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NEEDLE SYRINGE EQUIPMENT

Filed April 27, 1934

Fig. 1.

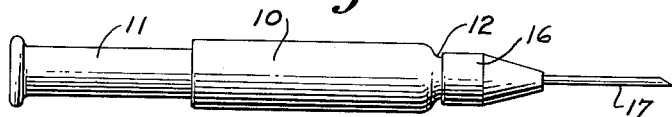


Fig. 2.

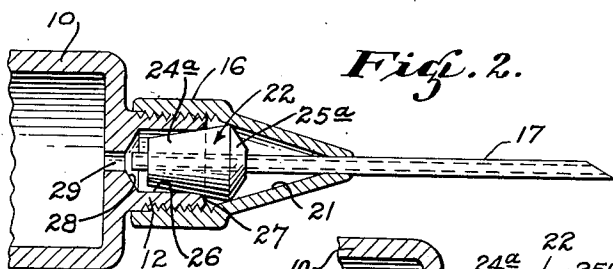


Fig. 4.

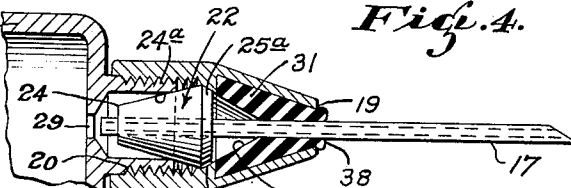


Fig. 3.

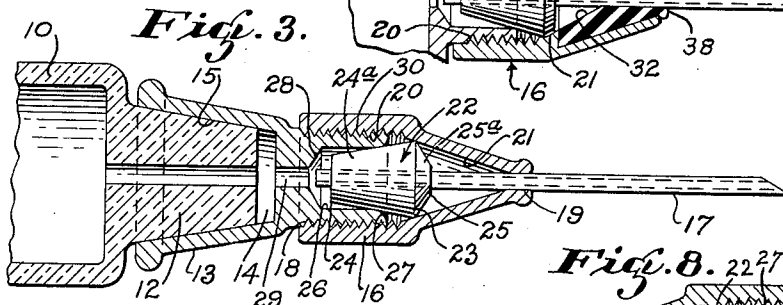


Fig. 8.

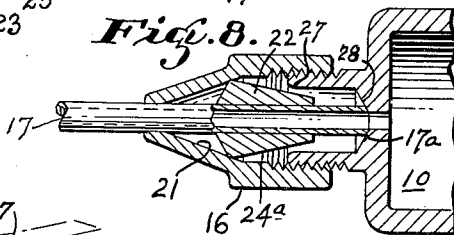


Fig. 5.

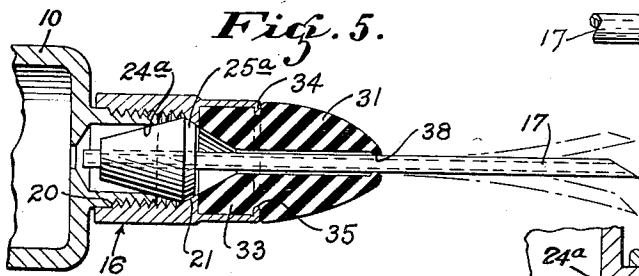


Fig. 6.

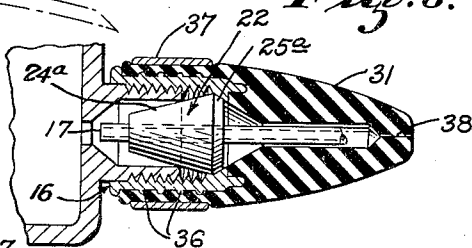
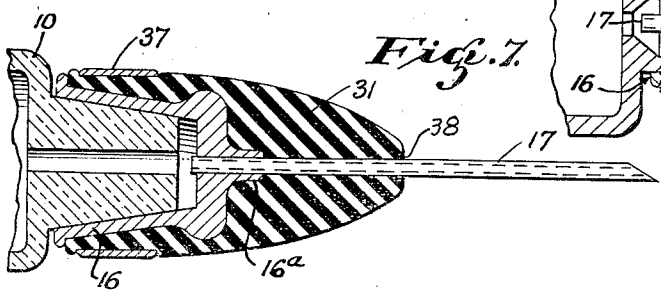


Fig. 7.



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NEEDLE SYRINGE EQUIPMENT

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4 Claims. (Cl. 128—215)

This invention relates to improvements in needle syringe equipment and particularly to that class of needle syringe equipment usually known as hypodermic syringe structures in which a tubular ejection needle is a separate element connected for operative purposes to the syringe structure by a separate ferrule or hub.

Broadly, the use of a separate needle with a lug intermediate its ends is known, but heretofore there have been objections to such separate needles for use in syringe equipment, due to the fact that a tight leak-proof seat could not be obtained between needle and syringe body without use of a wrench or tool for seating the needle, and not only was this inconvenient, but the nipple on the discharge end of the syringe body was frequently broken, especially in glass barrel syringes, (of what is commonly known as the Luer type); also the seating of the needle had to be of such force of contact with its seat that the material of the seat or of the lug became deformed, so that a needle would not form a perfect seat or joint in the next operation. Professional operators generally have been forced to the expense of utilizing the combined or integral needle and hub or ferrule, rather than be inconvenienced by these difficulties. Another objection to the separate needle has been that its sharpened or incision end has been dulled by the act of inserting the incision end through a hub or ferrule. Another objection to needles of all types is that the fulcrum of the needle under lateral strain is against a rigid surface at the tip or discharge end of the ferrule or hub, and if the needle breaks at this point of fulcrum, it becomes embedded in the tissue of a patient, which requires a surgical operation for removal of the embedded portion of the needle. This danger arises due to the tissue being compressed when making an injection and the consequent rebound of the tissue which obscures the embedded portion of a broken needle, especially in movable or moving tissue. It is the purpose of this invention to overcome these difficulties with an efficient, economical syringe equipment structure.

Among the objects of this invention are to provide syringe equipment in which a leak-proof joint may be had between a separate needle and a syringe container body; to provide means for mounting a needle on a syringe body wherein a leak-proof joint may be made without the use of implements or tools; to provide means for mounting a needle in leak-proof relation to a frangible discharge nipple of a syringe; to provide in sy-

ringe equipment a ferrule for attaching a needle to a syringe body whereby the sharpened end of the needle may be guided through an opening in the ferrule; to provide a ferrule for mounting a needle to a syringe body in which the ferrule is provided with a resilient portion to receive lateral stress on the needle and in which the fulcrum of the needle when under lateral stress is on a rigid portion of the ferrule which is inset axially from the extreme end of the ferrule; to provide a ferrule for needles of varying diameters; to provide an improved type of needle for syringe equipment separate from the attaching hub or ferrule and arranged for making a leak-proof joint with a syringe body; to provide a mounting for needles of various diameters.

With the foregoing and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawing, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, and size, number of parts and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

To more clearly comprehend the invention reference is directed to the accompanying drawing wherein:—

Fig. 1 is a horizontal side view of a syringe illustrating relative location of elements.

Fig. 2 is a longitudinal section showing one form of the invention, with syringe body in fragment and needle in full.

Fig. 3 is a longitudinal section of the invention showing the adaptation to a syringe body known as the Leur type of syringe, with syringe body in fragment and needle in full.

Fig. 4 is a longitudinal sectional view of modified form of ferrule or hub and needle structure, with modified form of ferrule in section.

Fig. 5 is a longitudinal view of ferrule or hub and needle structure in modified form, with modified form of ferrule in section.

Fig. 6 is a longitudinal view of needle structure and modified form of ferrule or hub in section.

Fig. 7 is a longitudinal section of modified form of ferrule or hub, with needle in full.

Fig. 8 is a fragmentary longitudinal sectional view of modified form of needle seat.

Referring to the drawing, wherein like characters of reference designate corresponding parts, 10 represents a hollow syringe body generally

cylindrical and provided with a plunger 11. The syringe body 10 and plunger 11 may be of any suitable type which has a discharge nipple 12 at its discharge end, preferably of lesser diameter than the syringe body. The syringe body 10 and the discharge nipple 12 may be of any suitable material such as metal or glass, and the nipple 12 may be externally threaded as in Fig. 1 or may be externally smooth as in Fig. 3, the former usually being characteristic of metal syringe bodies, and the latter being usually characteristic of glass syringe bodies known as the Leur type. With the Leur type which has a smooth exterior surface to the nipple, as illustrated in Fig. 3, it is desirable to provide an adapter 13 having a recess 14 with a smooth internal wall 15 into which the smooth nipple 12 snugly fits and is frictionally held. A tubular ferrule or hub 16 is provided to receive therethrough a tubular needle or cannula 17, the ferrule or hub having an end 18 by which the ferrule may be connected to the syringe structure, and an opening at the opposite end 19 through which the sharpened ejection end of the needle cannula may pass. The internal wall of the ferrule or hub adjacent its connecting end 18 is preferably internally threaded as at 20 and said internal wall intermediate the ends 18 and 19 may be provided with a tapered portion as at 21 to guide the sharpened point of the needle to and through the opening 19. The needle cannula 17 is provided with a lug 22 which is preferably fixedly mounted intermediate and spaced from both the ends of the needle so that it is more nearly spaced to the connection end than the incision end as shown in Figs. 2, 3, 4, 5, 6, and 8, and said lug is provided with varying transverse diameters so as to provide a tapered wall thereon from a portion of greater diameter, as indicated 23, to portions of lesser diameter, indicated 24 and 25, it being preferred that the taper of said lug shall be in both directions axially of the needle from the portion of greater diameter 23 toward the respective portions of lesser diameter 24 and 25 respectively, thus providing tapered wall sections 24^a and 25^a. Regardless of whether the syringe body be of the threaded nipple type shown in Fig. 2 or of the smooth-nipple type shown in Fig. 3, there is provided a mounting for the needle to the syringe structure of substantially similar character, in Fig. 2 said mounting being direct to the syringe body structure, and in Fig. 3 said mounting being to the adapter 13. For the purpose of mounting the needle to the syringe structure, there is provided at the mounting portion a socket 26 preferably having an arcuate chamfer 27 at the outer edge of its interior wall and preferably having its bottom wall 28 tapered inwardly to the conduit 29 which provides communication to the interior of the syringe body 10. The outer wall of the connecting portion is threaded as at 30 to cooperate with the threads 20 of the ferrule or hub 16 whereby the hub and connecting portion may be releasably connected, with the lug 22 and needle cannula 17 engaged therein, one tapered wall 24^a of the lug 22 seating on the chamfered edge 27 and the opposite end portion of the lug seating on the tapered wall 21 of the ferrule or hub 16. Such structure provides a double tapered seat between the needle and the syringe structure and permits a leak-proof joint to be made by manual manipulation with thumb and finger of the hand without the use of tools. It will be noted that the needle is thus provided with a double seat which forms

not only a leak-proof joint, but also a bracing for the needle at spaced points so that even though the opening 19 should be larger than the exterior diameter of the needle, nevertheless the needle would be firmly braced against wobbling on its seat, thus permitting the use of a single hub or ferrule with needles of varying diameters. For most advantageous use of needles or cannulas of various diameters, the end portion of ferrule 16 may include a resilient member 31 which will firmly grip the needles of varying diameters, and will prevent dulling the sharpened end upon insertion of the needle.

Referring to Fig. 4 in which a modification is shown of ferrule and needle, a resilient member 31 such as rubber is inserted in and held by the end portion of the ferrule and may be extended beyond the opening 19. The tapered wall 25^a of the lug 22 seats on the tapered wall 21 of the ferrule.

In the modification of Fig. 5 the tapered wall 25^a of the lug seats on the tapered wall 21 of the ferrule, and the resilient member 31 is extended beyond the end of the ferrule and has a base portion 33 engaged therein by an inturned bead 34 of the ferrule cooperating with an annular groove 35 in the base portion of the resilient member.

In Fig. 6 a modification is shown wherein the ferrule 16 is substantially imbedded in the resilient member 31, as by molding the resilient member over corrugations 36 of the ferrule, and the resilient member may be further fixedly maintained on the ferrule by an annular band 37.

In Figs. 4, 5, and 6 the tapered wall 21 is continued into the resilient member 31 which has its opening 38 with resilient walls which serve the purposes of permitting the use of needles of various diameters, and also snugly grip the needle so that if the needle should break at its rigid fulcrum there would be sufficient length extending from the tissue to permit withdrawal of the broken portion from the tissue; and in Figs. 5 and 6 the opening 38 is a slit which closes by its own resiliency upon withdrawal of the needle, and thereby seals the internal cavity within the syringe structure, and serves as a packing gland around the needle when in use.

In each of the structures of Figs. 4, 5, and 6 the tapered wall 24^a of the lug seats on a chamfer edge 27 in like manner as in Fig. 2.

Fig. 7 shows a still further modification of needle and hub, the hub having an extension or sleeve 16^a which may be swaged to the needle. In Fig. 7 there is a fixed relationship between the hub or ferrule 16 and needle 17, and the resilient member 31 may be moulded to the ferrule or hub 16 and further secured by an annular band 37 in substantially the same manner as in Fig. 6.

Fig. 8 shows an adaptation of seating the base 17^a of needle 17 directly on the conical taper of the bottom wall 28 of socket 26. This is particularly desirable in the use of needles of large diameter. The lug 22 seats at its maximum diameter on the tapered wall 21, but may not seat on the chamfer edge 27. Nevertheless, a leak-proof joint will be formed by the continuous narrow line of contact on a tapered wall between lug 22 and wall 21, and wall 28 and needle base 17^a. Such a structure adapts the same syringe to needles of varying diameters, for which purpose the ferrules of Figs. 4, 5, or 6 are especially effective, since the resilient member is adapted to accommodate a range of needle diameters.

In the devices of the Figs. 4, 5, 6, and 7, it will be noted that the needle may bend when subjected to lateral stress in practical operation by deforming the resilient member, and that the fulcrum of the needle against a rigid portion of the ferrule is substantially spaced from the extreme end or opening 19, so that if the needle should break when inserted in tissue and if the grip of the resilient material on the needle should fail to be sufficient to withdraw the broken portion of the needle, there will still remain a very appreciable length of needle which is free of the tissue, so that the broken shaft may be withdrawn by pincers or other implement, since the needle shaft cannot be inserted into tissue to a greater depth than the portion which is free and extends beyond the end 19.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. In syringe equipment, a tubular syringe body having at its discharge end a portion provided with a socket for seating an ejection needle, a tubular ejection needle having mounted thereon a tapered lug adapted to seat on the outer open end of the socket portion, and a ferrule member adapted at one end for connection to the socket portion, said ferrule member having a flexible body at its opposite end with an opening through which the discharge end of the needle may pass.

2. In syringe equipment, an adapter provided with socket to receive a discharge nipple of a tubular syringe body and having a discharge end portion provided with a socket for seating an

ejection needle, a tubular ejection needle having mounted thereon a tapered lug adapted to seat on the outer open end of the socket portion, and a ferrule member adapted at one end for connection to the socket portion, said ferrule member having a flexible body at its opposite end with an opening through which a discharge end of the needle may pass.

3. In syringe equipment, a ferrule for attachment of a tubular ejection needle to the discharge end of a syringe body, comprising a hollow body portion at one end for connection to a discharge end of a tubular syringe and an elastic body portion of inherently resilient material at its opposite end, said elastic body portion being mounted with relation to the ferrule so that its resiliency is maintained when the ferrule is securely mounted to a syringe body and said elastic body portion having an opening through which the discharge end of a tubular needle may pass.

4. In syringe equipment, a ferrule for attachment of a tubular ejection needle to the discharge end of a syringe body, comprising a hollow body portion at one end for connection to a discharge end of a tubular syringe and an elastic body portion of inherently resilient material at its opposite end, said elastic body portion having an opening through which the discharge end of a tubular needle may pass, said ferrule having a tapered internal wall intermediate the extreme ends thereof for guiding a needle into the opening through the elastic body portion.

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