CLOSURE LIDS FOR PAPER CONTAINERS

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This invention relates to closure lids for paper or the like containers of the type having an internal peripheral groove and a lip flaring outwardly and upwardly therefrom and terminating in a bead at its upper edge, and especially to transparent closure lids.

It is known that due to manufacturing tolerances and climatic changes, containers made of paper or the like fibrous material vary in size and shape at their open ends. For example, it is to be expected that at the closure groove paper containers, due to climatic changes, will vary about .015"—.020" in diameter for popular sizes such as 8 oz., 12 oz. and 16 oz. Additionally the variation in diameter, whether due to climatic changes or manufacturing tolerances or both, is sometimes more pronounced at the rim and at other times at the groove. Due to this variation in dimension and shape for a given size container it has been found difficult, if not impossible, to provide a suitable closure lid which could readily be applied and removed while at the same time remaining secured in position on containers of varying dimensions. Closure lids of the prior art for containers of this character have included, in addition to plane disc lids, several types each provided with a disc-like end adapted to be positioned within the flaring lip of the container and with a skirt disposed over the container rim. One of these types depended on compressive engagement of the disc-like end against the container groove, but variation in the groove diameter or out of roundness resulted in tight or too loose a fit. Another type depended entirely upon a lateral pinching or squeezing action of the container rim by forces exerted against its exterior and interior, but this type was difficult to attach and was subject to accidental displacement when used on containers varying only slightly from a given size. Another type provided for a lateral clamping action of the rim in combination with sealing engagement within the flared lip, and the variation in shape and diameter of the lip of the paper containers made such a dual fit impractical.

It is the chief object of this invention to provide closure lids for paper containers of the type described which may be readily applied and removed and yet will be securely held in closed position throughout the full range of manufacturing and climatic variations in shape and dimensions normally experienced with such containers.

Another object is to provide such closure lids which are transparent and which may be held to close tolerances in production and retain their shape and dimensions to a high degree throughout wide ranges of moisture and temperature.

A further object is to provide a closure lid for the purposes above indicated which may be molded in one piece, such as by infusion molding.

In general, my invention provides for alternative conditions of closure engagement with the lip of a container of the character described depending upon the extent of shape and dimensional variation in the particular container to which it is applied. Typical examples of the manner of lid engagement with containers of varying dimensions will be referred to below.

When the container closely follows its normal dimensions and shape, its lip bead is engaged along its upper and outer surface only and the lip is engaged interiorly at the container groove in such a manner that the inner surface of the container lip is free of contact by the lid from its engagement adjacent the groove upwardly to the top of the bead.

When the container lip is increased in diameter the bead is slightly larger than its normal dimension and therefore is engaged quite snugly along its outer cross-sectional diameter in such manner as to hold the lid in closed position despite the fact that because of the enlarged diameter at the groove, the lid does not tightly engage the interior of the lip even adjacent the groove.

When the container lip is smaller than its normal dimension the bead is decreased in diameter and the lip tightly engages the lip interiorly at the groove and serves to hold the lid tightly engaged in closure position despite the fact that the bead is not tightly engaged.

Further objects and advantages of the invention will more fully appear from the following description taken in conjunction with the drawings which illustrate by way of example the presently preferred embodiment of the invention.

Referring more particularly to the drawings:

Fig. 1 is a side elevational view showing the closure lid according to the present invention in sealing engagement with a paper container of normal groove dimensions and slightly larger than normal rim bead;

Fig. 2 is a top plan view of the structure shown in Fig. 1;

Fig. 3 is a much enlarged cross-sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a much enlarged cross-sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 2, but showing the relationship of the lid and container whose shape and dimensions have varied somewhat from the normal size; the relationship of the lid and container having been somewhat exaggerated to better illustrate the relationship of the parts; and

Figs. 6, 7 and 8 are further views similar to Fig. 5 illustrating further and other variations in the containers and their relationship to the closure engagement with the lid.

Referring more particularly to Figs. 1—4: A lid according to the present invention is designated as 1 and is positioned in closing engagement with a paper container designated as 2. The container 2 being of a conventional type, comprises the sidewall 3 having an internal groove 4 forming the lower boundary of an outwardly flaring lip 5 provided at its upper edge with an external bead such as the substantially circular hollow bead 6. In the embodiment shown, the lip 5 flares outwardly at a greater angle than the sidewall 3 and makes an angle of approximately 15° with a vertical line.

The closure lid 1 is a one-piece structure composed of relatively stiff thermoplastic material such as polyvinyl and in this embodiment is formed by infusion molding. The lid 1 comprises an integrally formed rigid closure end portion 10 and a rigid peripheral rim portion extending upwardly from the end portion in a direction generally normal to the end portion and thence inclined outwardly so as to provide an inner wall having a substantially cylindrical lower zone 11 and an outwardly flaring upper zone 12 from which the rim portion extends more abruptly outwardly as at 13 and then downwardly to provide an outer wall 14 substantially parallel to and spaced outwardly from the inner wall zone 11. The cy-
lindrical wall zone 11 extends the major portion of the height of the rim and preferably about two-thirds of the height and the flared wall portion 12 is inclined toward portion 11 at an angle of about 25°. The distance between the inner wall 11—12 and the outer wall 14 is preferably equal to or slightly smaller than the horizontal distance between the outermost edge of the bead 6 and the inner portion of the lip 5 at its juncture with the groove 4; and the configuration of the lid rim is such as to prevent a squeezing action of the bead 6 between the outer wall 14 and the inner wall 11—12 of the lid. The outer diameter of the lower inner wall zone 11 is preferably smaller by a few thousandths of an inch than the internal diameter of the lip 5 at the upper edge of groove 4.

An external bead 15 is provided on the lid 1 at the juncture of the end 10 and the inner wall portion 11 in register with the groove 4 and is adapted to be seated in the groove 4 when the container retains its normal dimensions, as illustrated in Figs. 3 and 4. The bead 15 extends outwardly beyond the exterior of wall portion 11 a radial distance of .008—.015". The outer wall 14 is thickened inwardly adjacent its lower edge and I have found it highly desirable to provide this thickened wall portion in the form of a plurality of circumferentially spaced rounded buttons such as 16 extending inwardly from the wall 14 a radial distance of .015—.030". The buttons 16 taper gradually from their maximum thickness in Fig. 7 and inward wall portion 11 so as to meet the wall 14 at a slight angle to facilitate engagement of the lid over the bead 6 and its removal therefrom and the upper edge of the buttons 16 are disposed slightly below the maximum diameter of the container bead 6. The wall 14 is preferably reinforced on its exterior by circumferentially spaced lugs such as 16 disposed below the respective corresponding buttons 16. Though less desirable, the said inwardly thickened wall portion may be continuous and the exterior reinforcements 16 omitted.

It has been found that lids made in accordance with this invention and formed of polystyrene provide the necessary stiffness and strength when made of relatively thin dimensions. For example, the normal wall thickness including the end 10, inner wall portions 11 and 12 and the outwardly extending portion 13 and outer wall portion 14, have a substantially uniform thickness of about .027".

In Fig. 5 a container designated as 2a illustrates a container of the same normal size as container 2 but in which the diameter of the container lip is larger than that of a normal container (enlargement being exaggerated for purposes of clarity) and in which the bead 6a is of substantially the same or somewhat smaller size than the normal diameter. In a container comprising such variations from normal, the lid 1 is held in place by tightly fitting engagement of the lid rim with the external diameter of the bead 6a while having little or no engagement between the bead 15 and container lip at the groove 4a. It is further noted that as in Fig. 4, the lip of the container along its exterior is not engaged by the lid rim from its upper edge downwardly toward the groove 4a.

In Fig. 6 a similar condition exists as above described with reference to Fig. 5 except that in Fig. 6 the lip of the container 2b is shown somewhat further enlarged in diameter so that the bead 15 of the lid is further removed from the groove 4b while the container bead 6b is somewhat more tightly engaged by the upper and outer wall of the lid rim.

In Figs. 7 and 8 conditions are shown in which the containers designated respectively as 2c and 2d have substantially smaller than normal lip diameters at the grooves designated as 4c and 4d and at the respective container beads 6c and 6d. Under these conditions the lid beads 15 tightly compressively engage the interior of the container: at the groove portions such as 4c and 4d, while the beads such as 6c and 6d are free from locking engagement with the lid rim.

It will be seen from the foregoing that lids made in accordance with this invention not only provide for view ing the contents through the lid and may be made with facility by molding, but are adapted for use throughout the full range of variations of size and shape which are encountered in paper containers. This latter advantage is of great importance and presents a very substantial advantage over lids of the prior art wherein it was found that with a lid intended to fit the container of given size, it would be too tight for one container and too loose for another container.

Having thus described my invention with particularity with reference to its preferred forms, it will be obvious to those skilled in the art, after understanding my invention, that various changes and modifications may be made therein without departing from the spirit and scope of my invention, and I aim in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. A closure lid for closing paper containers of the type having an outwardly flaring lip provided at its upper end with an external bead and bounded at its lower extremity by an internal peripheral groove provided in the container sidewall; said lid being a one-piece structure composed of relatively stiff thermoplastic material such as a rigidly formed rigid closure end portion and a rigid peripheral rim portion, said rigid rim portion extending upwardly from said end portion providing an inner wall thence outwardly and then downwardly providing an outer wall substantially parallel to and in spaced relationship to the inner wall, said inner wall being provided with an external bead extending radially outwardly beyond said wall .008—.015" and disposed at the juncture of said end and inner wall and adapted for engagement within the internal groove of said paper container to be closed and said outer wall substantially parallel to and in spaced relationship to the inner wall, said inner wall composed of relatively stiff thermoplastic material such as polystyrene comprising an integrally formed rigid closure end portion and a rigid peripheral rim portion for cooperative closure engagement with a paper container having an outwardly flaring lip extending upwardly from an internal groove and terminating in an external bead, said rim portion extending generally normal to said end portion for the major portion of its height thence inclined outwardly providing an inner wall having a substantially cylindrical lower zone and an outwardly flaring upper zone thence abruptly outwardly and then downwardly providing an outer wall substantially parallel to and in spaced relationship to the inner wall cylindrical zone and an outwardly flaring upper zone thence abruptly outwardly and then downwardly providing an outer wall substantially parallel to and in spaced relationship to the inner wall cylindrical zone; said outer wall being provided with an external bead disposed at the juncture of said end and inner wall and adapted for engagement within the internal groove of said container to be closed and said outer wall being provided on its exterior with a plurality of circumferentially spaced rounded buttons disposed adjacent its lower edge and extending radially inwardly from said outer wall a distance of .015—.030" opposite the cylindrical inner wall zone for engagement below the hollow bead of said paper container, the outer wall above said buttons being spaced outwardly from the outwardly flaring inner wall zone a distance greater than the thickness of the container lip; said outer wall provided with a one-piece closure lid composed of relatively stiff thermoplastic material such as polystyrene comprising an...
In combination with a paper container having an outwardly flaring lip provided at its upper end with an external bead and bounded at its lower extremity by an internal peripheral groove provided in the container sidewall, a one-piece closure lid composed of relatively stiff thermoplastic material such as polystyrene comprising an integrally formed rigid closure end portion and a rigid peripheral rim portion, said rim portion extending upwardly from the outer edge of said end portion to provide an inner wall and thence outwardly and downwardly to provide an outer wall, said inner wall being provided with an external bead disposed at the juncture of said end and inner wall in register with the internal groove of said container, said outer wall being provided on its interior with a plurality of circumferentially spaced rounded buttons disposed slightly below the maximum diameter of said container bead, and said inner wall being spaced from the interior of said outwardly flaring lip opposite said container bead and throughout the major downward extent of said lip.

7. In combination with a paper container having an outwardly flaring lip provided at its upper end with an external bead and bounded at its lower extremity by an internal peripheral groove provided in the container sidewall, a one-piece closure lid composed of relatively stiff thermoplastic material such as polystyrene comprising an integrally formed rigid closure end portion and a rigid peripheral rim portion, said rim portion extending upwardly from the outer edge of said end portion to provide an inner wall and thence outwardly and downwardly to provide an outer wall, said inner wall being provided with an external bead disposed at the juncture of said end and inner wall in register with the internal groove of said container, said outer wall being provided on its interior with a plurality of circumferentially spaced rounded buttons disposed slightly below the maximum diameter of said container bead, and said inner wall being spaced from the interior of said outwardly flaring lip opposite said container bead and throughout the major downward extent of said lip.

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