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VALVE UNIT FOR AN INTRAVENOUS LIQUID FEEDING APPARATUS

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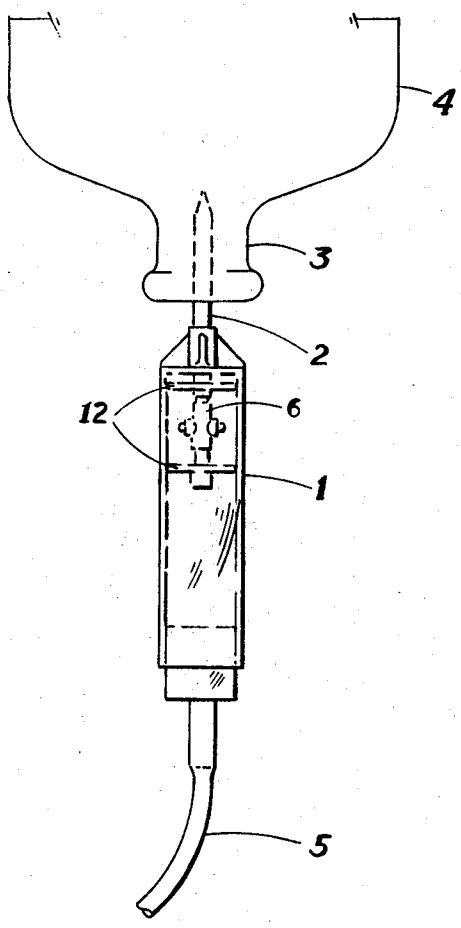


Fig. 1

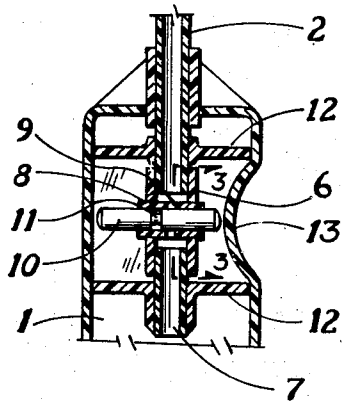


Fig. 2

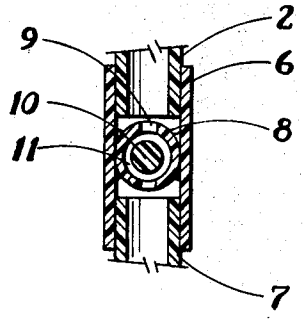


Fig. 3

INVENTOR.
Louis S. Santomieri
BY
Webster & Webster
ATTYS.

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VALVE UNIT FOR AN INTRAVENOUS LIQUID FEEDING APPARATUS

Louis S. Santomieri, Martinez, Calif., assignor to Deseret Pharmaceutical Company, Inc., Sandy, Utah

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ABSTRACT OF THE DISCLOSURE

A flow-control valve unit—for an intravenous liquid feeding apparatus which includes a drip chamber having a supply tube depending thereinto—disposed in the drip chamber in communication with the supply tube; the valve unit being maintained sterile by virtue of its disposition in the drip chamber but arranged so that opening and closing of such valve unit can be accomplished readily and manually from exteriorly of said drip chamber.

BACKGROUND OF THE INVENTION

At present, it is the practice in intravenous liquid feeding apparatus to control the flow through the flexible feed tube (which leads from an included drip chamber) by the use of an adjustable pinch-clamp on such tube. This has been found to be unsatisfactory because such type of clamp could not precisely control the rate of liquid flow through the tube.

SUMMARY OF THE INVENTION

The present invention provides, as a major object, an adjustable, flow-control valve unit in novel combination with an intravenous liquid feeding apparatus which includes a drip chamber having a supply tube depending thereinto from the top and a feed tube leading from the bottom; the adjustable valve unit, which permits of precise control of the rate of liquid flow, being disposed—for sterility—in the drip chamber in communication with the supply tube, but which valve unit is, however, readily manually adjustable from exteriorly of said drip chamber.

The present invention provides, as an additional object, a combination—as in the preceding paragraph—wherein the adjustable valve unit includes, wholly within the confines of the drip chamber, a movable valve adjustment member; the drip chamber being of flexible and resilient material (such as a suitable plastic) whereby the sidewall thereof may, by finger pressure, be deflected inwardly against and cause movement of said valve adjustment member. In this manner, the valve unit can be readily adjusted from exteriorly of said drip chamber yet remain sterile. As the drip chamber is normally transparent, the movable valve adjustment member can be visually located and so that the drip chamber sidewall can be deflected inwardly from an adjacent point thereon.

The present invention provides, as a further object, an adjustable valve unit, for an intravenous liquid feeding apparatus, which is designed for ease and economy of manufacture, and convenience of use.

The present invention provides, as a still further object, a practical, reliable, and durable valve unit, for an intravenous liquid feeding apparatus, and one which is exceedingly effective for the purpose for which it is designed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of the valve unit and drip chamber combination, as in use.

FIG. 2 is an enlarged, fragmentary sectional elevation of such combination, showing the valve unit closed.

FIG. 3 is a cross section on line 3—3 of FIG. 2, but with the valve unit open.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings and to the characters of reference marked thereon, the intravenous liquid feeding apparatus in which the valve unit is embodied includes an elongated cylindrical drip chamber **1**, closed at both ends and made of transparent, flexible plastic or similar material. Projecting from the top of the drip chamber **1** centrally thereof, and depending a short distance into the same, is a liquid supply tube **2** adapted to be projected through the usual closure in the neck **3** of a liquid container **4** to draw therefrom.

A flexible feed tube **5** communicates with and depends from the bottom of the drip chamber **1**, and such feed tube carries the usual intravenous injection needle (not shown) on its outer end.

It will, of course, be understood that the tubes **2** and **5** have liquid-tight connection with the top and bottom, respectively, of the drip chamber **1**; the latter thus being wholly closed to atmosphere.

The valve unit—which is disposed entirely within the drip chamber **1**—comprises a cylindrical coupling **6** considerably smaller in diameter than said chamber, and connected at its upper end to the lower end of the supply tube **2**. At its lower end, the coupling **6** is fitted with a short depending drip tube **7**, the same size as the tube **2**; the coupling thus spanning between said tubes **2** and **7** in communication therewith.

Centrally of the ends of the coupling **6**, a transverse open-ended valve cylinder **8** crosses the same forming a watertight closure at the sides with the coupling **6**, as shown in FIG. 3. The valve cylinder **8** (which at its ends terminates short of the drip chamber sidewall) is provided with small diametral holes **9** disposed in the plane of the axis of the coupling. Adjustably slidable in the cylinder **8**, and initially projecting equal distances beyond the ends of said cylinder, is a rod-like or cylindrical valve **10**; such slide valve having a circumferential groove **11** midway of its length adapted to register with the opposed holes **9** to a selective extent and dependent on the position of said valve. This allows the liquid to flow—at a controlled rate—from the container **4** through tube **2** above the valve and thence into the drip chamber **1** below the valve, from which it flows through the tube **5** to the intravenous injection needle.

To maintain the coupling **6** and valve cylinder **8** in a centralized position in the drip chamber **1**, rigid discs or spiders **12** engage the tubes **2** and **7** relatively close to the coupling **6**, and thence radiate into contact with the sidewall of said drip chamber. This leaves the zone of the sidewall of the drip chamber between the discs **12** free to be deflected inwardly toward either end of the valve **10**; said ends of the valve being clear of said sidewall in the normally straight condition thereof. Inward deflection of the flexible, drip chamber sidewall—as imparted thereto by finger pressure in the direction of one end or the other of the valve **10**, as shown at **13**—causes said valve to be shifted laterally of the drip chamber, so that the valve may be closed completely and the flow stopped, or the rate of flow altered as desired and dependent on the position of groove **11** relative to the opposed holes **9**. Thus, the rate of flow of the liquid from the drip tube **7** into the drip chamber **1** below the valve is—by visual determination—regulated by adjustment of valve **10**.

It will be noted that the best and most accurate control of the valve **10** will be obtained by engaging the flexible drip chamber **1** on opposite sides simultaneously by the

thumb and one finger of the hand, so that the valve may be easily and precisely moved in one direction or the other.

With the described valve unit it is possible to obtain quite precise control of the rate of flow of the liquid through the apparatus, and yet without any possible contamination of said valve unit or the liquid passing therethrough.

From the foregoing description, it will be readily seen that there has been produced such a valve unit, for an intravenous liquid feeding apparatus, as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the valve unit, for an intravenous liquid feeding apparatus, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

What is claimed is:

1. In an intravenous liquid feeding apparatus having a supply tube adapted at one end for connection to a source of liquid, a feed tube adapted at one end for connection with an injection needle, and a drip chamber connected at its opposite ends to the other ends of said supply and feed tubes; a valve unit in the drip chamber coupled to the supply tube and operative to control the rate of flow of liquid from the supply tube into the drip chamber, and said valve unit including a movable control member adapted to be adjusted from exteriorly of the drip chamber; the supply tube depending into the drip chamber from the top, and the valve unit comprising an open-ended tubular member connected to and depending from the lower end of the supply tube substantially concentric with but smaller than the drip chamber, a transverse valve cylinder extending across and forming a closure in the tubular member and terminating short of the sidewall of the drip chamber, the valve cylinder having opposed holes within the tubular member, and a slide valve in the cylinder and projecting from the ends thereof; the valve having a diametral groove therein adapted to register to a selectively variable extent with the holes, and the sidewall of the drip chamber being flexible and adapted to be manually deflected inwardly whereby to endwise engage and move the slide valve so as to adjust the extent of such registration of the groove with the holes, or to provide no registration.

2. An apparatus, as in claim **1**, with locating elements on the tubular member adjacent the ends thereof and engaging the sidewall of the drip chamber; said locating elements maintaining the tubular member centered in said drip chamber while allowing the sidewall thereof to be deflected inwardly in the zone of the valve.

3. An apparatus, as in claim **2**, in which the locating elements are rigid and disc-like.

4. In an intravenous liquid feeding apparatus having a supply tube adapted at one end for connection to a source of liquid, a feed tube adapted at one end for connection with an injection needle, and a drip chamber connected at its opposite ends to the other ends of said supply and feed tubes; the drip chamber being vertically elongated and including a transparent sidewall which is flexible and resilient, a valve unit disposed wholly within the upper portion of the drip chamber, the valve unit being coupled to the supply tube and operative to control the rate of flow of liquid from the supply tube into the lower portion of the drip chamber, flow from the valve unit being through a drip element thereon and which element is visible through the transparent sidewall of the drip chamber, and the valve unit including a movable flow control member likewise visible through said transparent sidewall of the drip chamber, and said member being adapted to be moved by manual deflection of said sidewall into engagement therewith.

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SAMUEL SCOTT, Primary Examiner

U.S. Cl. X.R.

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