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3,539,552

STACKABLE THIN WALLED TUBS

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9 Claims

ABSTRACT OF THE DISCLOSURE

An effective stacking shoulder construction for thin walled containers is obtained by locating such shoulders in corrugated side wall sections of the containers, and for rectangular containers, adjacent corner regions thereof. This shoulder construction and arrangement has proven effective against jamming of such containers together even when considerable weight has been placed atop a stack of such containers.

DESCRIPTION OF THE INVENTION

Containers as are customarily used for luncheon meat vacuumized packaging applications are commonly of a lid and tub variety. The tubs are normally thermoformed from clear plastic sheet material placed across the mouth of a suitably configured mold cavity, and formed into the cavity by vacuum drawing, usually with plug assist techniques. The draw can be shallow or deep, i.e., 1 to 4 inches. Even for the more shallow draws, the heated sheet material as it is formed into the mold cavity usually stretches and thins considerably. For example, it is not uncommon for 10 mil thermoplastic sheet, formed into one inch deep tubs, to draw down to 3 to 6 mils in thickness in various regions of the tubs so formed, particularly in the side wall sections of the tubs where the drawing is normally most severe.

Accordingly, for thin walled containers of this sort, it has been difficult to construct into such containers effective stacking features since inflections and distortions in such thin walled material occur under relatively slight loads.

In the past, it has been customary to locate such stacking features in the peripheral regions of the tub where thinning is usually at a minimum. For example, the tub can include a top wall, a downwardly depending side wall, and a horizontally disposed flange member integral with the lower extent of the tub side wall. The flange normally carries a hollow downwardly extending tongue which is adapted to be received in a marginally disposed groove formed in the lid part of such containers. A stacking feature is obtained by reverse sloping the tongue, that is, by sloping it inwardly such that when the tubs are stacked, the tongue rests on the inner extent of the flange member of the tub directly therebelow in the stack.

The afordescribed stacking feature is less than totally effective in preventing containers from locking or jamming together in a stack. The flange member in which the tongue is formed does have considerable flexibility. Accordingly, the tongue tends to bend in a moment about the horizontal plane of the flange member, particularly if the tub is rectangular, as opposed to circular, in shape. Thus, under a load the tongue can slip outwardly and off the inner extent of the flange member and lock into the hollow upper part of the tongue member of the tub therebelow in the stack.

The prior art has also experimented with raising sections of the top walls of such containers to obtain an effective stacking feature. For example, a hollow up-

wardly extending bead generally integral about the marginal edge of the top wall can be employed to this end. The jamming of the lower such bead into the hollow underside of the one thereabove in a stacked arrangement of such containers, however, is a problem even if reverse sloping principles are employed, and, accordingly, the effectiveness of such a stacking feature is oftentimes less than desired.

It is an object of the present invention to provide an improved stacking feature for thin walled tub containers employed in vacuumized luncheon meat, cheese, and like packages.

It is a further object of the present invention to provide such a stacking feature wherein the same is located in the side wall sections of such a tub.

It is yet a further object of the present invention to strategically locate and construct such stacking features in such a manner as to minimize the effect of inflections and distortions in the container walls which tend to cause the containers to jam or lock together in the stack.

Briefly, then, the present invention contemplates an improved stacking feature for usage in light or thin walled preformed plastic tubs of self-supporting structure. Such tubs normally include a top wall and a side wall depending downwardly and outwardly therefrom and terminating in an outwardly flaring or horizontally disposed flange member. The latter carries a mating region as, for example, a downwardly extending hollow tongue. The stacking feature comprises a plurality of hollow shoulders, each including a generally horizontally disposed first part extending outwardly from a mid-region portion of the side wall, and a reverse sloped second part extending diagonally inwardly from adjacent the outermost extent of the first portion and merging with the side wall at its junction with the horizontally disposed flange member. Such shoulders are set in a vertically corrugated background whereby inflection under load in the thin material of such containers is effectively avoided to the extent that a workable jam-resistant stacking feature is provided. For rectangular containers, such stacking shoulders are strategically positioned at corner regions of the side wall whereby the rigidity in such corner regions in combination with the indicated corrugated background provides an especially effective stacking feature.

Other objects and advantages of the present invention and its details of construction will be apparent from a consideration of the following specification and accompanying drawings wherein:

FIG. 1 is a top view of a tub including a stacking feature constructed according to the principles of the present invention;

FIG. 2 is a side view of the tub of FIG. 1;

FIG. 3 is an enlarged broken cross-sectional view of the tub of FIG. 1 in stacked relationship with another such tub; and

FIG. 4 is a cross-sectional view taken along reference line 4—4 of FIG. 2.

Referring now more particularly to the drawings, there is shown in FIGS. 1 and 2 a shallow generally rectangularly shaped tub 10 including a top wall 12. A side wall 14 is peripherally integral with top wall 12 and depends downwardly and outwardly therefrom at an angle α with the vertical axis 16, as is denoted in FIG. 3.

Tub 10 further includes a peripherally continuous flange portion or member 18 extending generally outwardly adjacent the lower extent 20 of side wall 14 and terminating in a rectangularly defined boundary 22. Intermediate the boundary 22 and the lower extent 20 of the side wall 14, flange carries a downwardly extending hollow tongue member 24. Tongue member 24 is

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adapted to be received in a marginally disposed groove of a suitable lid member (not shown). Such a lid is preferably a plastic film and foam laminate as, for example, taught in commonly assigned U.S. patent application Ser. No. 639,213, filed May 17, 1967, in the name of Ruben A. Tigner, a co-inventor of the present invention, the disclosure of which is fully incorporated herein by reference. Alternately, of course, more conventional lids such as those formed of impermeable paperboard, plastic, metal or the like can be adapted to usage in combination with tub 10.

As mentioned above, the inventive concept relates to a stacking feature for tub 10, and to this end there is provided a plurality of stacking shoulders 26 located in the lower regions of side wall 14.

As is best shown in FIG. 3, each stacking shoulder 26 comprises a generally horizontally disposed first member or part 28 extending outwardly from the side wall 14 at a location intermediate of top wall 12 and flange 18, and a reverse sloped second member or part 30 extending diagonally inwardly and downwardly from the outermost extent of the first part 26. Diagonal part 30 merges with the side wall 14 at the lower extent 20 thereof adjacent flange member 18.

Referring again to FIG. 3, the following critical dimensions are set forth in the drawings wherein A represents the vertical height of the stacking shoulders 26, B represents its horizontal dimension, and C represents the vertical extent of tongue member 24.

Correspondingly, Y represents the inner surface to inner surface dimension of tub 10 as measured from the lower terminating ends 25 of transversely opposed or aligned diagonal members 30, and X represents the same dimension, only as measured from a point on the inner surface of side wall 14 adjacent the first parts 28 of shoulder 26.

The angular dimensions critical to the proper formation of shoulders 26 are β which represents the slope of diagonal part 30 with respect to the vertical axis 16 and, as mentioned above, α which represents the slope of side wall 14 with respect to the same axis.

In order for stacking shoulders 26 to perform properly, the following relationships between the above-indicated dimensions, both angular and rectilinear, must be observed in constructing shoulders 26:

- (1) $\sin \alpha \times A > \text{side wall 14 thickness}$
- (2) $Y > X + 2$ (side wall 14 thickness)
- (3) $Y < X + 2B + 2$ (side wall 14 thickness)
- (4) $A > C$

Referring now to FIG. 4, there is shown a corrugated pattern 32 which represents a cross section through side wall 14 of tub 10. The corrugations as shown in FIG. 2 are preferably vertically aligned with a hill to valley dimension E in the range of approximately 15 to 100 mils, as measured at the region of side wall 10 adjacent first part 28 of shoulders 26.

The corrugations of corrugated pattern 32 of side wall 14 in combination with the strategic location of shoulders 26 at corner regions 34 is best shown in FIG. 1, effectively prevents inflections and distortions which would cause the shoulders to slip over one another and thereby cause jamming or locking of such containers in a stack, as is explained more fully hereinafter.

In FIG. 3, first parts 28 of shoulders 26 are illustrated as being substantially horizontal. However, in thermofforming of tub 10, it is difficult to obtain perfect detail and oftentimes shoulders 26 will slant downwardly and outwardly somewhat, rather than reside in a true horizontal plane. Considerable rounding of the corners 36 of shoulders 26 is also difficult to avoid and does affect the load bearing characteristics of such shoulders.

However, by incorporating shoulders 26 adjacent to corner regions 34 and by employing corrugated patterns

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32 to rigidify the side walls against inflections and distortions as described above, excellent stacking characteristics are obtained by the stacking shoulders 26 construction taught herein as exemplified by the following example.

EXAMPLE

A 10 mil polyvinyl chloride thermoplastic sheet material is placed over the mouth of the cavity. A vacuum draw and heated plug arrangement is employed to form the sheet to the mold whereby a tub of .922 inch in depth having a configuration substantially conforming to that shown in the drawings is obtained. The tub is removed from the mold and examined and the following approximate dimensions are recorded:

- (1) α —5° 40 minutes
- (2) β —7°
- (3) A—.180 inch
- (4) B—.036 inch
- (5) C—.125 inch
- (6) D—.5 inch
- (7) E—31 mils
- (8) X and Y—4.089 and 4.125 inches, respectively.

To test the stacking capabilities and effectiveness of such tubs, twelve such tubs were stacked, and a five-pound weight placed on top of the stack. The weight remained in its position for a duration of one minute. The weight was then removed and the containers inspected. No jamming or locking together of such containers was observed. Measurements made in the side wall 14 regions of such tubs varied from a low of approximately 3.5 mils to a high of approximately 6 or 7 mils.

While certain representative embodiments and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. In a light-walled plastic tub of a type for use in a vacuum package, the tub having a top wall and a side wall peripherally integral with the top wall and depending generally downwardly and outwardly therefrom, and including a peripherally continuous flange member extending generally outwardly from said side wall at the lower extent of the side wall, an improved stacking feature comprising: a plurality of stacking shoulders formed in said side wall, each such shoulder comprising a first part extending generally outwardly from said side wall at a location intermediate said top wall and said flange member, and a reverse sloped second part extending diagonally downwardly and inwardly from adjacent the outermost extent of said first part, said shoulders being set in a corrugated background comprising repetitive hill and valley regions formed in said side wall at locations generally immediately above said first parts, respectively, whereby distortion of the side wall under load is minimized in the regions of said shoulders, the hill to valley dimension of said corrugated patterns as measured adjacent said first parts, being less than 100 mils.

2. The tub of claim 1 wherein said side wall is generally rectangular in shape, said stacking shoulders being disposed adjacent the corner regions of said side wall.

3. The tube of claim 2 wherein each of the four sections comprising said side wall include two stacking shoulders, said shoulders being disposed in the outermost one-third portions thereof adjacent the two opposite corner regions, respectively, associated with each of said sections.

4. The tub of claim 1 wherein said flange member includes a mating means having a vertical dimension, the vertical height of said shoulders being greater than said vertical dimension.

5. The tub of claim 1 wherein said repetitive hill and

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valley regions are aligned substantially in the vertical direction.

6. The tub of claim 5 wherein said hill to valley dimension is in the range of from about 15 mils to 100 mils.

7. The tub of claim 1 wherein said second part of said shoulders merges with said side wall adjacent the juncture of the side wall and said flange member.

8. The tub of claim 6 wherein the maximum thickness of said side wall as measured in a mid-region portion thereof is less than 7 mils.

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9. The tub of claim 6 wherein the thickness of said side wall is in the range of from about 3.5 mils to about 7 mils.

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