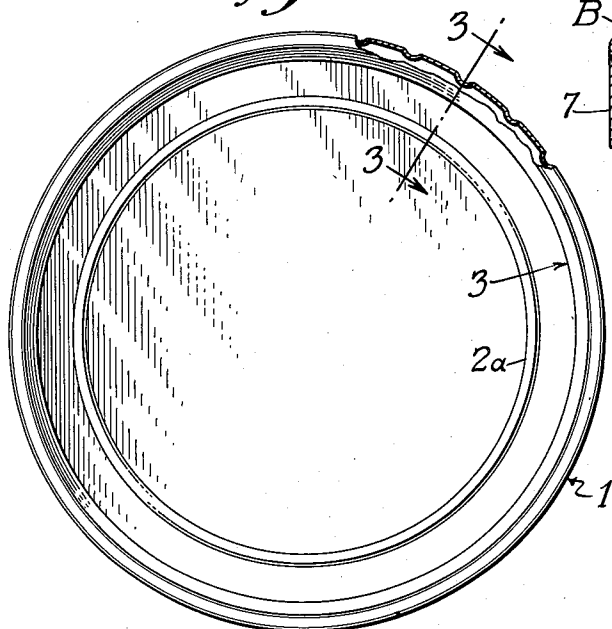


Fig. 3.

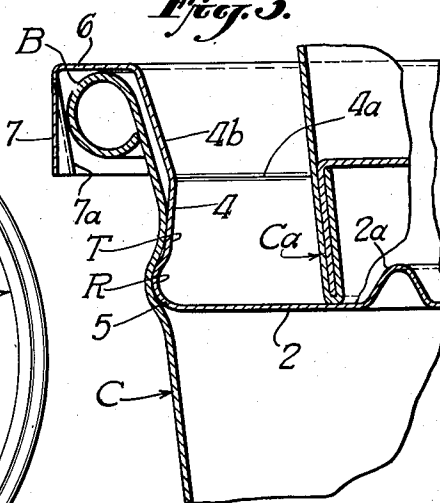


Fig. 2.

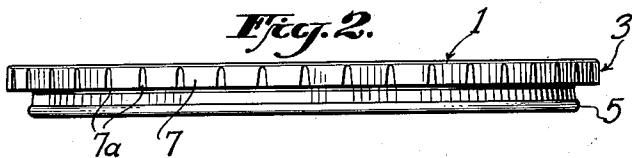


Fig. 4.

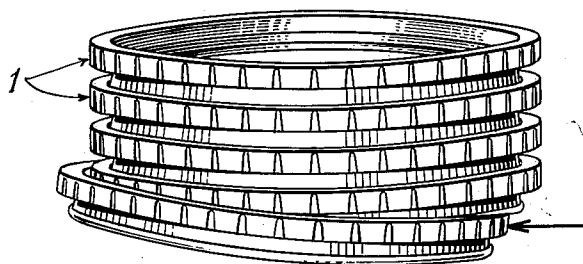


Fig. 5.

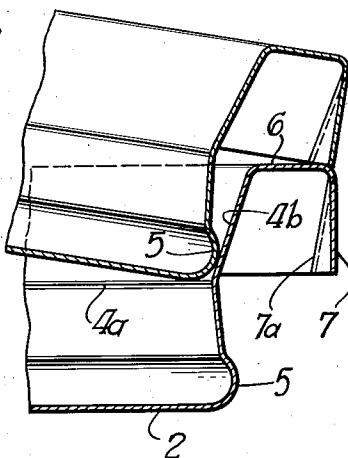


Fig. 6.
(PRIOR ART)

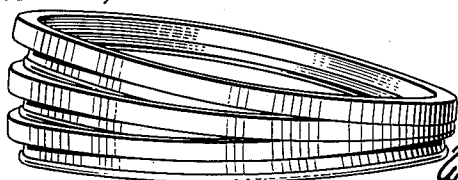
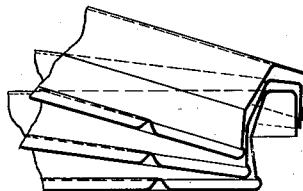


Fig. 7.
(PRIOR ART)



INVENTORS.
ALFRED FLACK,
RODNEY LUDDER.

BY

Ward & Haselton, Ormel & McChannon
ATTORNEYS.

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FLEXIBLE THERMOPLASTIC NESTABLE CLOSURE LIDS

Alfred Flack, New Hyde Park, and Rodney Ludder, Glen Head, N.Y., assignors to Lily-Tulip Cup Corporation, New York, N.Y., a corporation of Delaware

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6 Claims. (Cl. 220—60)

This invention relates to highly flexible thermoplastic nestable closure lids adapted to be individually successively fed from a stack of nested lids. More particularly the invention relates to such lids of the insert type adapted to close paper containers by interfitting interiorly of the mouth and provided with an upper rim portion of generally inverted U shape for enclosing the beaded lip of the container.

It has been proposed to make lids of very thin oriented sheet thermoplastic material, such as polystyrene, of a thickness of the order of .010" in order to provide for a rapid rate of production and a great saving in the cost of material. Both of these objectives have heretofore been achieved in the production of lids which adequately serve their desired functions in use as closures. However, it has been found that such closures are not adapted to be individually successively fed from stack formation, as required in automatically feeding from a nested stack of lids in a magazine in conjunction with a capping machine, and this deficiency has proven a great handicap in practical usefulness of such closure lids. This deficiency is due to the fact that such lids are so highly flexible that they readily warp and segments of the rim portions of adjacent nested lids become interlocked, due both to handling in stack formation as well as during feeding, thereby preventing successive feeding of a lowermost stacked lid. The problem presented was not only to provide such nestable lids which could be made of such thin flexible sheet material and at the same time be free of objectionable jamming while nested in stack formation, but to accomplish this in a manner so economical as not to counteract the low cost of producing lids from thin sheet thermoplastic material.

According to this invention we have devised such lids which are entirely satisfactory for automatic feeding from a nested stack of lids by providing peripherally spaced corrugations extending inwardly of the skirt rim to thereby prevent the interlocking of the rims of adjacent lids; and what is equally important, we have devised means of producing such lids without materially increasing the cost of apparatus for making such lids or the rate or cost of production of such lids.

Other objects, features and advantages of the invention will more fully appear from the following description taken in conjunction with the accompanying drawings which illustrate by way of example a presently preferred embodiment of the lid and in which:

Fig. 1 is a top plan view of a lid embodying the invention;

Fig. 2 is a side elevational view of the lid shown in Fig. 1;

Fig. 3 is an enlarged cross sectional view taken at 3—3 of Fig. 1 showing the lid in closure sealing engagement with a container;

Fig. 4 is a side elevational view of a nested stack of lids shown in Figs. 1, 2 and 3, illustrating the relative position of the lowermost lid being fed out of the bottom of the stack;

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Fig. 5 is an enlarged cross sectional view illustrating somewhat more clearly the manner in which the means provided on the lids prevent interlocking of the rims of adjacent lids;

Fig. 6 is a view similar to Fig. 4 but showing the objectionable interlocking of the rims of lids made according to the prior art; and

Fig. 7 is an enlarged cross sectional view somewhat more clearly showing the interlocking of prior art lid rims.

Referring to the drawings and more particularly to Figs. 1, 2 and 3, the closure lid is designated in general as 1 and comprises a bottom end wall 2, preferably provided with an embossed stiffening bead 2a, and an upwardly disposed peripheral portion designated generally as 3. The stiffening bead 2a is so positioned as to fall just within the internal diameter of the bottom rim of a superimposed container such as Ca when the filled containers closed with said lids are placed in stacked position as shown in Fig. 3. This keeps the filled stacked containers in vertical alignment. The peripheral portion 3 has an internal wall 4 provided, at its junction with the bottom 2, with an external convex bead 5 concave on its interior. Commencing at the bead 5 the wall 4 tapers gradually upwardly and inwardly along a conical section at about 5° to the vertical to an inner diameter at zone 4a substantially less than the external diameter of bead 5 and spaced a substantial distance above the bottom 2. From zone 4a the internal wall 4 tapers outwardly and upwardly along an inverted conical surface section 4b at about 18° to the vertical to an internal diameter substantially greater at the top of the peripheral portion 3 than the external diameter of bead 5. The portion 3 then extends outwardly laterally in a substantially horizontal plane to provide a rim top wall 6 whose outer edge is integrally formed with a downwardly extending skirt 7 terminating just above the zone 4a.

The bead 5 is adapted to fit within an internal annular recess R of a paper or the like container C and the wall 4 immediately above the bead 5 is of slightly larger diameter than the throat T of the container to assure a tight seal. The space provided in the rim as defined by the tapered internal wall section 4b, the upper wall 6 and the skirt 7 is of such size and shape as to freely and somewhat loosely enclose a lip bead B of the container C so as not to interfere with the seal at the throat T and locking at the recess R by the closure lid 1.

The sheet material from which these lids are made is relatively thin and flexible. The thickness will vary somewhat with the diameter. For example, for lids of about 4 3/4" diameter (such as used for 1 pint containers) we have found that .010" thick material is entirely satisfactory. For quite small lids the thickness should be at least .005" whereas for very large sizes the thickness might be as much as .020". The completed lids, however, are somewhat thinner in certain areas due to the method of manufacture to be described hereinafter but throughout the entire lid the thickness does not exceed the thickness of the sheet material from which the lids are made. Due to the fact that the thermoplastic lids are so thin throughout they are extremely flexible.

In order to prevent the interlocking of lids in stack formation and thus prevent their automatic feed from a magazine, we have provided in the skirt 7 peripherally spaced inwardly extending corrugations such as 7a formed in the wall of skirt 7 during the formation of the lid, in the manner to be more particularly described hereinafter. The corrugations 7a serve to effectively widen the lower edge structure of the skirt 7 in such a way as to prevent interlocking of the lid rims while not interfering with the insertion of the lid rim over the container bead B. Furthermore, the provision of such corrugations in no way

increases the production rate or cost of the lids as compared with those of the prior art.

While the radially inward extent of the corrugations may vary somewhat with varying sizes of lids, it has been found that an inward extent from the interior of skirt 7 at its lower edge of about three times the thickness of the skirt is preferable and that the inward extent of the corrugations should be at least twice and not more than five times the wall thickness. Also, while the peripheral spacing of the corrugations may be slightly varied, we have found that approximately 36 corrugations spaced about 10° apart are entirely satisfactory both for prevention of interlocking and for the facility of manufacture. The corrugations 7a commence closely adjacent the upper wall 6 and incline inwardly downwardly along straight lines to the lower edge of the skirt 7.

From the foregoing it will be seen that when a series of lids are superimposed in nested position to form a stack the bead 5 of each lid will rest on the outwardly and upwardly tapered section 4b (Fig. 4) which will serve as an inclined guideway along which a superimposed lid is moved upwardly at one edge and downwardly at its diametrically opposite edge relative to a lowermost supporting lid to facilitate the separation of a lowermost lid of the stack (Fig. 4). It will also be apparent from the foregoing, as illustrated in Figs. 4 and 5, that the inwardly extending corrugations 7a of each lid serve as dwells to engage the top 6 of the respectively adjacent lower lid at such times as one lid is tilted with respect to an abutting lid, as in dispensing from a stack of lids; as well as when one or more lids are warped or twisted in stack formation. By this means the objectionable interlocking of the lids of the prior art as shown in Figs. 6 and 7 is effectively overcome.

Having thus described our invention with particularity with reference to presently preferred forms of the same and having referred to some possible modifications of the invention, it will be obvious to those skilled in the art after understanding the invention, that other changes and modifications may be made therein without departing from the scope of the invention, and it is our intention to cover in the appended claims such changes as come within the scope of the invention.

What we claim is:

1. A readily flexible one-piece plastic nestable closure lid for containers comprising a bottom end and an upwardly disposed peripheral portion including an internal wall and a rim portion providing a downwardly extending skirt spaced outwardly from said internal wall, said internal wall having an external convex bead at its juncture with said bottom and at a zone intermediate its height having an internal diameter substantially smaller than the external diameter of said bead providing a seat for supporting engagement with the bead of a like nested lid, said internal wall flaring gradually outwardly from said seat to an internal diameter at its upper end substantially greater than the external diameter of said bead to provide an inclined guideway for the separation of adjacent lids during ejection of the lowermost supporting lid from the next uppermost supported lid in a nested stack, said downwardly extending skirt having corrugations disposed along its lower edge throughout its periphery at spaced intervals and extending inwardly of the interior of said external wall a radial distance greater than twice the thickness of said skirt and not exceeding five times the thickness of said skirt, said corrugations extending to the lower edge of said skirt so as to present thereat radially inwardly extending portions at said spaced intervals.

2. A readily flexible one-piece plastic nestable closure lid for containers comprising a bottom end and an upwardly disposed peripheral portion including an internal wall and a rim portion providing a downwardly extending skirt spaced outwardly from said internal wall for freely receiving a beaded lip of the container to be closed, said

internal wall being provided with an external peripheral convex bead at its juncture with said bottom for inter-fitting engagement in an internal groove of the container to be closed and said wall extending upwardly from said bead at a slight inward taper to a zone of reduced diameter spaced a substantial distance above said bottom and then tapering upwardly and outwardly to an internal diameter substantially greater than the external diameter of said bead, said skirt having inwardly extending corrugations disposed along its lowermost edge throughout its periphery at spaced intervals of approximately 10°.

3. A readily flexible one-piece plastic nestable closure lid for containers comprising a bottom end and an upwardly disposed peripheral portion including an internal wall and a rim portion providing a downwardly extending skirt, the thickness of said lid throughout its entire extent not exceeding .020", said interior wall having an external convex bead at its juncture with said bottom and at a zone intermediate its height having an internal diameter substantially smaller than the external diameter of said bead providing a seat for supporting engagement with the bead of a like nested lid, said interior wall flaring gradually outwardly from said seat to an internal diameter at its upper end substantially greater than the external diameter of said bead to provide an inclined guideway for the separation of adjacent lids during the ejection of a lowermost supporting lid from the next uppermost supported lid in a nested stack, said skirt having corrugations disposed throughout its periphery at spaced intervals at its lowermost edge and extending inwardly toward the exterior of said internal wall a distance of about three times the thickness of said skirt.

4. A readily flexible one-piece plastic nestable closure lid for containers, said lid having a thickness throughout its entire extent not exceeding .020" and comprising a bottom end and an upwardly disposed peripheral portion including an internal wall and a rim portion providing a downwardly extending skirt spaced outwardly from said internal wall, said internal wall having an external convex bead at its juncture with said bottom and at a zone intermediate its height having an internal diameter substantially smaller than the external diameter of said bead providing a seat for supporting engagement with the bead of a like nested lid, said internal wall flaring gradually outwardly from said seat to an interval diameter at its upper end substantially greater than the external diameter of said bead to provide an inclined guideway for the separation of adjacent lids during ejection of the lowermost supporting lid from the next uppermost supported lid in a nested stack, said downwardly extending skirt having at its lowermost edge peripherally spaced inwardly extending offset portions the inner edges of which define a circle whose diameter is substantially less than the external diameter at the top of said rim portion, thereby effectively widening the lower edge structure of said skirt to engage the top of a said adjacent lowermost supporting lid and prevent interlocking of adjacent lid rims when an uppermost supported lid is moved up the guideway of a lowermost supporting lid.

5. A readily flexible one-piece plastic nestable closure lid for containers, said lid comprising a bottom end and an upwardly disposed peripheral wall having an external convex bead at its juncture with said bottom and terminating at its upper edge in a rim of generally inverted U-shape cross section providing an interior wall and a downwardly extending external skirt spaced outwardly therefrom, said interior wall having an internal diameter substantially smaller than the external diameter of said bead providing a seat for supporting engagement with the bead of a like nested lid, said interior wall flaring gradually outwardly from said seat to an internal diameter at its upper end substantially greater than the external diameter of said bead to provide an inclined guideway for the separation of adjacent lids during ejection of the lowermost supporting lid from the next upper-

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most supported lid in a nested stack, and means inhibiting the interlocking of rim portions of a plurality of lids in nested condition when successively fed from the lower end of a stack as in a container capping machine, said inhibiting means comprising corrugations provided in said skirt at peripherally spaced intervals and extending inwardly thereof at the lowermost edge of said skirt, said corrugations being disposed at such peripherally spaced intervals and inward extent as to inhibit interlocking of nested covers while providing a space between the inwardly extending corrugations of said skirt and said interior wall for the reception of the bead of the container to be closed.

6. A readily flexible one-piece plastic nestable closure lid for containers, said lid comprising a bottom end and an upwardly disposed peripheral portion including an interior wall and a rim portion, said rim portion comprising a top and a downwardly extending skirt spaced outwardly from said interior wall, said skirt having a thickness throughout its entire extent not exceeding .020", said interior wall having an external convex bead at its juncture with said bottom and at a zone intermediate its height having an internal diameter substantially smaller than the external diameter of said bead providing a seat for supporting engagement with the bead of a like nested

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lid, said interior wall flaring gradually outwardly from said seat to an internal diameter at its upper end substantially greater than the external diameter of said bead to provide an inclined guideway for the separation of adjacent lids during ejection of the lowermost supporting lid from the next uppermost supported lid in a nested stack, said skirt having at its lowermost edge peripherally disposed dwell means extending inwardly substantially in the plane of said lowermost skirt edge and providing an internal diameter thereat substantially smaller than the external diameter of the top of said rim.

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