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[73]	Assignee	American Hospital Supply Corporation

3,055,361	9/1962	Ballard	128/214.4
3,215,141	11/1965	Podhora	28/214.4
3,324,853	6/1967	Czorny et al.	128/214.4
3,515,137	6/1970	Santomieri	128/214.4
3,537,451	11/1970	Beck et al.	128/214.4

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**[54] INTRAVENOUS CATHETER APPARATUS WITH
CATHETER TELESKOPED INSIDE PUNCTURING
CANNULA
21 Claims, 14 Drawing Figs.**

[52] U.S. Cl..... 128/214.4,
128/221

[51] Int. Cl. A61m 05/00

[50] Field of Search..... 128/214,
214.2, 214.4, 221

[56] **References Cited**

UNITED STATES PATENTS

2,566,499	9/1951	Richter.....	128/221
2,707,953	5/1955	Ryan	128/214

ABSTRACT: An intravenous catheter assembly in which a separable gripping hub integrates a rigid cannula within which a flexible catheter is telescopically disposed; the gripping hub including hinged jaws and a circumferential pressure band, one jaw including an abutment shoulder against which the proximate end of the cannula is abuttingly disposed during administration of the cannula for a catheter insertion procedure; the clamping means including a baseplate and separate clamp parts and a longitudinal and transverse clamp plate; means for gripping a rearwardly disposed flexible protective sheath; and a protector disposed within the protective sheath and protecting the cannula therein to prevent rupture of the catheter when the gripping hub is removed from the assembled parts.

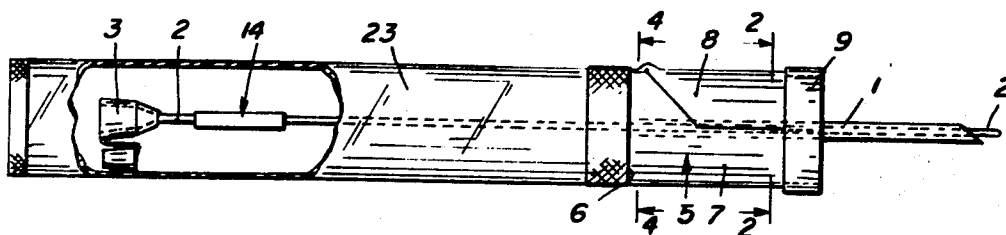


FIG. 1.

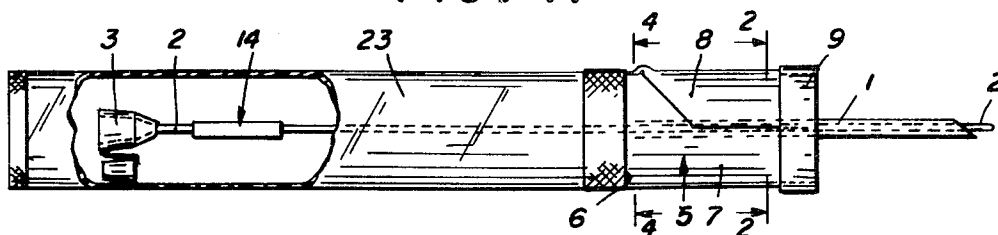


FIG. 2.

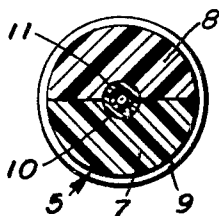


FIG. 3.

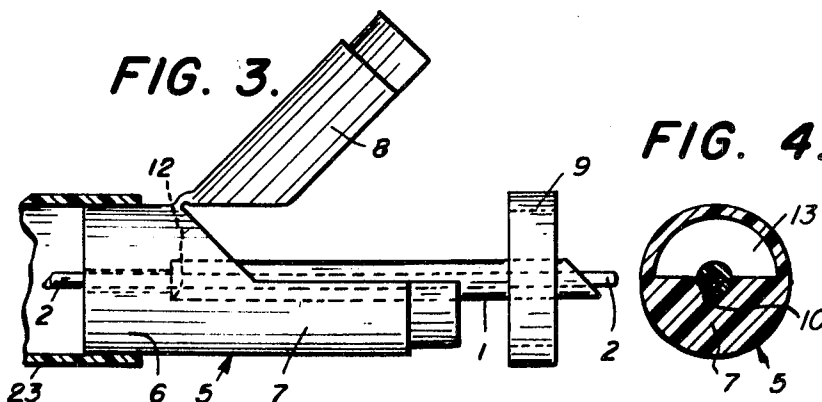


FIG. 4.

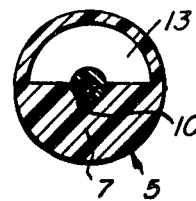


FIG. 5.

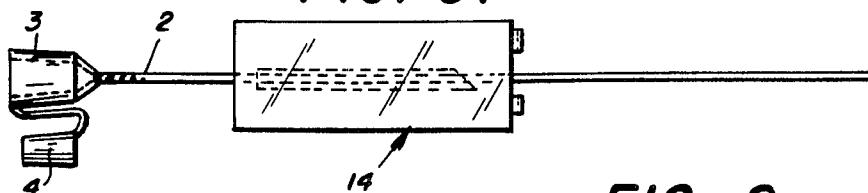


FIG. 8.

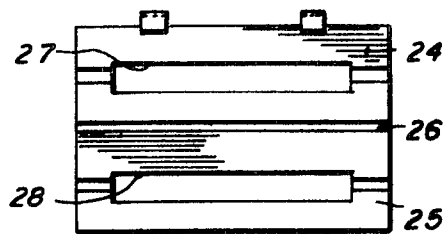


FIG. 6.

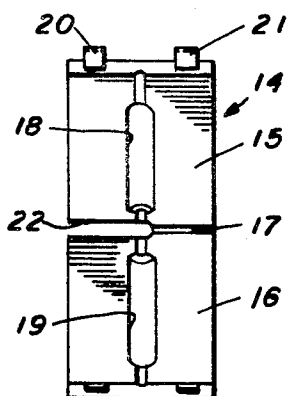
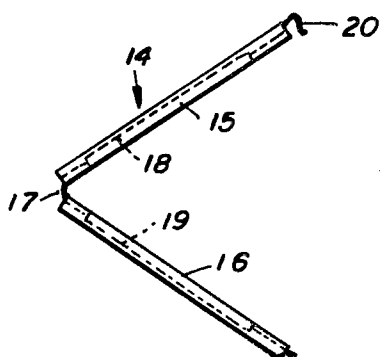


FIG. 7.



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FIG. 9.

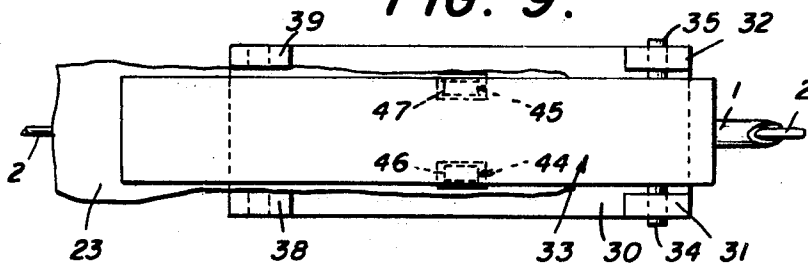


FIG. 10.

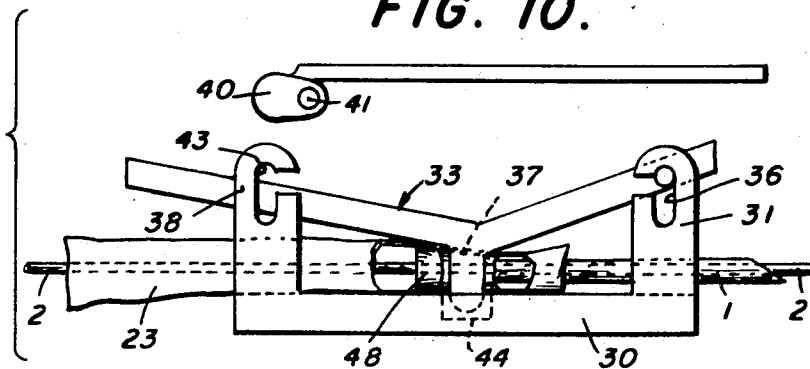


FIG. 11.

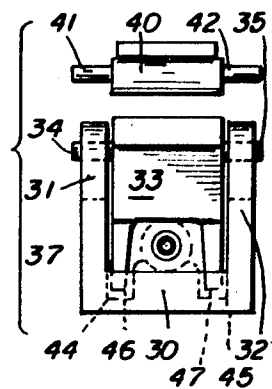


FIG. 12.

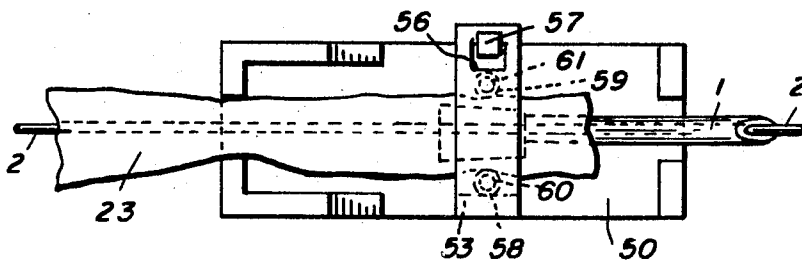


FIG. 13.

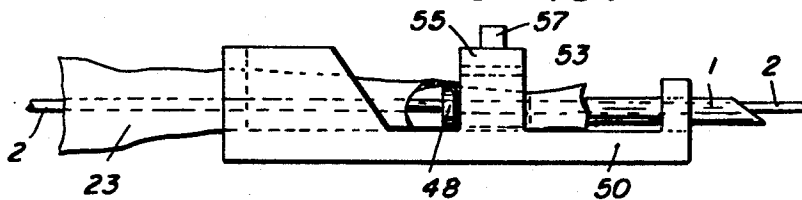
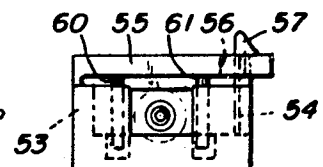


FIG. 14.



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INTRAVENOUS CATHETER APPARATUS WITH CATHETER TELESCOPED INSIDE PUNCTURING CANNULA

My invention relates to an intravenous catheter apparatus for inserting a flexible venous catheter into a patient's vein. These flexible venous catheters are often inserted into a patient's vein so he can move his arm without a rigid cannula gouging into his vein.

There are basically two types of intravenous catheter apparatus. One has the flexible catheter on an outside surface of the puncturing cannula and the other has the flexible catheter fed down through the cannula's bore. I have a related application filed on even date entitled "Intravenous Catheter Apparatus with Catheter Telescoped on Outside of Puncturing Cannula" Ser. No. 645,655 filed June 13, 1967 deals with the former type. The present application deals with the latter type.

In this application (catheter inside cannula) I have provided three embodiments of a unique hub construction for holding the cannula while making the venipuncture. In one embodiment, this hub has a pair of opposed jaws which grip tightly around the cannula. Once the venipuncture is made, the jaws separate and the entire hub can be pulled back over the catheter, leaving only the cannula on the catheter. The cannula slides to a rear of the catheter where it is encased in a protector that keeps the cannula's sharp puncturing end from damaging the catheter.

My invention can best be understood with reference to the drawings, in which:

FIG. 1 is a side elevational view of the intravenous catheter apparatus showing a first embodiment of my hub construction;

FIG. 2 is a cross-sectional view taken along line 2—2 of FIGURE 1;

FIG. 3 is an enlarged side elevational view of the first embodiment of my split hub;

FIG. 4 is a cross-sectional view taken along line 4—4 of FIGURE 1;

FIG. 5 is a top plan view of the venous catheter and cannula with the cannula encased in a first embodiment of my cannula protector;

FIG. 6 is a front elevational view of this first embodiment cannula protector showing it in open position;

FIG. 7 is a side elevational view of this first embodiment cannula protector;

FIG. 8 is a side elevational view of a second embodiment of the cannula protector showing it in open position;

FIG. 9 is a top plan view of a second embodiment of my split-apart hub;

FIG. 10 is a side elevational view of this second embodiment hub showing a removable cam locking member;

FIG. 11 is a front elevational view of this second embodiment hub;

FIG. 12 is a top plan view of a third embodiment of my split-apart hub;

FIG. 13 is a side elevational view of this third embodiment hub; and

FIG. 14 is a front elevational view of this third embodiment hub. Referring in detail to these drawings, the intravenous catheter apparatus includes a cannula 1 with a flexible venous catheter 2 slideable through its bore. A rearward end of this cannula is tightly held in a hub 5. A first embodiment of this hub (FIGS. 1-4) includes a sheath-receiving portion 6 with a rigid lower jaw 7 and a hinged upper jaw 8 attached to this sheath-receiving portion 6. Opposed grooves 10 and 11 in the jaws present surfaces which tightly grip against an outside surface of the cannula and are held in this relationship by a removable rigid band 9. One of the grooves 10 or 11 has a shoulder 12 against which a rear end of the cannula abuts when pushing the cannula into a vein.

Extending rearwardly through the hub is venous catheter 2 which has a hollow adapter 3 at its rear end with a tapered internal surface for connecting to an administration set. When not so connected, a plug 4 closes off the adapter. These elements (rearward portion of catheter, adapter and plug) are all protected from contamination by a flexible sheath 23 which is removably connected to sheath-receiving portion 6 of the hub.

In the past there has been some problem with the puncturing cannula of such apparatus. The puncturing cannula has a sharp edge at its forward end through which the soft flexible catheter extends. If the catheter is flexed and the cannula moves along the catheter, the cannula's sharp point can gouge into the soft catheter, possibly severing its wall. I have overcome this disadvantage by providing a protector for cannula 1.

A first embodiment of this protector 14 (shown in FIGS. 5-7) includes a pair of panels 15 and 16 with opposed grooves 18 and 19 for holding the cannula. These grooves are narrowed at their ends sufficiently to prevent the cannula from slipping out but still let the catheter pass through the protector. The panels 15 and 16 have their ends hinged together at 17. They are hinged on just one side of the grooves and have a transverse opening 22 leading into the grooves. Thus, the cannula protector 14 can be laterally slipped onto the catheter. Catch members 20 and 21 hold the panels together to encase the cannula and keep it from gouging into the catheter.

In a second embodiment of the protector (FIG. 8) the panels 24 and 25 are hinged along their sides by hinge 26. This second embodiment of the protector with grooves 27 and 28 can also laterally slip onto the cannula and be clamped shut to protect the cannula.

Both cannula protector embodiments are preferably made of polypropylene plastic with integral polypropylene hinges between panels 15 and 16 and panels 24 and 25.

Having described in detail the cannula protector, we turn now to the second and third embodiments of my hub. The first embodiment (FIGS. 1-4) has been described previously.

The second embodiment (FIGS. 9-11) of my hub has a base wall 30 with a pair of upstanding arms 31 and 32 on opposite sides of cannula 1. A lid 33 pivotally connects to these upstanding arms through pivot shafts 34 and 35 which fit into pivot pockets in these arms. Numeral 36 denotes the pivot pocket in arm 31, and there is a like pivot pocket in arm 32.

This lid 33 swings longitudinally towards base wall 30 and a portion 37 tightly clamps the cannula 1 against base wall 30. If desired, lid 33 can grip against a hub 48 on one end of cannula 1. Holding the lid 33 and base wall 30 in this gripping relationship is a cam member 40 with pivot shafts 41 and 42 that removably fit into pivot pockets in a second set of upstanding arms 38 and 39. Numeral 43 denotes the pivot pocket in arm 38 and arm 39 has a like pivot pocket. To open this embodiment of my hub, the operator pulls up on a handle of cam member 40 to release cam pressure on lid 33. After removing cam member 40 he then swings open lid 33 and pulls pivot shafts 34 and 35 out of the pivot pockets in upstanding arms 31 and 32. This lets the base wall 30 and the upstanding arm portions of the hub slide out from under the cannula.

Another feature of this second embodiment of the hub is the way a flexible sheath 23 is held to the hub. On each side of cannula 1 are cavities 44 and 45 in base wall 30 which can extend completely through the base wall if desired. Cooperating with these cavities are lugs 46 and 47 on lid 33 which push the flexible sheath 23 into the cavities where it is retained. When the lid is removed to release catheter 2, it simultaneously releases flexible sheath 23.

The third and final embodiment of my hub (FIGS. 12-14) has a base wall 50 also with upstanding arms 53 and 54. Here, however, the lid 55 is hingedly connected to one arm 53 and transversely swings across the cannula 1 to grip the cannula or a hub 48 at one end of the cannula 1 to base wall 50. An opening 56 in lid 55 receives a catch means 57 on upstanding arm 54 to lock the lid against the cannula. As in the second embodiment, lugs 60 and 61 cooperate with cavities 58 and 59 to simultaneously grip the flexible sheath 23.

The three hub versions described above can be made of various materials. However, the first and third embodiments are preferably made of polypropylene plastic with an integral polypropylene hinge between the jaws of the first embodiment and between the lid and upstanding arm of the third embodiment.

Having explained the structure of the various embodiments of my invention, we now turn to a brief description of how it is

used. First, the operator takes the intravenous catheter apparatus as shown in FIG. 1 and makes the venipuncture. Next, he pulls off band 9 (or removes cam member 40 or releases catch 57) and opens up the hub to release pressure on the cannula. He then pulls the flexible sheath 23 and the hub back over the catheter. He can remove the flexible sheath 23 and hub 5 while they are still connected to each other or he can pull flexible sheath 23 off of hub 5 and remove them separately. Enlarged catheter opening 13 in hub 5 passes over adapter 3 and plug 4. Next, he slides the cannula rearwardly along the catheter and locks it inside the cannula protector 14. Finally, all that remains is a flexible catheter in the patient's vein. There is no rigid cannula that can cause injury to him.

In the foregoing specification, I have described my invention using certain specific embodiments. It is understood that persons skilled in the art can make modifications to these embodiments without departing from the spirit and scope of this invention.

I claim:

1. Intravenous catheter apparatus comprising
 - a rigid puncturing cannula having a forward sharpened end and a rear abutment end;
 - a flexible catheter substantially longer than said cannula and telescopically disposed within said cannula for free relative movement therein;
 - a removable hub circumsposed about said cannula and including a separate, displaceable mechanical gripping means including an inner abutment portion engaging the abutment end of said cannula for facilitating administration of said cannula, said displaceable mechanical gripping means including at least a portion positioned adjacent said sharpened end of the cannula for circumferentially gripping said cannula to prevent relative longitudinal movement between said hub and cannula, said hub having hingedly opposed separable gripping surfaces displaceable from each other upon displacement of the mechanical gripping means and release of the circumferential gripping to permit removal of said hub from said cannula; and
 - a flexible sheath attached to said hub for protecting the catheter portion which extends rearwardly beyond said hub and said cannula
2. Intravenous catheter apparatus as set forth in claim 1 wherein the hub includes a pair of hinged jaws having gripping surfaces in opposed longitudinal grooves in the jaws.
3. Intravenous catheter apparatus as set forth in claim 2 wherein the hub is of polypropylene and has an integral polypropylene hinge between the jaws.
4. Intravenous catheter apparatus as set forth in claim 1 wherein the hub includes a sheath-receiving portion which has an opening therethrough for passage of the cannula; said sheath-receiving portion having a bottom jaw of the hub rigidly attached thereto and having a top jaw hingedly attached thereto on a transverse, chordally disposed integral hinge portion; and said top and bottom jaws having gripping surfaces in longitudinal opposed grooves in the jaws.
5. Intravenous catheter apparatus as set forth in claim 4 wherein the apparatus has a rigid band surrounding the jaws keeping them in gripping relationship with said cannula, said rigid band being removable from the jaws so the jaws can swing open for removal of the hub from the cannula.
6. Intravenous catheter apparatus as set forth in claim 1 wherein the flexible sheath is removable from the hub.
7. Intravenous catheter apparatus as set forth in claim 1 wherein the opposed gripping surfaces grip a needle hub attached to one end of the cannula.
8. Intravenous catheter apparatus comprising: a tubular puncturing cannula; a flexible catheter telescoped inside said cannula; a removable hub grippingly engaging said cannula, said hub having opposed gripping surfaces which can separate from each other to release the catheter and cannula; and a flexible sheath attached to said hub for protecting a catheter portion which extends beyond said hub, the hub including a

base wall with upstanding arms on opposite sides of said cannula, a lid pivotally connected to these arms and adapted to swing longitudinally along the cannula toward said base wall to grip said cannula between said lid and said base wall; and means for maintaining the lid and base wall in gripping relationship with said cannula.

9. Intravenous catheter apparatus as set forth in claim 8 wherein the lid and base wall grip a needle hub attached to one end of the cannula.

10. Intravenous catheter apparatus as set forth in claim 8 wherein the base wall has a second set of upstanding arms on opposite sides of said cannula and said means is a cam member removably connected to said second set of upstanding arms, said cam member forcing said lid to squeeze the cannula against said base wall.

11. Intravenous catheter apparatus as set forth in claim 8 wherein the flexible sheath is gripped between said lid and base wall.

12. Intravenous catheter apparatus as set forth in claim 11 wherein the flexible sheath is gripped on opposite sides of the cannula by a lug and cavity construction in the lid and base wall.

13. Intravenous catheter apparatus comprising: a tubular puncturing cannula; a flexible catheter telescoped inside said cannula; a removable hub grippingly engaging said cannula, said hub having opposed gripping surfaces which can separate from each other to release the catheter and cannula; and a flexible sheath attached to said hub for protecting a catheter portion which extends beyond said hub, the hub including a base wall, a lid pivotally connected to said base wall and adapted to swing transversely across said cannula and grip said cannula between the lid and the base wall, and releasable catch means on the hub to hold said lid in gripping relationship with said cannula.

14. Intravenous catheter apparatus as set forth in claim 13 wherein the lid and base wall grip a needle hub attached to one end of the cannula.

15. Intravenous catheter apparatus as set forth in claim 13 wherein the flexible sheath is gripped between said lid and said base wall.

16. Intravenous catheter apparatus as set forth in claim 15 wherein the flexible sheath is gripped on opposite sides of the cannula by a lug and cavity construction in the lid and base wall.

17. Intravenous catheter apparatus as set forth in claim 13 wherein the lid is pivotally connected to said base wall at an upstanding arm integral with the base wall.

18. Intravenous catheter apparatus as set forth in claim 1 wherein the catheter has a hollow adapter on an end of the catheter within said flexible sheath, and wherein the apparatus includes a removable closure for said hollow adapter.

19. Intravenous catheter apparatus as set forth in claim 1 wherein the catheter is substantially longer than said cannula and the cannula is slideable along said catheter after making a venipuncture, said apparatus including means within said flexible sleeve to protect the flexible catheter from being cut by a sharp-pointed end of the cannula surrounding the catheter after said hub has been removed from said cannula.

20. Intravenous catheter apparatus as set forth in claim 19 wherein the means includes a pair of hinged panels which clamp around the cannula to keep its pointed end from cutting into the catheter.

21. Intravenous catheter apparatus as set forth in claim 20 wherein the hinged panels have opposed mating grooves for encasing said cannula with a portion of the grooves extending beyond a pointed end of the cannula through which the catheter extends; said panels being of polypropylene with an integral polypropylene hinge integrally connecting the two panels together at one side of said grooves, which panels have an entrance slot on an opposite side of said grooves whereby the catheter can be laterally inserted into the grooves; and said panels have fastening means for holding them together to encase the cannula.