United States Patent

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[54] **PEDIATRIC DRAINAGE UNIT**
14 Claims, 3 Drawing Figs.

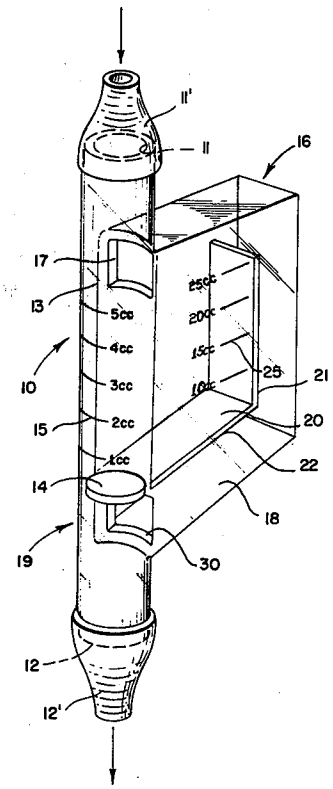
[52] **U.S. Cl.** **128/276**
[51] **Int. Cl.** **A61f 5/44**
[50] **Field of Search** 128/2, 295, 275, 213, 276, 277

[56] **References Cited**
UNITED STATES PATENTS

3,279,467	10/1966	Hofstra et al.	128/276
3,363,626	1/1968	Bidwell et al.	128/276
3,381,687	5/1968	Anderson et al.	138/276

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ABSTRACT: A pediatric drainage unit constituted by a one-piece integral unit having an inlet, an outlet, and a small collection chamber for receiving liquids entering the inlet, the chamber being calibrated in one cubic centimeter increments. A large reservoir is positioned adjacent the chamber for receiving the overflow therefrom, and a channel is provided from the top of the chamber, across the top of the reservoir and down around the reservoir to the outlet, the channel being adapted to pass to the outlet all of the gases entering the inlet and the liquid overflowing from the reservoir.



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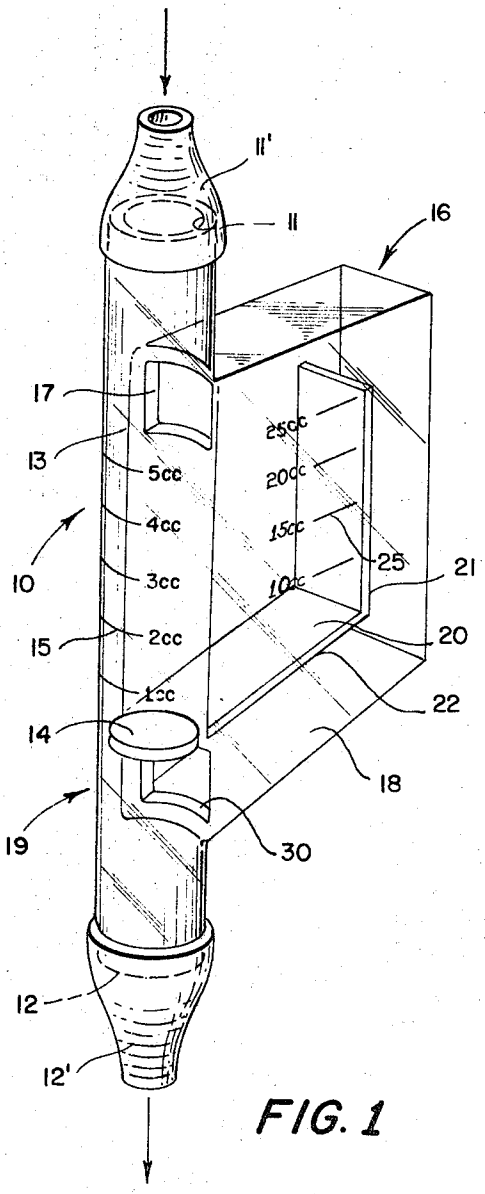


FIG. 1

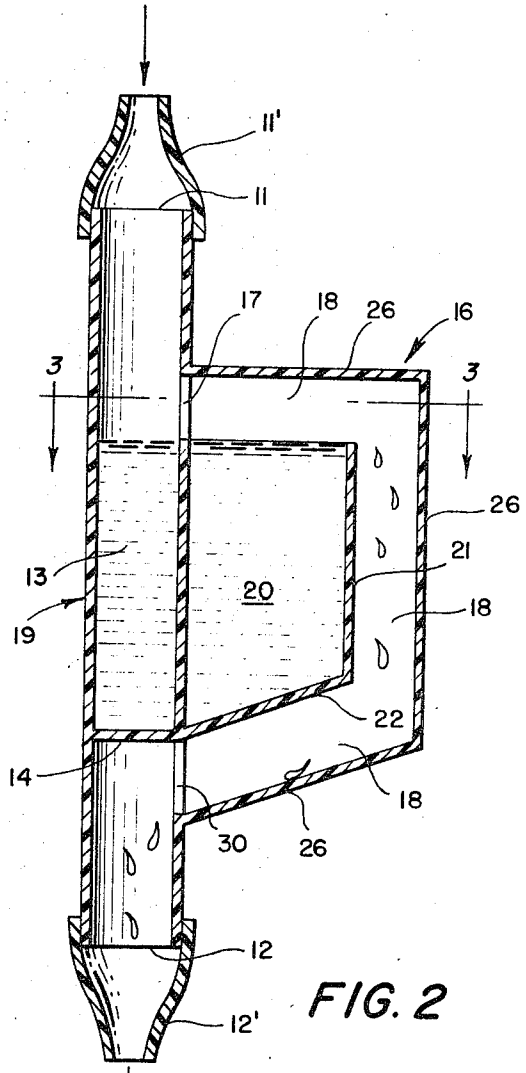


FIG. 2

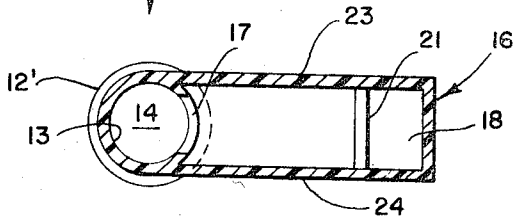


FIG. 3

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PEDIATRIC DRAINAGE UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to medical equipment, and in particular it relates to a pediatric unit for use with drainage apparatus.

2. Environment of the Invention

It is often necessary to drain fluid from body cavities such as the pleural cavity, the visceral cavities, etc. Apparatus for performing this function is shown in the Bidwell et al. U.S. Pat. Nos. 3,363,626 and 3,363,627, both issued Jan. 16, 1968.

However, special problems arise when dealing with infants. Here, it is necessary to have measurements of the fluids which drain from the cavity in 1 cubic centimeter (1 cc.) increments. In infants of 6 or 7 pounds, a loss of 5 cc. would usually require a transfusion.

3. Description of the Prior Art

A presently known pediatric unit is a cylindrical bottle adapted to be mounted between a cavity being drained and a main collection bottle and calibrated in increments of 5 cc. or 10 cc. and including a system of openable and closable valves for selectively holding the collected fluid in the cylindrical bottle and subsequently releasing the liquid to a main collection chamber. However, the use of openable and closable valves creates the problem that it may be necessary to temporarily stop the drainage and this can injure the patient by having the effect of a clamp on the drainage system.

SUMMARY OF THE INVENTION

Thus, the purpose of the present invention is to provide a new and improved pediatric drainage unit.

According to the present invention there is provided an integral pediatric drainage unit including an inlet adapted to be connected to a cavity to be drained and an outlet adapted to be placed in fluid communication with a vacuum source. Normally the outlet will be connected to the inlet end of a conventional drainage apparatus. Thus, the present invention may serve as an attachment for use with a conventional drainage apparatus.

The unit includes a relatively small collection chamber, preferably calibrated in increments of one cubic centimeter, for receiving liquids that enter the inlet. A substantially larger reservoir is positioned immediately adjacent the chamber for receiving fluids which overflow from the said relatively small chamber. A gas flow channel extends above the chamber and the reservoir, and around the reservoir to the said outlet. This channel permits a continuous flow of the gases entering the inlet around the chamber and the reservoir and through the outlet.

Certain design considerations render the device both simple and convenient. The unit may be entirely preformed as a one-piece unit. There are no external connections other than the inlet and outlet openings. The device is operated simply by attaching the inlet to a tube leading to the cavity and by connecting the outlet to a tube in fluid communication with a vacuum source. Any suitable material may be employed. However, it is preferable to employ a transparent material so that the liquid level in the chamber and in the reservoir can be observed directly and immediately read with the aid of the calibrations on the side of the chamber and on the side of the reservoir. Further, it may be preferable to construct the unit with the entire reservoir and channel positioned on one and the same side of the chamber. This leaves the space on the other side of the chamber free for tubing which may be in the area. Moreover, the arrangement has a relatively low profile thereby facilitating installation of the unit in a relatively small space.

Thus, the arrangement is such that it may be rendered operative simply by attaching the inlet and outlet openings to their respective tubes.

Thus, it is an object of this invention to provide a new and improved pediatric drainage unit.

It is another object of this invention to provide a pediatric drainage unit having a collection chamber calibrated in increments of one cubic centimeter.

It is still another object of this invention to provide a pediatric drainage unit of compact integral construction having a first relatively small collection chamber, a reservoir adjacent thereto and a continuously open channel leading from the inlet around the chamber and around the reservoir to the outlet.

It is still another object of this invention to provide a pediatric drainage unit of integral compact construction having a collection chamber, a reservoir and a continuously open channel, whereby gases entering the inlet flow through the channel to the outlet and liquid entering the inlet flows into the relatively small collection chamber.

Other objects and the attendant advantages of the present invention will become apparent from the detailed description to follow together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

There follows a detailed description of a preferred embodiment of the present invention to be read together with the accompanying drawings. However, it is to be understood that the detailed description and the drawings are provided for purposes of illustrating the preferred embodiment, and that the invention is capable of numerous modifications and variations apparent to those skilled in the art without departing from the spirit and scope of the invention.

In the drawings:

FIG. 1 is a perspective view of a pediatric drainage unit constructed in accordance with the present invention.

FIG. 2 is a sectional view taken along the center plane of the unit as shown in FIG. 1 and illustrating liquid being collected by the chamber and the reservoir.

FIG. 3 is a sectional view of the pediatric drainage unit taken along line 3–3 of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Like numerals are employed to indicate like parts throughout the specification.

Referring to the drawings, the pediatric unit **10** includes a tubular portion **19** at one side thereof having an inlet opening **11** and an outlet opening **12**. As shown, these are tubular openings of constant cross section provided with tube adapters **11'** and **12'**. Alternatively, however, the ends of openings **11** and **12** may be formed in the shape of adapters. Preferably, the unit will be formed of a transparent material so that the liquid collecting therein and flowing therethrough can be readily observed.

Also formed in the elongated tubular portion of the unit is a relatively small collection chamber **13** having a diaphragm **14** completely closing the bottom thereof and including calibrations **15** formed thereon in increments of 1 cubic centimeter.

The unit includes a laterally extending portion **16** in continuous fluid communication with the upper end of the tubular portion **19** above the collection chamber **13** through opening **17** and in continuous fluid communication with the lower end of tubular portion **19** adjacent outlet **12** through opening **30**. A continuously open channel **18** is formed between said openings **17** and **30**. The portion **16** is enclosed by a pair of sidewalls **23** and **24**, and a peripheral wall **26** engaging tubular portion **19** above opening **17** and below opening **30**. A reservoir **20** is formed in the laterally extending portion **16** by sidewalls **23** and **24**, a vertical partition **21**, the side of tubular portion **19** and a bottom partition **22**. The reservoir **20** is arranged to receive overflow fluid from the chamber **13** passing through the opening **17**. This reservoir **20** is considerably larger than chamber **13** and it includes calibrations **25**, preferably in increments of 5 cc. Overflow fluid from this reservoir **20** passes into the channel **18** and hence through opening **30** to outlet **12**.

In operation the opening 11 is connected to a tube leading to the cavity to be drained. The opening 12 is then connected to the trap chamber of a conventional vacuum operated drainage device. Fluid from the cavity is then drawn into the inlet 11, the liquid collecting in chamber 13 and the gases passing through opening 17 and through the channel 18 to the outlet 12 and hence to the collection chamber of the conventional drainage apparatus.

The calibrations 15 then clearly indicate the cubic centimeters collected in chamber 13. After this chamber has been filled, additional fluid flows into the reservoir 20 and the amount in reservoir 20 is determined by observing calibrations 25. Thus, a fine reading in terms of single cubic centimeters is provided for the first few cubic centimeters to be collected. Subsequently, it is sufficient to measure the collected liquid in increments of 5 cc.

FIG. 2 illustrates the condition of the pediatric unit during operation after both the chamber 13 and the reservoir 20 have been completely filled. Additional fluid flows over the partition 21 and through the channel 18 to the outlet 21. Thus, the gas flow channel 18 remains open continuously throughout the liquid collection stage and also after the unit has collected its full capacity of liquid so that at no time during the operation of the device is it necessary to stop drainage.

The overall arrangement of the device provides advantages in both the manufacturing and operation of the device. The device is preformed and it may be moulded in one piece or in a plurality of pieces which are subsequently assembled to form the finished unit.

Also, it is advantageous to have the portion 16 extending only to one side of the portion 19 thereby providing an eccentric arrangement which leaves the other side of portion 19 open for any tubing which may be in the area. Further, by making the reservoir 20 wider than the chamber 13 it is possible to extend the portion 16 laterally thereby providing a low profile so that the device takes up a minimum amount of vertical space.

Although the invention has been described in considerable detail with respect to a preferred embodiment, it should be apparent that the invention is capable of numerous modifications and variations apparent to those skilled in the art without departing from the spirit and scope of the invention as defined in the claims.

We claim:

1. A pediatric drainage device for receiving fluids from a cavity being drained by a vacuum source comprising: an integral housing unit having an inlet adapted to be placed in fluid communication with the cavity being drained and an outlet adapted to be placed in fluid communication with the vacuum source, an elongated chamber of relatively small cross section formed internally within the housing and positioned for receiving liquid entering the inlet, and a bypass channel communicating at one end with the upper end of said chamber and extending downwardly about said chamber and in fluid communication at its other end with said outlet, whereby gases entering the inlet flow through said channel to the outlet and liquids entering said inlet collect in said chamber until a predetermined quantity has been collected after which the liquids spill over from said chamber and subsequently pass through said channel to said outlet.

2. The device of claim 1 including an enlarged reservoir adjacent said chamber and substantially larger than said chamber for receiving and collecting liquids that spill over from said chamber, and wherein said channel passes over and around said reservoir to said outlet, whereby the liquids which spill over from the reservoir flow into the said channel and to said outlet.

3. The device of claim 2 wherein said inlet and said outlet openings are vertically aligned and wherein said channel extends from its said one end over the top of the reservoir and downwardly adjacent the reservoir and below the reservoir to its said other end.

4. The device of claim 3 wherein the said elongated chamber includes calibrations thereon in increments of 1 cubic centimeter and said chamber is of a sufficiently small cross section so that the said 1 cubic centimeter calibrations are readily distinguishable.

5. The device of claim 4 wherein said reservoir is substantially wider than said chamber and includes calibrations thereon in increments of 5 cubic centimeters to measure the quantity of liquid collected therein.

6. The device of claim 3 wherein the said overall shape of the housing is relatively flat, the width of the reservoir and the width of the channel each being approximately equal to the width of the chamber.

7. The device of claim 1 wherein said inlet and outlet openings are vertically aligned.

8. The device of claim 7 wherein said chamber is vertically aligned with and is located between said inlet and outlet openings.

9. The device of claim 1 wherein said elongated chamber includes calibrations thereon in increments of 1 cubic centimeter, and said chamber is of a sufficiently small cross section so that the said 1 cubic centimeter calibrations are readily distinguishable.

10. A device for collecting and measuring small quantities of liquid being drained from a cavity by a vacuum source comprising, an integral housing unit comprising an inlet for receiving fluids from the cavity and an outlet adapted to be placed in fluid communication with said vacuum source, an elongated chamber positioned to receive liquid entering the inlet, and a channel extending from the top of the chamber to the outlet, said chamber including calibrations thereon in increments of 1 cubic centimeter, and said chamber being of sufficiently small cross section so that the said 1 cubic centimeter calibrations are readily distinguishable.

11. The device of claim 10 including a reservoir adjacent the chamber and substantially larger than said chamber for collecting liquids that spill over from the chamber, and wherein said channel passes over and around said reservoir to receive liquids which spill over from said reservoir, and said reservoir being substantially wider than said chamber and including calibrations thereon in increments greater than 1 cubic centimeter to measure the liquid collected therein.

12. A fluid measuring and collecting device comprising an integral housing unit having:

a. an inlet opening and an outlet opening,

b. an elongated chamber of small cross section located below and aligned with said inlet,

c. an open top reservoir adjacent the chamber and integral therewith such liquid overflowing from the chamber enters the reservoir,

d. and a continuously open channel opening at one end into the top of the chamber, and extending over and around the reservoir and connecting at its other end with said outlet, such that gases may pass continuously from said inlet, through said channel to said outlet and liquid overflowing from the reservoir enters the said channel and flows to said outlet.

13. The device of claim 12 wherein said inlet and outlet openings are vertically aligned.

14. The device of claim 12 wherein said chamber is vertically aligned with and is located between said inlet and outlet openings, and wherein the overall shape of the housing is relatively flat, the width of the reservoir and the width of the channel being approximately equal to the width of the chamber.