

[72] Inventor **Allen J. Abel**
3110 Ridgewood Road, St. Paul, Minn.
55112
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[54] **BODY FLUID DRAINAGE AND COLLECTING APPARATUS**
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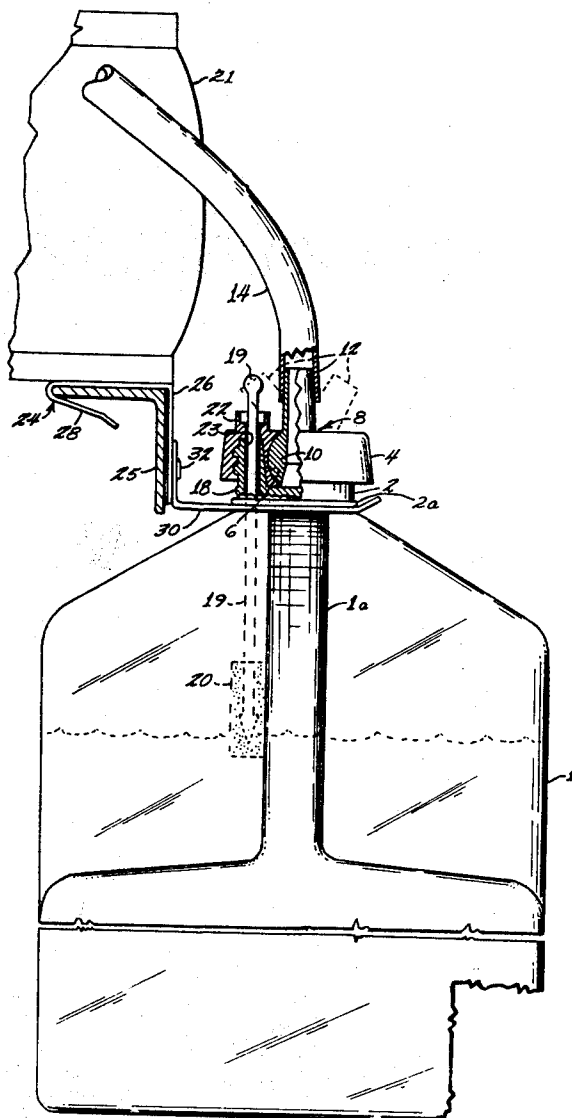
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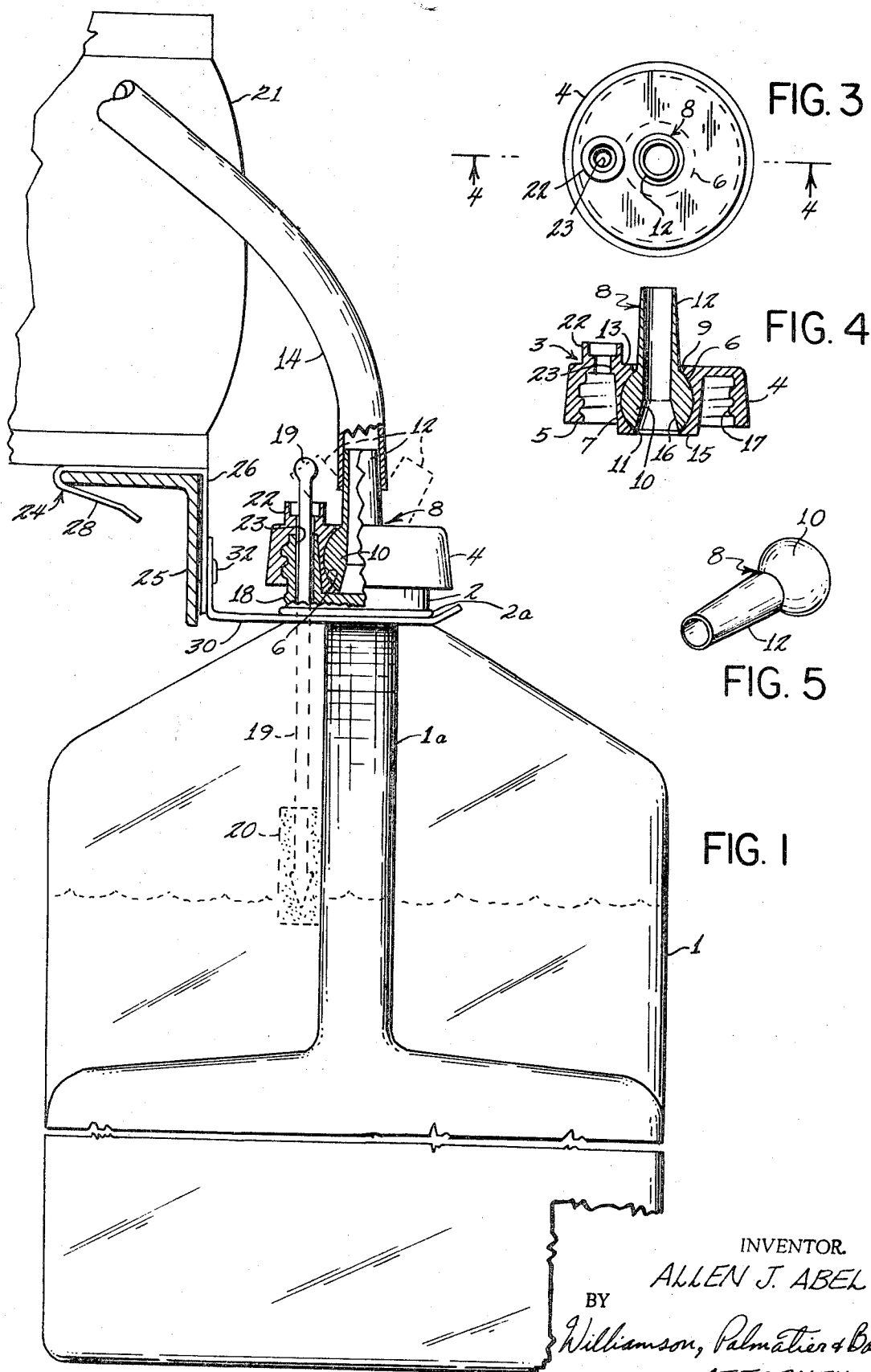
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Primary Examiner—Anton O. Oechsle
Assistant Examiner—Paul E. Shapiro
Attorney—Williamson, Palmatier & Bains

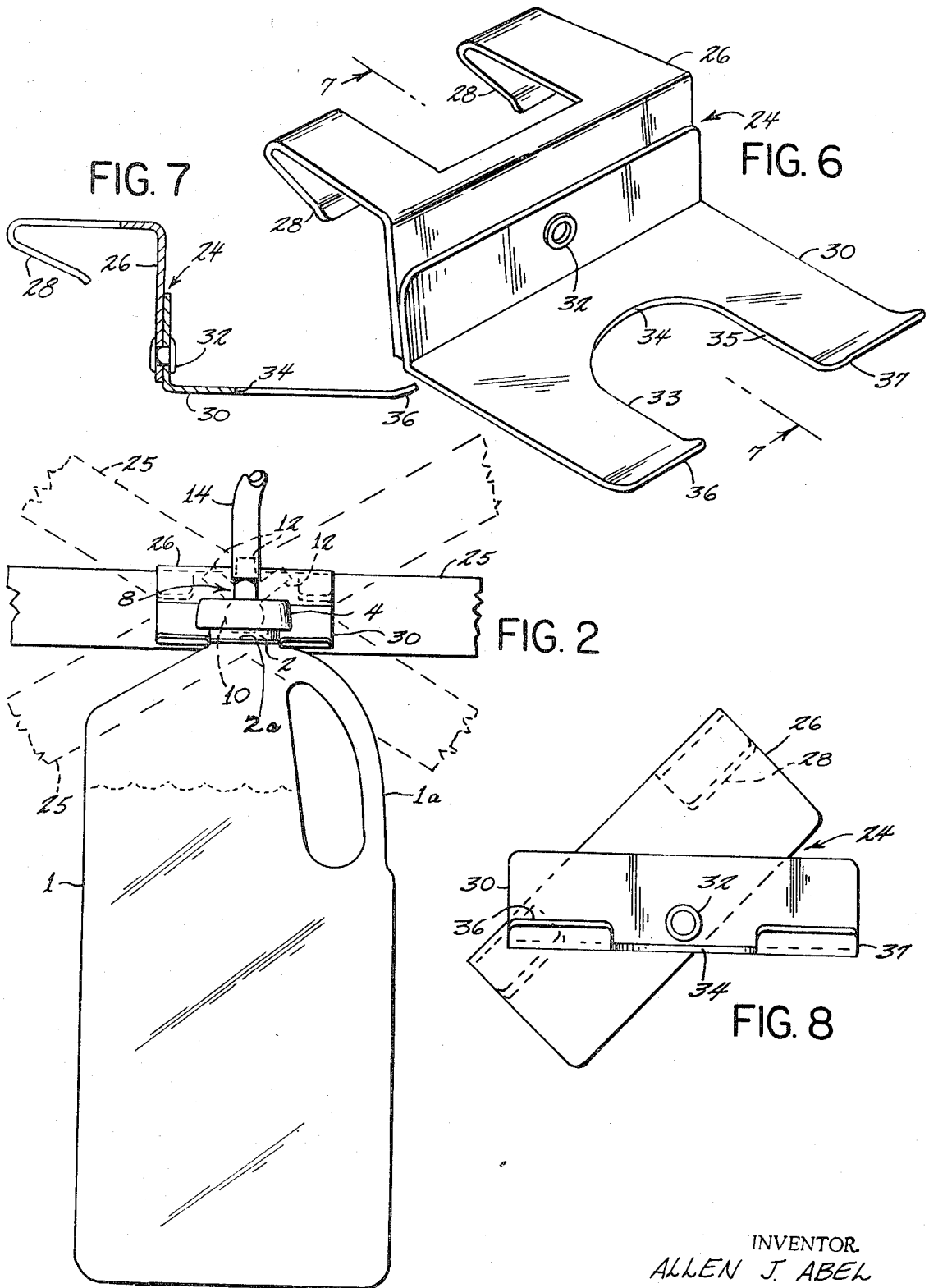
ABSTRACT: Apparatus for collecting body fluids from hospital patients including a swivel bracket for mounting a collecting vessel on a bed frame in such a manner that the vessel is not tipped as the bed frame is elevated to various positions; and a coupling assembly comprising a pliable plastic cap for the inlet of the collecting vessel and a tubular connecting member of relatively hard plastic having a stem portion adapted to be connected to the outlet of a drainage tube and a substantially spherical base portion rotatably and pivotally seated within a socket formed integrally with said cap. The aforesaid collecting vessel cap also includes a vent port within which a liquid level-indicating, float stem is slidably received, the stem projecting downwardly into the vessel and having a float element on its lower end.





INVENTOR.
ALLEN J. ABEL

BY
Williamson, Palmatier & Davis
ATTORNEYS



INVENTOR.
ALLEN J. ABEL
BY
Williamson, Palmeter & Baine
ATTORNEYS

BODY FLUID DRAINAGE AND COLLECTING APPARATUS

BACKGROUND OF THE INVENTION

It is common, postoperative practice to utilize a tubular device known as a catheter for draining body fluids from surgical patients, and in particular for flushing and draining the patient's bladder and urinary tract. The catheter is normally inserted into the patient's abdomen through an incision, and is connected at its discharge end to a drainage tube extending from a liquid-receiving vessel. The present techniques of firmly coupling the drainage tube to the inlet of a collecting vessel have the very serious disadvantage of permitting the flexible catheters and drainage tubes to kink and become blocked as the patient or the bed on which he is resting is moved to various positions, thereby greatly endangering the well-being of the patient. Also, the present practice of placing the liquid-receiving vessel on the floor adjacent the patient's bed has become a problem because of the frequent, inadvertent upsetting of the collecting bottle or receptacle by the persons attending the patient. It would be extremely desirable to be able to support the liquid receptacle on the patient's bed frame; however, there is no presently available bracket device by means of which this may be accomplished without tipping and spilling the receptacle when the patient's bed is elevated from a horizontal position.

BRIEF SUMMARY OF THE INVENTION

Having in mind the foregoing shortcomings associated with presently available apparatus for draining and collecting body fluids from hospital patients, I have developed a coupling unit and mounting bracket for a collecting vessel which accomplish the basic objectives of preventing the kinking of the drainage tube and conveniently mounting the liquid receptacle on a bed frame in such a way as to spherically shaped the tipping of the receptacle when the bed frame is elevated.

The kinking and restriction of the catheter and drainage tube is avoided by a unique coupling unit comprising a plastic cap for the collecting vessel having a generally spherically-shaped recess formed integrally therewith, and a tubular connecting stem having a ball or spherically shaped base which is pivotally retained within the aforesaid recess. A swivel joint is thus provided between the drainage tube connecting stem and the liquid receiver which permits the stem and attached drainage tube to swivel freely through a full 360° arc, thereby precluding undue bending and resultant blockage of the drainage tube as the patient moves to various positions.

A particularly beneficial aspect of my invention resides in the use of a swivel bracket to support the aforesaid collecting vessel, the bracket having a first, base member which is fastened to a bed frame and pivotally attached to a second, vessel-supporting bracket arm. If the bed is elevated to change the position of the patient, the first bracket member will move with the bed frame and pivot with respect to the second, vessel-supporting bracket arm, which will remain stationary, thereby avoiding the tipping and spilling of the liquid-collecting vessel.

As a further advantageous feature of my invention, I provide a vent port in the top of the aforesaid vessel cap within which a liquid level-indicating, float stem is slidably received. The float stem is preferably constructed of fluorescent material or provided with a fluorescent coating so that as it moves up and down in response to changes in the level of the liquid within the collecting vessel, the amount of liquid in the vessel may be readily detected in a dark room by simply noting the distance by which the fluorescent stem projects upwardly above the vent port.

These and other objects and advantages of my invention will become readily apparent as the following description is read in conjunction with the accompanying drawings, wherein like reference numerals have been used to designate like elements throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front, elevation view showing my improved drainage and collection apparatus secured to a bed frame, a portion of the coupling assembly being broken away for clarity;

FIG. 2 is a side, elevation view of the apparatus of FIG. 1 showing in phantom lines the angular positions to which the bed frame can be elevated;

FIG. 3 is a top view of the coupling unit of this invention;

FIG. 4 is a vertical section view taken along lines 4-4 of FIG. 3;

FIG. 5 is a perspective view of the tubular connector which forms a portion of the coupling unit;

FIG. 6 is a perspective view of the swivel mounting bracket for the collecting vessel;

FIG. 7 is a vertical section view taken along lines 7-7 of FIG. 6; and

FIG. 8 is a front, elevation view of the mounting bracket illustrating the manner in which the base member of the bracket may pivot relative to the bracket arm which supports the collecting vessel.

The fluid-collection apparatus of this invention has been particularly designed with a view towards draining and accumulating fluids from postoperative patients in hospitals. To that end, a liquid-receiving vessel 1 is shown supported adjacent the side of a bed 21 in FIG. 1. Liquid-collecting or receiving vessel 1 preferably takes the form of a plastic bottle having a handle 1a and a raised inlet portion or neck 2 to which a cap 4 is threadably connected. Cap 4 comprises one element of a coupling unit or assembly generally indicated by reference numeral 3 in FIG. 4.

Referring now to FIGS. 3 through 5, cap 4 has a base or bottom wall 5 and a central socket or recess 6 which is preferably of substantially spherical configuration. In the preferred embodiment of my invention, cap 4 is injection molded from soft, pliable plastic such as polyethylene, and spherical recess 6 is formed integrally therewith, recess 6 being defined by central, downwardly depending wall portion 7. The second element of coupling unit 3 is tubular connector member 8 having a base portion 10 and an upper connecting stem 12 adapted to be connected to a drainage tube 14 shown in FIG. 1. Stem 12 is preferably a male-female connector which may be frictionally secured to the inside or outside wall of a drainage tube depending upon the size of drainage tube 14 being used. Aligned apertures 9 and 11 are provided in the upper and lower ends of socket 6, these apertures being of smaller width than base portion 10 of tubular connector 8, thereby providing shoulders 13 and 15 by means of which base portion 10 is retained within socket 6.

As appears most clearly in FIGS. 4 and 5, base 10 of tubular connector 8 is of a curvilinear shape conforming substantially to the contour of socket 6. By virtue of this arrangement a swivel joint is provided between connector 8 and cap 4 whereby connecting tube 8 may be pivoted from its normally upright position to an angle with respect to a vertical axis extending through the center of socket 6, the angular positions to which stem 12 of connector 8 may be pivoted being shown in phantom lines in FIGS. 1 and 2. As is indicated in FIGS. 1 and 2, stem 12 may be pivoted in any direction from its upright position because of the swivel action between its spherical base 10 and spherical socket 6. Tubular connector 12 may thus swivel freely with respect to cap 4 so that stem 12 may trace a full 360° arc in a horizontal plane about the vertical axis of socket 6. In order to facilitate the assembly of tubular connector 8 to cap 4, connector 8 is made of hard, unyielding material, and is preferably a rigid plastic piece molded from polycarbonate or polystyrene. Hard base portion 10 of connector 8 may thus be seated in spherical recess 6 by forcing it through upper aperture 9, the elastic plastic material of cap 4 surrounding aperture 9 yielding and then flexing back into position as base 10 is pushed therethrough.

It is to be noted with respect to FIGS. 1 and 4, that inside walls 16 at the bottom of base 10 flare outwardly to present an unimpeded discharge path for the droplets of fluid flowing downwardly through connecting stem 12. Integral wall portion 7 of cap 4 which defines socket or recess 6 extends downwardly below the base 5 of cap 4 in order that discharge aperture 11 at the bottom of tubular connector 8 will be disposed a substantial distance within receiver inlet neck 2, thereby insuring that fluid droplets will fall freely into bottle or receptacle 1 without wiping the side walls of neck 2 from which bacteria could migrate back upwardly through connector 8 and discharge tube 14 to the patient. The disposition of the lower end of socket 6 well within the lower confines of receiver inlet 2 may be seen in FIG. 1 wherein cap 4 has been screwed onto neck 2 with internal threads 17 of cap 4 threadedly engaging external threads 18 on neck 2. It would of course be possible to provide a snap-on connection between cap 4 and neck 2 rather than a threaded connection.

For the purpose of permitting the level of fluid within collecting vessel 1 to be quickly and easily determined, I have provided a liquid level indicator in the form of float stem 19 having a styrofoam float block 20 at its lower end. Stem 19 is slidably received within guide channel 23 of raised nipple 22 on the top of cap 4. Guide channel 23 is of a slightly larger diameter than stem 19 thereby providing an annular space therebetween communicating the space within vessel 1 with the opening in the top of nipple 22. This annular clearance space serves as a passageway through which receptacle 1 may be permanently vented. As a particularly advantageous feature of my liquid level-indicating device, I coat float stem 19 with a fluorescent material so that a doctor or nurse can tell at a glance the level of fluid in container 1 at night without turning the lights on and disturbing the patient.

Referring now to FIGS. 1 and 6 through 8, I will explain the bracket arrangement which I utilize to support receptacle 1 above the floor so that it will not be inadvertently bumped and tipped over by persons attending the patient in bed 21. Reference numeral 24 generally indicates my support bracket which appears most clearly in FIGS. 6 and 7. Bracket 24 is comprised of a back or base plate 26 and a receptacle-supporting bracket arm 30 attached thereto by means of swivel fastener 32. Bracket member 30 is provided with a slot or recess 34 defined by two, forwardly extending fingers 33 and 35 turned upwardly at their outer ends 36 and 37. Recess 34 is sized to receive receptacle neck 2, with enlarged annular portion 2a thereof being supported on fingers 33 and 35 in the manner shown in FIGS. 1 and 2. Right angle base plate 26 of bracket 24 is secured to bed frame 25 by means of hooked end portions 28 as shown in FIG. 1. Plate 26, being secured to bed frame 25 will rotate therewith about swivel connector 32 as bed frame 25 is tilted to various positions as indicated by phantom lines in FIG. 2 to elevate either the head or foot thereof. As bracket plate 26 swivels with bed frame 25 about the substantially horizontal axis of swivel connector 32, receptacle support arm 30 will remain in the substantially horizontal position shown in FIGS. 1 and 2, thereby preventing the tipping of collecting vessel 1 and the spilling of its contents. The relative pivotal movement between back plate 26 and support arm 30 is illustrated in FIG. 8.

On the basis of the foregoing description, it will be readily apparent that swivel bracket 24 and coupling unit 3 combine to provide a particularly advantageous arrangement for supporting a collecting vessel at a patient's bedside and connecting the vessel to a drainage tube extending from the patient. The pivotal joint between tubular connector 8 and bottle cap 4 permits the patient to turn or change his position in bed or to have his bed elevated without disconnecting drainage tube 14 from collecting vessel 1 or bending and kinking tube 14 in such a way as to restrict the flow of fluid therethrough. As the patient moves, drainage tube 14 will simply move with him by forcing or pulling connecting stem 12 to a different angular position as indicated by the phantom lines in FIGS. 1 and 2; and the bending of tube 14 which would take place if it had a

stationary connection to vessel 1 at its discharge end is prevented. As bed 21 is elevated to various positions thereby tipping bed frame 25, swivel bracket 24 operates to prevent the tipping and spilling of collecting vessel 1. Swivel bracket 24 and coupling unit 3 thus combine to insure that neither the drainage of body fluids nor the collection thereof is disturbed as a result of the movement of the patient or his bed. Swivel bracket 24 permits collecting vessel 1 to be conveniently supported at the patient's bedside above the floor so that it will not be bumped and tipped over by a nurse or doctor, and fluorescent float stem 19 clearly indicates the level of fluid in vessel 1 without having to use a flashlight or room light during the nighttime hours.

The drainage apparatus of this invention may be advantageously utilized in any fluid-collecting operation where a flexible conduit communicating with a receiver is likely to be moved and bent and thereby restricted. I contemplate that my improved drainage apparatus will find particular utility in hospitals for collecting body fluids from postoperative patients. Such procedures as the transurethral resection process wherein a patient's bladder and urinary tract are flushed with a saline solution require the use of a catheter and drainage tube in combination with a collecting vessel. The above-described apparatus permits such drainage procedures to be carried out without fear of interruptions which might endanger the safety and well-being of the patient.

It will of course be understood that various changes may be made in the form, details, arrangement and proportions of the various parts of my invention as described above without departing from the spirit and scope of my invention as defined by the following claims.

I claim:

1. Liquid handling apparatus comprising in combination a liquid coupling unit connecting a liquid conduit to an upright, liquid receiving vessel having a raised inlet, said coupling unit comprising:

a removable cap having an outer peripheral wall with coupling means thereon positively attached to a complementary coupling portion on said raised inlet, said cap including an integral, central wall portion spaced radially inwardly from said peripheral wall and defining therewith an annular space within which an annular wall forming said raised inlet is received, the inside surface of said central wall portion defining a recess of substantially spherical configuration having curvilinear upper and lower wall portions with aligned, upper and lower apertures therein;

a tubular connector and flow passage member having an upper stem portion detachably connected to said liquid conduit and a substantially spherical base portion seated within said spherical recess, and retained therein by abutting contact with said upper and lower wall portions thereof, whereby said connector member may be pivoted from its normally upright position to an angle with respect to a vertical axis through said recess and may swivel freely with respect to said cap so as to trace a full 360° arc about said vertical axis; and

wherein said spherical base portion of said tubular connector has a liquid discharge opening at the bottom end thereof located a substantial distance downwardly within said raised inlet at the same level as and opening directly into said lower aperture in said lower wall portion of said spherical recess, said lower aperture being at least as large in cross-sectional area as said discharge opening in said spherical base portion and providing an unrestricted opening of such size communicating with said vessel inlet, and said raised inlet presenting an unrestricted flow passage defined by said annular wall forming said inlet and opening directly into the interior of said receiving vessel, whereby liquid will drop freely into said receiving vessel from said tubular connector without wiping the annular wall surface of said raised inlet.

2. A coupling unit as defined in claim 1 wherein:

said cap is formed from soft, elastic plastic material; and

said tubular connector member is made of hard, unyielding material, whereby said base portion of said connector member

may be forced into said recess through said upper aperture therein.

3. A coupling unit as defined in claim 1 wherein: the inside walls of said connector member within said base portion flare outwardly towards said aperture at the lower end of said recess, and define at their lower extremities said discharge opening.

4. A fluid coupling unit for connecting a fluid conduit to a liquid receiver having a raised inlet comprising:

a cap adapted to be secured to said raised inlet, said cap including a recess of substantially spherical internal configuration with aligned apertures at the upper and lower ends thereof;

a tubular connector member having an upper stem portion adapted to be connected to a fluid conduit and a substantially spherical base portion retainably seated within said recess, whereby said connector member may be pivoted from its normally upright position to an angle with respect to a vertical axis through said recess and may swivel freely with respect to said cap so as to trace a full 360° arc about said vertical axis;

a vent port in the top of said cap; and

a liquid level-indicating stem of smaller diameter than said port slidably received therein, said stem having a float on the lower end thereof, whereby said stem will move up and down within said vent port in response to changes in the level of fluid within said receiver.

5. A coupling unit as defined in claim 4 wherein said liquid

level-indicating stem is fluorescent, whereby the level of fluid in said receiver may be readily determined at night.

6. In combination with postoperative drainage apparatus including a catheter connected to a collecting vessel positioned at the side of a bed which is capable of being elevated at the foot or the head, improved bracket means for supporting said vessel comprising:

a first bracket member secured to the frame of said bed and movable therewith;

and a second, vessel-supporting member pivotally attached to said first bracket member by a fastener having a generally horizontally extending axis about which said first bracket member may rotate with said bed frame; and

a coupling assembly connecting said catheter to said vessel, said coupling assembly including a tubular connecting stem having a curvilinear base, and a socket of curvilinear shape conforming to the shape of said stem base within which said base is pivotally retained.

7. Apparatus as defined in claim 6 wherein said vessel-supporting member has two generally horizontally extending fingers turned upwardly at their outer ends defining therebetween a recess through which the neck of said vessel may extend, said fingers serving to supportably engage an enlarged annular portion on said receptacle neck of greater width than said recess.

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