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CHECK VALVE FOR THE ADMINISTRATION
OF PARENTERAL SOLUTIONS
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2,879,784

FIG. 1

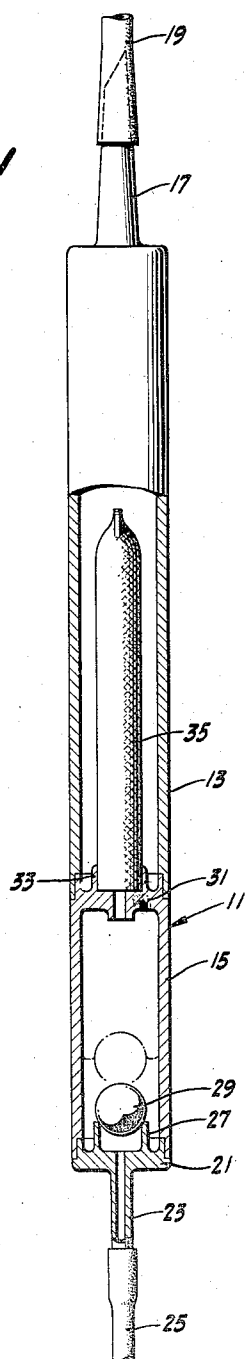
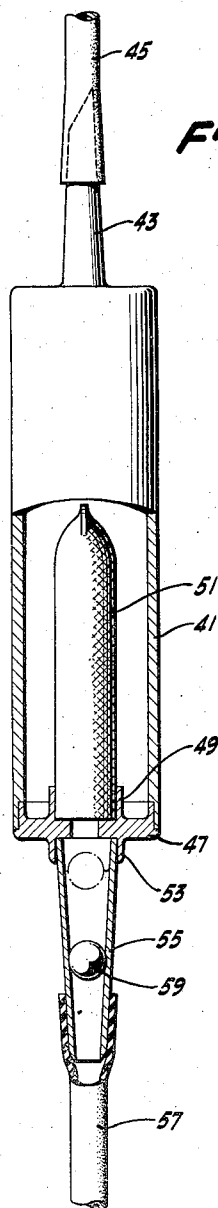


FIG. 2



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1

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CHECK VALVE FOR THE ADMINISTRATION OF PARENTERAL SOLUTIONS

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1 Claim. (Cl. 137—192)

This invention relates in general to intravenous solution administering sets, and in particular to improvements in a part adapted to be incorporated in such a set.

There is an increasing tendency toward the use of gas pressure behind intravenous solutions to increase the rate of injection thereof into the veins of a patient. When the amount of solution to be injected into the patient's veins is greater than the supply within the solution container, an attendant manually closes a tube leading from the container to the patient just as the container is drained and before the tube is exhausted of liquid to prevent gas from being injected into the patient and causing an air embolism. It is apparent that even infrequent improper action by the attendant would have serious consequences, and it is toward the solution of this problem that the present invention is directed.

It is a primary object of the present invention to provide a device forming a component part of an intravenous solution set and being equipped with a float check valve arranged to be buoyed up off its seat by liquid flowing into said device to allow passage of such liquid through said device toward the patient, but dropping onto its seat upon substantial exhaustion of liquid within said device to prevent the injection of gas into a patient's vein.

The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description where the forms of the invention selected for illustration in the drawings accompanying and forming a part of the specification are outlined in full.

In said drawings, two forms of the invention are shown, but it is to be understood that it is not limited to these forms since the invention as set forth in the claim may be embodied in other forms.

Referring to the drawings:

Fig. 1 is a side elevation of a device embodying the objects of my invention and wherein the lower half thereof is shown in mid-section, the better to illustrate its construction.

Fig. 2 is a side elevation of a modified form of my invention and wherein the lower half is shown in mid-section.

The device, as illustrated in Fig. 1, includes an elongated cylindrical chamber, generally entitled 11, formed of an upper section 13 joined to a lower section 15. upper section 13 has an upwardly extending nipple or spike 17 shown as being inserted in the lower end of a section of tubing 19, by which an intravenous solution is fed to said chamber. Lower section 15 has a closure cap 21 joined to the lower end thereof, and formed on and depending from the cap is a nipple 23, the latter being inserted into the upper end of a tube 25 leading to the patient. The other or remote end of tube 25 has an injection needle thereon for insertion into the veins of a patient.

Formed integrally with and upstanding from cap 21 is an annular rib 27 forming a seat for a ball float check

2

valve 29, the latter being contained in section 15. Ball 29 may be formed of rubber, plastic, cork or any other suitable material having a specific gravity sufficiently less than that of the liquid passing through the chamber so that ball 29 is buoyed up off its seat by said liquid. It is apparent that the inner walls of section 15 are so dimensioned as to confine lateral movement of ball 29 sufficiently to ensure its proper seating when the liquid supporting the same is exhausted.

Formed across the upper end of section 15 is a web 31 centrally apertured and having an upstanding annular rim or rib 33 adapted to receive the lower end of a tubular filter member 35. Filter member 35 may be formed of a plastic fabric such as nylon, but, regardless of the material from which it is formed, it is form-sustaining and sealed at its upper end as shown.

In use, the device is incorporated in the intravenous solution administering set at a place between the intravenous solution reservoir or container and the patient, and may conveniently be incorporated as shown by having its opposite ends inserted into tubes leading to the reservoir or container and the patient. Cylinder 11 is vertically arranged and gas pressure is applied at the reservoir to force the intravenous solution through the administering set into cylinder 11 where it passes through filter 35 to have the clots and like matter filtered therefrom and passes down into section 15. Ball 29 is buoyed up off its seat by the liquid, said liquid then passing down through nipple 23 and tube 25 toward the patient.

After liquid issues from the injection needle and all air has been removed from the set, said needle is injected into the patient and the administration of the intravenous solution proceeds at a rate determined by the force of gravity and the pressure of the gas.

When the intravenous solution supply in the container or reservoir is exhausted, gas will travel down through tube 19 forcing the last increment of solution therebefore into cylinder 11. However, as the solution is exhausted from section 15, float check valve 29 descends from the dot-dash line position shown in Fig. 1 and seats on valve seat 27 just before the complete exhaustion of solution from section 15, thereby serving to prevent gas from traveling down tube 25 toward the patient.

Fig. 2 shows a modified form of the invention wherein there is included an elongated cylindrical chamber 41 provided with a nipple or spike 43 at its upper end for insertion into a tube 45. Cylinder 41 is closed at its lower end by a cap 47 joined to said cylinder and centrally apertured for the passage of fluid therethrough. Extending upwardly from cap 47 is an annular rib or rim 49 receiving the lower end of a tubular filter element 51 similar in construction to filter element 35.

Depending from cap 47 is an annular rib or rim 53 receiving therewithin the larger upper end of a tapered tube 55, the lower end of which is preferably beveled and functions as an outlet nipple for insertion into a tube 57. Tube 57 leads to the patient. Contained within tube 55 is a ball float check valve 59, similar to valve 29, and having a size such as to seat against the inner walls of tube 55 intermediate the length thereof when not suspended by a liquid.

The operation of this form of the invention is similar to that of the previously described form, ball 59 being buoyed up off its seat by liquid within tube 55 (see the dot-dash lines in Fig. 2) and again seating upon substantial exhaustion of the liquid in said tapered tube to prevent the travel of gas down through outlet tube 57.

It is apparent that by arranging the filter element in each of the forms of the invention in a position above the valve structure, an arrangement has been provided for preventing clots and similar matter from detrimentally affecting the operation of the valve.

It will therefore be seen that I have provided a device forming a component part of an intravenous solution administering set and functioning to allow the flow of liquid therethrough but preventing the flow of gas through the outlet line connected thereto.

The particular form of float check valve shown in the drawings is not intended to limit my invention, since the valve may take many forms, and therefore the invention is intended to be limited only by the following claim.

Having thus described my invention, what I claim and 10 desire to secure by Letters Patent is:

An intravenous solution set component comprising a tubular chamber provided at its upper end with an inlet nipple arranged to be connected with a fluid source and provided at its lower end with an outlet nipple arranged 15 to be connected with a section of flexible tubing; a valve

seat formed in the lower end of said chamber; and a float check valve accommodated within the lower end of said chamber and operatively associated with said valve seat.

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