

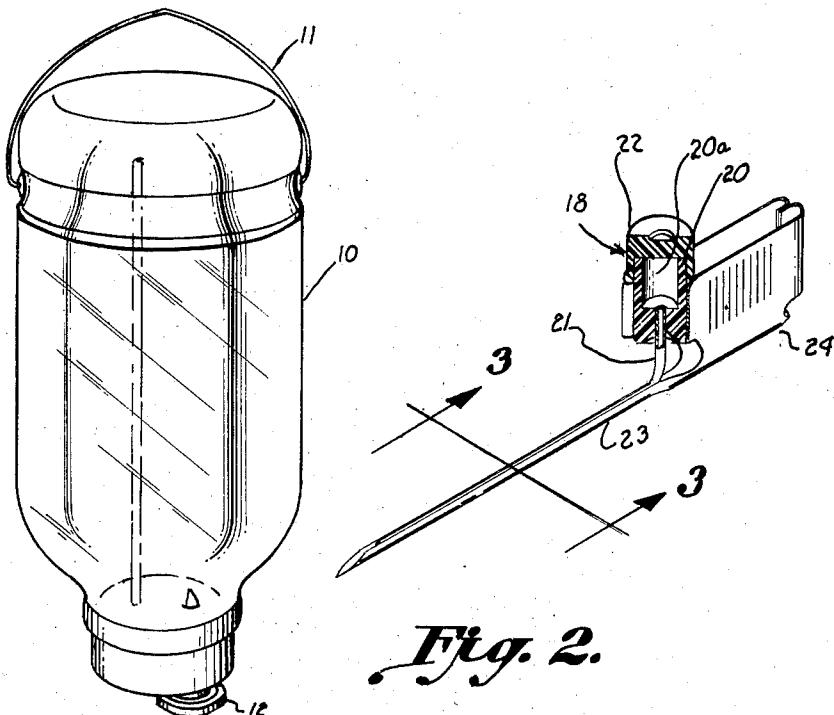
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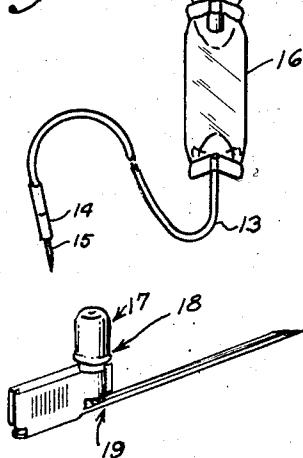
VENOUS CATHETER

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*Fig. 2.*

*Fig. 1.*



*Fig. 3.*



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## VENOUS CATHETER

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5 Claims. (Cl. 128—221)

This invention relates to venous-catheter apparatus; in particular, it concerns greatly improved apparatus for introducing a catheter into a vein for long-continued parenteral fluid therapy.

The present invention involves the use of novel apparatus and a new type of catheter comprising novel and useful means for introducing the catheter into the vein and for connecting the sterile liquid container to the catheter. By the present invention, catheter administration of parenteral liquids is made safe and convenient and far more satisfactory both to patient and attendant than the older techniques of either needle administration or catheter administration.

My apparatus, moreover, avoids the necessity for using aseptic techniques of administration, since all the apparatus of administration will normally be pre-sterilized, and no direct contact is necessary between the hands of the attendant and any part of the apparatus entering the vein or in contact with the liquid.

Similarly, in furtherance of the object of maintaining sterility, my apparatus never permits the patient's blood to be driven "upstream" into the administration apparatus, since it at all times maintains within it, under a pressure "head," a column of the parenteral liquid being administered. Similarly, my apparatus renders easy the highly desirable procedure of removing the liquid source, when a given period of administration has been completed, while leaving the catheter within the vein and without cutting or clamping the catheter. This is accomplished without danger of contamination and without possibility of the patient's blood being "backed up" into the apparatus. Thus, by my apparatus and technique of administration, a patient receiving parenteral therapy need have his vein entered only occasionally, since a catheter once inserted can normally be left in place for several days.

It is therefore an object of my invention to provide an apparatus for venous-catheter administration of parenteral liquids wherein the needle employed for introduction of the catheter into the vein can be removed from the vein and disengaged from the catheter by sidewise movement, thus permitting the free end of the catheter to be permanently affixed to a coupling member of greatly enlarged cross-sectional area;

Another object is to provide, by the technique just described, a venous catheter so enlarged at its free end as to make it impossible for the catheter to be received wholly within the blood stream or lost within a vein.

Still another object is to provide a venous catheter having a terminal portion modified to arrest undesired "upstream" flow of blood or liquid at all times, while permitting parenteral liquid to flow freely in the desired direction.

Other objects and advantages of my invention will appear as the specification proceeds.

My invention will be explained in conjunction with the accompanying drawing in which:

Fig. 1 is a perspective view showing the venous catheter of my invention and a suspended sterile liquid container

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to make clear the manner in which the liquid container and the catheter are joinable by a conventional hose conduit; Fig. 2 is a perspective view, partially in section, of the venous catheter of Fig. 1; and Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 2.

Referring now to the drawing, and in particular Fig. 1, I have shown a liquid container 10 suspended by a bail 11 in a manner well known to the art. Such sterile liquid containers are normally suspended in a bottom-up position two to four feet above the level of the patient's body so as to provide a substantial pressure "head" to urge the parenteral liquid into the vein of the patient. The outlet of the bottle is penetrated by a hose adapter 12, over which is stretched the upper end of conduit hose 13. The lower end of hose 13 is stretched over a second hose adapter 14, which has needle 15 inserted therein. Drip meter 16 is connected in the conduit tubing to provide a means by which the administrator can determine the rate of flow, which can be regulated by a clamp (not shown).

Fig. 1 also shows a catheter generally designated 18, formed with an enlarged rigid terminal member generally designated 17. As can be seen more clearly in Fig. 2, this construction is very simple and inexpensive, since it involves preparing shank 20 from a rigid plastic material and cementing in proper position the catheter tube portion 21. Mounted over the terminal end of shank 20 and closing off the axial passage 20a therein is cap 22, constructed of a material adapted to be self-sealing after puncture by a hypodermic needle. It is to be understood that I do not limit my invention to the particular structure shown, as, for example, there are many methods known to the art for securing a self-sealing membrane across passage 20a of shank 20.

Self-sealing cap 22 facilitates the highly desirable procedure of leaving the catheter tube 21 within the patient's vein for long periods of time, such as several days. This result it accomplishes by functioning as a valve which at once maintains the parenteral fluid within catheter 18 under a pressure head and thus prevents blood from running up into the catheter and at the same time serves as a barrier against contamination entering the catheter from outside during periods when liquid is not being administered. My catheter might be employed in conjunction with the ordinary needle used in current practice for parenteral administration, except rather than being inserted in the patient's vein, a needle such as 15 would merely be passed through valve cap 22. Upon completion of a given treatment, needle 15 may be removed, and the self-sealing membrane portion of cap 22 will close automatically, and the patient, in perfect comfort, can move about to the full extent that his condition permits while retaining the catheter tube 21 in his vein. When it is time for another administration of liquid, the exterior surface of cap 22 may be sterilized, as by an alcohol swab, a new sterile needle inserted into cap 22, and the administration will proceed as before.

A simple and inexpensive instrument for inserting the above-described catheter can be seen by reference to the drawing, and in particular Fig. 2. From Fig. 2 it can be seen that the instrument for inserting catheter 18 includes a hollow needle portion 23 and a shank or handle portion 24 integral with the needle portion. From Fig. 3 it can be seen that needle 23 has a hollow lumen cut away to provide generally a U-shaped or trough-shaped cross-section. The cross-sectional area of the lumen is sufficient to receive catheter tube 21 with slight frictional contact, and the side walls of needle 23 are long enough to clear catheter tube 21 when it is being received within the needle, as shown at 23a of Fig. 3. In other words, the walls of needle 23 extend upwardly from the base of the U a greater distance than the separation between

walls. Providing needle 23 with walls enclosing the lumen about an arc of at least 180° permits needle 23 to be introduced into the patient's vein and then withdrawn without the creation of any frictional contact between catheter tube 21 and the patient's body tissues.

The shank end of needle portion 23 is provided with an integral spring clamp portion 24 of substantially enlarged cross-section and interior, which also serves as a handle for inserting the needle. Clamp portion 24 is adapted to fit over terminal portion 17 of the catheter 18. In the insertion of catheter 18, it is fitted into the lumen of needle portion 23, and terminal portion 17 of catheter 18 is clamped into the jaws of clamp portion 24. This operation can be accomplished without special precautions to insure sterility merely by tearing an opening in the sterile package containing catheter 18, introducing sterile needle 23 therein, and pressing the catheter into the needle lumen by manual pressure through the cellophane or other plastic walls of the sterile package containing the catheter. Still another packaging expedient to preserve sterility would be to provide the catheter previously mounted in the inserting instrument, as shown in Figs. 1 and 2.

#### Operation

When it is desired to insert the catheter of my invention into the vein of a patient for parenteral administration extending over substantial periods of time, catheter 18, mounted in the inserting instrument as shown in Fig. 1, is inserted into the patient's vein in a conventional manner. Clamp member 24 is then freed from catheter terminal portion 17, and needle 23 is removed, leaving catheter tube 21 within the vein. If desired, catheter terminal portion 17 can then be taped to the patient's arm. Once the catheter is within the vein, flow can be started by insertion of needle 15 into self-sealing cap 22.

As desired, needle 15 may be removed, and other medication provided. During an extensive period of parenteral administration, the patient can receive liquid in this manner without any discomfort whatever, and no movement of the patient's arm, sudden or gradual, can cause pain.

While I have, in this specification, described at considerable length and in considerable detail certain specific embodiments of my invention, it is to be understood that these embodiments are illustrative only, and that many variations therein and departures therefrom may be made by persons skilled in the art while retaining the spirit of my invention. Therefore, it is my desire that the scope of my invention be determined primarily with reference to the appended claims.

I claim:

1. For inserting a venous catheter, a hollow needle of U-shaped cross-section having a pointed end and walls extending upward from the base of the U a distance greater than the separation between the walls, whereby a catheter of diameter substantially equal to the distance between the walls of the U can be removably inserted

into said needle and lie therewithout without protruding above the top of the U.

2. For inserting a venous catheter, a hollow needle of U-shaped cross-section having a pointed end and walls extending upward from the base of the U a distance greater than the separation between the walls, whereby a catheter of diameter substantially equal to the distance between the walls of the U can lie therein without protruding above the top of the U, said needle being provided near the end opposite the point with a portion of enlarged size and enlarged interior, the wall of said enlarged zone being modified to provide a spring clamp adapted to releasably receive and to grip frictionally the substantially cylindrical rigid terminal portion of a venous catheter.

3. For inserting a venous catheter, a hollow needle of U-shaped cross-section having a pointed end, and opposite the pointed end an integral portion of enlarged size and enlarged interior, the wall of said enlarged portion being modified to provide a spring clamp adapted to releasably receive and to grip frictionally the substantially cylindrical rigid terminal portion of a venous catheter.

4. A venous catheter comprising an elongated flexible tube of small diameter terminated at one end by a substantially enlarged integral terminal member of rigid material having an interior passageway for fluids, said terminal member being provided with a self-sealing penetrable membrane closing off its liquid passageway, preventing flow of fluids in the direction from the catheter proper toward the terminal member when no external liquid source is connected thereto.

5. Venous-catheter apparatus comprising, in combination, a hollow needle having a pointed end and an elongated shank portion, said shank portion having a relieved zone in the wall thereof parallel to the needle axis and leaving a trough-shaped lumen, the body of said needle enclosing said lumen about an arc of at least 180°, said needle being provided with an integral handle portion opposite its pointed end, and a catheter formed from an elongated flexible tube of diameter slidably held within said lumen and terminating at one end in a substantially enlarged terminal member of rigid material having an interior passageway for fluids and providing a means for coupling a liquid source to the interior of the catheter, said enlarged terminal member being releasably received in snug frictional engagement in the said handle portion therefor.

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