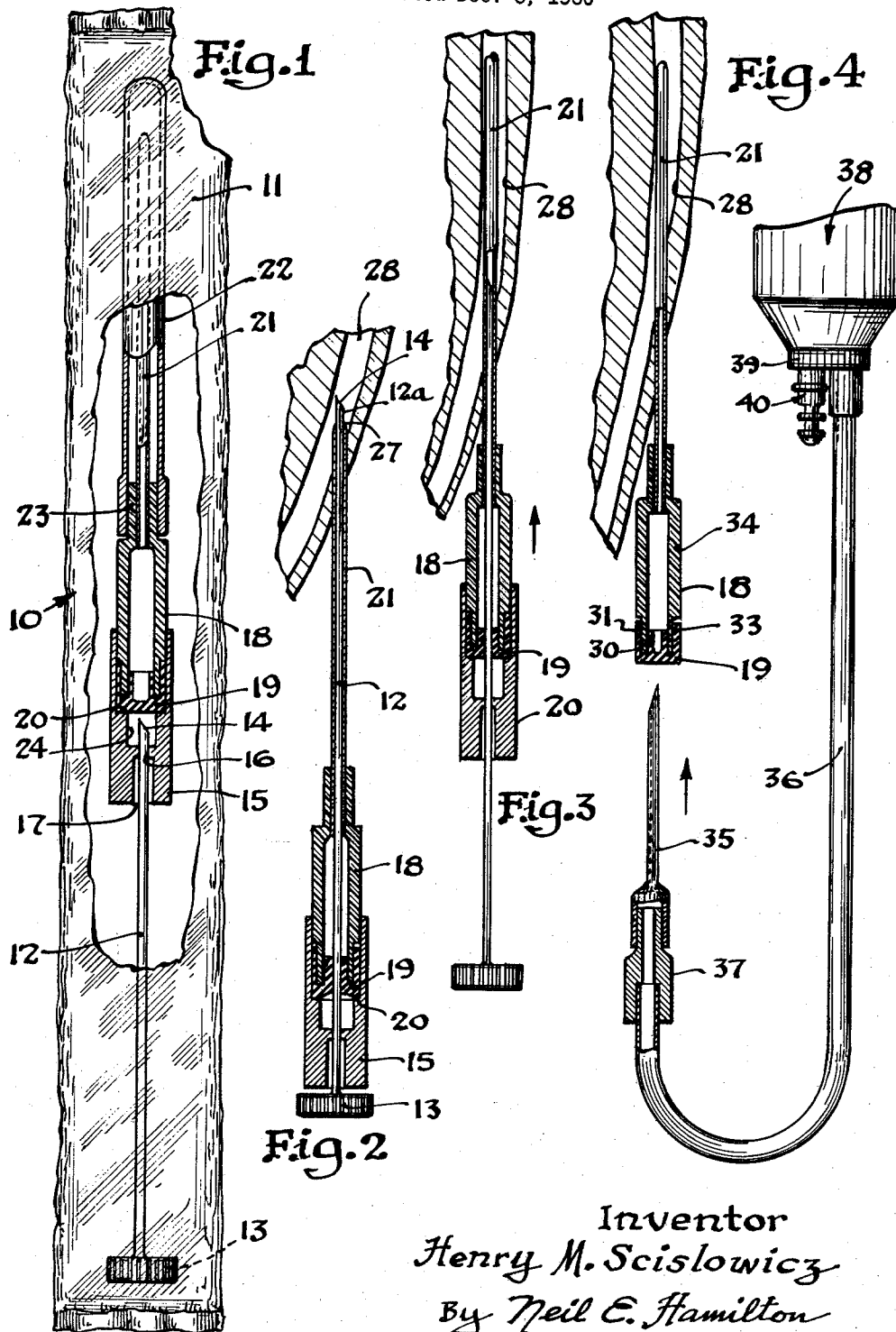


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VENOUS CATHETER APPARATUS

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VENOUS CATHETER APPARATUS

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This invention relates to a venous catheter apparatus. In particular, this invention relates to a novel venous catheter device for prolonged administration of parenteral liquids.

When it is necessary to administer parenteral liquids, it is commonplace to administer such liquids over a prolonged period of time. This requires either that a separate puncture be made at the time of each administration or that a catheter of some sort be left in communication with the recipient's vein at all times. The former procedure is obviously very undesirable. With the catheter devices presently available, the latter procedure requires that a cumbersome apparatus protrude from the vein which can be accidentally contacted unless caution is exercised. Further, upon insertion of a catheter into a vein, it is desirable that as small a puncture hole as possible be made and also that some indication of entry into a vein be provided. Once the vein has been entered, a means of attaching an administration apparatus to the catheter must be provided.

Through the present device, parenteral liquids can be administered into a vein of a recipient and the device can be retained in the vein with a minimum amount of discomfort. Sterility is at all times maintained. The present device also provides a means of indicating whether communication with a vein has been made.

It is therefore an object of the present invention to provide a venous catheter assembly, which when inserted into a vein offers a simple means of communication with an administration apparatus.

It is a further object of the present invention to provide a venous catheter device which can be inserted and operated at a minimum of discomfort to the recipient.

It is a still further object of this invention to provide a venous catheter device which offers a sterile means of administration for intravenous solutions.

It is also an object of this invention to provide a venous catheter which can be manufactured at a low cost and thereby is disposable.

The means of achieving the foregoing and other objects of the present invention will be readily understood by reference to the following detailed description when considered in conjunction with the accompanying drawing of a preferred embodiment of the invention wherein:

FIGURE 1 is a side elevational view, partially in vertical section, of the venous catheter of the present invention enclosed in a transparent casing with a portion thereof broken away for better illustration;

FIGURE 2 is a view in vertical section of the novel venous catheter illustrating the initial puncture of a vein of a recipient;

FIGURE 3 is a view like FIGURE 2 illustrating the catheter in full communication with the vein;

FIGURE 4 is a view in vertical section of the venous catheter having one end inserted in a vein while the other end is in position for engagement with an administration apparatus;

In the embodiment of the invention illustrated in the foregoing figures, the venous catheter assembly, generally indicated at 10, comprises a transparent casing or bag 11, which is composed, in this instance, of a thin flexible plastic material. Sealably enclosed in plastic bag 11 at the lower end thereof is a solid metallic trocar 12 with a gripping member 13 at one end and a sharpened point 14

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at the distal terminal end. Trocar 12 is slidably mounted in a small diameter axial channel 16 of guide member 15, also having a large diameter axial channel 17. Guide member 15 is frictionally secured over a rigid plastic hub member 18 as well as reseal plug 19 which closes one end of the hub member. Channel 17 serves to maintain trocar 12 for a true perpendicular piercing of plug 19. Shoulder 20 of guide member 15 abuts against reseal plug 19. An annular chamber 24 is provided in guide member 15 and accommodates sharpened point 14 of trocar 12. A length of small diameter flexible tubing 21 is secured in fluid tight engagement at its proximal end with hub 18 at the end opposite reseal plug 19. That portion of tubing 21 projecting from hub 18 is protected by a cap 22 which engages a small diameter forward section 23 of hub 18.

Guide member 15 is axially aligned with hub 18. Trocar 12, accommodated in axial channel 16, is thereby placed in axial alignment with hub member 18 and tubing 21. Trocar 12 is constructed for slidable engagement through reseal plug 19 and flexible tubing 21, as is best illustrated in FIGURE 2. In the preferred embodiment, the external diameter of trocar 12 is approximately the same as the internal diameter of tubing 21 to provide snug embracing of the outer surface of the trocar 12. A slight frictional interference results when trocar 12 is withdrawn through tubing 21. This interference, when combined with the movement of trocar 12 through reseal plug 19, forms an air tight seal creating a vacuum in tubing 21 thereby pulling blood into the tubing when a vein is tapped. Tubing 21 in this instance is formed of a translucent plastic such as polyvinylchloride. The presence of blood therein can thereby be readily viewed. With the external diameter of trocar 12 contacting the inside of a flexible tubing 21, support is given to the tubing rendering it rigid. Tubing 21 is thereby prevented from slipping back on trocar 12 at the time the device is inserted in a vein.

In certain instances, depending upon the rigidity of materials used to compose tubing 21, trocar 12 may be of a smaller diameter than tubing 21. For example, where the tubing is composed of a semi-rigid plastic material, the tubing would be somewhat self-supporting and would not tend to kink upon insertion. The withdrawal of trocar 12 through reseal plug 19 would, by itself, cause a sufficient vacuum to draw blood into tubing 21. Should the diameter of trocar 12 be slightly larger than the internal diameter of tubing 21, it will by its contact with tubing 21, draw blood into the tubing. It will also serve to better support the tubing.

A beveled point 27 is provided on the end of tubing 21 and with point 14 of trocar 12 affords a relatively painless insertion of the tubing into vein 28. Trocar 12 is of sufficient length to project point 14 beyond beveled point 27 at its distal terminal end when gripping member 13 is moved to within a short distance of guide member 15. It will thus be apparent that gripping member 13 also serves as a limiting stop means when trocar 12 is moved toward the guide member.

As shown in FIGURE 4, reseal plug 19 has an internal and an external wall 30 and 31, respectively, for attachment with wall portion 34 of hub 18. Reduced diameter portion 33 is provided in wall portion 34 for accommodating wall 31. Reseal plug 19 is, in this instance, composed of a soft, rubberized material and is solvent sealed to hub 18.

In operation, the venous catheter assembly 10 is packaged and sterilized in bag 11 as shown in FIGURE 1. When it is desired to employ assembly 10, plastic bag 11 is severed so as to expose only protective cap 22. Bag 11 is then grasped against hub 18 and protective cap 22 removed. With the shank portion of trocar 12 still pro-

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tected; trocar 12 is, by means of gripping member 13, moved in the direction of hub 18. The point 14 is thereby plunged through reseal plug 19 and ultimately projects beyond beveled point 27 of tubing 21. Plastic bag 11 is completely removed and tubing 21, along with a relatively short extending portion 12a of trocar 12, is inserted in vein 28 as shown in FIGURE 2. At this stage, in order to determine if a vein has been entered, trocar 12 can be withdrawn a short distance in the direction away from hub 18. If entry has been made, blood will be pulled into tubing 21 by the vacuum created when trocar 12 is withdrawn through tubing 21 and reseal plug 19. With trocar 12 in a stationary position, tubing 21 is inserted a greater distance into vein 28. This is shown in FIGURE 3. With a desired length of tubing 21 placed in vein 28, trocar 12 is completely withdrawn from hub 18. Guide member 15 is also removed leaving only hub 18 and reseal plug 19 in communication with tubing 21, as illustrated in FIGURE 4.

Reseal plug 19 is next engaged by needle 35 which is attached to an administration set including a length of tubing 36, a needle adapter 37, a bottle 38 and a cap 39 with valve means 40.

Various types of medications or parenteral liquids can thus be administered through tubing 21 and into vein 28. With trocar 12 positioned inside tubing 21, only a puncture hole the size of the tubing need be made. The catheter assembly of this invention provides a connecting means for the administration of parenteral liquids which is composed of a minimum number of parts extending from vein 28, and at the same time, offers a self-sealing puncture site. It will also be apparent that trocar 12, while being withdrawn through tubing 21 and reseal plug 19 offers a unique means for detecting entry into a vein.

If desired, hub 18 can be secured to the recipient by means of a piece of adhesive tape (not shown), or the like. Further, guide member 15 need not be employed, but instead, the catheter assembly could be packaged with trocar 12 extending through reseal plug 19 as shown in FIGURE 2, but with the guide member removed. Gripping member 13 would then abut against reseal plug 19.

All of the parts, with the exception of trocar 12 and reseal plug 19 are fabricated from a plastic composition such as polyethylene, polyvinylchloride, nylon, polysytrene and the various acrylates as well as other flexible and rigid plastic materials. In the preferred embodiment of the present invention, the transparent casing or bag 11 as well as protective cap 22 and guide member 15 are composed of polyethylene; tubing 21 is composed of polyvinylchloride and hub 18 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. As at present advised with respect to the apparent scope of my invention, I claim the following subject matter.

I claim:

1. In a venous catheter assembly, a combination, comprising: a hub member; a length of flexible tubing axially aligned with and in fluid tight engagement with said hub member; a reseal plug attached to said hub member; a trocar having a sharpened end slidably mounted in said flexible tubing, said hub member and said reseal plug, said trocar being of sufficient length to project said sharpened end of said trocar a short distance beyond the end of said tubing, said reseal plug and said hub member being in axial alignment, and means for guiding said trocar axially through said reseal plug and into said flexible tubing; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseal plug, and communication with said vein can be established by again piercing said reseal plug.

2. In a venous catheter assembly, a combination, comprising: a rigid plastic hub member; a length of flexible

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plastic tubing having a beveled point at one end and the other end in fluid tight engagement with one end of said hub member; a rubber reseal plug attached to the other end of said hub member; a trocar having a sharpened point with an external diameter of approximately the same dimension as the internal diameter of said tubing slidably mounted in said flexible tubing, said hub member and said reseal plug, said sharpened point of said trocar projecting a short distance beyond the end of said beveled point of said tubing; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseal plug, and communication with the vein can be established by again piercing said reseal plug.

3. In a venous catheter assembly, a combination, comprising: a rigid plastic hub member; a length of flexible, transparent plastic tubing having a beveled point at one end and having the other end in fluid tight engagement with one end of said hub member; a rubber reseal plug attached to the other end of said hub member; a solid metallic trocar having a sharpened point at one end and an external diameter of approximately the same dimension as the internal diameter of said tubing slidably mounted in said reseal plug, said hub and said tubing; gripping means associated with said trocar at the end opposite said point and positioned outside said reseal plug, said sharpened point of said trocar projecting a short distance beyond the end of said beveled point of said tubing; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseal plug and communication with the vein can be established by again piercing said reseal plug.

4. In a venous catheter assembly, a combination, comprising: a hub member; a length of tubing in fluid tight engagement with one end of said hub member; a reseal plug attached to the other end of said hub member; a trocar for slidable engagement through said reseal plug, said hub member and said tubing; a guide member mounted on said hub member for axially guiding said trocar through said reseal plug and said tubing, said trocar having a sharpened point and being of sufficient length to project said point beyond the end of said tubing, said point of said trocar positioned in said guide member; whereby after said tubing and the point of said trocar are inserted into the vein, said trocar is withdrawable from said tubing and said reseal plug, and communication with the vein can be established by again piercing said reseal plug.

5. In a venous catheter assembly, a combination, comprising: a hub member, a length of flexible tubing in fluid tight engagement with one end of said hub member; a reseal plug attached to the other end of said hub member; a trocar for slidable engagement through said reseal plug, said hub member and said tubing; a guide member for said trocar mounted on said hub member and extending outwardly a short distance from said reseal plug, said guide member being in axial alignment with said hub member, said trocar having a sharpened point slidably mounted in said guide member and said trocar being of sufficient length to project said sharpened point beyond the end of said flexible tubing; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseal plug, and communication with the vein can be established by again piercing said reseal plug.

6. In a venous catheter assembly, a combination, comprising: a hub member; a length of flexible translucent tubing in fluid tight engagement with one end of said hub member; a reseal plug attached to the other end of said hub member; a trocar having an external diameter of approximately the same dimension as the internal diameter of said tubing for slidable engagement through said reseal plug, said hub member and said tubing; a guide member for said trocar mounted on said hub member

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and extending outwardly a short distance from said reseat plug, said guide member being in axial alignment with said hub member, said trocar having a sharpened point at one end and a gripping means at the opposite end, said sharpened point slidably mounted in said guide member and said trocar being of sufficient length to project said point beyond the end of said flexible tubing before said gripping member contacts said mounting member; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseat plug and communication with the vein can be established by again piercing said reseat plug.

7. In a venous catheter assembly, a combination, comprising: a hollow cylindrical hub member; a length of flexible translucent tubing in fluid tight engagement with one end of said hub member; a cylindrical reseat plug having an inner and an outer wall portion fitted over the other end of said hub member; a trocar having an external diameter of approximately the same dimension as the internal diameter of said tubing for slidable engagement through said reseat plug, said tubing and through said reseat plug; a guide member for said trocar mounted on said hub member and extending outwardly a short distance from said reseat plug, said guide member being in axial alignment with said hub member, said trocar having a sharpened point at one end and a gripping means at the opposite end, said sharpened point slidably mounted in said guide member and said trocar being of sufficient length to project said sharpened end beyond the end of said flexible tubing before said gripping means contacts said mounting member; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseat plug, and communication with the vein can be established by again piercing said reseat plug.

8. In a venous catheter assembly, a combination, comprising: a hollow, cylindrical hub member; a length of flexible, translucent tubing having a beveled point at one end and having the other end in fluid-tight engagement with one end of said hub member; a cylindrical reseat plug attached to the other end of said hub member; a trocar having an external diameter of approximately the same dimension as the internal diameter of said tubing for slidable engagement through said reseat plug, said hub member and said tubing; a guide member for said trocar mounted on said hub member and extending outwardly a short distance from said reseat plug, said guide member being in axial alignment with said hub member, said trocar having a sharpened point at one end and gripping means at the opposite end, said sharpened point slidably mounted in said guide member and said trocar being of sufficient length to project said sharpened point beyond the end of said flexible tubing before said gripping means contacts said mounting member; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseat plug, and communication

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with the vein can be established by again piercing said reseat plug.

9. In a venous catheter assembly, a combination, comprising: a hollow, cylindrical, rigid, plastic hub member; a length of flexible, plastic, translucent tubing having a beveled point at one end and having the other end in fluid tight engagement with one end of said hub member; a protective cap for said flexible tubing removably secured to said hub member; a rubber reseat plug having an inner and outer wall portion fitted over the end of said hub member; a solid metallic trocar having a diameter of approximately the same dimension as the internal diameter of said tubing for slidable engagement through said reseat plug, said hub member and said tubing; a guide member for said trocar mounted on said hub member and extending outwardly a short distance from said reseat plug, said guide member being in axial alignment with said hub member, said trocar having a sharpened point at one end and gripping means at the opposite end, said sharpened point slidably mounted in said guide member and said trocar being of sufficient length to project said sharpened point beyond the end of said flexible tubing before said gripping means contacts said mounting means; a flexible, plastic, transparent, casing enclosing said assembly; whereby after said tubing and the point of said trocar are inserted into a vein, said trocar is withdrawable from said tubing and said reseat plug, and communication with the vein can be established by again piercing said reseat plug.

10. In a venous catheter assembly, a combination, comprising: a length of flexible tubing having a distal terminal end and a proximal terminal end, a hub member in fluid tight engagement with said proximal end of said flexible tubing, a trocar slidably and axially received in said flexible tubing and said hub member, said trocar having a sharpened distal terminal end which is extendable beyond the distal terminal end of said flexible tubing, at least the distal terminal end of said flexible tubing snugly embracing the outer surface of said trocar near said sharpened distal terminal end, and a reseat plug through which said trocar extends connected to an axially aligned with said hub member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,770,236	Utley et al. -----	Nov. 13, 1956
2,828,744	Hirsch et al. -----	Apr. 1, 1958
2,829,644	Anderson -----	Apr. 8, 1958
2,915,063	Cutter -----	Dec. 1, 1959

FOREIGN PATENTS

843,744	Great Britain -----	Aug. 10, 1960
1,064,445	France -----	Dec. 23, 1953

OTHER REFERENCES

Gritsch et al.: "Value of Indwelling Catheters in Intravenous Therapy," J.A.M.A., Sept. 19, 1959, vol. 171, No. 3, pp. 121/281-126/286.