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R. L. HUBER

2,847,994

DONOR SET NEEDLE AND TUBING COMBINATION

Filed March 3, 1953

Fig. 1

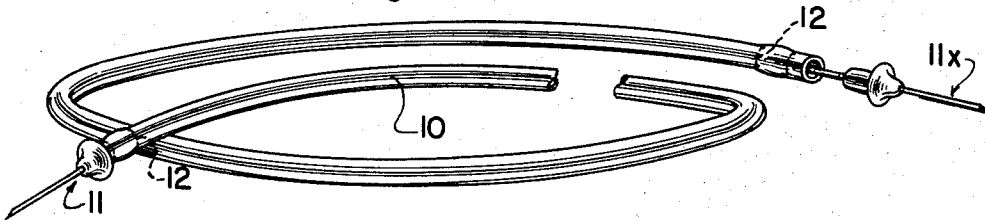


Fig. 2

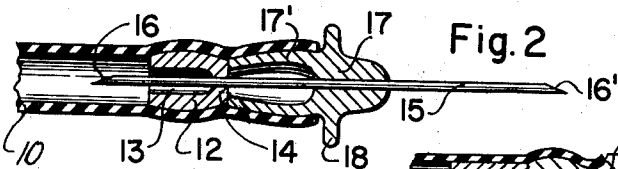


Fig. 4

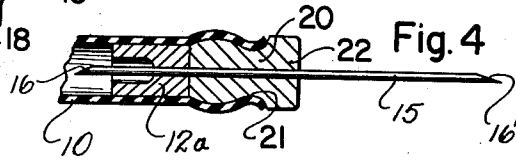


Fig. 3

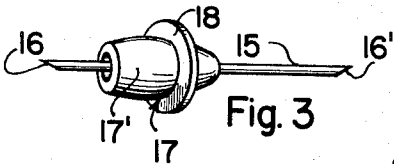


Fig. 5

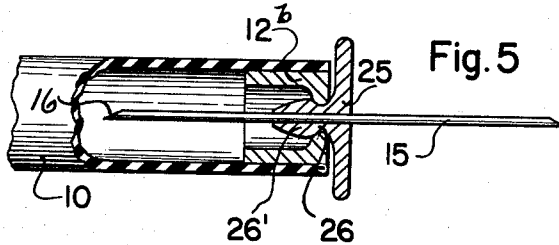


Fig. 6

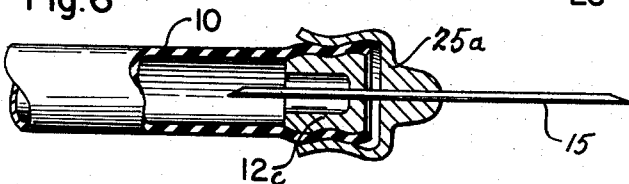


Fig. 7

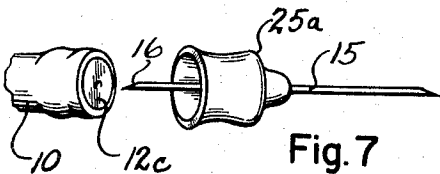


Fig. 9

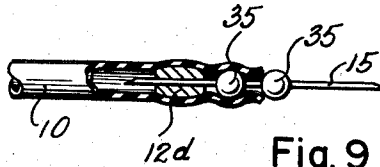
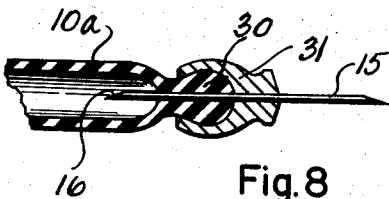


Fig. 8



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DONOR SET NEEDLE AND TUBING COMBINATION

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4 Claims. (Cl. 128—214)

This invention relates to improvements in what are known as and generally referred to in the medical profession as "blood donor sets." More particularly, it relates to the provision of detachable needles for use in connection with the flexible tubing as used in donor sets and the like; it being the principal object of the invention to provide needle equipped blood donor and recipient sets that retain their sterilized, aseptic condition until used; and then permits the ready removal from the tubing of the needles for re-use after re-autoclaving; the tubing which cannot be re-sterilized, then being discarded.

More specifically stated, it is the primary object of the present invention to provide a novel and practical combination of flexible tube, tube closing stopple, needle and needle mounting that provides for the easy and satisfactory handling of the set in carrying out its intended uses, and yet permits the easy and ready removal of the needles for sterilization and their subsequent application to a new sterile tube.

It is a further object of the invention to provide needles with mounting hubs of novel form whereby they can be easily and properly applied to the stopple closed ends of the tubing and which hubs serve as means for facilitating the manipulation of the needles.

Further objects and advantages of the invention reside in the details of construction of the various parts as used in combination; in their mode of assembly and in their manner of use, as will hereinafter be described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a length of flexible tubing as used in donor sets; showing the tube as equipped at one end with a needle, and showing a needle ready for application to its other end.

Fig. 2 is an enlarged sectional view of a stopple and needle hub and needle as applied to the tube end.

Fig. 3 is a perspective view of a needle and its novel mounting hub.

Fig. 4 is a sectional view of a needle equipped with a hub of an alternative form of construction as applied to the stopple and tube end.

Fig. 5 is a sectional detail showing another novel needle hub and stopple combination as applied to a tube end.

Fig. 6 is an enlarged sectional view of the end portion of a tube and its closing stopple, and showing another form of needle mounting hub as designed for application over the tube end and stopple.

Fig. 7 is a perspective view of the stopple closed end of a tube, and a needle as equipped with a mounting hub designed for receiving the tube end therein as has been shown in Fig. 6.

Fig. 8 is a sectional view of a needle with a novel mounting hub applied to the sealed or permanently closed end of the tube.

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Fig. 9 is a sectional view showing still another form of needle mounting and its application to the stopple and end of the tube.

The present day blood donor set comprises a length of flexible tubing, usually of plastic, equipped at its opposite ends with tubular, single pointed needles. One of these needles is designed for piercing the stopple of the bottle which contains or is to receive the blood and the other needle is designed to be applied to a vein of the donor or recipient. After use of the donor set, it is now common practice to discard it in its entirety. The tube and its stopples are not items of much expense but the needles and their hubs are relatively expensive. Therefore, it is economically practical to save or recover them for reuse when possible. The present invention makes this saving or recovery of needles possible through the combination of novel parts as herein disclosed.

Referring more in detail to the drawings:

In Fig. 1, a length of flexible plastic tubing, as used in a blood donor set, is designated by numeral 10, and when ready for use it is equipped at its opposite ends with needles, herein designated in their entireties by numerals 11 and 11'; the latter being shown removed from the tube end. Prior to use of the set, the needles are enclosed in sterile protective shields, not herein shown, that are removed just prior to use.

At its ends, the tube is closed by soft rubber stopples, 12, fitted therein, and as best seen in Fig. 2, substantially inset from the ends of the tube. Each stopple is somewhat greater in diameter, at a location medially of its ends than the internal diameter of the tube 10, and is slightly tapered toward its opposite ends. Along the axial line of the stopple, leading from its inner end outwardly, is a socket 13 that terminates close to the outer end surface of the stopple providing a relatively thin wall as at 14.

The needle cannula 15, is pointed at both ends, as at 16 and 16' and has a hub 17 fixed thereabout intermediate the ends. The hub has a tubular inner end portion 17' adapted to be fitted within that portion of the tube 10 that extends beyond the stopple 12; this portion of the hub being somewhat enlarged intermediate its end and tapered toward its open end for easy application but to cause stretching of the tube and a tight fit when it is pushed into place.

Encircling the hub is an annular and outwardly extending flange 18. The needle cannula 15 is sealed through and fixed in the base of the hub. The opposite end portions of the needle extend substantially from the hub for piercing the stopple and for application to a donor or recipient, or through the bottle stopple.

To apply this needle to the tube end, the pointed inner end 16 of the cannula is projected centrally through the thin outer end wall 14 of the stopple 12 and the tubular portion 17' of the hub is projected into the tube end until it seats against the stopple end surface. The parts then will be in the relationship in which they are shown in Fig. 2. The flange 18 of the hub affords a good finger and thumb gripping element for applying the needle to the tube and also for the projecting of the outer end of the needle through the stopple of the blood containing or receiving bottle.

In Fig. 4, I have shown an alternative form of hub for the needle. This hub, 20, is solid, and is formed intermediate its ends with a shallow encircling channel 21 or depression, and between this depression and its inner end, the hub is somewhat swelled to a greater diameter than the tube 10, and is then tapered for easy entrance to the open end of tube. When projected into the tube end, the latter is stretched over the enlargement and caused to draw down tight in the channel 21 to insure security. The outer end portion 22 of the hub

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is of greater diameter than the tube 10 and provides a gripping surface for the easy application or removal of the needle.

In Fig. 5, I have illustrated still another modification of the device of Fig. 3. In this, the needle cannula 15 is equipped between its ends with a hub in the form of a round disk 25, rigidly attached thereto; the needle passing centrally through the disk which, at the inside thereof and encircling the needle, has an inwardly extended neck 26 terminating in a somewhat enlarged knob 26', leading along the needle and merging therewith. This inner end portion of the neck is designed to be forced through the end wall of the stopple 12b following the passage of the needle therethrough so that when properly applied, the parts will assume the relationship shown in Fig. 5 and the needle thereby securely held and the tube end sealed.

In Fig. 6, I have illustrated a needle as equipped with a hub that receives the end portion of the tube within it as distinguished from the showing in Figs. 2 and 4.

In this combination of parts, the tube 10 has the stopple 12c applied flush within its end portion. The stopple is of such diameter as to cause a slight stretching of the tube end when the stopple is applied thereto. Also, the stopple has a shallow encircling valley into which the tube is drawn for a secure hold. The cannula 15 is equipped with a cup-like hub 25a that receives the end of the stopple closed tube 10 tightly therein, and the cup is shaped to seat in the valley of the stopple. Also, the entrance to the cup is somewhat flared for easy application but constricted within the flared end.

Fig. 8 shows a tube 10a that is permanently closed at its end; terminating in a ball-shaped portion 30. The needle cannula 15 is equipped with a cup-shaped hub 31. To apply this needle, the inner end point thereof, is projected through the portion 30, and the latter then seated in the cup-like portion of the hub as shown.

In Fig. 9, is shown still another modification of needle mounting. The cannula is here equipped medially of its ends with two small ball shaped hubs 35-35. The tube 10 has a stopple 12d seated therein and inwardly spaced from the tube end. The needle is applied in the same manner as explained in connection with Fig. 2, and one of the ball shaped members is caused to be pressed into the tube end as shown.

The donor set, comprising tube 10, as equipped with stopples, needles and hubs of any of the various forms shown, is easy to use and after use provides for easy removal of needles for saving, while the tube and stopples are discarded. The needles can be re-autoclaved or sterilized and reused with safety.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is:

1. A donor set comprising a length of flexible tubing, a needle pierceable stopple on each end thereof, a pair

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of double ended needles, said needles respectively having end portions projected axially through the said stopples and extending within opposite ends of the tubing, means fixed to each of the needles medially of their respective ends as a finger grip for manipulation thereof in application or removal of the needles from the tubing and stopples, said means fixed to the needles having a portion thereof in holding engagement with the tubing to additionally seal the tubing and resist accidental withdrawal of the needles from their respective stopples.

2. A donor set comprising a length of flexible tubing, a needle pierceable stopple in each end of the tubing positioned inwardly from the extreme end thereof, a pair of double ended needles, said needles respectively having end portions projecting axially through said stopples and extending within the tubing, hub means fixed to each needle medially of their respective ends, said means having an inner end portion removably fitted within the extreme outer end of the tubing that extends beyond the stopple, a finger gripping member on the exposed portion of said hub means for the application of the needle and hub means to the tube and stopple.

3. A donor set comprising a length of flexible tubing, a needle pierceable stopple in each end of the tubing positioned inwardly from the extreme end thereof, a pair of double ended needles, said needles respectively having end portions projecting axially through said stopples and extending within the tubing, hub means fixed to each needle medially of their respective ends, said means having an inner end portion removably fitted within the extreme outer end of the tubing that extends beyond the stopple, a finger gripping member on the exposed portion of said hub means for the application of the needle and hub means to the tube and stopple, said inner end portion of the hub means being cylindrical and slightly swelled in diameter between its ends to stretch the tubing and resist accidental removal therefrom.

4. In a donor set comprising a length of flexible tubing, a needle pierceable stopple fitted in an end thereof inwardly from the tube end and a double pointed needle projected into the tube coaxially through the stopple; said needle having two bead-like bodies fixed thereon intermediate its ends, of slightly greater diameter than the inside diameter of the tubing, one of which is pressed into the tube end as a securing element for the needle and the other being exposed at the end of the tube as a finger grip.

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