

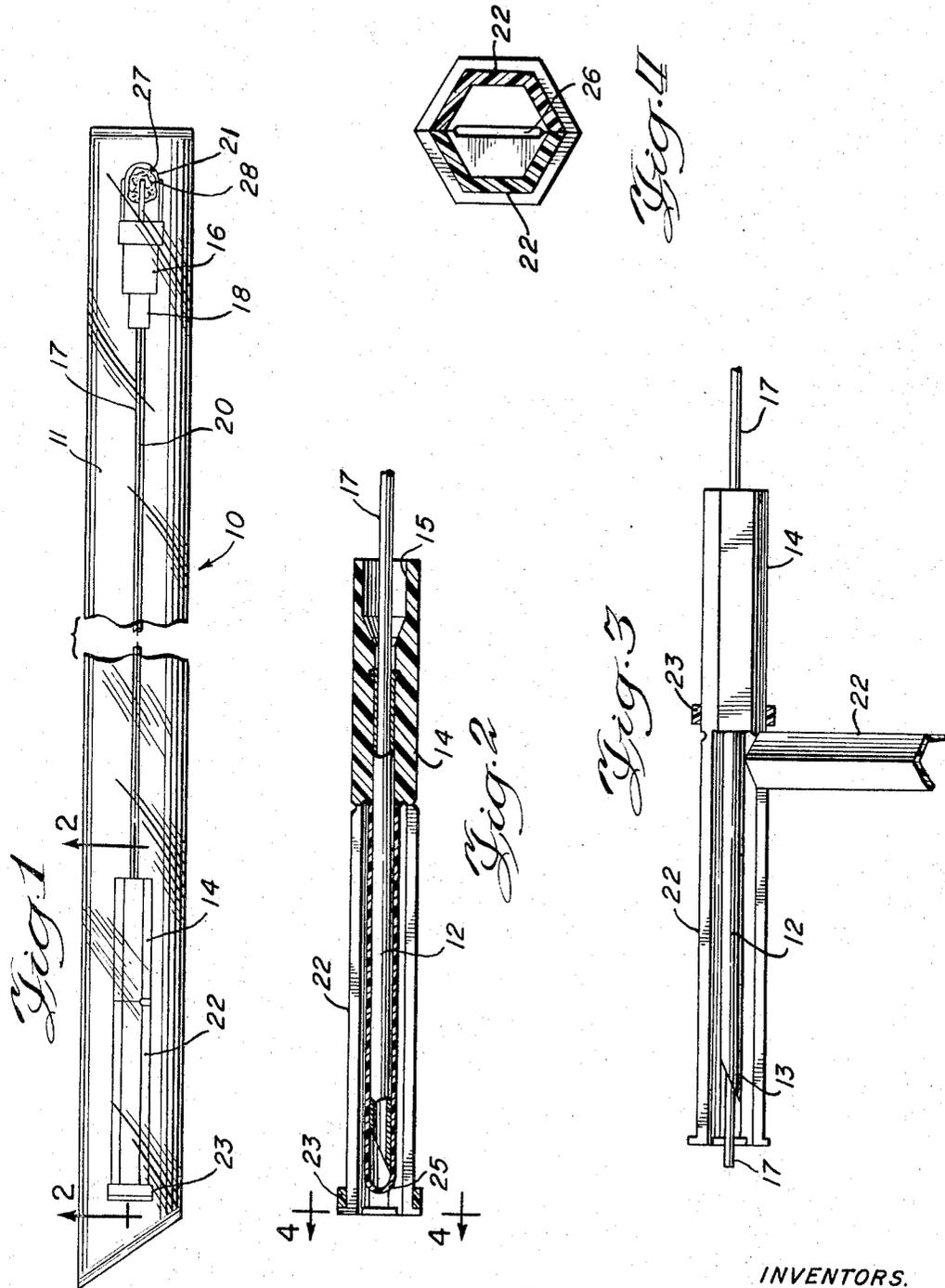
June 6, 1967

H. M. SCISLOWICZ ET AL
INTRAVENOUS CATHETER ASSEMBLY WITH DIVISIBLE
NEEDLE SHEATH PORTIONS

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2 Sheets-Sheet 1



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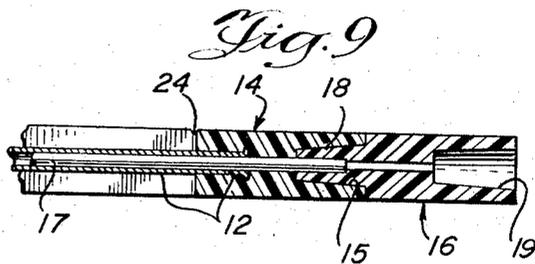
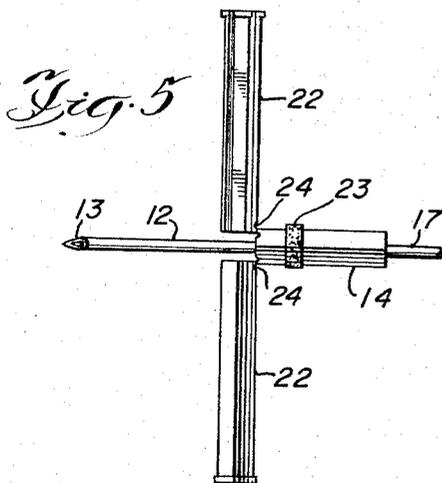
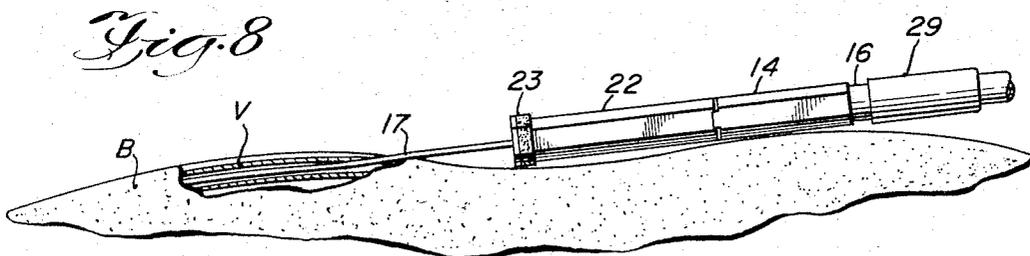
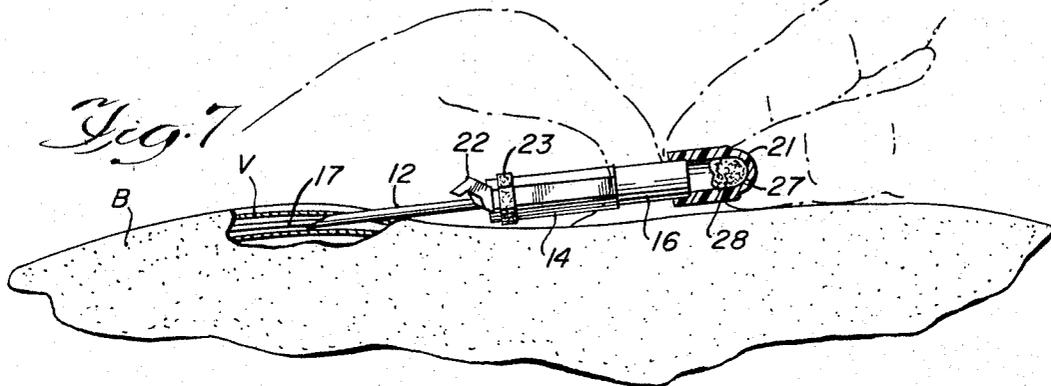
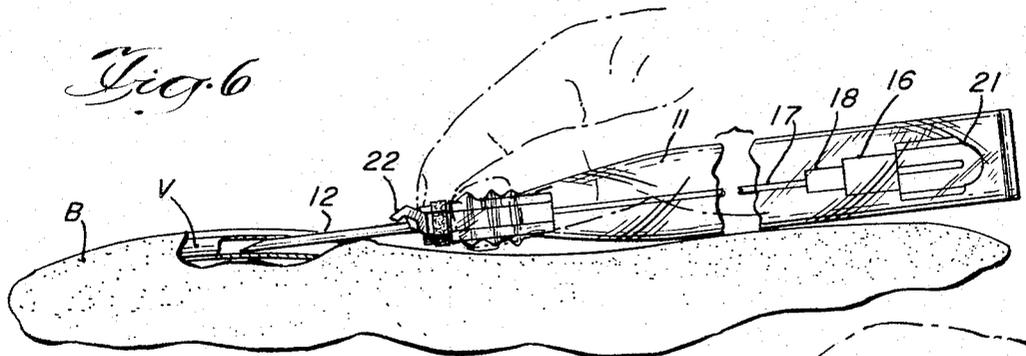
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INTRAVENOUS CATHETER ASSEMBLY WITH DIVISIBLE NEEDLE SHEATH PORTIONS

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 Filed Nov. 18, 1964, Ser. No. 412,061
 7 Claims. (Cl. 128-214.4)

This invention relates to an intravenous catheter and in particular to a structure including a protective closure for the cannula.

When it is necessary to administer parenteral liquids, such as in intravenous feeding and the like, it is common to make a venipuncture with a cannula and then thread a sterile plastic catheter into the vein. The cannula is then withdrawn, the catheter is taped to the patient's body proximate the entry point, and administration apparatus is attached to the catheter. In such surgical and hospital procedures, it is extremely important to avoid contamination of the equipment. It is also important that the cannula be immobilized after it is withdrawn from the patient to prevent accidental puncture of the catheter.

The present device provides a sheath for the cannula which serves the dual function of a protective closure for the cannula before use and to prevent the catheter from being pierced by the pointed end of the cannula after the cannula has been withdrawn from the recipient. The venous catheter assembly of the present invention provides a device which can be inserted and manipulated at a minimum of discomfort to the recipient, maintains sterility of the cannula and catheter, and can easily be attached to administration apparatus. The device can be manufactured at low cost and is therefore disposable after use.

The means of achieving the foregoing and other advantages of the present invention will be readily understood by reference to the following detailed description when considered in conjunction with the accompanying drawing, in which:

FIGURE 1 is a side elevational view of the venous catheter of the present invention in assembled relation and enclosed in a transparent envelope;

FIGURE 2 is a fragmentary sectional view taken along line 2-2 of FIGURE 1;

FIGURE 3 is a partial fragmentary view showing the sheath in open position;

FIGURE 4 is a transverse sectional view taken along the line 4-4 of FIGURE 2;

FIGURE 5 is a partial perspective view showing the sheath in open position;

FIGURES 6, 7, and 8 are fragmentary perspective views showing successive steps in the insertion of an intravenous catheter in accordance with the present invention;

FIGURE 9 is a fragmentary sectional view of the hub portion of the present device in engagement with the adaptor.

In the invention illustrated in the foregoing figures, the venous catheter assembly, generally indicated at 10, is enclosed in a transparent casing or envelope 11, which is made of, for example, a thin, flexible plastic material. After packaging, the assembly is sterilized in the envelope 11. A rigid tubular cannula 12, as shown in FIGURES 2 or 3, terminating in a pointed end 13, is embedded in a plastic hub 14 as shown in FIGURE 2. The hub 14 has an internal bore or recess 15, into which fits an adaptor 16, as shown in FIGURE 9. A catheter 17 comprising a length of small diameter flexible tubing is slidably disposed in the cannula 12 and extends through the hub 14, the recess 15, and is firmly fastened in liquid tight engagement with the protruding portion 18 of the adaptor 16. The adaptor

16 has a passage 19 extending therethrough, as shown in FIGURE 9, the protruding portion 18 being insertable into the bore 15 of the hub 14. Thus, a continuous passage for the flow of fluid from administration equipment to the recipient is provided. Extending through the catheter is a flexible stiffener 20. The stiffener 20 is in the form of a wire and may be composed of stainless steel or other materials such as nylon, high density polyethylene or the like. The stiffener 20 is fastened in a cap 21 which slidably engages the adaptor 16. The stiffener renders the catheter somewhat more rigid than when no stiffener is employed and aids in inserting the catheter into an artery, for example. After the catheter 17 is inserted into the recipient, the stiffener 20 is removed from the catheter by simply pulling the cap 21 off the adaptor 16, thereby withdrawing the stiffener 20. Fluid may then be injected through the passage 19 of the adaptor 16 and the catheter 17 and into the recipient. The cap 21 is provided with a hole or air vent 27 so that when the cannula 12 and catheter 17 are inserted into the vein, blood will flow back into the catheter and provide an indication that the proper entry has been made. A small piece of cotton 28 or other absorbent material can be placed in the cap 21 to absorb any small amount of blood which may flow back through the catheter.

Swingably fastened to the hub 14 is a protective sheath 22 formed of at least two like portions. Prior to use, the sheath 22 envelops and protects the cannula 12, as shown in FIGURE 1. A narrow annular sleeve 23 is slidably mounted on the assembly so that when in position over the sheath 22, as in FIGURE 1, the two halves of the sheath are clamped together. When it is desired to use the device, the sleeve 23 is slid back from the sheath 22 into a position on the hub 14. The two halves of the sheath 22, being swingably mounted on the hub 14, are extended laterally as in FIGURE 5, thereby exposing the cannula 12. In the illustrated embodiment, the two halves of the sheath 22 are hinged to the hub 14 by a narrowed portion 24 of the wall structure, as shown in FIGURE 5. After the catheter 17 is inserted into the recipient and the cannula 12 is removed, the two halves of the sheath 22 are closed over the cannula 12 and the annular sleeve 23 is slid over the sheath 22 to clamp the two halves together. The catheter 17 now extends through the cannula 12 and the slot 26 which is formed when the two halves of the sheath 22 are clamped together. The walls of the slot 26 gently grip the catheter without restricting it to any meaningful degree and thereby prevent the cannula and hub assembly from slipping along the catheter. The protective sheath 22 maintains the catheter 17 in generally axial alignment with the tubular cannula 12 so that accidental piercing of the catheter 17 by the pointed end 13 of the cannula 12 cannot occur. Without such a protective sheath, the catheter oftentimes bends back against the pointed end of the cannula and is punctured, necessitating its withdrawal and the reinsertion of another catheter with resultant discomfort and possible danger to the patient.

After the catheter 17 is inserted into the recipient and the cannula 12 is withdrawn, the sheath 22 is clamped together, and the cannula and hub assembly is gently slid back along the catheter 17. The protruding portion 18 of the adaptor 16 is then inserted into the bore 15 of the hub 14, as shown in FIGURE 9. The venous catheter assembly is now ready to be attached to administration equipment (not shown). This can be done in any suitable manner, for example, by inserting a needle adaptor from the administration equipment into the passage 19 of the adaptor 16.

If desired, a tubular sleeve 25 having a closed end can be slipped over the cannula 12 before the assembly is

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sealed in the envelope 11, as shown in FIGURE 2. The tubular sleeve 25 prevents accidental contact of the fingers with the sterile cannula when the assembly is being manipulated prior to insertion into a recipient. After the sheath 22 is opened, the sleeve 25 can be slipped off, exposing the sterile cannula. Although the closed end on the tubular sleeve 25 is not necessary to maintain the sterility of the cannula 12, it serves the purpose of preventing the catheter 17 from slipping through the cannula 12, and possibly through the slot 26 of the sheath 22 before the assembly is put into use. If this occurs, it is necessary to withdraw the catheter 17 back into the cannula 12 before the cannula is inserted into the vein of a recipient.

When it is desired to employ the venous catheter assembly 10, the envelope 11 is severed so as to expose only the cannula and hub portion of the assembly. The envelope 11 is then pulled back and grasped against the hub 14, as shown in FIGURE 6. The annular sleeve 23 is then slid back into position onto the hub 14 thereby unclamping the sheath 22. The two halves of the sheath 22 are extended laterally, as shown in FIGURE 5, to expose the cannula 12. The tubular sleeve 25 encasing the cannula 12 is withdrawn and discarded. The pointed end 13 of the cannula 12 is inserted through the skin of the recipient B and into the vein V. This is shown in FIGURE 6. The catheter 17 is then inserted into the vein V to the desired extent. After the catheter 17 is inserted the desired length into the vein V, the cannula 12 is slowly withdrawn from the vein V while at the same time, pressure is applied at the point of entry to prevent withdrawal of the catheter 17. The hub 14 and adaptor 16 are then joined together by inserting the protruding portion 18 of the adaptor 16 into the bore 15 of the hub 14, as shown in FIGURE 7. Cap 21 is then grasped through the envelope 11 and, while firmly holding the hub 14 and adaptor 16, the envelope 11, cap 21 and stiffener 20 are withdrawn from the assembly and discarded. The sheath 22 is then folded back over the cannula 12, and the annular sleeve 23 is slid back over the sheath 22 to clamp it together, if desired, the assembly can be secured to the recipient by a strip of tape (not shown) or the like. A needle adaptor 29 or other suitable connecting means from a fluid container is then attached to the adaptor 16 whereby the fluid is administered to the recipient. After insertion of the catheter into the recipient, if fluid is not to be administered immediately, then the cap 21 may be permitted to remain in place until such time as fluid is to be administered. This will prevent blood from flowing back through the catheter and will maintain a sterile system until connection is made with administration equipment.

The venous catheter assembly of the present invention provides a connecting means for the administration of parenteral fluids of various types and is composed of the minimum number of parts. All of the parts, with the possible exception of the stiffener 20, are made from plastic materials such as polypropylene, polyvinylchloride, nylon, or other suitable plastic materials. In the preferred embodiment of the present invention, the transparent envelope 11 is composed of polyethylene, the hub 14 and sheath 22 are composed of polypropylene, and the adaptor 16 is composed of a methacrylate plastic material.

Others can readily adapt the invention for use under various conditions of service by employing one or more of the novel features disclosed, or equivalents thereof. All such practice of the invention is considered to be a part hereof provided it falls within the scope of the appended claims.

What is claimed is:

1. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a cannula in axial alignment with said hub member and having a pointed end, the end of the cannula opposite the pointed end being in fluid tight engagement with the hub to form a passageway through the hub and the cannula;

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a sheath disposed around said cannula, said sheath having two symmetrical halves swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; an adaptor having a passage therethrough and engageable with the bore of the hub; a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with the adaptor; a hollow cap engageable with the adaptor; and a stiffener slidably disposed within the catheter, the proximal end of said stiffener being affixed to the cap, said stiffener rendering the catheter somewhat rigid and being removable after the catheter is inserted in position.

2. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a cannula having a pointed end, the end of the cannula opposite the pointed end being embedded in the hub to form a passage through the hub and cannula; a sheath disposed around said cannula, said sheath having at least two portions swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; releasable clamping means effective to clamp the two halves of the sheath about said cannula; an adaptor having a passage therethrough and engageable with the bore of the hub; a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with the adaptor; a hollow cap engageable with the adaptor; and a stiffener slidably disposed within the catheter, the proximal end of said stiffener being affixed to the cap, said stiffener rendering the catheter somewhat rigid and being removable after the catheter is inserted in position.

3. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a cannula having a pointed end, the end of the cannula opposite the pointed end being embedded in the hub to form a passageway through the hub and cannula; a removable tubular sleeve disposed around said cannula; a sheath disposed around said cannula and said tubular sleeve, said sheath having two halves swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; an annular sleeve slidably mounted on the hub and the sheath and effective to clamp the two halves of the sheath together when in position thereon; an adaptor having a passage therethrough and engageable with the bore of the hub; a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with the adaptor; a hollow cap having a vent therein and engageable with the adaptor; and a stiffener slidably disposed within the catheter, the proximal end of said stiffener being affixed to the cap, said stiffener rendering the catheter somewhat rigid and being removable after the catheter is inserted in position.

4. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a cannula having a point at one end and having the other end in fluid tight engagement with one end of said hub member to form a passageway through the hub and the cannula; a sheath disposed around said cannula, said sheath having two halves swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; clamping means effective to clamp the two halves of the sheath about said cannula; tubular coupling means engageable with the hub member and having open ends; a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with one end of the coupling means to provide a fluid flow path through said coupling means and said catheter; a hollow cap engageable with the other end of the coupling means; and a stiffener slidably disposed within the catheter, one end of said stiffener being affixed to the hollow cap, said stiffener rendering the catheter somewhat rigid and being removable after the catheter is inserted in position.

5. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a cannula having a point at one end and having the other

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end in fluid tight engagement with one end of said hub member to form a passageway through the hub and the cannula; a sheath disposed around said cannula, said sheath having at least two portions swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; clamping means effective to clamp the two halves of the sheath about said cannula; tubular coupling means engageable with the hub member and having open ends; and a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with the coupling means to provide a fluid flow path through said coupling means and said catheter.

6. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a cannula having a pointed end, the end of the cannula opposite the pointed end being embedded in the hub to form a passageway through the hub and cannula; a sheath disposed around said cannula, said sheath having two halves swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; an adaptor having a passage therethrough and engageable with the bore of the hub; and a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with the adaptor to provide a fluid flow path through said adaptor and said catheter.

7. In a venous catheter assembly, a combination comprising: a hub member having a bore therethrough; a

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cannula having a pointed end, the end of the cannula opposite the pointed end being embedded in the hub to form a passageway through the hub and cannula; a removable tubular sleeve disposed around said cannula; a sheath disposed around said cannula and said tubular sleeve, said sheath having at least two portions swingably mounted on the hub so as to form a protective closure for the cannula when in a closed position; an annular sleeve slidably mounted on the hub and the sheath and effective to clamp the halves of the sheath together when in position thereon; an adaptor having a fluid flow passage therethrough and engageable with the bore of the hub; and a catheter slidably mounted in the cannula and the hub and in fluid tight engagement with the adaptor to provide a fluid flow path through said connector and said catheter.

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