United States Patent

[11] 3,620,437

[72] Inventor **Robert C. Kulp**
Spring City Township, Pa.

[21] Appl. No. **620,762**
[22] Filed **Mar. 6, 1967**
[45] Patented **Nov. 16, 1971**
[73] Assignee **The Alan IW Frank Corporation**
O'Hara Township, Allegheny County, Pa.

[54] **CUP AND LID**
11 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **229/43**
[51] **Int. Cl.** **B65d 5/64,**
B65d 43/00
[50] **Field of Search** 229/43;
220/97, 97 C, 60; 215/41

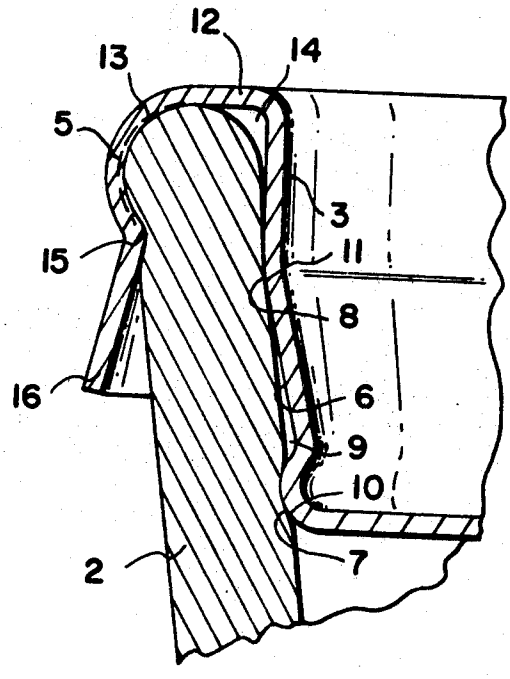
[56] **References Cited**

UNITED STATES PATENTS

3,388,827	6/1968	Thanhauser et al.	229/43 X
2,947,463	8/1960	Conklin	229/43
2,901,161	8/1959	Henchert	229/43
3,112,841	12/1963	Martinelli	229/43 X
3,262,602	7/1966	McConnell et al.	220/44 X
3,301,464	1/1967	Amberg	229/43
3,315,872	4/1967	Carbone	229/43
3,335,901	8/1967	Edwards	220/60
3,339,786	9/1967	Biglin	229/97 X

Primary Examiner—Davis T. Moorhead
Attorney—Edward Hoopes III

ABSTRACT: A cup and lid combination comprising a generally frustoconical open-topped cup and a lid having a plug portion to be forced down into the open top of the cup, the plug portion of the lid being shaped to sealingly engage the inside surface of the cup at two zones of the plug portion, one zone adjacent the bottom of the plug portion and another zone intermediate the bottom and top of the plug portion. The surface of the plug portion of the lid at the first zone is rounded to facilitate entry of the plug portion of the lid into the cup and the surface of the plug portion of the lid at the second zone is relatively pointed to enhance its sealing effect. The lid has a hood portion receiving the cup rim and the open top of the cup has a slightly outwardly projecting lip which is embraced and sealingly engaged by the hood portion of the lid. The lid is shaped for three-point frictional engagement with other identical lids when nested to form and maintain a stack of lids for shipping and storage.



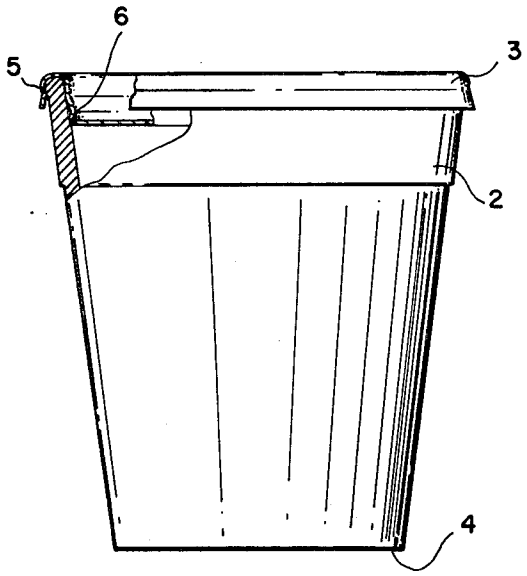


FIG. 1.

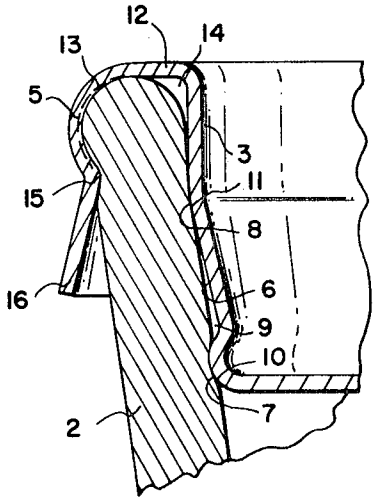


FIG. 2.

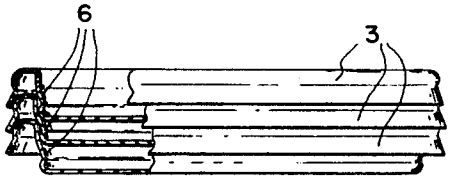


FIG. 3.

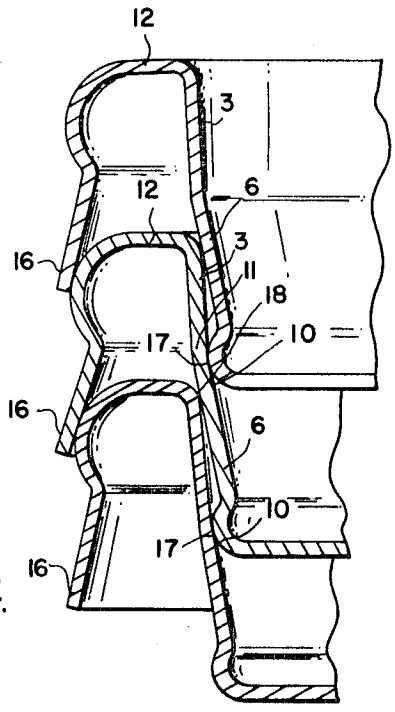


FIG. 4.

ROBERT C. KULP
INVENTOR
BY
Edward Hoopes III

HIS ATTORNEY

CUP AND LID

This invention relates to a cup and lid and has reference particularly to the shapes of the cup and lid providing for an especially tight seal between the cup and lid when the lid is applied to the cup, the lid also being shaped so that when a plurality of the lids are nested they form a compact self-maintained stack with each lid fitting to and frictionally engaging the lid below it in the stack.

While my invention is adaptable to cups and lids made of a variety of materials, I have found it to have especial utility when embodied in cups and lids of plastic material, especially when the cups are made of expandable polystyrene beads. The cups may be formed in a manner known to those skilled in the art by subjecting the heat and pressure expandable polystyrene beads impregnated with a blowing agent which under the application of heat causes the beads to expand. It is found that such cups are subject to some shrinkage upon aging and that while the shrinkage is not great it may be sufficient to impair the fit of a lid.

My cup and lid combination is designed to insure maintenance of a tight fit and effective seal both when the cup is new and when the cup has been subject to shrinkage upon aging. A two-point seal internally of the cup is maintained with either a fresh cup or a shrunken cup and an additional sealing point at the outside of the cup rim is provided for with a fresh cup.

My lid is shaped so that a plurality of the lids when nested form a compact self-maintaining stack with each lid fitting to and frictionally engaging the lid below it in the stack providing for most efficient packing of the lids for shipment and storage. The custom in the trade is to ship and store the cups in nested relationship and the lids separately in nested relationship. My cup and lid are formed to provide both optimum sealing between cup and lid whether the cup is fresh or shrunken and also to provide for maintenance of a stack of the lids when nested whereby the lids are frictionally held together in such manner as to consume a minimum of space and maintain their nested or stacked relationship.

I provide a cup and lid combination comprising a generally circular open-topped cup which adjacent the open top of the cup is generally conical with maximum transverse dimension at the open top and a lid having a plug portion adapted to be forced down into the open top of the cup, the plug portion of the lid being shaped to sealingly engage the inside surface of the cup at two zones of the plug portion, one zone adjacent the bottom of the plug portion and another zone intermediate the bottom and top of the plug portion, with the plug portion of the lid out of sealing engagement with the inside surface of the cup between the two zones. Desirably the surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone of the plug portion adjacent the bottom of the plug portion is rounded to facilitate entry of the plug portion of the lid into the open top of the cup. The surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone of the plug portion intermediate the bottom and top of the plug portion may be relatively pointed to enhance its sealing effect. The lid preferably has a hood portion receiving the cup rim and engaging the top of the rim to limit the extent of entry of the plug portion of the lid into the open top of the cup. The open top of the cup may have a slightly outwardly projecting lip and the hood portion of the lid may embrace and sealingly engage such lip, especially on a fresh cup. On a shrunken cup the hood portion of the lid may not sealingly embrace the outwardly projecting lip of the cup.

I also provide a nestable cup lid comprising a plug portion adapted to be forced down into the open top of a cup and a hood portion adapted to receive the cup rim, the plug portion having an outward projection at a zone adjacent the bottom of the plug portion which when the lid is stacked atop an identical lid seats in a zone of the plug portion of the underlying lid above the first-mentioned zone and the plug portion having at a still higher zone an outwardly inclined surface which when the lid is stacked atop an identical lid seats in the hood portion of the underlying lid. More specifically the plug portion may

have in addition to the outward projection at a zone adjacent the bottom of the plug portion an upwardly and outwardly inclined zone above the first mentioned zone so that the outward projection, when the lid is stacked atop an identical lid, seats in the upwardly and outwardly inclined zone of the underlying lid and the upwardly and outwardly inclined zone when the lid is stacked atop an identical lid seats in the hood portion of the underlying lid. The radially outer part or skirt of the hood portion preferably seats on the hood portion of the underlying lid when the lid is stacked atop an identical lid.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention in which

FIG. 1 is an elevational view with a portion cut away of a cup and lid combination in accordance with my invention;

FIG. 2 is a greatly enlarged fragmentary cross-sectional view of the cup and lid combination shown in FIG. 1;

FIG. 3 is an elevational view with a portion cut away of a stack of lids in accordance with my invention; and

FIG. 4 is a greatly enlarged fragmentary cross-sectional view showing portions of three of the stacked lids.

Referring now more particularly to the drawings and first to FIGS. 1 and 2, my cup is designated generally by reference numeral 2 and my lid is designated generally by reference numeral 3. The cup may be deemed to be made of expandable polystyrene beads as above indicated so that it may shrink slightly upon aging. The cup is of generally frustoconical shape with a closed bottom 4 and an open top having a slightly outwardly projecting lip 5. The cup is characteristically a generally circular open-topped cup which adjacent the open top of the cup is generally conical with maximum transverse dimension at the open top.

My lid 3 has a plug portion designated generally by reference numeral 6 adapted to be forced down into the open top of the cup 2. The plug portion of the lid is shaped to sealingly engage the inside surface of the cup at two zones of the plug portion, one zone 7 adjacent the bottom of the plug portion and another zone 8 intermediate the bottom and top of the plug portion, with the plug portion of the lid out of sealing engagement with the inside surface of the cup between the two zones as indicated at 9. This construction affords a double seal internally of the cup and optimum assurance against leakage.

The surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone 7 of the plug portion adjacent the bottom of the plug portion is rounded as shown at 10 to facilitate entry of the plug portion of the lid into the open top of the cup. When the lid is being applied to the cup after the cup has been filled with liquid the rounded surface 10 slides easily down the inside surface of the cup until the lid reaches sealing position.

The surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone 8 of the plug portion intermediate the bottom and top of the plug portion is relatively pointed as shown at 11 to enhance its sealing effect. The reduced area of engagement between cup and lid at this point due to the shape of the lid affords maximum sealing pressure or force per unit of area. Any leakage or seepage past the zone 7 will be stopped at the zone 8. Also the two-zone engagement between the cup and lid provides for proper orientation of the lid with respect to the cup avoiding application of the lid in tilted position with consequent danger of leakage.

The lid 3 has a hood portion 12 which receives the cup rim and engages the top of the rim to limit the extent of entry of the plug portion of the lid into the open top of the cup. As shown in FIG. 2, the hood portion 12 of the lid embraces and sealingly engages the lip 5 of the cup at zone 13 forming a third sealing point between the cup and the lid with the cup and lid out of contact in between the zones 8 and 13 as shown at 14. The cup shown in FIG. 2 is a fresh cup. Upon shrinkage the cup may decrease in transverse dimension at the lip 5 to

the extent that the seal at the zone **13** may become partially or entirely ineffective but the shrinkage of the cup renders all the more tight the seals between the cup and the lid at the zones **7** and **8** so that a seal at the zone **13** is of minimal importance with a shrunken cup.

The hood portion **12** of the lid extends about the lip **5** to such an extent, as indicated at **15**, as to positively lock the lid against removal from the cup without substantial distortion of the lid. Thus I provide for a cup and lid combination in which the lid seats firmly and squarely upon the cup and effectively seals the cup against leakage and is maintained in sealing position until it is removed by substantial distortion of the lid. When the lid is to be removed the radially outer part or skirt **16** of the hood portion **12** may be raised or pried outwardly and upwardly until the lid is disengaged from the cup at the zone **15** whereafter the lid may be moved upwardly to draw the plug portion of the lid out of the interior of the cup. Due to the taper of the cup the seals at the zones **7** and **8** are broken upon slight upward movement of the lid.

Referring now to FIGS. **3** and **4**, my lid in addition to providing for an exceptionally tight and effective seal with my cup is also designed so that when a number of the lids are nested they form a compact self-maintaining stack with each lid fitting to and frictionally engaging the lid below it in the stack. The lids shown in FIG. **4** are the same as the lid shown in FIG. **2** and the same reference numerals apply. The plug portion **6** of the upper lid **3** viewing FIG. **4** has an outward projection at a zone **10** adjacent the bottom of the plug portion which when the lid is stacked atop the lower lid seats on an upwardly and outwardly inclined zone **17** of the plug portion **6** of the underlying lid above the zone **10** thereof and the plug portion **6** of the upper lid **3** has at a still higher zone an outwardly inclined surface **18** which seats in the hood portion of the underlying lid. Also the skirt **16** of the upper lid seats on the hood portion of the underlying lid. Thus there is a three point seating of each lid upon the lid below it in the stack whereby a firm tight stack ideally suited for shipping and storage is formed. The top lid of a stack may easily be removed by forcing the skirt upwardly which loosens the contact below it and enables it to be easily removed.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied.

I claim:

1. A cup and lid combination comprising a generally circular open-topped cup which adjacent the open top of the cup is generally conical with maximum transverse dimension at the open top and a lid having a plug portion adapted to be forced down into the open top of the cup, the plug portion of the lid being shaped to sealingly engage the inside surface of the cup at two zones of the plug portion, one zone adjacent the bottom of the plug portion where the plug portion upon being forced down into the open top of the cup outwardly deforms the inner surface of the generally conical portion of the cup adjacent the open top thereof to form a liquidtight seal and another zone intermediate the bottom and top of the plug portion, with the plug portion of the lid out of sealing engagement with the inside surface of the cup between the two zones.

2. A cup and lid combination as claimed in claim **1** in which the surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone of the plug portion adjacent the bottom of the plug portion is rounded to facilitate entry of the plug portion of the lid into the open top of the cup.

3. A cup and lid combination as claimed in claim **1** in which the surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone of the plug portion intermediate the bottom and top of the plug portion is relatively pointed to enhance its sealing effect.

4. A cup and lid combination as claimed in claim **1** in which the surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone of the plug portion adjacent the bottom of the plug portion is rounded to facilitate entry of the plug portion of the lid into the open top of the cup and the surface of the plug portion of the lid which sealingly engages the inside surface of the cup at the zone of the plug portion intermediate the bottom and top of the plug portion is relatively pointed to enhance its sealing effect.

5. A cup and lid combination as claimed in claim **1** in which the lid has a hood portion receiving the cup rim and engaging the top of the rim to limit the extent of entry of the plug portion of the lid into the open top of the cup.

6. A cup and lid combination as claimed in claim **5** in which the open top of the cup has a slightly outwardly projecting lip and the hood portion of the lid embraces and sealingly engages such lip.

7. A cup and lid combination as claimed in claim **4** in which the lid has a hood portion receiving the cup rim and engaging the top of the rim to limit the extent of entry of the plug portion of the lid into the open top of the cup and the open top of the cup has a slightly outwardly projecting lip and the hood portion of the lid embraces and sealingly engages such lip.

8. A nestable cup lid comprising a plug portion adapted to be forced down into the open top of a cup and a hood portion adapted to receive the cup rim, the plug portion having an outward projection at a zone adjacent the bottom of the plug portion which when the lid is stacked atop an identical lid seats in a zone of the plug portion of the underlying lid above the first-mentioned zone and the plug portion having at a still higher zone an outwardly inclined surface which when the lid is stacked atop an identical lid seats in the hood portion of the underlying lid.

9. A nestable cup lid comprising a plug portion adapted to be forced down into the open top of a cup and a hood portion adapted to receive the cup rim, the plug portion having an outward projection at a zone adjacent the bottom of the plug portion and an upwardly and outwardly inclined zone above the first-mentioned zone, the outward projection, when the lid is stacked atop an identical lid, seating in the upwardly and outwardly inclined zone of the underlying lid, and the upwardly and outwardly inclined zone, when the lid is stacked atop an identical lid, seating in the hood portion of the underlying lid.

10. A nestable cup lid as claimed in claim **8** in which also, when the lid is stacked atop an identical lid, the radially outer part or skirt of the hood portion seats on the hood portion of the underlying lid.

11. A nestable cup lid as claimed in claim **9** in which also, when the lid is stacked atop an identical lid, the radially outer part or skirt of the hood portion seats on the hood portion of the underlying lid.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,620,437 Dated November 16, 1971

Inventor(s) ROBERT C. KULP

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 14, change "the" to --to--.

Signed and sealed this 23rd day of May 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

USCOMM-DC 60376-P69
U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334