Sept. 26, 1967 R. E. ERICSON 3,343,542

URINE COLLECTION BAG

Filed July 30, 1964

Fig. 1.

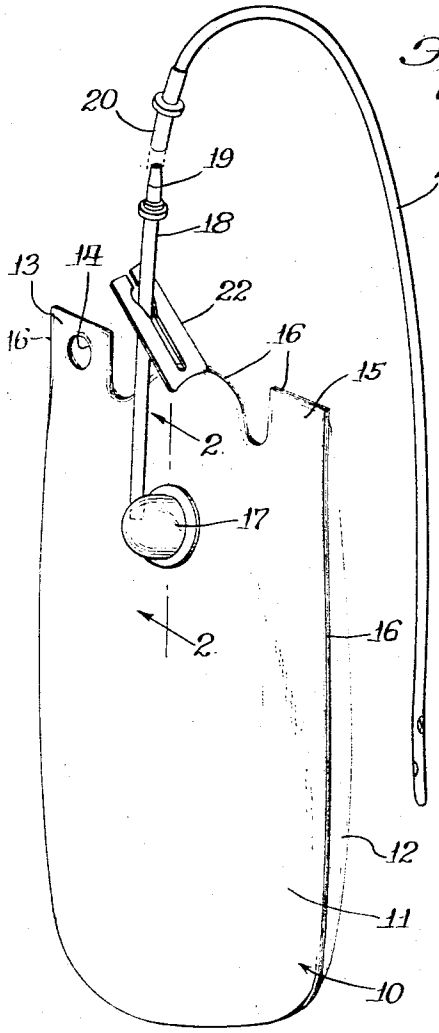


Fig. 2.

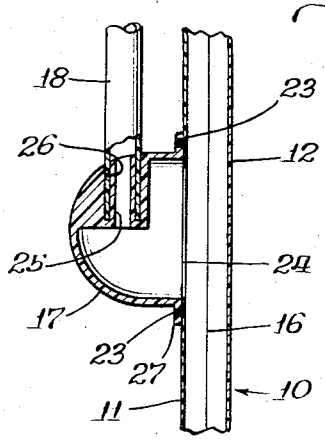


Fig. 3.

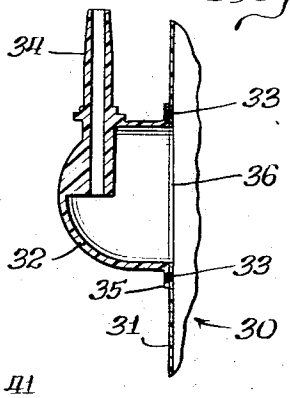


Fig. 4.

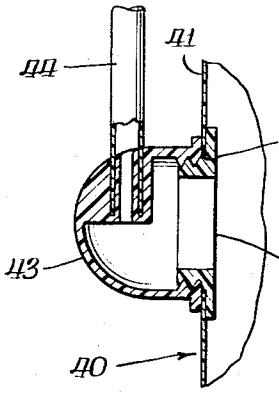
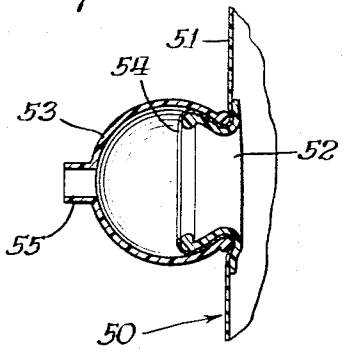


Fig. 5.



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URINE COLLECTION BAG

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ABSTRACT OF THE DISCLOSURE

A closed system urine collection bag having a drip chamber attached to the face of one of the panels of the bag so that urine flowing through tubing into the bag passes intermediately through the drip chamber. The drip chamber permits observation of urine flow into the bag and also prevents backflow of urine into the tubing, whether the bag be in a vertical, inclined or horizontal position.

This invention is concerned with urine collection bags of the type used in conjunction with oridinary and indwelling catheters. Specifically, the invention is concerned with collection bags which are designed to be used once in a closed system and then discarded.

Urine collection systems are of two types: closed systems and open systems. With closed systems there is the advantage that outside bacteria cannot invade the bladder through the open tubing and the catheter. This system also has the advantage that it can be used either lying flat on the bed or hanging vertically. Where it lies flat, there is no leakage but it is impossible to determine when urine is flowing in the system even when the collection bag and tubing are transparent. When the bag lies flat, the urine already in the bag has some hydrostatic pressure and this slows up the incoming urine so that it backs up in the tubing. It thus takes longer to drain a bladder when the bag lies flat than when it is vertical in the closed system. The open system and closed system are equally expeditious in draining a bladder when the bags are vertical.

The open system with its vertical collection bag may employ a "drip chamber," however, such as those used in the line for blood transfusions. These transparent drip chambers permit flow to be observed because when used vertically the enlarged chamber is never filled but the fluid flows out as fast as it enters. Some urine collection systems now available use a drip chamber with an open bottom. The chamber "plugs in" to an opening between the walls of the collection bag. This collection system while it is substantially closed must still be considered "open" because if placed horizontally urine will leak out and hence it is possible for bacteria to leak in. A plug-in system, even if made watertight in a closed system, would be a step in the proper direction but the drip chamber would not function properly if the bag and tubing were lying horizontally because of the backup problem.

Urine collection bags ideally should be part of a closed system containing a drip chamber which functions properly both when lying horizontally and suspended vertically. The rate of flow should be similar for bags lying horizontally to that of bags vertically suspended and there should be no urine backup in the tubing.

The drip chambers of this invention are preferably molded of thermoplastic material by injection molding but other methods of molding and forming may be utilized such as by reforming plastic tubing, for instance.

It is the object of this invention to provide a urine collection bag with an attached drip chamber in a closed system which latter will function properly either with the bag suspended vertically or on an incline or with the bag lying horizontally.

It is a further object of the invention to provide a closed system urine collection bag which may be filled in the horizontal position whereupon the drip chamber will automatically adjust its position so as to remain above the fluid in the bag.

It is a further object of this invention to provide a closed system urine collection bag with an attached drip chamber which bag, lying horizontally and containing urine whether in the connected or disconnected condition, will not permit backflow of urine into the drip chamber or the attached tubing.

Other objects of the invention will be apparent from an inspection of the specification and from the drawings wherein:

FIGURE 1 illustrates in prespective a typical collection bag of the invention with a connecting tube and fittings for connection to a urinary catheter.

FIGURE 2 is a cross section of a portion of the bag of FIGURE 1 showing the drip chamber about normal size.

FIGURE 3 shows a variation of the drip chamber with an integral tapered fitting in cross section.

FIGURE 4 illustrates in cross section a two-piece drip chamber wherein the two parts screw together to form a clamp.

FIGURE 5 illustrates in cross section a two-piece drip chamber wherein the two parts are a snap-fit clamp.

Urine collection systems are furnished to hospitals complete with either ordinary or indwelling catheters and in sterile ready-to-use condition. With ordinary catheter systems because of the difficulty of adequately cleaning and sterilizing such systems after use and because of the danger of reuse even on the same patient without sterilization, it is becoming increasingly prevalent to dispose of the entire system after a single use. The urine collection bag of this invention is simply and specifically designed for single use. The fact that the bag with its drip chamber may be used horizontally permits relatively short tubing because the bag may be placed quite close to the patient. Where the catheter is inexpensive, such as those made of extruded tubing, the whole system may be discarded quite economically after a single use.

Where an indwelling catheter is the preferred type, the relatively short tubing necessary with the collection bag of this invention is also advantageous. After clamping shut the tube, the collection bag may be disconnected by means of the conical fitting and replaced with a fresh bag. However, if handled carefully so as to keep the drip chamber above the urine no clamp for the collection bag is necessary on disconnecting it.

Referring once more to the drawings:

In FIGURE 1 the urine collection bag **10** is formed of two panels **11** and **12** of film. It is preferred that one of the panels be transparent and one be embossed since it is advantageous to determine the liquid level in the bag and the embossing helps separate the two panels as the initial liquid enters. The bag preferably is made of two separate sheets sealed all around their peripheries with the seal **16** but it may be made of a single sheet folded to make the two panels or may be of tubular film sealed around the remaining superimposed edges of the two panels to form a closed structure except for the drip chamber **17**. The preferred embodiment of the invention has projecting ears **13** and **15**, ear **13** having a perforation **14** which has a sealed area around the hole. Preferably, the films **11** and **12** are sealed in face-to-face contact throughout the entire area of ear **13**. Ear **15** on the other hand, is preferably sealed only at its border edge so that the ear is hollow and connects with the hollow interior of the bag. In practice, after the bag is filled, the clamp **22** is used to close the tube **18**. Thereafter the connection between the friction fit female connector **20** and the

male connector **19** is broken and the detached bag is removed to a urinal. The bag may be emptied by snipping off the seal on the ear **15**.

Obviously the shape of the bag is not critical and the ears **13** and **15** may be eliminated entirely, if desired.

With regard to sealing, it is preferred that the seals **16** be made with electronic heat-sealing equipment. This method of sealing produces very narrow strong seals which are relatively inconspicious. But wider heat seals may be utilized if that is expedient or the seals may be made with suitable water insoluble cements and glues although the products are far less attractive.

The catheter **21** of FIGURE 1 is a simple tubular type formed of extruded vinyl tubing. When made slightly longer, a catheter of this type may be connected by means of female fitting **20** directly to the drip chamber where the latter is equipped with an integral male fitting such as **34** in FIGURE 3. But the catheter tube itself may be connected to the drip chamber as in FIGURE 2 substituting the tube **21** for the tube **18**. Other more elaborate catheters such as inflatable and other types of retentive indwelling catheters may similarly be used with the collection bag of the invention.

The novelty of the invention largely resides, however, in the unique drip chamber **17** which unlike all previous drip chambers is attached to the face of one of the collection bag panels. The liquid entering the drip chamber thus passes through a hole in the panel to enter the collection bag. In FIGURE 2, the flange **27** of the drip chamber **17** is sealed to the panel **11** of bag **10** by means of seals **23**. preferably, the seal is an electronic heat seal but other heat seals and water-insoluble solvent cements and glues may be substituted, if desired. The hole **24** in the panel **11** is preferably made so as to coincide with the open bottom of the drip chamber **17**. The tube **18** (or alternatively the catheter tube **21**) is inserted into the drip chamber with the nipple **25** projecting into the tube bore. A cylindrical or slightly conical channel exists around the nipple **25** and the tube **18** (or **21**) fits within this channel surrounding the nipple. The fit is a friction fit but cementing or gluing may be utilized as well.

In FIGURE 3, the collection bag **30** has one film panel wall **31** to which the flange **35** of the drip chamber **32** is heat sealed, cemented or otherwise attached by the seal **33**. The hole **36** coincides with the open bottom of the chamber. The drip chamber has an integral conical male fitting **34** which permits a female fitting such as **20** of FIGURE 1 to be directly connected. Obviously, the integral fitting may be female which connects to a male fitting on the catheter or tubing.

In FIGURE 4, the collection bag **40** has one film panel wall **41** with a hole **45** therein. The drip chamber is in two parts **42** and **43** which screw together to form a pressure seal around the hole **45** and fasten the drip chamber to the bag. The tube **44** fastens to the drip chamber in the same way as tube **18** fastens to the drip chamber in FIGURE 2.

In FIGURE 5, the collection bag **50** has one film panel wall **51** with a hole **54** therein. Again the drip chamber is in two parts, a transparent relatively stiff female portion **53** which includes the dome portion of the chamber and a male portion **52** which is more flexible and resilient, the two portions constituting a snap fitting which clamps the film between them. The portions thus create a watertight seal and also fasten the drip chamber to the bag. The nipple **55** may have a tube fitted over it or fitted into it preferably being cemented or glued in place.

One advantage inherent in the collection bag of this invention is due to the fact that as the bag fills the drip chamber is moved outwardly automatically. This permits the bag to be flat in a substantially horizontal position or

at any angle to the vertical so long at the drip chamber is on top and at the high end of the chamber as it is placed in position. Thus, if the collection bag is placed between the patient's legs lying flat on the bed, no urine can spill and there can be no backup since the drip chamber will always be above the level of liquid in the bag. Likewise, the bag may be placed alongside the patient with the tubing passing either over or under the interposed leg.

I claim:

1. A urine collection bag comprising a urine retention chamber, a flexible wall of said chamber, an aperture in said wall, said chamber being watertight except for said aperture, a drip chamber attached to said flexible wall and forming a watertight seal with said wall around said aperture and means integral with said drip chamber for attachment thereto of a tube whereby urine may flow out of said tube into and through a portion of said drip chamber having an internal diameter substantially greater than that of said tube and then into said retention chamber, said drip chamber having a portion through which the progress of urine therethrough may be viewed.

2. The urine collection bag of claim **1** wherein the drip chamber is heat sealed to said flexible wall.

3. The urine collection bag of claim **1** wherein the drip chamber is adhesively attached to said flexible wall by a water insoluble adhesive.

4. The urine collection bag of claim **1** wherein the means integral with said drip chamber for attachment thereto of a tube is a nipple.

5. The urine collection bag of claim **1** wherein the drip chamber is in two parts which interfit to clamp the edges of said aperture between them.

6. The urine collection bag of claim **5** wherein the drip chamber parts screw together.

7. The urine collection bag of claim **5** wherein the drip chamber parts snap together.

8. The urine collection bag of claim **1** wherein the flexible wall is a transparent film.

9. The urine collection bag of claim **1** wherein the bag is formed of two sheets of film sealed together around their peripheries.

10. The urine collection bag of claim **9** wherein the two sheets of film are heat sealed in a narrow band bordering their peripheries.

11. The urine collection bag of claim **1** wherein the integral nipple is a tapered fitting.

12. The article of claim **1** wherein the bag includes integral means whereby it may be suspended vertically.

13. The urine collection bag of claim **1** including an attached tubing and a connector.

14. The article of claim **13** including means for temporarily closing the channel of said tubing.

15. The urine collection bag of claim **1** wherein the drip chamber is an integral molded fitting.

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