Jan. 27, 1970 R. O. ARCE 3,491,757

HYPODERMIC SYRINGE WITH NON-TURNING TIP CONNECTOR

Filed Dec. 30, 1966 4 Sheets-Sheet 1

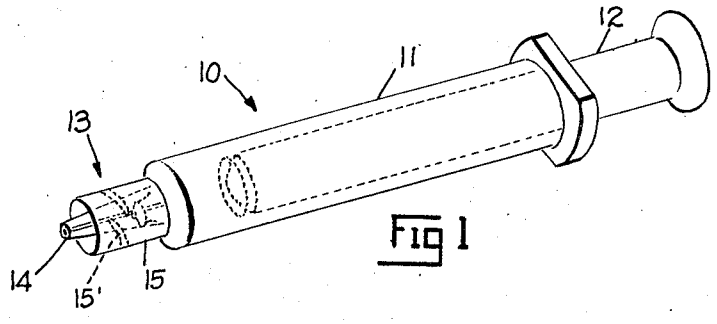


Fig 1

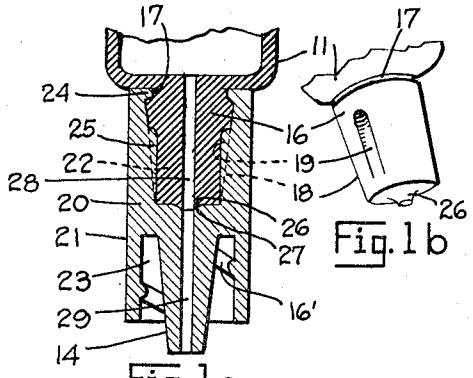


Fig. 1b

Fig. 1a

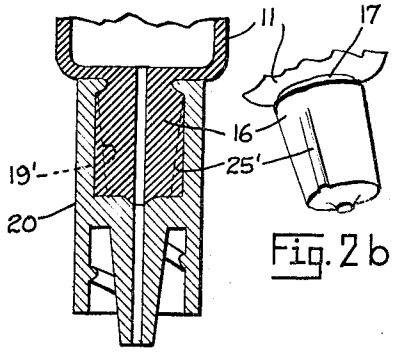


Fig. 2b

Fig. 2a

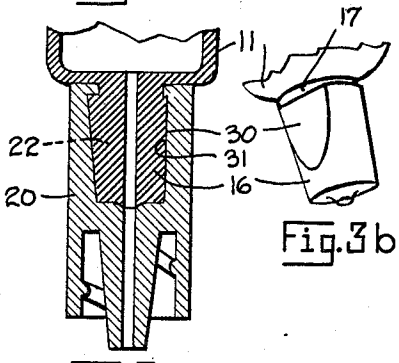


Fig. 3b

Fig. 3a

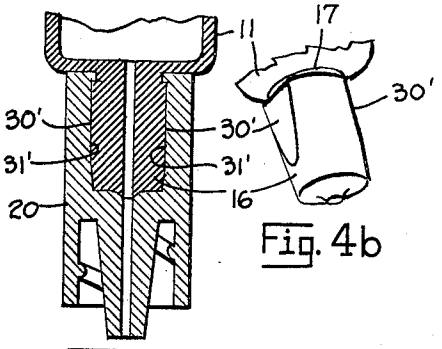


Fig. 4b

Fig. 4a

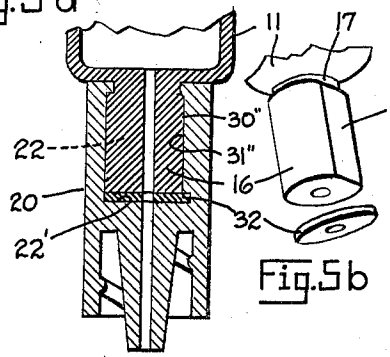


Fig. 5b

Fig. 5a

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HYPODERMIC SYRINGE WITH NON-TURNING TIP CONNECTOR

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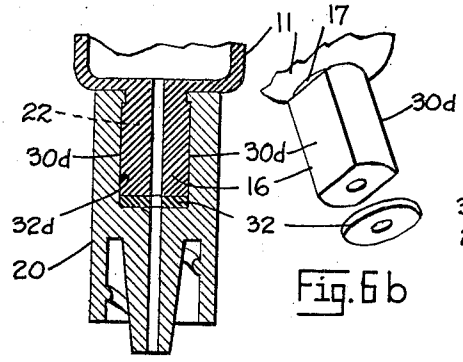


Fig. 6b

Fig. 6a

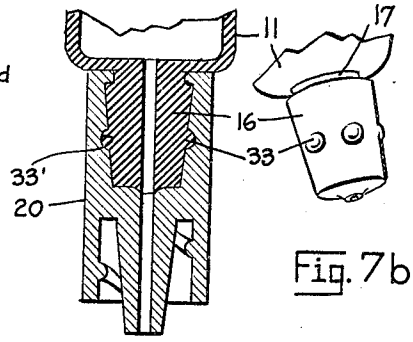


Fig. 7b

Fig. 7a

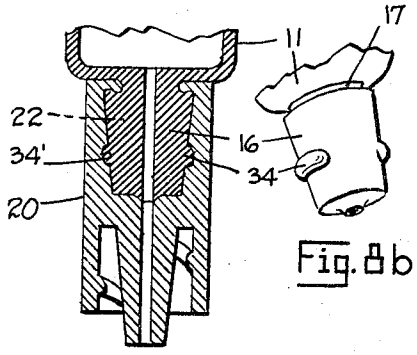


Fig. 8b

Fig. 8a

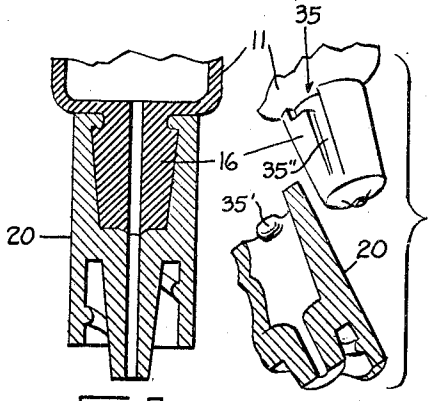


Fig. 9a

Fig. 9b

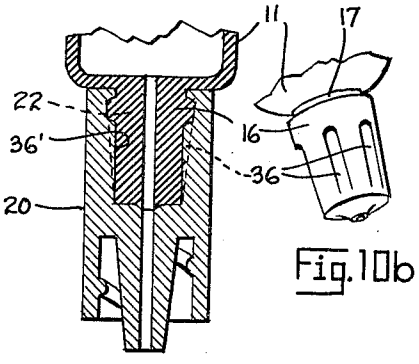


Fig. 10b

Fig. 10a

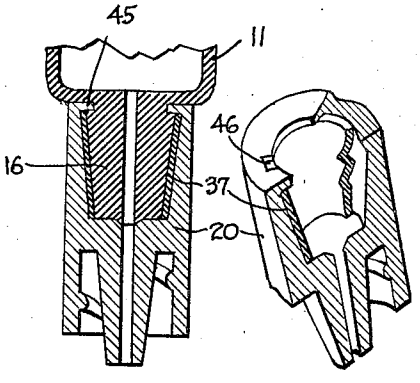


Fig. 11a

Fig. 11b

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HYPODERMIC SYRINGE WITH NON-TURNING TIP CONNECTOR

Filed Dec. 30, 1966 4 Sheets-Sheet 3

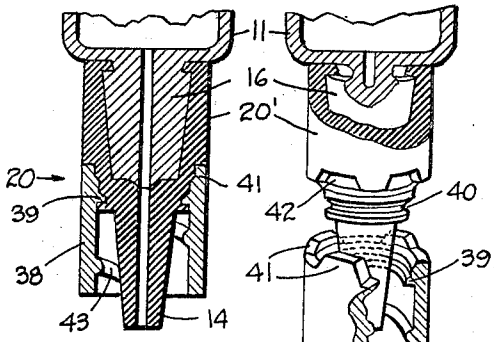


Fig. 12a

Fig. 12b

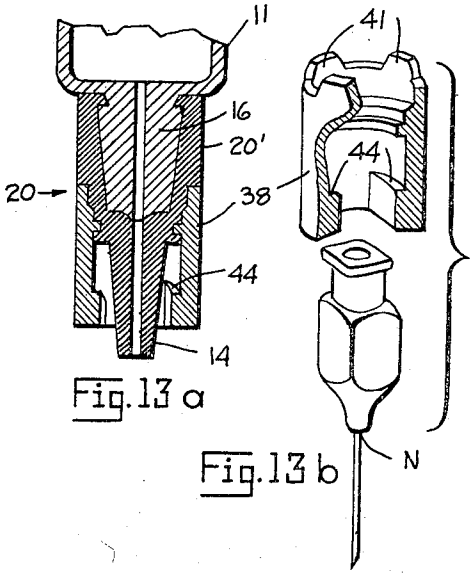


Fig. 13a

Fig. 13b

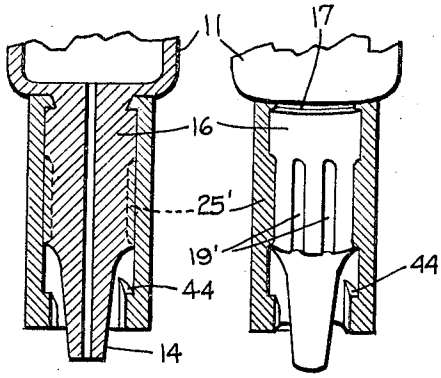


Fig. 14a

Fig. 14b

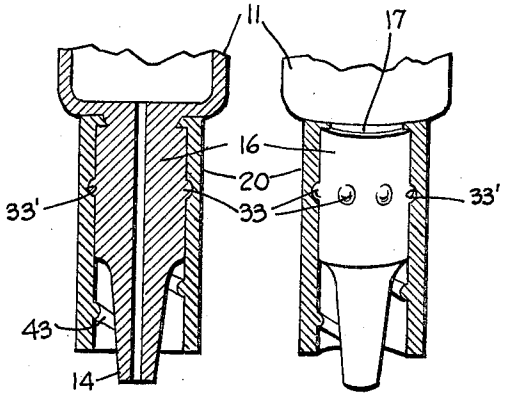


Fig. 15a

Fig. 15b

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HYPODERMIC SYRINGE WITH NON-TURNING TIP CONNECTOR

Filed Dec. 30, 1966 4 Sheets-Sheet 4

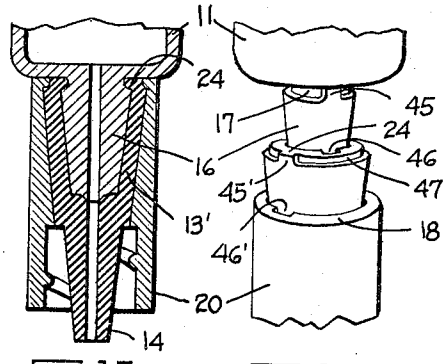


Fig. 16a Fig. 16b

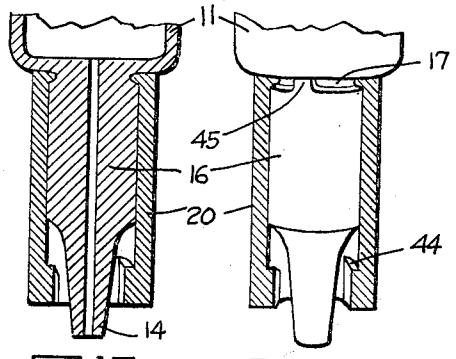


Fig. 17a Fig. 17b

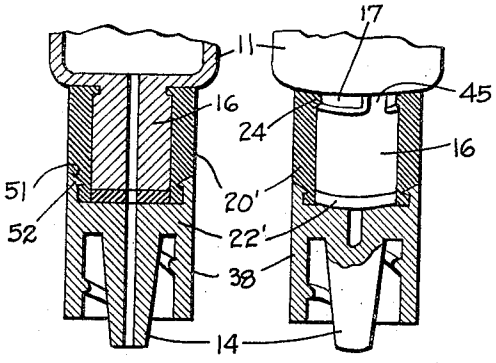


Fig. 18a Fig. 18b

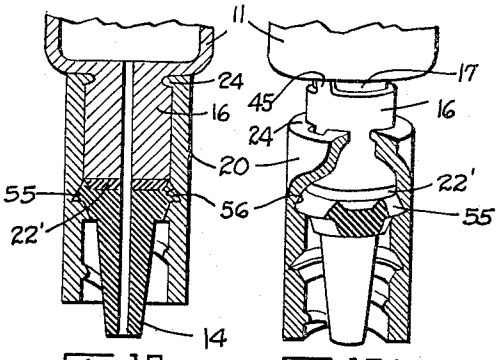


Fig. 19a Fig. 19b

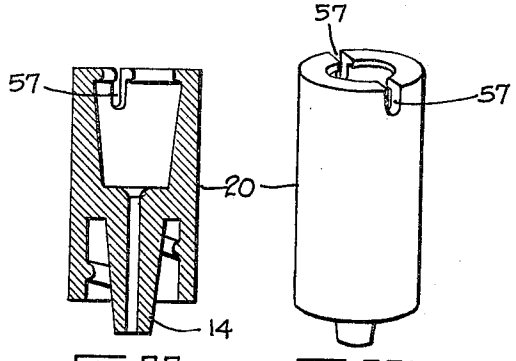


Fig. 20a Fig. 20b

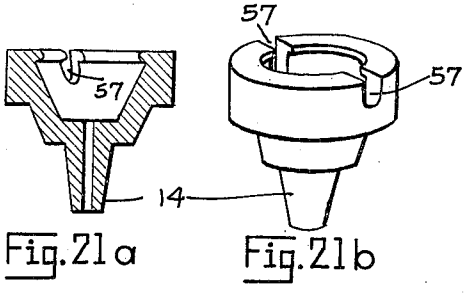


Fig. 21a Fig. 21b

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United States Patent Office 3,491,757
Patented Jan. 27, 1970

3,491,757

HYPODERMIC SYRINGE WITH NON-TURNING TIP CONNECTOR

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Filed Dec. 30, 1966, Ser. No. 606,062
Int. Cl. A61m 5/32
U.S. Cl. 128—221 3 Claims

ABSTRACT OF THE DISCLOSURE

A transparent disposable plastic hypodermic syringe with a tip connector for reception and retention of the hypodermic needle in a non-turning and airtight relationship with the fluid containing cylinder of the syringe.

This invention relates in general to hypodermic syringes and specifically to improvements therein whereas the present day type of hypodermic syringe with the "Leur-Lok" has many disadvantages which my invention overcomes.

The "Leur-Lok" arrangement, as it is used today with its positive reception of the injection needle does have the advantage of providing positive gripping of the needle as well as positive sealing against leaks which may cause air to enter the syringe, this entrance of air, above all things, being dangerous in the proper use of the hypodermic syringe.

Although the physical arrangement of the "Leur-Lok" type of hypodermic syringe is its prime advantage the specific material from which it is made has been the prime factor or in its high cost. The cylinder is generally made of glass as is the plunger and the actual "Leur-Lok" attachment is made of chromed brass which is subject to corrosion, difficulties in cleaning and sterilizing and other deleterious factors. Its opacity and very form makes it difficult to clean and impossible to determine whether it is absolutely clean before reuse.

It is the primary object of my invention, therefore, to produce a hypodermic syringe in which all the parts are transparent, other than the actual needle itself, which forms no part of my invention, whereby the form of the various parts and their transparency not only makes cleaning and antisepticizing easy and positive but the cost of manufacturing is considerably reduced as certain parts can be molded from plastic in a very simple and inexpensive manner and yet with a precision completely adequate for the intended purpose and having the advantage of being disposible if necessary with little or no attendant loss because of the low cost. They may be used with present day glass cylinders or with plastic cylinders.

Another object of my invention is to provide a tip connection for reception of the needle in which said tip connection has a positive non-turning and airtight connection with the cylinder.

One other object of my invention is to provide dual-purpose and convertible tips which may be used either with the "Leur-Lok" type of needle or as a "free pivot" type connection where the needle, tubing or other element is slipped onto a tapered nozzle of the syringe without being locked thereon.

Other objects and advantages as well as the construction and manner of use of the various forms of my invention will be apparent from the following specification in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a hypodermic syringe constructed in accordance with my invention covered in now abandoned application for U.S. patent Ser. No. 578,816, filed Sept. 12, 1966, with the integral "Leur-Lok" tip and movable plunger.

FIGS. 1*a* and 1*b* are a cross sectional view and a fragmentary perspective view of one form of hypodermic syringe tip connection in which the cylinder is provided with short slots to engage projecting ribs in the "Leur-Lok" type element for positive and nonturning connection therewith.

FIGS. 2*a* and 2*b* are similar views in which the ribs and slots are reversed with the "Leur-Lok" element having full length slots to receive ribs running the full length of the syringe tip.

FIGS. 3*a* and 3*b* are similar views with both elements having single planar partial contacting portions to prevent turning.

FIGS. 4*a* and 4*b* are similar views with double opposed partial planar contacting surfaces.

FIGS. 5*a* and 5*b* are similar views with a full single planar contacting surface on each element and a sealing element between the cylinder tip and the "Leur-Lok" type element.

FIGS. 6*a* and 6*b* are similar views with full double flat contacting surfaces and the sealing element.

FIGS. 7*a* and 7*b* are similar views with a plurality of projections on the glass cylinder extension adapted to snap into position in matching depressions in the "Leur-Lok" type element.

FIGS. 8*a* and 8*b* show another form of glass projection used similarly to FIGS. 7*a* and 7*b*.

FIGS. 9*a* and 9*b* illustrate a bayonet type connection between the cylinder and the "Leur-Lok" type fitting.

FIGS. 10*a* and 10*b* illustrate a plurality of ribs and slots between the cylinder tip and "Leur-Lok" type fitting.

FIGS. 11*a* and 11*b* illustrate the use of a surrounding gasket or seal between the cylinder tip and the "Leur-Lok" type fitting to be used in the event the dimensions of the glass tip are not perfect.

FIGS. 12*a* and 12*b* illustrate a dual member "Leur-Lok" in which the cylinder member receives a snap fit plastic nonrotatable sealing tip thereon, which in turn receives a snap fit needle receiving member with the lugs received in recesses in the sealing tip to prevent turning therebetween.

FIGS. 13*a* and 13*b* illustrate an arrangement similar to FIGS. 12*a* and 12*b* wherein opposite inclined shoulders provide for reception in fixed position of the hypodermic needle.

FIGS. 14*a* and 14*b* illustrate another form of the invention in which a cylindrical shaped outer snap-fit member is received on the glass cylinder which has its own internal needle engaging "free pivot" tip, the outer member snap fitting with the "free pivot" tip, and ribs and slots being used between said member and tip, thus preventing turning.

FIGS. 15*a* and 15*b* are similar views in which projections and indentations are used between the cylinder and the snap fit member with a spiral rib receiving the needle.

FIGS. 16*a* and 16*b* illustrate another form of the invention in which the glass cylinder foreshortened tip receives a snap fit internal member projecting into the needle which engages the outer cylindrically shaped member, snap fitting onto the internal member, suitable lugs and apertures being provided between various members to prevent rotation therebetween.

FIGS. 17*a* and 17*b* illustrate a form of my invention similar to FIGS. 14*a* and 14*b* wherein one or more lugs and recesses may be provided at the snap fit annulus between an outer cylindrical member and the glass cylinder tip.

FIGS. 18*a* and 18*b* illustrate still another form of the invention in which the glass cylinder receives a short snap fit cylindrical member which in turn receives another

short snap fit member in the form of a "Leur-Lok" and also having a "free pivot" central needle engaging tip and spiral needle receiver, suitable lugs and recesses being provided between the glass cylinder and the first short cylindrical member, and a sealing member being received between the first short cylindrical member and the second snap fit member.

FIGS. 19*a* and 19*b* illustrate the glass cylindrical member receiving a projecting snap fit cylinder with lugs and recesses therebetween to prevent turning, said projecting cylinder having a spiral rib for reception of the neeedle, and an internal projecting member to contact the needle and snap fitting internally with the projecting cylinder, planar surfaces therebetween preventing turning and a gasket between the end of the glass cylinder and the internal projecting member to form a seal therebetween.

FIGS. 20*a* and 20*b* illustrate another form of my invention showing a "Leu-Lok" type fitting similar to FIGS. 9*a* and 9*b*, with opposed slots to provide more flexibility to the tip for application to the cylinder.

FIGS. 21*a* and 21*b* illustrate still another form of my invention in which the "Leur-Lok" connection is eliminated but which retains the opposed slots for additional elasticity.

In the various forms shown in the drawings I have endeavored to illustrate a number of different configurations possible in which the principles of my invention are incorporated. It must be kept in mind that the cylinder can be made of glass or plastic although glass may be preferable for its ease in cleaning and its clarity as well as its inherent characteristic of maintaining its form regardless of the heat of the sterilizing medium.

With the use of my invention the problem of breakage is minimized as the application of the needle to the cylinder is through an intermediate nonbreakable material.

In some cases of application of an intermediate member to the tip of the cylinder it is essential that there be no rotative movement between the two elements and therefore various means have been shown in the modifications of the intermediate member or members to prevent rotative relation with the cylinder.

Referring now to the drawings by numerals of reference in FIG. 1 where I have illustrated the syringe **10** as shown in my application Ser. No. 578,816, with its cylinder **11** and plunger **12** both being made of a suitable plastic material, the cylinder having its needle receiving tip **13** with central apertured tapered nozzle **14** and outer cylindrically shaped needle receiving socket **15** having spiral securing ribs **15'** internally thereof.

In FIGS. 1*a* and 1*b*, the cylinder **11** may be formed with a reduced tip **16** having an annular recess **17** at the juncture of the tip with the cylinder, the tip preferably being tapered as at **18** and in this particular form having oppositely disposed slots **19**, the use of which will be explained hereinafter, said slots extending only partially the length of the tip **16**.

The intermediate "Leur-Lok" type needle receptor **20** in FIG. 1*a* has a substantially cylindrical outer configuration or surface **21** with opposing internal recesses **22** and **23**, one recess **22** having inturned lip **24** adapted to snap fit into the annular recess **17** between the tip **16** and cylinder **11**, the recess **22** being a substantially precise fit with said tip **16**. The receptor **20** is provided with opposing ribs **25** internally of recess **22** adapted to register with the oppositely disposed slots **19** and thereby prevent rotative movement of the receptor **20** when mounted on the tip **16**.

The end of the tip **16** may be provided with a projection **26** adapted to fit a matching recess **27** in the receptor **20** aiding in the sealing relation between the two at the junction of the central aperture **28** of the tip **16** and the central aperture **29** of the receptor **20**.

The end of the receptor **20** remote from the syringe cylinder **11** has an elongated tapered nozzle **14** extending through the recess **23** and internally of said recess **23** are spiral securing ribs **16'** in substantially the same form as now in use for the "Leur-Lok" system.

In the modification shown in FIGS 2*a* and 2*b* the slots **19** and ribs **25'**, are reversed and are of full length of the reduced syringe tip **16** and internal recess **22**.

In the form of my inventions shown in FIGS. 3*a* and 3*b*, rotative movement between the tip **16** and needle receptor **20** is prevented by the partial flat surface **30** on the tip **16** bearing against flat surface **31** of the internal recess **22** of the needle receptor **20**.

In FIGS. 4*a* and 4*b* my invention shows a modification in which opposing partial flat surfaces **30'** on the tip **16** are used to engage opposite partial flat surfaces **31'** in the recess **22** of the needle receptor **20** to prevent turning relation between the tip and receptor.

In FIGS. 5*a* and 5*b* the modification shows a full planar single surface **30''** on tip **16** in contacting relation with full planar single surface **31''** internally of the recess **22** of needle receptor **20**, thus preventing turning relation therebetween. A resilient sealing member **32** is used at the end of tip **16** between said tip and the end portion **22'** of the recess **22**.

FIGS. 6*a* and 6*b* show double in full planar surfaces **30***d* and the sealing member **32** as in FIGS. 5*a* and 5*b*, the interior of the recess **22** also having double flat surfaces **31***d*.

FIGS. 7*a* and 7*b* illustrate the use of projections **33** on the tip **16** to engage matching identations **33'** in the internal surface of recess **22**.

In FIGS. 8*a* and 8*b* are illustrated a tip **16** with lateral projections **34** adapted to engage lateral recesses **34'** in the internal surface of recess **22**.

FIGS. 9*a* and 9*b* show a bayonet type connection **35** between the tip **16** and the needle receptor **20**, the projection **35'** riding in the recess **35''** of the tip **16**.

FIGS. 10*a* and 10*b* show a plurality of slots **36** in the tip **16** adapted to receive a plurality of registering ribs **36'** extending internally from the wall of the needle receptor **20** into recess **22**.

In all of the forms described in FIGS. 1*a* to 10*b*, the inturned lip **24** snaps into place in annular recess **17** making for a tight fit between the tip and the needle receptor **20**, and each of the forms employs means for preventing turning relation between the tip and the receptor. Thus, the "Leur-Lok" type needle can be securely applied to the needle receptor **20** without turning of said receptor.

In FIGS. 11*a* and 11*b* the inturned lip **24** of the needle receptor **20** engages the annular recess **17**, there being a rotation restricting means in the form of a stop member **45** on the reduced tip **16** engaging a recess **46** in the needle receptor. There is also provided between said needle receptor **20** and the reduced tip **16** an annular sealing member **37** of a suitable material whereby any imperfections in the glass reduced tip **16** will not affect the seal between said tip and the needle receptor **20**.

In FIGS. 12*a* and 12*b*, a two-piece needle receiving tip is illustrated with the needle receptor **20** having the same form of elongated tapered nozzle **14** as shown in the previous figures, the receptor **20** having associated therewith the separate "Leur-Lok" type collar **38** with annular rib **39** receivable in annular groove **40** in the receptor **20**, a plurality of lugs **41** being received in recesses **42** to prevent rotation between the collar **38** and the upper portion **20'** of the receptor **20**. Helical rib **43** is adapted to receive the hypodermic needle which moves thereupon into sealing position.

FIGS. 13*a* and 13*b* show the same general structure as FIGS. 12*a* and 12*b* except that inclined planar surfaces **44** are used for reception of the Needle N.

FIGS. 14*a* and 14*b* show a needle receptor **20** in which the tapered nozzle **14** is actually an extension of the reduced tip **16**, a plurality of ribs **25'** internally of the needle receptor **20** being adapted to engage matching recesses **19'** in the reduced tip **16'**, inclined planar surfaces

44 being employed in the same manner as in FIGS. 13*a* and 13*b*.

FIGS. 15*a* and 15*b* show the same general idea with glass projections **33** on the reduced tip **16** being adapted to engage recesses **33'** on the interior surface of the needle receptor **20**, and helical ribs **43** receiving the needle.

In FIGS. 16*a* and 16*b*, I have illustrated still another form of my invention where an annular recess **17** is provided between the reduced tip **16** and the cylinder **11** of the hypodermic syringe, the recess **17** being interrupted by a stop member **45**. An elongated tapered nozzle member **14** with its upper portion **13'** having inturned lip **24** snap fits into place in the annular recess **17** around the reduced tip **16** with a recess **46** engaging the stop member **45** to prevent rotation. At the point of contact between the inturned lip **24** and the reduced tip **16** is an outer annular recess **47** which receives the inturned lip **48** of the needle receptor **20** of the "Leur-Lok" type, a stop member **45'** engaging the recess **46'** to prevent rotation.

FIGS. 17*a* and 17*b* illustrate a type of needle receptor as shown in FIGS. 14*a* and 14*b* with the reduced tip **16** and tapered nozzle **14**, the stop member **45** preventing rotation of the needle receptor. The inclined planar surfaces **44** as shown in FIGS. 13*a* and 13*b* are used for moving the needle into sealing position.

FIGS. 18*a* and 18*b* again show the two piece arrangement as in FIGS. 12*a* and 12*b* and 13*a* and 13*b*, the reduced tip **16** being cylindrically shaped and having the annular rib **24** received in the annular groove **17**, interrupted by stop member **45** preventing rotation of an intermediate member **20'**, having the annular recess **51** adjacent one end and externally thereof, receiving the lip **52** of the "Leur-Lok" type collar **38**, a sealing member **22'** being received between the end of the reduced tip **16** and the adjacent surface of the needle carrying collar **38**.

FIGS. 19*a* and 19*b* also show a two piece arrangement but in this instance the outer cylindrical portion or needle receptor **20** snap fits in the annular recess **17** by means of annular rib **24**, a stop member **45** preventing rotation. The elongated tapered nozzle **14** is internally received by the receptor **20**, the annular rib **55** snapping into position in annulad recess **56**, with a sealing member **22'** between the reduced tip **16** and the nozzle or tip **14**.

FIGS. 20*a* and 20*b* illustrate another modification in which one or more slots **57** may be provided to give more elasticity to the needle receptor **20** to facilitate its application to the annular recess **17**. The slots **57** may be used in any of the forms shown in the drawings.

FIGS. 21*a* and 21*b* show the use of the same type of slot **57** in a form of the invention which eliminates the "Leur-Lok" connection and employs only the tapered receptor **14** for a needle, tubing or the like, this being what is termed the "free-pivot" type of connection.

While I have shown numerous different variations of my invention I do not wish to be limited to the specific modifications shown as other forms may be employed without departing from the spirit of my invention.

I have provided various forms of inexpensively made units adaptable for both use with the "Leur-Lok" type needles and for "free-pivot" use for needles, tubing or any other device attachable to a hypodermic syringe. The very fact that my invention may be made from the new plastic materials and still retain precision control of critical tolerances in design and manufacture without impairing the efficiency of the hypodermic syringe makes it a definite advancement over the devices now existent in the art. The further great advantage is that units can be sold for either "free pivot" use or for "Leur-Lok" use, or in combination for either of the two uses resulting in a considerable saving in cost of hypodermic syringes.

What I claim as new and desire to secure by Letters Patent is:

1. In a hypodermic syringe employing a fluid receiving cylinder, a reduced projecting portion extending from one end of the cylinder, an annular recess on the reduced projecting portion adjacent said one end of the cylinder, a tip adapted to receive a removable needle sealingly carried by the cylinder, said tip including an annular portion receivable by said annular recess, rotation preventing means between the cylinder and the tip which include registering portions therebetween rendering one rotatively immovable with respect to the other, the projecting portion including an extended "free-pivot" connection for devices connected to the syringe, the tip including the "Leur-Lok" connection for the needle.

2. The structure as specified in claim **1**, the "free-pivot" connection for devices connected to the syringe being carried internally of the tip, and a sealing element between the "free-pivot" connection and the projecting portion of the fluid receiving cylinder.

3. The structure as specified in claim **1**, the projecting portion carrying a "free-pivot" connection for devices connectable to the syringe, the tip being received in nonrotatable relation about the "free-pivot" connection and having a "Leur-Lok" connection for the needle.

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