

[54] VACUUM SEALED FLUID COLLECTION
BOTTLE

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[58] Field of Search 215/320, 329, 307, 309;
220/60 R

[56] **References Cited**
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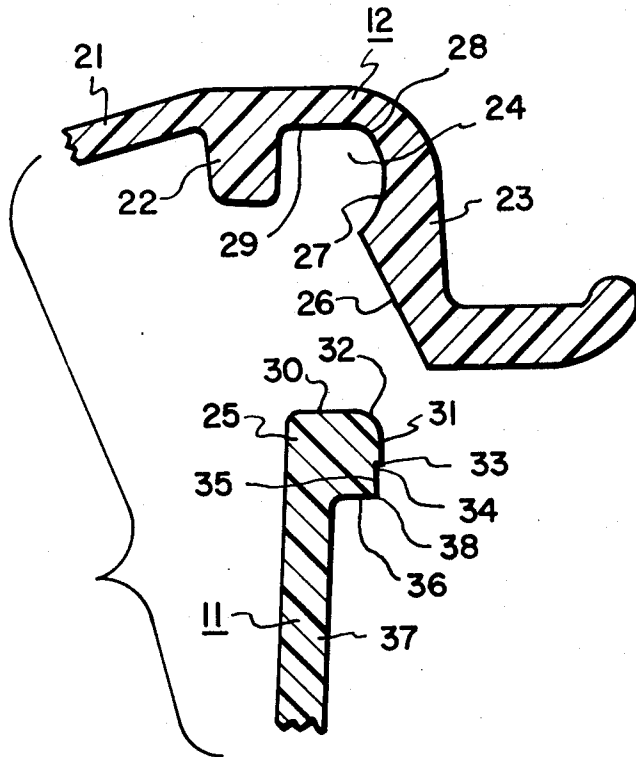
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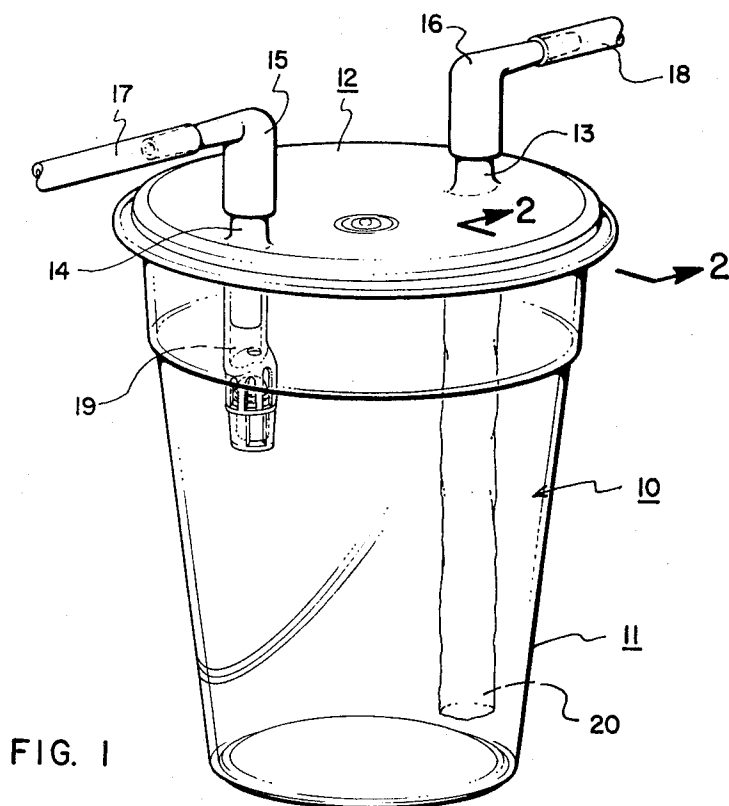
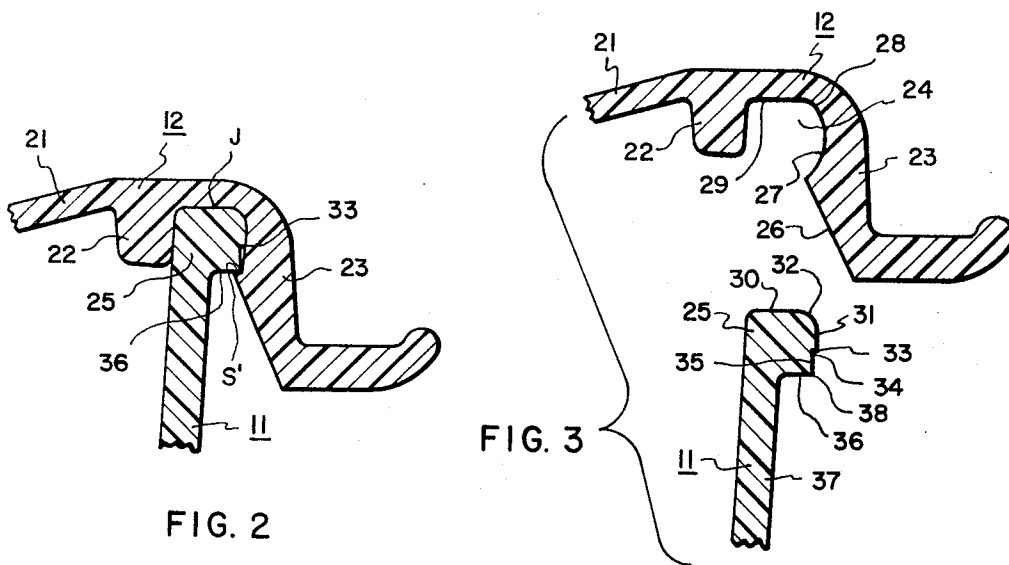
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[57] **ABSTRACT**

A vacuum operated fluid-collection bottle incorporating optimum seal and locking structure at the cover and container thereof. This is effected by supplying, relative to the vertical transverse cross section thereof, an arcuate seal of essentially long-length, this being followed by one or more, corner or wedge-type penetrating seals, as well as a permissible final seal, to further increase the efficiency of the vacuum-seal. The resultant annular seal of the cover relative to the container increases the efficiency at which the unit is operated and increases the allowable vacuum pressure to be applied to the bottle. Provision is also made for pressure-surge cover release.

7 Claims, 3 Drawing Figures





VACUUM SEALED FLUID COLLECTION BOTTLE

SPECIFICATION

The present invention relates to vacuum-operated fluid-collection bottles and, more particularly, to a bottle of the type described suitable for hospital use, wherein optimum sealing qualities are needed.

The present invention is directed to the task of increasing seal efficiency and lock efficiency between the lid or cover of a vacuum operated fluid bottle and the container to which the cover is snapped. It has been found that seal efficiency is measurably increased when two conditions occur: first, there should be an elongated seal juncture relative to the vertical, transverse cross section of the bottle proximate the seal structure area; second, there should be at least one and preferably a pair of peripheral, penetrating locking seals such as annular corner sectors which serve to indent the inner side wall material of the resilient lid constructions. In a preferred form of the invention there are actually two corner ridges that serve this latter function.

Accordingly, a principal object of the present invention is to provide a new and improved vacuum operated liquid collection bottle.

A further object is to provide an improved seal and locking structure relative to the cover and container of a vacuum operated bottle.

An additional object is to provide a cover and container, seal and locking structure which will facilitate a release of the cover upon the occurrence of excessive, positive air pressure surges, so as to avoid chancing damage to the container proper.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a vacuum operated fluid bottle constructed in accordance with the principles of the present invention in a preferred embodiment thereof.

FIG. 2 is an enlarged, fragmentary, cross-sectional detail taken along the line 2—2 in FIG. 1 and illustrating the seal structure of the bottle when the cover is snapped onto the container.

FIG. 3 is an exploded view similar to FIG. 2 and illustrates the various surfaces of the bottle components prior to the actual snapping of the cover onto the expanded lip of the container.

The vacuum-filled liquid-collection bottle 10 is shown to include a container 11 and a lid or cover 12. Cover 12 is provided with a fluid inlet port 13 and also a vacuum port 14. Both of these ports are provided with L-configured elbows 15 and 16 providing for the connection thereto of vacuum pump donut 17 and fluid inlet conduit 18. To the vacuum port 14 there may be connected a maximum liquid-level determining float valve 19 the structure of which is set forth in the inventor's copending application entitled A VALVE AND RELATED STRUCTURE FOR VACUUM OPERATED LIQUID-FILLED BOTTLES, Ser. No. 250,982, filed May 8, 1972, incorporated herein by reference. A collapsible, plastic anti-splash tube 20 may be disposed

cooperatively with respect to and communicating with body fluid inlet port 13.

In practice, the employment of the fluid bottle 10 will be useful in surgical and recovery rooms and hospitals wherein it is desired to withdraw or aspirate certain types of body fluid for collection within container 10. Conduit 17 will of course be connected to a vacuum pump or other source of negative pressure, whereas tube 18 will lead to a suction tip of some conventional prescribed type.

Of importance in the present invention is the seal provision in the cover and container structures of the bottle, so as to provide a maximum sealing effect as between the radially expanded lip of the container and the cover. Thus, cover 12 includes a central, dish-shaped concave portion 21 surrounded by a depending bead 22. Bead 22, with outer flange portion 23, forms a cavity 24 for receiving the radially expanded annular lip 25 of container 11. As the design of the outer flange portion of cover 12 progresses upwardly, see FIG. 3, it is seen that outer flange portion 23 includes an inwardly angulated, inner camming surface 26 which is contiguous with a slightly outwardly angulated peripheral inner side-wall surface 27. This angulation should approximate about 10° to 15°; the outwardly angulated, peripheral inner surface 27 progresses into an annular radius or groove 28 contiguous with upper surface 39.

The upper expanded lip 25 of container 11 includes upper surface 30 and essentially squared, outer vertical surface 31 contiguous with medial annular surface 32. Surface 31 terminates at a "point," or annular, medial, i.e., essentially central edge 33 which is defined by such surface as well as a horizontal ring surface 34. Surface 34 is contiguous with annular, vertically oriented, recessed annular surface 35, and is indented about 0.002 inches relative to surface 31. Surface 36 flares into outer surface 37 of the container. Container 11 also includes a second annular, lower edge 38, as a second penetrating sealing and primary locking abutment.

The lid is preferably made of polyethylene material, for example, that has some "give" or resiliency relative to wall surface indentation as well as to the "spring" of the corner formed by surface 29 in FIG. 3.

When the lid or cover 12 is snapped onto container 11, the outer portion of the lid including portion 23 springs outwardly slightly, so that there exists an exact correspondence and tight juncture J as between the adjacent mutually contacting surfaces as at 29, 28 and 27 of the lid, and surfaces 30, 32 and 31 of lip 25 of container 11. The springy or resilient quality of the lid, particularly at portion 23, will none the less cause the lid to tend to constrict inwardly, and this constricting action is performed against the "points" or annular corners or edges 33 and 38 which serve both as seals and also as minor and major, cover-locking means, respectively. Additionally, surface S' serves as a final sealing surface. Thus, there is not only the seal of extended arc relative to surface 32 of the outwardly expanding lip 25, but also there are annular corner penetrations proximate medial and lower edges 33 and 38 relative to the peripheral inner surface 27 of the container cover. Thus, there are not only an essentially elongate transverse seal, relative to the cross section shown in FIG. 2, but also there are edge, locking and sealing penetrations proximate "corners" 33 and 38 into the cover material itself. Polyethylene is an especially useful plastic

to accommodate a slight deformation or penetration of the peripheral edges at 33 and 38.

Bead 22 in its contact with the interior wall of the container precludes the spreading out of flange portion 23 upon the application of vacuum.

The locking function performed by annular edges 33, and especially 38, serves the important function of adding to the seals at J and S', in essence, a double lock, this so that the seal areas may be tightly preserved. The penetrating lock structure used is by its nature automatically releasable, contra conventional constructions such as threads, tab-in-slot construction, and so forth. Hence, by using the present invention, when a nurse pinches or closes off the body fluid conduit 18 at the operating tip thereof, this so as to increase vacuum pressure and drawing power, and then immerses the same in a blood or body fluid pool, or proceeds with a hospital abortion technique, the sudden surge of positive pressure, i.e., sudden reduction in negative pressure, will not chance a fracture in the container itself but merely will effect the necessary release of the cover at sealing and locking edges 33 and 38, this as a safety precaution.

It has been found that the above construction, as to container and cover seal, is greatly effective in increasing the vacuum that can be produced in the container, this thereby enabling a rapid drawing of liquid into the container upon application of vacuum to conduit 17.

What is provided therefore is a new and improved aspiration bottle construction wherein the cover and container are sealed together in a highly advantageous manner, using a high efficiency seal structure.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention at its broader aspects and, therefore, the aim in the appended claims is to cover all such modifications as fall within the true spirit and scope of the present in-

vention.

I claim:

1. In the combination an aspiration container and a cover releasably secured thereto, said cover including fluid inlet and vacuum ports, an improvement wherein said cover is resilient and includes a peripheral, outer flange portion having, progressing upwardly, an annular, outwardly sloping, inner side-wall surface, said container including an axially extending and radially outwardly extending annular lip, said lip having an exterior annular edge medial of the axial length of said lip and exterior is snapped onto and thereby installed over said lip.

2. The structure of claim 1 wherein said cover includes an interior, depending annular bead uniformly spaced from said outer flange portion.

3. The structure of claim 2 wherein said cover includes a central, dish-shaped concave portion disposed centrally of said bead.

4. The structure of claim 1 wherein said bead engages said container interiorly thereof.

5. The structure of claim 1 wherein said inner side wall surface overlaps and seals against said annular lower edge.

6. The structure of claim 5 wherein said cover includes a lower, annular inner camming surface below and contiguous with said inner side-wall surface.

7. In combination, a container having opposite, wall surfaces and forming a radially outwardly extending lip said lip having a central annular planar edge, and an annular planar lower edge, and a resilient cover having an annular, outer flange portion and a mutually spaced, interior depending bead, said outer flange portion and bead engaging said opposite wall surfaces and thereby mutually receiving said lip of said container whereby said exterior edges sealingly penetrate the exterior of said flange of said cover.

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