

## [54] CAN OR CONTAINER AND THE LID THEREFOR

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[51] Int. Cl. .... B65d 41/00

[58] Field of Search..... 220/42 C, 60 A, 66, 42 A,  
220/42 B, 42 D, 42 E, 60 R, 42 C

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## [57] ABSTRACT

A can or container having a rim with an inner vertical wall at the top thereof and a lid applied to the rim for closing and sealing the can, wherein the lid has a main

concave or central dish-shaped surface with a peripheral annular downwardly and generally vertically extending portion merging into a annular upwardly and outwardly inclined sloping planar surface portion which merges into an annular vertical wall, the upwardly and outwardly inclined sloping surface portion being intermediate the peripheral annular downwardly extending portion and the vertical wall. As pressure inside the can increases the concave central dish-shaped portion of the lid will tend to straighten and then continue upwardly to assume an upward curvature which simultaneously moves the outwardly inclined intermediate surface to decrease the angle of the slope in the direction of a horizontal plane which then causes the vertical wall of the lid to apply an outwardly lateral or radial pressure against the inner vertical wall of the rim to more firmly retain the lid on the rim. This takes place during shipment and handling of the can and its contents. As additional pressure continues to build up in the can, due to continued handling, the central portion of the lid will assume its ultimate convex shape, with the intermediate outwardly sloping surface changing its slope to an inward upwardly sloping surface, thereby increasing the lateral outward or radial pressure of the vertical wall of the lid against the vertical wall of the rim to its maximum extent so that the lid cannot be blown off the rim by any foreseeable internal pressure, thus making this structure the ultimate in safety by the retention of the lid on the container irrespective of the internal pressure that is normally built up.

2 Claims, 4 Drawing Figures

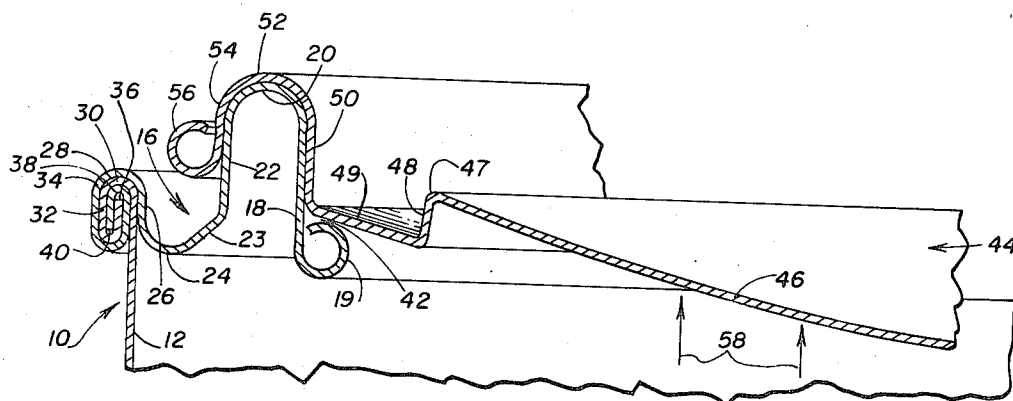


FIG. 1

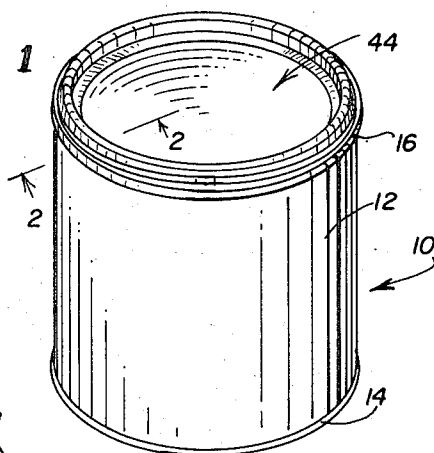
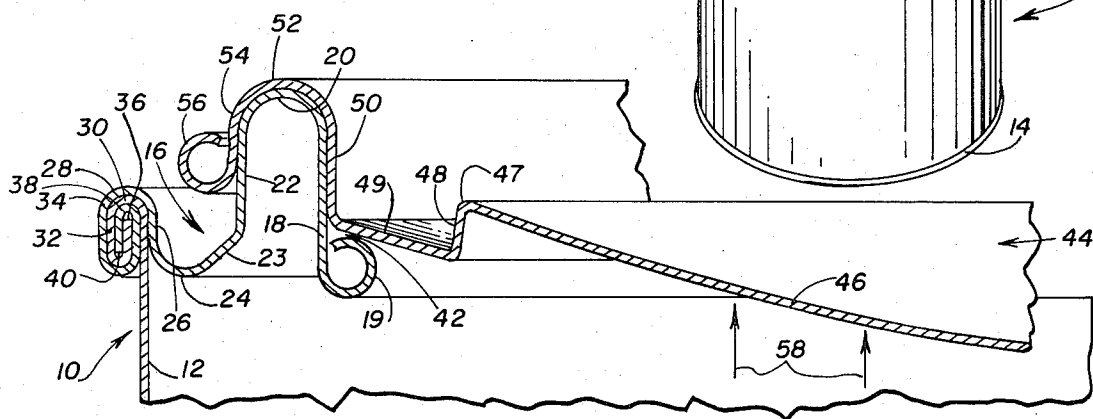


FIG. 2

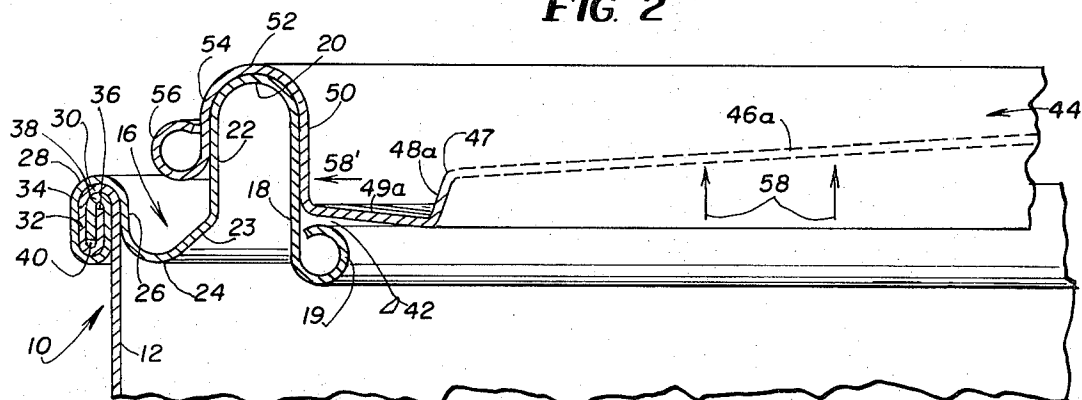


FIG. 3

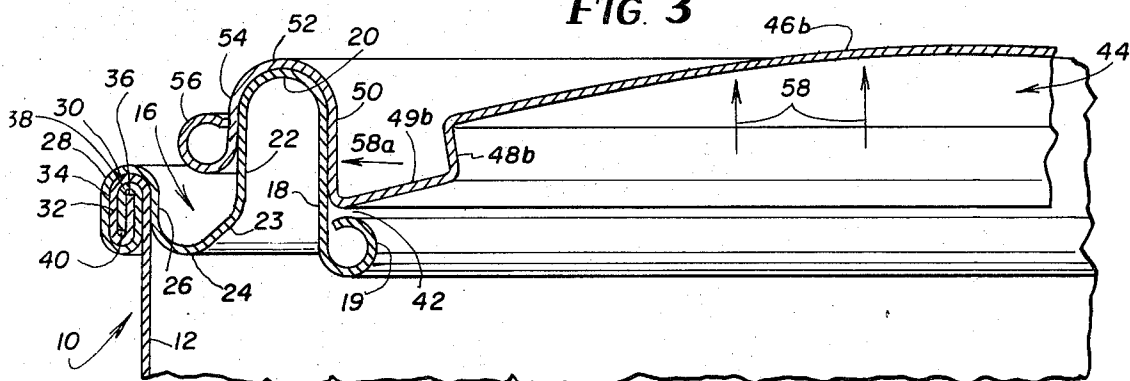


FIG. 4

## CAN OR CONTAINER AND THE LID THEREFOR

This invention is an improvement on my U.S. Pat. No. Re26,730 issued on Dec. 2, 1969, and my copending application Ser. No. 199,520 filed Nov. 17, 1971.

## BRIEF SUMMARY OF THE INVENTION

In addition to attaining all of the objectives set forth in the aforementioned Reissue Patent and copending application, this invention will retain the lid on the can when increased pressure is built up and exerted in the interior of the can.

The central portion of the lid is concave or dish-shaped and the internal pressure will cause the central concave or dish-shaped portion of the lid to move upwardly to a generally horizontal plane and to an upward curvature, opposite to its previous concave shape, to cause the inner vertical wall of the lid to exert an outwardly lateral or radial pressure against the inner vertical wall of the rim to effectively secure the lid to the container. This takes place during handling, shipment and transit of the container and its contents by the hydraulic pressure which builds up inside the container. At this stage the lid will remain attached to the rim to withstand any possible built-up pressure and will also reduce or prevent the possibility of anyone manually prying off the lid. If additional pressure builds up due to continued handling, the central concave shape of the lid assumes a convex shape to absorb primary pressures, which is its ultimate shape. At this point the lateral or radial pressure exerted by the lid against the rim is increased to its ultimate degree so that the lid is tightened to its total limits to the rim of the container.

One of the objects of this invention, therefore, is that when the pressure inside the can is such that it would normally blow the lid from the top rim as it is seated in its closed position, the increased pressure against the underside of the concave-shaped lid will tend to cause the lid to assume a convex shape and transmit an outwardly lateral or radial pressure from the vertical wall of the lid to the vertical wall of the rim and thereby additionally tighten the lid with respect to the rim and prevent the lid from being forced off of the rim.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawing:

FIG. 1 is a view of the container and lid forming this invention, with the lid in closed position without pressure.

FIG. 2 is an enlarged sectional view taken on line 2-2 of FIG. 1.

FIG. 3 is an enlarged sectional view, similar to FIG. 2, but showing in dotted lines the upward curvature of the central portion of the lid which occurs as internal pressure builds up during handling and transit of the container and its contents; and

FIG. 4 is a view showing the convex shape of the central portion of the lid when the maximum or ultimate pressure has been reached.

The can or container, generally indicated by the numeral 10, comprises a circular body 12, a bottom 14 secured to the body 12 and a rim generally indicated at 16 secured to the top of the can body.

The rim 16 is of circular shape and is formed to comprise an inner vertical wall 18 which terminates at its

lower end in an inner rolled bead 19. The upper portion of the vertical wall 18 of the rim is curved or arcuate-shaped to form a rolled top surface 20 which continues downwardly, with an outer spaced vertical wall 22 which angles or inclines outwardly at the bottom as at 23 and which continues laterally with a horizontal bottom section 24, which continues vertically upwardly to form a spaced vertical wall 26, which then continues outwardly to form a rolled top surface 28 to receive therewithin the rolled upper edge 30 of the body of the container.

The upper edge 30 continues downwardly as at 32 within the downwardly extending portion 34 of the rim. The downwardly extending portion 32 of the can body is turned inwardly and upwardly and terminates at an edge 36. The downwardly extending portion 34 of the rim continues around the edge 36 of the can body as at 38 and terminates in a downwardly extending end 40. The rim 16 is thus interlocked with the top of the can or container. The inner vertical wall 18 of the rim is adjacent the central can opening 42. The rolled top surface 20 extends above the plane of any other portion of the rim.

The lid generally indicated at 44 is of circular shape and comprises a main central concave or dish-shaped portion 46 which continues upwardly to an annular peripheral edge 47 and then continues with an annular downwardly extending short peripheral wall portion 48 which is substantially vertical and the bottom of which then continues upwardly to form an upwardly and outwardly sloping planar intermediate wall portion 49 which is of annular shape and then continues upwardly to form a spaced inner vertical wall 50 which curves to form a rolled-up top portion 52 and then continues downwardly to form an outer wall 54 which terminates in an outwardly turned edge or bead 56. As shown in FIG. 2, the rolled-over top portion 52 of the lid extends above the top concave or dish-shaped portion 46 of the lid. The angle or slope of the intermediate wall portion 49 is approximately 15° and the outer end of the wall 49 is immediately above the rolled bead 19.

The rolled portion 20 of the spaced vertical walls 18 and 22 of the rim form an inverted U-shaped configuration, and the portion of the lid comprising the rolled-over portion 52 and spaced vertical walls 50 and 54 likewise form an inverted U-shaped configuration, which may be termed the seating portion of the lid. As best seen in FIG. 2, the inverted U-shaped portion of the lid seats on and engages the inverted U-shaped portion of the rim. As will be seen, the rolled-over top portion 52 of the lid seats on and embraces the rolled top surface 20 of the rim, with the vertical wall 50 of the lid contiguous to and in engagement with the vertical wall 18 of the rim and the outer wall 54 of the lid contiguous to and in engagement with the upper portion of the vertical wall 22 of the rim.

Since both the rim and the lid are made of metal a certain amount of "give" and compression of the metal takes place in the rim and the lid to effect a sealing therebetween. For example, the bend 20 and the vertical walls 18 and 22 of the inverted U-shaped portion of the rim will be compressed inwardly when engaged by the complementary inverted U-shaped portion of the lid. This effects a seal-tight fit between the lid and the rim.

The inverted U-shaped portion of the rim on which the lid seats cannot become filled with or covered by

a paint or like material so as to affect the seating of the lid, for if any paint splashes or gets thereon it will, due to the shape of said member, roll down and will not accumulate on the surface, as would occur with containers having rims with conventional friction grooves in the rims.

The central concave or dish-shaped portion 46 of the lid, the short peripheral annular downwardly extending wall 48 surrounding the peripheral edge 47 of the dish-shaped portion 46, and the annular angular or upwardly and outwardly inclined intermediate planar wall 49 merging into the upturned vertical wall 50 of the lid are all important in the manner in which they operate to seal and tighten the lid on the rim when an upward pressure, as indicated by the arrows 58 in FIG. 2, is applied against the underside of the lid. The internal upward pressure, indicated by the arrows 58, will cause the central concave portion 46 of the lid to move upwardly from the FIG. 2 position to the dotted line position indicated by the numeral 46a in FIG. 3, which is a slightly arched position above the horizontal plane. As this occurs the annular intermediate wall 49 will move upwardly and reduce its incline, as indicated at 49a in FIG. 3, closer to a horizontal plane, with the annular peripheral wall sloping or inclining downwardly and outwardly as indicated at 48a. This will cause the vertical wall 50 to move laterally outwardly or radially, as indicated by the arrow 58', tightening against the vertical wall 18 of the rim, which vertical wall 18 is then deflected slightly laterally outward or radially. This build up of internal pressure within the container takes place as the container and its contents, such as paints or other liquids or solids within the closed container, are being handled as in transit and/or shipment, and as the internal pressure builds up the tightness of the lid against the rim increases so as to make them inseparable. Continued handlings of the can will further increase the pressure within the can and will cause the central portion 46 of the lid to assume the final convex shape, indicated at 46b in FIG. 4, where the horizontal plane at the center or axis is on substantially the same horizontal plane as that of the top portion 52 of the lid. In this convex position the peripheral wall is inclined inwardly as at 48b and the intermediate wall slopes inwardly and upwardly as at 49b to exert the maximum outwardly lateral or radial pressure against the vertical wall 50 to the maximum extent so that the lid cannot be blown off the rim of the container by a foreseeable built up internal pressure.

The configuration of the rim and of the lid of this invention is compatible to high speed production methods to provide the required friction in the proper places to meet all sealing specifications demanded by industry.

The shape and structure aforescribed generates enough flexibility to make certain that the vertical wall 50 of the lid seats at all times against the vertical wall 18 of the rim, regardless of the imperfections in manufacture, even if the wall 18 of the rim may be out of ver-

tical or there are eccentricities in the circular shape of the can rim and lid due to metal thickness variations caused by the stretch forming process. This self-adjusting feature is present because of the shape of the lid in relation to that of the rim of the can.

What is claimed is:

1. A container and a lid for closing said container, said container having a rim, said rim having a raised portion extending inwardly of the side wall of the container, said raised portion being of an inverted U-shape which comprises an outer vertical wall, a spaced inner vertical wall connected by an arcuate-shaped top to said outer vertical wall, said outer vertical wall spaced inwardly of the side of the container and defining an annular space therebetween, said lid removably mounted on said rim and having a seating portion which is of an inverted U-shape which comprises an outer vertical wall and a spaced inner vertical wall connected by an arcuate-shaped top, said outer vertical wall of the lid being equal to or shorter than the inner vertical wall of said lid, said lid seating portion adapted to overlie and frictionally engage the raised portion of the rim with the vertical walls of the lid seating portion frictionally engaging the vertical walls of the rim raised portion and with the outer vertical wall of the lid extending into the annular space and the friction engaging surfaces between the inner wall of the lid, and the inner wall of the rim being equal to or greater than the friction engaging surfaces of the outer wall of the rim and the outer wall of the lid, said inner vertical wall of the lid being substantially parallel with the inner wall of the rim and in frictional contact therewith substantially along the entire length of the inner wall of the lid, said outer vertical wall of the lid having a peripheral edge positioned inwardly of the side wall of the container, said lid having a central concave or dish-shaped portion and an annular downwardly extending relatively short peripheral wall with the peripheral wall continuing outwardly and inclined angularly upward to form an intermediate planar wall which then continues upwardly to form an inner vertical wall of the lid, whereby the pressure inside the container will cause the concave or dish-shaped portion of the lid to tend to move upwardly above a horizontal plane to a generally convex shape with the inclined angular intermediate wall changing its angle of inclination towards a generally horizontal plane to cause the inner vertical wall of the lid to apply a radial pressure against the spaced inner vertical wall of the rim to tighten the lid with respect to the rim.

2. A structure as defined in claim 1 in which when the maximum pressure is built up inside the container and the dish-shaped portion of the lid reaches its maximum convex shape the intermediate planar wall will be inclined in an opposite angular inclination from its initial angular inclination to apply the maximum radial thrust against the vertical wall of the lid.

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