

Nov. 28, 1961

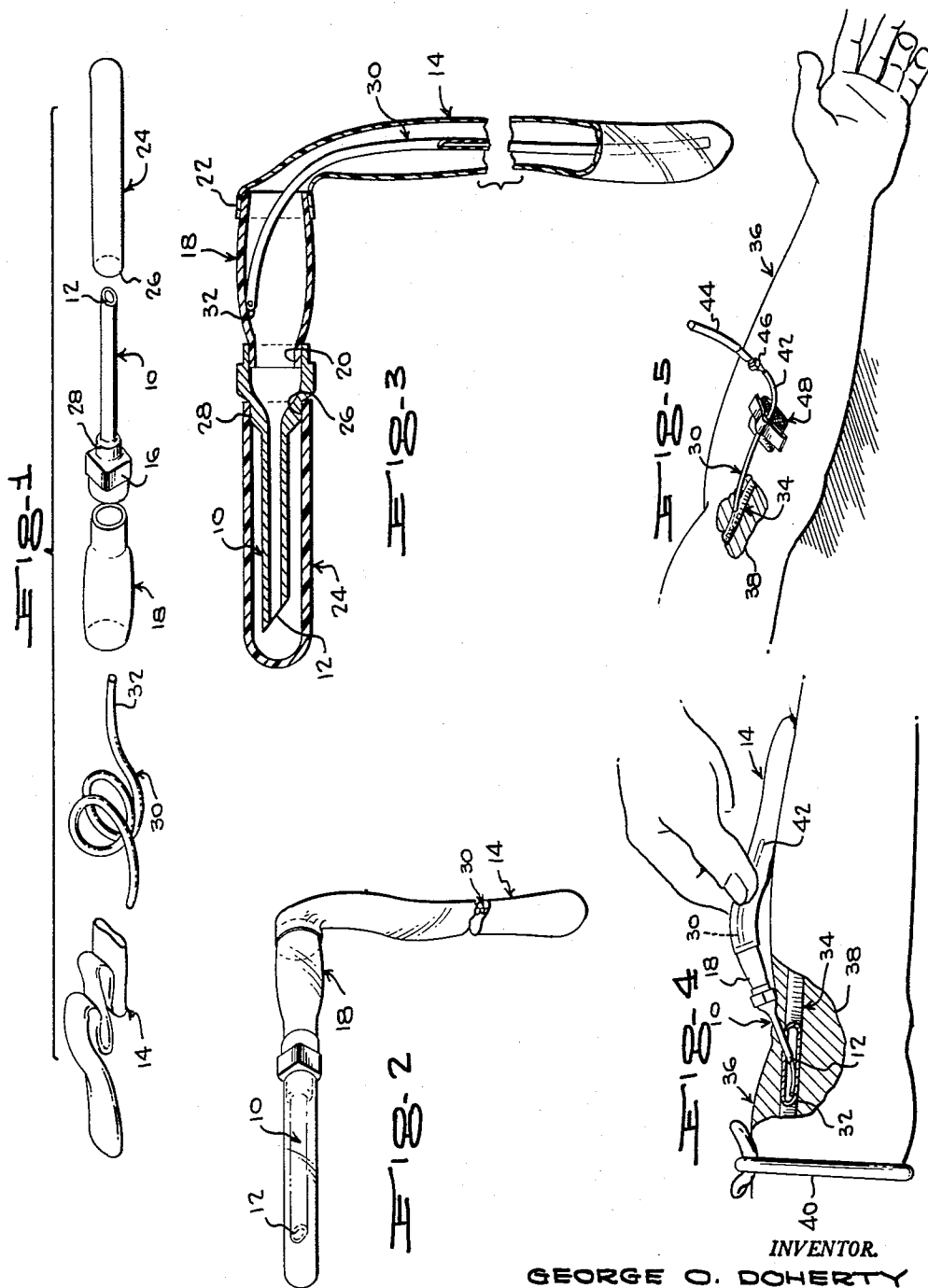
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3,010,453

APPARATUS FOR INTRAVENOUSLY ADMINISTERING FLUID

Filed Oct. 8, 1957

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

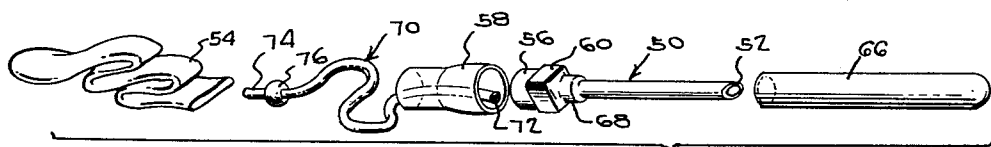


FIG-6

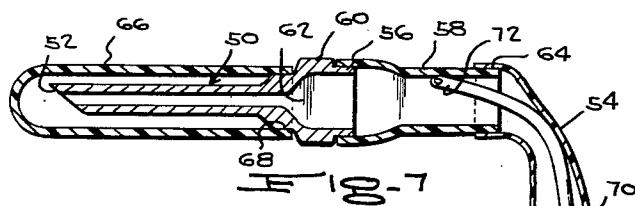


FIG-7

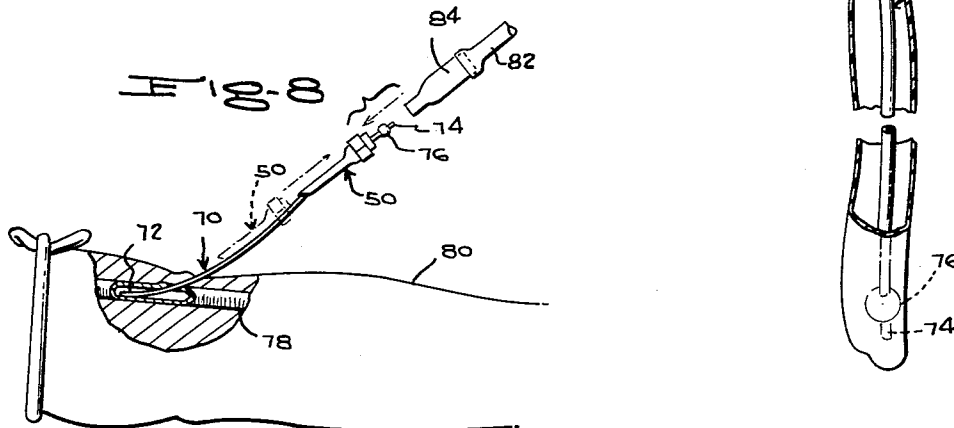


FIG-8

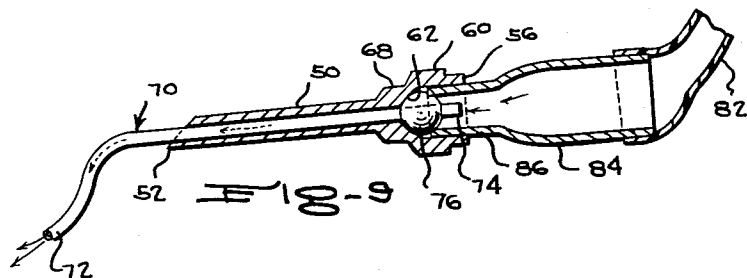


FIG-9

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1

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APPARATUS FOR INTRAVENOUSLY
ADMINISTERING FLUID

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7 Claims. (Cl. 128—214)

This application is a continuation-in-part of application Serial No. 646,992, filed March 19, 1957, now abandoned, and relates to apparatus for intravenously administering fluid to a patient.

In the intravenous administration of fluid, as commonly practiced, a rigid hollow needle is inserted into the vein of the patient, usually in the portion of a vein in the patient's arm, and after the needle has been thus inserted, a source of fluid is connected to the needle. As soon as the needle has been thus placed, it is necessary to immediately immobilize the patient's arm. This immobilization is required in order to obviate the danger of the piercing end of the needle from passing entirely through the vein, should the patient accidentally move the arm. Should this happen, another puncturing of the arm of the patient and reinsertion of the needle in the portion of the vein in such arm would be required, resulting in additional pain and discomfort to the patient.

An object of the present invention is to provide an apparatus for intravenously administering fluid which eliminates the necessity of immobilizing the patient's appendage after the administering element has been inserted in the vein in such appendage.

Another object of the present invention is to provide an apparatus for intravenously administering fluid which enables the insertion of a pliable administering element into the punctured vein of a patient's appendage.

A further object of the present invention is to provide an apparatus for intravenously administering fluid which enables the insertion of a portion adjacent one end of a sterile pliable administering element through a rigid hollow needle into the punctured vein of a patient's appendage, and while such portion is in the punctured vein to attach to the other end of the element a source of administering fluid without destroying or contaminating the sterility of such other end.

A still further object of the present invention is to provide an apparatus for intravenously administering fluid which lends itself to ready and simple execution, which is positive in action, and which is commercially practical.

These and other objects and advantages of the present invention will be fully apparent from the following description when taken in connection with the annexed drawing, in which:

FIGURE 1 is an exploded perspective view of the components of the apparatus according to the present invention;

FIGURE 2 is an isometric view of the components in assembled condition;

FIGURE 3 is a sectional view, on an enlarged scale, of the assembly of FIGURE 2;

FIGURE 4 is a view showing the first step in the insertion of the pliable catheter of the apparatus into the vein of a human;

FIGURE 5 is a view of the apparatus showing the catheter inserted in the vein and the needle and the protective sac withdrawn from the apparatus;

FIGURE 6 is an exploded perspective view of the components of the apparatus according to a modified form of the present invention;

FIGURE 7 is a sectional view, on an enlarged scale, of the assembly shown in FIGURE 6;

FIGURE 8 is a view illustrating the use of the appa-

2

ratus of the present invention in its modified form; and
FIGURE 9 is a sectional view of the apparatus of the modified form in a position of use.

Referring to FIGURES 1 to 5 of the drawing in which like numerals indicate like parts throughout the several views, the apparatus for intravenously administering the fluid, according to the present invention, comprises a rigid hollow needle, designated generally by the reference numeral 10, having one end 12 shaped for piercing the skin of a human.

A pliable sac 14, open at one end, is operatively connected to the other end 16 of the needle 10 by means of a semirigid coupling 18 having one end detachably connected to said needle other end. The needle other end 16 has an enlarged portion forming a handle by means of which the needle 10 may be manipulated and the coupling 18 has a reduced neck 20 which fits within the end of the needle adjacent such enlarged portion. The open end portion 22 of the sac 14 is stretched to be of a size such that it may be circumposed about the end of the coupling 18 remote from the portion which enters the needle 10. A rigid cover 24, having an open end 26, encloses the piercing end of the needle 10 and is detachably secured with the open end 26 slidably received upon the shoulder 28 provided on the needle 10 between the piercing end 12 and the enlarged portion.

A pliable catheter 30 is positioned within the sac 14 and is shiftable from the position within the sac 14 through the needle 10 into a position in which one end 32 projects beyond the piercing end 12 of the needle 10. This shifting of the catheter 30 through the needle 10 is accomplished by manipulating the sac and the application of force to the catheter sufficient to move it through the sac 14 into the interior of the coupling 18, through the coupling 18, and into the open end of the needle 10. The manual manipulation of the catheter 30 through the needle 10 is depicted in FIGURE 4, which shows that the penetrating end of the needle 10 has been inserted into a vein 34 in the arm 36 of a patient.

After the penetrating end 12 of the needle 10 has penetrated the wall of the vein 34 and the catheter 30 has been manually shifted to the position in which the portion of the catheter 30 adjacent the one end 32 has entered the vein 34, the needle 10 and the attached sac 14 may be withdrawn from about the catheter 30 upon the application of a pulling force to the portion of the needle 10 exteriorly of the skin 38 of the human, a finger of one hand of the user being used to compress the arm 36 at a point adjacent the point of penetration of the needle 10 through the skin 38 and flesh of the arm 36 and forwardly of such point so as to compress and hold the portion of the catheter adjacent the one end 32 within the vein 34.

In using the apparatus for intravenously administering the fluid into the vein of a human, as above described, the sac 14 first has to be either evacuated and completely collapsed or completely filled with an isotonic solution such as sodium chloride. This is necessary so as to avoid any possibility of introducing an inadvertent air embolism into the vein. The sac thus prepared, the appendage of the patient is externally cleaned in the area in which the penetration is to be made. Then the cover 24 is removed from the needle and the piercing end 12 of the needle is inserted through the skin 38 into the vein 34 with such suitable tourniquet 40 as is desired, temporarily obstructing the flow of blood through the vein 34. After the portion of the needle 10 adjacent the piercing end 12 has been inserted into the vein, the sac 14, preferably of transparent plastic or similar material, is manually manipulated and force applied through the hand of a user to the adjacent part of the catheter 30 inwardly of the piercing end of the catheter 30 to work and shift the

3

catheter 30 into the needle 10 and through the needle piercing end 12 to a position in which the portion adjacent the end 32 of the catheter 30 is fully within the vein 34. The coupling 18 and needle 10 may then be withdrawn from about the catheter 30, over the other end 42 of the latter, and discarded. A suitable flexible conduit 44 having a coupling 46 on its free end is next attached to the end 42 of the catheter 30 and connected to the source of fluid to be administered in the conventional manner.

With only the pliable catheter 30 inserted into the vein 34, the arm 36 of the patient need not be immobilized and a simple gauze pad and bandage assembly as at 48 may serve to secure the catheter 30 to the arm 36, permitting the arm 36 to be moved without chance of disturbing the flow of liquid through the catheter 30 into the vein 34 and without danger of other injury to the arm 36 as was formerly the case when the needle which was used to penetrate the vein 34 was also used to convey the liquid administered.

Referring to the apparatus of the present invention as illustrated in FIGURES 6 to 9 of the drawing, the numeral 50 represents a rigid hollow needle having one end 52 shaped for piercing the skin of a human.

A pliable sac 54, open at one end, is operatively connected to the other end 56 of the needle 50 by means of a semirigid coupling 58 having one end detachably connected to the needle's other end 56. The other end 56 of the needle 50 has an enlarged portion 60 having a tapering shoulder 62 on the inner wall thereof. One end of the coupling 58 is enlarged so as to fit over the other end 56 of the needle 50 adjacent the enlarged portion 60, as shown in FIGURE 7.

The portion 64 adjacent the open end of the sac 54 is of a size to fit tightly over the adjacent end of the coupling 58 for sealing the contents of the sac 54 and the coupling 58 in a sterile condition. A rigid cover 66, having one end open, encloses the piercing end of the needle 50 and is detachably secured with the open end thereof slidably received upon a shoulder 68 formed on the needle 50 adjacent the enlarged portion 60.

A pliable catheter 70, having a forward end 72 and a rearward end 74, is positioned within the sac 54 so that the forward end 72 is adjacent the needle 50 and the rearward end 74 is remote from the needle 50. The catheter 70 carries a fixed sealing member 76 inwardly of and adjacent the rearward end 74 of the catheter 70.

The catheter 70 is stored within the sac 54 until such time as it is needed and then it is shiftable by the application of manipulating force through the sac 54 and the adjacent part of the forward end portion of the coupling 58 to a position projecting beyond the end 52 of the needle 50 with the rearward end 74 of the catheter 70 rearwardly of the needle 50, as shown in FIGURE 8. The needle 50 is slidable along the catheter 70 after the cover 66 has been removed from the needle and after the forward end 72 of the catheter 70 has been projected into the vein 78 of an arm 80 of an individual after puncturing by the needle 50, as shown in FIGURE 8. A first position of the needle 50 on the catheter 70 is shown in dotted lines and a second position of the needle 50 is shown in full lines with the sealing member 76 about to enter the open end of the needle 50 for sealing engagement with the shoulder 62 formed within the needle 50 on the inner wall of the latter. The coupling 58 is withdrawable from the needle 50 upon the application of a rearwardly directed force which also serves to remove the sac 54 from its operative connection with the needle 50.

After the one end 72 of the catheter 70 has been inserted into the vein 78 and the needle 50 move or slid along the catheter 70 to the position in which the sealing member 76 is in sealing engagement with the shoulder 62, a flexible conduit 82 leading to a source of fluid to be administered is connected to the enlarged portion 60 of the needle 50 by means of a rigid coupling element 84 having a reduced portion 86 adjacent one end con-

4

formably shaped to fit within the enlarged portion 60 of the needle 50, as shown in FIGURE 9.

It will be seen, therefore, that the sac 54 may be used to protect the catheter 70 in a sterile condition and the cover 66 may be used to protect the penetrating end portion of the needle 50 after the latter has been sterilized. The catheter 70 is easily shifted so that its end 72 is forwardly of and projects beyond the penetrating end 52 of the needle 50 for placement within a vein which has been pierced by the needle 50. The needle 50 is easily withdrawn along the catheter 70 to the position in which the sealing member 76 is received within the open end of the needle 50 and the coupling element 84 easily attached to the needle 50 without contaminating or destroying the sterile condition of the end 74 of the catheter 70. Fluid introduced through the conduit 82 may then be introduced into the vein 78 without any part of the apparatus of the present invention becoming unsterile or becoming contaminated by unsterile handling.

While only preferred embodiments of the present invention have been shown and described, other embodiments are contemplated and numerous changes and modifications may be made therein without departing from the spirit of the invention as set forth in the appended claims.

What is claimed is:

1. Apparatus for intraveneously administering a fluid comprising a hollow internally sterile needle having one end shaped for piercing and being provided at its other end with a hub-like element, said needle being adapted for penetration of the piercing end through the skin of a human into a vein of said human, a semi-rigid tubular coupling detachably connected at one end to the hub-like element of said needle, a pliable internally sterile sac permanently closed at one end and being detachably connected to the other end of said coupling, and a pliable sterile catheter having a forward end and a rearward end, said rearward end being provided with a fixed sealing member within said sac, the forward end of said catheter being slidably disposed at one end near the hollow needle so as to be shiftable when the penetrating end of the needle has been inserted into the vein of a human from the position within said sac through said needle into a position in which the forward end thereof projects beyond the penetration end of said needle upon the application of a manipulating force to the sac and the adjacent part of the catheter inwardly of said forward end thereof by the hand of a user of said apparatus, said needle being shiftable rearwardly along said catheter after the forward end thereof has been projected into said vein until said sealing member is wholly within and in sealing engagement with said needle by the application of a rearwardly directed force, said coupling being withdrawable from said needle after said sealing member of said catheter is in sealing engagement with said needle upon application of a pulling force to said coupling.

2. Apparatus for intraveneously administering a fluid comprising a hollow internally sterile needle having one end shaped for piercing and being provided at its other end with a hub-like element, said needle being adapted for penetration of the piercing end through the skin of a human into a vein of said human, an internally sterile covering closing the piercing end of said needle and detachably secured to said needle, a semirigid tubular coupling detachably connected at one end to the hub-like element of said needle, a pliable internally sterile sac permanently closed at one end and being detachably connected to the other end of said coupling, and a pliable sterile catheter having a forward end and a rearward end, the forward end being slidably disposed near the hollow needle, the rearward end extending loosely into and being entirely enclosed within the interior of the sac, said rearward end being provided with a fixed sealing member inwardly of and adjacent the rearward end thereof positioned within said sac so that the forward end

5

is adjacent said needle and the rearward end is remote from said needle, said catheter being shiftable when the penetrating end of the needle has been inserted into the vein of a human from the position within said sac through said needle into a position in which said forward end thereof projects beyond the penetration end of said needle upon the application of a manipulating force to the sac and the adjacent part of the catheter inwardly of said forward end by the hand of a user of said apparatus, said needle being slidable rearwardly along said catheter after said cover has been detached from said needle and after the forward end of the catheter has been projected into said vein until said sealing member is wholly within and in sealing engagement with said needle by the application of a rearwardly directed force, and said coupling being withdrawable from said needle after said sealing member of said catheter is in sealing engagement with said needle upon application of a pulling force to said coupling.

3. A self-contained sterile catheter unit comprising a hollow needle of the hypodermic type being sharpened at one end and being provided at its other end with a hub-like element, at least the interior surfaces of said needle and hub being sterile, a tubular coupling mounted on the hub and extending outwardly therefrom in the provision of a sterile chamber which is external to the needle, an elongated internally sterile pliable tubular sac removably secured at one end upon the outer end of the coupling and being closed at its other end so as to define an entirely enclosed sterile space which communicates with the chamber in the coupling, a small-diameter sterile catheter adapted for slidable passage, at one end, through the needle, said catheter being enclosed for substantially its entire length and loosely within said sterile space, and an internally sterile close-ended tubular sheath of somewhat greater length than the needle and being sized for snug-fitting removable disposition over the hub-attached end of the needle for enclosing the skin penetrating portion of the needle within a sterile chamber.

4. A self-contained sterile catheter unit comprising a hollow needle of the hypodermic type being sharpened at one end and being provided at its other end with a hub-like element, at least the interior surfaces of said needle and hub being sterile, a tubular coupling removably mounted on the hub and extending outwardly therefrom in the provision of a sterile chamber which is external to the needle, an elongated internally sterile pliable tubular sac removably secured at one end upon the outer end of the coupling and being closed at its other end so as to define an entirely enclosed sterile space which communicates with the chamber in the coupling, a small-diameter sterile catheter adapted for slidable passage, at one end, through the needle, said catheter being enclosed for substantially its entire length and loosely within said sterile space, and an internally sterile close-ended tubular sheath of somewhat greater length than the needle and being sized for snug-fitting removable disposition over the hub-attached end of the needle for enclosing the skin penetrating portion of the needle within a sterile chamber.

6

5. A sterile self-contained catheter unit according to claim 3 wherein the distal end of the catheter is provided with an enlargement sized to seat itself retentively within the interior of the hub.

6. A self-contained sterile catheter unit comprising a hollow needle of the hypodermic type being sharpened at one end and being provided at its other end with a hub-like element, at least the interior surfaces of said needle and hub being sterile, a tubular coupling mounted on the hub and extending outwardly therefrom in the provision of a sterile chamber which is external to the needle, said coupling having an internal diametral size at one end substantially equal to the diametral size of the outer end of the hub so as to fit snugly thereon, an elongated internally sterile pliable tubular sac removably secured at one end upon the outer end of the coupling and being closed at its other end so as to define an entirely enclosed sterile space which communicates with the chamber in the coupling, and a small-diameter sterile catheter adapted for slidable passage, at one end, through the needle, said catheter being enclosed for substantially its entire length and loosely within said sterile space, said coupling member having an external diametral size at said other end for snug-fitting engagement with said sac.

7. Apparatus for intravenously administering a fluid comprising a hollow internally sterile needle having one end shaped for piercing and being provided at its other end with a hub-like element, said needle being adapted for penetration of the piercing end through the skin of a human into a vein of said human, a semi-rigid tubular coupling detachably connected at one end to the hub-like element of said needle, a pliable internally sterile sac closed at one end and being detachably connected to the other end of said coupling, and a pliable sterile catheter having a forward end and a rearward end, said rearward end being provided with a fixed sealing member within said sac, the forward end of said catheter being slidably disposed at one end near the hollow needle so as to be shiftable when the penetrating end of the needle has been inserted into the vein of a human from the position within said sac through said needle into a position in which the forward end thereof projects beyond the penetration end of said needle upon the application of a manipulating force to the sac and the adjacent part of the catheter inwardly of said forward end thereof by the hand of a user of said apparatus, said catheter being shiftable through said needle after the forward end thereof has been projected into said vein until said sealing member is wholly within and in sealing engagement with said needle.

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