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PARENTERAL SOLUTION EQUIPMENT

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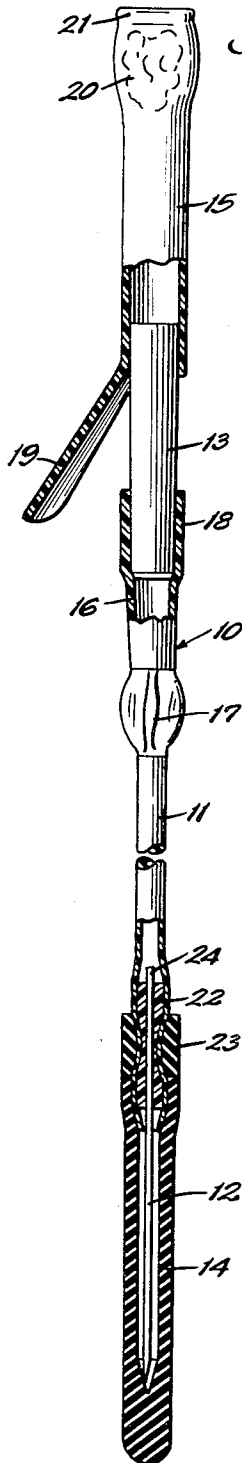


*Fig. 1*

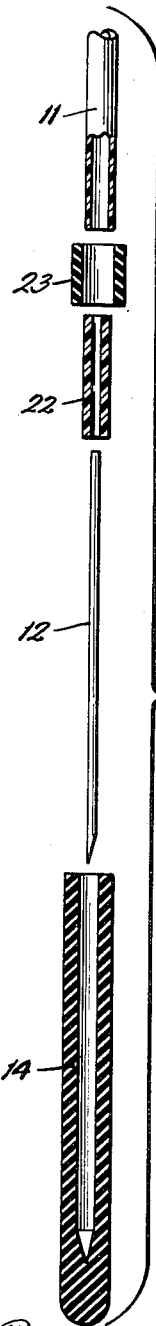


*Fig. 2*

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## PARENTERAL SOLUTION EQUIPMENT

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3 Claims. (Cl. 128—214)

This invention relates to parenteral solution equipment and a method of preparation, and, more particularly, to an administration set for parenteral solutions especially suited for pediatric usage.

This application is a continuation-in-part of our copending application, Serial No. 427,455, filed May 4, 1954.

Conventionally, a parenteral solution administration set includes a length of tubing adapted to be connected at one end to a source of parenteral solution and at the other end with a hypodermic needle inserted into the body of a patient. The set portion of the above-described combination is considered expendable, i.e., disposable after a single use, while the needle is not. To a certain extent, the decision to reuse needles is based on their cost. A factor in the cost of needles is the provision of a rather elaborate shank or hub, usually of metal integral with the needle, which is employed to facilitate attachment of the needle to the administration set. As a consequence of this situation, many parenteral administrations were made with dull needles.

Further, the separate handling of needles and their attachment at the time of an administration is time-consuming. Such loss of time could be critical, as, for example, when the administration is to be performed on a battlefield.

The provision of a shank on a hypodermic needle for the purpose of attachment to a set is distinctly disadvantageous when the needle forms a part of a pediatric scalp vein administration set. Where parenteral therapy is to be administered to an infant, it is desirable to introduce the hypodermic needle into the scalp vein and, as much as possible, in a position only slightly tilted with respect to the infant's head, i.e., almost parallel to the scalp. In such a case, the hub or shank of the needle interferes with the desired needle positioning.

It is an object of this invention to provide parenteral solution equipment and a method of preparing the same which overcomes the disadvantages and problems outlined above. Another object is to provide a new parenteral administration set and a method of preparing the same. Still another object is to provide a parenteral administration set in which a needle is united with the tubing portion of the set. Yet another object is to provide a parenteral administration set in which the needle is positioned within a length of flexible tubing. Other objects and advantages of this invention can be seen as this specification proceeds.

This invention will be explained, in an illustrative embodiment, in conjunction with the accompanying drawing, in which—

Fig. 1 is an elevational view, partly in section, of a pediatric scalp vein set embodying teachings of this invention; and Fig. 2 is a fragmentary exploded view of the set shown in Fig. 1.

In the illustration given, the numeral 10 designates generally a parenteral administration set of the type employed to administer parenteral fluids into the scalp vein of an infant. Set 10 includes a length of flexible tubing

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11 provided at one end with a hypodermic needle 12 and at the other end with an adapter 13. Protector means in the form of a sleeve 14 are provided over needle 12, and the interior of the set is protected against contamination from the adapter end by means of a second sleeve or stocking 15. The elements shown making up set 10 are provided in sterile, packaged form, and are ready for immediate use in a hospital, doctor's office, or the like.

To employ set 10, it is merely necessary to communicate a source of parenteral fluid with adapter 13. Adapter 13 is known as a female Luer adapter or fitting, which is characterized by having an inward taper. Thus, for example, where it is desired to administer only a small quantity of fluid to an infant, it is possible to insert the spout of a hypodermic syringe into adapter 13, the spouts of hypodermic syringes being provided with a male or meeting taper corresponding to the female taper of adapter 13. Alternatively, it is possible to employ set 10 in combination with a conventional administration set which includes a length of flexible tubing equipped at one end with a male adapter and at the other end with a plug-in connector adapted to be inserted into a bulk parenteral solution container. Bulk solution containers usually contain from about 250 to about 1000 ml. of a parenteral fluid such as glucose, saline, blood, etc.

When set 10 has been communicated with a source of parenteral fluid and the set filled with liquid to expel any air, needle 12 is inserted at the administration site and thereafter the administration commenced.

It is to be appreciated, therefore, that fittings other than female adapter 13 can be provided at one end of tubing 11. For example, where it is contemplated that a substantial quantity of parenteral solution will be administered through set 10, the set can be equipped with a connector adapted to penetrate the resilient stopper of a bulk parenteral solution container. Where, however, the set is intended to be used either with a hypodermic syringe or a separate conventional administration set, adapter 13 can be conveniently attached to tubing 11 by means of an intermediate sleeve 16. Sleeve 16 is fused at one end thereof to tubing 11 by spaced heat-seals 17. Sleeve 16, being of a thermoplastic material, possesses sufficient resiliency to permit the gripping thereby of adapter 13 in an air-tight fashion as at 18. A sleeve of similar material to sleeve 16 is employed for protector 15, which closes one end of the set against contamination. Protector 15 is provided with a finger-tab 19 permitting removal of protector 15 by "peeling back" the sleeve making up protector 15. Mounted in the unattached end of protector 15 is a plug of cotton 20 and the end of protector 15 adjacent plug 20 is heat-sealed as at 21.

The arrangement of elements at the needle end of set 10 can be readily appreciated from a consideration of Fig. 2, wherein the elements are shown in exploded form. Referring now to Fig. 2, it is seen that needle 12 is provided with a sleeve 22. Sleeve 22, prior to sterilization, is provided of a size so that it loosely fits over needle 12. Overlying sleeve 22 is tubing 11, and overlying tubing 11 about sleeve 22 is a second sleeve or collar 23. Collar 23 is provided of a resilient material such as rubber, and has an inner diameter such that it tightly grips tubing 11 and collar 22 both before and after heat sterilization.

Collar 22 is constructed of a thermoplastic material that is substantially rigid at room temperature but which is heated-deformable in the range of commercial sterilization temperatures (i.e., 230–250° F.).

During sterilization of set 10, collar 22, under the radially compressive pressure of collar 23, is squeezed into a tight and locking relationship with needle 12. It is to be noted that collar 23 need not be greater or even coextensive in length with collar 22, but needs be only of

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the length corresponding to the length of the area of securement desired.

It is believed that this invention can be further appreciated from a consideration of the following example wherein specific details of construction and preparation of a specific set are set down.

#### Example

In the preparation of a set 10 suitable for introducing parenteral fluid into the scalp vein of an infant, a 12-inch length of flexible tubing 11 is provided. In this example, tubing 11 is constructed of polyvinyl chloride and has a bore or inner diameter of .066 inch and a wall thickness of .018 inch. Sleeve 17 is also constructed of polyvinyl chloride, having a length of  $\frac{15}{16}$  inch, a bore of .160 inch, and a wall diameter of .025 inch. Tubing 11 and sleeve 16 are united as by heat-sealing, after which sleeve 16 is provided with nylon adapter 13. Protector 15 is a  $2\frac{1}{2}$  inch length of polyvinyl chloride having a bore of 0.190 inch and a wall diameter of .020 inch. Mounted in the end of protector 15 opposite that equipped with finger pull-tab 19 is cotton plug 20. Inserted into the end of tubing 11 opposite the end equipped with adapter 13 is a  $\frac{9}{16}$  inch length of cellulose acetate butyrate tubing having an inside diameter of .035 inch and an outside diameter of .066 inch. Inserted into the butyrate tubing which is identified in the drawing as collar 22, is a  $1\frac{1}{16}$  inch long 23-gauge stainless steel short beveled cannula constituting hypodermic needle 12. Needle 12 is inserted sufficiently far through collar 22 so that the end of collar 22 is positioned a spaced distance from the unsharpened end of needle 12, as can be seen in Fig. 1 and identified by the numeral 24. Positioned about tubing 11 and collar 22 is collar 23 which, in this example, is a  $\frac{1}{4}$  inch length of rubber tubing having a  $\frac{1}{16}$  inch bore and a  $\frac{1}{32}$  inch wall thickness. Positioned over the sharpened end of needle 12 is protector 14, which is also constructed of rubber and is of a length corresponding to that necessary to fully enclose needle 12 and at the open end of the protector overlap collar 22. The assembly thus made is subjected to

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steam sterilization, after which the set is cooled and the open end of protector 15 heat-sealed.

Optimum results are obtained where needle 12 is inserted through collar 22 a sufficient distance to provide the overlap indicated at 24. Should needle 12 have its unsharpened end positioned within the length of collar 22, it is possible that under sterilization conditions collar 22 will flow so as to close the unsharpened end of needle 12.

While, in the foregoing specification, we have set forth a specific structure in considerable detail for the purpose of illustrating the invention, it will be understood that such details of structure may be varied widely by those skilled in the art without departing from the spirit of this invention.

15 We claim:

1. In heat sterilized parenteral solution equipment, a hypodermic needle, a length of flexible tubing, a rigid thermoplastic sleeve within said tubing and about said needle, said sleeve being radially inwardly deformed to grip said needle and being heat-deformable in the range of commercial sterilization temperatures, and resilient band means about said tubing and the deformed portion of said sleeve.

2. The structure of claim 1 in which said sleeve is positioned on said needle intermediate the ends thereof.

3. The structure of claim 1 in which a female adapter is coupled to the end of said tube remote from said needle, and protector means closing the end of said adapter and the exposed portion of said needle.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |                    |                |
|-----------|--------------------|----------------|
| 2,257,355 | Vohrer .....       | Sept. 30, 1941 |
| 2,322,701 | Nesset et al. .... | June 22, 1943  |
| 2,329,796 | Stoffer .....      | Sept. 21, 1943 |
| 2,689,563 | Huber .....        | Sept. 21, 1954 |
| 2,704,074 | Butler .....       | Mar. 15, 1955  |
| 2,712,822 | Gewecke .....      | July 12, 1955  |
| 2,794,435 | Stevens .....      | June 4, 1957   |