United States Patent [19]

Holbrook et al.

[11] **3,742,934**

[45] **July 3, 1973**

[54] **BODY FLUID COLLECTION BOTTLE FOR PEDIATRIC USE**

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[73] Assignee: **Medical Development Corporation,** Salt Lake City, Utah

[22] Filed: **Aug. 12, 1971**

[21] Appl. No.: **171,294**

Related U.S. Application Data

[63] Continuation of Ser. No. 859,849, Sept. 22, 1969, abandoned.

[52] **U.S. Cl.** ..... **128/2 F,** 128/272, 73/427

[51] **Int. Cl.** **A61b 5/00**

[58] **Field of Search** ..... 128/2 F, 275, 294, 128/295, 276; 150/0.5; 215/1 C, 1.5, 6, 7, 10; 73/426–428, 171; 222/566; 206/47 B

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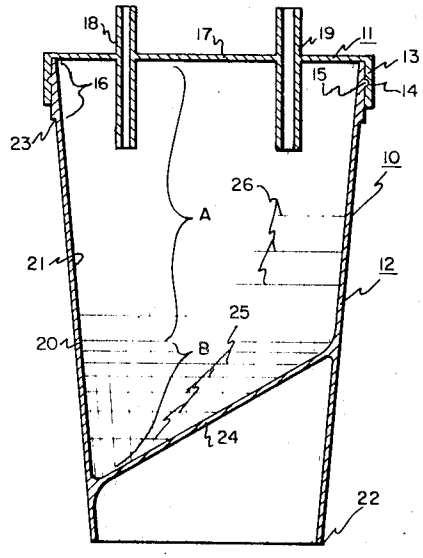
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[57] **ABSTRACT**

The present invention comprises a body fluid collection bottle construction wherein the container portion thereof is provided with fluid constraining means, this to provide a container area of reduced transverse cross-section such that an initial filling of the lower portion of the container, even as to introduction of small quantities of liquid, will result in a rapid rise in the fluid level. In such event, and with the employment of appropriate graduation indicia, small amounts of fluid initially introduced into the bottle may be very accurately measured. Above the lowermost, fluid constraining portion of the bottle construction, the introduction of progressively larger amounts of liquid will produce a reduced vertical rise in the fluid level of the upper portion of the bottle construction.

1 Claim, 5 Drawing Figures



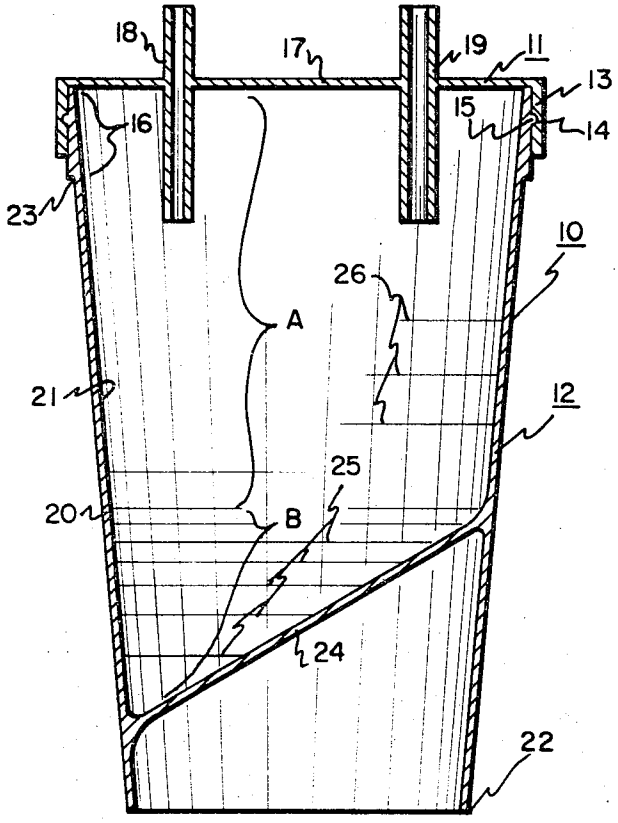


FIG. 1

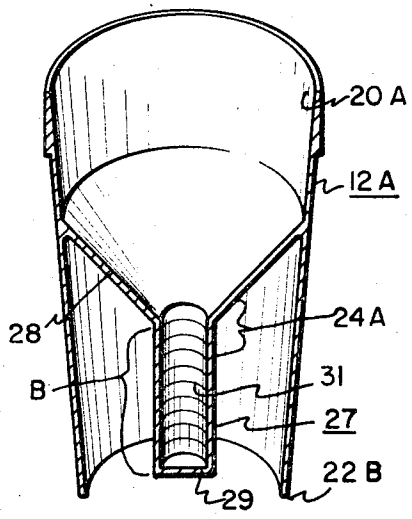


FIG. 2

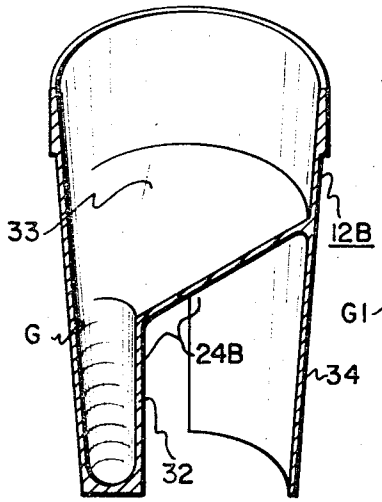


FIG. 3

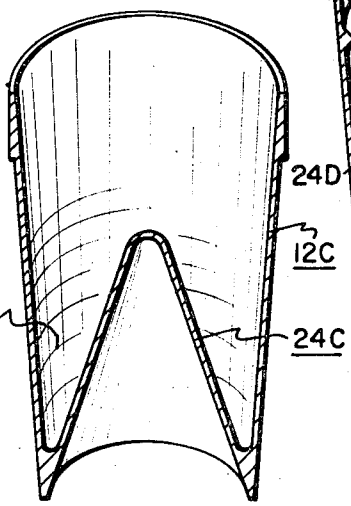


FIG. 4

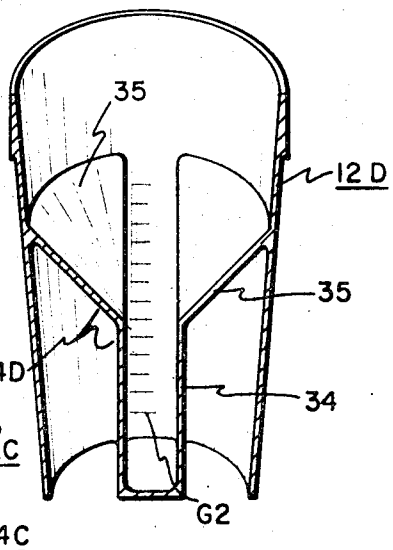


FIG. 5

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BODY FLUID COLLECTION BOTTLE FOR PEDIATRIC USE

This is a continuation of the inventors' prior, pending application entitled "Body Fluid Collection Bottle for Pediatric Use," Ser. No. 859,849, filed Sept. 22, 1969, to be abandoned.

The present invention relates to body fluid collection bottles and, more particularly, to a new and improved bottle which may be used in hospitals for pediatric cases as well as for child and adult patients.

In the past a number of different types of vacuum-operated body fluid collection bottles have been devised. Not known heretofore are bottles which are suitable for pediatric use. It is well known that for body fluid removal from pediatric cases, i.e., babies, there must be a very accurate measurement of any fluid, such as blood, drained from the operative area of the small child. The purpose for this is so that if blood is withdrawn from the child, an equivalent amount of blood can be replaced into the infant during or following the operation. It is most important to determine accurately the quantity of fluid withdrawn from the operative area, this in order that an identical amount of fluid may be introduced intravenously into the young patient.

Heretofore, the fluid collection bottles have been designed to be useful principally for adults and, when graduated, measure substantially large volumes of liquid in the bottle area. There is no present bottle, to the inventors' knowledge, which is useable both for pediatric patients as well as for adult patients.

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

An additional object is to provide a surgical bottle of the type described which is useable for pediatric cases.

An additional object is to provide a body fluid collection bottle wherein initial quantities of fluid introduced into the bottle may be very accurately measured.

A further object is to provide a body fluid collection bottle which fills rapidly as to vertical height displacement on introduction of initial quantities of fluid and, thereafter, fills more slowly as progressively increasing amounts of fluid are introduced into the bottle.

According to the present invention, the bottle construction in a preferred form of the invention includes a container having a fluid constraining means. Such fluid constraining means is configured and oriented so that a rapid vertical rise of the fluid level in the bottle is experienced even though small quantities of fluid are initially introduced into the bottle. Above the general, fluid-constraining means the container will open into an enlarged area such that further introduction of liquid will fill such container more slowly. The fluid-constraining means as further illustrated in the invention may take many forms such as an angulated partition, a graduated cylinder, an inverted cone, and so forth.

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 an enlarged side elevation, principally taken along a vertical transverse plane, of a body fluid collection bottle incorporating the features of the present invention in one form thereof.

FIGS. 2–5 are similar to FIG. 1, with the cover of the bottle being omitted for purposes of clarity and illustrate in reduced scale additional embodiments of the invention wherein the fluid-constraining means is constructed to provide for a rapid rise of fluid level within the container upon initial introduction of fluid therein.

In FIG. 1, body fluid collection bottle **10** is shown to include a cover **11** and also a container **12.** Cover **11** is preferably made of a slightly flexible material such as a suitable grade of polyethylene, polystyrene or polyurethane. In such event the depending lip **13** of cover **11** may include an interior annular groove **14** which may be pressed over annular bead **15** on the upper lip margin **16** of container **12.** Top **17** of cover **11** is provided with vacuum port **18** and fluid admittance port **19.** Vacuum port **18** is constructed for connection to a vacuum pump, whereas the fluid admittance port will be provided with tubular means constructed for proximate disposition, at its receiving end, at an operative or other area of a patient, which area is to be drained of fluid.

In the construction shown, and relative to the releasable engagement of cover **11** of container **12,** the groove and bead construction, reference numerals **14** and **15,** provide an easy snap-fit engagement of these two members to complete the configuration of bottle **10.**

Container **12** will of course include a peripheral side wall **20** having a side wall interior surface **21.** Side wall **20** depends to its support base **22.** Thus, bottle **10** may be constructed to rest upon solid structure at support base **22** or, in an alternate form of the invention, a depending shoulder **23** may be provided the configuration of container **12.** Equivalent means may also be employed such that, by shoulder **23** or such equivalent means, the container may be supported from a circularly configured wall bracket, by way of example.

Of importance in the present invention is the provision of a fluid-constraining means which in FIG. **1** takes the form of a slanted partition **24.** Either the partition itself or side wall **20** may be provided with mutually spaced graduations **25.** Such graduations are used in order that an observer may visually determine the volume of fluid contained by the bottle at any given time. Close inspection of the bottle of FIG. **1** reveals that there are really two basic interior areas, namely, A and B. Area B is useable to contain and accurately measure initial inflow of body fluid such as blood. Graduations **25** may be very closely spaced or variably spaced, as required and depending upon the particular configuration of the fluid-constraining means **24.**

As thus far described, the fluid collection bottle **10** of FIG. **1** operates as follows. The container **12** and cover **11** will in general be separately packaged in sterile or other desired condition and, immediately preparatory to use, will be snapped or otherwise secured or disposed together in the manner shown in FIG. **1.** Vacuum port **18** will be connected to a suitable vacuum pump and the fluid admittance port will be connected to a hose leading to the patient. The starting of the vacuum pump will lower the gaseous pressure within the interior of container **12** so that fluid subject to gaseous (atmospheric) pressure above that within the container will commence to travel through the hose and enter the container area.

It is noted that the fluid-constraining means or partition 24 is not horizontal but rather, in the form of the invention shown in FIG. 1, is uniformly angulated or flat. This is to provide an interior area B which fills rapidly upon the introduction of small volumes of liquid. Accordingly, there will be a marked vertical rise of fluid within the area B upon the entrance into the bottle of but a small amount of fluid. There are a number of advantages as a consequence thereof. For example, the bottle as shown is very suitable for pediatric use, wherein, for surgery involving infants, the amount of body fluid or blood which is drained from the operative area must be accurately measured even as to minimal amounts, this in order that such blood specific amount may be replaced in the infant's system. Graduation markings 25, which may appear either on the side wall of container 12 or on the fluid-constraining means itself, will be variably spaced as indicated for measuring equivalent amounts of liquid in area B. It is noted that the fluid-constraining means 24 satisfies requirement of preserving the essentially cylindrical configuration of the container, with or without a slight taper, and yet provide at a bottom area thereof a rapid rise of fluid level for given introduction of small quantities of fluid within the container, and then allowing more normal fluid level rises proximate area B wherein further amounts of blood or other fluid are collected, either from a pediatric patient or an adult.

Where the bottle is to be used both for infants and for older persons, then it is advantageous to supply additional graduations 26 which will measure in increments substantially larger volumes of liquid introduced into the bottle; thus, the bottle is suitable for use not only with infant patients, but with adults as well.

In FIG. 2 container 12A, corresponding to container 12 in FIG. 1, includes a fluid-constraining means 24A a graduated cylinder portion 27 contiguous with a funnel portion 28 and having graduations 31. Funnel portion 28 feathers into the side wall 20A of container 12A. It is noted that the bottom 29 of graduated cylinder portion 27 may be disposed at or above support base 22B of container 12A.

In the embodiments shown in FIGS. 1 and 2, as well as in the remaining embodiments, it is contemplated that the material used will be transparent and clear in order that accurate readings may be made. In the case of FIG. 2, the graduations within graduated cylinder portion 27 may be equally spaced at 31, since this "cylinder" portion is in fact cylindrical. In any event, very small quantities of fluid initially introduced into container 12A may be very easily and accurately measured within the graduated cylinder portion of the container. Thereafter, that is after additional amounts of fluid are introduced above area B, then further graduations may be used to measure substantially larger volumes of fluid or liquid.

In FIG. 3 container 12B includes a graduated cylinder portion 32 which, with funnel portion 33, forms a fluid-constraining means 24B. Accordingly, an initial introduction of fluid or liquid will flow into the graduated cylinder portion 32, the same being conveniently graduated at G1 for rapid reading thereof by medical personnel.

Where graduated cylinder portion 32 forms a leg, then an additional support 34 may be provided in the container construction and depend from the remainder of the container construction in the manner illustrated in FIG. 3.

In FIG. 4, fluid container 12C is indented at opposite extremities to form a fluid-constraining means; the fluid-constraining means takes the form of an inverted cone 24C, formed as a partition by and between representative container indentations C and D. It is noted that by virtue of graduations G1, very small amounts of fluid initially introduced into the container may be accurately measured. Graduations G1, for equivalent volumes will progressively decrease in spacing as one advances upwardly, and that above the cone area there will be normal measurements of increased quantities of fluid introduced into the container, i.e., 12C.

In FIG. 5, a graduated chamber or cylinder portion 34 combines with funnel portions 35 in forming a fluid-constraining means 24D for container 12D. It is noted that the graduated cylinder portion 34 will be filled first and that suitable graduations at G2 may be used to measure initial amounts of fluid introduced in the container.

Funnel portion 35 of course serves as a means for introducing fluid into the graduated chamber 34 of container 12D of FIG. 5. It is noted that the chamber, which may be cylindrical as seen in FIG. 2, may also be slotlike or rectangular, as desired.

What is provided, hence, is a body fluid collection bottle which incorporates fluid-constraining means such that initial introductions of fluid or liquid within the container of the bottle construction can be accurately measured, even as to minute amounts. Above the fluid-constraining means there may be provided graduations for measuring substantially larger quantities of fluid or liquid.

It is noted that all of the containers shown in FIGS. 1–5 may be easily molded by mold halves both of which have positive portions. The invention may take any one of several forms of course, subject to imposition of the conceptual restriction that a lowermost portion of the container, fills rapidly upon introduction of small quantities of initial fluid and, thereafter, fills more slowly. At least that portion of the container which fills rapidly, initially, will be graduated with appropriate small incremental markings representative of small incremental fluid level displacements correspondingly to small increases in volume. The container will preferably include additional graduation markings measuring larger quantities of fluid above the fluid-constraining area of the container.

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.

We claim:

1. A surgical fluid collection bottle for pediatric use and including, in combination, structure defining a fluid enclosure and comprising a container having a support base, a transparent side wall, and an upper lip margin, a cover constructed for releasable securement to said upper lip margin, said cover being so releasably secured to said upper lip margin, said cover including mutually spaced vacuum pump operated vacuum port means and fluid inlet port means depending beneath said cover within said container and communicating with the interior thereof, said container including a uniformly angulated non-horizontal uni-cavity-forming

body-fluid partition spanning the cross-sectional interior of said container and disposed beneath both of said port means and above said support base, for increasing fluid-level displacement for a given deposit volume proximate said partition in a constricted lower volume area bounded by said partition and a peripheral sector of said side wall relative to that displacement occurring for an equivalent volume disposed in an upper volume area situated above said lower volume area and formed by said side wall above said sector, said structure also including mutually, vertically spaced graduation indicia disposed on said side wall of said container proximate said partition.

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