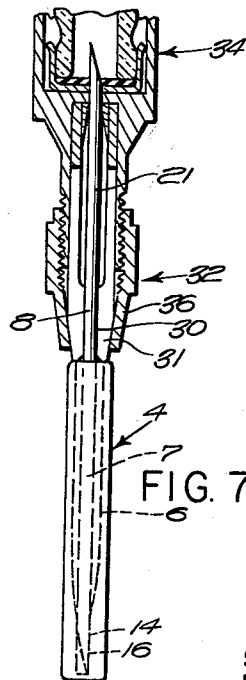
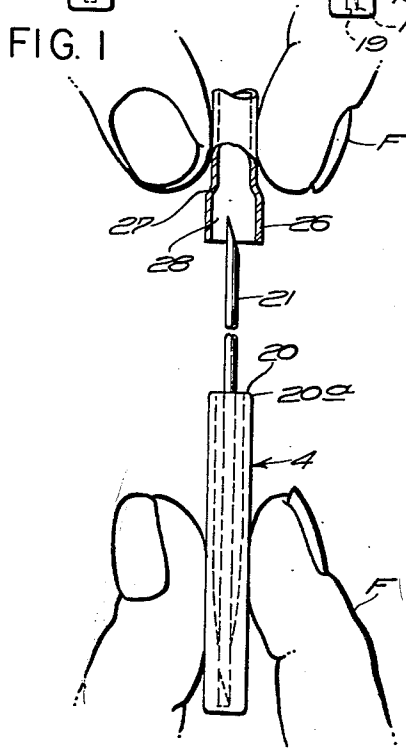
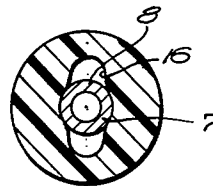
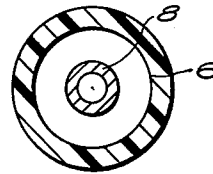
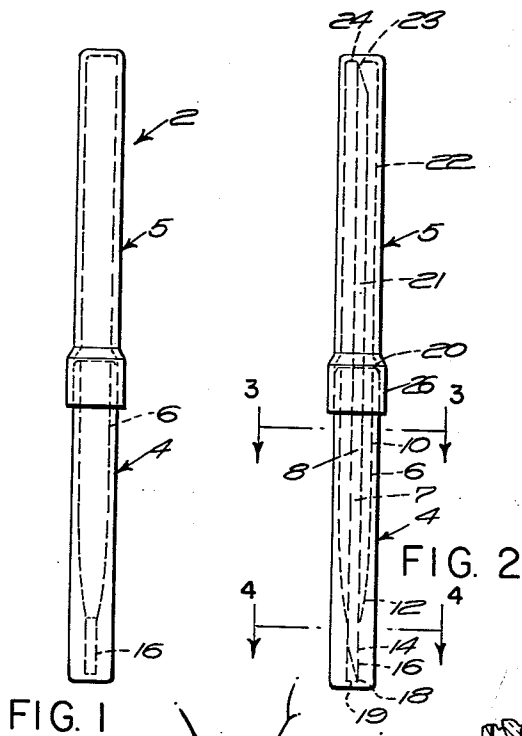


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PACKAGE FOR HYPODERMIC NEEDLES

3 Sheets-Sheet 1



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PACKAGE FOR HYPODERMIC NEEDLES

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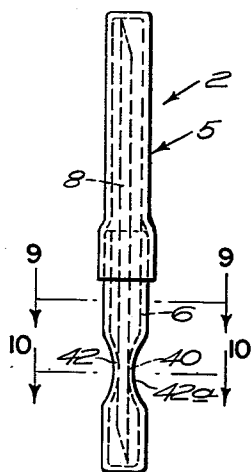


FIG. 8

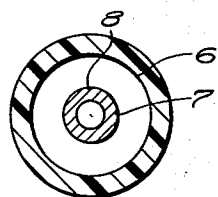


FIG. 9

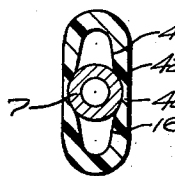


FIG. 10

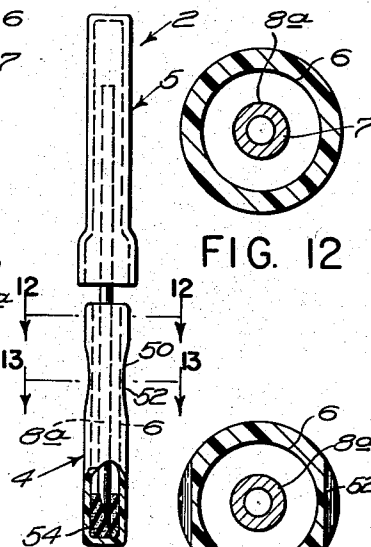


FIG. 11

FIG. 12

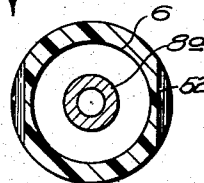


FIG. 13

FIG. 6

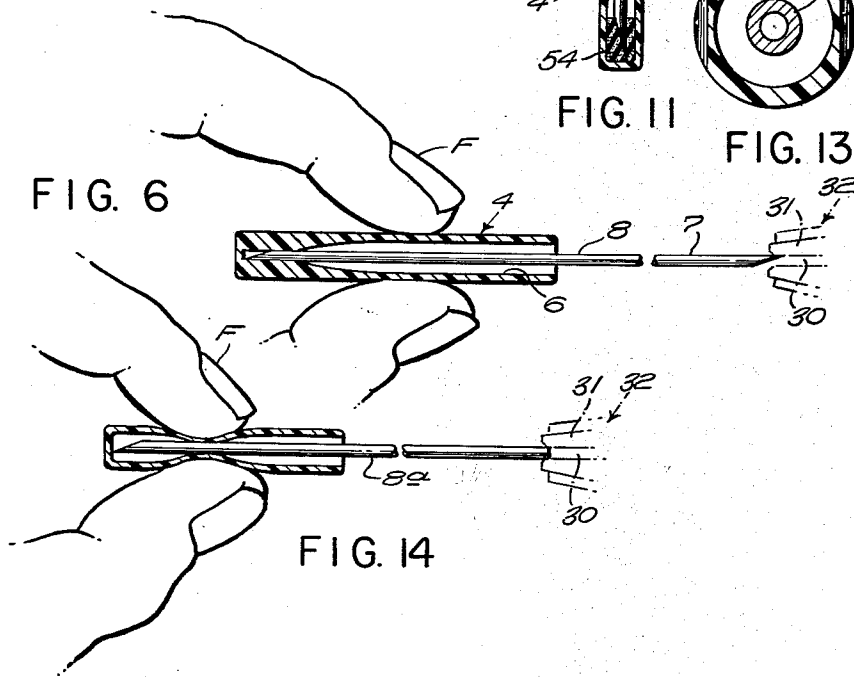


FIG. 14

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3 Sheets-Sheet 3

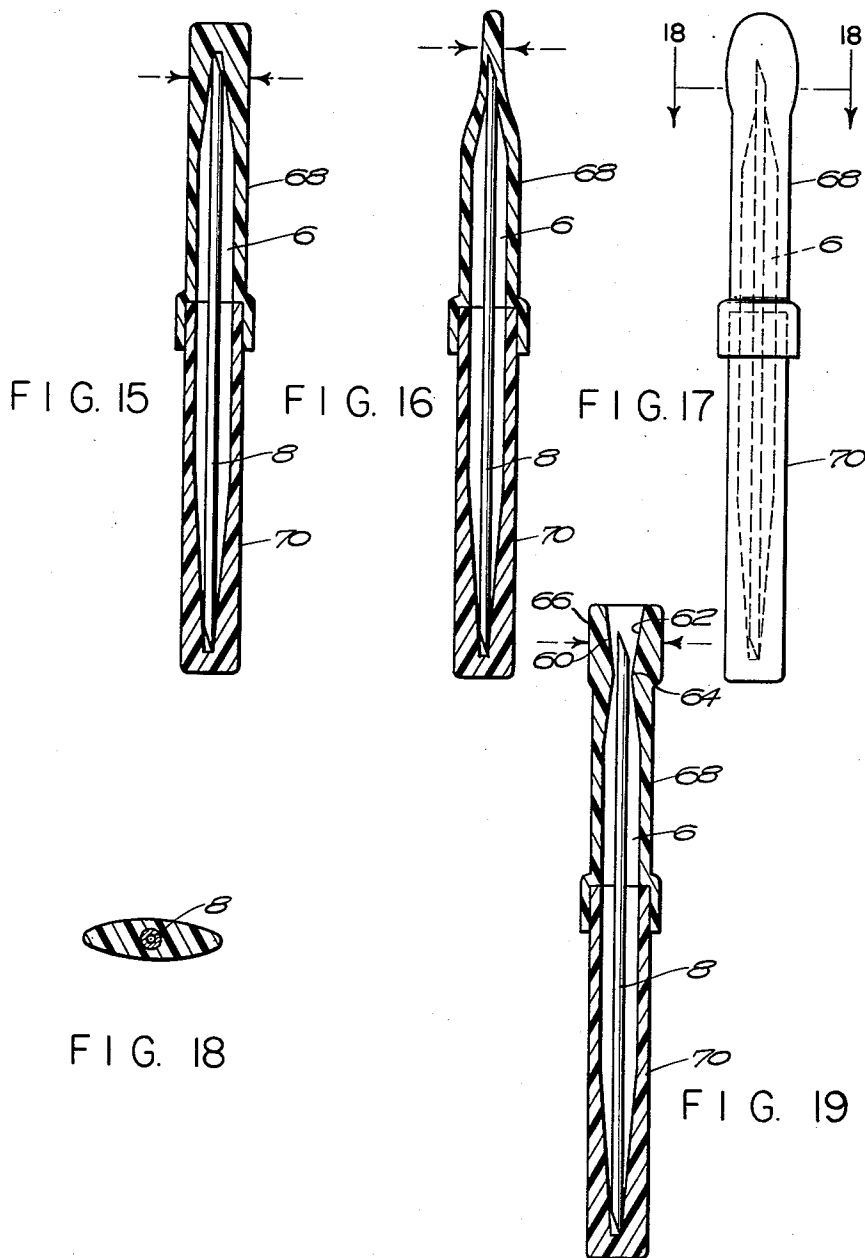


FIG. 18

FIG. 19

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## PACKAGE FOR HYPODERMIC NEEDLES

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Filed Jan. 6, 1960, Ser. No. 832

8 Claims. (Cl. 206—43)

The present invention relates to a novel package for a hypodermic needle and more particularly to a package for an inexpensive disposable, hubless hypodermic needle comprising a tube sharpened at one or both ends for use with a syringe of the type described in copending application Serial No. 784,822 filed January 2, 1959. This type of syringe has a chuck for releasably holding the needle and into which chuck the needle is adapted to be inserted and secured.

This application is a continuation-in-part of copending application Serial No. 798,403 filed March 10, 1959, now abandoned, which is a continuation-in-part of application Serial No. 784,822.

The term hubless needle is used hereinafter to refer to a needle comprising a tube sharpened at one or both ends and which does not have a fixture affixed thereto for the purpose of attaching the needle to the syringe.

It is an object of the present invention to provide such a package which is so simple and inexpensive to make that it adds very little to the cost of the disposable needle.

It is another object to provide such a package in which the needle is centralized by the construction of the package and which is simple and inexpensive to load.

It is another object to provide such a package which comprises a needle retainer having a bore for receiving the hubless needle with a portion which is to be inserted in the syringe protruding from the open end of the retainer and covered by a cap having a bore for receiving such protruding portion of the needle. The cap is preferably releasably secured to the retainer. The retainer is provided with means for releasably gripping the needle to hold it in the retainer with such portion protruding therefrom. Consequently, by grasping the retainer with the fingers the cap can be removed to expose the portion of the needle protruding from the retainer and such exposed and protruding portion can be inserted into the syringe and locked in place without touching the needle with the fingers and without danger of dropping the needle regardless of the position in which the retainer is held.

A preferred manner of gripping the needle is to provide the needle-receiving bore of the retainer with a portion of reduced diameter to firmly and releasably grip the needle as aforesaid. The material of the retainer forming the bore portion of the reduced diameter is resilient and yieldable and has the properties of yieldingly resisting deformation and of springing back to its original shape after a deforming force is released, as for example, polyethylene and other plastics falling within the class of plastics known as semi-rigid plastics. The reduced diameter is preferably slightly less than the diameter of the needle when the needle is removed so that when the needle is located within the portion of reduced diameter, the reduced diameter exerts a tension on the needle to grip it firmly along a sufficient portion of its length to prevent it from wobbling or drooping. The reduced diameter portion may be at any position along the length of the retainer. Preferably the entire retainer and the cap are made of the above mentioned material so they can be made by inexpensive injection molding if so desired. Since the material resists deformation and is semi-rigid the retainer is relatively rigid or semi-rigid in an axial or longi-

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tudinal direction to protect the needle from damage in handling.

With this embodiment the gripping or retaining portion of reduced diameter holds the needle firmly in a predetermined position at all times to prevent it from moving around in the package. It (the portion of reduced diameter) continues to grip the needle after it is inserted into and secured in the syringe and after the fingers are removed from the retainer, to thereby hold the retainer over the portion of the needle protruding from the syringe to protect such portion of the needle until the syringe is ready for use, whereupon the retainer can be easily pulled off the needle by a pull sufficient to overcome the gripping force exerted by the reduced diameter portion of the retainer.

Another form of gripping means for gripping the hubless needle as aforesaid comprises a finger gripping or pinching portion of flexible material which is spaced anywhere along the length of the retainer and which is adapted to be pinched between the fingers to thereby pinch the needle between the fingers without touching the needle with the fingers. The portion of the bore formed by such finger pinching portion may be larger than the needle or may be of reduced diameter to grip the needle even when such finger pinching portion is not pinched between the fingers. Preferably, the finger gripping portion comprises a thin yieldable portion of the wall of the retainer formed by reducing an outside diameter of the retainer to form two oppositely positioned, flat finger pinching areas. By making these portions flat and thin, they are more flexible and yieldable. Such a finger pinching portion can be used in addition to and spaced axially from a needle gripping bore portion of reduced internal diameter or if desired the portion of the retainer forming the gripping portion of reduced internal diameter can also be reduced in external diameter and in thickness to form a finger pinching portion as aforesaid.

Another object is to provide such a package which insures that the hubless needle will be moved to its correct axial position in the syringe when it is inserted therein and will not be inserted too far or not far enough. This is achieved by selecting the length of the portion of the needle protruding from the open end of the retainer so that such open end of the retainer will abut against the syringe when the needle is inserted to its correct position in the syringe to thereby prevent the needle from being inserted any further.

Another object is to provide such a package in which the needle can be sterilized after it is packaged, the package being adapted to be subjected to sterilizing conditions with the needle contained therein.

It has been found that polyethylene is an excellent package material.

Other objects and advantages of the invention may be apparent from the following description and the accompanying drawings in which:

FIG. 1 is a view in elevation of an embodiment of the package of the present invention.

FIG. 2 is a view like FIG. 1 with a hubless hypodermic needle for a cartridge type syringe contained in the package.

FIG. 3 is a view taken along the line 3—3 of FIG. 2.

FIG. 4 is a view taken along the line 4—4 of FIG. 2.

FIG. 5 is like FIG. 2 with the cap removed.

FIG. 6 is like FIG. 2 showing the needle being inserted into the syringe.

FIG. 7 is like FIG. 6 showing the needle inserted to its correct position in the syringe with the retainer still held on the needle.

FIG. 8 is a view like FIG. 2 of another embodiment of the invention.

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FIG. 9 is a view taken along the line 9—9 of FIG. 8.  
FIG. 10 is a view taken along the line 10—10 of FIG. 8.

FIG. 11 is a view like FIG. 2 of yet another embodiment of the package of the present invention containing a needle for a medical type syringe.

FIG. 12 is a view taken along the line 12—12 of FIG. 11.

FIG. 13 is a view taken along the line 13—13 of FIG. 11.

FIG. 14 is a view like FIG. 11 with the cap removed and with the finger pinching portion of the retainer of FIG. 11 being pinched between the fingers to grip the needle.

FIG. 15 is a section in elevation of another embodiment of the package of the present invention.

FIG. 16 is a view of the package of FIG. 15 after a portion thereof has been molded around a portion of the needle to releasably grip the needle.

FIG. 17 is a view taken along the line 17—17 of FIG. 16.

FIG. 18 is an enlarged section taken along the line 18—18 of FIG. 17.

FIG. 19 is a view of another embodiment of the package of the present invention at an intermediate, unsealed, needle-loading stage.

With reference to FIG. 1, 2 represents a package embodying the present invention and comprising a cylindrical shaped hollow retainer 4 made of a resilient and yieldable material having the properties of resiliently resisting deformation and of springing back to its original shape when a deforming force thereon is released, such as polyethylene, and a cylindrical shaped hollow cap 5 preferably of the same material.

Retainer 4 has a longitudinal central bore 6 for receiving the end portion 7 of a hypodermic needle 8 the sharpened end of which end portion is adapted to be inserted into the patient. The needle 8 shown in FIG. 2 is adapted to be used with a cartridge type syringe and hence is sharpened at both ends.

The main upper portion 10 of the bore 6 is preferably larger in diameter than the needle 8. The bore preferably tapers at 12 into a lower end portion 14 of reduced diameter. The opposite sides 16 of portion 14 are preferably flattened as shown in FIG. 4. The distance between the flattened sides 16 of the portion 14 is slightly less than the diameter of the needle when the needle is removed so that when the needle is located therebetween in the position shown in FIG. 2 the resilient, yieldable polyethylene walls forming such sides exert a tension on the needle to firmly grip the needle and hold it in the predetermined position shown in FIG. 2 with the sharpened end 18 of the needle slightly above the closed bottom 19 of the bore 6 and with a predetermined length 21 of the needle protruding beyond the open end 20 of the retainer 4, as shown, such protruding portion 21 being the end portion of the needle which is to be inserted into the syringe. This protruding portion 21 of the needle 8 is received within the bore 22 of the cap 5, as shown, with the other sharpened end 23 of the needle 8 contacting or slightly below the end wall 24 of the bore 22. The other open end of cap 5 may be provided with an enlarged lip 26 which receives the open end portion of the retainer 4 with the open end 20 abutting against the shoulder 27 formed by the enlargement 28 of the bore 22 and the remainder of the bore 22, as shown.

The lip 26 may be secured over the open end of the retainer 4 by friction fit on the open end portion of the retainer. The rim of the open end of the cap may be spot sealed to the retainer so that the seal may be ruptured by a twisting motion when the cap is to be removed from the retainer. The outer edge of the open end 20 of the retainer is preferably bevelled as at 20a.

The reduced diameter gripping portion 14 of the retainer firmly grips the needle to safely hold and retain

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it in the retainer 4 in the predetermined position shown and with the predetermined length 21 thereof protruding from the open end thereof regardless of the attitude or position of the retainer and with the cap 5 in place, as shown in FIG. 2, or removed, as shown in FIG. 5, so that the needle will not drop out or be jarred out even when the retainer is held open end down. Consequently, the needle cannot move around within the package and by grasping the retainer 4 between the fingers F of one hand and the cap 5 between the fingers F of the other hand, as shown in FIG. 5, the cap can be removed from the retainer to expose the protruding portion 21 of the needle, as shown, without touching the needle or causing it to be moved from its predetermined position. Furthermore, with the retainer 4 still grasped between the fingers, the exposed protruding portion 21 of the needle 8 can be inserted into the needle receiving passage 30 between the jaws 31 of the chuck 32 of the medical type syringe 34 until the open end 20 abuts against a portion of the chuck, as shown in FIGS. 6 and 7, and locked in the chuck by tightening the screw cap 36 of the chuck without touching the needle. The chuck and syringe construction above referred to are described in detail in co-pending U.S. application Serial No. 784,822.

After the needle has been secured in the syringe, the retainer 4 is held on the needle in the position shown in FIG. 7 by the portion 14 of reduced diameter even after the fingers F are removed from the retainer and regardless of the position of the syringe, to thereby protect the portion 7 of the needle protruding beyond the syringe until the needle is ready for use, whereupon it can be pulled off the needle to expose portion 7 by a gentle pull, which is all that is necessary to overcome the gripping force exerted on the needle by the reduced diameter portion 14 of the bore 6.

The needle 8 is gripped by the reduced diameter portion 14 of the bore along a sufficient portion of the length thereof to firmly hold the needle in the position shown in FIGS. 2 and 5 with its longitudinal axis parallel to the longitudinal axis of the retainer 4 and to prevent the needle from wobbling in the retainer when it is being inserted into the needle passage 30 of the syringe.

Although the length of reduced diameter portion 14 is sufficient to provide a grip firm enough to hold the needle as aforesaid, the total gripping force is kept small enough so that the retainer can be easily pulled off the needle after it is inserted into the syringe.

As aforesaid the abutment of the open end 20 of the retainer against the jaws 31 or any other part of the chuck of the syringe, as shown in FIG. 7 limits the distance which the needle 8 can be moved into the syringe. Consequently, proper selection of the protruding length 21 will insure that the needle will in every case be inserted to its proper axial position in the syringe as shown in FIG. 7. The proper protruding length 21 can be obtained by proportioning the lengths of the bore 6 of the retainer and the needle 8 so that when the sharpened end 18 of the needle contacts or nearly contacts the bottom 19 of the retainer 4 the proper length 21 protrudes beyond the open end 20. In any case, whether or not the end 18 of the needle contacts the end 19 of the bore 6, the needle is inserted to a predetermined depth in the retainer 4 so that it will extend into the syringe to the desired extent when the open end 20 of the retainer is brought into contact with the chuck.

It is noted that the package is relatively rigid in an axial direction in the sense that it is not collapsible axially. The retainer and/or cap may be ribbed or their walls may be strengthened in some other way along the sides in order to increase axial rigidity without interference with the gripping function of the retainer.

The needle 8 may be sterilized before or after the needle has been positioned in the package. This will depend upon the material of which the container and cap are made and the type of sterilization employed by the manu-

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facturer. It is preferable to sterilize the needle after packaging because this lessens the possibility of contamination.

Sterilization after packaging may be done in two ways, in dry heat or in a sterilizing gas. In either case the material of which the package is made must not only have the properties above referred to but also must be unharmed by the sterilization operation and in case gas is used the package should be of such material to permit permeation of the gas through the container walls. Polyethylene is one such gas permeable material. It is permeable to ethylene oxide which is a well known sterilization gas.

In the embodiment shown in FIG. 8 the reduced diameter portion 40 of the bore 6 of the retainer 4 is located intermediate the ends of the bore and the portion 42 of the wall of the retainer 4 forming the reduced diameter portion 40 has a reduced external diameter and consequently is thinner than the rest of the wall so that it is more flexible and yieldable. The reduction 42 of the external retainer diameter forms opposite flat external finger gripping surfaces 42a opposite the flat internal surfaces 16 of the reduced diameter portion 40 of the bore 6, as shown in FIG. 10. By pinching the thin, flexible portion 42 of the retainer between the fingers, the needle is pinched between the fingers to increase the gripping force on the needle while it is being inserted into the syringe and locked therein. The grip of reduced diameter portion 40 is sufficient to hold the retainer on the needle until the syringe is ready for use. If desired, the portion 42 of the wall may be of the same thickness as the rest of the retainer.

In the embodiment shown in FIG. 11 the bore 6 of the retainer 4 does not have a portion of reduced diameter so that the entire wall of the bore is larger than the needle 3a. The means for gripping the needle 3a comprises only a finger pinching portion 50 of the wall of the retainer 4 such finger pinching portion comprising a portion of the retainer wall which has a reduced external diameter and hence which is thinner and more flexible than the rest of the wall. Reduction of an external diameter of the retainer wall as aforesaid forms two opposite yieldable finger gripping surfaces 52 as shown in FIG. 13. When the needle is to be used, the thin flexible finger pinching portions 52 are pinched between the fingers to thereby pinch the needle and hold it firmly between the fingers without touching the needle while the cap is removed and the needle is inserted into the syringe, as shown in FIG. 14.

In the embodiment shown in FIG. 11 the needle 3a is prevented from moving around in the package by a pad 54 of soft needle pierceable material at the bottom of the bore of the retainer. The sharpened end of the needle is thrust into the pad as shown so that the pad grips the end of the needle and holds it in the retainer. However, the needle is easily pulled out of the pad after it is inserted in the syringe. The pad may be made of any material which is rigid enough to hold the needle steady but soft enough to be pierced by the needle, as for example foam resins such as foam polystyrene and foam polyurethane. Without the pad the needle will move around in the package but the finger gripping portion 52 will still permit the needle to be firmly gripped between the fingers for insertion into the syringe without touching the needle.

The retainer of FIG. 11 may be provided with a bore having a portion of reduced diameter like that shown in FIG. 1 or FIG. 8 spaced axially from the finger gripping portion 52. Also the retainer of FIG. 2 may be provided with a gripping portion like 42 of FIG. 8 spaced axially from the portion 14 of reduced diameter.

In the embodiment of FIG. 11 the needle 3a is sharpened only at the end received in the retainer, the other end, which protrudes from the retainer and is received in the syringe, being blunt. This type of needle is used

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with medical type syringes of the type described in copending application Serial No. 784,822.

The section of the reduced diameter portion 14 of the bore in FIG. 2 and 42 of the bore in FIG. 8 may be circular so as to grip the needle about its circumference or it may be elliptical as shown in FIGS. 4 and 10.

The term retainer as used herein shall refer to that member of the package which grips the needle.

If desired the reduced diameter portion can be molded around and against the needle during manufacture to thereby grip it, as shown in FIGS. 16 to 18.

In the embodiment shown in FIG. 15, the bore 6 is tapered at or near both ends to centralize the needle in the bore. The ends of the needle fit snugly in the narrow ends of the bore.

The bore of the package of FIG. 15 may be provided at either end with a reduced diameter needle gripping portion corresponding to reduced diameter portion 16 in FIGS. 1 to 4, to releasably grip the needle or it may be provided with a reduced diameter needle gripping portion intermediate its ends as shown in FIG. 8.

FIGS. 16 to 18 illustrate a modification which is formed by molding an end portion of the package of FIG. 15 around the centralized needle by the application of heat and pressure, as referred to above. Preferably the molding pressures are applied in the directions of the arrows in FIGS. 15 and 16 to squeeze the end portion of the package around and into intimate contact with the needle to thereby releasably grip the needle. In such case the package material or at least the molded end portion is preferably made of a thermoplastic material such as polyethylene, polyvinyl chloride polymers and copolymers, e.g. polyvinyl chloride-polyvinyl acetate copolymers, etc.

FIG. 19 illustrates a modification like FIG. 15 but in which the bore extends through an end of the package, as shown, to provide an opening 60 in the end of the package through which the needle may be inserted into the bore to the position shown. The opening may, but not necessarily, flare outwardly at 62 from the small dimension 64 of the taper at that end of the bore to facilitate insertion of the needle into the bore through the opening. The end 66 of the package through which the opening 60 extends may be enlarged, as shown. The small dimension 64 is only slightly larger than the diameter of the needle so that it together with the taper at the other end of the bore centers the needle in the bore. Note that when the needle is seated at the other end of the bore, it extends through 64 and into 62. After the needle has been loaded into the bore the opening is sealed. This may be done by joining and sealing the surfaces of the opening by cementation to thereby seal the opening and, if desired, releasably grip the needle. Preferably, however, it is done by the application of heat and pressure to the end 66 of the package to mold it around the needle. The pressure is preferably applied in the directions of the arrows in FIG. 19 to squeeze the end 66 around and into intimate contact with the needle to thereby releasably grip the needle and seal the opening, as shown in FIGS. 16 to 18. In such case, the end 66 is preferably made of a thermoplastic material, as aforesaid. The walls of the bores of the separable retainer portion 68 and cap portion 70 are preferably flush to provide a continuously smooth wall.

In the embodiments of FIGS. 16 to 19, like the embodiments shown in FIGS. 1 to 14, the length of the needle protruding from the retainer portion 68 is such that when it is inserted into the syringe, the engagement of the end of the retainer portion from which the needle protrudes with the chuck of the syringe will insure proper positioning of the needle in the syringe.

Although a preferred package material is polyethylene, any resilient yieldable, semi-rigid material having the properties of yieldingly resisting deformation and of springing back to its original shape after release of a deforming force and of resisting sterilization conditions to

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which it is to be exposed can be used as for example silicone plastics and polytrifluoromonoethylethylene which are semi-rigid and are known as semi-rigid plastics.

It is not essential that the retainer portion and the cap portion be of the same materials. It may be preferable that the retaining portion be more flowable and weldable or fusible than the capping portion.

We claim:

1. A package containing a hubless hypodermic needle for a syringe, said needle having an end portion for insertion into said syringe, the other end of said needle being sharpened for penetration into the patient, said package comprising a needle retainer portion and a removable cap therefor, said retainer portion having an internal bore removably receiving said sharpened end portion of said hubless hypodermic needle with said end portion of the needle to be inserted in the syringe protruding beyond an open end of the retainer portion and covered by said cap, thereby to determine the distance to which said needle may be inserted in the syringe after removal of said cap, said package being relatively rigid in an axial direction, said retainer portion having means yieldably and releasably gripping the needle to removably retain it in a predetermined position in the bore of the retainer portion with said end portion of the needle to be inserted in the syringe protruding from said open end, said gripping means comprising a portion of said bore having a reduced diameter for yieldably and releasably gripping said needle.

2. A package according to claim 1, the material of the retainer portion and the form and size of said reduced diameter portion forming said yieldable means for releasably retaining said needle in the retainer portion.

3. A package according to claim 1, said reduced diameter portion comprising a plastic portion of the wall of said needle retaining portion molded around and in intimate contact with a portion of said needle to releasably grip the needle.

4. A package according to claim 1, at least the portion of the retainer wall forming said bore portion of reduced diameter comprising a resilient and yieldable material having the properties of yieldably resisting deformation and of springing back to its original shape after release

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of a deforming force, said reduced diameter being smaller than the diameter of said needle when the needle is removed.

5. A package according to claim 1, said reduced diameter gripping portion being at the bottom of said bore.

6. A package according to claim 5, said reduced diameter portion being joined to the rest of the bore by a tapered portion.

7. A package containing a hubless hypodermic needle which is sharpened at at least one end for piercing an object, said package having a bore removably receiving said needle, said bore having means at both ends for positioning the needle in the bore, said means at both ends comprising reduced diameter portions at opposite ends of said bore and engaging the end portions of said needle to thereby center said needle in said bore, said package being relatively rigid in an axial direction, said package comprising a needle retaining portion and a cap portion separable from said needle retaining portion, one of said reduced diameter portions of said bore being in the needle retaining portion and the other in the cap portion, the reduced diameter portion of said needle retaining portion comprising means yieldably and releasably gripping the needle to removably retain it in a predetermined position in the needle retaining portion with an end portion of the needle protruding beyond said needle retaining portion into said cap portion.

8. A packaged needle according to claim 7, the other of said reduced diameter portions being tapered.

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