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Holbrook

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[54] **BODY FLUID COLLECTION BOTTLE**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 85,075, Oct. 29, 1970, Pat. No. 3,699,815.

[52] **U.S. Cl.** **137/575,** 73/427, 128/275, 137/582

[51] **Int. Cl.** **A61f 5/44,** E03c 1/181

[58] **Field of Search** 73/427; 128/275–278, 283; 137/590, 592, 575, 582

[56] **References Cited**

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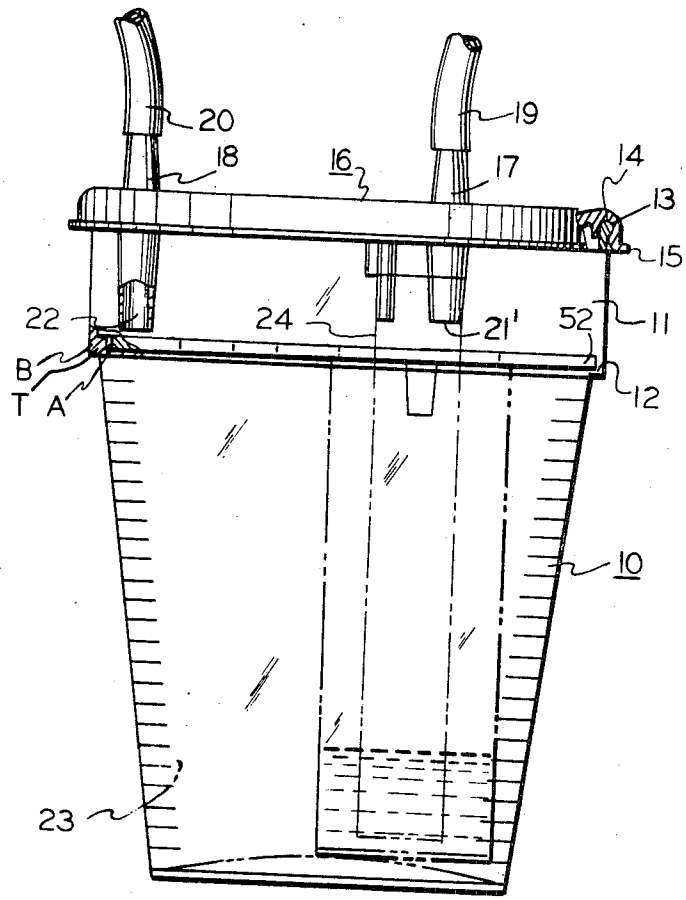
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Assistant Examiner—Daniel M. Yasich
Attorney—M. Ralph Shaffer

[57] **ABSTRACT**

A vacuum operated body fluid collection bottle having an insert container of receptacle which is calibrated to receive accurately measurable, small quantities of body fluid collected within the bottle. Such insert includes overflow means whereby quantities in excess of a predetermined amount can overflow into the interior of the outside container. The insert container, in a preferred form of the invention, is positioned by means of a flange disposed against a shoulder provided within the interior of the bottle. Both outside and interior containers are uniquely calibrated to satisfy a variety of conditions. An anti-splash tube is incorporated and uniquely positioned within the bottle construction and is appropriately spaced from the lid thereof to provide for a free exhaust of air and hence a creation of reduced pressure conditions proximate the liquid inlet of the bottle.

4 Claims, 3 Drawing Figures



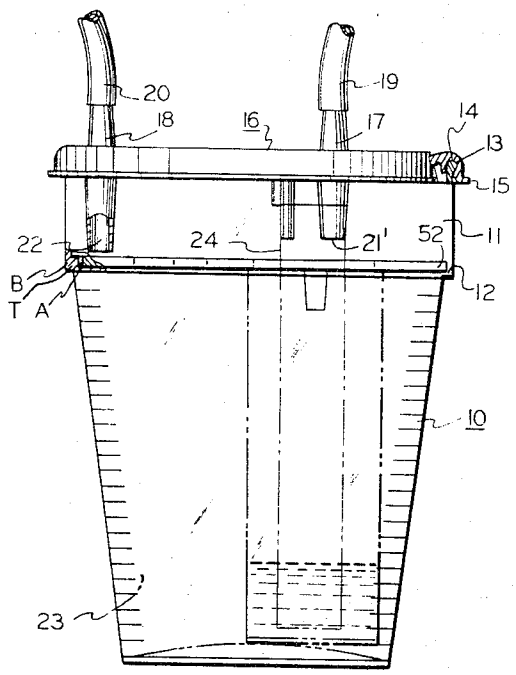


FIG 1

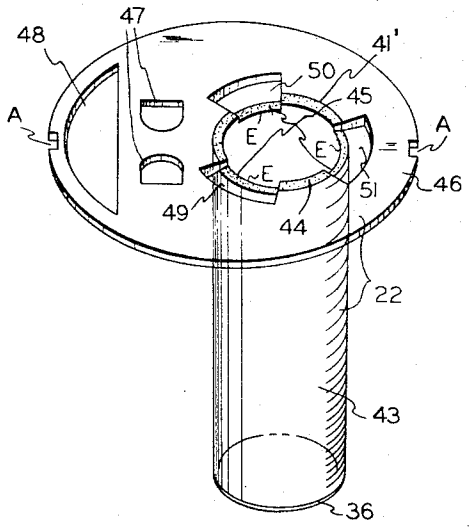


FIG. 3

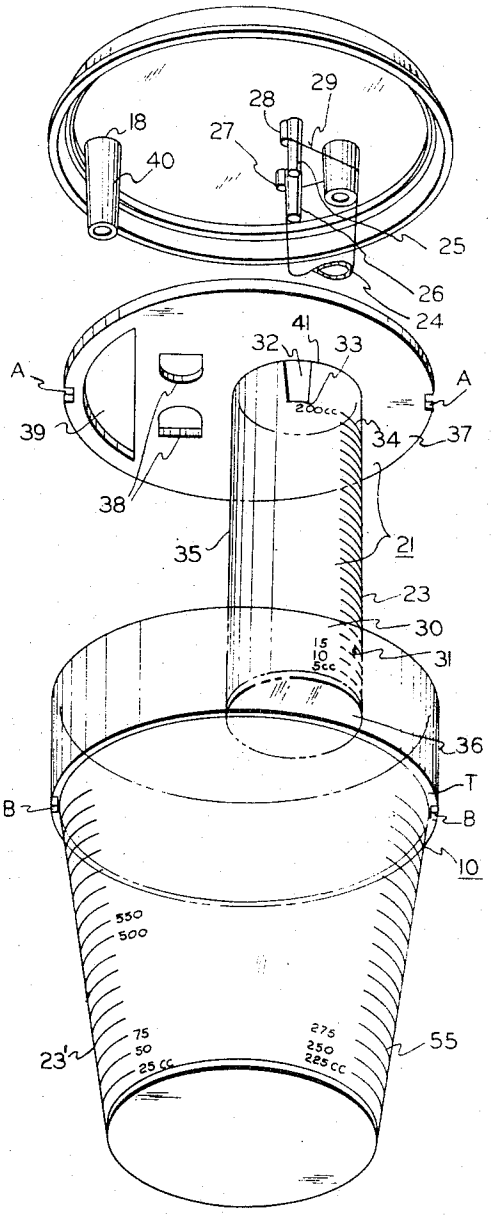


FIG. 2

BODY FLUID COLLECTION BOTTLE

This is a continuation in part of a co-pending application entitled IMPROVEMENTS IN BODY FLUID COLLECTION BOTTLE, Ser. No. 85,075, filed Oct. 29, 1970, and now U.S. Pat. No. 3,699,815.

The present invention relates to vacuum operated bottles used in hospitals and the like, which bottles are used for collecting body fluid such as blood from a patient during or after surgery. The bottle construction of the present nature is particularly suited for collecting and measuring with a high degree of accuracy, small amounts of aspirated body fluid from all types of patients, and especially infants, where the same is taken during instance of pediatric surgery.

In the past body fluid collection bottles have appeared on the market in a limited number of designs. Those bottle constructions of which the applicant is aware are generally suitable for collecting very large amounts of body fluid such as in connection with abdominal surgery for adult patients. A distinct need is present in the marketplace for providing a bottle that can either be used to collect large amounts of body fluid, i.e., from 200 cc to 1,000 cc quantities, but also can be used to collect and accurately measure very small amounts of body fluid such as that anticipated during periods of surgery, especially pediatric surgery. For surgery in connection with infants, it is very important to determine with great care and accuracy the amount of body fluid, e.g., blood, which is taken from a young child; this quantity of fluid must be predetermined and returned in identical amounts as by transfusion or other means. To date no bottle is available, to the applicant's knowledge, which is suitable for fine measurement use.

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

A further object of the invention is to provide a new and improved body fluid collection bottle having a selectively removable container insert, such insert being designed to receive small amounts of fluid introduced into the bottle construction.

An additional object is to provide for a body fluid collection bottle an insert comprising a calibrated container and flange, the flange being designed for support by the interior of the bottle construction concerned.

A further object of the invention is to provide a bottle construction having an outside container and an interiorly disposed, selectively removable inside container, both containers being calibrated such that if only the inside container is used, body fluid collected therein can accurately be measured, whereas if there is overflow, or if the insert is previously removed, then additional accurate respective readings can be taken.

An additional object is to provide a body fluid collection bottle having an anti-splash device usable as an introduction means leading into the fine-measurement portion of the container, and also to prevent blood or other body fluid from foaming at the bottom of the bottle construction, such anti-splash device being spaced from the lid of the bottle construction to provide for reduced pressure conditions at the fluid inlet.

An additional object is to provide a bottle construction having an interior container wherein reduced pressure conditions can be maintained both within and outside of the interior container when disposed within the bottle.

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 drawing in which:

FIG. 1 is a front elevation of a body fluid collection bottle constructed in accordance with the principles of the present invention, and illusrates one embodiment thereof.

FIG. 2 is an exploded view of the construction shown in FIG. 1, the anti-splash device being illustrated in fragmentary view.

FIG. 3 is a perspective view of the interior container member of the bottle construction in a second embodiment thereof.

In FIGS. 1 and 2 the container **10** is provided with an enlarged, cylindrical, upper margin **11** defining an upwardly facing, interior shoulder **12** at transverse offset T. A downwardly facing shoulder S is likewise formed thereby. A bead **13** is likewise provided, which bead snaps into bead recess **14** associated with the lip **15** of lid **16.** Lid **16** is provided with fluid inlet port **17** and vacuum port **18,** both of which proceed completely through the generally horizontal configuration of the lid so that their opposite extremities appear on opposite sides of the lid, as indicated. The upper extremities of fluid inlet port **17** and vacuum port **18** are tapered in the usual manner to accommodate a pressed or other fitting thereto of fluid inlet conduit **19** and vacuum conduit **20** in the customary manner. Conduit **19** and **20** provide communication by openings **21'** and **22'** into the interior **23** of container **10.**

The lid is designed so as to effect a vacuum seal between the groove surface of groove **14** and the surface of bead **13,** so that upon the application of reduced pressure, as by means of a vacuum pump relative to vacuum conduit **20,** then an area of reduced pressure will be present inside the container at **23** so as to cause aspiration body fluid to proceed from the operating area of the patient through inlet conduit **19,** downwardly through opening **21'** into the interior **23** of the container **10.** For convenience of illustration, the connection of the vacuum pump to vacuum conduit **20** and also the end fitting fluid inlet conduit **19** at the patient's operative area are not shown.

In the absence of the inclusion of an inner member such as inner member **21,** having graduation indicia **23** or inner member **22** of FIGS. **2** and **3,** then the "open container" graduations **23'** will be utilized to "read" the amount of fluid collected by the container **10.** These graduations, if desired, can be made in increments of 25 cc up to a fluid level of 500 cc, and thereafter in graduation spacings of 50 cc.

Accordingly, in the absence of the inclusion of inner member **21** or **22,** see in FIGS. **2** and **3,** within the container **10** of FIG. **1,** then a vacuum produced via vacuum conduit **20** will cause aspirated body fluid to proceed up the inlet fluid conduit **19** from the patient area and advance through the lid **16** into the interior **23** of container **10.** Special note is to be made that in a highly preferred form of the invention, there will be included a very thin-walled, flexible plastic casing or tube **24**

through which the body fluid proceeds. This is to prevent a foaming of body fluid at the bottom area of the container, so as to facilitate correct reading of the contents of the container at all times during the operation period. Casing **24** is accommodated as to placement by prongs **25** and **26**, see FIG. **2**, which prongs include integral spacer bosses **27** and **28**. The purpose for these spacer bosses is to delimit the upward advance of casing **24**, so that a space **29** is maintained over the column of fluid rising upwardly in casing **24**. This preserves the evacuated condition proximate the end of opening **21'** relative to fluid inlet port **17** so as to insure proper operation of the device, including the precluding of "siphoning-back" to the patient area.

As to a preferred construction a heat weld may be performed at one or all of the prongs **25, 26** and fluid inlet port **17** to insure that the casing **24** retains its spacing (**29**) from the lid and serves as an anti-splash element.

In certain types of operation procedures, and especially for pediatric work, there is required an exact measurement of body fluid withdraw from the infant patient, even though such fluids may be in very small amounts. For this purpose the iner member **21** is provided. The same includes inner container **30** provided with pediatric or fine graduations **31**. These are preferably of the order of from 5 cc to 200 cc, in 5 cc increments.

The inner container **30** of inner member **21** (in FIG. **2**) is shown to be provided with an overflow aperture **32**. The overflow aperture may take the form of a slit, as seen in FIG. **2**, the bottom **33** of which is aligned with the 200 cc marking at **34**. Accordingly, any blood or body fluid proceeding upwardly will immediately spill over the bottom edge **33** into the area outside of inner container **30** but yet within the overall container **10**.

To complete the inner container construction, there may be provided the graduated cylinder **35** a bottom disk **36** cemented to the same, or otherwise made integral therewith, so as to provide a bottom-enclosed container.

The inner member **21** also preferably includes an upper portion, here a flange **37** preferably provided with thumb-and-finger apertures **38** and also, insert-alignment, keying notches A registering with outer container protrusions B, and, in addition, access aperture **39** to accommodate selective insertion therethrough of the lower portion **40** of vacuum port **18**. In the event that the depending portion **40** of vacuum port **18** is not unduly long relative to the spacing of the upper flange from the lid, then the access opening **39** may not be needed since air can be exhausted through the thumb-and-finger apertures.

As to construction (see FIG. **2**) the inner container **30** is merely pressed into annular opening **41**. Optionally, the same may be glued into place, of course, or the entire unit may be molded as an integral part, relative to inner member **21**.

An alternate form of an inner member **21** is shown in FIG. **3** wherein the inner member **22** is at this time provided with an inner container **43**, similar to inner container **30** in FIG. **2**. Inner container **43** is closed at the bottom either by an independent disk **36** or otherwise, and at its upper extremity **44** the same includes a plurality of indentations **45** which are mutually spaced as indicated. Correspondingly, a flange **46** is provided with the thumb-and-finger apertures **47**, access opening **48**, and press-fit aperture **41'** corresponding to apertures **38, 39**, and **41** in FIG. **2**. In the FIG. **3** embodiment the flange **46** likewise includes mutually spaced openings **49–51** which serve as overflow openings relative to body fluid proceeding upwardly relative to the container so as to spill over the edges E forming indentations **45**, through the openings **49–51** into the interior **23** of the overall large container **10**.

When an inner member is disposed within the container **10**, then, in a preferred form of the invention the flange **37** will rest about its outer lower margin **52**, see FIG. **1**, upon the upwardly facing interior shoulder **12** of container **10**. Accordingly, body fluid entering flid inlet conduit **19** and being drawn upwardly by virtue of the reduced pressure area at **23**, as before explained, will proceed down fluid inlet port **17** and through casing **24** into the lower portion of inner container **30** of inner member **21**. Fluid will rise in inner container **30**, both interiorly and exteriorly of the casing **24**, proceeding upwardly until either the flow of fluid up inlet conduit **19** stops, through cessation of the operation, or until the body fluid spills over either aperture base **33** (see FIG. **2**) or spills over the upper edges E and the indentation **45** in FIG. **3**.

It will be seen that for small withdrawals of body fluid there will be present a very accurate measurement of the body fluid within nner container **30**, or inner container **43** in FIG. **3**. This will be especially desirable for pediatric use where, as it is seen, a general container may accommodate the insert, e.g., inner member **21**, to provide for very accurate measurements of small quantities of blood or other body fluid.

Note is to be made relative to FIG. **2** that a reduced pressure area is present at the discharge end of fluid inlet **17** by virtue of either thumb-and-finger apertures **38**, access opening **39**, or both. The same likewise applies relative to FIG. **3** embodiment as to inner member **22**.

In the event that the supply of body fluid withdrawn exceeds the capacity of inner container **30** relative to FIG. **2**, then the blood or body fluid will spill over aperture base **33** to rise within the general overall container **10**, at the inner area thereof exterior of inner container **30**. Accordingly, "overflow" graduations **55** may be supplied on the exterior or even interior of the side wall surface of container **10** in FIG. **2** so that one may know the total body fluid withdrawn, i.e., the body fluid contained in inner container **30** plus the overflow fluid residing in container **10** exterior of container **30**. The same will likewise apply relative to the insert or inner member **22** of FIG. **3**.

When the insert or inner member is withdrawn, then the general, "open container" graduations **23'** will be used to measure accurately the blood or body fluid contained in the container.

It is thus seen that the container of the present invention with its accompanying insert or "inner member," is very versatile in use for affording both reception and also accurate measurement of very small or even relatively large collections of blood or other body fluid from a patient. In the insert the construction supplies a means for ascertaining an accurate reading of body fluid in pediatric quantities, whereas the two sets of graduations **23'** and **55** of the outer container **10** provide for both "open container" fluid measurement and

also an insert-provided container as to measurement for overflow conditions.

All parts described herein are preferably made of a transparent plastic such as polyethylene, so that visual readings of fluid levels can be made.

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 in its broader aspects.

I claim:

1. A vacuum-operated body fluid collection bottle including, in combination, an outer container, an inner container means, said inner container means being detachably mounted inside said outer container, a lid secured to said outer container and having a vacuum port and also a fluid inlet port communicating with the interior of said container, an anti-splash tubular element aligned with said fluid inlet port and depending with respect thereto, and means on said container means for spacedly mounting said anti-splash tubular element inside with respect to said lid, whereby to translate the vacuum condition of said outer container over and into the interior of said anti-splash tubular element, said fluid inlet port, said anti-splash tubular element, and said spacedly mounting means being mutually constructed and arranged with respect to each other to provide an air-passageway between said fluid inlet port and said anti-splash tubular element to effect such translation.

2. Structure according to claim **1** wherein said lid has a pair of depending prongs comprising said spacedly mounting means, said prongs and fluid inlet port being arranged in triangular relationship, said anti-splash element being disposed over said prongs and said fluid inlet port and enjoying a spaced relationship relative to the remainder of said lid.

3. Structure according to claim **2** wherein said prongs include individual boss means for abutting said anti-splash element to thereby space the same from the remainder of said lid.

4. A body fluid collection bottle including, in combination, an outer container, an inner container means, said inner container means being detachably mounted inside said outer container, a lid secured to said outer container and having a vacuum port and also a fluid inlet port communicating with the interior of said container, a tubular anti-splash element mounted inside said inner container means and spacedly depending from said lid and being in alignment with said fluid inlet port, means affixed to the combination of said outer container and said lid and engaging said anti-splash element for so supporting said anti-splash element inside said inner container means, said anti-splash element and said fluid inlet port being mutually constructed and arranged with respect to each other to provide an air passageway therebetween and over said anti-splash element such that ambient gaseous reduced-pressure conditions of the interior of said outer container are translated to the interior of said anti-splash element beneath said fluid inlet port.

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