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L. F. WALDMAN, JR
INDWELLING CATHETER UNIT

3,335,723

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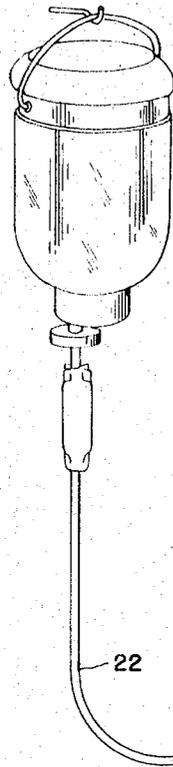
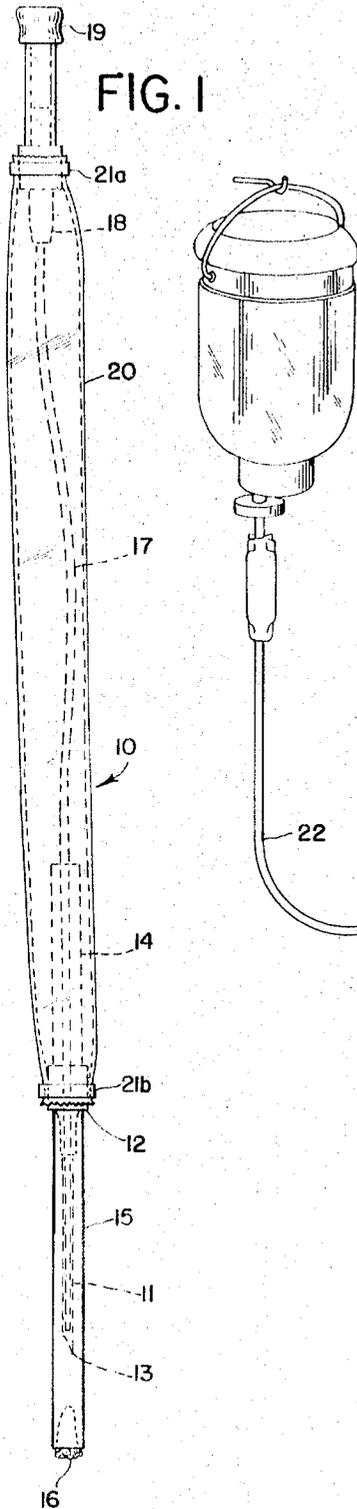


FIG. 3

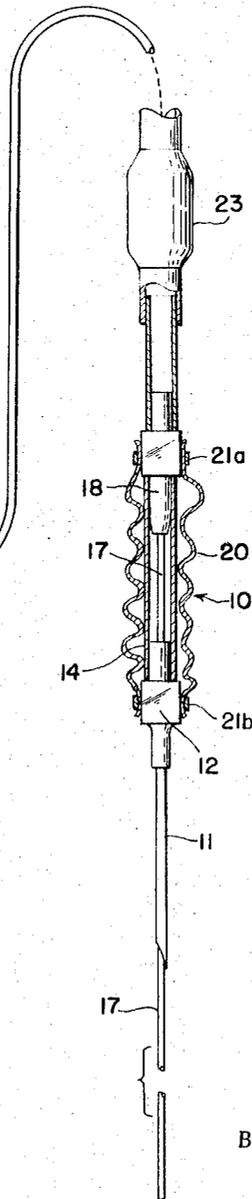
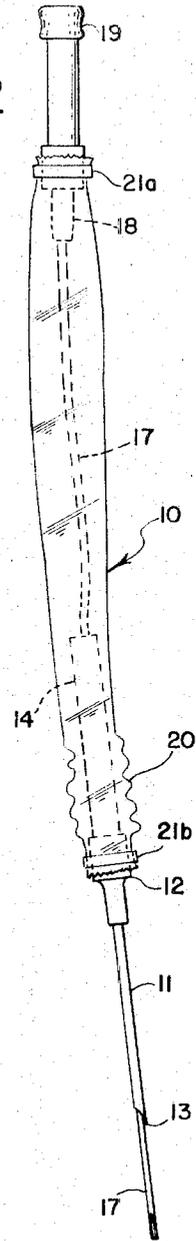


FIG. 2



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INDWELLING CATHETER UNIT

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1 Claim. (Cl. 128—214.4)

The present invention relates to an apparatus for the intravenous administration of fluids. More particularly, it relates to an improved indwelling catheter.

Quite often it is essential, especially in surgical cases, that large volumes of fluids be administered to a patient over a relatively long period of time. Until recently it has been necessary in such instances to place the hollow metal needle of a fluid administration set in the vein of the patient, administer a unit of fluid, leave the needle in the vein, and then at a later time administer additional units of fluid through the same needle; or alternatively to withdraw the needle after the administration of each unit of fluid and make a new venipuncture with a new needle at a new site when it is desired to administer another unit of fluid. Both of these alternatives present obvious disadvantages. To overcome these disadvantages the "indwelling catheter" was devised. The "indwelling catheter" is an inert flexible plastic tube which is placed into the vein of a patient and allowed to remain there for the entire period of fluid administration. Since it is flexible and inert the indwelling catheter does not cause the irritation or trauma which normally results when a metal needle is allowed to remain in a vein for long periods of time.

Two types of "indwelling" catheter units are currently available commercially. The first type is one in which the indwelling catheter is disposed as an external sleeve about a piercing device such as a stylet or a needle. The second type of unit is one in which the indwelling catheter is disposed within or introduced into the vein of a patient by threading it through the lumen of a needle and into the vein. The two types of units are exemplified by the devices of U.S. Patents Nos. 3,094,122 and 3,017,884, respectively.

The first type of unit offers a substantial advantage in that, if perchance, the needle is not properly placed within a vein the unit can be flushed and another attempt made to locate it properly. The second type of unit also provides a substantial advantage in that it provides, more readily, for the protection and sterility of the indwelling catheter.

The present invention while it relates to a unit of the second type, that is, one in which the catheter is threaded through the lumen of the needle into the vein of the patient, nevertheless, possesses the aforementioned advantages of both types of indwelling catheter units.

It is in general the object of the present invention to provide a superior and improved indwelling catheter unit.

This and other objects will be apparent to those skilled in the art from the specification and the drawings in which:

FIGURE 1 is an elevational view of the apparatus.

FIGURE 2 is an elevational view of the apparatus with the plastic cannula partly advanced and the protector tip removed.

FIGURE 3 is an enlarged sectional view of the apparatus connected to a conventional fluid administration set.

In FIGURE 1 it is seen that the apparatus of the invention, which is generally referred to by the numeral 10, comprises a hollow needle 11, which is provided with a hub 12 and a pointed end 13. Attached to the hub 12 at the end distal the needle is an outwardly extending, relatively rigid, elongated, hollow, cylindrical, take-up tube

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14. Extending over the length of the needle and protecting the pointed end 13 is a protective tip member 15 which is attached to the hub 12 at one end and is provided with a cotton plug 16 at the other end.

The free end of the flexible plastic indwelling catheter 17 extends into the lumen of the needle 11 and through the hollow, cylindrical member 14. The other end of the catheter 17 is affixed in communicating relationship to the hub of a female luer adapter 18. To protect it from contamination the open end of the luer adapter 18 is closed with a rubber stopper 19.

A flexible, collapsible, non-extensible, lay flat, protective sleeve 20 of plastic material, such as polyethylene or the like, is fastened in a protective manner about the catheter 17 and is affixed at one end to the hub 12 of the needle 11 and at the other end to the hub of the female luer adapter 18. The sleeve 20 also encompasses and protects the entire length of the hollow member 14. The ends of the sleeve 20 are attached to the hubs by suitable attachment means 21a and 21b, e.g., rubber bands, plastic tape, or the like.

The apparatus as it appears in FIGURE 1 is completely assembled and can be sterilized without structural change by conventional gas or radiation sterilization techniques.

In use, the catheter unit is connected to an administration set 22 via the female luer adapter 18 and primed. A control clamp (not shown) on the set is closed, and the protector tip 15 is removed from the needle. A venipuncture is made and the advancement of the catheter is started by gathering the sleeve 20 on the take-up tube in an accordion-like fashion (FIGURE 2). To determine whether a successful catheter placement has been made, the flashback device 23 (FIGURE 3) on the administration set is compressed and released. If the catheter is properly placed in a vein blood will appear in the catheter.

To completely thread the catheter into the vein the sleeve 20 is further gathered on the take-up tube until the distal end of the luer adapter 18 is engaged into the proximal end of the take-up tube 14. (See only in FIGURE 3.) The needle is then retracted from the venipuncture site to a non-flexing anatomical surface where the needle point is covered by a needle guard or tape and the catheter hub, take-up tube, and needle combination are taped to said surface. The site of the venipuncture, and catheter entrance, is then covered by a bandage and infusion is started.

Alternatively, if so desired, the flow of fluid through the catheter may be commenced immediately after the venipuncture is made and while the catheter is being advanced.

The device of the present invention is unique in that it allows for two methods of introduction of catheter through the needle lumen into the vein. The first method allows for advancement of the catheter by gathering the sleeve 20 onto the take-up tube. As the sleeve is gathered on the take-up tube the catheter is automatically advanced into the vein. The second method of advancing the catheter allows for an actual threading of the catheter through the needle lumen by manipulation of the catheter itself through the sleeve 20. As the catheter is threaded into the vein, the excess sleeve material is gathered onto the take-up tube in an accordion fashion.

In addition to the advantages realized from the alternate methods of advancing the catheter, the apparatus of the present invention provides additional advantages for it is provided with a female luer adapter which is readily accessible and can be connected to an intravenous administration set prior to making a venipuncture. This feature permits the priming of the catheter prior to venipuncture and when used with the flashback feature on the administration set it provides a non-messy way of determining whether the catheter is placed in the vein.

The apparatus of the present invention, in addition to providing the forementioned advantages, is inexpensive and readily disposable. In its preferred embodiment the hub of the needle, the female luer adapter, the take-up tube, the protector tip, the protective sleeve and the catheter are made of suitable plastic resinous materials such as polyethylene, polypropylene, nylon and the like. The exact size and proportions of the various elements, such as the size of the needle and the length of the catheter, will, of course, be determined largely by the desires of the ultimate user, i.e. the physician. It will be readily understood, however, that in order for the device to function in the manner described the catheter must readily fit within the lumen of the needle and bore of the take-up tube and the plastic sleeve must be of sufficiently large diameter to allow it to be gathered in accordian-like fashion on the take-up tube. The length of the take-up tube will, of course, be controlled by the length of the catheter and the sleeve, i.e., it must be long enough to accommodate the sleeve in an accordian-like fashion.

From the foregoing, it will be apparent that a number of changes and modifications can be made without departing from the spirit and scope of the invention.

What I claim is:

In an indwelling catheter unit, a hollow needle having a point at one end and a hub at the other end, a rigid

plastic elongated, hollow cylindrical take-up tube attached to said hub, a flexible plastic catheter extending through said needle and take-up tube and mounted movably for projection of one end of the catheter past the end of the needle, a female luer adapter at the other end of the catheter for attachment to a source of parenteral fluid, a flexible, collapsible lay flat plastic sleeve attached at one end to said female luer adapter and the other end to the hub of said needle, said female luer adapter having a proximal end which will fit within and engage the distal end of take-up tube in a leakproof manner when the catheter is fully advanced, and said take-up tube being of sufficient length to accommodate the full collapsed length of said sleeve in an accordian-like manner.

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