

[54] **CLOSED IRRIGATION AND URINARY DRAINAGE SYSTEM APPARATUS**

[75] Inventor: Ronald E. Spiegel, Chicago, Ill.
 [73] Assignee: Cenco Medical Health Supply Corporation, Chicago, Ill.
 [22] Filed: Apr. 8, 1971
 [21] Appl. No.: 132,421

[52] U.S. Cl. 128/275, 128/247, 285/DIG. 22, 285/319
 [51] Int. Cl. A61f 5/44
 [58] Field of Search 128/275-278, 295, 247, DIG. 24; 285/23, 260, 283, 319, 423, DIG. 22

[56] **References Cited**

UNITED STATES PATENTS

2,100,058	11/1937	McGrady	285/283
2,098,423	11/1937	Kennedy	285/283
3,371,897	3/1968	Serany, Jr. et al.	128/275
3,394,954	7/1968	Sarns	285/319
3,478,743	11/1969	Ericson	128/275
3,513,849	5/1970	Vaillancourt et al.	128/350 R
3,575,170	4/1971	Clark	128/275

3,604,420	9/1971	Vaillancourt	128/275
3,640,552	2/1972	Demler et al.	285/DIG. 22

Primary Examiner—Charles F. Rosenbaum
 Attorney—Robert E. Wagner

[57] **ABSTRACT**

A closed irrigation and urinary drainage system apparatus having a catheter means for removing fluids from a patient and a drainage inlet tube which may be connected or disconnected from the catheter means by a hinged connector means for transferring such fluids into a distensible collection bag having an outlet tube for emptying it. The hinged connector means includes an upstream hollow socket portion insertable into the catheter means and a downstream adapter portion insertable into the drainage inlet tube and attached by a hinge means to the upstream portion. The system may be closed for drainage or opened to permit access for irrigation by swingably joining or separating the two portions of the connector means which, when joined, are held in fixed and sealed relationship by interior interlocking ring and groove means.

7 Claims, 4 Drawing Figures

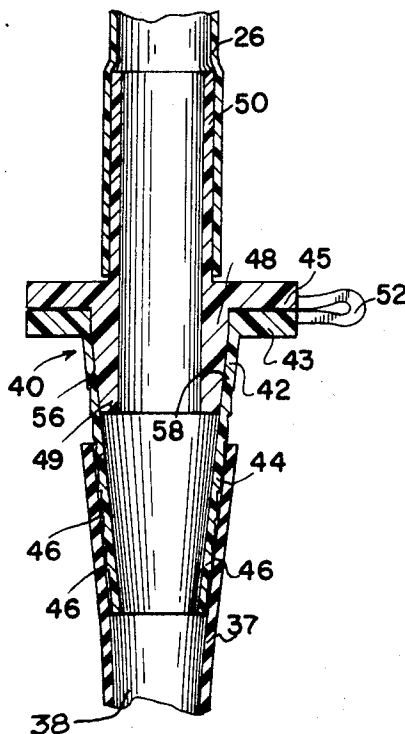
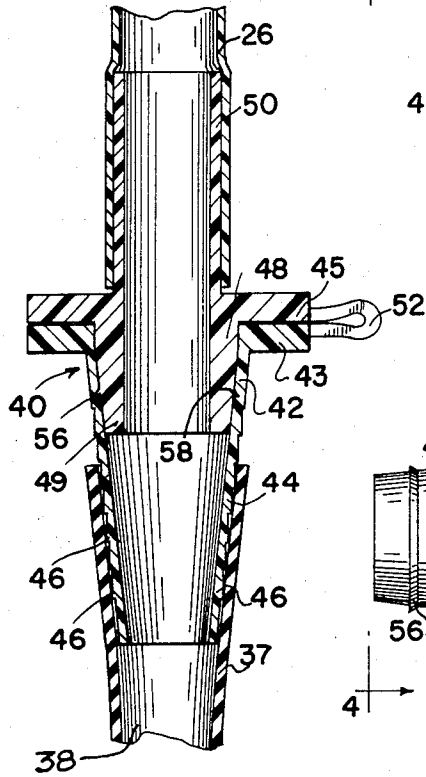
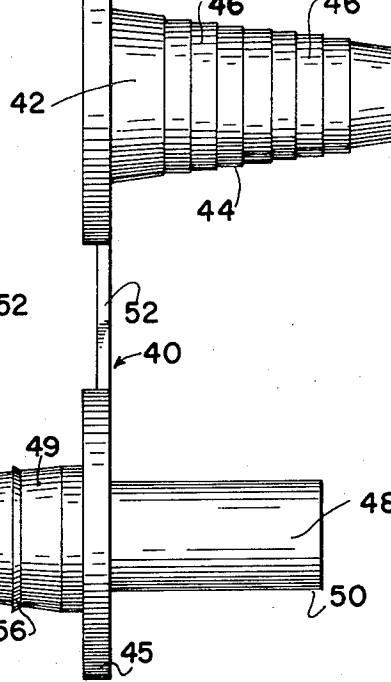


FIG. 2



4

FIG. 3



4

FIG. 1

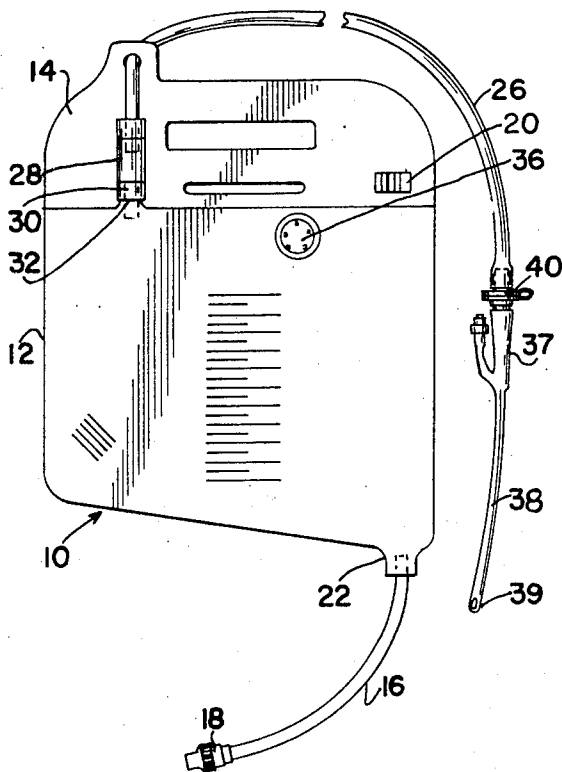
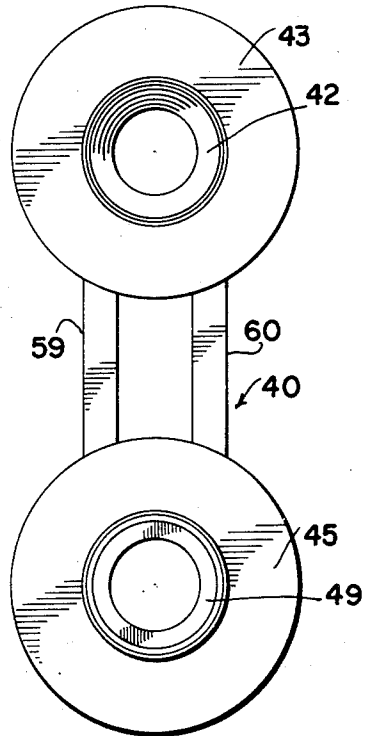


FIG. 4



INVENTOR

RONALD E. SPIEGEL

BY

Robert E. Wagner

ATT'Y.

CLOSED IRRIGATION AND URINARY DRAINAGE SYSTEM APPARATUS

This invention relates to an irrigation and urinary drainage system apparatus having a hinged connector means interposed between the catheter and drainage inlet tube which permits the system to be closed or opened without disconnecting any of its elements.

BACKGROUND OF THE INVENTION

Typical elements for closed irrigation and urinary drainage system apparatus in use today include various commercial types of flexible tube catheters for insertion into the patient and removal of fluids from the patient, and a drainage inlet tube connected to such a catheter, for transferring fluids removed by the catheter into a distensible collection bag which contains and stores such fluid and which may be emptied by an outlet tube at its bottom. The connection between the drainage inlet tube and the catheter is presently accomplished by either a catheter adapter which consists of a frusto-conical tip inserted over the upstream end of the drainage inlet tube and then inserted into the downstream end of the flexible catheter tube, or a right angle adapter such as that shown in U.S. Pat. No. 3,513,849 to Vaillancourt et al.

In the operation of irrigation and closed urinary drainage systems, however, it is often desirable to have selective and easy access to the system to insert irrigating fluid or to withdraw samples at any desired time. A system employing the catheter adapter tip as a connector has several disadvantages in this regard. First, removal of the semi-rigid tip from the flexible rubber catheter tubing requires use of a pulling and twisting motion and separation is often so abrupt and violent that not only is there a danger of accidentally pulling on the catheter itself and causing discomfort or even trauma to the patient but also a great possibility of spilling fluid. Moreover, once separation has been accomplished, the catheter adapter tip must be capped before it is set aside, in order to prevent fluid remaining in the inlet tube from being discharged through the catheter tip adapter should the inlet tube be laid down at an elevation below that of the fluid contained within the tube. Such capping is also necessary to prevent contamination of the catheter tip adapter by foreign bodies which it may come in contact with when set aside. If the tip is contaminated, bacteria could be easily propagated through the catheter by backflow of the fluid.

Another disadvantage of this type of connector is that such catheter adapter tip caps are usually manufactured in conjunction with a plug insertable into the downstream end of the catheter itself to prevent discharge while removing the catheter tip adapter cap. Such units are sold with a plug placed inside the tip adapter cap, the open end of the cap being closed by a plastic sealer cap. These components are only usable once unless sterilized and are easily misplaced because of their small size.

Finally, reconnection of the system requires removal of the catheter tip adapter cap and the catheter plug and reinsertion of the catheter adapter tip into the catheter. This operation not only involves spilling of fluid but also requires unavoidable touching of the interior surfaces of the system by the attendant in order to secure a good connection.

Thus, the significant problems with this type of catheter adapter tip have been that the number of components and the necessity for complete disconnection of the system to permit sampling or irrigation and removal of part of the system from the area adjacent the catheter have increased the possibility of contamination both within the catheter tube opening itself and on the surface of the catheter tip, such contamination often resulting in the introduction of foreign bacteria into interior parts of the body such as the bladder.

The right angle catheter adapter shown in the patent to Vaillancourt et al would appear to constitute an improvement over the widely used catheter adapter tip described above. However, it has the definite disadvantage of having a rather unwieldy right angle configuration which not only could act to impede the flow of fluid from the catheter into the discharge inlet tube but also is difficult to manufacture because it requires molding of one piece of material having an interior hollow section with two right angle bends and a removable cap. Such a construction is difficult and expensive to manufacture.

The Vaillancourt et al. adapter also has the disadvantage that when the system is opened to permit introduction of a syringe for irrigation, the adapter, since it is rigid, holds the inlet tube and the catheter at the same relative positions they are in during closed flow. Thus, the two elements cannot be maneuvered with respect to each other and, depending upon the position that the adapter is held in and depending upon the time required for the syringe to be inserted, fluid contained in either the inlet tube or the catheter will either spill out of the syringe opening or will flow back into the patient through the catheter.

DESCRIPTION OF THE INVENTION

This invention includes a closed irrigation and urinary drainage system apparatus for removing fluids from a patient or providing at any desired time for irrigation or aspiration through the same system, having hinged connector means interposed between a conventional flexible tube catheter and a drainage inlet tube connected to a distensible collection bag and outlet means. The dual purpose of this system is accomplished through use of a novel connector means having an upstream hollow socket portion insertable into the downstream or proximal end of the catheter and a downstream hollow adapter portion, one end of which is insertable into the upstream end of the discharge inlet tube, the opposite or plug end being insertable into the hollow socket portion of the connector means. The hollow socket portion and the adapter portion of the connector means are attached to each other by a hinge means which allows the two portions to be swingably joined and separated.

The upstream hollow socket portion of the connector means has an exterior shell of frusto-conical configuration having a series of ribs disposed about its circumference. Such a configuration allows it to be easily inserted into the proximal end of the catheter and the ribs provide for a securely fixed and fluid-tight seal between the upstream socket portion and the catheter.

The plug end of the hollow adapter portion of the connector means is formed in a shape similar to that of the interior of the hollow socket portion and has disposed about its circumference one or more raised

ribs which correspond with and are located in a similar position to depressed grooves disposed about the interior circumference of the hollow socket portion. When the adapter portion is swung into the socket portion on the hinge connecting the two, the raised rings lock into the depressed grooves, holding the two portions in fixed and sealed relationship.

In the preferred method of construction, the socket portion has an annular flange located at its downstream end and the adapter portion has an annular flange disposed about its middle, the two flanges being adjacent to one another when the plug end of the adapter portion is securely locked into the socket portion. The unique construction of this connector means offers a closed urinary drainage and irrigation system with several distinct advantages over the present system.

First, because of the snap-lock hinge connector means, it is much easier and more convenient to break into this system to permit sampling or irrigation and aspiration than it was in previous systems. No twisting is required to separate the socket portion and the adapter portion of the connector means and no sudden or violent jerks result. The portions are merely un-snapped. This invention permits the drainage system to be opened without requiring a complete separation of the elements of the system.

In addition, since the portions of the connector means are attached by a hinge means, the attending personnel will never have to place the end of the discharge inlet tube on the bed or nearby table and will not have to bother with protecting the catheter adapter tip from contamination or worry about leaking fluid since the plug end of the adapter portion of this connector means is always in view and is always held away from contaminating contact with foreign bodies. Furthermore, the flange portions of the preferred construction of this invention project out from the exterior surfaces of the connector and serve to shield the areas of vital contact which are most susceptible of contamination both from contact by those touching the connector means or from side contact.

Another advantage of this connector means is that it may be molded in one piece which performs the same function with a greater degree of efficiency and sterility than conventional catheter adapter tips which require protective caps and plugs, which are in themselves easy to lose or contaminate.

Moreover, since this invention provides, when both portions are joined in locked position, straight-line flow from the catheter to the inlet tube, there is not the possibility of impeding flow as is present in a right angle type of connector. Furthermore, when the portions of this connector are swung back in disconnected position, the flow, unlike that in the right angle type of adapter, is completely broken and both the catheter and inlet tube may be positioned with respect to each other so that the fluid neither spills on the surrounding area nor flows back into the patient.

Finally, since the connector means is molded out of one piece and in a straight line, it is less expensive to manufacture than the present connectors or catheter adapters.

Accordingly, it is an object of this invention to provide a closed irrigation and urinary drainage system apparatus which provides selective access to the system to insert fluid or withdraw samples at any desired time.

It is another object of this invention to provide a closed irrigation and urinary drainage system apparatus which permits intermittent irrigation and aspiration whenever desired without completely separating any of the elements providing the drainage path.

It is a further object of this invention to provide, in such a closed irrigation and urinary drainage system apparatus a hinged connector means interposed between the catheter and drainage inlet tube which allows the catheter and drainage inlet tube to be disconnected and swingably separated without twisting or jerking.

It is a still further object of this invention to provide, in a closed irrigation and urinary drainage system apparatus, a connector means having a one piece molded construction in which all components are present and permanently attached.

It is still another object of this invention to provide a closed irrigation and urinary drainage system apparatus having a connector means of one piece construction which permits easy assembly of the elements of this system.

It is also an object of this invention to provide a closed irrigation and urinary drainage system apparatus having a connector means which provides in joined position for straight-through flow of the fluids in the system.

It is also a further object of this invention to provide a closed irrigation and urinary drainage system apparatus having a connector means which permits the elements of the system to be disconnected without being subject to contamination by contact with foreign bodies.

These and other important objects of this invention will become apparent from the following description taken in conjunction with the drawings illustrating a preferred embodiment wherein:

FIG. 1 is a front elevational view showing the closed irrigation and urinary drainage system apparatus;

FIG. 2 is a cross-sectional view parallel to the direction of flow taken through the hinged connector means interposed in closed position between the catheter and drainage inlet tube of the closed irrigation and urinary drainage system apparatus;

FIG. 3 is a top view of a free body of the hinged connector means of the closed irrigation and urinary drainage system apparatus; and

FIG. 4 is an elevational view of the hinged connector means of the closed irrigation and urinary drainage system apparatus in open or disconnected position as taken along line 4—4 in FIG. 3.

Referring now to the drawings and more particularly to FIG. 1, there is shown the closed irrigation and urinary drainage system apparatus 10 having a conventional catheter 38 including a balloon-type inflatable distal end 39, which is insertable into the patient, and a proximal or downstream end 37.

The catheter 38 is connected to a drainage inlet tube 26 by a hinged catheter connector means 40 interposed between the proximal end 37 of the catheter 38 and the upstream end of the drainage inlet tube 26.

The drainage inlet tube 26, in turn, is in communication with a distensible collection bag 12 through a medial drip chamber 28 disposed on the handle 14 of the distensible collection bag 12. The medial drip chamber 28 assures proper uniform flow of fluid into the distensible bag 12 through discharge tube 30 at its

downstream end which is inserted into bag 12 through opening 32 in bag 12. An outlet tube 16 at the lower end of distensible collection bag 12 permits emptying of the contents of the bag 12 whenever desired. The outlet tube 16 is in communication with the interior of the distensible collection bag 12 through the outlet bag opening 22 and has at its downstream end an outlet valve 18 controlling the flow of fluid out of the outlet tube 16.

The inlet and outlet openings 32 and 22, respectively, in the distensible collection bag 12 are hermetically sealed, and outlet tube 16, when not in use, may be held in an upright position by outlet tube holder 20. The distensible collection bag 12 may be also provided with an air filter 36 as shown in FIG. 1.

The catheter 38 is conventionally constructed of a flexible and soft but impervious material such as rubber. The drainage inlet tube 26 and the outlet tube 16 may be constructed of any flexible, impervious material such as plastic. The distensible collection bag 12 may be constructed of any thin, flexible, impervious material, preferably transparent, such as plastic.

The hinged catheter connector means 40 which provides for the unique operation of this closed irrigation and urinary drainage system apparatus is shown in more detail in FIG. 2. The connector means 40 is shown in closed position and includes an upstream hollow socket portion 42 having a frusto-conical exterior shell 44 with a series of raised ribs 46 disposed about its exterior circumference. This hollow socket portion 42 is inserted into the downstream or proximal end 37 of catheter 38.

Hollow socket portion 42 is connected by hinge means 52 to downstream hollow adapter portion 48 of connector means 40. In the preferred connection shown in FIG. 2, hinge means 52 is attached at its one end to an annular flange 43 disposed at the downstream end of hollow socket portion 42, and is attached at its opposite end to an annular flange 45 disposed at the middle of hollow adapter portion 48.

The downstream hollow adapter portion 48 includes a cylindrical drainage inlet tube adapter end 50, which is insertable into the upstream end of drainage inlet tube 26, and a hollow plug end 49, which is insertable into the hollow socket portion 42 of catheter connector means 40, to complete the connection between catheter 38 and drainage inlet tube 26. Hollow plug end 49 is similar in exterior configuration to the interior configuration of hollow socket portion 42, and has disposed about its exterior circumference at least one raised ring means 56 which corresponds to depressed groove means 58 disposed about the interior circumference of hollow socket portion 42. When downstream hollow adapter 48 is swingably joined to upstream hollow socket portion 42, raised ring means 56 snap-lock into depressed groove means 58 to hold the two portions in fixed and sealed relationship.

When the two portions are joined as described in fixed relationship, the annular flanges 43 and 45 are placed adjacent to each other. As shown in FIG. 2, these flanges 43 and 45 have a greater over-all diameter than the diameters of the different portions of the connector means 40, so that flanges 43 and 45 will support portions 42 and 48 of the connector means 40 above any surrounding foreign surfaces when such por-

tions 42 and 48 are either connected or disconnected. Flanges 43 and 45 also provide for greater maneuverability of the portions 42 and 48 with respect to one another since hinge means 52 is attached to portions 42 and 48 at the periphery of their respective flanges, in effect providing a longer length of hinge. Finally, flanges 43 and 45 also serve to prevent the inadvertent contamination of sensitive interior parts of the connector means 40 while the interlocking portions 42 and 48 of the connector means 40 are being handled in order to disconnect or connect them.

In FIG. 3, the connector means 40 is shown as a free body in open or disconnected position and the series of raised ribs 46 disposed about the circumference of the frustoconical exterior shell 44 of the upstream hollow socket portion 42 is seen in more detail. The raised ring means 56 disposed about the outer circumference of the hollow plug end 49 of the downstream hollow adapter portion 48 is also pictured. On the opposite side of downstream flange 45 from plug end 49 is shown the cylindrical drainage inlet tube end 50.

In FIG. 4 is illustrated the interior detail of connector means 40. This view shows the similar configuration of hollow plug end 49 and the interior of upstream hollow socket portion 42. In addition, a preferred construction of hinge means 52 is shown as consisting of separate flexible straps 59 and 60 attached at opposite ends to the peripheries of downstream flange 45 and upstream flange 43.

In the operation of the closed irrigation and urinary drainage system apparatus, the fluid is removed from the patient by the catheter 38 having its distal balloon end inserted into the patient. The catheter 38 is connected to the drainage inlet tube 26 by the hinged catheter connector means 40 which transfers the fluid removed from the patient in straight-line flow into drainage inlet tube 26. Drainage inlet tube 26 then transfers this fluid into medial drip chamber 28 which dispenses it uniformly into distensible collection bag 12. Distensible collection bag 12 is transparent and contains volumetric indicators on its face so that the amount of fluid collected may be determined by observation. Outlet tube 16 permits emptying of the fluid stored in distensible collection bag 12 at any desired time.

In the operation described above, the urinary drainage system is considered closed because fluid is transferred directly from the patient into the collection means without being exposed to any exterior influences. To open the system, however, for purposes of irrigating, aspirating or sampling fluid, the system is broken into at the connector means 40 where the downstream hollow adapter portion 48 joins the upstream hollow socket portion 42. The two portions are simply pulled apart and downward toward the position of the hinge 52, unsnapping the raised ring means 56 from the depressed groove means 58, thereby disconnecting the two portions. The adapter portion 48 is then swingably separated from the hollow socket portion 42 until the two portions are moved to a position such as that shown in FIG. 3. Any irrigation, aspiration or sampling procedures may then be performed through the open hollow socket portion 42 of connector means 40 which provides direct access to the patient.

The connector means 40 may be constructed of any suitable material which is impervious, corrosion-resistant, capable of being formed or molded as a unitary piece into the required configuration and slightly resilient, such as plastic.

The catheter connector means 40 makes possible the operation of a closed irrigation and urinary drainage system apparatus which may be opened at any desired time to permit irrigation and aspiration of the patient and sampling of discharged fluids and which, by the unique construction of the connector means, does not require total separation of the elements of the drainage system following disconnection and, therefore, substantially reduces the danger to the patient from possible contamination of the elements of the system and reduces the time required to perform such irrigation or sampling.

While the invention has been described in relation to a preferred embodiment thereof, it will be apparent to those skilled in the art that the structural details are capable of wide variation without departing from the principles of the invention.

I claim:

1. In a drainage system of the type used for removing fluids from a patient, the combination comprising:

a conventional flexible tube catheter means having a distal end which is insertable into the body of the patient and a proximal end;

a connector means joining said catheter means at its proximal end to a drainage inlet tube means with an upstream end and a downstream discharge end, said connector means having an upstream hollow socket portion insertable into said proximal end of said catheter means, and a downstream hollow adapter portion insertable into the upstream end of said drainage inlet tube means, said socket portion and said adapter portion being attached in swingable relationship to each other by hinge means, said hinge means allowing said adapter portion and said socket portion to be joined in sealed relationship so that fluids may be conducted from said catheter means through said connector means to said drainage inlet tube means, and said hinge means alternatively allowing said adapter portion and said socket portion to be separated, thereby permitting access to said system for irrigation and aspiration purposes;

a distensible collection bag for receiving and storing fluids removed from the patient connectable to said downstream discharge end of said drainage inlet tube means; and

an outlet tube means for emptying fluid stored in said collection bag.

2. The combination of claim 1 wherein said upstream hollow socket portion of said connector means is frustoconical in exterior configuration having a series of circumferential ribs disposed on its surface, said ribs being effective to hold said portion of said connector means in fixed, sealable relationship within said proximal end of said flexible tube catheter means.

3. The combination of claim 1 wherein said downstream hollow adapter portion of said connector

means comprises a cylindrically-shaped end insertable into and fixed to said upstream end of said drainage inlet tube means, and an opposite plug end having an exterior configuration similar to the interior configuration of said upstream socket portion of said connector means, though of slightly smaller dimension, said plug end being swung into said upstream hollow socket portion on said hinge means and joined to said upstream hollow socket portion of said connector means by locking means, said locking means being effective to hold said adapter portion and said socket portion in fixed, sealed relationship.

4. The combination of claim 3 wherein said locking means comprises raised annular means disposed about the circumference of said plug end of said adapter portion, said annular means being fittable into depressed groove means similarly disposed in corresponding position about the interior circumference of said upstream hollow socket portion of said connector means.

5. In a drainage system of the type used for removing fluids from a patient and including a conventional flexible tube catheter means having a distal end and a proximal end and in communication through a drainage inlet tube means having an upstream end and a downstream end with a distensible collection bag means for holding and containing the fluids removed from the patient and having an outlet tube means for emptying said bag means, the improvement comprising, connector means joining said catheter means to said tube means in hinged relationship, thereby permitting temporary disengagement of said catheter means from said inlet tube means, said connector means including an upstream hollow socket portion insertable into the proximal end of said catheter means, and a downstream hollow adapter portion having a cylindrical end insertable into the upstream opening of said drainage inlet tube means and a plug end insertable into said upstream hollow socket portion of said connector means, said hollow adapter portion and said hollow socket portion being swingably attached to one another by hinge means and having corresponding locking means disposed in each portion to prevent relative movement and leakage when joined together to form a closed drainage system.

6. The connector means of claim 5 wherein the hollow upstream socket portion of said connector means includes an exterior shell of frusto-conical configuration having a series of raised ribs disposed circumferentially about its surface, said ribs being effective to fixedly and sealably maintain said socket portion within the proximal end of said catheter means.

7. The connector means of claim 5 wherein said locking means includes raised annular means circumferentially disposed about said plug end of said hollow adapter portion, said raised annular means corresponding to depressed annular means disposed about the interior circumference of said hollow socket portion, said raised annular means fitting into said depressed annular means to join said adapter portion and said socket portion in fixed, sealed relationship when said plug end is swingably inserted into said hollow socket portion.

* * * * *