

Sept. 25, 1962

S. MYERSON ET AL

3,055,364

STERILE PACKAGED HYPODERMIC NEEDLE AND SYRINGE

Filed Aug. 24, 1959

3 Sheets-Sheet 1

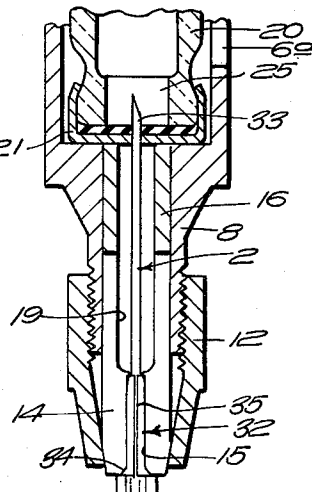
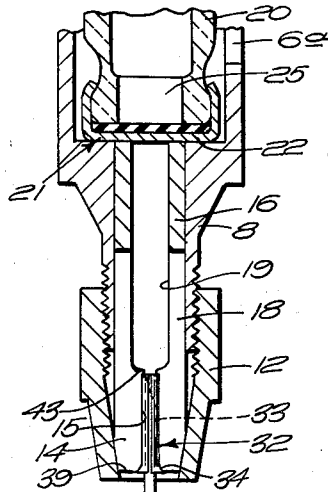
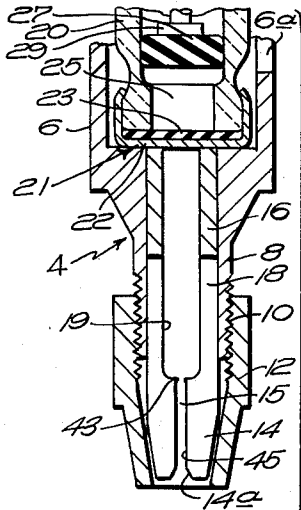


FIG. 1

FIG. 2

FIG. 3

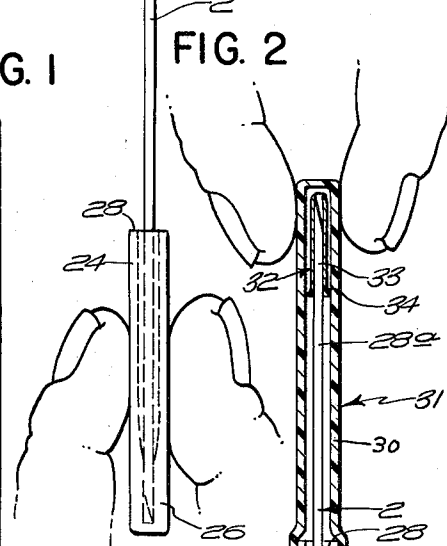
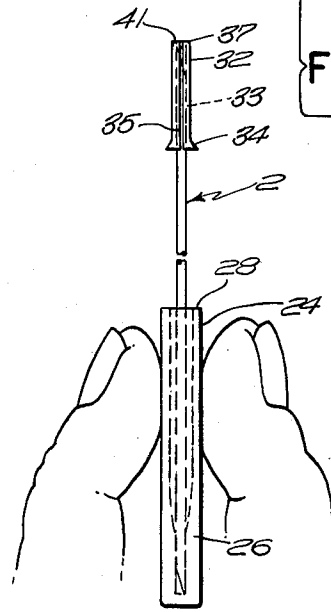


FIG. 4

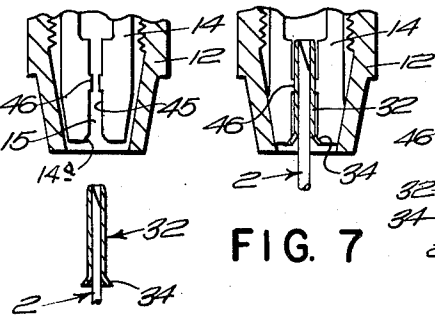


FIG. 7

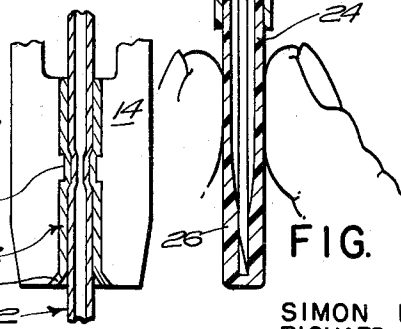


FIG. 8

FIG. 5

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FIG. 6

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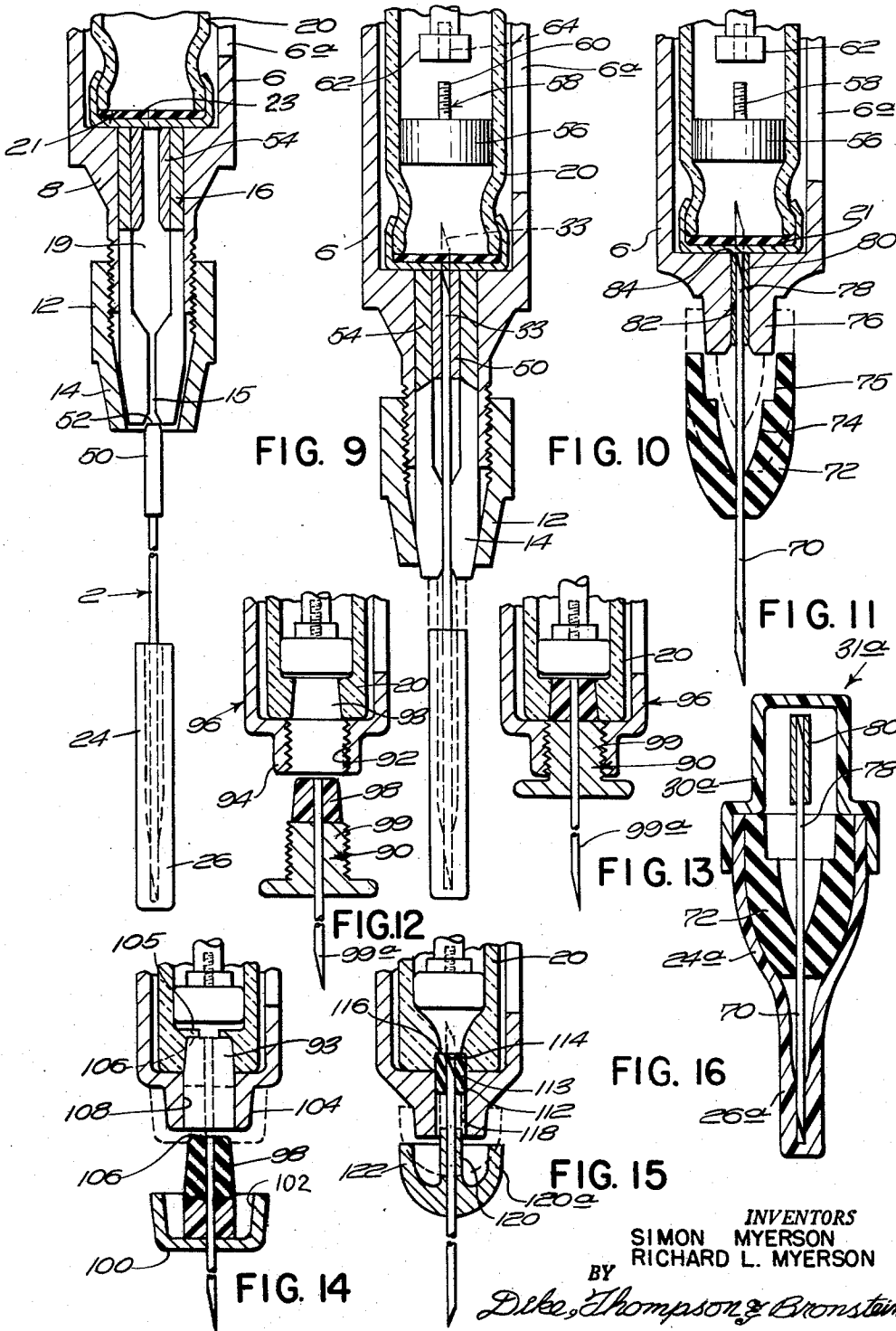
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

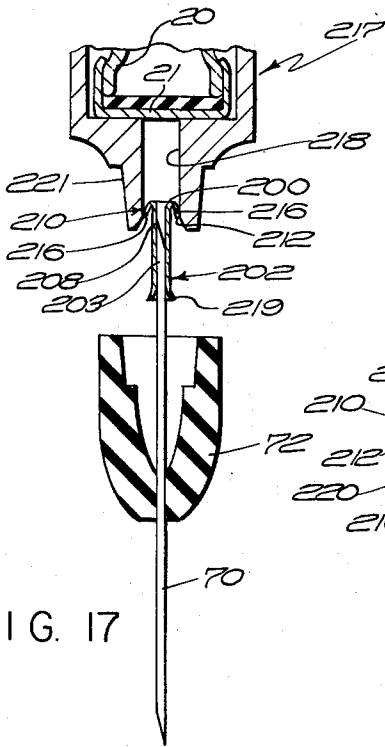


FIG. 17

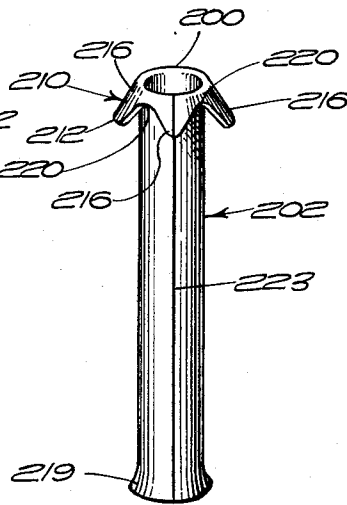


FIG. 19

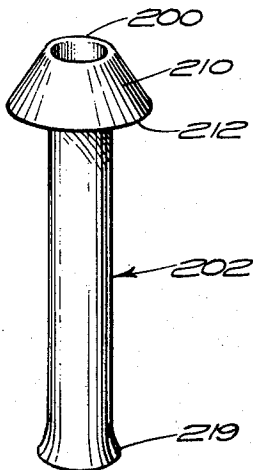


FIG. 20

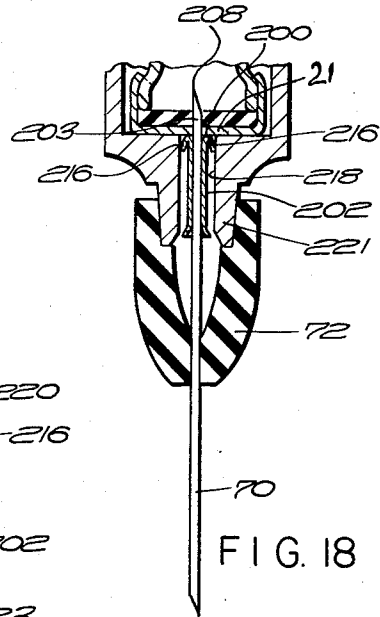


FIG. 18

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STERILE PACKAGED HYPODERMIC NEEDLE AND SYRINGE

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Filed Aug. 24, 1959, Ser. No. 835,802
10 Claims. (Cl. 128—221)

The present invention relates to disposable hypodermic needles and syringes and is a continuation-in-part of copending application Serial No. 802,162, filed by us March 26, 1959, and now abandoned.

There are two types of disposable hypodermic needles. One is a hubless type needle of the type described in copending application Serial No. 784,822 filed by us January 2, 1959 and copending application Serial No. 798,403 filed by us March 10, 1959 and entitled, Package for Hypodermic Needles, and now abandoned. This type of needle is detachably secured to the syringe by means of a chuck attached to the syringe. Sterilized needles of this type are available in packages of the type described in our above mentioned copending patent applications by means of which package the sterilized needle can be inserted into and secured in the syringe without touching the needle with the fingers.

The other type of needle has a hub affixed thereto by means of which the needle is removably secured to the syringe. Sterilized needles of this type are also available in packages by means of which the sterilized needle can be inserted into and secured in the syringe without touching the sterilized needle with the fingers.

These sterile packed disposable needles can be used with both medical, aspirating type syringes and dental, cartridge type syringes the latter utilizing a sterilized cartridge which contains a measured dose of medication and which is removably placed in the hollow barrel of the syringe. The cartridge has a self-sealing end cap which is pierced by the sharpened end of the needle when the needle is inserted into the needle receiving passage of the syringe or when the cartridge is moved into place in the barrel after the needle is secured in the syringe. The medical type syringes do not utilize a cartridge. Rather, medication is aspirated into the graduated barrel of the syringe by moving the plunger upwardly in the barrel in most cases at least.

Since the needles are sterile packed, it is not necessary to sterilize them. However, it is necessary to sterilize the syringe each time it is used. This is time consuming and expensive and in many cases it discourages doctors, dentists and hospitals from using sterile packed needles because they feel that since a sterilizing operation is required anyway, the needle might as well be sterilized at the same time despite the fact that the usual sterilization methods do not guarantee against carrying infection like hepatitis from one patient to another.

It is an object of the present invention to provide an improved hub type and hubless type needle of novel design which eliminates the necessity of sterilizing the syringe. This is accomplished by providing the end portion of the needle to be inserted in the syringe with a protective shield or sleeve located around and attached to the periphery of such end portion to protect it against contact with the syringe when it is being secured to the syringe.

It is another object of the present invention to provide a novel aspirating type syringe for use with such a needle. This is accomplished by the use of a cartridge type syringe with an empty sterilized cartridge of a new construction, in that there is no pierceable cap at its bottom and it has an opening at the bottom which is sealed by a seal carried by the needle. The cartridge is transparent, inex-

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pensive, preferably graduated and like the needle, can be disposed of after use.

Another object of the invention is to provide such a syringe and such a needle in which the empty cartridge is open at its lower end and in which the sleeve functions not only to protect the end portion of the needle against contact with the syringe during insertion of the needle into the syringe but also as a closure for the open end of the cartridge into which the fluid can be drawn.

In one embodiment of the invention the shield or sleeve or fitting is fitted tightly but slidably around the end portion of the needle whereas in another embodiment the shield is of yieldable resilient material and fixed to the end portion of the needle.

With the use of a tightly fitting slidable sleeve relative sliding movement between the sleeve and needle is provided after the needle has been at least partially inserted into the syringe to expose the end portion of the needle for entrance into a sterilized cartridge in the barrel of the syringe. This relative movement is provided by engagement of the sleeve with a portion of the syringe and/or the needle pierceable end cap of the cartridge when the cartridge has one or some other part of the cartridge to halt further axial movement of the sleeve or when a cartridge having a needle pierceable end cap is used, by engagement of the end cap or some other part of the cartridge with the sleeve when the cartridge is inserted into the barrel of the syringe, the cap being at the same time pierced by the needle. The end portion of the needle which enters into the sterilized cartridge touches no part of the syringe other than the sterilized cartridge after it is exposed by such relative movement and before it is exposed the sleeve protects it against contact with the syringe.

The yieldable resilient sleeve fixed to the needle is used with an empty cartridge which is open at its lower end and when the needle is moved to its ultimate position the sleeve closes the opening at the lower end of the cartridge.

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

FIG. 1 is a view in elevation showing a needle embodying the present invention and retained in the retainer member of a needle package of the type described in our application Serial No. 798,403 filed March 10, 1959 about to be inserted between the jaws of a cartridge, chuck type syringe of the type described in application Serial No. 784,822, the upper portion of the syringe being cut away and the lower chuck portion of the syringe being shown in section.

FIG. 2 is like FIG. 1 showing the needle partially inserted in the syringe to a position in which movement of the sleeve with the needle is halted.

FIG. 3 is like FIG. 1 showing the needle inserted to and secured in its ultimate position.

FIG. 4 is a view in perspective of the sleeve of FIG. 1. FIG. 5 is a section in elevation of the sterile packed needle of FIG. 1.

FIG. 6 is a view like FIG. 1 of a different embodiment of the invention.

FIG. 7 is a view like FIG. 2 of the embodiment of FIG. 6.

FIG. 8 is a view like FIG. 3 of the embodiment of FIG. 6.

FIG. 9 is a view like FIG. 1 of another embodiment of the invention showing the needle about to be inserted in the syringe.

FIG. 10 is an enlarged view like FIG. 9 of the embodiment shown in FIG. 9 showing in dotted lines the needle secured in its ultimate position and in full lines the needle partially inserted into the syringe and showing more of the syringe and the cartridge than in FIG. 9.

FIG. 11 is a view like FIG. 10 of another embodiment of the present invention embodying a needle with a needle attaching hub.

FIG. 12 is a view like FIG. 9 of yet another embodiment of the invention embodying a needle with a hub and a flexible protecting sleeve and an empty cartridge with an open bottom, the needle being shown about to be inserted into the syringe.

FIG. 13 is a view like FIG. 12 showing the needle inserted and secured in place in the syringe.

FIG. 14 is a view like FIG. 12 of another embodiment employing a needle with a hub and a resilient sleeve.

FIG. 15 is a view like FIG. 11 of another embodiment embodying a needle with a hub and a sleeve having an end wall and an empty cartridge open at its bottom end.

FIG. 16 is a section in elevation of the sterile packed needle of FIG. 11.

FIG. 17 is a view like FIG. 11 of another embodiment of the invention embodying a needle with a hub and showing the needle being inserted in the passage in the syringe.

FIG. 18 is a view of the embodiment of FIG. 17 with the needle inserted and secured in its ultimate position in the syringe.

FIG. 19 is a view in perspective of the sleeve of FIG. 17.

FIG. 20 is a view in perspective of another embodiment of the sleeve of FIG. 19.

With reference to FIGS. 1 to 8, 2 represents a hubless needle embodying the present invention and 4 represents a cartridge, chuck type syringe of the kind described in application Serial No. 784,822 and comprising a hollow barrel 6 terminating in a hollow tubular end portion 8 having an external threaded portion 10 over which a screw cap 12 is adapted to be threaded to loosen and tighten the needle gripping jaws 14 at the end of a tubular member 16 press fitted into the bore of end portion 8 and having a plurality of slits in an end portion to form resilient spring legs 18 which extend downwardly into the jaws 14, as shown. The jaws 14 form a needle receiving passage 15 extending into a needle receiving passage 19 of greater diameter than passage 15 and formed by the thinner spring legs 18.

The hollow barrel 6 has a removable, transparent glass or plastic cartridge 20 of conventional construction located therein, as shown. The cartridge, when it is inserted into the barrel, contains a measured dose of medication and has a needle penetratable cap 21 of conventional construction over the open lower end thereof, such cap comprising a pierceable soft metal outer layer 22 and an inner layer 23 of self-sealing rubbery material, e.g. rubber. The lower end of the cartridge comprises a needle receiving passage 25, the lower open end of which is covered by the cap 21. The cartridge is provided with a resilient rubber stopper 27 which fits tightly within the cartridge and which is adapted to be propelled downwardly by the plunger 29 of the syringe to the position shown in FIG. 1, to expel the medication in the cartridge through the needle 2 when the needle is secured in place as shown in FIG. 3. The cartridge may be placed into and removed from the barrel 6 through window 6a in the side of the barrel while the plunger is held upwardly out of the way, all as described in application Serial No. 784,822. The filled cartridge is sterile packed.

The hubless needle 2 is sterile packed in a package 31 (FIG. 5) the construction of which is described in our application Serial No. 798,403 filed March 10, 1959. The package 31 comprises an elongated hollow polyethylene retainer member 24 in the bore of which is retained an end portion of the needle 2 by means of a portion 26 of reduced internal diameter which grips and holds the needle in the position shown with a predetermined portion 28a protruding from an open end 28 of the retainer 24, such protruding portion being covered by the cap 30.

The sharpened end portion 33 of the needle which is

adapted to extend into the cartridge 20 and contact the liquid therein when the needle is secured in its ultimate position in the syringe as shown in FIG. 3, is provided with a protective shield or sleeve 32, which is fitted tightly but slidably around the periphery of such end portion 33, as shown, and preferably has a longitudinal slit 35 along the length thereof. The end 34 of sleeve 32 flares outwardly into a conical or trumpet shaped, outwardly extending flange or stop 34. The upper or inner edge of the sleeve is flush with the end of the needle 2 or extends slightly beyond it.

In the embodiment shown in FIGS. 1 to 8, the passage 15 between the chuck jaws 14 is preferably smaller than the diameter of the sleeve 32 when the jaws are in their normal relaxed positions. Consequently, the jaws are forced apart against the very gentle spring force exerted by the spring legs 18 when the needle 2, with sleeve 32, is inserted in the passage 15 and the jaws exert a slight inward tension on the sleeve.

When the needle is to be used, the cap 30 is removed from the retainer 24 without touching the sterilized needle by grasping the retainer 24 between the fingers of one hand and the cap 30 between the fingers of the other hand to expose the protruding portion 28a of the needle with the sleeve 32 over the end portion 33 thereof as shown in FIG. 1.

Thereafter, while still holding the needle by means of a retainer 24 and hence without touching the needle, the end portion 33 of the needle with the sleeve 32 attached thereto by the tight but slidable fit therebetween is inserted into the needle receiving passage 15 to the position shown in FIG. 2 in which position further axial movement of the sleeve 32 is halted by engagement of the flange 34 of the sleeve 32 with the tip 39 of the jaws 14 or by engagement of the edge 41 of the sleeve 32 with the slight protuberances 43 extending radially inwardly from the top of the inner walls 45 of the jaws 14 forming the passage 15.

Upon continued application of a needle inserting force the needle 2 continues to move axially with respect to the sleeve into and through enlarged needle receiving passage 19, the end portion 33 being moved out of the sleeve 32, until the needle engages and pierces the cap 21 and moves to its ultimate position shown in FIG. 3 with the end portion 33 within the lower reduced diameter portion 25 of the cartridge 20, in which position the open end 28 of the retainer 24 abuts against the flange 34 of the sleeve or some other portion of the jaws 14 to prevent further insertion of the needle. The sleeve 32 remains in the passage 15, as shown.

Thereafter, the screw cap 12 is tightened on the jaws 14 to grip the needle 2 tightly through the sleeve 32. The slit 35 in the sleeve allows the sleeve to give radially to thereby more readily permit tightening of the sleeve on the needle when the jaws are tightened on the sleeve. In the embodiment shown in FIGS. 1 to 8 the sleeve should be sufficiently yieldable to permit such tightening of the sleeve around the needle and is preferably made of a metal which is yieldable as aforesaid.

If protuberances 43 are used, the flange 34 on the sleeve 32 may be omitted and vice versa since only one is required. However, both can be used if desired.

The protuberances 43 should be small enough so as not to interfere with the passage of the needle 2 or touch the end portion 33 of the needle when it is moved out of the sleeve past the protuberances.

In the embodiments shown in FIGS. 1 to 3 the sleeve should be preferably long enough to extend along the entire length of the passage 15 as shown in FIGS. 2 and 3.

It is noted that the inner wall of the enlarged needle receiving passage 19 formed by the spring legs 18 of the chuck is substantially larger in diameter than the needle to provide adequate clearance therebetween and that the sleeve 32 held firmly between the jaws 14 by the inward tension exerted thereon by the jaws guides the needle as it

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is moved through such enlarged passage 19 to prevent the needle and hence end portion 33 from moving laterally into contact with the walls of such enlarged passage while the needle is being moved from the position shown in FIG. 2 to the position shown in FIG. 3. The sleeve 32 not only keeps the needle centered so as to guide it to its destination without touching the walls of passage 19 but it also protects the needle against contacting the inner jaw walls 45 forming the passage 15. Consequently, the sterilized needle and especially the end portion 33 does not contact any portion of the syringe at any time except for the cap 21, which is sterilized. Consequently, the syringe does not have to be sterilized. Furthermore, the sterilized needle is not touched by hand at any time so that it remains sterile. The end portion 33 of the needle contacts nothing other than the sterilized sleeve until it hits the sterilized cap 21.

The retainer 24 is retained on the portion of the needle protruding from the syringe after the needle is secured to the syringe to protect such portion until the needle is ready for use at which time the retainer is pulled off the needle.

Although for purposes of explanation, the needle has been described as being inserted into the syringe after the cartridge has been inserted into the barrel and this is one way of preparing the syringe for use, the needle can be inserted to the position shown in FIG. 3 before the cartridge 20 is inserted into the barrel of the syringe and the axial movement of the cartridge to the position shown in FIGS. 1 to 3 in subsequently placing it in the syringe causes the needle to penetrate the cap 21, as shown.

Note that the mouth 14a of the passage 15 is enlarged to facilitate the entry of the sleeve into the passage.

The sleeve 32 must fit around end portion 33 of the needle tightly enough to retain its position on such end portion during passage of the sleeve and end portion through the passage 15 from the position shown in FIG. 1 to the position shown in FIG. 2 in spite of the inward tension applied to the sleeve by the jaws 14. However, the fit should not be so tight as to require an excessive amount of axial force in order to force the end portion 33 of the needle to slide out of the sleeve when the movement of the sleeve is halted.

In order to achieve a tighter grip on the needle, the inner walls 45 of the jaws 14 may be provided with slight protruberances 46 in the nature of one to a few thousandths of an inch, as shown in FIGS. 6 to 8. Protruberances 46 are small enough so that they do not block the passage of the sleeve from the position shown in FIG. 6 into and through the passage 15 to the position shown in FIG. 7 in which further movement of the sleeve is halted, or prevent the further movement of the needle to the position shown in FIG. 8. Thus, they are much smaller than the protruberances 43. With the use of such protruberances the inward tension of the jaws is made slight so that the protruberances will not block the sleeve. When the screw cap 12 is tightened over the sleeve the protruberances are forced into the sleeve to deform it as shown in FIG. 8, the deformed portion of the sleeve being forced into the needle to deform it slightly as shown. The height of the protruberances and hence the deformation of the needle are so slight that flow through the needle is not harmfully affected. They are greatly exaggerated in size as compared to the diameter of the needle in FIGS. 6 to 8 for the sake of clarity. The protruberances may be in the form of a lateral ridge extending along the width of the inner wall 45 of one or more of the jaws 14 or in the form of tiny buttons. The protruberances may be located anywhere along the length of the inner wall 45 of the jaws. At present a preferred spot is deemed to be directly adjacent the upper narrow end of the enlarged tapered mouth 14a at the entrance of the passage 15 between the jaws.

In FIGS. 9 and 10, the sleeve 50 does not have a radially outwardly extending flange and its motion is halted by

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engagement of the edge 52 thereof with the penetratable cap 21 of the cartridge 20, as shown in full lines in FIG. 10. A sleeve holding guide 54 is provided at the upper end of the passage 19 for guiding the needle and sleeve to the center of the cap 21. The entrance of the bore of the guide 54 is tapered to aid in guiding the sleeve and needle into the guide. The bore of the guide is only slightly larger than the external diameter of sleeve 50. In this embodiment the sleeve is retained on the end portion 33 of the needle and moves with it during insertion of the needle from the position shown in FIG. 9 through the passages 15 and 19 and guide 54 until the edge 52 of the sleeve engages the cap 21, as shown in full lines in FIG. 10, to thereby halt further movement of the sleeve, whereupon the application of a further needle inserting force forces the needle to move axially with relation to the sleeve and the end portion 33 to move out of the sleeve and through the cap 21 to its ultimate position shown in dotted lines in FIG. 10 whereafter the chuck is tightened. The sleeve 50 remains in the sleeve holder 54, as shown in FIG. 10. Thus, the sleeve protects end portion 33 against contact with any portion of the syringe except for the sterilized cap 21. In this embodiment in which the sleeve does not remain between the chuck jaws, it may be made of any desired material as for example plastic or metal, and the longitudinal slot is not required. The sleeve shown in FIGS. 9 and 10 does not have such a slot.

The passage 15 between the jaws 14 may be smaller or larger than the needle when the jaws are in a relaxed condition. Preferably, it is smaller so that the jaws are forced apart by the sleeve and needle when they are inserted and exert a slight tension on the sleeve while it is passing through passage 15 and thereafter on the needle.

Although an intermediate portion of the outer periphery of the needle touches the jaws of the syringe this does not matter because the liquid does not contact this portion of the needle.

Although in the above description of FIGS. 9 and 10 the needle is inserted after insertion of the cartridge, the needle can be inserted and secured in its ultimate position shown in dotted lines in FIG. 10 before the cartridge is placed in the barrel in which case the sleeve remains around the end portion 33 while it is moved to its ultimate position since there is nothing to halt its movement. Thereafter, the cartridge is inserted and the axial movement of the cartridge during insertion thereof into the barrel to the position shown in FIG. 10 pushes or slides the sleeve 50 back on the needle to the position shown in FIG. 10 by engagement of the cap 21 with the edge 52 of the sleeve, the needle being forced through the cap 21 at the same time. This is the customary procedure with cartridge type syringes.

The needles of FIGS. 9 and 10 may be sterile packaged by enclosing them in a package 31 as shown in FIG. 5.

In the embodiment shown in FIGS. 1 to 8, the sterilized cartridge contains a measured dose of medication with the stopper being located at the top of the cartridge and forming a closure therefor. However, in the embodiment shown in FIGS. 9 and 10 the sterilized cartridge is empty and the resilient rubber stopper 56 (see FIG. 10) is located at the bottom of the main cartridge bore and has the head of a screw 58 embedded therein with the threaded shank 60 of the screw exposed and extending upwardly out of the stopper. The plunger 62 of the syringe is provided with a threaded recess 64 into which the shank 60 is threaded by rotating the handle of the plunger and hence the plunger after the cartridge is placed in the barrel of the syringe and the plunger has been lowered. Thereafter, with the needle secured in the syringe as shown in FIG. 10, by pulling upwardly on the plunger, the stopper 56 is moved upwardly in the cartridge to aspirate medication into the cartridge through the needle. The upper end of the cartridge is open so that the plunger can be moved downwardly

through the cartridge to a position in which it can be attached to the stopper after the cartridge is placed in the syringe. There is sufficient clearance between the periphery of the plunger 62 and the inner wall of the cartridge so that the plunger does not touch the cartridge. The upper portions of the syringe (including the upper portion of the plunger) and cartridge are not shown because they are conventional.

The empty cartridge is sterile packed and inexpensive and may be thrown away after use as is the case with filled cartridges. It should be transparent and have graduations marked thereon to measure the amount of liquid aspirated into the cartridge.

The embodiments shown in FIGS. 1 to 8 can be used with empty cartridges and the embodiment shown in FIGS. 9 and 10 can be used with filled cartridges.

In FIG. 11 the needle 70 has an attaching hub 72 affixed thereto as by swedging. The end of the internal bore 74 of the hub is enlarged and tapered at 75, as shown, to cooperate with an externally tapered lower tip 76 of the syringe to attach the needle to the syringe in the proper position as shown in dotted lines. The fit between the externally tapered tip 76 and tapered portion 75 of the bore of the hub 72 is tight enough to firmly secure the needle to the syringe when the hub is moved axially over and onto the tip 76 from the position shown in full lines to the position shown in dotted lines.

The hub 72 may be of plastic or metal and may be secured on the tip 76 in a number of ways, as for example by a Luer lock arrangement or by cooperating screw threads.

The end portion 78 of the needle 70 corresponds to the end portion 33 of FIG. 1 and has a tightly fitting sleeve or shield 80 around the periphery thereof. Sleeve 80 is of the same construction as the sleeve 50 in FIGS. 9 and 10 and is retained on the end portion 78 of the needle to protect it against contact with the unsterilized syringe while the needle is being inserted into the syringe through the needle receiving passage 82 to the position shown in full lines in FIG. 11, in which position the engagement of the end 84 of the sleeve 80 with the cap 21 of the cartridge halts further axial movement of the sleeve. Thereafter, continued application of a needle inserting force forces the needle to move axially with respect to the sleeve and the end portion 78 to move out of the sleeve through the cap 21 to the position shown in dotted lines, the hub 72 at the same time being moved to the position shown in dotted lines to secure the needle in the syringe and limit further axial movement of the needle. In the FIG. 11 embodiment an empty cartridge is used as in the case of FIGS. 9 and 10 but a filled cartridge can be used.

The needle can be inserted into and secured in the syringe in the position shown in dotted lines before the cartridge is inserted in which case the sleeve remains on the end portion 78 when the needle reaches its ultimate position shown in dotted lines. The engagement of the cap 21 of the cartridge with the end 84 of the sleeve during the subsequent insertion of the cartridge into the barrel of the syringe to the position shown forces the sleeve to slide back on the needle to the position shown in FIG. 11 at the same time that the needle penetrates the cap.

The needle shown in FIG. 11 may be sterile packaged as shown in FIG. 16 wherein the package 31a is similar to the package 31 shown in FIG. 5. It comprises an elongated, hollow, polyethylene retainer member 24a in the bore of which is retained the end portion 70 of the needle by means of a portion 26a of reduced internal diameter which grips and holds the needle in the position shown with a predetermined portion protruding from an open end of the retainer member 24a such protruding portion being covered by the cap 30a. In this embodiment the upper end of the retainer member 24a may frictionally grip the hub 72 in which event the retainer member 24a

need not be provided with the portion 26a of reduced internal diameter.

In FIGS. 12 and 13 the empty cartridge 20 does not have a sealing cap but is open at the bottom and the hub 90 affixed to the needle is threaded in an internally threaded needle receiving passage 92 in the lower tip 94 of the syringe 96 to secure the needle in the syringe in the position shown in FIG. 13. The opening 93 of reduced diameter at the bottom of the cartridge is tapered as shown.

The sleeve 98 is made of a resilient, flexible and yieldable material, as for example rubber or a rubbery plastic, and has an external taper which cooperates with the taper of opening 93 as set forth hereinafter. The sleeve is located at the end of the threaded shank portion 99 of the hub 90 and it is non-slidably affixed to either the needle 99a or to the end of the shank portion 99.

Insertion of the needle into the needle receiving passages 92 and 93 and tightening of the threaded hub 90 in the threaded passage 92 to move the hub and needle from the position shown in FIG. 12 to the position shown in FIG. 13 wedges the tapered sleeve tightly against the tapered wall of opening 93 to form a seal. The sleeve also protects the needle from contacting any portion of the syringe during insertion thereof in the syringe from the position shown in FIG. 12 to the position shown in FIG. 13. The taper of the sleeve 98 not only cooperates with the taper of the wall of opening 93 to provide a tight seal between the sleeve and wall of the opening but it also cooperates with the relatively larger diameter of the passage 92 as compared to the small top end of the tapered sleeve to avoid contact of the top of the sleeve which contacts the liquid, with the unsterilized wall of passage 92. As in the other embodiments the cartridge is sterilized and can be inserted after the needle has been secured in place, whereby the opening 93 in the cartridge is moved downwardly over and wedged against the sleeve.

The shank portion 99 of the hub functions as a base for the sleeve to wedge it tightly in the opening 93 and prevent it from being pushed back on the needle or to limit its backward movement. The needle of the embodiment of FIGS. 12 and 13 may be sterile packaged in a package 31a in the manner as shown in FIG. 16.

The embodiment shown in FIG. 14 corresponds to that shown in FIGS. 12 and 13 except that the hub 100 of the needle has a tapered internal bore 102 for cooperating with the externally tapered lower tip 104 of the syringe to secure the needle to the syringe in the position shown in dotted lines. Also the upper end of the tapered, needle receiving passage 93 in the cartridge has a radially inwardly extending flange 105 against which the radially outer portion of the upper end 106 of the tapered rubber sleeve 98 is pressed when the needle is moved from the position shown in full lines into the syringe to its ultimate position shown in dotted lines. During insertion of the needle in the needle receiving passage 108 of the syringe, this radially outer portion of the top end of the sleeve is apt to touch the syringe. By providing the flange 105 against which such portion is pressed the portion does not contact the liquid. Consequently, even if it touches the wall of the passage 108 it will not contaminate the liquid. For the same reasons, it is preferable that the cartridge shown in FIGS. 12 and 13 be provided with a similar flange.

The embodiment shown in FIG. 15 is like that in FIG. 11 except that an empty cartridge open at the bottom is used and the sleeve 112 is fitted tightly but slidably around the end portion 113 of the needle and has an end wall 114 over the tip of the needle, such end wall being adapted to engage the shoulder 116 in the opening in the lower end of the cartridge 20 when the needle is inserted in the needle receiving passage to halt the axial movement of the sleeve as shown in full lines in FIG. 15. Continued application of a needle inserting force forces the needle to move axially with respect to the sleeve and the end portion 113 to move out of the sleeve thereby causing the needle to pierce the end wall 114 and move

to its ultimate position shown in dotted lines, in which position the shank 120 of the hub 120a affixed to the needle engages the bottom of the sleeve to urge the sleeve into tight sealing contact with the tapered walls of the cartridge opening and shoulder 116 as shown in dotted lines and in which position the needle is secured to the syringe by the attaching hub 120a as shown in dotted lines.

Wall 114 should be self-sealing. The sleeve may be made of a rubber material such as rubber or a rubbery plastic or of the same material as the cap 21 of the cartridge in FIGS. 1 to 3, i.e. layers of metal or plastic and rubber.

In the embodiments shown in FIGS. 17, 18, 19 and 20 the forward inner or upper end 200 of sleeve 202 fitting tightly but slidably over the inner end portion 203 of the needle 70, which has the same construction as needle 70 of FIG. 11, is located slightly beyond the inner end 208 of the needle and is provided with a flange 210 bent outwardly and rearwardly along the sleeve 202 at an inclination to the longitudinal center axis of the sleeve, as shown, the rear edge 212 of the flange being of greater diameter and circumference than its forward end 200, such forward end comprising the leading or inner end of the sleeve and the bend joining the flange with the sleeve proper. The flange 210 may be serrated to form four oppositely disposed prong-like members 216 with serrations or valleys 220 between them as shown in FIG. 19 or may be non-serrated and solid as shown in FIG. 20. The syringe 217 is exactly like the syringe shown in FIG. 11 except that the needle receiving passage 218 in the tip 221 thereof is slightly larger in diameter than the widest portion 212 of flange 210, such widest portion in the figures being the rear edge of the flange. The sleeve may have a longitudinal seam 223 extending along the length thereof and a trumpet or cone shaped enlargement 219 at its trailing end to facilitate placing the sleeve on the end portion of the needle and also to act as a stop to arrest movement of the sleeve when the sleeve is used with a chuck type syringe as in the case of the sleeve shown in FIGS. 1 to 4.

The inner or leading end portion 203 of the needle 70 with the sleeve 202 located therearound is inserted into the passage 218 as shown in FIG. 17. When the forward flanged end 200 of the sleeve engages the pierceable end wall 21 of the cartridge 20 further axial movement of the sleeve is stopped and the end portion 203 of the needle continues on out of the sleeve through the pierceable end wall 21 of the cartridge to its ultimate position shown in FIG. 18 in which position the hub 72 of the needle 70 tightly grips the tapered tip 221 of the syringe to secure the needle in the syringe.

The needle may be inserted first to its ultimate position shown in FIG. 18 and the cartridge 20 can then be inserted in the syringe to force the sleeve 202 back on the needle and cause the needle to pierce the end 21 of the cartridge as in the other embodiments. However, at present it is deemed preferable to insert the cartridge first and then the needle.

The purpose of the flange 210 is to protect against contaminated material on the wall of passage 218 being pushed or scraped onto the end 200 of the sleeve or into the opening at the leading end 200 of the sleeve and hence into eventual contact with the needle by engagement of the sleeve with the wall of the passage during insertion of the needle. It acts as a guide to space the leading end 200 of the sleeve, and hence the opening therein and the end portion 203 of the needle, from the wall of the passage 218 and hence prevents such end of the sleeve and such end portion of the needle from contacting the wall of the passage. The slope or inclination of the flange ensures that any contaminated material which is pushed forwardly by the engagement of the rear edge 212 of the flange will collect between the rear portion of the flange and the wall which forms a reservoir for such material, and hence will not be pushed or scraped into the opening at

the end of the sleeve or into contact with the end 200 of the sleeve.

A serrated flange is preferred because the area of contact between the flange and passage 218 is reduced to a minimum while still affording the protection desired by spacing the leading end of the sleeve from the wall of the passage. The less the area of contact the less the amount of contaminated material on the walls of the passage which will be pushed forwardly by such contact. It is noted that the total area of contact is reduced by tapering the opposed edges of each of the prongs 216 as shown. The prongs 216 of the serrated flange should be spaced circumferentially to assure that they will perform the function of spacing the leading end of the sleeve from the wall of the passage in all lateral directions. Although four oppositely disposed prongs are shown, three will suffice if they are circumferentially spaced properly. Also more than four prongs can be used and in certain cases two might suffice.

The flange may extend from a portion of the sleeve spaced rearwardly from the leading end of the sleeve but not so far as to prevent it from performing the above mentioned functions. It can be incorporated in the sleeves of the other embodiments to perform the same function. Where it is incorporated in sleeves used with a chuck type syringe, as in FIGS. 1 to 9, a solid, non-serrated flange of small dimension is preferred and the chuck jaws should be relatively lax and hence exert only a slight tension on the sleeve when it is inserted therebetween to prevent the jaws from pushing the sleeve back on the needle by contact with the flange.

The needles of the embodiments of FIGS. 14 and 15 and 17 to 20 may be sterile packaged in a package 31a in the manner shown in FIG. 16.

In all the embodiments shown, the sleeve must be made of a material which will withstand the needle sterilization conditions used by the manufacturer.

The terms "attach" and "attached" as used in the claims hereof to define the manner in which the sleeve is mounted on the needle, are intended to include the tight fitting, slidable attachment of the sleeve to the needle shown in FIGS. 1 to 11, 15 and 17 to 20 and the non-slidable fixed attachment shown in FIGS. 12 to 14.

The term "sleeve" as used herein includes sleeves of the type shown in FIGS. 1 to 14 and 17 to 20 which do not have an end wall and sleeves of the type shown in FIG. 15 which have an end wall 114. All of the sleeves shown in FIGS. 1 to 11 and 17 to 20 may be provided with such pierceable end walls if so desired.

The sleeve may be longer than is shown in the drawings so long as it is sufficiently shorter than the needle in the case of FIGS. 1 to 11 and 15 and 17 to 20 to permit the end portion of the needle which pierces the cap of the cartridge in FIGS. 1 to 11 and 17 to 20 and the end wall of the sleeve in FIG. 15 to be exposed and to provide a sufficient length of exposed portion at the other end of the needle for insertion into the patient. In the modification shown in FIGS. 9 and 10, for example, the sheath is preferably long enough to begin entrance into guide 54 before it leaves the passageway 15 between the jaws. The guide 54 may be larger than illustrated in FIG. 9.

According to this invention a sterile packaged needle is provided for attachment to a syringe by the physician, dentist or other operator and to said needle a protective end sleeve is attached which cannot fall off the needle when the package is being opened and which will not move from said position until or unless it is urged by means provided in the syringe or on the cartridge.

We claim:

1. In combination a hypodermic needle and a syringe, said needle having a patient entrant end portion and an opposite syringe entrant end portion, said syringe having a barrel for containing a cartridge, said syringe

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having a needle receiving passage leading to said barrel and a plunger movable within said barrel, said needle having a protective sleeve mounted with a slidable, friction fit around and surrounding said syringe entrant end portion, said passage being of adequate dimension to freely receive said sleeve, said sleeve being disposed in said passage and slidable back on said needle by engagement with at least one of said cartridges and said syringe.

2. A combination according to claim 1, wherein said sleeve extends beyond the syringe entrant end of said needle and is substantially axially rigid, said sleeve having a bore extending therethrough, the minimum diameter of said bore being adequate to slidably receive said needle, said sleeve being slidable back on said needle.

3. A hypodermic needle having a patient entrant end portion and a syringe entrant end portion for use with a syringe having a barrel and a needle receiving passage leading to said barrel through which the syringe entrant end portion of said needle is adapted to be inserted into said barrel, said needle having a thin substantially axially rigid sleeve mounted with a slidable yieldable gripping friction fit around and surrounding said syringe entrant end portion with an end of said sleeve extending beyond the syringe entrant end of said needle, said sleeve having a bore extending therethrough, the minimum diameter of said bore being adequate to slidably receive said needle, said sleeve being slidable back on said needle, said sleeve being provided at its syringe entrant end portion with a thin skirt extending rearwardly and outwardly at an angle to the center axis of said sleeve.

4. A needle according to claim 3, said skirt being serrated.

5. A needle according to claim 3, said sleeve being of a thin metal.

6. A needle according to claim 3, the outer end of said bore diverging outwardly, the divergence of said bore spacing the syringe entrant end of the needle radially inwardly from the outer end of said sleeve whereby when the sleeve is slid back on the needle said divergence functions to prevent said syringe entrant end of the needle from contacting said outer end of the sleeve.

7. A needle according to claim 3, said sleeve having means spacing the syringe entrant end of the needle

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radially inwardly from the outer end of said sleeve whereby when the sleeve is slid back on the needle said last-mentioned means functions to prevent said syringe entrant end of the needle from contacting said outer end of the sleeve.

8. A hypodermic needle having a patient entrant end portion and a syringe entrant end portion for use with a syringe having a barrel and a needle receiving passage leading to said barrel through which the syringe entrant end portion of said needle is adapted to be inserted into said barrel, said needle being sharpened at both ends and having a thin substantially axially rigid sleeve mounted with a slidable yieldable gripping friction fit around and surrounding said syringe entrant end portion with an end of said sleeve extending beyond the syringe entrant end of said needle, said sleeve having a bore extending therethrough, the minimum diameter of said bore being adequate to slidably receive said needle, said sleeve being slidable back on said needle.

9. A needle according to claim 8, said sleeve being provided at its syringe entrant end portion with an outwardly extending skirt for spacing the syringe entrant end of said sleeve from the wall of said passage.

10. A needle according to claim 8, said sleeve having means spacing the syringe entrant end of the needle radially inwardly from the outer end of said sleeve whereby when the sleeve is slid back on the needle said last-mentioned means functions to prevent said syringe entrant end of the needle from contacting said outer end of the sleeve.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,055,364

September 25, 1962

Simon Myerson et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 11, line 8, for "cartridges" read -- cartridge --.

Signed and sealed this 21st day of April 1964.

(SEAL)

Attest:
ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER


Commissioner of Patents