United States Patent [19]

Chittenden et al.

[11] **3,927,671**

[45] **Dec. 23, 1975**

[54] **IRRIGATION SOLUTION ADMINISTRATION SYSTEM AND RESERVOIR THEREFOR**

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[22] Filed: **Mar. 16, 1973**

[21] Appl. No.: **341,807**

Related U.S. Application Data

[62] Division of Ser. No. 140,407, May 5, 1971, Pat. No. 3,756,237.

[52] **U.S. Cl.**..... **128/227;** 128/214 R; 128/DIG. 24

[51] **Int. Cl.²**..... **A61M 3/00**

[58] **Field of Search**..... 128/214 C, 227, 214.2, 128/214 R, DIG. 24

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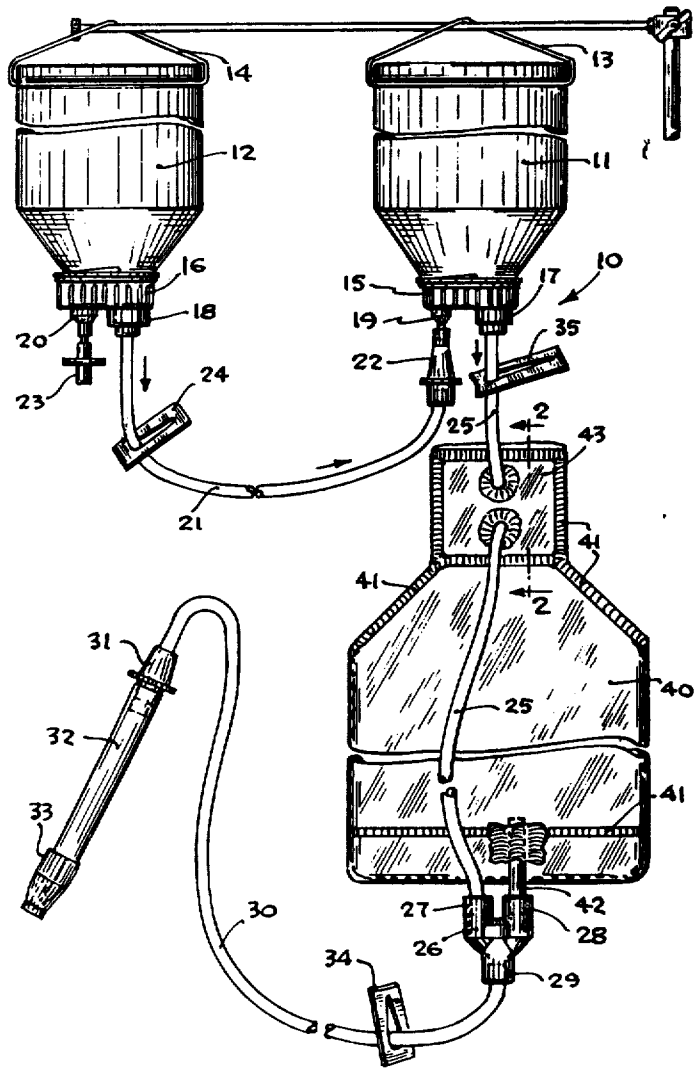
[57] **ABSTRACT**

An irrigating solution administration system including a reservoir positioned for parallel flow of fluid from the solution container and the reservoir to the instrument being used is provided. The reservoir is placed in-line with the tubing connecting the solution container and instrument by means of a Y-type connector, for example. The reservoir assists in maintaining a constant pressure head, particularly when the reservoir comprises a flexible pouch, and increases the flow rate of fluid to the instrument.

5 Claims, 4 Drawing Figures



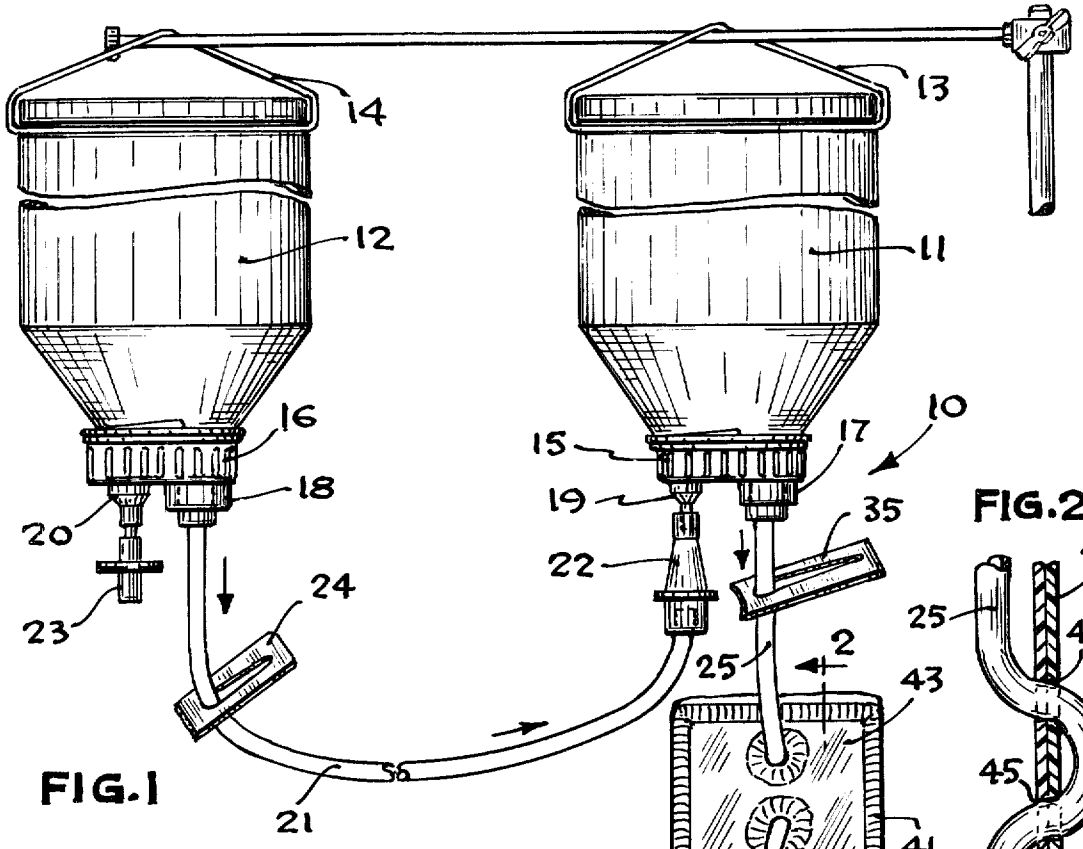


FIG. 1

FIG. 2

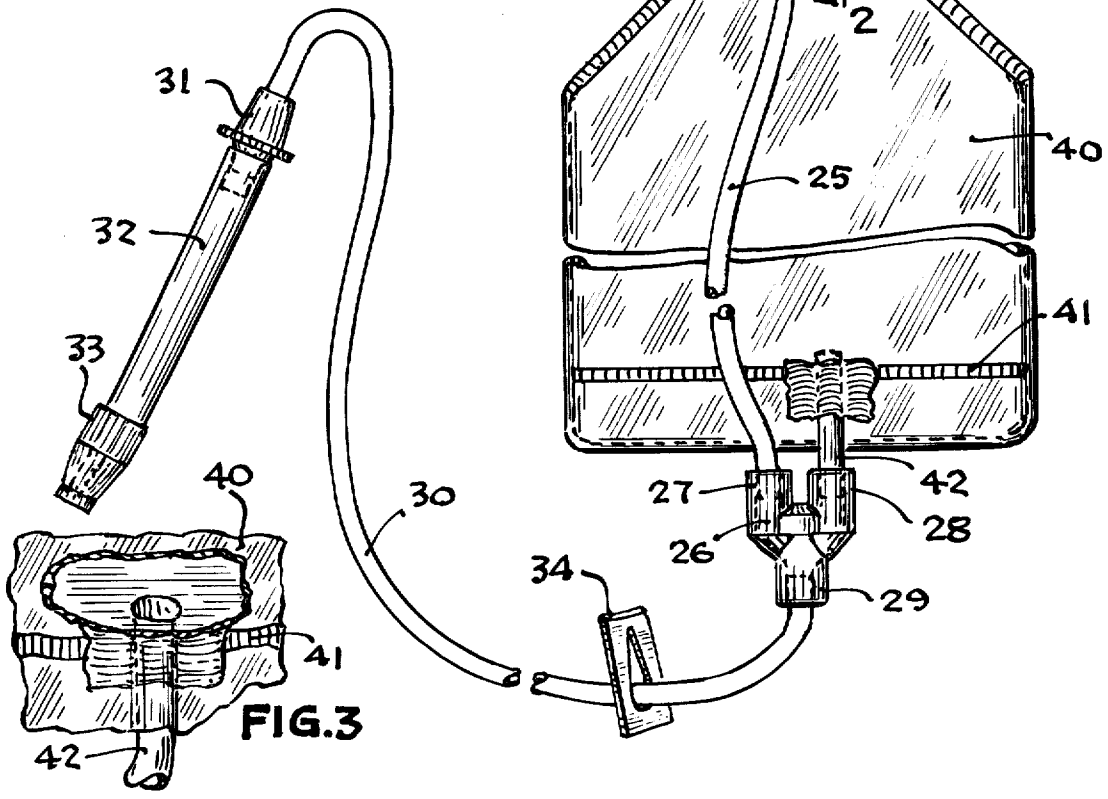
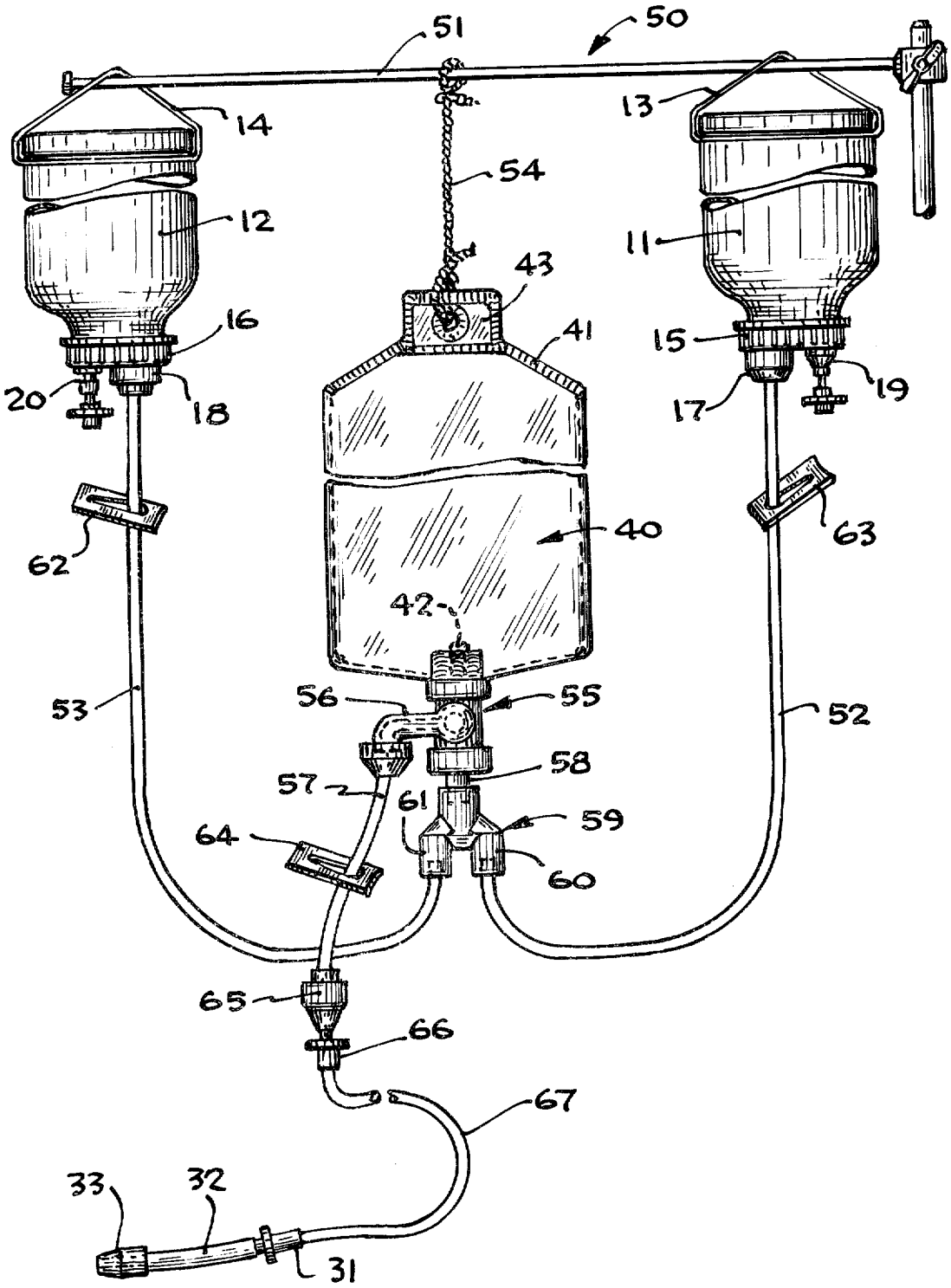


FIG. 3

FIG. 4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IRRIGATION SOLUTION ADMINISTRATION SYSTEM AND RESERVOIR THEREFOR

This is a division of application Ser. No. 140,407, filed May 5, 1971, now U.S. Pat. No. 3,756,237.

BACKGROUND OF THE INVENTION

Irrigating solutions are used for prophylaxis, treatment, and other special purposes including surgical irrigation such as for example, to irrigate or bathe body tissues, organs and wounds. Specific procedures are irrigation of the bladder for cystocopy and during and following urologic surgery; tidal irrigation of the bladder in paraplegic or quadriplegic patients; all types of irrigation of wounds to cleanse them, from rinsing a simple abrasion to removing surgical debris by irrigation, and to treat infection locally as an ancillary to a systemic administration of antibacterial agents. In some procedures, such as during transurethral prostatic resection (TUR), debris must constantly be washed from the operative field requiring relatively large quantities of irrigating solutions and a relatively constant and continuous flow. Accordingly, present systems employ a plurality of solution containers arranged in series for example, and attached to an instrument with flexible tubing for the flow of fluid therethrough. With such a system, as one container is emptied it can be replaced while flow continues through a second container.

SUMMARY OF THE INVENTION

The present invention comprises an irrigating system which includes a reservoir positioned for parallel flow of fluid from the solution container and the reservoir to the instrument being used and the patient. Preferably, the reservoir comprises a flexible pouch having a common inlet and outlet for flow of fluid into and out of the pouch and positioned in-line with the tubing connecting the solution container and instrument by means of a V-connector, for example. The reservoir assists in maintaining a constant pressure head, particularly when the reservoir comprises a flexible pouch, and increases the flow rate of fluid to the instrument. Before irrigation is begun, the flexible pouch is filled with fluid. By use of a Y-connector positioned at the bottom of the flexible pouch, flow can proceed directly from the solution container to the instrument being used through tubing connected between the solution container and one leg of the Y-connector, through the common leg of the Y-connector and thence through tubing to the instrument. Since the flexible pouch is connected to the other leg of the Y-connector, under certain conditions, flow can also proceed from the flexible pouch directly to the instrument. The flexible pouch assists in maintaining a constant pressure head because when the effective head drops in the solution container, flow will begin from the pouch. Being flexible, internal and external forces such as surface tension and atmospheric pressure will act on the pouch to increase the flow of irrigating solution so that a greater flow will result with a given static head. The flexible pouch also acts as a reservoir in the event of an emergency wherein for any reason, flow from the irrigating solution container is interrupted. In a transurethral prostatic resection procedure for example, the pouch can be made to contain enough solution for three changes of the bladder, i.e., about 1200 milliliters of solution. By filling the reservoir to a desired volume and then closing off the flow of fluid from the container; a measured volume of solution can be administered.

DRAWINGS

The invention can be better understood with reference to the following drawings in which:

FIG. 1 illustrates an irrigating system employing two solution containers arranged in series and including a reservoir comprising a flexible in-line pouch.

FIG. 2 is a side elevational view partially in cross-section taken along the lines 2—2 of FIG. 1 and illustrating one method of maintaining the in-line pouch in a vertical position during an irrigating procedure.

FIG. 3 is a side elevational view partially in cross-section illustrating the exit port of the in-line pouch.

FIG. 4 is an elevational view of an irrigating system employing an in-line flexible pouch and in which the solution containiners are arranged for parallel flow of fluid.

DETAILED DESCRIPTION

FIG. 1 illustrates an arrangement of a system in which the solution containers are arranged for series flow of fluid and including a flexible pouch positioned in-line with the tubing. The system **10** as illustrated includes two solution containers or bottles **11, 12** having a bail band or hanger **13, 14** positioned on the bottom thereof in order to facilitate hanging of the container during use, as shown. Attached to the mouth or opening of the containers **11, 12** are caps **15, 16** which include an exit port **17, 18** and an air vent or secondary port **19, 20** to which can be attached either a tubing adaptor **22** or air filter **23.** In the system illustrated, a section of tubing **21** provides a pathway for fluid from the container **12** to the container **11** and is attached to the port **19** of the container **11** by means of a tubing adaptor **22** which is affixed to the tubing **21.** The other end of the tubing **21** is sealed in fluid-tight engagement with the exit port **18** of the container **12.** An air filter **23** is attached to the port **20** of the container **12** to permit the entry of filtered air as the fluid empties from the container **12.** A clamp **24** is positioned on the tubing **21** to control the flow of fluid between the containers **11, 12.** A section of tubing **25** is sealed in a fluid-tight relationship with the exit port **17** of the first or primary solution container **11** and provides a flow path for the fluid through the Y-manifold **26** and the tubing **30** to the instrument being employed or the patient. The Y-manifold **26** includes two legs **27, 28** one of which **27** is affixed in fluid-tight relationship with the tubing **25** in communication with the primary container **11.** The single or common leg **29** is attached in fluid-tight relationship with the tubing **30** the other end of which includes an adaptor **31** to which is affixed a short segment **32** of tubing. The open end of the tubing **32** can be attached to an appropriate instrument and prior to use is covered by a hood **33.** A flexible pouch **40** fabricated in a conventional manner from lay flat tubing material such as flexible polyvinylchloride is positioned in-line with the tubing **25:** The pouch is sealed around its edges **41** and includes an exit port **42** which is in fluid-tight relationship with the interior of the pouch and the one leg **29** of the Y-manifold **26.** To maintain the pouch **40** in a vertical position during use, a flap **43** extends from the end of the pouch **40** away from the exit port **42** and includes two openings **44, 45** through which the tubing **25** attached to the cap is threaded prior to sealing to the Y-manifold **26.** If

desired, instead of using a manifold connector as described, the tubing leading from the solution container or containers can be sealed directly into the bottom of the reservoir **40** as is the exit port **42**.

To use the system, caps **15, 16** and attendent tubing, flexible pouch and instrument (not shown) are attached to the irrigating solution containers **11, 12** as illustrated in FIG. **1**. By means of the clamp **34**, the tubing **30** at the bottom of the pouch **40** is closed off and the clamps **24** and **35** which control the flow of fluid from the containers **11, 12** are opened. This permits the flexible pouch **40** to fill with fluid after which the clamp **34** is released permitting fluid to flow through the system and into the instrument. In the system as illustrated, fluid flows in series from the secondary container **12** through the exit port **18** of the cap **16** into the tubing **21** and thence through the port **19** of the cap **15** and into the primary solution container **11**. The fluid then flows from the primary container **11** through the exit port **17** of the cap **15** and into the tubing **25** and to the instrument as previously explained. It is apparent that the secondary container **12** will empty first at which time it can be replaced while flow continues from the primary container **11**. As the dynamic head at the Y-manifold **26** drops due to fluid flow, flow will begin from the flexible pouch **40**. The fluid will flow through the exit port **42** into the leg **28** of the Y-connector **26** and thence into the tubing **30** to the instrument being used. In this fashion, the flexible pouch **40** acts to maintain a constant dynamic head in the system. The pouch **40** also acts as a reservoir in the event both containers **11, 12** should empty or flow be prevented for any reason. Being flexible, the pouch **40** also acts to increase flow because of the action of internal and external forces such as surface tension and atmospheric pressure on the pouch **40**. Accordingly, greater flow can be obtained with a decreased static head and an attendant reduced pressure at the instrument.

FIG. **2** illustrates a system in which the solution containers are arranged for parallel flow of the fluid and including a flexible pouch positioned in-line with the tubing. With this type of arrangement, flow of fluid normally proceeds simultaneously from both containers. With this arrangement, flow is increased somewhat in comparison to the arrangement illustrated in FIG. **1** since with that arrangement, flow must proceed from the secondary container to the primary container, through ports in the cap and thence through the tubing to the instrument. As with the system **10**, illustrated in FIG. **1**, this system **50** includes two solution containers or bottles **11, 12** suspended from a hanger **51** by means of a bail-band or hanger **13, 14** attached to the bottom of the bottle. A cap **15, 16** is attached to the mouth of the container as previously described. In this arrangement, the flexible pouch **40** includes an extending flap **43** from which the pouch **40** is suspended from the hanger **51** by means of a cord **54**. Again, the pouch **40** is sealed around its edges **41** and includes an exit port **42** which is in fluid-tight relationship with the interior of the pouch **40** and a Y-manifold **55**. One leg **56** of the manifold is attached to tubing **57** leading to the instrument being used (not shown). The other leg **58** of the Y-manifold **55** is connected to a second Y-manifold **59**, one leg **60** of which is attached to the tubing **52** leading to the first solution container **11** and the other leg **61** is attached to the tubing **53** leading to the second solution container **12**. Clamps **62, 63, 64** are positioned on the tubing to control the flow therein. The tubing **57** includes an adaptor **65** on its end distal from the pouch **40** engageable with a corresponding adaptor **66** on a section of tubing **67** the other end of which also includes an adaptor **31** engageable with a short segment **32** of tubing for ultimate connection to an instrument (not shown).

What is claimed is:

1. Apparatus for the administration of fluid in a surgical procedure comprising:

a container of fluid having an outlet port,

a reservoir for storage of fluid having a common inlet and outlet port allowing fluid to flow into and out of said reservoir,

said outlet port of said container and said common port of said reservoir connected in parallel to a manifold in communication with an instrument to be used in said procedure, whereby fluid from said container can flow through said manifold to fill said reservoir and a constant flow of fluid to said instrument can be provided.

2. The apparatus defined in claim **1**, wherein said reservoir is a flexible pouch sealed about the edges thereof.

3. The apparatus defined in claim **1**, wherein said manifold is external to said container and reservoir and is Y-shaped.

4. The apparatus defined in claim **1** wherein said outlet port of said container is connected to said manifold through a second manifold located between them.

5. The apparatus defined in claim **4** wherein a plurality of containers of fluid have outlet ports connected to said second manifold.

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