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FLEXIBLE CHECK VALVE

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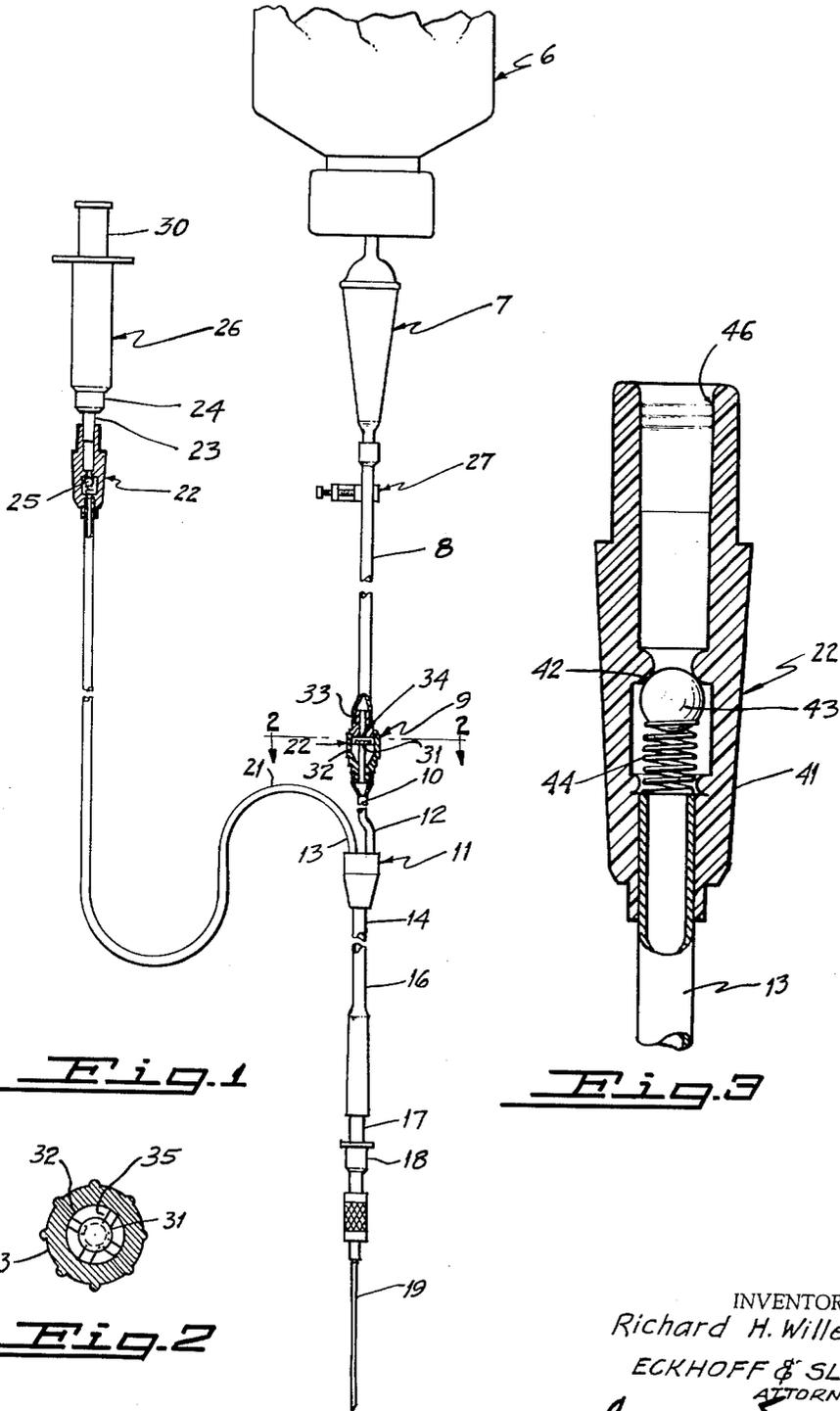


Fig. 1

Fig. 3

Fig. 2

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FLEXIBLE CHECK VALVE

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2 Claims. (Cl. 128-214)

This invention relates to the administration of parenteral fluids.

In an application, Serial No. 629,530, filed December 20, 1956, now Patent No. 2,866,457, there is disclosed a simple apparatus assembly enabling any desired supplemental medication to be given a patient through an existing administration apparatus set-up to administer a parenteral fluid to the patient. Briefly, that apparatus includes the usual parenteral fluid container connected by an administration set, e.g., a drip meter, tubing, and flow control means on the tubing, the latter terminating in a needle suitable for placement in a desired location on the patient. Additionally, the set-up includes a pair of check valves and a Y-fitting, one leg of which is connected by the tubing to the patient needle; one check valve is interposed in the line between the drip meter and one leg of a Y-fitting; the other check valve is connected to the other leg of the Y-fitting, and is adapted to receive suitable means for injecting a supplemental medicament such as a sedative from a hypodermic needle.

While that apparatus was and is highly successful in use, certain shortcomings became apparent in use. For example, prior to the administration of certain solutions, it is desirable to ascertain if the needle is properly located in the patient, e.g., most administrations of parenteral fluids must be made into a vein and it is therefore necessary to apply a negative pressure to the needle to ascertain if the needle is in a vein, this being made evident if blood is drawn by the negative pressure into the transparent tubing connected to the needle.

Also, the apparatus made it evident that the anesthetist might, to advantage, administer a supplemental medication during the course of an operation, in which case it was desirable that the hypodermic syringe be out of the area of the operation and physically available at a location convenient to the anesthetist. In this case, the length of tubing between the check valve to be employed with the syringe and the Y-connection would be relatively long. To ensure proper administration, it is necessary that this tube be freed of air to avoid injection of air into the patient. Each of these operations is made possible with the apparatus of the present invention. Briefly, this includes a novel form of a check valve connected to one leg of the Y-connection, the valve being such that it can be used as either a check valve to prevent flow in one direction or as a relief or by-pass valve, permitting flow in such one direction and which normally the valve would prevent. Both functions of the valve can be achieved by external manipulation of the valve and without exposing the interior of the valve or administration set to the atmosphere.

It is in general the broad object of the present invention to provide a novel, simple and improved apparatus for the administration of parenteral fluids, particularly one which enables air to be removed from the system selectively or a negative pressure applied to a needle associated with the apparatus.

It is in general the broad object of the present invention to provide a novel, simple and improved apparatus for the administration of parenteral fluids.

The invention includes other objects and features of advantage, some of which, together with the foregoing, will appear hereinafter wherein the present preferred form of administration apparatus is disclosed. In the drawing accompanying and forming a part hereof, FIGURE 1 is

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a side view, partly in section, showing the apparatus assembly embodying the present invention.

FIGURE 2 is a section taken along the line 2-2 in FIGURE 1, showing the construction of one of the check valves, that shown at 9 in FIGURE 1.

FIGURE 3 is a cross-section taken longitudinally through the other check valve and which embodies certain novel features and which is designated 22 in FIGURE 1.

Referring to the drawing, I have indicated at 6 a container for a suitable parenteral fluid, the latter including a stopper, as is well-known in the art. A flow meter or drip meter, generally indicated at 7, and such as that shown in Patent 2,730,098, is inserted into the stopper in the container 6 and provides means for observing the rate of the flow of fluid from the container 6. A length of tubing 8 connects the outlet end of the drip meter to a first check valve, generally indicated at 9. The other end of the check valve is connected by tubing 10 to a Y-connection, generally indicated at 11. The Y-connection includes a first inlet leg or passage 12, a second inlet leg or passage 13, and an outlet leg or passage 14, the latter being connected by a length of transparent tubing 16 to an adapter 17, the latter being fitted within the hub 18 of the needle 19.

The second leg 13 of the Y-fitting is connected by tubing 21 to a second check valve, generally indicated at 22; the length of tubing 21 can be that necessary to the administration, e.g., it can be an inch or so or several feet in length. The second check valve has a Luer-tapered inlet 23 into which, for example, supplementary medication is introduced as by a syringe 26, the end 24 of the syringe being shown in tight frictional engagement with the inlet 23.

Any device well-known in the art can be utilized for the check valve 9 and one can use a ball-check or a flap check valve, as desired. That specifically shown at 9 is one which is well-known and which includes a disc 31 supported on several lugs 35 in spaced relation to the sidewalls 32 of check valve body 33 to permit free fluid flow in one direction. The disc is also spaced closely adjacent to the end of check valve inlet 34. If fluid flow reversal occurs, the disc is moved slightly upwardly to cover the end of the inlet 34 and so prevent the back-flow of fluid.

In accordance with the present invention, check valve 22 includes a body, generally indicated at 41, and which is made of an elastomeric material such as gum rubber, polyvinyl chloride, or polyethylene. The body 41 includes a valve seat 42 against which a ball seats under the pressure of a spring 44, the spring resting on the end of tubing 13. The tubing 13 can be held in place by friction or by a suitable adhesive between the interior of the body 41 and the tubing. The upper end of the body 41 is provided with a suitable tapered section, generally indicated at 46, and which taper generally corresponds to that known as a Luer taper.

The advantages of providing a flexible valve body are many. For example, with a hypodermic syringe connected to the valve body, as shown in the drawing, one can apply negative pressure to that region in which needle 19 is located, it only being necessary in this instance to clamp off tubing 8 with clamp 27, retract the syringe plunger and, at the same time, manually deform the flexible valve housing 22 to an extent whereat the ball valve 43 is free of the seat 42. The hypodermic syringe 26 can be at any location which is relatively remote from the Y-connection 11, tubing 21 being made of sufficient length to permit of this accommodation. Air is eliminated from this length of tubing merely by deforming the flexible valve body by external manipulation prior to connection of the hypodermic syringe, positive fluid pressure being provided from the container 6, fluid flowing

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through the Y-connection 11 to the ball 43. This enables the anesthetist, for example, to operate the hypodermic syringe at will from a location remote from the region of the operation.

In use, the flow of fluid from container 6 is regulated by a screw clamp, generally indicated at 27. Until it is desired to administer a supplementary fluid, the inlet 23 on the second check valve 22 is closed as by a sterile cover. If it is desired during the course of the administration of the parenteral fluid from container 6 to administer a supplementary fluid, for example, an anesthetic medication such as sodium pentathol, it is only necessary to uncover the inlet 23, ensure that air is absent from this part of the apparatus as by manually manipulating the flexible valve body 41, as has been described, then inserting the end 24 of syringe 26 and injecting the supplementary medication into the fluid system. The injected material cannot pass check valve 9 nor can the fluid in the system pass the check valve 22. Thus, the two portions of the system are isolated, one from the other, by the two check valves, yet the entrapped air can be removed readily and the position of the needle ascertained, all without endangering the sterility of the fluid content of the system.

I claim:

1. In a parenteral fluid administration set, including a fluid container having an outlet, a drip meter connected to said outlet, a first check valve, a first fluid conduit connected at one end of said drip meter and at its other end to said first check valve, a Y-connection having a first and second inlet conduit and a common third outlet conduit, conduit means connecting the first check valve and the first inlet conduit, the improvement consisting in a second check valve connected to the second inlet conduit and having a flexible valve body and a movable valve member therein normally maintained in closed position and movable under positive fluid force application to permit fluid flow therethrough in a first direction into the second inlet conduit and thence to the third

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outlet conduit, said flexible valve body being manipulatable to unseat the valve member to permit fluid flow from the second inlet conduit in a direction opposite to said one direction.

2. In a parenteral fluid administration set, including a fluid container having an outlet, a drip meter connected to said outlet, a first check valve, a first fluid conduit connected at one end of said drip meter and at its other end to said first check valve, a Y-connection having a first and second inlet conduit and a common third outlet conduit, conduit means connecting the first check valve and the first inlet conduit, the improvement consisting in a second check valve connected to the second inlet conduit and having a flexible valve body and a movable valve member therein normally maintained in closed position and movable under positive fluid force application to permit fluid flow therethrough in one direction into the second inlet conduit and thence to the third outlet conduit, the second check valve being adapted for connection to a hypodermic syringe whereby a liquid can be forced preferentially in said one direction, to the third outlet conduit, the second check valve body being manually movable to unseat the valve member and permit flow in a direction opposite to said one direction.

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