

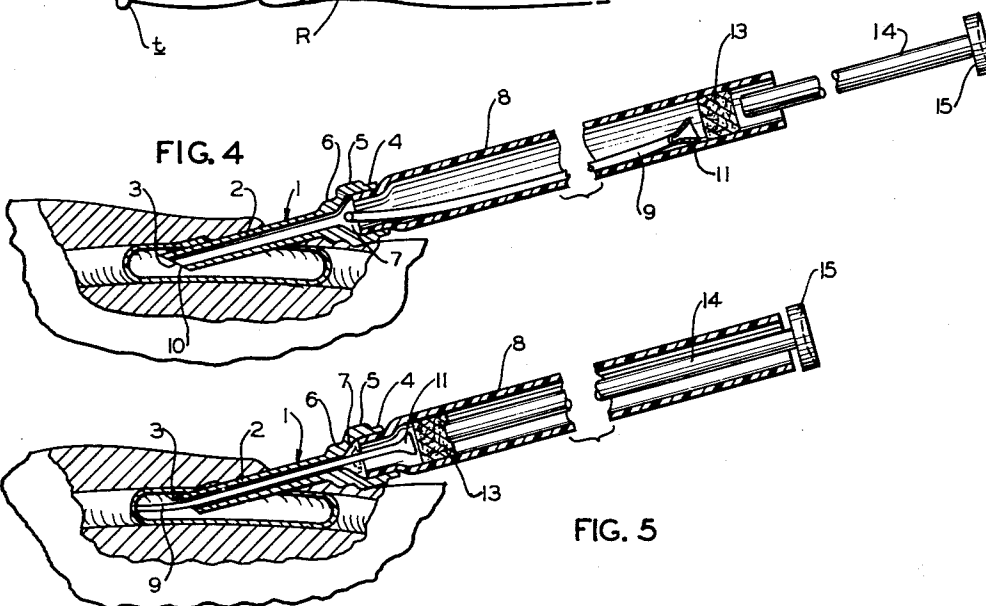
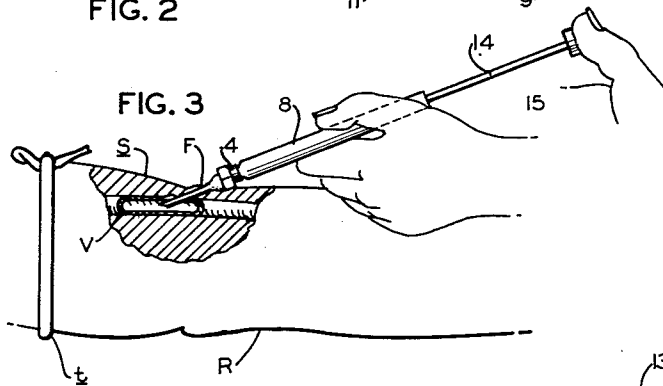
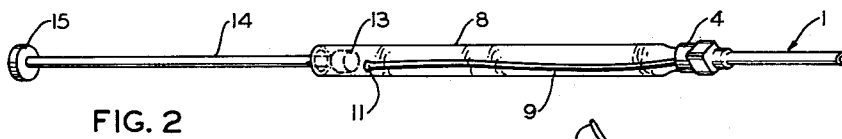
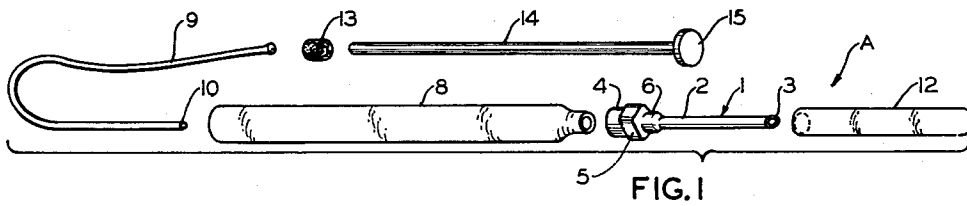
Sept. 19, 1961

G. O. DOHERTY
MEANS AND METHODS OF INJECTING OR
INFUSING FLUIDS INTO PATIENTS

3,000,380

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2 Sheets-Sheet 1



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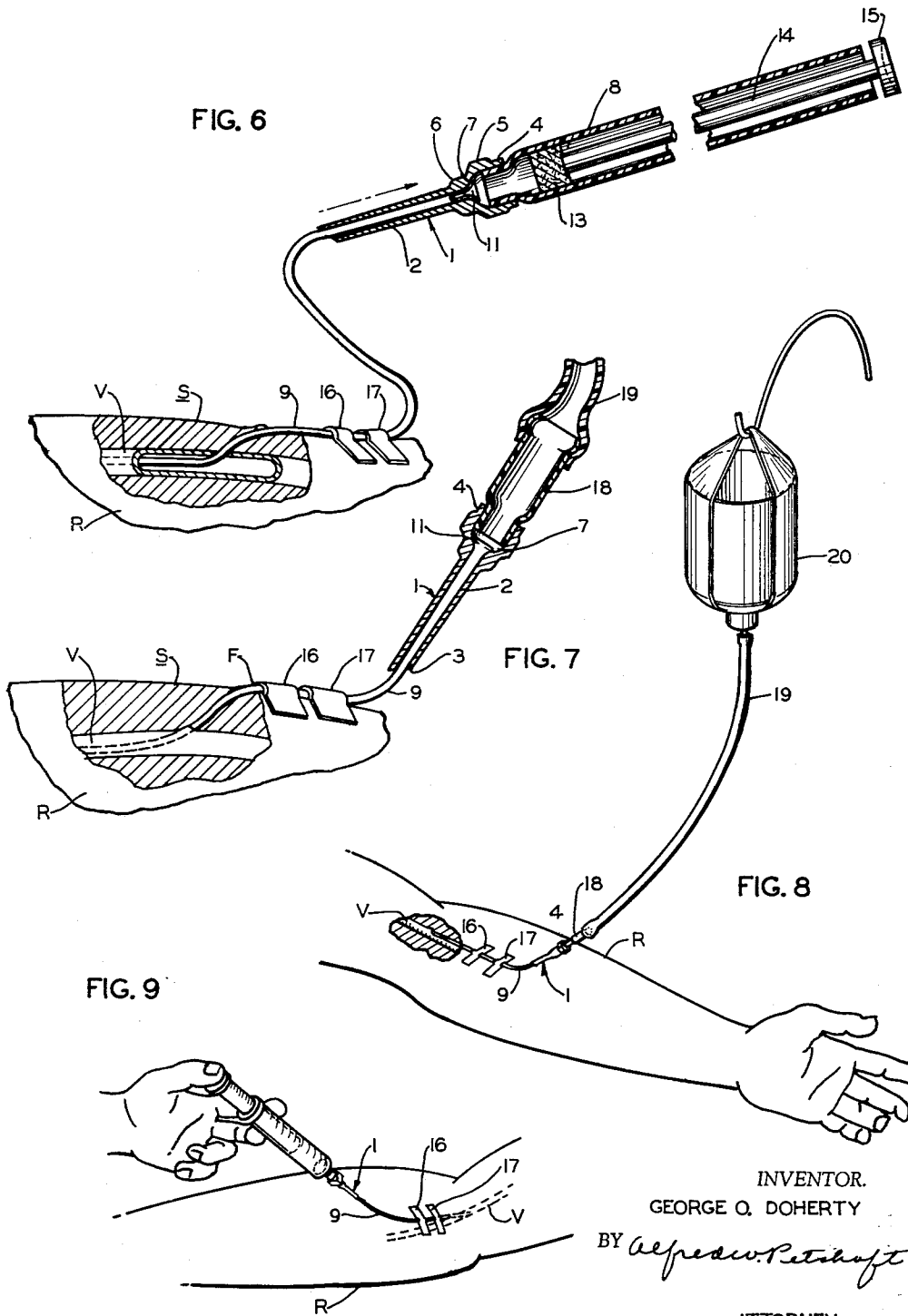
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MEANS AND METHODS OF INJECTING OR INFUSING FLUIDS INTO PATIENTS

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2 Claims. (Cl. 128—214)

This invention relates in general to certain new and useful improvements in surgical devices and, more particularly, to means and methods for injecting or infusing fluids into patients.

As has been pointed out in my copending application Serial No. 646,992, filed March 19, 1957, now abandoned, the injection or infusion or infusion of fluids into a patient is used, at the present time, in a wide variety of medical and surgical procedures. Moreover, in intravenous administration of isotonic saline solution, glucose, and the like, the giving of blood transfusions, and the induction of spinal anesthesia, intravenous infusion techniques are routinely employed. In carrying out such procedures, it is conventional practice to insert a heavy hollow needle into the vein, artery, spine, or other affected area, and, once the needle is properly installed, some suitable fluid conduit is connected to the external end thereof. In the case of intravenous infusion, a connection is made by a Luer fitting or other similar means to rubber tubing leading to the supply-flask or bottle. Likewise, in the case of blood transfusions, the needle is suitably connected to the transfusion apparatus. Since the needle must remain in the patient's arm during the injection or infusion procedure, immobilization of the arm on an arm board or similar structure is mandatory for obvious reasons. Furthermore, these standard techniques of intravenous therapy require the services of a physician, interne, or surgical nurse and it is necessary that such person thoroughly scrub his hands and wear sterile rubber gloves in order to avoid contamination of the equipment.

In the case of surgical patients, these problems are multiplied by reason of the fact that a venipuncture is made and a needle installed in the arm routinely in preparation for surgery so as to be available in case of an operative emergency and again in the recovery room as well as during convalescence additional venipunctures may become necessary. Each time a venipuncture is made, the patient's arm must be immobilized and, of course, the services of a physician, interne, or surgical nurse will be required. Finally, in cases where intravenous feeding is required for an extended period of time, it is necessary for a patient to lie with an arm outstretched and immobilized on an arm board for a number of consecutive days, resulting in patient immobility and poor patient morale.

Hence, it is the primary object of the present invention to provide means for intravenously administering fluid which can be allowed to remain in position in the patient's arm, or other area, for long periods of time, so that only a single venipuncture need be made for all the various intravenous procedures which may become necessary during the course of a particular operation or illness.

It is also an object of the present invention to provide means of the type stated which eliminates the need for immobilizing the patient's arm or other appendage and, at the same time, eliminates unnecessary loss of the patient's blood.

It is a further object of the present invention to provide means of the type stated wherein a needle need be inserted into the vein only a short distance and thereafter removed, thus materially reducing the incidence

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of local trauma, scarification and similar damage to the vein.

It is an additional object of the present invention to provide means of the type stated which prevents coagulation of the blood within the catheter during periods where no fluid is flowing from the infusion set into the vein.

It is a further object of the present invention to provide means of the type stated which is relatively easy to use without the necessity of hand scrubbing or using sterile gloves and, at the same time, always maintains its sterile condition.

It is another object of the present invention to provide an intravenous infusion method which readily permits the insertion of a catheter into the vein without contamination and without the need for so-called "sterile procedure", that is to say, the use of rubber gloves and sterilizing solutions.

With the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawings (two sheets)—

FIG. 1 is an exploded perspective view of means for intravenously administering fluid to a patient, said means being constructed in accordance with and embodying the present invention;

FIG. 2 is a perspective view of the intravenous catheter of the present invention in assembled relation;

FIG. 3 is a fragmentary sectional view showing the intravenous catheter being installed within the patient's vein;

FIGS. 4, 5, and 6 are fragmentary sectional views showing successive steps in the installation of an intravenous catheter in accordance with the present invention;

FIG. 7 is a fragmentary sectional view showing the intravenous catheter installed within the vein and connected to a fluid supply conduit or tube;

FIG. 8 is a perspective view of the intravenous catheter after it has been inserted into the vein and showing the manner of using the apparatus for intravenous feeding; and

FIG. 9 is a fragmentary perspective view showing the intravenous catheter as used in conjunction with a hypodermic syringe.

Referring now in more detail and by reference characters to the drawings, which illustrate a preferred embodiment of the present invention, A designates means for intravenously administering fluid to a patient and comprising a rigid needle 1 having a hollow shank 2 terminating its forward end in a point 3, the latter being shaped for piercing the skin and vein. At its rear end, the needle 1 is formed with a diametrically enlarged hollow cylindrical hub 4, the outer periphery of which is provided with a knurl 5. Connecting the hub 4 and shank 2 is a connecting neck 6, and interiorly of the hub 4 the neck 6 is provided with a conical seat-forming recess 7. Fitted into the hub 4 and gripped snugly thereby is a tubular tip integrally formed as the forward end of an elongated cylindrical barrel 8 formed of glass or heavy transparent synthetic material, such as Lucite, polystyrene resin, or the like. Shiftably disposed within the bore of the needle 1 and extending into the cylindrical barrel is a flexible plastic catheter 9 preferably formed of a polymerized synthetic resin, such as vinyl resin or the like, and having a miter-cut forward end 10 initially positioned adjacent the needle point 3. The catheter 9 is loosely disposed within the barrel 8 and at its rear end the catheter 9 is flared out in the provision of a seating-tip 11 for snugly fitting within the hub 4 and tightly engaging the seat-forming recess 7. Preferably, the needle 1 is covered with a tubular protector sleeve 12, which is longer than the needle 1 and is suitably closed at its outer end.

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Slidably disposed within the barrel 8 is a plunger-head 13 axially provided with a rearwardly projecting push-rod 14 which terminates, exteriorly of the barrel 8, in a button-like knob 15. As will be seen by reference to FIGS. 4, 5, and 6, the plunger-head 13 is so arranged that it will, when shifted forwardly, abut against the seating-tip 11 of the catheter 9 and force the catheter 9 forwardly through the needle 1.

In use, the arm or other appendage R is externally cleaned in the area in which the penetration is to be made. The protector sleeve 12 is then removed from the needle 1 and the pointed end 3 of the needle is inserted through the skin *s* into the vein V, utilizing a suitable tourniquet *t*, the latter being conventionally used to control the flow of blood through the vein V. After the needle 1 has been inserted into the vein V, the push-rod 14 is manually propelled forwardly by applying force from the finger of the user against the knob 15, as shown in FIG. 3, thereby advancing the catheter 9 through the needle 1 and into the vein V. After the catheter 9 is in position within the vein V, the needle 1 is slowly withdrawn from the vein V and moved back along the catheter 9, while, at the same time, digital pressure is applied to the skin *s* distal to the needle piercing point so as to hold the catheter 9 within the vein V. The needle is withdrawn until the seating-tip 11 is firmly seated within the conical recess, as shown in FIG. 6, thereby sealing the catheter 9 within the needle 1. Thereafter, the exposed portion of the catheter 9 is secured to the appendage R adjacent the needle-puncture F by strips of tape 16, 17, after which the barrel 8 is grasped and removed from the hub 4. The needle hub 4 is then attached through a suitable fitting 18 to a tube 19, the latter being suitably connected to an infusion set 20, as shown in FIGS. 7 and 8.

In connection with the present invention, it should be noted that, as the needle 1 punctures the vein V, the blood pressure will cause a certain amount of blood to flow into the catheter 9. As the blood flows into the catheter 9, however, the air within the barrel 8 will be slightly compressed and the blood-flow will be relatively slow. Meanwhile, the push-rod 14 is propelled forwardly abutting against the open end of the seating-tip 11, effectively sealing it against further blood-leakage. Consequently, there will be virtually no loss of blood during the time in which the catheter 9 is advanced from the barrel 8 into the vein V.

It will also be apparent that the barrel 8 protects the catheter 9 and the covering sleeve 12 protects the needle 1 after the entire apparatus A has been assembled and sterilized. The catheter 9 may be easily manipulated by the push-rod 14 and plunger-head 13 so as to shift the catheter 9 through the needle 1 into the vein V. The needle 1 is easily withdrawn along the catheter 9 and the needle hub 4 is readily attached to the fitting 18 for intravenous administration of fluids without contaminating or destroying the sterile condition of the seating-tip 11 of the catheter 9. As a result, fluid introduced through the

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tube 19 can be introduced into the vein V without becoming unsterile or contaminated and the possibility of inadvertently introducing an air embolism into the vein V is substantially avoided. It will also be apparent that the doctor, nurse, or technician, in using the apparatus A, will not be required to scrub or use sterile gloves, as is ordinarily required in conventional venipuncture techniques heretofore in use. Moreover, the use of an arm board is eliminated since there is no necessity for a patient to have the appendage immobile except during installation or removal of the catheter 9.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the means and methods for injecting or infusing fluids into patients may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. Intravenous catheter means comprising a needle having a tubular bore and a sharpened end capable of penetrating the flesh and entering a blood vessel of a patient, said needle also being provided at its other end with a hub-like element, a rigid elongated barrel removably secured by a slip-fit to the hub, a flexible catheter having one end slidably disposed within the tubular bore of the needle and having a substantial portion of its length extending beyond the hub-like element of the needle into and lying loosely within the barrel so as to be shiftable from the barrel through the needle and into the patient's blood vessel when the needle has been inserted therein, said loosely lying portion being provided at its proximal end with an enlargement sized for retentive engagement within the hub and an imperforate plug slidably engaged within the barrel for shifting movement axially therealong, said plug having an inwardly presented flat face-portion for abutting engagement against said proximal end of the portion of the catheter which lies loosely within the barrel for propelling the catheter through the bore of the needle as the plug is pushed along the barrel.

2. Intravenous catheter according to claim 1, in which the elongated barrel is diametrically reduced and slip-fitted internally within the hub of the needle.

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