

[54] SURGICAL COLLECTION UNIT

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[51] Int. Cl. A61m 1/00

[58] Field of Search 128/275-278

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[57] ABSTRACT

A surgical collection unit includes an inlet conduit, an outlet conduit, and an enclosed container. The inlet and outlet conduits have portions extending within and opening into the container. Means are associated with the outlet conduit for withdrawing air from the container to reduce the atmospheric pressure therein so that fluent material is forced through the inlet conduit into the container. A bypass conduit may be provided between the inlet conduit and the outlet conduit. A valve may be provided for directing the fluent material alternatively either through the bypass valve or into the container.

15 Claims, 6 Drawing Figures

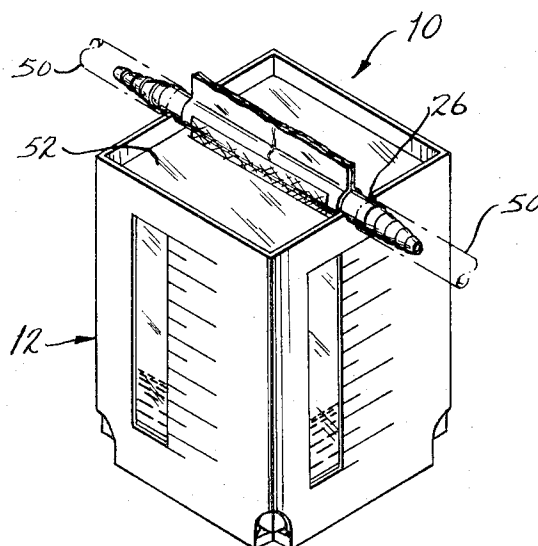


FIG. 1

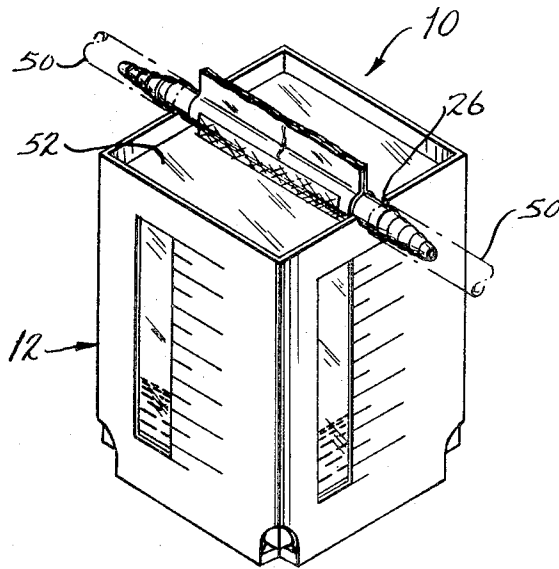


FIG. 2

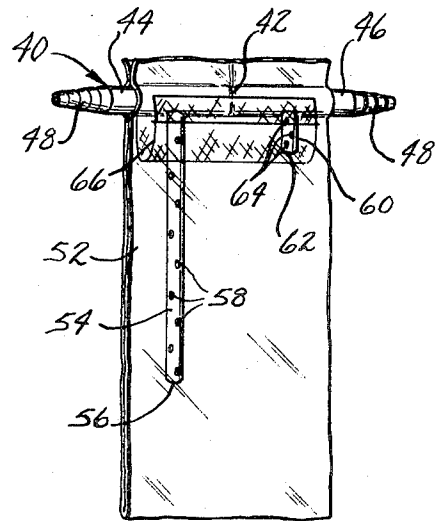


FIG. 3

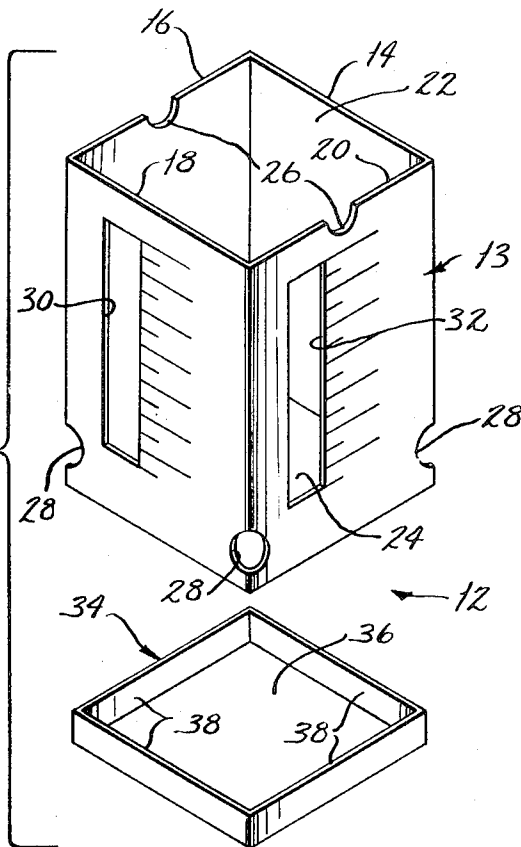
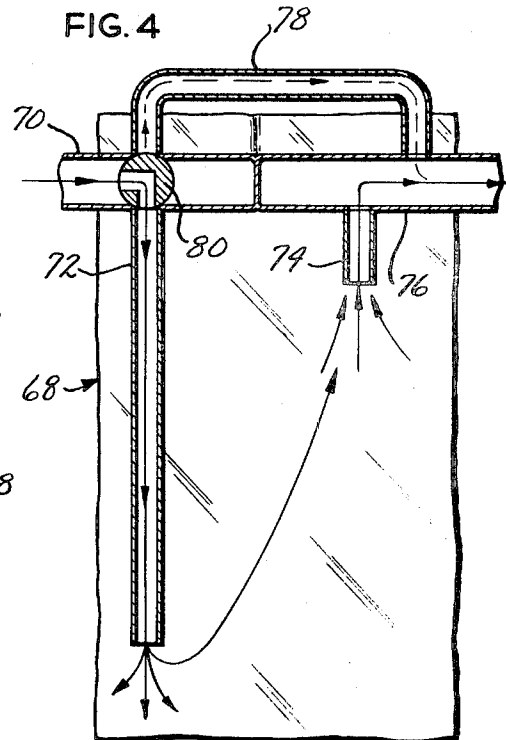


FIG. 4



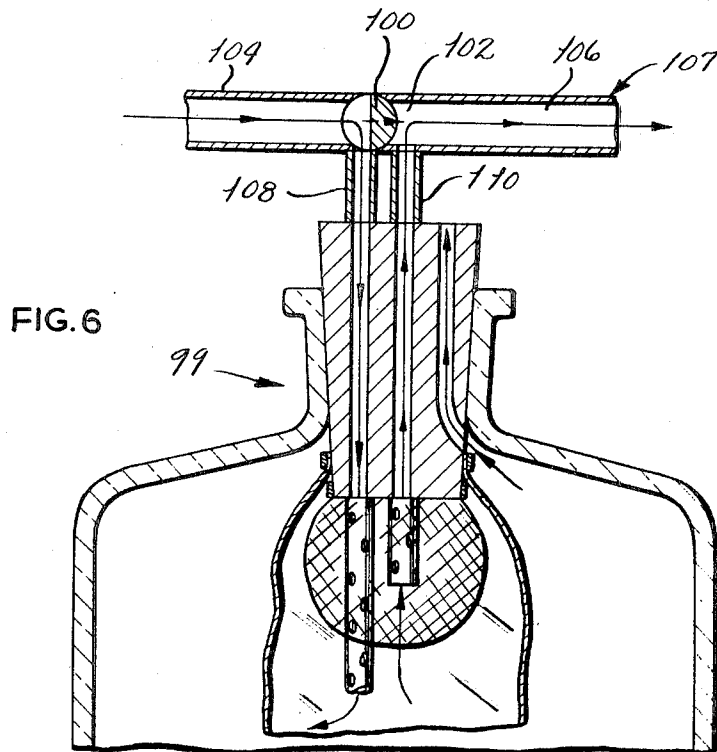
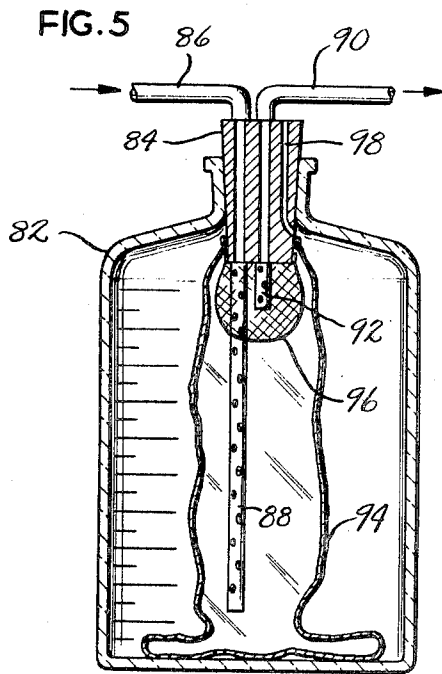
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SURGICAL COLLECTION UNIT

This invention relates to a surgical collection unit.

Surgical collection units are often used during surgery for evacuation of blood, pus, urine and other materials. These materials are collected so that they may be analyzed and measured after the operation. Suction apparatus has been used which includes devices mounted in the line of suction for collecting these materials, but the ones presently being used have many disadvantages. For example they are usually heavy and are not disposable. Because they are used for more than one patient, they must be sterilized in order to prevent contamination between patients. Physicians sometimes want to empty the collection units in the middle of the operation and begin collecting material anew. This is not usually possible with collection units presently known because they cannot be easily emptied in the middle of the operation. Many collection units are made of glass and hence are breakable, thereby creating a safety hazard in the operating room. Because of the great amount of equipment in operating rooms and because of the need for everything to be positioned efficiently, it is desirable to have a collection unit which may be suspended or mounted anywhere in the operating room.

Among the several objects of the present invention may be noted the provision of a surgical collection unit which is disposable; the provision of a surgical collection unit which may be sterilized at the time of manufacture and stored until use; the provision of a surgical collection unit which may be stored in a collapsed state so that it will occupy the smallest possible space; the provision of a surgical collection unit which is inexpensive to manufacture so that it will be economical to dispose of it after its first use; the provision of a surgical collection unit which can be replaced after being used for one patient, thereby eliminating the need for sterilization between patients to prevent cross-contamination; the provision of a surgical collection unit which is not breakable; the provision of a surgical collection unit which may be mounted along a suction conduit anywhere in the line of suction; the provision of a surgical collection unit which may be emptied periodically without being disconnected; and the provision of a surgical collection unit which accurately measures the evacuated materials. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated,

FIG. 1 is a perspective view of the surgical collection unit of this invention;

FIG. 2 is a perspective view of the container for the collection unit;

FIG. 3 is a perspective exploded view of the receptacle for the collection unit;

FIG. 4 is a sectional view of a modification of the surgical collection unit shown in FIGS. 1-3;

FIG. 5 is a sectional view of another modification of the surgical collection unit of this invention; and

FIG. 6 is a partial sectional view of a further modification of the surgical collection unit of this invention.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to FIGS. 1-3, numeral 10 designates a surgical collection unit. A receptacle 12 is formed from a cardboard box 13 having four walls 14, 16, 18, 20, and two open ends 22, 24. A pair of semi-circular notches 26 are provided in the top edges of opposite walls 16, 20. Adjacent the bottom corners of box 13 are four cutouts 28. A pair of longitudinal slots 30, 32, are provided in adjacent walls 18, 20, of box 13. A plurality of indicia are printed on the outer surface of walls 18, 20, adjacent slots 30, 32, to indicate the depth of the materials showing through slots 30, 32. A box bottom 34 includes a floor 36 with four upwardly extending walls 38 along the edges of its periphery.

Before assembly and during storage box 13 is folded to be flat so that it will occupy a minimum of space. To assemble receptacle 12, box 13 is unfolded so that it is in the rectangular shape shown in the drawings. Bottom 34 is slidably inserted within the lower open end 24 of box 13 until its corners protrude outwardly through cutouts 28. The corners of box 13 below cutouts 28 are folded inwardly below the bottom of box bottom 34 so as to retain it in position within box 13. These corners also hold bottom 34 slightly above the floor on which box 13 is resting so that bottom 34 will not become damp if the floor is wet.

An elongated tube 40 rests on top of receptacle 12 with its opposite ends in notches 26. Tube 40 is preferably constructed from flexible plastic material. It has a divider 42 approximately midway along its length so as to divide itself into an inlet conduit 44 and an outlet conduit 46 which have no communication therebetween. The ends of tube 40 are shaped into two male connectors 48 for connecting tube 40 between a pair of suction hoses 50 so that it will be in the line of suction. Divider 42 may be formed in tube 40 by heating or by crush-sealing. The function of divider 42 is prevent material from entering outlet conduit 46 from inlet conduit 44.

Surrounding tube 40 and suspended downwardly therefrom is a collection bag or container 52. Bag 52 is preferably made from a transparent material so that it is possible to see the contents therein. In its original form bag 52 is folded into a flat shape (FIG. 2), but as it fills with evacuated materials it bulges outwardly to conform to the shape of receptacle 12 (FIG. 1). The upper end of bag 52 sealably surrounds tube 40 so that it encloses portions of both inlet conduit 44 and outlet conduit 46.

In communication with inlet conduit 44 and extending downwardly within bag 52 is an inlet duct 54. It extends downwardly within bag 52 so that its extreme lower end is adjacent but not in contact with the lower end of bag 52. Inlet duct 54 has an opening 56 at its extreme lower end and a plurality of apertures 58 along its entire length. An outlet duct 60 is in communication with outlet conduit 46 and extends downwardly therefrom to provide communication into the interior of bag 52. Outlet duct 60 is comparatively short compared to duct 54; it includes an opening 62 at its extreme lower end and a plurality of apertures 64 along its length. A mesh guard 66 surrounds a portion of the lower surface of tube 40 so that it provides a cage completely surrounding outlet duct 60 and further surrounding at least one of the uppermost apertures 58 of inlet duct 54. Mesh guard 66 is positioned within collection bag 52 so that it prevents bag 52 from closing off apertures 64 in outlet duct 60 and the uppermost apertures 58 within inlet duct 54.

The collection unit illustrated in FIGS. 1-3 is operated by mounting male connectors 48 to suction hose 50 so that the unit is in the line of suction between a source of evacuated materials and a suction apparatus (not shown). When the suction apparatus is activated air is drawn out of bag 52 through outlet duct 60 into outlet conduit 46 towards the suction unit. This reduces the pressure within collection bag 52. The atmospheric pressure outside bag 52 forces material to be evacuated into inlet conduit 44, through inlet duct 54, and out of apertures 58 and opening 56 into collection bag 52. Since the uppermost apertures 58 of inlet duct 54 are within mesh guard 66, they are not blocked by the walls of bag 52 even though the walls may be collapsed by the atmospheric pressure outside bag 52. As evacuated materials come out of the extreme upper apertures 58, they flow downwardly into bag 52, thereby causing it to spread open and conform to the walls of receptacle 12. The indicia along longitudinal slots 32 provide means for measuring the materials within bag 52. If for some reason it is desirable to empty the contents of bag 52 during an operation, the bag is inverted by pivoting it around and in unison with tube 40 so that it is positioned above tube 40. This will cause the evacuated materials within bag 52 to flow outwardly through outlet duct 60, thereby emptying bag 52. Bag 52 may then be returned to its original position and it will begin collecting materials anew.

After the operation is over collection unit 10 is removed from the line of suction by disconnecting suction hoses 50 and lifting bag 52 out of receptacle 12. If desired, collection bag 52 may be left within the receptacle and the entire collection unit transported to the laboratory for analysis. If it is necessary to preserve the evacuated materials for later study, the collection unit may be used as a storage container. When analysis is completed the collection unit may be thrown away. Because of the inexpensive nature of the materials from which the collection unit is constructed, a new collection unit may be used for each operation, thereby eliminating the possibility of cross-contamination from one patient to another.

Referring to FIG. 4, a modified form of the invention is illustrated which includes a collection bag 68, inlet conduit 70, inlet duct 72, outlet duct 74, and outlet conduit 76, all of which are identical in construction to the corresponding parts illustrated in FIGS. 1-3. Extending between inlet conduit 70 and outlet conduit 76 and forming a communication passage therebetween is a bypass conduit 78. Mounted within inlet conduit 70 is a valve 80 which may be moved from a first position providing exclusive communication from inlet conduit 70 into inlet duct 72 to a second position providing exclusive communication from inlet conduit 70 to bypass conduit 78. Valve 80 may be kept in its first position in order to fill bag 68, and when it is no longer desired to collect materials within bag 68, valve 80 is moved to its second position, thereby causing the materials to move through bypass conduit 78 into outlet conduit 76. Bypass conduit 78 is shaped like an inverted U, thereby forming a handle for carrying or hanging collection bag 68.

An additional modification of this invention is illustrated in FIG. 5 wherein a receptacle is formed from a jar 82 having indicia marked on its side. A stopper 84 is fitted within the neck of jar 82 and includes an inlet conduit 86 extending therethrough and terminating in an inlet duct 88 within jar 82. Also extending through stopper 84 is an outlet conduit 90 which terminates in an outlet duct 92 within jar 82. A collapsible balloon-like collection bag 94 surrounds the lower end of stopper 84 and encloses inlet duct 88 and outlet duct 92. A wire mesh guard 96 also surrounds the upper portion of inlet duct 88 and all of outlet duct 92 to prevent bag 94 from blocking the apertures therein. A bleeder duct 98 extends through stopper 84 and provides communication between the atmosphere outside jar 82 and the space between bag 94 and the interior surface of jar 82. When suction is applied to outlet conduit 90 it draws evacuated materials through inlet conduit 86 and inlet duct 88, thereby filling collection bag 94. As collection bag 94 expands within jar 82 the air occupying the space between bag 94 and jar 82 escapes through bleeder duct 98 so that no air is trapped therein.

A further modification of the collection unit of this invention is illustrated in FIG. 6. A jar and stopper unit 99 such as illustrated in FIG. 5 is additionally provided with a bypass valve 100 and a bypass conduit 102 between an inlet conduit 104 and an outlet conduit 106. Inlet conduit 104, bypass conduit 102, and outlet conduit 106 together comprise a longitudinal tube 107. An inlet duct 108 and an outlet duct 110 extend downwardly from inlet conduit 104 and outlet conduit 106, respectively. Bypass valve 100 is situated in inlet conduit 104 at the point where it joins inlet duct 108 and bypass conduit 102. Bypass valve 100 is movable from a first position wherein it permits exclusive communication between inlet conduit 104 and inlet duct 108 to a second position wherein it permits exclusive communication between inlet conduit 104 and bypass conduit 102. Bypass valve 100, when in its second position, permits the evacuated materials to pass into outlet conduit 106 without entering the jar and stopper unit 99.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

What is claimed is:

1. A surgical trap comprising container means having flexible side walls, the outer portions of which are exposed to ambient air, said container means further including container

inlet duct means and container outlet duct means each having at least one duct opening in communication with the interior of said container means, said inlet duct means adapted to be placed in communication with a source of substantially fluent material, said container means adapted to be placed in communication with suction means for drawing said fluent material into said container means, said trap further including a resilient protective member disposed in said container means across said inlet duct means to shield said inlet duct opening from blockage by the flexible side walls of said container means, such that said side walls remain spaced from said inlet duct opening.

2. A surgical trap as claimed in claim 1 wherein said resilient protective member is porous and extends dependingly across said inlet duct opening, such that fluent material passes from said inlet duct opening through said resilient porous member of said container means.

3. A surgical trap as claimed in claim 1 wherein said resilient protective member extends across said outlet duct opening to shield said outlet duct opening from blockage by the flexible side walls of said container means, such that said side walls remain spaced from said outlet duct opening.

4. A surgical trap as claimed in claim 1 wherein said resilient protective member is formed of a screen-like material.

5. A surgical trap as claimed in claim 4 wherein said protective member is also disposed across said outlet duct opening, said screen-like material being of a mesh that permits passage of said fluent material through said screen.

6. A surgical trap as claimed in claim 1 wherein said container means are collapsible into a flattened condition, entry of said fluent material into said container through said inlet duct opening causing said container to expand from said collapsed flattened condition, said expansion corresponding to the volume of said fluent material entering the interior of said container means.

7. The surgical trap of claim 1 wherein said container means is suspended from said inlet and outlet duct means, said trap further including a box having upper edges, said inlet and outlet duct means resting on said upper edges such that said container means hangs from said duct means within said box.

8. The surgical trap of claim 7 wherein said box includes vertical slots therein for permitting observation of the level of fluent material within said container means.

9. The surgical trap of claim 8 wherein said slots include indicia means for indicating the volume of fluent material within said container means.

10. The surgical trap of claim 7 wherein said box is collapsible.

11. The surgical trap of claim 9 wherein said box is open, said upper edges defining the border of said opening.

12. The surgical trap of claim 1 wherein said outlet duct means opens into the upper end of said container means, and said protective member extends across said outlet duct means, said container means and said outlet duct means being rotatable to an inverted position wherein a substantial portion of said container means is placed over said outlet conduit, said protective member shielding said outlet duct opening from blockage by the flexible side walls of said container means, thereby permitting fluent material in said container means to exit through said outlet duct means.

13. The surgical trap of claim 1 wherein bypass duct means extend between said inlet and outlet duct means providing communication therebetween, said trap further including valve means between said inlet and bypass duct means for making and breaking the communication between said inlet and outlet duct means.

14. The surgical trap of claim 1 wherein said inlet and outlet duct means are joined by bypass duct means, and valve means are provided between said bypass and inlet duct means for opening and closing the communication therebetween.

15. A surgical trap comprising an inlet conduit and an outlet conduit; an enclosed container; said inlet and outlet conduits

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having portions extending within and opening into said container; and means associated with said outlet conduit for withdrawing air from said container to reduce the pressure within said container; said inlet conduit being adapted to be placed in communication with a source of substantially fluent material; whereupon the reduction of pressure within said

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container causes the atmospheric pressure outside said container to force said fluent material through said inlet conduit into said container wherein said container is a collapsible bag suspended within a receptacle, said receptacle having at least one opening extending from its interior to the atmosphere.

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