

[54] **NON-SPILL DRINKING CUP TOP**

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[52] U.S. Cl. ....**222/482, 222/518, 220/90.4**

[51] Int. Cl. ....**B67d 3/00**

[58] Field of Search.....**222/482, 545, 559, 222/509, 518; 220/90.4, 90.2, 44 R; 137/525**

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*Primary Examiner*—Robert B. Reeves

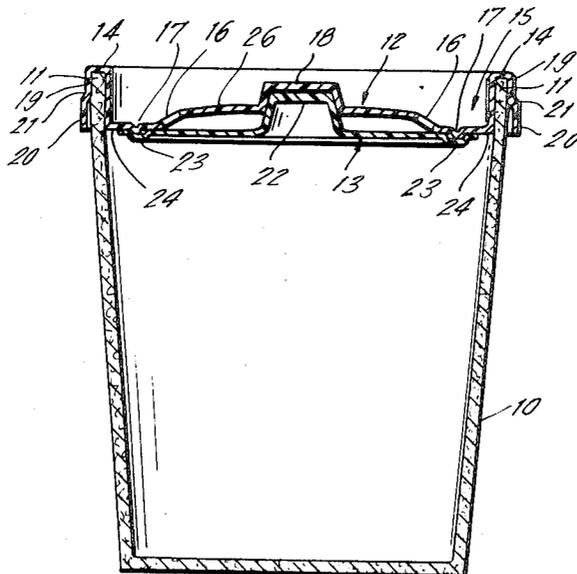
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[57] **ABSTRACT**

A non-spill drinking cup cover is formed of two sections joined at their center. The outer cover section can be secured to the outer periphery of a drinking cup in a conventional manner. The outer cover section further contains an annular well which in turn has a plurality of openings and at least one annular reinforcing rib means. The inner closure section nests within the central portion of the cover section and additionally contains at least one annular reinforcing rib means near the periphery thereof. The closure section is stressed such that the periphery thereof is normally biased toward contact with the bottom of the annular well of the cover section along a closed line such that all openings of the cover section are between the line of contact and the central portion of the cover section so as to form a fluid-tight seal. The cover section is more elastic than the closure section so that upon application of pressure, the cover section will undergo elastic deformation so as to open the contact between the cover section and closure section and allow fluid to flow through the holes into the annular well. The user may then drink from any annular position on the rim of the outer annular well.

**3 Claims, 8 Drawing Figures**



SHEET 1 OF 2

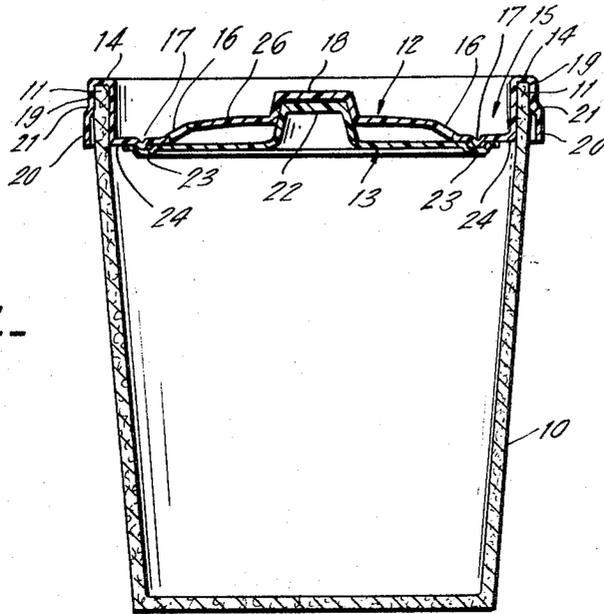


FIG. 1.

FIG. 2.

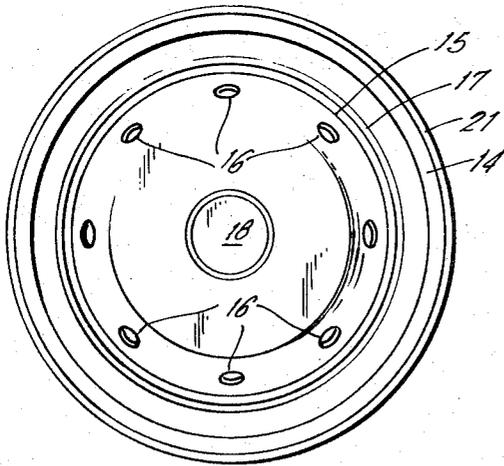


FIG. 3.

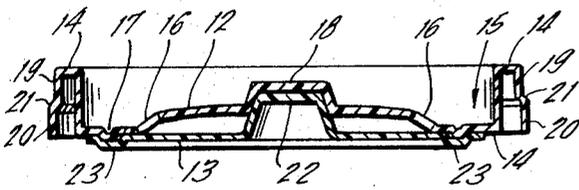
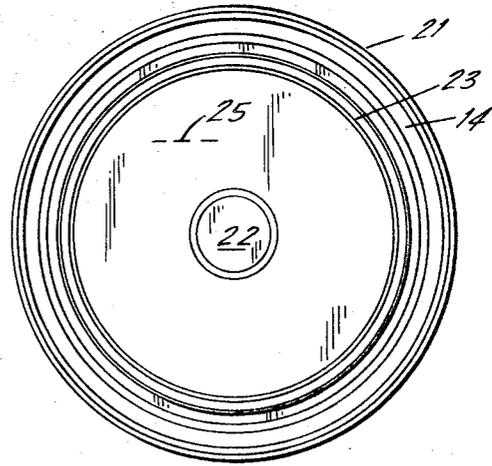


FIG. 4.

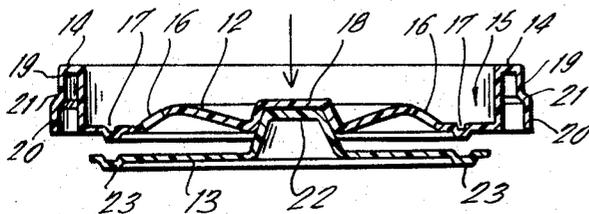


FIG. 5.

FIG. 10.

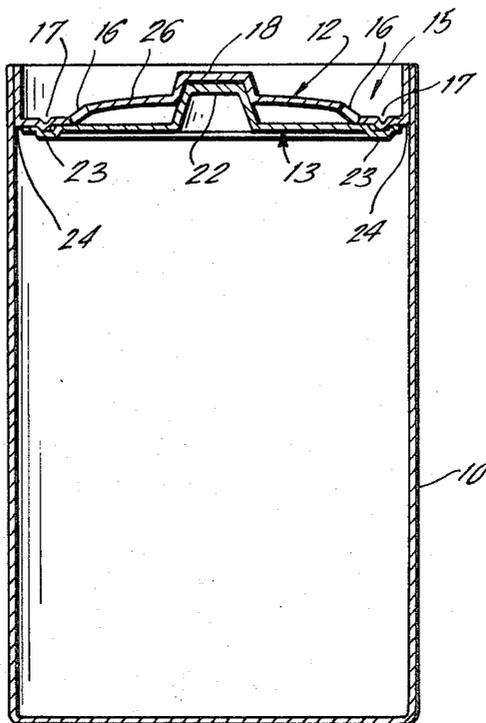


FIG. 6.

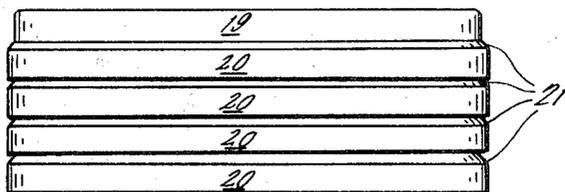
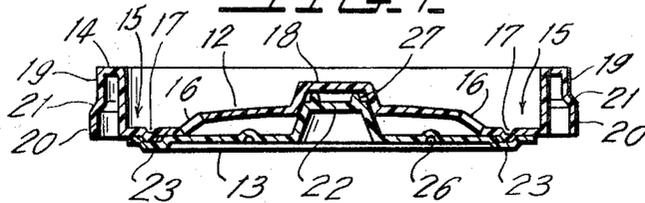


FIG. 7.



## NON-SPILL DRINKING CUP TOP

## BACKGROUND OF THE INVENTION

Non-spilling drinking cup covers which are commercially acceptable from the point of view of economy and convenience of use have been sought for many years. Covers of this type have numerous applications, such as for covering fluid filled containers which may be used while the user is in motion which could cause spillage of the container contents if the cover were open. Typical of the myriad applications for which such containers can be used is for a hot coffee container to be used in a moving vehicle such as an automobile, boat or commuter train.

Non-spill container covers proposed in the past generally require relatively complex parts and valve structures which raise the expense of the cover prohibitively. The prior art container covers also have restricted peripheral areas for drinking from the cup, with the cover in place, and the user is aware that he is not drinking from the familiar cup rim, thereby leading to a psychological dislike to using this kind of valve cover.

A novel non-spill cover for a container is described in copending application Ser. No. 171,680 filed Aug. 13, 1971, and assigned to the assignee of the present invention. The cover is formed of two sections joined together at their center. The outer cover section contains a relatively deep annular well extending around its outer periphery and openings are provided at or near the bottom of this well, which are normally sealed by the inner cover member. The openings are unsealed by the user by pressing down on the outer cover member to resiliently deform or deflect the outer cover member, thereby to move the bottom member down and away from the openings. The annular well may then be filled with fluid from the cup interior by conventionally tilting the cup, and the user may drink from any annular position on the rim of the outer annular well.

The non-spilling drinking cup cover of the copending application is a substantial improvement over the prior art container covers. However, the cover still has some disadvantages, most important of which is the possibility of failing to achieve a fluid-tight seal between the two sections if the sections are not properly aligned during assembly of the cover.

Accordingly, it is the object of this invention to provide an improved non-spill drinking cup top, the two sections of which normally contact each other in a fluid-tight seal. Another object of this invention is to provide an economical container cover which will provide the same mouth sensation as when drinking from the rim of a conventional container. A further object of the invention is to provide non-spill container top covers which can be placed one on top of the other for storage and shipment in a compact manner.

These and other objects of the invention will become apparent from the detailed description of the invention in which:

FIG. 1 is a cross-sectional view through the axis of a disposable container having thereon the non-spill cover of the invention;

FIG. 1a is a cross-sectional view through the axis of a metal container having thereon the non-spill cover of the invention;

FIG. 2 is a top plan view of the cover of FIG. 1;

FIG. 3 is a bottom plan view of the cover of FIG. 1; FIG. 4 is a cross-sectional view of the non-spill cover of the invention in its normal configuration;

FIG. 5 is a cross-sectional view of the non-spill cover of this invention when pressure is applied to the cover section so as to cause an elastic deformation thereof;

FIG. 6 is a side view of four covers stacked for storage; and

FIG. 7 is a cross-sectional view of a preferred embodiment of the non-spill cover of the invention in its normal configuration.

## SUMMARY OF THE INVENTION

This invention relates to drinking cup closures. More particularly, the invention relates to a non-spill drinking cup closure containing a cover section having an well around its outer periphery, a plurality of openings situated within said well, and at least one annular reinforcing rib means within said well; a closure section, symmetrical with the cover section, having a raised central portion and at least one annular reinforcing rib means near the periphery thereof, the raised central portion of the closure section nesting within the central portion of the cover section; the closure section being stressed such that the periphery thereof is normally biased toward contact with an annular region of the bottom of the annular well such that all holes are between the region of contact and the central portion of the cover section in a fluid-tight seal; said cover section being more elastic than the closure section so that the application of pressure to the cover section will cause elastic deformation thereof so as to open the contact between the cover and closure sections. The cover section is preferably sufficiently pre-stressed by virtue of its general shallow spherical central region so that it will snap back to its original position upon release of the pressure — an "oil can effect."

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a conventional disposable drinking container 10 made, e.g., of a foam plastic, and having a normally open lip 11. Container 10 can take any desired form and can be made of any desired material. The cover of the present invention is intended to fasten onto the periphery of lip 11 after the container is filled with a liquid.

It will be understood by those skilled in the art that the cover of this invention and the container can be made of any suitable material. For example, the cover and the container can be made of metal. Thus, an aluminum cover can be fastened to an aluminum can by welding the periphery of the cover to the rim of the can as shown in FIG. 1a.

The cover of the present invention has a cover section, generally designated as 12, and a closure section, generally designated as 13. In the Figures, cover section 12 contains a re-entrantly shaped rim section 14 which can be the type used on conventional lids for fitting container rim 11 with a snap-fit to hold the cover section 12 on the container 10. Any other means of securing cover section 12 to container 10, for example, a threaded connection, could be used in place of the press-fit rim 14.

Cover section 12 and closure section 13 are usually circular in configuration and are preferably formed of a

resiliently rigid, thermoformed plastic material of the type familiarly used for disposable container lids. Thus, sections are self-supporting and relatively rigid. Cover section 12 is more elastic than closure section 13 so that when pressure is applied to cover section 12 it will undergo elastic deformation while closure section 13 will undergo relatively little elastic deformation. The difference in elasticity can be obtained, for example, by forming the two sections from different plastic materials or by making the closure section thicker than the cover section.

Immediately inside rim 14 of cover section 12 is a relatively deep annular well 15. Within well 15, there is a plurality of openings 16, usually located on a common diameter. While openings 16 can be located on the bottom of well 15 or on the innermost wall thereof, it is preferred to have openings 16 on the innermost wall. Well 15 also contains an annular reinforcing rib means 17 on a diameter greater than that of openings 16. Reinforcing rib means 17 also serves the further function of a sealing projection used in the seal of the invention. Well 15 can contain as many additional annular reinforcing rib means as desired.

In a preferred embodiment, cover section 12 has a raised central portion 18 which can be in the form of a bulb or button or other form as desired. If the preferred embodiment of the invention, the re-entrant portion of rim section 14 has a stepped surface. In other words, the re-entrant surface will be in the form of a first cylinder 19 and a second cylinder 20 having a greater diameter, the cylinders being connected by a shoulder 21. The stepped re-entrant surface allows the pre-assembled covers of the present invention to be stored in nest-like form (FIG. 6). When the covers are stacked, the innermost surface of cylinder 20 of the upper cover will fit over the outer surface of cylinder 19 of the lower cover and the leading edge of cylinder 20 of the upper cover will rest on shoulder 21 of the lower cover.

Closure section 13 is symmetrical with cover section 12 and has a raised central portion 22 which is joined to the central portion of cover section 12 or, preferably, to raised central portion 18 of cover section 12 by bonding or welding with a suitable adhesive. As a result, cover section 12 and closure section 13 are accurately located relative to one another during assembly of the non-spill top. The closure section also has an annular reinforcing and sealing rib means 23 near its periphery and can contain as many additional annular reinforcing rib means as desired. Annular reinforcing rib means 17 and 23 have the same diameter so that the two reinforcing rib means will fit into each other when the cover is in its normal position to form a fluid-tight annular seal.

Closure section 13 is a continuous member having an outside diameter less than the inside diameter of container 10 at the axial position at which closure structure 13 is positioned relative to container 10 so that, as shown in FIG. 1, there is always a space 24 between the outer edge of closure section 13 and the interior of container 10. The outer diameter of closure section 13 is further dimensioned to be equal to or greater than the diameter of the lowest portion of well 15 of cover section 12. A vapor pressure release slot 25 can be made in closure section 13 between raised central portion 22 and reinforcing rib 23.

It will be understood by those skilled in the art that cover section 12 and closure section 13 can be manufactured by standard equipment of the type presently used to manufacture drinking container lids. Thus, both members can be formed by standard thermoforming techniques as applied to conventional plastics used for container lids, such as rubber modified polystyrene, polyethylene, a graft copolymer of acrylonitrile, polybutadiene and styrene, polypropylene, polystyrene, and the like. Moreover, since both members are circularly developed, the dies needed for their production are easily made. Openings 16 can be made by any suitable die cutting apparatus.

The closure section 13 is stressed such that the periphery thereof is normally biased toward contact with the bottom of annular well 15 at an annular region located on a diameter of greater dimension than the diameter of openings 16. Specifically, this contact takes place between ribs 17 and 23 and surfaces adjacent thereto. As a result of such contact, a fluid-tight seal is obtained.

The stressed closure section 13 can be made by any of the techniques known in the art. For example, closure section 13 can be manufactured such that the periphery thereof is angled slightly upward. Alternatively, closure section 13 can be made such that the height from the periphery to the top of raised central portion 22 is slightly less than the height from the point of contact on cover section 12 to the point of contact to the point of joinder of raised central portion 22 to raised central portion 18.

As best seen in FIG. 5, when pressure is applied to raised central portion 18, cover section 12 undergoes an elastic deformation so that closure member 13 is moved away from the bottom of annular well 15. Fluid can now flow from container 10 through annular space 24 and openings 16 into annular well 15. The user then drinks with his lips at any peripheral portion of rim 14 and fluid will continue to come into well 15, until exhausted, so long as cover section 12 is depressed. The cover section 12 is preferably sufficiently pre-stressed, by virtue of its generally shallow spherical central region 26 that it will snap back into the position of normal contact with closure section 13 (FIG. 4) upon removal of the pressure which caused the elastic deformation. This uses the well known "oil can effect" in the design of cover section 12.

FIG. 7 shows one preferred embodiment of this invention. The non-spill drinking cup of this Figure basically differs from the cover of FIG. 1 in two respects. Closure section 13 contains an additional annular reinforcing rib means 26 between annular reinforcing rib means 23 and raised central portion 22. Additionally, raised central portion 22 has been provided with a raised annular ring or rib 27 at the top thereof. Raised central portions 18 and 22 are thereby easily, strongly and completely bonded together through raised annular rib 27 at the point of contact between rib 27 and the bottom or raised central portion 18.

Various changes and modifications can be made in the container cover of this invention without departing from the spirit and the scope thereof. The various embodiments disclosed herein are for the purpose of further illustrating the invention but were not intended to limit it.

We claim:

1. A container closure comprising:  
 a cover means having a raised central portion, an annular well between said raised central portion and the periphery of said cover means, a plurality of openings in said cover means situated within said well, and at least one annular reinforcing rib means within said well;  
 a closure means symmetrical with said cover means, having a raised central portion and at least one annular reinforcing rib means near the periphery of said closure means;  
 the raised central portion of said closure means nesting within the raised central portion of said cover means;  
 said raised central portion of said cover means and said raised central portion of said closure means being interconnected by a raised annular rib means located on said raised central portion of said closure means;  
 said closure means being stressed such that the periphery thereof is normally biased towards contact with the bottom of said annular well of said cover means at a point such that said openings are between said point of contact and said point of nesting, in a fluid-tight seal; and  
 said cover means being more elastic than said closure means whereby the application of pressure upon the central portion of said cover means will cause

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elastic deformation of said cover means so as to open the contact between said cover means and said closure means.  
 2. The container closure of claim 1 wherein said cover means and said closure means are concentric circular discs, said cover means additionally has peripheral connection means connectible to the lip of an open container, said peripheral connection means having an outer stepped surface, said annular reinforcing rib means of said cover means and said annular reinforcing rib means of said closure means are located on diameters of equal dimension, and wherein said closure means has an annular reinforcing rib means between said raised central portion and said annular reinforcing rib means near the periphery of said closure means.  
 3. The container closure of claim 1 wherein said plurality of openings are located on a common diameter and situated on the innermost wall of said annular well, said annular reinforcing rib means of said cover means having the same diameter as said annular reinforcing rib means of said closure means, and said closure means being sufficiently prestressed to snap back into said position of normal contact upon removal of said pressure which caused said elastic deformation thereof to open said contact.

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