April 7, 1970 J. C. LOGOMASINI 3,504,823

CONTAINER

Filed May 6, 1968

FIG. I

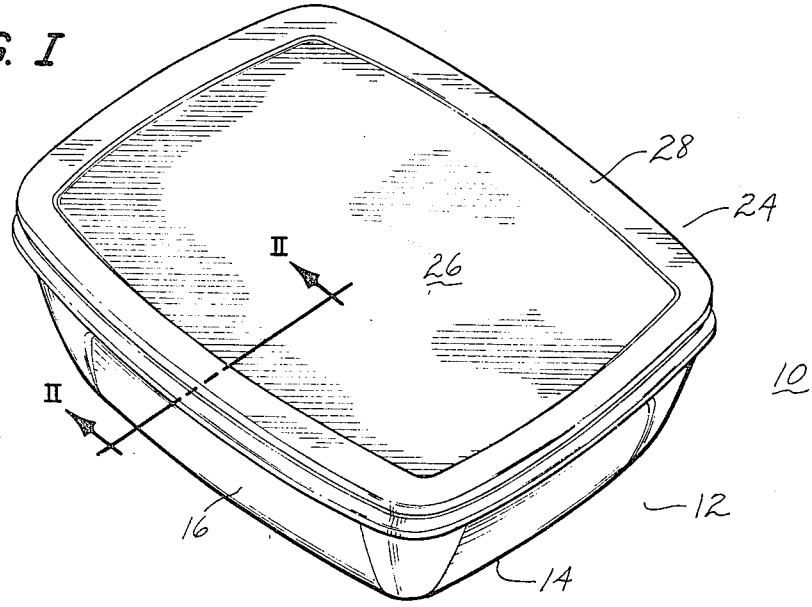


FIG. II

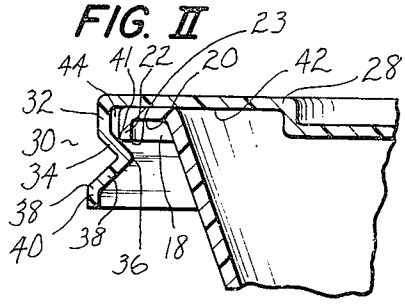


FIG. III

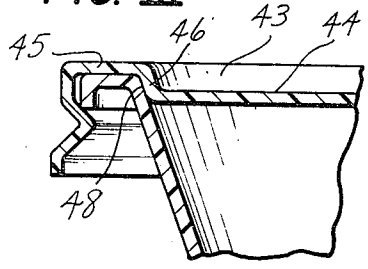
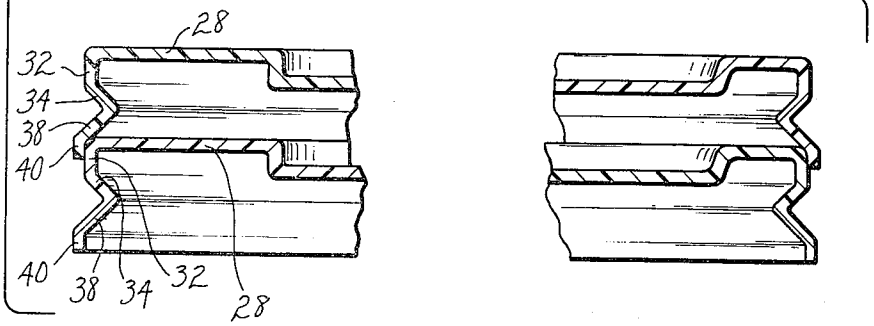


FIG. IV



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CONTAINER

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U.S. Cl. 220—60 4 Claims

ABSTRACT OF THE DISCLOSURE

Sealing configurations in a lid and complementary body which include a rim on the body extending outwardly from the top edge of the body, having a pendant portion at the outer edge of the outwardly extending portion, and a stackable lid having a resilient skirt which includes an inwardly tapering portion for compressively bearing against the pendant portion of the rim to create a seal between the two parts.

This application relates to a container and more particularly to a sealing configuration at a joint between a lid and complementary container body.

Thin wall thermoplastic containers are becoming increasingly useful for packaging and storing foods. These containers are generally closed with snap-on covers of either the insert or over-cap variety which have peripheral sealing portions designed to mate with cooperating segments of the container body. Consistent provision of a tightly sealed container which is easily opened by the consumer is difficult to achieve when the parts are mass produced by automated high speed production equipment. More specifically, the close tolerance requirement of the configurations of prior packages are generally incompatible with economical high speed, low cost, manufacturing rates which involve forming from thin plastic sheeting. Stackability of the lids without tilting or wedging is also a requirement to insure trouble free release of individual lids from stacking formations without jamming when operating in conjunction with an automated capping device.

Attempts to solve the sealing problems associated with caps in the past have involved the use of rather complicated and difficulty formable rim sections of the container body which cooperate with the lid. Typical of these approaches are thickened and/or curled rims requiring auxiliary or separate forming operations. In addition, some of these attempts have not been entirely satisfactory due to the extreme precision required in the forming tooling to effect an appropriately curled or thickened rim section.

Now a lid and container body combination have been developed having extremely effective sealing characteristics wherein the container can be formed from sheet material without the necessity of thickening or rolling the rim portion.

Accordingly, it is an object of the present invention to provide an improved container lid and body combination.

It is another object of this invention to provide a container lid and body combination which permits relaxation of molding tolerances for the mating sealing portions of the parts while still providing an effective container seal.

It is an additional object of the invention to provide an improved, tight sealing, thin walled plastic container which may be formed by conventional thermoforming techniques.

An additional object of this invention is to provide a non-circular, resilient, snap-on container lid which cooperates with sealing portions in the upper end of a complementary container body which has substantially the same thickness as that of the remainder of the body.

These and other objects will be in part obvious and will in part appear hereinafter.

These and other objects are accomplished by providing a container comprising a body having a base, a side wall extending upwardly and outwardly from the periphery of the base to an edge defining an open upper end, a rim of substantially uniform thickness having a first portion extending outwardly from said edge and a second portion extending downwardly from the outer end of the first portion, a lid for closing the open end of the body comprising a top wall having a generally flat peripheral portion, a resilient skirt depending from the outer edge of the peripheral portion having an inwardly tapering portion adapted to compressively contact a surface of the second portion of the rim so as to force the peripheral portion of the lid top wall against the surface of the first portion of the rim to create a tight seal between the body and lid.

In describing the overall invention, reference will be made to preferred embodiments illustrated in the accompanying drawings in which:

FIG. I is a perspective view of the container of the present invention;

FIG. II is a partial, sectional view taken along the line II—II of FIG. I;

FIG. III is a partial, sectional view similar to FIG. II showing an alternate embodiment of the invention; and

FIG. IV is a partial, sectional view illustrating the manner in which the lids of the invention may be stacked or nested together.

With reference to the drawing, wherein identical numerals refer to identical parts, there is shown in FIG. I a generally rectangular, thin wall, plastic container **10**, comprising body **12** and lid **24**. Body **12** comprises base **14**, a side wall **16** extending upwardly and tapering outwardly from the periphery of base **14** to an edge which defines an open upper end in body **12**. Side wall as used herein is meant to include circular as well as rectangular configurations. As apparent from FIGS. II and III, rim **18** is provided at the upper end of body **12** and is of a substantially constant thickness which is generally equivalent to the thickness of the side wall and bottom of body **12**. Rim **18** comprises a first portion **20** extending outwardly from the edge at the top of sides **16** around the periphery of body **12**, and a second portion **22** extending substantially straight downwardly from the outer end of first portion **20** of rim **18**. Edge **23** is at the inner corner of second portion **22** of rim **18**. Lid **24** is provided for closing the open end of body **12** and comprises top wall **26** having a generally flat peripheral portion **28** and a resilient skirt **30** depending from the periphery of top wall **26**. Skirt **30** has a downwardly extending vertical portion **32** at the periphery of portion **28** of top wall **26**, and a second portion at the lower end of vertical portion **32** which initially tapers inwardly at **34** to apex **36** and then flares outwardly at **38** from apex **36** terminating outwardly of the outer surface of vertical portion **32**. Skirt **30** further has a downward extension **40** at the outer end of the outwardly flaring section **38** of the second portion, which in turn is laterally outwardly of the periphery of portion **28** of top wall **26**.

The seal of container **10** occurs when lid **24** is placed across the open mouth of body **12** and pressed downwardly into place. When this is done the inner surface of inwardly tapering portion **34** of resilient skirt **30** of lid **24** engages and presses against outer corner edge **41** of second portion **22** of rim **18**, substantially around the periphery of the container. This results in urging a portion of the inner surface **42** of peripheral portion **28** of top wall

26 of lid 24 sealingly against the upper surface of first portion 20 of body rim 18. Because of the pressure of the inwardly tapering portion of the resilient skirt against corner edge 41, the peripheral portion 28 of the lid is pulled firmly into engagement with portion 20 of rim 18. In so doing the vertical section 32 of resilient skirt 30 is placed under tension.

As can be seen from FIG. II, peripheral portion 28 of top wall 26 of lid 24 straddles rim 18 with space 44, which may be variable in dimension, existing between the inner surface of vertical portion 32 of skirt 30 and the outer surface of second portion 22 of body rim 18. Thus a close tolerance between the mating resilient skirt of the lid and the rim 18 of the body is not required, because of the resilient nature of the thermoplastic lid, a seal will be maintained as long as outer corner 41 of the portion 22 comes to rest along any portion of the inside surface of inwardly tapering section 34 of lid skirt 30.

Container 12 may be resealed after opening by merely pressing the lid once more into place under and against the end of the second portion of the body rim.

In FIG. III, there is shown an alternate embodiment of the invention wherein lid 42 is of the insert variety as opposed to the overcap type illustrated in FIG. II. Lid 42 in FIG. III has a depressed planar wall portion 44 and a generally flat peripheral portion 45. Short, tapered axial section 46 joins the inner periphery of portion 45 with the outer periphery of the depressed wall 44. Section 46 is designed to contact the inner surface 48 of a short upper body portion at the top of the body sides close to the open end when the lid is in place thereon and otherwise functioning similarly to that shown in FIG. II. With this configuration lid 42 retards the tendency of the sides to move inwardly. This movement could occur, for example, when liquid within body 12 is being frozen, which results in pulling the sides inwardly, thereby preventing a good seal between the lid and body.

As perhaps is best shown in FIG. IV, lids 24 are readily stackable or nestable in a manner which resists tilting with respect to each other and permits trouble free disengagement and delivery of single caps for application to the container bodies. An upper lid when stacked atop a lower lid is resiliently supported in line contact around its full periphery by the lower lid at the junction of its downward extension 40 with its outwardly tapering portion 38. Thus, when lids 24 are required to be stacked, it is essential that the inner wall of extension 40 lie outside the outer wall of vertical portion 32 of the lid skirt. This, of course, is unnecessary when stacking is not required. If some movement occurs of adjacently stacked lids toward each other, it does so along the inner surface of outwardly tapering portion 38 of the skirt of the upper lid. Wedging of one lid within another would require the unlikely occurrence of the outer edge of the top wall of a lower lid to move beyond the apex 36 in the skirt of an upper supported lid. Extension 40 serves to prevent lateral movement of the lids with respect to each other when they are stacked together prior to application to the container body, and also serves as a gripping edge for the fingers of a user when removing the lid from the body.

The above description and particularly the drawing is for purposes of illustration only and is not to be taken in a limited sense.

The container seal of the present invention is dependent on the cooperation between an inwardly converging portion of a resilient lid skirt, a body rim, and a vertical portion of the lid skirt above the inward convergence. When the lid is in place on the body, the lower outer corner edge of the downwardly extending second portion of the body rim must lie between the apex of the inwardly converging portion of the lid skirt and the point of initial inward taper of this skirt portion. Otherwise the second portion of the body rim may taper either inwardly or flare outwardly but preferably is at substantially 90 degrees to the first body rim portion. Similarly, when the lid is in place on the body the outer surface of this second downwardly extending portion of the body rim must be situated sufficiently outwardly of the top edge of the body so that it too is vertically aligned with the lid surface between the apex and point of initial inward convergence of the inwardly tapering portion of the skirt. In other words, the first portion of the body rim must be sufficiently long in a lateral direction to place the second rim portion within the tapered section of the lid. With this configuration a compressive type of contact is obtained between the inwardly converging portion of the lid skirt and the second portion of the body rim, with this force in turn acting to urge the lid against the body rim. Furthermore, the inwardly tapering portion of the lid should be spaced downwardly below the outer edge of the lid in order to provide a laterally extending space between the lid and rim which compensates for molding tolerance variations.

The tightness of the container seal may be controlled by means of the extent of the inward taper of the lid skirt portion. Thus, for packages containing materials which evaporate under normal storage conditions, such as water in liquid based margarines, the angle of the inward taper with respect to the vertical axis of the container may be increased over that which is needed for packaging less critical foods. In general this angle of taper should be between about 10 to 70 degrees with the vertical and preferably between about 15 to 50 degrees in order to provide the proper balance between ease of removal and tightness of seal.

The rim of the container body of the present invention is preferably L-shaped and has sufficient thickness to withstand the compressive contact of the skirt to provide the seal. The thickness of the first portion of the body rim should be between about 5 to 30 mils whereas that of the second portion of the rim should be at least 15 mils. Such a configuraion, as depicted in the drawing may be thermoformed directly into one of the two sealing parts of the container without requiring a subsequent separate forming operation such as curling or rolling, wherein a portion of the rim at the top of the body is curved back in on itself. This design has an additional advantage in that it is uniquely applicable to non-circular containers where, because of configuration, rim rolling is virtually impossible.

Though the low tolerance container seal of the present invention is uniquely applicable to non-circular type packages, it should be understood that it may be used also with circular shapes. Other possible configurations include square, oval, oblong, triangular and the like.

The material from which the container is formed may be any plastic capable of being molded from sheet material. Thermoplastics generally have the advantage of being tough, difficult to break under ordinary circumstances, and have sufficient strength to be fabricated relatively thinly from web stock for economy purposes, since the containers contemplated herein are of the throw-away type which are generally meant to be nonreusable after consumption of the initial contents. The resulting lid and body when formed in this manner are unitary in construction, have no seams, and are of the thin wall variety having a generally uniform thickness.

Usable thermoplastics are polymers based on styrene, acrylonitrile, polyolefins such as, for example, polyethylene or polypropylene and mixtures of the same.

It is conceivable that a body of one material could be used in conjunction with a lid of a different material in order, for example, to obtain a lid having a resiliency which exceeds that of a more rigid body. Such a combination could be a polyethylene lid on a modified polystyrene body. Particularly useful thermoplastics for forming these containers are relatively stiff materials such as, for example, rubber modified polystyrene or polystyrene which preferably has incorporated a rubber compound grafted or mechanically blended therein; e.g., acrylonitrile, butadiene, styrene copolymers. These relatively stiff materials give excellent reproducibility in thermoformed

parts, are tough and resilient even when thin and kept at low temperatures, and are usually inert to most foods which may be packaged in the container.

In general, the present lid and container body combination find particular utility in automated and semi-automated packaging lines for foods and other consumer items, and wherever storage space dictates that a plurality of lids in telescoping relation must be stored. The assembled container comprising the lid and container body is tightly sealed, yet easily openable and resealable. The lids may be easily dispensed with little or no difficulty from the bottom of a stack, while at the same time resisting any tendency of one to tilt with respect to another when in stacked formation. Conventional thermoforming techniques using thin sheeting may be used to finish form the sealing parts and consequently, high manufacturing rates may be maintained at very low costs. Dimensional tolerances of the mating parts may be relaxed without a corresponding increase in reject rate or decrease in the sealing quality of the lid.

It will be understood that many variations and modifications of the embodiments herein described will be obvious to those skilled in the art, and may be carried out without departing from the spirit and scope of the invention.

What is claimed is:

1. A container comprising:

(a) a body having a base, a side wall extending upwardly and outwardly from the periphery of the base to an edge defining an open upper end, a rim of substantially uniform thickness having a substantially horizontal first portion extending outwardly from said edge and a second portion extending downwardly substantially perpendicular to the outer edge of the first portion, said rim terminating at the lower end of said second portion; and

(b) a one-piece resilient stackable lid for closing the open end of the body, said lid being of substantially constant thickness throughout the full extent of its surface area, said lid comprising a top wall having a generally planar peripheral portion and a resilient skirt depending from the outer edge of the peripheral portion, said skirt comprising a substantially vertical upper portion, a fastening and stacking portion immediately below said upper portion, said fastening and stacking portion having a first section converging inwardly from the lower end of the upper portion toward the center of the lid at an angle of between 10 to 70 degrees with the vertical and terminating in a circumferential line situated inwardly from the outer surface of the second portion of the rim, whereby said first section may compressively contact the outer edge of the lower end of the second portion of the rim when the lid is placed on the body to pull said peripheral portion of the lid into sealing contact with the upper surface of the horizontal first portion of the rim, said fastening and stacking portion of the lid having a second portion flaring outwardly from the circumferential line away from the center of the lid terminating outwardly of the outer surface of said vertical upper portion of the lid and a downward extension at the outer end of said second section of the fastening and stacking portion, whereby said second section may seat on the outer edge of the generally flat peripheral portion of the top wall of a like sized and configured lid and the downward extension surrounds the upper portion of the skirt of said similarly configured lid when a plurality of said like sized and lids are vertically stacked together to maintain the top walls of adjacently stacked lids in spaced relationship and to prevent said immediately adjacent lids from moving sideways with respect to each other within the stack.

2. The container of claim 1 wherein the lid is of the insert type having a depressed planar wall adapted to retard inward movement of the body side wall, and a short section between the depressed portion and the generally flat peripheral portion, said short section sealingly contacting the surface of a portion of the body side wall close to the open end when the lid is in place across the open end of the body.

3. The container of claim 1 wherein one of said body and said lid is made from a styrene polymer and the other is made from low density polyethylene, thereby obtaining enhanced sealing by means of the deformable cooperation between the two materials.

4. The container of claim 1 wherein the dimensions of the lid skirt and the rim of the body are such that the upper vertical portion of the lid skirt is spaced from the second portion of the rim when the lid is in sealing engagement with the body.

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U.S. Cl. X.R.

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