April 24, 1962 W. R. KOEHN 3,030,953

APPARATUS FOR APPLYING CATHETER

Filed Oct. 17, 1957 2 Sheets-Sheet 1

Fig. 1.

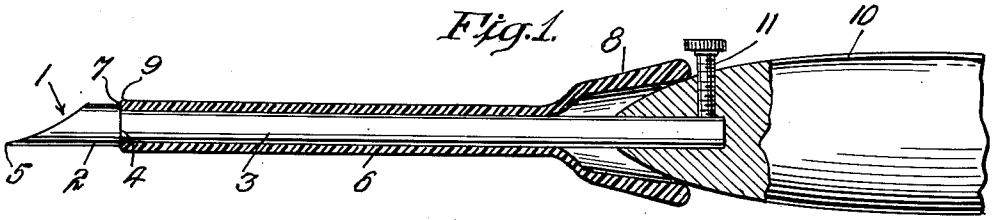


Fig. 4.

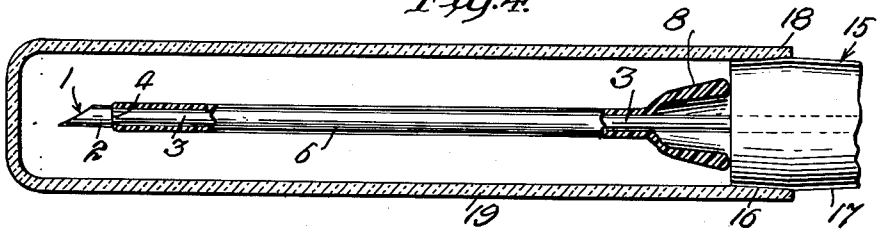


Fig. 5.

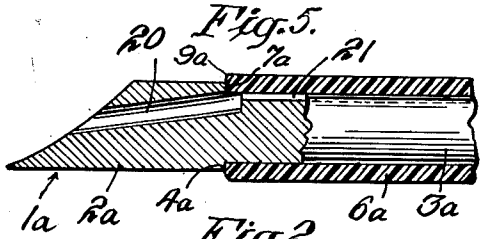


Fig. 6.

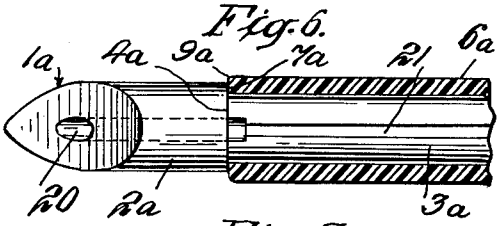


Fig. 2.

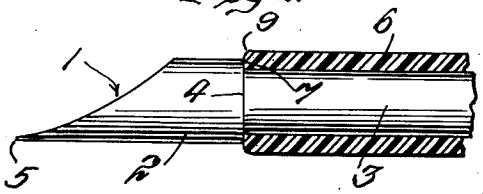


Fig. 3.

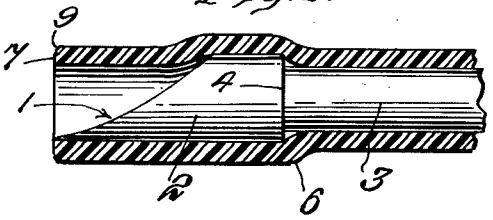


Fig. 7.

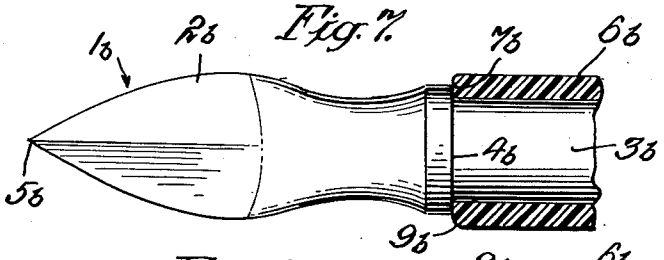
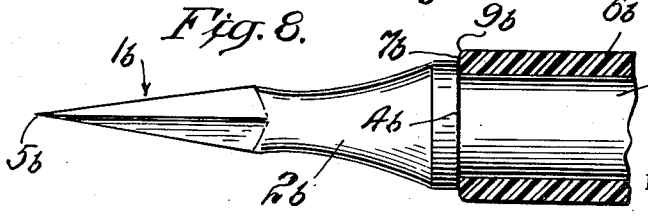


Fig. 8.



INVENTOR.
WILBUR R. KOEHN
BY
Curtis, Morris & Safford
ATTORNEYS

April 24, 1962 W. R. KOEHN 3,030,953

APPARATUS FOR APPLYING CATHETER

Filed Oct. 17, 1957 2 Sheets-Sheet 2

Fig. 9.

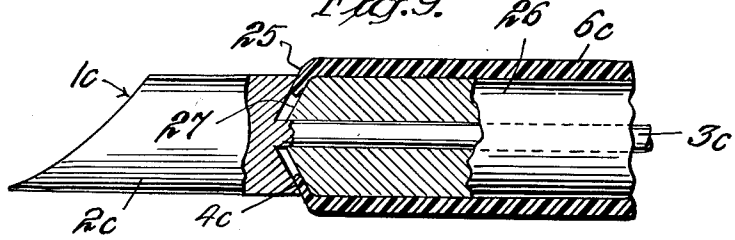


Fig. 10.

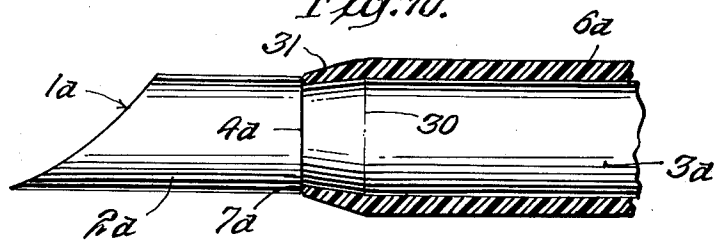


Fig. 11.

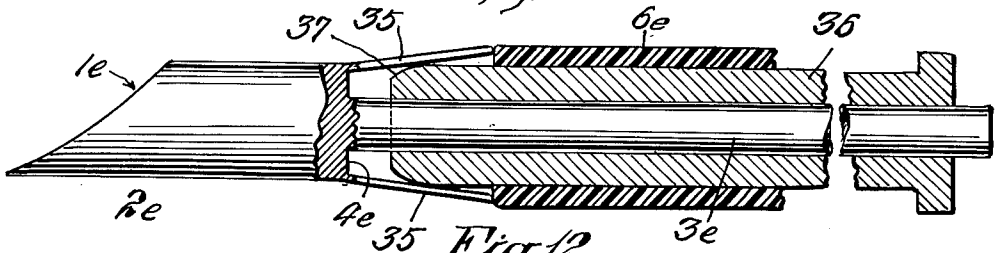


Fig. 12.

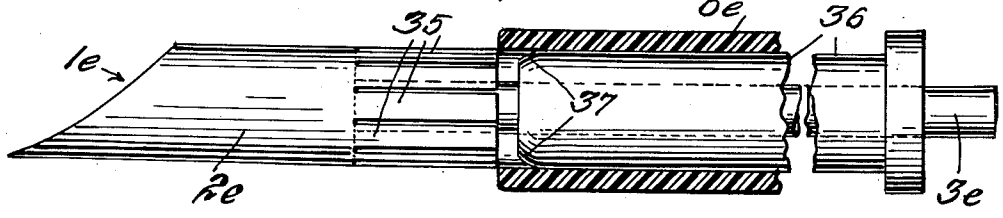


Fig. 13.

INVENTOR.
WILBUR R. KOEHN
BY
Curtis, Morris & Safford
ATTORNEYS

United States Patent Office 3,030,953 Patented Apr. 24, 1962

3,030,953

APPARATUS FOR APPLYING CATHETER

Wilbur R. Koehn, New York, N.Y.
(20 Shorewood Drive, Sands Point, Long Island, N.Y.)

Filed Oct. 17, 1957, Ser. No. 690,709
9 Claims. (Cl. 128—214)

The present invention relates to a method of and surgical apparatus for applying a catheter tube to any required location in the human body.

It is a usual practice in blood transfusions, intraveneous feeding or when fluids are to be withdrawn from the body to attach a tube to a hollow needle and insert the needle into a vein or other body cavity. The fluid then flows through the tube and hollow needle into the body when fluids are to be delivered therethrough or through the needle and tube when fluids are to be withdrawn.

Repeated punctures of veins with metal needles for withdrawing successive blood samples, delivering successive transfusions or intravenous feeding, tend to cause venous thromboses and subcutaneous hematomas. It has, therefore, become a common practice to leave the needle in the body for long periods of time. To prevent relative movement of the body and needle, the part of the body where the needle is inserted must be immobilized with considerable discomfort to the patient. This is especially true when the needle is inserted into a vein, as, for example, in the arm, where relative movement might cause a puncturing of the vein and additional trauma. To prevent such relative movement the arm is strapped in fixed position.

Obviously, it would be desirable to insert the end of a soft flexible catheter into a body cavity instead of a needle. It has heretofore been proposed to so insert the end of a catheter tube into a vein or other body cavity by means of a needle and then withdraw the needle. One such method requires the use of a relatively large hollow needle to make the incision, telescoping the end of the tube through the hollow needle and then withdrawing the needle over the catheter tube. Such a method of inserting a catheter tube produces a large incision and excessive cutting of the tissue and is especially undesirable when the incision is made in a vein.

It has also been proposed to attach the end of a catheter tube to a needle and then withdraw the needle through the catheter. With this proposed arrangement, openings are provided in the sides of a relative small hollow needle. The catheter tube surrounds the needle and has forwardly projecting tabs which are inserted into the openings in the needle. A stylet is then inserted through the hollow needle to clamp the ends of the tabs against the interior sides of the needle. This arrangement is impractical because of the complicated structures required, the very small dimensions of the parts and the difficulty of manually inserting the ends of tabs at the end of a catheter into the very small openings at the sides of a small needle.

One of the objects of the present invention is to provide an improved method of and surgical apparatus for inserting the end of a catheter tube to any desired location in the human body.

Another object is to provide a method of and apparatus for inserting a catheter tube into the body with the aid of a relatively small needle and then withdrawing the needle through the catheter.

Still another object of the present invention is to provide a method of forming a catheter tube to provide a blunt end having a rounded outer edge.

Another object is to provide a surgical apparatus of the type indicated which may be hermetically sealed in an enclosing casing for storage as a self contained sterile unit.

Another object is to provide a surgical apparatus of

the type indicated in which the flow of blood can be observed to show when the end of the catheter has entered a vein.

Still another object is to provide a surgical apparatus of the type indicated which is of simple and compact construction adapted for economical manufacture and one which is reliable in operation.

These and other objects will become more apparent from the following description and drawings in which like reference characters denote like parts throughout the several views. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings:

FIGURE 1 is a greatly enlarged longitudinal sectional view of a preferred form of surgical apparatus incorporating the novel features of the present invention;

FIGURE 2 is an enlarged view of one end of the needle and catheter tube and showing the blunt end of the tube with its outer edge slightly rounded;

FIGURE 3 is a view similar to FIGURE 2 showing the manner in which the catheter tube yields radially to permit the enlarged head of the needle to be withdrawn therethrough;

FIGURE 4 is a longitudinal sectional view of the assembled needle and catheter tube illustrated in FIGURES 1 to 3 with a finger grip at the end of the needle shaft in the form of a stopple for hermetically sealing the needle and catheter assembly in an enclosing casing;

FIGURE 5 is an enlarged sectional view of a needle of modified construction for indicating the flow of blood.

FIGURE 6 is a sectional plan view of the needle illustrated in FIGURE 5 to show the bore in the pointed head and groove in the shank;

FIGURE 7 is a sectional view similar to FIGURE 5 showing a needle with a different form of point for insertion in a body cavity;

FIGURE 8 is a sectional plan view of the needle illustrated in FIGURE 7;

FIGURE 9 is a sectional view similar to FIGURE 2 showing a needle and catheter tube of modified construction for clamping the end of the tube to the needle;

FIGURE 10 is a view similar to FIGURE 2 showing a needle and catheter of another modified construction;

FIGURE 11 is a sectional view of a needle of another modified construction having spring fingers adapted to be flexed outwardly to provide a continuous surface from the head of the needle to the outside diameter of the catheter tube; and

FIGURE 12 is a view similar to FIGURE 11 showing the spring fingers released and retracted to the inside diameter of the catheter tube; and

FIGURE 13 is a longitudinal sectional view of a rod inserted in the catheter tube to plug the tube when required.

The method of the present invention is based on the discovery that a conventional catheter tube with an annular end cut at right angles to its axis will follow a puncturing needle to the desired location in the body without deformation of the end of the tube or tearing the fibers of the skin and tissue as it passes therethrough. More surprisingly, it has been discovered that a needle having a puncturing head of a larger outside diameter than the inside diameter of the catheter tube may be withdrawn through the tube without displacing its end.

Therefore, in accordance with the method of the present invention, a catheter tube composed of a suitable chemically inert resilient material is formed with an end terminating in a plane at right angles to its axis. The blunt end on such a catheter of a suitable material ren-

ders it sufficiently rigid to prevent deformation when inserted into body tissue, but sufficiently resilient to expand radially to permit the needle head of larger diameter than the inside diameter of the tube to be withdrawn therethrough. Such materials include those used in conventional catheter tubes such as polyethylene, polyvinyl and nylon plastics. For example, a catheter tube of polyethylene having an inside diameter of .047 inch and an outside diameter of .065 inch has been used with a needle corresponding substantially to a conventional No. 19 needle and having a head with an outside diameter of .057 inch.

The blunt end of the catheter tube projects radially from its inside diameter in a right angular shoulder through at least one-half the wall thickness. Preferably, the right angular shoulder extends radially outwardly for two-thirds of the wall thickness with its outer peripheral edge slightly rounded. The blunt end of the catheter tube may be formed by molding it in a suitable mold. However, one particular method of forming a blunt end which has been successfully used is to slide a section of a conventional plastic catheter tube over a rod having substantially the same inside diameter and then rolling the tube on a flat surface under a blade which flares at a wide angle from the cutting edge. When so cut, the blunt end of the tube has an annular shoulder in a plane at right angles to its axis which extends radially outwardly from its inner diameter for about two-thirds of its wall thickness with a gradual rounding of the remaining one-third of the wall thickness to the outer periphery of the tube. Therefore, the term "blunt" as used in the specification and claims is intended to mean that the terminal end lies in a plane at right angles to its axis, but includes a slight rounding at the outer peripheral edge of the shoulder or even a taper from the blunt end to the outer periphery of the tube.

The catheter tube is made only long enough to adapt its blunt end to be inserted into the body cavity and project outwardly from the body. Thus, the catheter tube is only several inches in length and is adapted to be connected to a tube extension after the blunt end has been inserted into the body. For this purpose, the end of the catheter tube opposite the blunt end is formed with a conventional tapered fitting for connection with a tube extension. The tapered fitting also may be molded as an integral part of the catheter tube or may be molded as a separate piece and thereafter attached to the end of the tube as by welding it thereto by the application of heat.

The formed catheter tube is applied to a needle having a head with a pointed end and a reduced shank projecting rearwardly from the head and forming an annular shoulder therebetween. The reduced shank of the needle is only slightly smaller than the inside diameter of the tube to provide a limited clearance of capillary dimensions. The needle may be formed in a conventional manner by grinding the head on a bias to its axis to form a sharp pointed end for puncturing the skin and tissue which progressively widens to the outside diameter of the head. The blunt end of the catheter tube when applied to the shank of the needle abuts the annular shoulder between the head and shank. In accordance with the present invention the head of the needle has a greater outside diameter than the inside diameter of the catheter tube to provide a guide for the end of the tube. The annular shoulder on the needle overlies at least a portion of the blunt end of the catheter tube adjacent its inner periphery. Preferably, the annular shoulder on the needle extends radially to about one-half the thickness of the tube wall, but may extend to the outside diameter of the tube. The right angular shoulder on the blunt end of the catheter tube then abuts the annular shoulder on the needle and may project beyond the needle head with the outwardly projecting portion rounded or rearwardly tapered to the outside diameter of the tube.

It is desirable to have the needle head of as small dimensions as possible to reduce the size of the incision made by the needle head to a minimum. However, if the annular shoulder on the needle is made too shallow, the end of the catheter tube tends to catch on the tissue fibers and does not readily follow the needle point. If the annular shoulder on the needle is made too high it increases the size of the incision and requires a greater expansion of the tube to accomodate the head when the needle is withdrawn. Thus, the head of the needle has a larger diameter than the inside diameter of the catheter tube and the blunt end of the catheter tube preferably projects radially beyond the head of the needle approximately one-half of its wall thickness with the outwardly projecting edge of the tube slightly rounded. It is to be understood, however, that variations may be made in the relationship of the needle head and catheter tube. For example, if a thin wall catheter tube is used or if the material is especially flexible, the annular shoulder on the needle may overlie a greater area of the end of the tube. It has been determined by experiment that a catheter tube of polyethylene having an outside diameter of .061 inch, an inside diameter of .045 inch and used with a needle having a shank of .041 inch and a head of .061 inch operates satisfactorily to insert the catheter and remove the needle.

The blunt end of the catheter tube is inserted into a body cavity such as a vein by inserting the pointed sharpened end of the needle into the body at the desired location. The pointed end of the needle cuts a hole in the skin and tissue through which the blunt end of the catheter tube will follow the needle to the desired location in the body even when it projects radially beyond the head of the needle and will pass between the elastic fibers of the tissue and spread them apart without catching or tearing the fibers. During such movement the tension of the tissue fibers tends to move the end of the catheter away from the shoulder and inwardly toward the shank of the needle and provide a capillary path through which blood will flow and be observed through the transparent tube wall when the needle head enters a vein. However, the blunt end of the tube is sufficiently rigid to prevent any substantial deformation.

When the blunt end of the catheter tube has been inserted to the desired location in the body the tube is held with one hand and the rearwardly projecting end of the needle shank is grasped between the fingers of the other hand and withdrawn relative to the catheter tube. Surprisingly, the blunt end of the catheter tube expands radially to permit the shouldered head of the needle to pass therethrough as the needle is withdrawn. The blunt end of the catheter tube does not fold back on itself or catch on one side of the needle or split, but instead it yields uniformly around its entire periphery to permit the enlarged head to pass therethrough. After the needle has been withdrawn from the tube, the catheter tube is taped on the body to hold it in a fixed position and a tube extension is applied to the fitting at its exterior end. A catheter tube so applied may be left in the body for a long period of time without any detrimental affect. Furthermore, the area where the catheter tube is applied does not need to be immobilized as the relatively flexible tube yields to accommodate itself to any movement of the body. When it is desired to close the tube to stop the flow of blood therethrough, a rod of plastic material of substantially the same length and outside diameter as the length and inside diameter of the tube is inserted to plug the tube.

Several embodiments of surgical apparatus used in accordance with the above described method and incorporating the present invention are illustrated in the drawings. As shown in FIGURES 1 and 2, the surgical apparatus comprises a needle **1** having a head **2** and a reduced shank **3** projecting rearwardly therefrom and forming an annular shoulder **4** therebetween. The forward end of the head **2** is hollow ground to provide a pointed

end 5 for puncturing skin and underlying tissue. Surrounding the shank 3 is a catheter tube 6 having a blunt end 7 abutting the annular shoulder 4 on the needle and a tapered fitting 8 at its opposite end. The reduced shank 3 is of a length to project rearwardly from the catheter tube 6 beyond the fitting 8.

In the illustrated embodiment, the blunt end 7 of the catheter tube 6 projects radially beyond the annular shoulder 4 of the needle head 2 and has a slightly rounded edge 9 at its outer periphery. Preferably, the blunt end 7 of the catheter tube 6 projects radially beyond the annular shoulder 4 of the needle 1 a distance substantially equal to the height of the annular shoulder and the rounded peripheral edge 9 extends through approximately one-third of the wall thickness of the catheter tube 6.

A hand grip 10 is provided on the rearward end of the shank 3 of the needle 1 which projects beyond the tapered fitting 8 of the catheter tube 6 to adapt the needle to be withdrawn through the tube. For purposes of illustration, the hand grip 10 is illustrated in the form of a detachable handle having a central bore for receiving the end of the shank and attached thereto by a set screw 11. It will be understood, however, that the handle 10 may take other forms and may be attached thereto as an integral part of the shank.

The needle 1 and catheter tube 6 are composed of chemically inert materials. For example, the needle may be made of stainless steel and the catheter tube may be made of polyethylene plastic. The needle head 2 and catheter tube 6 may be made in different sizes and the construction of the present invention permits a needle and tube of relatively small size to be used. For example, the catheter tube may be made of polyethylene with an inside diameter of .047 inch and an outside diameter of .065 inch and the head 2 of the needle may have an outside diameter of .057 inch and the shank an outside diameter of .043 inch.

The blunt end 7 of the catheter tube 6 is inserted to the desired location in the body by holding the assembled tube and needle between the forefinger and the thumb and pressing the pointed end 5 of the needle into the skin and tissue. As explained above, the pointed end of the needle cuts a small hole in the skin and tissue and the end 7 of the catheter tube 6 follows the head 2 of the needle through the skin and tissue to the desired location. When the end 7 of the tube is properly located in the body, the tube is held by one hand and the needle withdrawn relative thereto by means of the hand grip 10. During such retraction of the needle 1, the head 2 moves relative to the catheter tube 6 from the position illustrated in FIGURE 2 to that illustrated in FIGURE 3 and the blunt end 7 of the catheter tube 6 yields radially to permit the enlarged head 2 to pass therethrough in the manner illustrated in FIGURE 3.

FIGURE 4 illustrates a construction for adapting an assembled needle 1 and catheter tube 6 as shown in FIGURE 1 to be sterilized and hermetically sealed in an enclosing casing. The needle 1 and the catheter tube 6 as illustrated in FIGURE 4 are identical with those illustrated in FIGURE 1 except that the hand grip at the rearward end of the needle shank 3 is in the form of a stopple 15. The stopple 15 may be composed of a suitable plastic such as polyethylene and is molded or otherwise attached to the end of the shank of the needle as an integral part thereof. The stopple 15 has oppositely directed conical tapers 16 and 17 to adapt it to be pressed into and tightly fit the open end 18 of a cylindrical casing 19 of plastic or the like.

With the construction illustrated in FIGURE 4, the assembled needle 1 and catheter tube 6 as well as casing 19 may be thoroughly cleaned and sterilized after which the tapered end 16 of the stopple 15 is pressed into the open end 18 of the casing 19 to engage the sides of the casing and form a hermetic seal. The assembled sterile unit may then be stored for future use. When it is desired to use the catheter tube 6 the stopple 15 and attached needle 1 and catheter 6 assembly are removed from the casing 19 and reversed and the tapered end 17 pressed into the end of the casing. The casing 19 then operates as a handle from which the needle 1 and catheter 6 assembly project. The forward end of the needle 1 is then inserted in the manner previously described and the needle withdrawn by means of the casing 19 operating as a hand grip.

FIGURES 5 and 6 illustrate a modified needle construction for visually indicating when the end of the needle and catheter tube have entered a vein. The needle 1*a* as illustrated in FIGURES 5 and 6 has a head 2*a* and shank 3*a* with an annular shoulder 4*a* therebetween like the needle illustrated in FIGURE 1. However, the head of the needle 2*a* has a bore 20 extending from the forward face of the needle to the periphery of shank 3*a* at the rear of the shoulder 4*a*. A longitudinal groove 21 extends along the periphery of the needle shank 3*a* from the rearward end of the bore 20 to the rearward end of the shank. A catheter tube 6*a* surrounds the shank 3*a* of the needle and has a blunt end 7*a* abutting the shoulder 4*a* on the needle. As the polyethylene catheter tube 6*a* is transparent, blood can be observed as it flows along the groove 21. Thus, the needle 1*a* and catheter 6*a* assembly illustrated in FIGURES 5 and 6, will indicate when the end of the needle 5 has penetrated a vein.

FIGURES 7 and 8 illustrate another modified construction of needle head. In this construction the needle 1*b* has a head 2*b* and a shank 3*b* with an annular shoulder 4*b* as previously described. The pointed end 5*b*, however, is in the form of a narrow head for cutting a larger opening for leading the blunt end 7*b* of the catheter tube 6*b* to a desired location in the body. This type of needle 1*b* is particularly applicable for the insertion of the catheter tube into deep cavities such as the chest or abdomen.

FIGURE 9 illustrates another modified construction of needle and catheter tube assembly in which the forward end of the catheter tube is gripped to the needle head. In the construction illustrated in FIGURE 9 a needle 1*c* has a head 2*c* and a reduced shank 3*c* projecting rearwardly from the head to form an annular shoulder 4*c* therebetween. However, in the modified construction illustrated in FIGURE 9 the shank 3*c* is of considerably reduced diameter and the annular shoulder 4*c* is in the form of a rearwardly directed cone. Also, the forward end 25 of the catheter tube 6*c* is inclined inwardly to overlie the rearwardly directed conical shoulder 4*c* on the needle head. The inwardly directed end 25 of the catheter tube 6*c* may be initially molded or may be produced by merely heating and forming the blunt end of the plastic tube to the desired shape. A sleeve 26 is mounted to slide on the shank 3*c* of the needle which has a conical front face 27 for engaging the inwardly directed end 25 of the tube to clamp it against the conical shoulder 4*c* of the needle 1*c*. Thus, the portion of the forward end 25 of the catheter tube 6*c* which projects radially from the needle head 2*c* constitutes an annular blunt end which follows the needle head through the skin and tissue.

The forward end of the needle 1*c* and catheter 6*c* assembly are inserted in the same manner as previously explained. When the end 25 of the catheter tube 6*c* is properly located, the sleeve 26 is slid rearwardly to release the end 25 after which the catheter tube is slid rearwardly relative to the sleeve. The end 25 yields as it slides over the sleeve 26 to stretch it to the outer periphery of the sleeve. Sleeve 26 is then pressed forwardly into engagement with the annular shoulder 4*c* on the head of the needle 2*c* to form a continuous surface and the needle 1*c* is withdrawn through the tube. With this construction the head 2*c* and sleeve 26 of the needle 1*c* provide a continuous surface of the same diameter as the inside diameter of the tube 6*c* to facilitate the removal of the needle.

FIGURE 10 illustrates another modified construction in which the head and shank of the needle have the same outside diameter with an intermediate recessed portion therebetween. The needle 1*d* illustrated in FIGURE 10 has a head 2*d* similar to that illustrated in FIGURE 1 with an annular shoulder 4*d* at the rear of the head. The shank 3*d* then tapers outwardly from the shoulder 4*d* to a diameter equal to the outside diameter of the head 2*d* at a normal plane 30 rearwardly of the shoulder. The shank 3*d* then extends rearwardly from plane 30 at the same diameter. The forward end portion 31 of the catheter tube 6*d* tapers inwardly from the plane 30 to the shoulder 4*d*. Forward blunt end 7*d* of the catheter tube 6*d* abuts the shoulder 4*d*, but in this construction the blunt end does not necessarily project radially beyond the head 2*d* of the needle and the inclined forward portion 31 forms a continuous surface from the outer periphery of the head to the outer periphery of the tube. The construction illustrated in FIGURE 10 facilitates the insertion of the end of a catheter tube 6*d* of a particular size with a smaller needle.

FIGURES 11 and 12 illustrate a still further modified construction of needle adapted to be expanded to form a continuous surface from the head of the needle to the outside diameter of the catheter tube during insertion and to be contracted to the inside diameter when withdrawn. The needle 1*e* illustrated in FIGURES 11 and 12 has a head 2*e* and shank 3*e* to form an annular shoulder 4*e* therebetween. Projecting rearwardly from the head 2*e* of the needle are a series of spring fingers 35. The spring fingers 35 may be formed by counter boring the needle 1*e* between the shank 3*e* and the periphery of the head 2*e* and then slotting the cuff so formed to form the series of fingers. Mounted to slide on the shank 3*e* is a sleeve 36 having a tapered forward end forming an annular cam face 37. Thus, by sliding the sleeve 36 forwardly as shown in FIGURE 11 the cam face 37 at the end of the sleeve 36 expands the spring fingers to provide a continuous surface from the outside diameter of the head 2*e* to the outer periphery of the catheter tube 6*e*. By sliding the sleeve 36 rearwardly relative to the catheter tube 6*e* the spring fingers 35 are released which flex back to their normal position illustrated in FIGURE 12 to substantially the same diameter as the inside diameter of the catheter tube 6*e*. This construction facilitates the insertion of the end of the catheter as well as the removal of the needle after the catheter tube has been properly located in the body.

FIGURE 13 illustrates a rod 40 used to plug the catheter tube 6 when required. The rod 40 is made of a plastic material such as polyethylene and has a handle 41 at its rearward. Handle 41 has a portion of the same contour as the fitting 8 at the rearward end catheter tube 6. Rod 40 has substantially the same diameter as the inside diameter of the catheter tube 6 and extends forwardly from the handle a distance equal to the length of the tube with a smooth rounded end 42 adapted to project slightly beyond the end of the tube when the handle 41 is seated in the fitting 8. When it is desired to stop the flow of blood, the rod 40 is merely inserted through the rearward end of the catheter tube until the handle 41 is seated in the fitting 8.

It will now be observed that the present invention provides an improved method of and surgical apparatus for inserting the end of a catheter tube to any desired location in the human body. It will also be observed that the present invention provides a method of and surgical apparatus for inserting a catheter tube to a desired location in the body by means of a puncturing needle and then withdrawing the needle through the tube. It will further be observed that the present invention provides a surgical apparatus which is of simple and compact construction, reliable in operation and one which may be made cheaply enough to render it disposable after a single use.

While a number of embodiments of the invention are herein illustrated and described, it will be understood that further modifications may be made in the construction and arrangements of elements without departing from the spirit or scope of the invention. Therefore, without limitation in this respect the invention is defined by the following claims.

I claim:

1. Surgical apparatus for delivering fluids to or withdrawing fluids from the human body comprising a needle having a head with a sharp, pointed end for penetrating tissue and a shaft of uniform diameter projecting rearwardly therefrom, an annular shoulder on the needle between the head and shaft, a catheter tube surrounding and contacting the shaft of the needle through a major portion of its length and having an end terminating in a plane at substantially right angles to its axis at the rear of the needle head, said annular shoulder on the needle overlying at least a portion of the end of the catheter tube around its entire inner periphery and said catheter being rigid longitudinally when in position on the needle to prevent collapse when inserted through tissue, and one of the parts comprising said end of the catheter tube and shoulder on the needle being relatively flexible with respect to the other part to permit the head of the needle to be withdrawn through the catheter tube.

2. Surgical apparatus for delivering fluids to or withdrawing fluids from the human body comprising a needle having a head with a pointed end and a shaft of uniform diameter projecting rearwardly therefrom to provide an annular shoulder therebetween, a flexible plastic catheter tube mounted on and contacting said shaft, through a major portion of its length, the end of the catheter tube adjacent the head of the needle being blunt and forming an annular end at least partially covered by the annular shoulder between the head of the needle and shaft and projecting radially therebeyond, said shaft extending outwardly beyond the end of the tube and having a handle grip at its end to adapt the needle to be withdrawn through the catheter tube, and said radially projecting blunt end of the tube being rigid longitudinally when in position on the needle to follow the head of the needle through skin and tissue and flexible radially to permit the head of the needle to be withdrawn therethrough.

3. Surgical apparatus for delivering fluids to or withdrawing fluids from the human body comprising a needle having a cylindrical head pointed at one end and a shaft of uniform diameter projecting rearwardly therefrom to provide an annular shoulder therebetween, a thin walled hollow catheter tube of polyethylene surrounding and contacting said shaft throughout the major portion of its length and having one end terminating in a plane at substantially right angles to its axis adjacent the head of the needle and shaped at its other end to form a tapered fitting, the head of the needle overlying at least a portion of the inner periphery of the said one end of said catheter tube and said shaft projecting beyond the end of the fitting, and the end of the tube being rigid longitudinally when mounted on the needle and flexible radially to permit the head of the needle to be withdrawn therethrough.

4. Surgical apparatus for delivering fluids to or withdrawing fluids from the human body comprising a needle having a cylindrical head pointed at one end and a reduced shaft of uniform diameter projecting rearwardly therefrom to provide an annular shoulder therebetween, a catheter tube of flexible plastic material surrounding and contacting the shaft through a major portion of its length and having an inside diameter to provide a sliding fitting with the outside diameter of the shaft and an outside diameter greater than the outside diameter of the head, the end of the catheter tube adjacent the annular shoulder on the needle being blunt with a sharp edge at its inner periphery and a slightly rounded edge at its outer periphery, said blunt end of the catheter tube projecting radially beyond the head of the needle, said shaft of the needle projecting rearwardly beyond the end of the catheter tube

opposite the blunt end to adapt the needle to be withdrawn through the catheter tube, and said radially projecting blunt end of the tube being rigid longitudinally when mounted on the needle to follow the head of the needle through skin and tissue and flexible radially to permit the larger head of the needle to be withdrawn therethrough.

5. Surgical apparatus in accordance with claim 1 in which the end of the catheter tube opposite the end at the rear of the needle head is shaped to form a tubular fitting for detachable connection with a tube extension.

6. Surgical apparatus in accordance with claim 1, in which the assembled needle and catheter tube are located in a cylindrical casing having an open end, and means on the assembly cooperating with the end of the casing to close the casing after pasteurization to provide an hermetically sealed unit.

7. Surgical apparatus in accordance with claim 6 in which the shaft of the needle extends beyond the end of the catheter tube and has a hand grip at its end, and the means cooperating with the end of the casing to close the casing is the hand grip on the rearward end on the needle shaft which cooperates with the end of the casing to provide a sealing connection therewith.

8. Surgical apparatus in accordance with claim 1 in which the catheter tube is composed of transparent material and the needle head is hollow and the periphery of the shaft is recessed to provide a groove extending longitudinally thereof and connected to the hollow needle head whereby the flow of blood through the hollow head

of the needle and groove on the shaft can be observed through the transparent catheter tube to indicate when the needle head has entered a vein.

9. Surgical apparatus for delivering fluids to or withdrawing fluids from the human body comprising a needle having a head with a pointed end and a shaft of uniform diameter projecting rearwardly therefrom, an annular shoulder on the needle between the head and shaft, a hollow catheter tube of flexible material surrounding and contacting the shaft of the needle through a major portion of its length and having an annular end at right angles to its axis positioned adjacent to and at least partially behind said annular shoulder around the entire periphery of the shoulder and being rigid longitudinally when mounted on the needle to cause the said tube to follow the head of the needle through the skin and tissue to locate the end of the catheter at the desired position in the body, and said shaft extending beyond the catheter tube and having a hand grip at its end whereby to adapt the needle to be pulled rearwardly relative to the catheter tube to withdraw the head through the tube.

References Cited in the file of this patent

UNITED STATES PATENTS

396,754	Mayfield	Jan. 29, 1889
1,924,785	Roig	Aug. 29, 1933
2,770,236	Utley et al.	Nov. 13, 1956
2,828,744	Hirsch et al.	Apr. 1, 1958
2,836,180	Strauss	May 27, 1958