Dec. 8, 1953 G. M. HICKEY 2,661,740

DISPOSABLE SYRINGE

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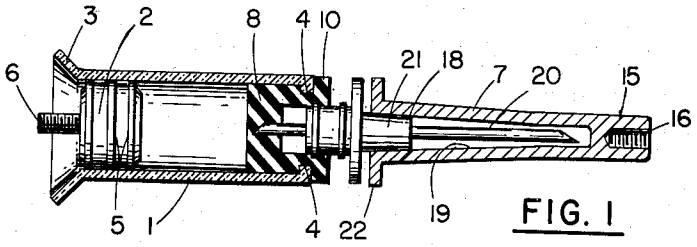


FIG. 1

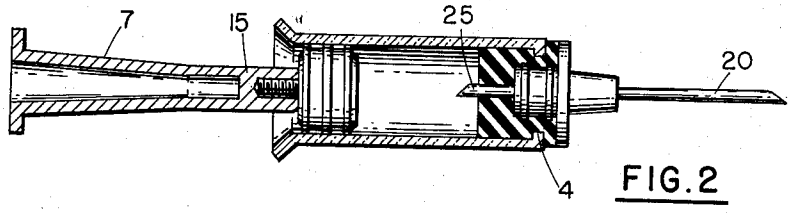


FIG. 2

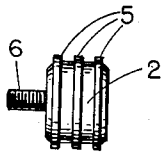


FIG. 3

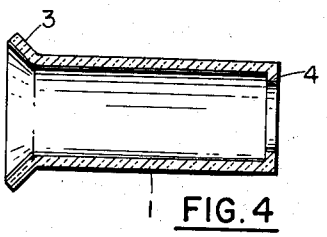


FIG. 4

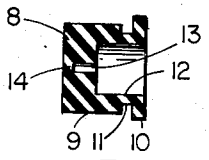


FIG. 5

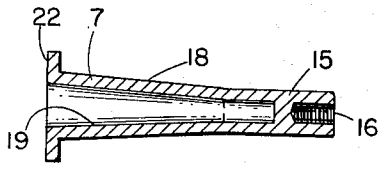


FIG. 6

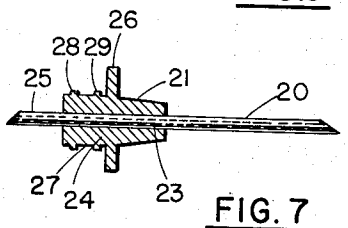


FIG. 7

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DISPOSABLE SYRINGE

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2 Claims. (Cl. 128—218)

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This invention relates to a so-called disposable hypodermic syringe and is concerned with the provision of a simple construction which permits a degree of tolerance in the size of certain of the parts thereby simplifying and reducing the cost of manufacture. A further primary object of the invention is to provide a syringe construction which positively positions the needle hub in each of the two positions which it occupies when in storage and in use and further provides means whereby the two positions may be determined by the sense of touch.

The invention will be more fully described with reference to the accompanying drawings which show one illustrative embodiment of the invention.

Referring to the drawings:

Fig. 1 is an axial section, partly in elevation of the assembled parts of the syringe in their inactive positions;

Fig. 2 is a similar axial section, partly in elevation, of the assembled parts of the syringe in the positions which they occupy when the syringe is ready to be used for making an injection;

Fig. 3 is an elevation of the piston which serves to eject the contents of the syringe;

Fig. 4 is an axial section of the syringe barrel;

Fig. 5 is an axial section of the perforatable plug or stopper;

Fig. 6 is an axial section of the piston rod or handle (see Fig. 2) which serves also (see Fig. 1) as a protecting cap for the needle; and

Fig. 7 is an axial section of the needle and its hub.

The barrel 1 is made of glass or other suitable material and is cylindrical to permit the sliding movement of the piston 2 excepting that the left hand end is flared to provide the divergent flange 3 which serves to facilitate introduction of the piston 2 and as a finger grip and the right hand end is provided with the inturned flange or shoulder 4, the purpose and utility of which will be more fully described hereinafter.

The piston 2 is of well known construction, preferably having a rigid core (not shown) covered by a rubber sleeve having several flexible ridges 5 which give fluid tight contact with the inner surface of the barrel 1. The piston 2 comprises the screw threaded stud 6 which may be integral with the core referred to above and serves for the attachment of the piston rod or handle 7.

The plug 8 is made of rubber or similar flexible and compressible, inert and impervious material. Plug 8 comprises the cylindrical body portion 9 and the slightly larger flange 10 separated by the external groove 11 and is provided with the large

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cylindrical bore or cavity 12 and the smaller bore 13 which extends from the bottom of the bore 12 nearly through the plug leaving only the thin layer 14 to be punctured by the needle. The handle 7 comprises the cylindrical end 15 provided with the screw threaded bore 16 adapted to engage the stud 6 of the piston 2, the slightly flared or conical end 18 having the tapered smooth bore 19 adapted to receive the injection end 20 of the needle and to engage the frusto-conical end portion 21 of the needle hub, and the flange 22 which provides a finger grip. The needle assembly consists of the cannula 23 and the hub 24. The cannula consists of the injection end 20 referred to above, the puncturing end 25, and of course the intermediate portion which is surrounded by the hub 24. The hub 24 consists of the frusto-conical end 21 referred to above, the flange 26 which provides a finger grip and the cylindrical portion 27 provided with the two spaced apart parallel ridges 28 and 29.

The syringe is assembled and operated as follows. The plug 8 is inserted in its end of the barrel 1. It will be noted that the plug 8 is firmly anchored to the barrel by the cooperation of the flange 4 and the groove 11. This is important because otherwise the plug might be forced inwardly into the barrel when the needle assembly is inserted. The needle assembly is then inserted into the bore 12 until the ridge 28 meets the resistance of the relatively thin layer of rubber opposite the flange 4. This positions the puncturing end 25 of the cannula with respect to the layer 14. The barrel is then filled with the liquid to be injected and the piston 2 inserted with the aid of the handle 7. The handle is then removed from the piston 2 and applied as a cap over the injection end 20 of the needle as appears in Fig. 1. When the syringe is to be used the puncturing end 25 of the needle is forced through the plug 8 and the ridge 28 is forced past the flange 4 and the flange 26 is seated on the plug 8 by pushing on the handle 7 and its flange 22. The handle is then removed from the injection end 20 of the needle and screwed on to the stud 6 of the piston 2 as shown in Fig. 2. At this point the syringe is ready for an injection.

It will be noted that the syringe construction has only two screw threaded parts, i. e. the bore 16 in the handle 7 and the stud 6 of the piston 2. These parts suitably are made of metal or plastic and do not involve any difficulties in their manufacture. The cannula is of course made of metal and its hub is formed of metal or plastic and may be made to accurate size without difficulty. The body 1 with its flanges 3 and 4 preferably is made

of glass and here some tolerance as to size is desirable. This tolerance is provided by the rubber ridged piston 2 and the rubber plug 8. The hub 24 of the needle may be inserted into the bore 12 of the plug 8 regardless of considerable variation in the size of the bore 12 and of the flange 4 and nevertheless, when readied for an injection by forcing the ridge 28 past the flange 4, is securely held. Screw threading of the socket 12 in the plug 8 and of the needle hub 24 is thus avoided and no twisting operation is required for puncturing the plug.

The insertion of the needle assembly to its inactive position shown in Fig. 1 and its movement to active position shown in Fig. 2 both may be determined by the sense of touch. The resistance to further movement which occurs when the ridge 28 approaches the flange 4 serves to advise the operator that the needle assembly has reached the limit of its inactive position and the sudden variation in resistance to movement as the ridge 28 passes the flange 4 serves to advise the operator that the needle assembly has arrived at its operating position.

I claim:

1. A hypodermic syringe comprising a rigid cylindrical barrel having an inturned flange at one end thereof, a piston slidable in said barrel, said piston having a screw threaded stud projecting from one end thereof, a flexible cylindrical plug having an external groove, said plug being secured in one end of said barrel by the co-action of said inturned flange and said groove; said plug having also a cylindrical bore, a needle assembly comprising a cannula having an injection end, a perforating end and a hub therebetween, said hub comprising a tapered portion adjacent the injection end and a cylindrical portion adjacent the perforating end of said cannula and a flange therebetween, said cylindrical portion of the needle hub being of substantially the same size as said cylindrical bore in said plug and having at least one circular ridge thereon adapted to engage the wall of said bore, and a handle member having a bore in one end adapted to enclose the injection end of said cannula and to engage the frusto-conical portion of said hub and a threaded bore in the other end adapted to engage the threaded stud on said piston.

2. A hypodermic syringe comprising a hollow cylindrical body, a flexible plug and a needle assembly, said body having an integral inturned flange at one end thereof, said plug having a cylindrical portion adapted to fit the cylindrical inner surface of said body, a flange adapted to engage the end of said body, a circumferential groove adapted to fit said inturned flange and a cylindrical axial bore extending inwardly from the flange end thereof, said needle assembly comprising a cannula and a hub secured intermediate the ends thereof, said cannula having an injection end and a perforating end, said hub having a cylindrical portion adapted to fit said bore and spaced apart parallel ridges adapted to deform the wall of said bore, said ridges being of such external diameter with respect to the internal diameter of said inturned flange that extra force is required when inserting the cylindrical portion of said hub into said bore to push one of said ridges past said flange.

GEORGE M. HICKEY.

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