

Feb. 6, 1962

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3,019,932

UNIVERSAL CAP

Filed Dec. 12, 1958

2 Sheets-Sheet 1

Fig. 1.

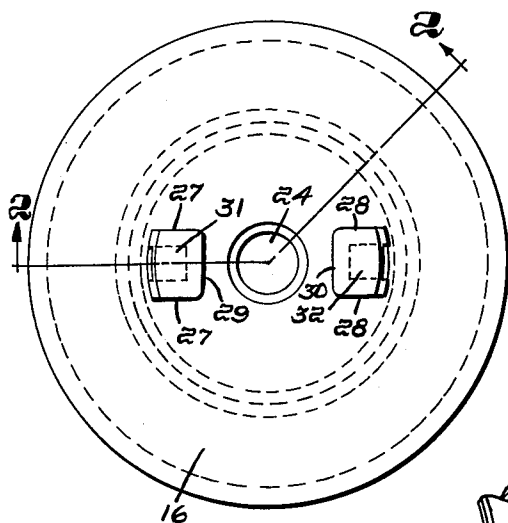


Fig. 3.

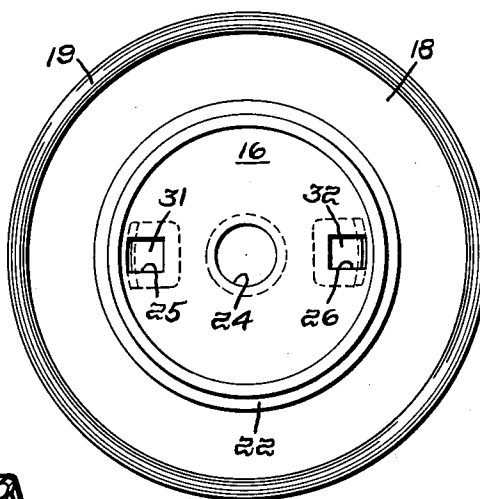
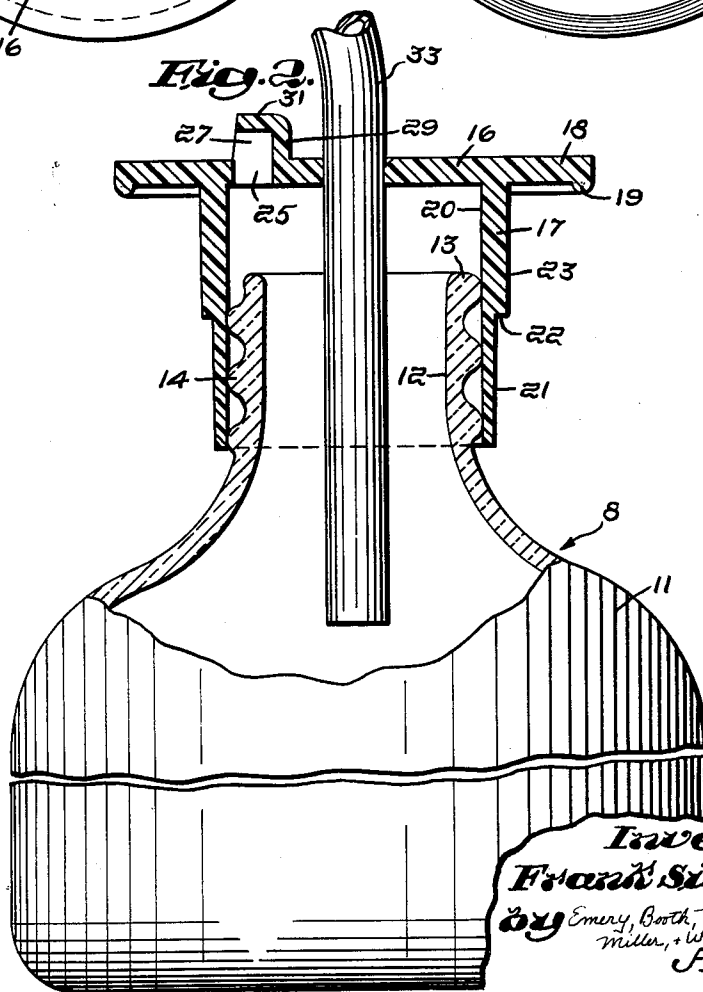


Fig. 2.



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Fig. 4.

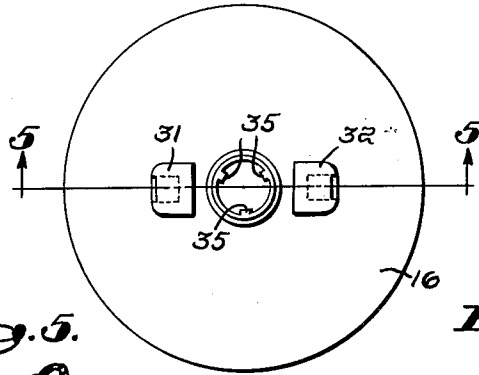


Fig. 5.

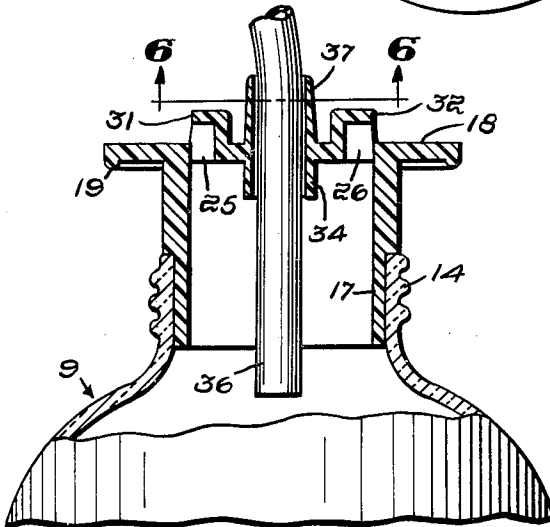


Fig. 6.

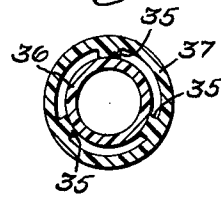


Fig. 8.

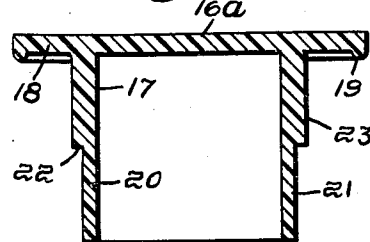
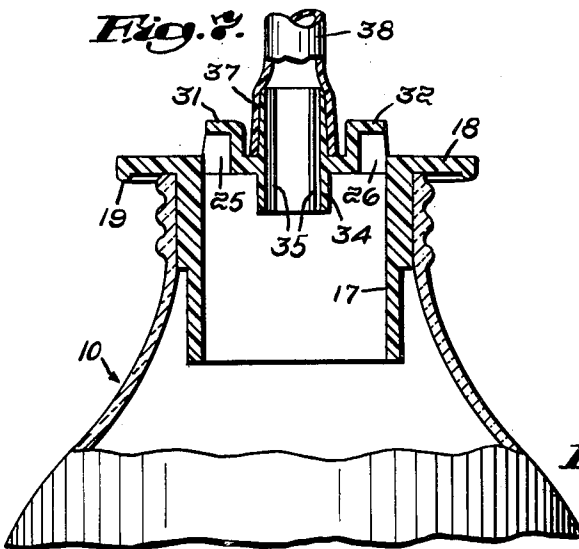


Fig. 7.



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UNIVERSAL CAP

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1 Claim. (Cl. 215—37)

This application relates to fluid handling and more particularly to a universal cap, or container adapter and closure device. In one adapter embodiment the invention cap universally fits a tube for coupling to different size containers, and serves to vent the containers as in fluid collecting. In another adapter embodiment the cap hereof variously adapts both to different size containers and to different size tubes, for coupling the tubes to the containers in the fluid collecting assembly. In a third or stopper form the invention provides a cap for universally fitting to and removably closing different size containers, as for storing fluids.

The invention will be better understood from a consideration of the following specification taken in conjunction with the accompanying drawing in which:

FIG. 1 is a top plan view of the cap of the invention;

FIG. 2 is a section along the line 2—2 of FIG. 1;

FIG. 3 is a bottom plan of the cap;

FIG. 4 is a top plan of another embodiment of the cap;

FIG. 5 is a vertical section along the line 5—5 of FIG. 4 and showing a smaller tube received through the cap stem;

FIG. 6 is a horizontal section along the line 6—6 of FIG. 5 showing the gripping of the tube by the internal ribs of the cap stem;

FIG. 7 is a section like that of FIG. 5 showing a larger tube received over the cap stem; and

FIG. 8 is a section of another form of the invention cap.

The present invention has important application to the medical field wherein, as in surgical and urological practice, there is much fluid handling and collecting, as of urinary drainage. Hospitals effect significant cost, time and space savings by reusing for such fluid collecting receptacles or bottles in which they have originally obtained saline, glucose or the like solutions. The several manufacturers of such solutions furnish them in bottles which have necks of different size and which differ also in exterior shape, whereby the hospitals are required to use a number of caps of different size and shape for the bottle closures.

The collection of fluids in the commercial bottles is commonly through tubing, of which the conventional sizes are appreciably smaller than the bottle necks, whereby in the absence of a suitable coupling means the tubing can drop to the bottom of or pull free from the bottles, and thus leave the drainage system open to spillage or contamination. Accordingly, the present invention provides a device by which tubing of the different standard sizes may be fitted to receptacles or bottles of the different commercial shapes and sizes, and to effect a unitary closed drainage system.

In fluid handling also the container closures are frequently misplaced or damaged in connection with their removal for dispensing or collecting, and this has necessitated the use of a variety of stopper devices for replacing the caps with which the containers are originally furnished. Accordingly, in its closure form the invention cap provides a stopper device universally applicable to the several commercial bottle types and sizes and whereby only a single item need be stocked by institutions, and also in the home, restaurant or office as a replacement cap.

The invention adapter is designed for use with receptacles or bottles such as indicated generally at 8, 9,

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and 10, FIGS. 2, 5 and 7, and which may have throats or necks which are conventionally of three different sizes, namely, 28, 38, and 43 millimeter diameter. The bottles all have a main body or fluid storing portion 11 surmounted by a reduced, generally annular mouth or neck 12 which terminates in a rounded rim 13. The bottle necks 12 may have screw threads 14, or they may be smooth, ribbed, or otherwise exteriorly formed for sealing engagement by the caps with and by which they are originally furnished and closed.

Referring now to adapter form of FIGS. 1—3, the invention cap is there shown to comprise a unitary, generally cup-shaped body or member having a generally flat annular plate or disc as the top wall 16. Integrally dependent from said top wall 16 is a generally shorter annular ring or sleeve formed as the side wall 17.

In accordance with the invention, the cap side wall 17 is specially and novelly formed for variously engaging and more particularly for fitting within or without the different size bottle necks 12, and with the top wall 16 extending laterally or closed over the bottle rims 13. For easy assembly of the cap with the bottles 8, 9, 10 said top wall 16 extends or projects outwardly of side wall 17 as at manipulating flange 18, and mounts at its periphery a gripping and stiffening projection in the form of a dependent bead or rib 19.

For fitting the cap to the smaller size bottle indicated generally at 8, FIG. 2, the side wall 17 has an inner face 20 specially formed and finished to be received over and grip around the bottle. More particularly, the inside diameter of the side wall 17 is approximately the same as the outside diameter of the bottle neck, or the inner face 20 may be slightly larger at the bottom, and taper up or reduce toward top wall 16 for the desired tight sealing engagement with said smaller bottle neck, as shown, FIG. 2.

The adapter side wall 17 is seen also to be made longer than the neck of the smaller size bottle 8, whereby the top wall 16 is spaced from the bottle rim 13.

For interfitting with the necks of the intermediate size bottles 9, FIG. 5, the cap side wall 17 is formed in a lower portion 21 with an outside diameter slightly smaller than said intermediate necks, whereby said lower portion 21 is seen to telescope within the necks. The lower outside diameter 21 may also have a downward taper, as for assuring desired tight fit with the bottle inside diameter, and it terminates upwardly in an intermediate step or shoulder 22 which is seen to engage over the bottle rim 13, and thereby firmly to seat the adapter in its engagement with the intermediate size bottles.

For seizure similarly in the bottles 10, FIG. 7, having throats of a larger size the cap side wall 17 is widened or thickened upwardly of shoulder 22 to define a larger-outside-diameter upper portion 23. This upper portion 23 will be understood to have an outside diameter which is approximately that of the inside diameter of said larger size throats; or it may be slightly smaller at and flare upwardly from shoulder 22 so as to have wedging fit in the bottle throats 12, when the adapter is fully inserted to seat on rim 13.

In the FIGS. 1—3 form the top wall 16 of the invention adapter has a central opening 24 shaped and proportioned to grip and seal around a drainage tube 33 of conventional size. By this firm or snug interfitting of the adapter with the drainage tube, the drainage supply is protected both against inadvertent withdrawal of the tube, with resultant fluid spillage, and against excessive depression of the tube as to a position of drainage-stopping engagement of its end with the receptacle bottom.

The adapter top wall is additionally formed with one or more, herein two, vent openings 25, 26 which are located on a radius intermediate the tube opening 24 and cap side wall 17. The vent openings 25, 26 are not so

large as to interfere with the central tube fitting opening 24, but large enough to afford unrestricted venting of the bottle under pressure filling of as well as gravity drainage to the same.

To protect the vents against obstruction and the container content against contamination, the openings 25, 26 are provided with hoods or covers. Where as here the vents are of rectangular shape, the hoods are defined by side walls 27, 28 connected by back walls 29, 30 and covered by top walls 31, 32. These vent cover top walls 31, 32 are made to extend over the cap top wall openings 25, 26, whereby the vents are exposed to the atmosphere through substantially vertical openings. The vents 25, 26 are herein also arranged 180° apart around the central opening 24, and with their hoods facing oppositely outward of the same.

The adapter embodiment of FIGS. 4-7 departs from that of FIGS. 1-3 in the provision of a central stem 34 projecting upwardly and downwardly from the top wall 16 and having a plurality of, herein three internal axial ribs 35 projecting inwardly to a diameter slightly smaller than that of a smaller size tube 36, whereby to grip and support the same in the desired bottom-spaced position as shown, FIG. 5.

The adapter stem 34 is externally formed in its upwardly projecting part with a taper 37 proportioned to have expanded over it and so to seize to a larger size tube 38 as shown, FIG. 7. Thus in the stem fitted adapter embodiment of FIGS. 4-7 the invention cap is seen to universally fit to the different commercial sizes of tubing as well as to a variety of bottle sizes.

In the adapter forms thus far considered the invention cap is preferably formed of a low cost, light weight, moldable plastic material which is also gas sterilizable. A suitable plastic is polyethylene, in an appropriate formulation of which the adapter may be at once stiff in the top wall 16 and soft toward the bottom of the side wall 17. The adapter will thus deform sufficiently to accommodate manufacturing tolerances either upon being pulled down outside as a sleeve or upon being pushed down inside as a stopper, and thereby adapt and conform to the relatively rigid glass bottle so as always to effect the desired tight sealing fit with the same. The design and construction and polyethylene or similar inexpensive formulation of the cap will be seen also to permit its mass production at a cost so low as to warrant its being discarded after but a single use, and so promoting the minimum handling and sterile preservation of equipment which is sought for in medical and hospital practice.

The invention contemplates the application of the cap also as a stopper, and more particularly as a universal closure for the several bottle types and sizes to which it has been shown to be applicable. Thus in the FIG. 8 form the cap has the similar side wall construction as in the FIGS. 1-3 and FIGS. 4-7 forms, whereby it also is universally applicable to the several mentioned bottle types and sizes, but is provided with a solid top wall 16a without vent or other openings. It will be apparent that in the stopper form of FIG. 8 the invention cap combines with the bottles to provide a completely closed sealed fluid storing system. It will be appreciated also that as

a stopper the invention cap has wide application as a replacement cap for bottles used in the home, restaurant or office as well as in medical practice. For such general application the bottle cap may be of nylon or the like plastic selected for capacity to withstand steam sterilization, whereby it is reusable.

In use the invention cap is assembled with the various bottles by simply pushing it down over, or in, the bottle necks, sufficient thrust being employed to effect the desired seizure. With the adaptor forms the end of the collecting tube is then forced through the top opening 24 or through or over the stem 34, to the desired extent, generally so as to leave it spaced from the fluid being collected. The receptacle or bottle may be supported on the floor or other fixed surface, or, as in ambulatory drainage, it may be carried in a suitable basket or the like.

For removal of either the adapter or stopper from the bottle, the invention cap is simply forced upward by pulling with the fingers or pushing with the thumb against the underside of the top wall 16, in the usual manner which may comprise or include also rocking or twisting of the cap relative to the bottle.

It will be understood that my invention is not limited to the particular embodiments thereof illustrated and described herein, and I set forth its scope in my following claim.

I claim:

In a drainage system, means for universally fitting a drainage tube to different size bottles comprising a rigid light weight unitary molded plastic body having a disc-like top wall, said top wall formed with an opening arranged and proportioned to receive and grip and seal around the drainage tube with its end held against both inadvertent withdrawal from and excessive depression into the bottles, the top wall formed also with one or more other openings constructed and arranged to vent the bottles while preventing contamination of their content, and an annular sleeve-like side wall integrally dependent from said top wall, said side wall formed with different size annular parts proportioned to telescope with the mating annular necks of different size open-mouth fluid receptacles, the side wall having also a straight, smooth cylindrical inner face for engaging over necks of smaller size, and the side wall further having a stepped outer face for lower and upper engagement there with necks respectively of intermediate and larger size.

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