

[54] **DIGIT MANIPULABLE QUICK  
RELEASE CANNULA INSERTION  
DEVICE**

[75] Inventor: **Vayden F. Stanley**, Dallas, Tex.  
[73] Assignee: **Vicra Sterile, Inc.**, Dallas, Tex.  
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[52] U.S. Cl. .... **128/214.4, 128/221**  
[51] Int. Cl. .... **A61m 05/00**  
[58] Field of Search .... **128/214.4, 221, 348, DIG. 16**

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**FOREIGN PATENTS OR APPLICATIONS**

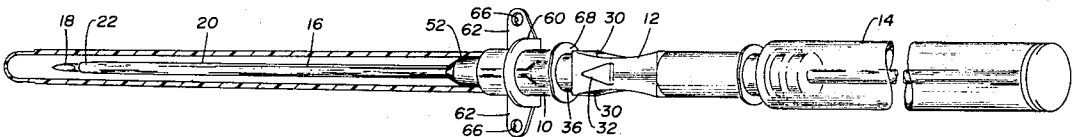
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*Primary Examiner*—Dalton L. Truluck  
*Attorney*—Richards, Harris & Hubbard

[57] **ABSTRACT**

An over-the-needle catheter insertion device wherein the catheter and needle are connected to respective interconnecting hub members. The catheter hub member is connectable to an infusion source. The catheter hub member has an outwardly extending ridge molded integrally therewith, providing a means by which the catheter hub and needle hub can be separated by manipulation of only one hand.

**8 Claims, 7 Drawing Figures**



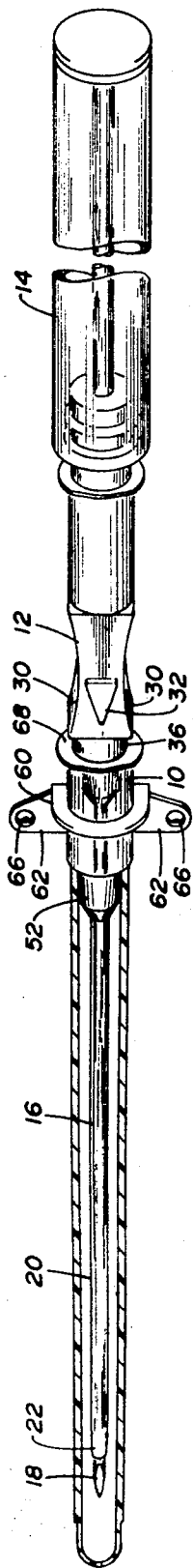


FIG. 1

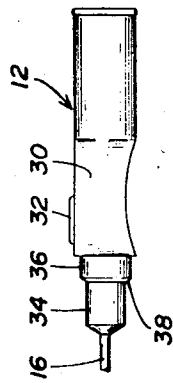


FIG. 2

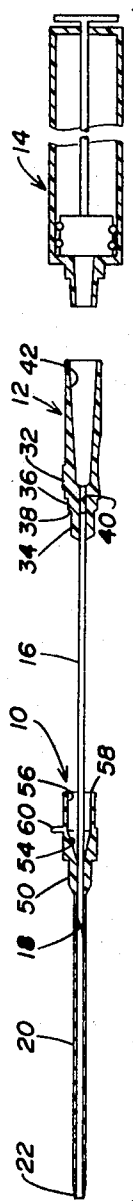


FIG. 3

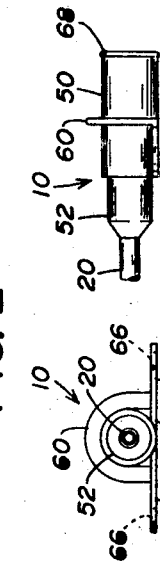


FIG. 4

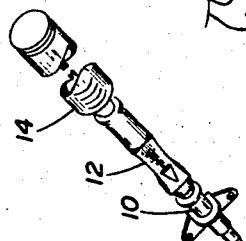


FIG. 5

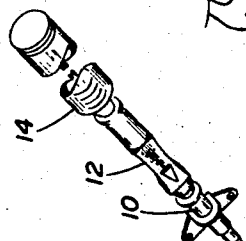


FIG. 6

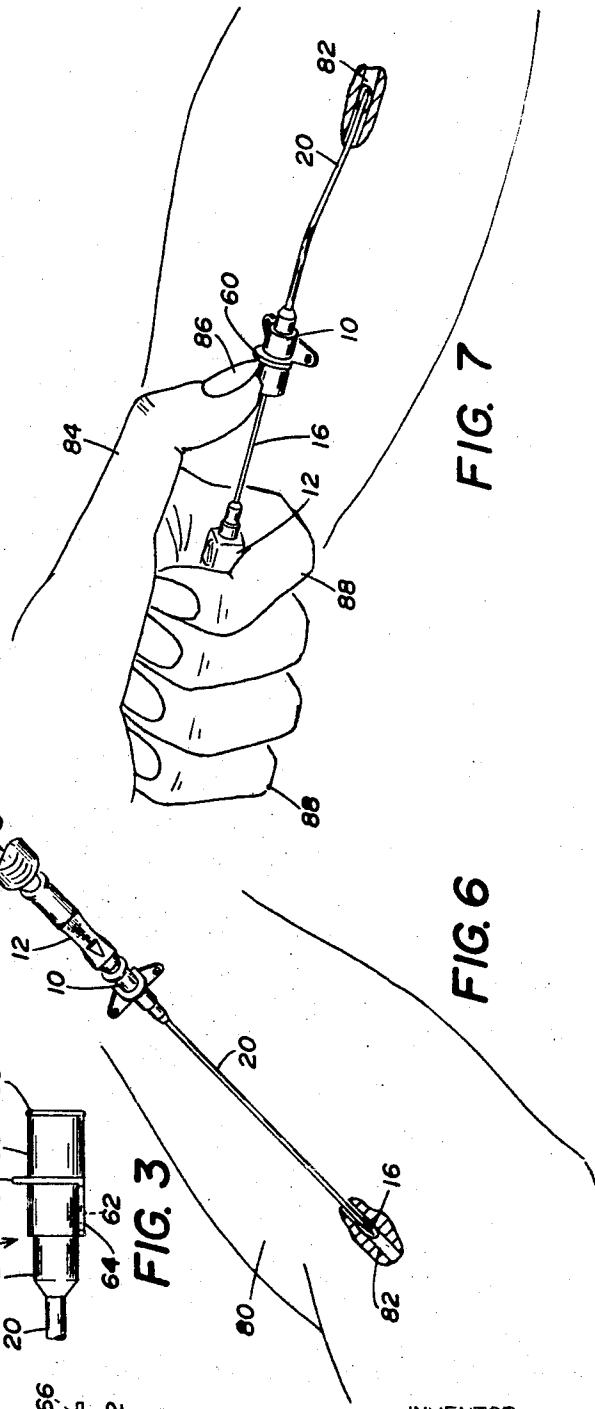


FIG. 7

INVENTOR  
VAYDEN F. STANLEY

*Richards, Horne & Hubbard*  
ATTORNEYS

## DIGIT MANIPULABLE QUICK RELEASE CANNULA INSERTION DEVICE

### BACKGROUND OF THE INVENTION

The present invention relates to cannula insertion devices and more particularly to an easily separable over-the-needle catheter insertion device.

Cannula insertion devices such as the general type of catheter insertion device disclosed herein are available in the prior art. The medical instruments supply industry continuously strives to improve such devices in an attempt to provide simpler, easier to use, disposable devices than are presently on the market. For example, some of the more recent improvements relate to the means for tying down the catheter after the needle has been removed and to the catheter construction itself. While operating such over-the-needle catheter devices of this general type, it is highly desirable to be able to effect single handed separation of the needle from the catheter after the combination has been inserted into subcutaneous tissue of a patient and generally into a blood vessel of the patient. Single handed manipulation is desirable since the operating or manipulating doctor or technician prefers to have his other hand free to perform auxiliary functions which necessarily or preferably must occur simultaneously with the separation of the needle from the catheter. An exemplary auxiliary function is the depression of or pressure which must be applied to the patient's blood vessel at the point of entry of the catheter into the vessel or upstream therefrom. This is done as the needle is extracted or removed from the interior of the catheter to prevent blood loss which will occur through the catheter before it can be connected to an infusion device.

Other desirable features of this general type of device include a non-sticking connection or no connection between the catheter and needle, a method or way to determine in which direction a beveled sharpened needle is facing, and an improved tie down means for the catheter.

### SUMMARY OF THE INVENTION

The present invention, therefore, provides a subcutaneous catheter insertion device comprising: a stylet, the distal end thereof being sharpened, the proximal end thereof being mounted in a stylet hub member having a distal receiving end, a flexible cannula slidably disposed over the stylet, the distal end of the cannula terminating short of and tapering toward the distal end of the stylet, a cannula hub member in which the proximal end of the cannula is mounted, the cannula hub member removably disposed over the distal receiving end of the needle hub member, said cannula hub member having a digit engageable means extending outwardly therefrom to facilitate removal of the cannula hub member from the stylet hub member.

### BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention will be derived by reference to the ensuing specification in conjunction with the accompanying drawings in which:

FIG. 1 is a top view of the cannula insertion device of the present invention;

FIG. 2 is a side view of the stylet hub member of the present invention;

FIG. 3 is a side elevational view of the cannula hub member of the present invention;

FIG. 4 is a front view of the cannula hub member of the present invention;

FIG. 5 is a partially exploded elevational cross-sectional view of the cannula, cannula hub member, stylet, stylet hub member and handle means of the present invention;

FIG. 6 is a view of the insertion of the cannula of the present invention into a patient's appendage; and,

FIG. 7 is a view of the removal of the stylet from the interior of the cannula of the present invention.

### DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention will be described in relation to a preferred embodiment. It should be apparent to those of ordinary skill in the disposable medical supply art that many alterations, variations, substitutions, modifications and other changes can be made to the embodiment disclosed herein without departing from the original concept of the invention. It is intended that the invention be limited only by the definition contained in the appended claims. When referring to the various figures, like numerals will be utilized where applicable and appropriate for simplicity and ease of understanding.

Referring first to FIG. 1, a preferred embodiment of the cannula insertion device of the present invention is illustrated. A cannula or catheter hub member 10 is slidably disposed at its proximal end over the distal end of a stylet or needle hub member 12. Removably attached to the proximal end of the stylet hub member is a handle means, which in this instance comprises a syringe 14 removably disposed in a socket in the proximal end of the stylet hub member. A pointed stylet, in this case hollow needle 16, is firmly mounted in the distal end of the stylet hub member, hereinafter the needle hub, 12. The pointed end 18 of the needle has been sharpened by grinding at a bevel with a circular grinding tool as is common in the art. A flexible cannula, in this embodiment flexible catheter 20, is firmly mounted in the distal end of the cannula hub member 10, hereinafter the catheter hub 10. The flexible catheter 20 is slidably disposed over the exterior of the hollow needle 16 and terminates short of the pointed end 18. The distal end 22 of the flexible catheter is also ground so that its outside diameter approaches the outside diameter of the needle 16. Preferably, the catheter 20 has an inside diameter which is approximately the same or very slightly larger than the outside diameter of the needle 16.

The needle can be manufactured from any standard surgical steel available in the art. The catheter can be manufactured from polypropylene, polytetrafluoroethylene or any other suitable flexible material which can be extruded into a cannula or catheter as shown. Of course, the catheter material must be surgically compatible and nontoxic. Many such materials are available in the art. The other components of the present invention, such as the catheter hub 10, the needle hub 12 and the handle means or syringe 14, can be manufactured from polypropylene, polyamides, polyesters or any other suitable thermoplastic material available to the art.

The syringe 14, as shown, has been partially broken away since in reality the syringe is usually about 3 or

more inches long in comparison to the 2 inch or less combined length of the needle hub 12 and the catheter hub 10. Such syringes are readily available commodities from medical supply houses which deal in disposable medical equipment. The primary purpose of providing a handle or syringe 14 is to increase the grip of the fingers as they are wrapped around the needle hub 12 and the handle 14. Such a handle facilitates insertion of a catheter and needle and also aids in the removal of the needle from the catheter as will be explained hereinafter.

Referring now to FIGS. 2 through 5, a more detailed description of the catheter, catheter hub, needle and needle hub assembly will be provided. A side elevational view of the needle hub is provided. The needle hub 12 is provided first with a pair of side indentations 30 (also seen in FIG. 1) which facilitate grasping between a thumb and forefinger for initial insertion of the needle and catheter into subcutaneous tissue. Also provided on the top portion of the needle hub is an indicator 32, in this case a triangularly shaped raised portion, which points in the direction of the needle 16 and indicates when the beveled pointed end 18 is facing upwardly. The needle 16 is mounted in the distal end portion 34 of the needle hub by molding techniques well known in the art. The distal end portion 34 of the needle hub is generally circular in cross section. Rearward of the distal end portion 34, a portion 36 of circular cross section of greater diameter than the distal end portion 34 is provided. The enlarged portion 36 provides a shoulder 38, the function of which will be described specifically in conjunction with FIG. 5. In the particular embodiment illustrated, a channel 40 is provided in the interior of the needle hub 12 which communicates with a female luer socket 42.

The catheter hub 10, two views of which are shown in FIGS. 3 and 4, includes a body portion 50, a distal end 52 of generally circular cross section into which the catheter 20 is securely mounted. Again, techniques for mounting catheters in hubs such as catheter hub 10 are well known in the art. The interior of the catheter 20 communicates with an inwardly, forwardly tapering channel 54. The rear of tapering channel 54 communicates with channel portion 56 which opens onto the proximal end of the catheter hub 10. The channel portion 56 is generally of circular cross section and of slightly larger diameter than the distal end portion 34 of the needle hub. Channel portion 56 also forms a female luer socket. The channel portion 56 is then capable of receiving the distal end portion 34 of the needle hub. The respective dimensions of the channel portion 56 and distal portion 34 provides a slidably and rotatably disposed connection between the needle hub 12 and the catheter hub 10. Furthermore, the shoulder 38 abuts against the rear portion 58 of the catheter hub so that the catheter hub will only slide a fixed distance over the distal end 34 of the needle hub 12. The reason for this will be apparent later.

The catheter hub 10 is provided with a finger or digit engageable rib 60 which extends substantially radially outwardly from the exterior or periphery of the catheter hub 10. As can be seen in FIG. 4, the rib 60 extends around the periphery of the catheter hub 10 terminating at a plane tangential to the exterior surface of the catheter hub. Lying in this tangential plane also are

provided a pair of wings 62 which form a flat surface 64 on which the catheter hub 10 rests against a patient's appendage or surface tissue. This feature prevents the catheter from turning in a person's vein and possibly twisting the vein and stopping flow therethrough. Provided in the winged members are apertures 66 through which tie down means such as an elastic band or other tie down band can be inserted to hold the device to a patient's appendage. Provided at the rear or proximal end of the catheter hub 10 is a second rib member 68 which also in certain positions is provided to be digit engageable. As will be noted, the rib member 60 is spaced forward of the proximal end of the catheter hub. This spacing in conjunction with the spacing of the entire catheter hub assembly 10 from the needle hub 12 provides sufficient distance for thumb or thumb nail engagement of the rib 60 so that the needle 16 and needle hub 12 can be removed from the catheter 20 and catheter hub 10.

A better understanding of this operation will be gained by reference to FIGS. 6 and 7. The catheter and needle assembly are inserted into a patient's appendage, for example, an arm 80 and into the patient's vein 82, shown partially broken away. The catheter 20 and needle 16 are inserted as a unit by grasping the needle hub 12 with a thumb and forefinger while wrapping the remaining fingers around the needle hub and syringe 14. This operation is well known to the ordinary doctor or technician who has utilized this type of device. With reference to FIG. 7, the needle 16 is removed from the interior of the catheter hub 10 and catheter 20 after venipuncture has been accomplished. This operation is effected by the doctor or technician by placing the thumb 84 or thumb nail 86 in a position to engage the rib 60 on the catheter hub 10. The needle hub 12 in conjunction with the syringe 14, around which the operator's fingers 88 are wrapped, is then moved backwardly or rearwardly relative to the catheter hub 10 which is held in place by flexure of the operator's thumb 84. This single hand operation leaves the technician's other hand free to apply pressure in the area of the venipuncture in order to prevent blood flow through the catheter 20. Alternatively, the thumb or thumb nail 86 can engage the rearward portion 58 or rib 68 of the catheter hub 10 to remove the needle hub 12 and the needle 16.

What is claimed is:

1. A subcutaneous cannula insertion device comprising:

a stylet, the distal end thereof being sharpened, the proximal end thereof being mounted in a relatively thin walled tubular stylet hub member having a distal receiving end of reduced diameter,

a flexible cannula slidably disposed over said stylet, the distal end of said cannula terminating short of and tapering toward the distal end of said stylet,

a relatively thin walled tubular cannula hub member in which the proximal end of said cannula is mounted, said cannula hub member loosely and removably disposed over said distal receiving end of said stylet hub member, said cannula hub member having a digit engageable means extending outwardly therefrom to facilitate removal of said cannula hub member from said stylet hub member,

said digit engageable means spaced forwardly of said proximal end of said cannula hub member, the relative spacing and sizing of said tubular cannula hub member, said tubular stylet hub member, and said digit engageable means being such to permit a single hand to grasp the tubular stylet hub member and, while so grasping, for the thumb or other digit of said single hand to engage said digit engageable means to separate said cannula and said stylet by the action of said single hand,

said digit engageable means extending upwardly and circumferentially a sufficient distance to permit said digit to engage and remain in firm engagement during the separation of said cannula hub member and said stylet hub member, and during said separation to control the relative motion between said cannula and said stylet, said digit engageable means being oriented with respect to said cannula to lie at least along the upper circumferential surface when said device is in position to be introduced into a patient.

2. The cannula insertion device of claim 1 wherein said digit engageable means comprises a rib member extending outwardly from said cannula hub member and wherein said rib member extends substantially radially from said hub member at a substantially fixed distance from the axis of said cannula hub member and around at least a portion of the circumference thereof.

3. The cannula insertion device of claim 2, said rib member discontinuous about the circumference of said cannula hub member on one side of a line substantially tangential to the exterior surface of said cannula hub member, said line lying in a plane perpendicular to the axis of said cannula hub member.

4. The cannula insertion device of claim 3 wherein said cannula hub member has opposed sidewardly projecting wing members thereon, said wing members having means for attaching a tie down member thereto, said wings located substantially along said tangential line to provide in combination with said rib member a substantially flat surface capable of nonrotatably abutting surface tissue of a patient.

5. The cannula insertion device of claim 1 wherein said cannula hub member is slidably and loosely rotatably disposed on said stylet hub member.

6. The cannula insertion device of claim 5 wherein said stylet comprises a hollow needle, said needle sharpened by a double grind facing in a predetermined

direction, and wherein said cannula hub member has located thereon indicia means which indicates the direction in which said double grind on the distal end of said needle is facing.

7. A subcutaneous cannula insertion device comprising:

a stylet, the distal end thereof being sharpened, the proximal end thereof being mounted in a relatively thin walled tubular stylet hub member having a distal receiving end of reduced diameter,

a flexible cannula slidably disposed over said stylet the distal end of said cannula terminating short of and tapering toward the distal end of said stylet,

a relatively thin walled tubular cannula hub member in which the proximal end of said cannula is mounted, said cannula hub member loosely and removably disposed over said distal receiving end of said stylet hub member, said cannula hub member having a digit engageable means extending outwardly therefrom to facilitate removal of said cannula hub member from said stylet hub member,

said digit engageable means spaced forwardly of said proximal end of said cannula hub member,

said digit engageable means extending outwardly to present a raised surface normal to said relatively thin walled cannula hub member, said raised normal surface extending along the upper portion of said device when said device is oriented in the position for insertion into a patient but terminating circumferentially on the underside of said device to provide a region of reduced diametrical proportions opposite on said underside,

the relative spacing and sizing of said tubular cannula hub member, said tubular stylet hub member, and said digit engageable means being such to permit a single hand to grasp the tubular stylet hub member and, while so grasping, for the thumb or other digit of said single hand to engage said digit engageable means to separate said cannula and said stylet by the action of said single hand.

8. The cannula insertion device of claim 7 in which said digit engageable means comprises a generally U-shaped shoulder means carried on said cannula hub member with the central portion of said U-shaped shoulder means being located along the upper portion of said device when said device is oriented in position for insertion into the patient.

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