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NASA TECH BRIEF

Ames Research Center

Regulator for Intravenous Feeding

The problem:

To maintain a constant rate of flow of intravenous feeding solution from a reservoir and to prevent introduction of air into the vein of a patient when the reservoir is empty.

The solution:

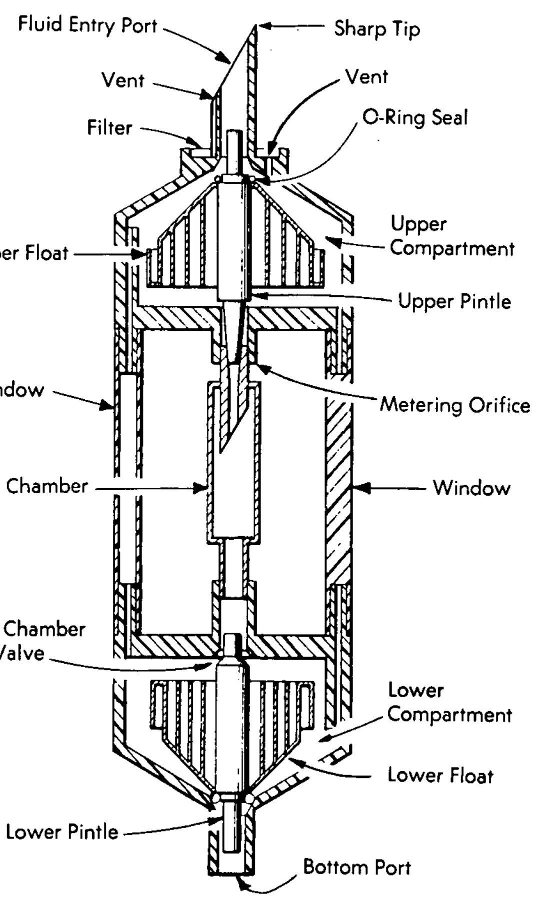
A constant level of solution (maintained by a float valve) provides a constant drop rate as long as solution can flow into the patient's vein; a second float valve allows solution to enter the vein, but prevents entry of air.

How it's done:

The top of the regulator is equipped with a sharp tip so that the rubber stopper of a bottle containing sterile feeding solution can be penetrated easily; as shown in the diagram, the tip is ported so that only filtered air is vented into the bottle. Tubing, attached to the bottom port, conducts solution to the patient's vein.

When the bottle containing feeding solution is inverted, fluid flows into the upper compartment of the regulator, but flow stops after a short time because the upper float lifts and presses an O-ring seal (at the top of the float) against the fluid entry port; however, as long as the float is supported by solution, the metering orifice is open, and solution can flow into the drop chamber. Flow of solution past the O-ring seal occurs at the rate established by the aperture between the upper pintle and the seat of the metering orifice, and the rate is readily adjusted by manipulation of the position of the drop chamber inasmuch as its upper section is the seat of the metering orifice. Moreover, the valving action provided by the float maintains a nearly constant level of solution in the upper compartment, thus assuring a nearly constant drop-rate. The drop chamber is constructed of clear plastic so that the drop-rate can be monitored visually through ports or windows in the body of the device.

The lower compartment also contains a float-valve mechanism; the buoyancy of the float is adjusted so



that it will unseat the lower pintle when the compartment is nearly completely filled with solution. Similar to the action explained above for the float in the upper

(continued overleaf)

compartment, when the lower float is in its uppermost position, solution can flow through the bottom port into the patient's vein. However, because solution ordinarily is metered into the lower compartment more slowly than it can flow out, the weight of the float in the lower compartment is usually supported by the lower pintle. Thus, each time a drop of solution enters the lower compartment, the lower float rises just enough to permit flow through the bottom port and then settles back into place to seat the lower pintle and prevent air from entering the patient's vein. If the patient's vein becomes saturated, the lower compartment will become nearly filled with solution; the lower float will lift and close the drop-chamber exit valve so that no more solution can flow through the drop chamber. Concomitantly, the upper float shuts off flow of solution from the supply bottle.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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Patent status:

This is the invention of a NASA employee, and a patent application has been filed. Inquiries concerning license for its commercial development may be addressed to the inventor: Mr. John Dimeff, Ames Research Center, Moffett Field, California 94035.

Source: John Dimeff
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