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C. SZMUKLER ET AL
MEDICAL PUNCTURING NEEDLE

2,864,365

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FIG. 1

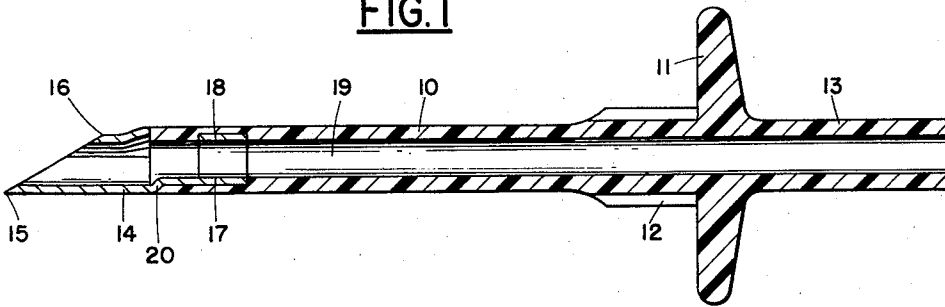


FIG. 3

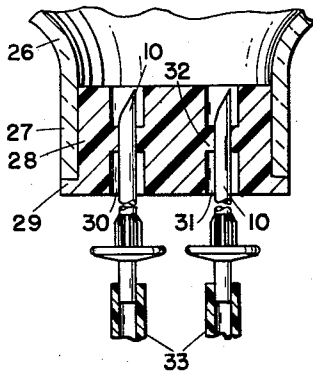


FIG. 2

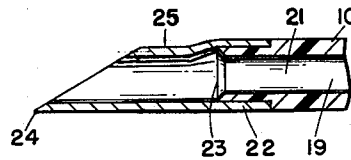


FIG. 4

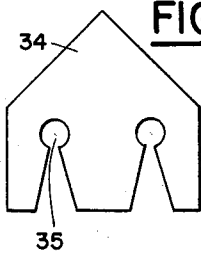


FIG. 5

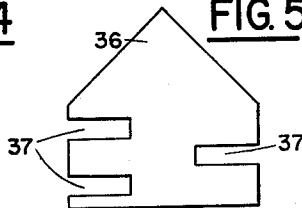


FIG. 6

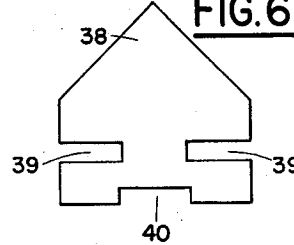


FIG. 7

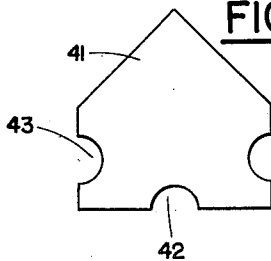
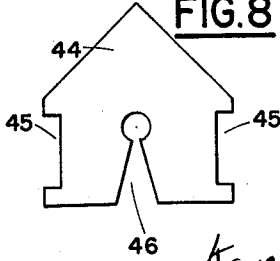


FIG. 8



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2,864,365

MEDICAL PUNCTURING NEEDLE

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Application March 8, 1957, Serial No. 644,781

5 Claims. (Cl. 128—221)

This invention relates to a structurally and functionally improved puncturing needle particularly intended for the perforating of seals associated with bottles and other receptacles containing blood serum and similar solutions to be introduced into the human body.

Needles of this type are conventionally employed to extend through the seal of the receptacle to permit of the withdrawal of liquid from the interior of the latter and also to allow the introduction of air into the same as liquid is withdrawn.

It is a primary object of the invention to furnish a puncturing needle which will be delivered to the user with its surfaces completely sterile to avoid any probability of contamination. Preferably the needle will be used only a single time and thereafter discarded; the cost of production of the unit being so low, that such procedure is entirely permissible and economical.

A further object is that of furnishing a puncturing needle which may readily penetrate a seal, such as a rubber closure, associated with a receptacle or bottle without danger of plug-cutting and with assurance that the tip portion of the needle will remain in permanent association with the main cannula body through the piercing and withdrawing operation.

A still further object is that of furnishing a unit of this character which may be economically produced and the parts of which may be readily sterilized without damage resulting to the assembly.

With these and other objects in mind reference is had to the attached sheet of drawings illustrating practical embodiments of the invention, and in which:

Fig. 1 is a sectional side view of a needle assembly embodying the present teachings;

Fig. 2 is a fragmentary view of the pointed end of a needle embodying an alternative construction to that illustrated in Fig. 1;

Fig. 3 is a sectional fragmentary view showing needles of the type in question applied to the seal or closure of a receptacle; and

Figs. 4 to 8 inclusive illustrate tip portions of various designs which may form a part of the needle assembly.

Referring primarily to Fig. 1, the numeral 10 indicates the body of the cannula. This body is formed of a suitable plastic material by, for example, molding. That material may be polyamide, super-polyamide (known as nylon) or other proper substance capable of being sterilized in an autoclave at 120° C. without deformation or other damage. Preferably integral with body 10 and adjacent the rear end of the same is an outstanding flange portion 11. The latter enables the user to grip the assembly either for the purpose of projecting or retracting it. Body 10 adjacent the flange 11 is conveniently provided with an annular series of ribs 12 which extend forwardly of the actuating portion. These ribs may receive the base end of a sheath or cap (not shown) which houses the forward end of the needle and maintains the latter in sterile condition. To the rear of the flange 11, the cannula is continued in a tubular part

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13. The latter serves as a mounting for the end of a flexible tube or other unit through which air or liquid is received or discharged.

The forward end of the needle is formed of a metal section. This will include a body 14 conveniently embracing sheet metal and rolled upon itself to furnish a tubular part. The outer end edge of this body may extend at a diagonal to the axis of the assembly to furnish cutting edges and terminate in an outer piercing point 15. Adjacent the base of this open end, a heel portion exists. This may be depressed inwardly as indicated at 16 to avoid plug cutting. A connecting part 17 is included as an integral element of body 14 and terminates in a rear tubular portion or sleeve 18.

The thickness of the metal employed to provide the tip is preferably such that the sleeve or rear part 18 will define a bore, the surface of which is flush with the face of lumen 19. At the same time, the outer surface of sleeve portion 18 will not, at this zone, extend through to the outer surface of the cannula 10. Connecting portion 17 will also preferably be co-extensive with the lumen of the cannula. Beyond the same, the tip body may be enlarged or project outwardly as at 20 to furnish the portions 14, 15 and 16. The outer surfaces of these will preferably be in line with the outer face of the cannula. It is apparent that the plastic material of the main body 10 will key into the various recessed portions of the tip short of the outer end of the same. In this manner, the tip will be maintained against movement with respect to other parts of the assembly as the assembly is manipulated by the actuating portion furnished by flange 11. This keying is preferably affected at the time of molding of the assembly. It is of course apparent that by furnishing recessed parts as shown in the plastic portions of the unit, the portions of the tip body might be keyed into these parts subsequent to the molding of the latter in order to establish and maintain the desired relationship.

In lieu of the construction shown in Fig. 1, cannula 10 as in Fig. 2 may have a shouldered or reduced forward portion 21. Conveniently this terminates in a flared edge 23. Encircling the reduced part 21 is the rear body portion 22 of a tip continued forwardly of body 10 to terminate in a piercing point 24. Similarly to the construction described in connection with Fig. 1, the heel portion of the tip body may be depressed inwardly as at 25 to avoid the danger of plug-cutting. Again, in this form of construction, it will be understood that the relatively recessed portions of the tip body receive material integral with the cannula 10 so that this material keys into these parts, thereby in effect rendering the tip integral with the remainder of the assembly.

The unit has been shown in association with the seal or stopper of a receptacle in Fig. 3. In that view, the numeral 26 indicates the body of a bottle ordinarily provided with a neck portion 27. The latter is closed by a stopper conveniently embracing a plug 28 which enters the neck and a head portion 29 which bears against the pouring lip of that neck. The stopper, in accordance with conventional practice, may have its outer face recessed as at 30 and 31. Its plug face is similarly recessed. The base portions of the aligned recesses are separated from each other so that diaphragm portions 32 intervene them. As illustrated, the rear parts of the needle body 10 may have connected to them tubes 33. The diameter of recess 30 may be greater than that of recess 31. In that case, the former will receive the needle through which liquid is dispensed from the interior of the receptacle. Recess 31 may receive a needle of smaller diameter which serves to vent air into the body of the plasma or blood receptacle.

In lieu of the tips shown in Figs. 1 and 2, diverse alternative types of tips may be utilized. These have been

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illustrated in Figs. 4 to 8 inclusive. In each instance and as shown, these tips—in common with the structures of Figs. 1 and 2—are formed of metal. While not shown in detail, the edges of the tips may be ground and sharpened to assure a ready piercing of a closure or other layer as the needle is thrust into contact with that layer and subjected to pressure. Obviously, that thrusting may readily be achieved by exerting pressure against the flange or actuating portion 11. Such portion will also serve to effect a ready withdrawal of the needle from the seal, closure, or other layer.

As in Fig. 4, the tip may include a body 34, capable of being rolled or shaped to furnish a tubular member and providing at its outer end a piercing point. Within the rear edge of that body, recesses 35 are formed and include generally keyhole configurations. It is apparent that the plastic material, either at the time of molding or otherwise, will extend into these recesses to lock the point against any movements with respect to the cannula.

As in Fig. 5, the point may involve a body 36, the side edges of which are formed with notches or recesses 37 for the same purpose. In Fig. 6, the body 38 is formed in its side edges with recesses 39, while in its base it includes a recess 40. With such a type tip, a construction extremely similar to if not identical with that illustrated in Fig. 1 is provided.

It is apparent that numerous other tip configurations might be employed. For example, as in Fig. 7, the tip could include a body 41 formed in its base with an arcuate recess 42 and in its side edges with similar recesses 43. Also, as in Fig. 8, the tip body 44 could conveniently be formed with rectangular recesses 45 in its side edges. For example, a keyhole type recess 46 might be formed in the base edge of this body. In all instances, it is preferred that the body include a width such that it may be rolled upon itself to furnish a tubular tip portion. That tip portion should include bore parts substantially co-extensive with the lumen 19 of the cannula and exterior face parts flush or co-extensive with the outer surface of the cannula.

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Thus among others, the several objects of the invention as specifically aforementioned are achieved. Obviously, numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

We claim:

1. A puncturing needle including in combination a cannula body, a metal tip comprising a piercing end portion and a base, said base providing recesses, the material of said body keying into said recesses to retain said tip fixed with respect to the cannula body and said tip being formed of sheet metal curved to define an arcuate portion co-extensive with said cannula.

2. In a puncturing needle as recited in claim 1, said arcuate portion being continued to provide a tube the bore of which aligns with the lumen of said cannula.

3. In a puncturing needle as recited in claim 1, the sheet metal body of said tip being defined by edge portions and openings formed in the base of said body adjacent such edges to provide the recesses into which the material of said cannula body keys.

4. A puncturing needle including in combination a cannula body, a metal tip comprising a piercing end portion and a base, said base providing recesses, the material of said body keying into said recesses to retain said tip fixed with respect to said body, said base being curved upon itself to provide a tubular part and the bore of said part being substantially flush with the lumen face of the cannula.

5. In a puncturing needle as specified in claim 4, and the outer and inner faces of the tip being substantially aligned with the outer and inner faces of the cannula.

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