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 [21] Appl. No. **727,574**
 [22] Filed **May 8, 1968**
 [45] Patented **Sept. 22, 1970**
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[56] **References Cited**
UNITED STATES PATENTS
 2,867,213 1/1959 Thomas..... 128/350
 3,186,410 6/1965 Buono 128/275
 3,234,943 2/1966 Metz 128/214
 3,312,221 4/1967 Overment..... 128/275
 3,357,429 12/1967 Folkman et al. 128/275

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[54] **COLLECTION CONTAINER FOR MEDICAL LIQUIDS**
23 Claims, 8 Drawing Figs.

[52] U.S. Cl..... **128/275,**
128/214, 128/272, 128/350
 [51] Int. Cl..... **A61F 5/44**
 [50] Field of Search..... **128/214,**
275, 276, 147, 350; 229/62.5; 128/272; 150/8

ABSTRACT: For collecting urine from a patient a container with a drip housing fitting within its tubular neck. This drip housing has a one-way disk valve at its outlet and includes a double vent system to protect the patient. The drip housing provides an air break in the urine column from the patient and prevents urine from backing up into the patient's bladder from the container. When the container is full, it can be emptied through a sliding valve at its bottom while the container is still attached to a flexible collection tube leading from the patient.

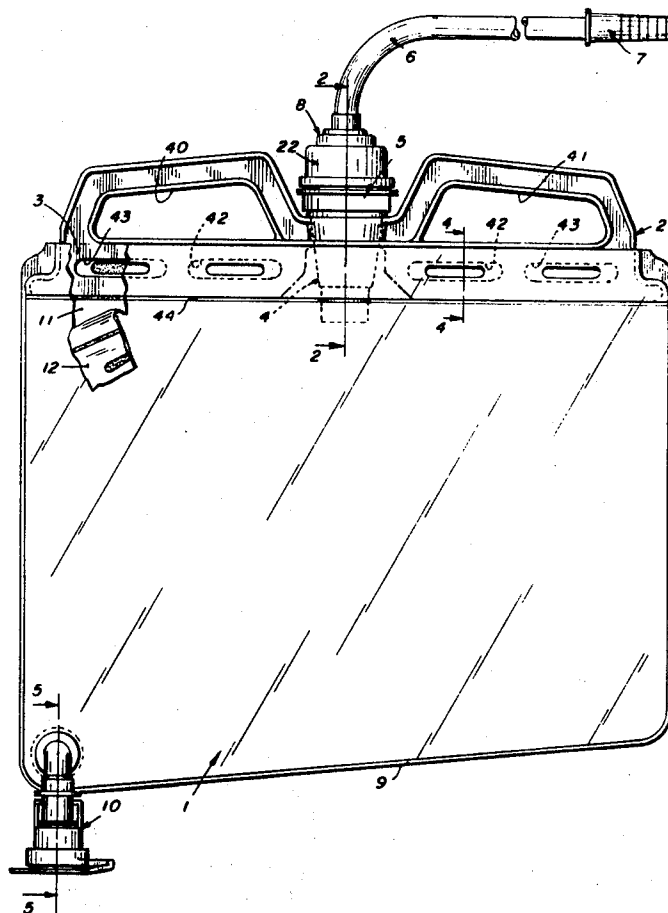


FIG. 1.

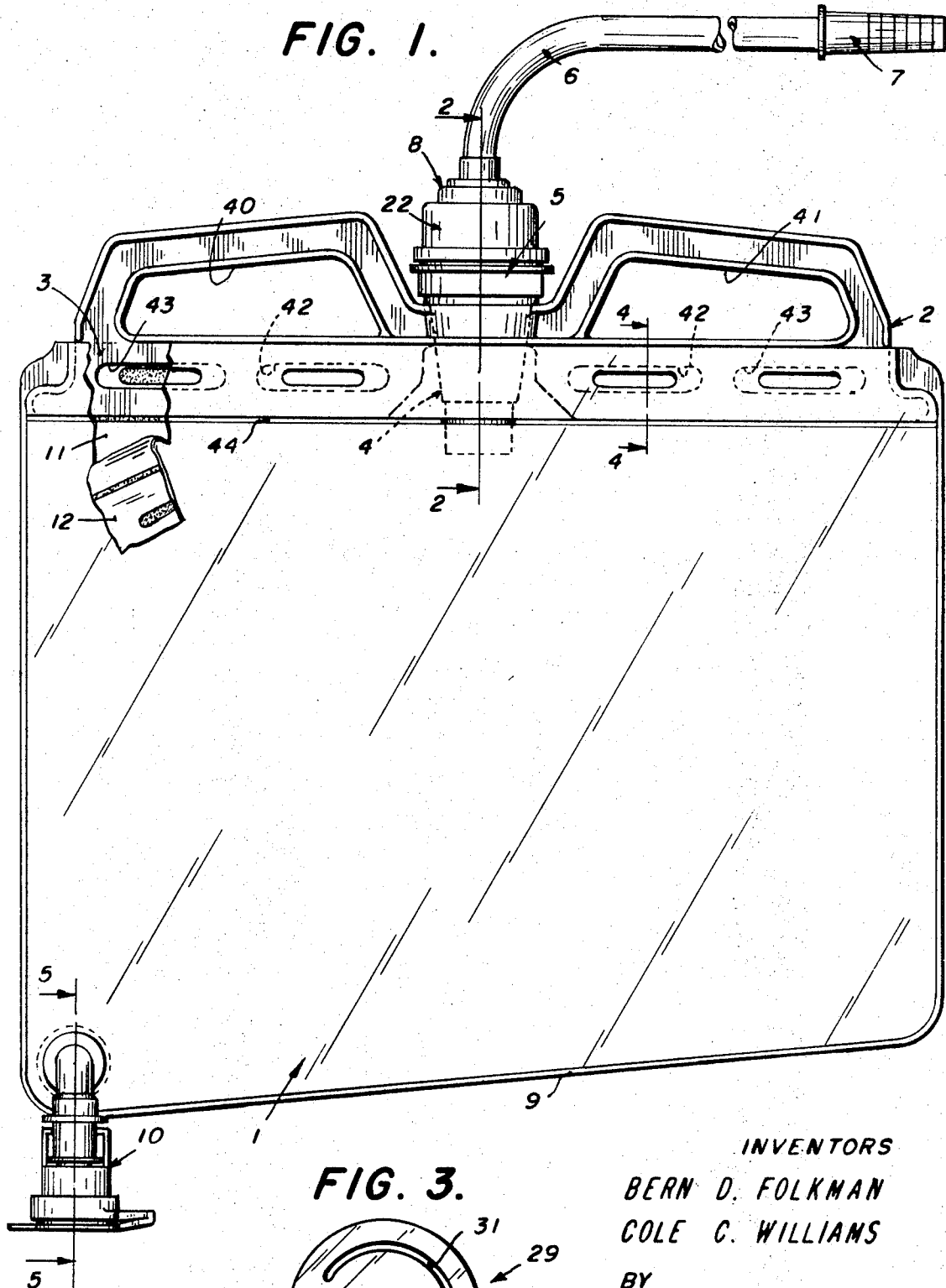
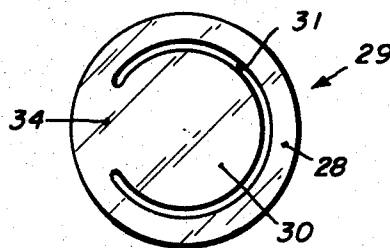


FIG. 3.



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FIG. 2.

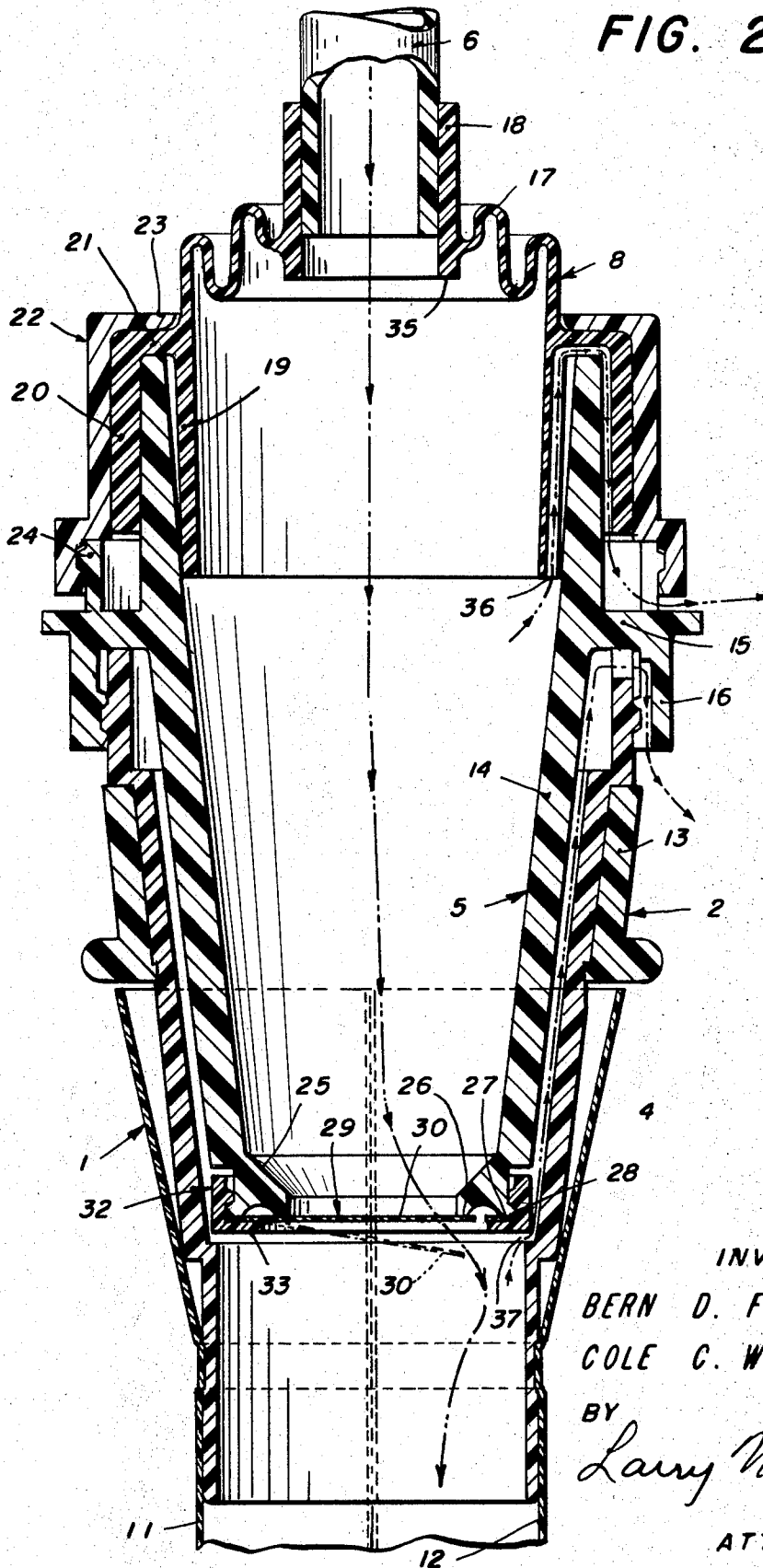


FIG. 4.

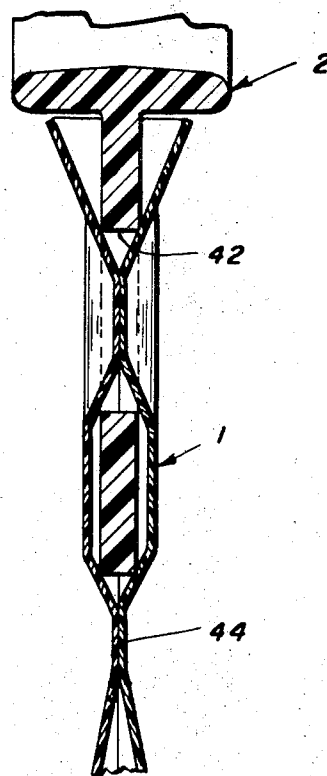
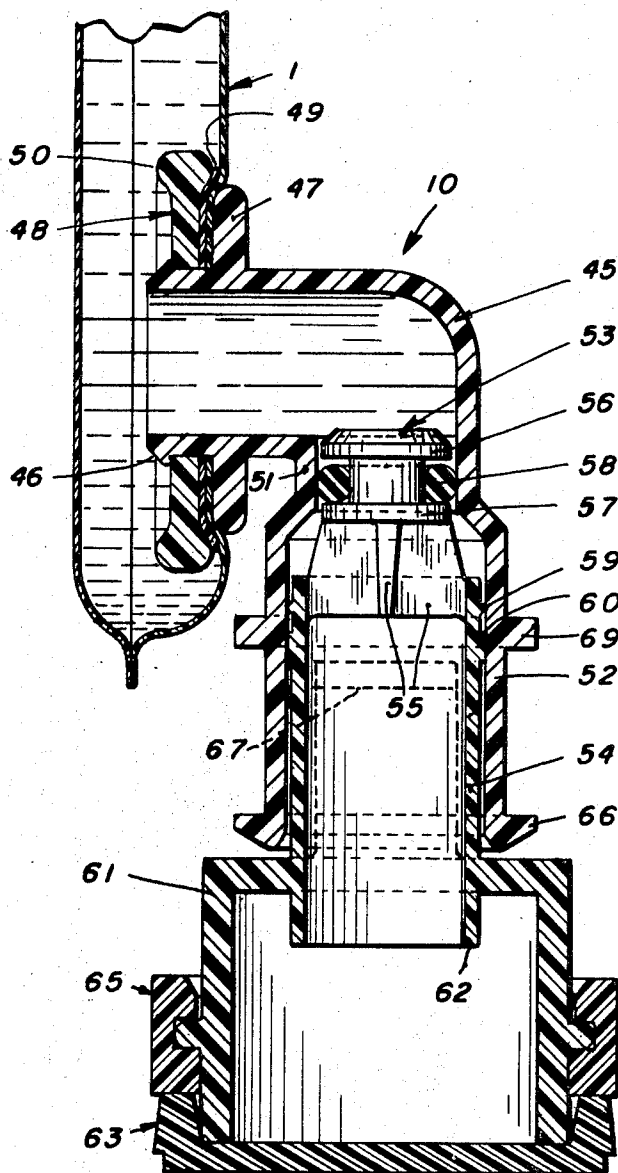


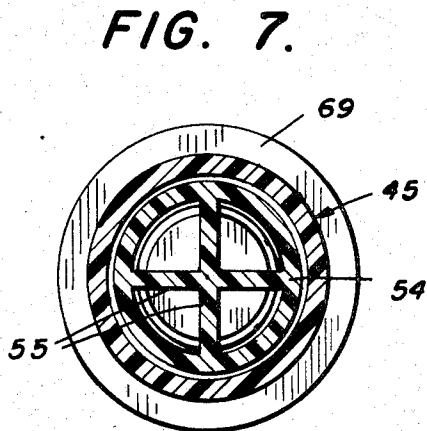
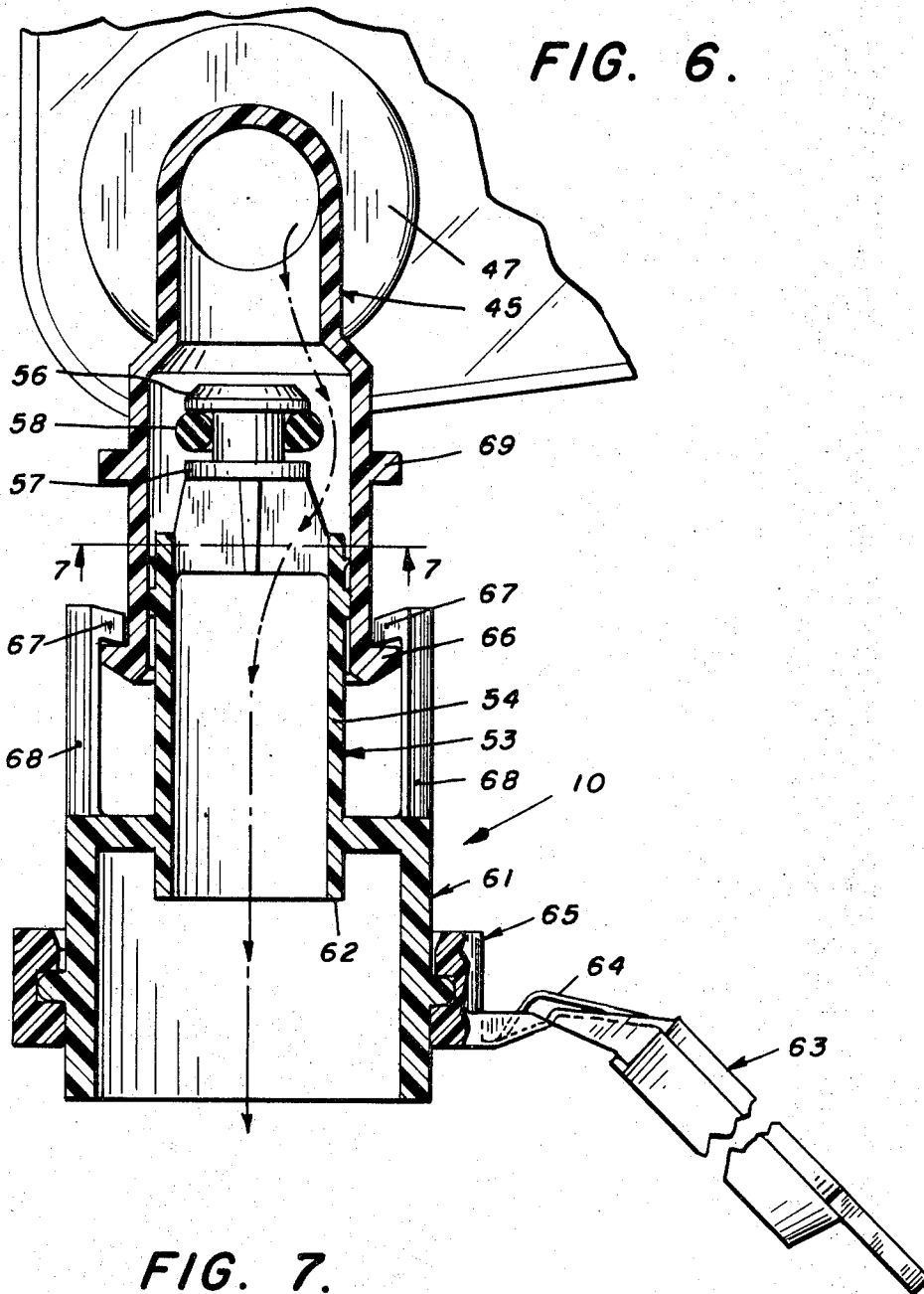
FIG. 5.



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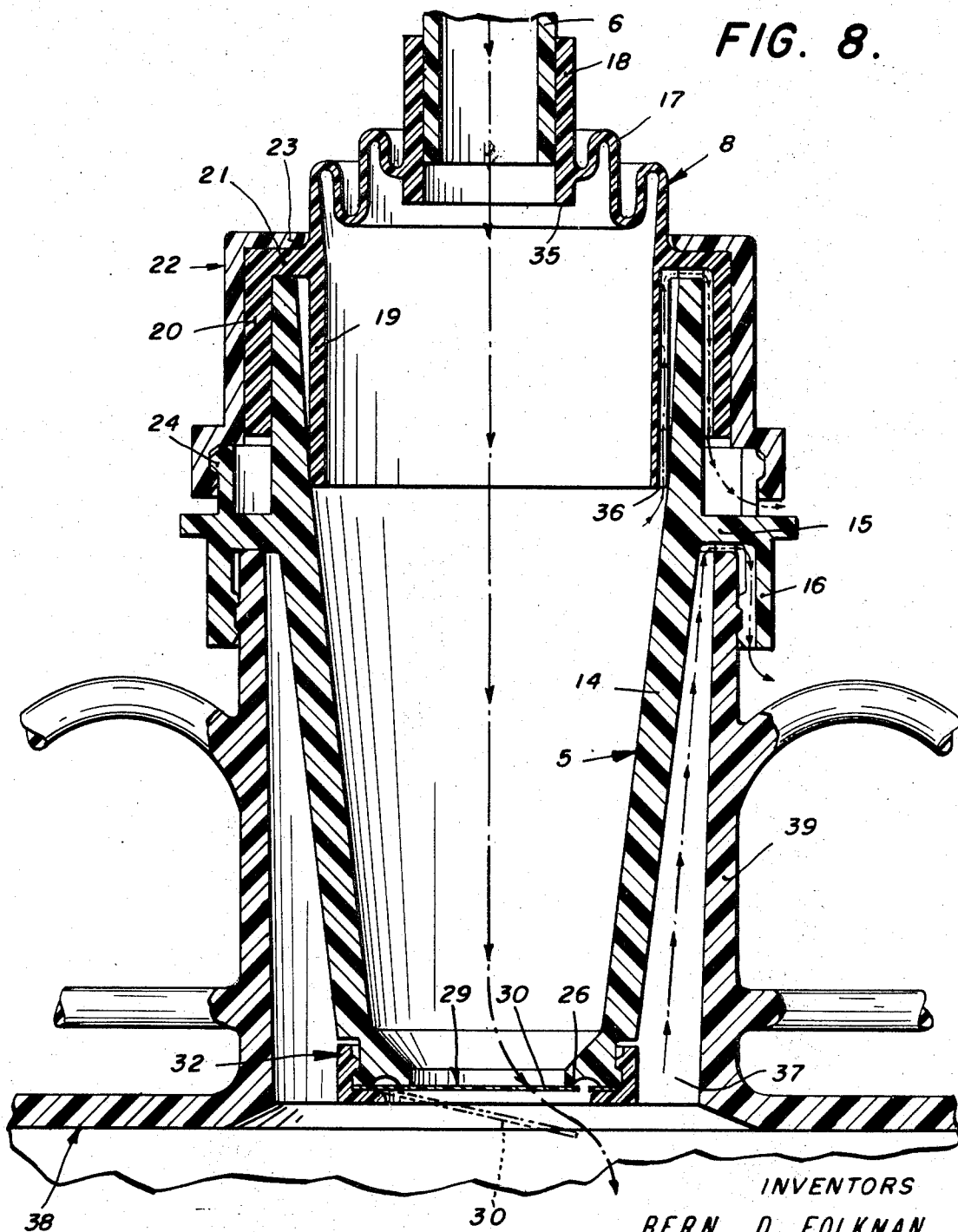


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FIG. 8.



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COLLECTION CONTAINER FOR MEDICAL LIQUIDS

This invention relates to a container for collecting urine from a patient. Many post operative patients and patients with urological disorders have urine continually collected from them. This is done by inserting a catheter into the patient's urethral canal and then connecting a flexible collection tube to the catheter. A container is connected to a bottom end of the collection tube and urine drains from the patient into the container.

After urine stands in this container for a period of time, bacterial growth in the collected urine greatly increases. Thus, it is important that urine within the container be kept out of contact with urine flowing through the collection tube to prevent creep contamination along the urine column back up into the patient's bladder. It is also important to prevent collected urine in the container from being hydraulically forced back into the patient if the container is flexible and is accidentally squeezed.

In this invention, these obstacles have been overcome by a unique drip housing that fits within a rigid tubular neck sealed between wall panels of a layflat bag or within a rigid tubular neck of a one-piece blow-molded container. This drip housing provides an air break in the urine column and in addition has a one-way disk valve at its bottom end that keeps collected urine from being forced back into the patient. The invention also has a safety vent feature, including a first vent which leads to the atmosphere from above the disk valve, and a second vent which leads to the atmosphere from below the disk valve. Such double vent structure insures that the patient can still void urine through the first vent even if the disk valve happens to stick shut, and also allows air and urine to exit from the container through the second vent, eliminating back pressure up the urine column to the patient.

In use, urine drains from the patient along the collection tube, through the drip housing, and into the container. With patients who have to be kept on a catheter for long periods of time, the collection container must be periodically emptied. We have provided a unique outlet valve structure at the bottom of the container, which valve structure has a reciprocable hollow plunger that opens and closes the valve. A nurse can empty the container through this valve without disconnecting the container from the collection tube.

The invention will become more clear with reference to the drawings, in which:

FIG. 1 is a front elevational view of the container showing the flexible layflat bag embodiment;

FIG. 2 is an enlarged cross-sectional view taken along line 2-2 of FIG. 1;

FIG. 3 is a bottom plan view of the disk valve shown in FIG. 2;

FIG. 4 is an enlarged cross-sectional view taken along line 4-4 of FIG. 1;

FIG. 5 is an enlarged cross-sectional view taken along line 5-5 of FIG. 1 showing the valve in closed position;

FIG. 6 is an enlarged cross-sectional view of the outlet valve similar to FIG. 5, but showing the valve rotated 90° with the valve in open position;

FIG. 7 is a cross-sectional view taken along line 7-7 of FIG. 6; and

FIG. 8 is an enlarged cross-sectional view similar to FIG. 2, but showing the drip housing mounted in the rigid neck of a blow-molded collapsible container.

Referring specifically to the drawings, FIG. 1 shows the container 1 in the form of a layflat bag with a rigid handle 2 sealed in its mouth 3. In a center of the handle is a rigid tubular neck 4 into which fits a drip housing 5. A flexible collection tube 6 with a connector 7 on its distal end for connecting to a catheter leads to an upper end of the drip housing and is connected thereto by a flexible adapter 8. Urine collects in the bag which has a sloping bottom 9, the lower end of which has a manually operable valve 10 for emptying the bag while it is still connected to collection tube 6.

The specific details of the drip housing are shown in the cross-sectional view of FIG. 2. Here, we have the rigid tubular

neck 4 sealed between two flexible walls 11 and 12 of a layflat bag. The flap section torn away is to show construction of the bag. As shown here, the tubular neck 4 fits within an annular portion 13 of a rigid handle 2. The drip housing itself includes a tubular sleeve 14 that telescopes inside tubular neck 4, an outlet disk valve structure at its bottom end, and flexible adapter 8 at its upper end. The tubular sleeve 14 has a peripheral ledge 15 with a depending skirt 16 which has a groove therein. This skirt groove snaps over a peripheral rib on the upper end of the tubular neck to lock the sleeve to the neck.

Closing off a top of tubular sleeve 14 is an adapter 8 having a flexible convoluted end wall 17 and a central tube retainer 18 which also forms a depending drip tube inside the drip housing. The adapter has depending concentric inner and outer skirts 19 and 20 that fit respectively inside and outside the tubular sleeve 14, and a shoulder 21 joins the two skirts together. To insure that the adapter is firmly locked on the tubular sleeve 14, a rigid collar 22 surrounds the outer skirt and has an inwardly extending flange 23 that overlies shoulder 21 of the adapter. A lower end of this collar has an internal groove that snaps over a rib on an upstanding ring 24 on the external ledge of the tubular sleeve.

At a bottom of tubular sleeve 14 is the drip housing's outlet disk valve structure. The bottom of the tubular sleeve has an inner wall 25 that tapers inwardly to an outlet and has a valve seat 26 surrounding the outlet. Encircling the valve seat 26 and separated therefrom by a groove is a valve clamping surface 27. Fitting against this valve clamping surface is an outer circumferential portion 28 of a disk valve 29, with this valve best shown in the plan view of FIG. 3. It has been found that a disk valve of Mylar (Du Pont trademark) polyester plastic works very well. A center flap portion 30 of this disk valve is separated from the circumferential portion by a C-shaped slot 31. The circumferential portion 28 is firmly held to the valve clamping surface by a retainer ring 32 which is snap fitted by a rib and groove structure to an external surface of the tubular sleeve. This retainer ring has an inwardly directed flange 33 that stops short of the valve seat 26. In this combination, the center flap portion 30 of the valve swings downwardly from the weight of the urine to empty the drip housing of urine. However, the center flap portion 30 is spring biased upwardly against the valve seat by a connecting web 34. This construction allows urine to drain from the drip housing but not re-enter the housing from the container. This disk valve also has a unique advantage of providing little, if any, resistance to blood clot passage through the valve because of the valve's wide opening. Previous valves formed of layflat tube sections could be held open if a blood clot lodged in the tube.

When connected to a patient, urine flows down through the collection tube 6, drips off the end of drip tube 35, which is substantially smaller than tubular sleeve 14, and into the drip housing. This provides an air break in the urine column to prevent bacterial growth from the collected urine back up into the patient's bladder. Urine within the drip chamber runs out through the disk valve at the bottom of the tubular sleeve. If this valve happens to stick shut, the patient can still pass urine, thus providing a safety feature for the patient. In this case, urine from the drip housing travels through a tortuous first vent 36 between the upper section of the tubular sleeve and the concentric skirts of the adapter. The vent is "tortuous" to reduce chances of bacteria entering the container through this first vent.

Also providing a safety feature for the patient is a second tortuous vent 37 leading from the container's interior between the tubular neck and tubular sleeve to the atmosphere. Thus, if the container is flexible and accidentally squeezed, urine and air can exit through this second vent without creating a back pressure on the urine column or hydraulically pushing collected urine back up into the patient. Should any urine be pushed out through second vent 37, ledge 15 keeps the urine from contaminating first vent 36.

In the above explanation of FIG. 2, the drip housing has been described as being in the rigid neck of a layflat bag. This same drip housing also works well in a neck of a one-piece blow-molded collapsible container 38, as shown in FIG. 8. In FIG. 8, the tubular neck 39 is an integral and homogeneous part of the container's top wall such as in U.S. Pat. No. 3,319,684. The parts of the drip housing are essentially the same as shown in FIG. 2.

In FIG. 2, this drip housing is fitted in a tubular neck which in turn is fitted within an annular portion 13 of a long, flat rigid handle. The handle has a pair of finger holes 40 and 41 (see FIG. 1) in its upper portion and has a series of elongated transverse slots 42 and 43 in its lower portion. This handle fits within the mouth of a layflat bag and the bag walls are heat sealed or otherwise bonded to each other within these slots to permanently join the handle to the bag. If desired, another lateral heat seal 44 can be made below the handle 2. This structure for joining the handle and bag together works particularly well when the bag and handle are of dissimilar plastic materials that are not heat sealable to each other.

Now that we have discussed the drip housing as it relates to either a layflat bag or a collapsible blow-molded container, we go on to the feature of the container which allows it to be emptied while still connected to a patient.

As shown in FIG. 5, the container has a valve at its lower end. This valve 10 includes a rigid outlet tube 45 in the form of an elbow. An upper end of the elbow has a peripheral snap ring 46 and an external flange 47 spaced from the snap ring. The upper end of the outlet tube fits within an opening in the container wall, and a washer 48 with an opening smaller in diameter than the snap ring is wedged over the snap ring to firmly grip the container wall between the flange and washer. Preferably, there is also provided a resilient rubber gasket 49 in face to face relationship with the container wall to give a liquid-tight joint. It has also been found that an enlarged peripheral rib 50 about the washer bends the container wall about the flange 47 and thus helps to make a very tight joint.

In FIG. 5, the rigid outlet tube has a horizontal portion and a vertical portion. This vertical portion has a smaller diameter portion 51 and a larger diameter portion 52 joined by a shoulder. Within the vertical portion is a longitudinally reciprocal plunger 53 having a tubular body with a bore therethrough and a piston 54, which piston has a web 55 at its lower end fitted within and integrally joined to the tubular body. This web has a smaller cross-sectional area than the body bore whereby liquid can flow around the piston and into the body bore. The piston 54 has a head with a pair of spaced ribs 56 and 57 and a resilient O-ring 58 fitting between these ribs. This O-ring seals with an inner surface of the small diameter portion of the outlet tube but not with its large diameter portion. Liquid is kept from flowing between the tubular body and the inner surface of the outlet tube's large diameter portion by a pair of wiper rings 59 and 60 on the external surface of the tubular body.

The plunger has at a lower end of its tubular body an integral rigid drip housing 61 of substantially larger diameter than the tubular body. The tubular body extends a short distance downwardly into the drip housing to form a drip tube 62. Thus, the drip housing 61 forms a guard around the drip tube 62 as urine drains out of a lower end of the drip tube 62. When the valve is shut, a hinged lid 63 closes off a lower mouth of the drip housing 61. Preferably, the lid is connected by a toggle hinge 64 to a ring 65 surrounding the drip housing, and this toggle hinge holds the lid either in a closed or open position.

As used, the container is connected to a catheterized patient as explained above. When the container needs emptying, a nurse simply swings the lid 63 to one side of the drip housing and pulls down on drip housing 61, which in turn pulls piston 54 out of the small diameter portion of the outlet tube opening up a passage for urine to flow. Stop tab 66 limits the downward movement by abutting against an inwardly directed ear 67 on a longitudinal arm 68 extending upwardly from drip

housing 61. After the container is empty, she closes the valve by pushing upwardly on the drip chamber until ear 67 abuts stop tab 69, limiting upward movement. She then swings the lid over the drip chamber mouth. This lid and drip housing provide a compartment that protects the end of drip tube 62 from contamination.

In the foregoing specification, specific examples have been used to illustrate the invention. However, it is understood that persons skilled in the art can make certain modifications to these embodiments without departing from the spirit and scope of the invention.

We claim:

1. For collecting urine, the combination of: a container with a tubular neck portion at its upper end; a hollow drip housing attached to said tubular neck portion and being in flow communication with the container which is substantially larger than the drip housing; a flexible collection tube connected to an upper end of the drip housing; said drip housing having an outlet orifice at a bottom thereof encircled by a valve seat at the drip housing's lower edge; and a flexible disk valve biased upwardly against said valve seat, whereby liquid can flow through the collection tube to the drip housing and out of the drip housing into the container, but cannot flow from the container back into the drip housing.

2. The combination as set forth in claim 1 wherein the combination has a vent means above said disk valve providing a passage from inside the drip housing to the atmosphere, whereby liquid can flow through the collection tube even if said disk valve becomes stuck shut.

3. The combination as set forth in claim 1 wherein the container is a layflat flexible bag with a neck portion sealed between opposite walls of the bag.

4. The combination as set forth in claim 1 wherein the container is a layflat thermoplastic bag having opposed walls joined together about their peripheries except along their top edges which define a mouth of the bag, and the combination also includes: a flat rigid handle fitted within the mouth of said bag, said handle having at least one finger opening above the upper edges of the bag walls and at least one transverse slot below the upper edges of the bag walls; said tubular neck portion being connected with the handle and providing an entrance passage to the bag's interior; and said opposed bag walls being sealed to each other within the slot to permanently connect the handle to the bag.

5. The combination as set forth in claim 1 wherein the neck portion is integrally and homogeneously formed with a top wall of a blow-molded container.

6. The combination as set forth in claim 1 wherein the drip housing includes a tubular sleeve with an orifice at its bottom end, and an adapter joined to an upper end of the tubular sleeve, said adapter having a flexible top wall connected to one end of the collection tube.

7. The combination as set forth in claim 6 wherein the adapter has a depending skirt telescopically received on the tubular sleeve.

8. The combination as set forth in claim 7 which also includes a rigid collar surrounding the adapter skirt, said rigid collar having an inwardly directed flange that overlies a shoulder on the adapter, said collar being secured to said tubular sleeve whereby the collar in turn holds the adapter to the tubular sleeve.

9. The combination as set forth in claim 1 wherein the disk valve has a C-shaped slot separating a center flap portion and an annular circumferential portion.

10. The combination as set forth in claim 9 wherein the disk valve's annular peripheral portion extends outwardly beyond the valve seat and is held to a bottom of the drip housing by a retainer ring with an inwardly directed flange which is concentric with and spaced from the valve seat.

11. A urine collection container; a flexible conduit above the container; and enlarged drip housing with an upper end connected to the conduit for receiving urine from the conduit, said drip housing having an outlet at a bottom thereof in flow

communication with the container which is substantially larger than the drip housing; a downwardly facing valve seat encircling the outlet; and a movable disk valve biased upwardly against said valve seat to provide a one-way liquid check valve.

12. For collecting medical liquids, the combination of: a container with a tubular neck portion; a tubular sleeve fitting within the tubular neck portion, and retained therein by a mating groove and rib structure on the tubular neck and sleeve; and an adapter closing off an upper end of the tubular sleeve, said adapter having concentric inner and outer skirts joined by a shoulder, the inner and outer skirts fitting respectively inside and outside said tubular sleeve; a flexible end wall integral with the adapter and having an integral tube retainer; a flexible collection tube joined at one end to the tube retainer of the adapter; a drip tube extending downwardly from the flexible wall into the tubular sleeve, said drip tube being substantially smaller in diameter than said tubular sleeve; a rigid collar fitting around the outer skirt and snap fitted by a rib and groove construction to the tubular sleeve, said collar having an inwardly directed flange overlying said adapter shoulder holding the adapter to the tubular sleeve; said sleeve having an outlet orifice at its bottom end and a valve seat surrounding the orifice; a disk-shaped valve member with a C-shaped slot separating a center flexible flap portion from an annular circumferential portion extending beyond the valve seat, with the center flap portion adapted to seat against said valve seat; and a snap ring fitted onto a lower end of the tubular sleeve, said snap ring including an inwardly directed flange that tightly holds the annular circumferential portion of the disk valve next to the tubular sleeve's lower end, whereby liquid can flow through the collection tube into the drip housing and from there into the container, but liquid cannot flow from the container back up into the drip chamber, said combination having first vent means and second vent means providing passages respectively from above and below the disk valve.

13. For collecting medical liquid, the combination of: a container with an inlet port at its top and an outlet port at its bottom; a rigid outlet tube connected to the outlet port, said outlet tube having a bore with small and large diameter portions joined by a shoulder; a plunger fitting within the outlet tube and movable reciprocally along the outlet tube's bore; said plunger having a piston that forms a liquid-tight seal with the outlet tube in its smaller diameter bore portion, but not in its large diameter bore portion; said plunger including a body with a passage through which liquid can flow from the container when the piston is in the outlet tube's larger diameter bore portion; and said plunger also including an outlet drip housing of larger internal diameter than said passage, which outlet drip housing is connected with the plunger body portion to provide a shield for liquid draining from the plunger passage.

14. The combination as set forth in claim 13 wherein the outlet tube is in the form of an elbow with one end joined to the container.

15. The combination as set forth in claim 13 wherein the container is a layflat bag.

16. The combination as set forth in claim 13 wherein the outlet tube has an external snap ring on one end and an external flange spaced from the snap ring on the outlet tube; and the combination includes a washer with an aperture smaller in diameter than the snap ring, said washer fitting between the snap ring and the flange to retain a wall of the container between the washer and the flange.

17. The combination as set forth in claim 16 wherein there is a resilient gasket surrounding the outlet tube, said washer being in face to face contact with the container's wall.

18. The combination as set forth in claim 13 wherein the piston has a pair of longitudinally spaced ribs, and an O-ring is fitted between these ribs.

19. The combination as set forth in claim 13 wherein the plunger's body portion has at least one external wiper ring in sealing relationship with an inner surface of the outlet tube's large diameter bore portion.

20. The combination as set forth in claim 13 wherein the plunger's body portion is tubular with a center passage for liquid to flow, and the piston includes a web construction at its lower end which has less cross-sectional area than the center passage of the plunger, said web being integrally joined to an upper end of the plunger's tubular body portion.

21. The combination as set forth in claim 13 wherein the plunger and the outlet tube have cooperating means for limiting the longitudinal travel of the plunger within the outlet tube's bore.

22. The combination as set forth in claim 21 wherein the means includes a pair of longitudinally spaced stop tabs on the outside of said outlet tube; a longitudinally extending arm on the plunger; and an inwardly extending ear on the arm, said ear being positioned between the stop tabs so as to abut the stop tabs at opposite extremes of longitudinal movement of the plunger in the outlet tube.

23. For collecting medical liquid, the combination of: a container with an inlet port at its top and an outlet port in its side wall adjacent a bottom of the container; a rigid outlet tube in the shape of an elbow with one end of the outlet tube fitting within the outlet port, said outlet tube including a peripheral snap ring around the outlet tube's end inside the container, and an external flange spaced from the snap ring, said flange being outside the container wall; a washer with an opening smaller in diameter than the snap ring fitting between the snap ring and the flange to hold the container wall between the snap ring and flange; a resilient gasket in face to face relationship with the container wall about the outlet port to prevent liquid leakage; said outlet tube having a small diameter bore portion and a large diameter bore portion which are joined by a shoulder; a plunger reciprocally movable within the outlet tube, said plunger including a piston adapted to form a liquid-tight sliding seal with the small diameter bore portion of the outlet tube but not with the large diameter bore portion, said piston having a pair of longitudinally spaced ribs, and a resilient O-ring fitting between these ribs; a tubular body portion of the plunger having a central passage through which liquid can flow; said piston having a web structure at its bottom, which web structure is smaller in cross-sectional area than said body portion passage of the plunger, said web structure being integrally joined to an upper end of the tubular body portion, whereby liquid can flow around said piston, through the web structure and into said passage; at least one wiper ring on the tubular body portion for sealing against an internal wall surface of the outlet tube's large diameter bore portion; said plunger including a drip housing of substantially larger diameter than the body portion passage, said drip housing being connected to the body portion to provide a shield for liquid draining from said passage, said drip housing having an open mouth at its bottom; a drip tube connected with the passage and extending inside the drip housing; and a spring-biased hinged lid connected to the plunger, said lid toggling between a closed position over said mouth and an open position to one side of said mouth.