

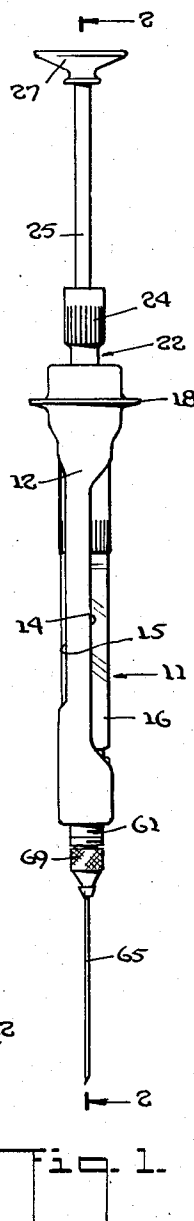
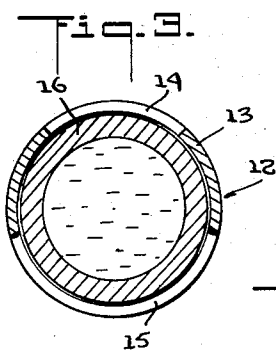
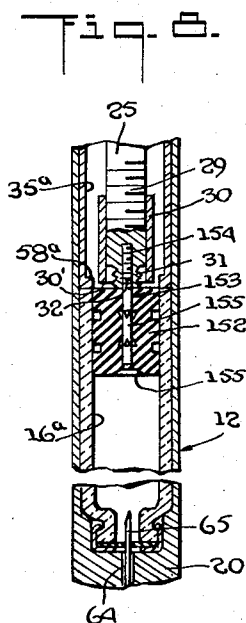
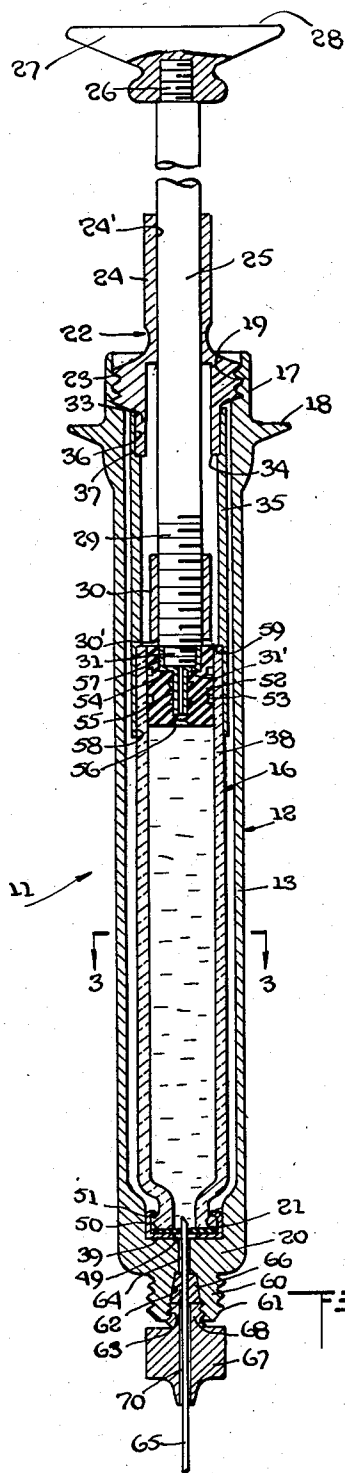
Sept. 15, 1959

B. FRIEDMAN
HYPODERMIC SYRINGES

2,904,043

Filed Feb. 10, 1954

2 Sheets-Sheet 1



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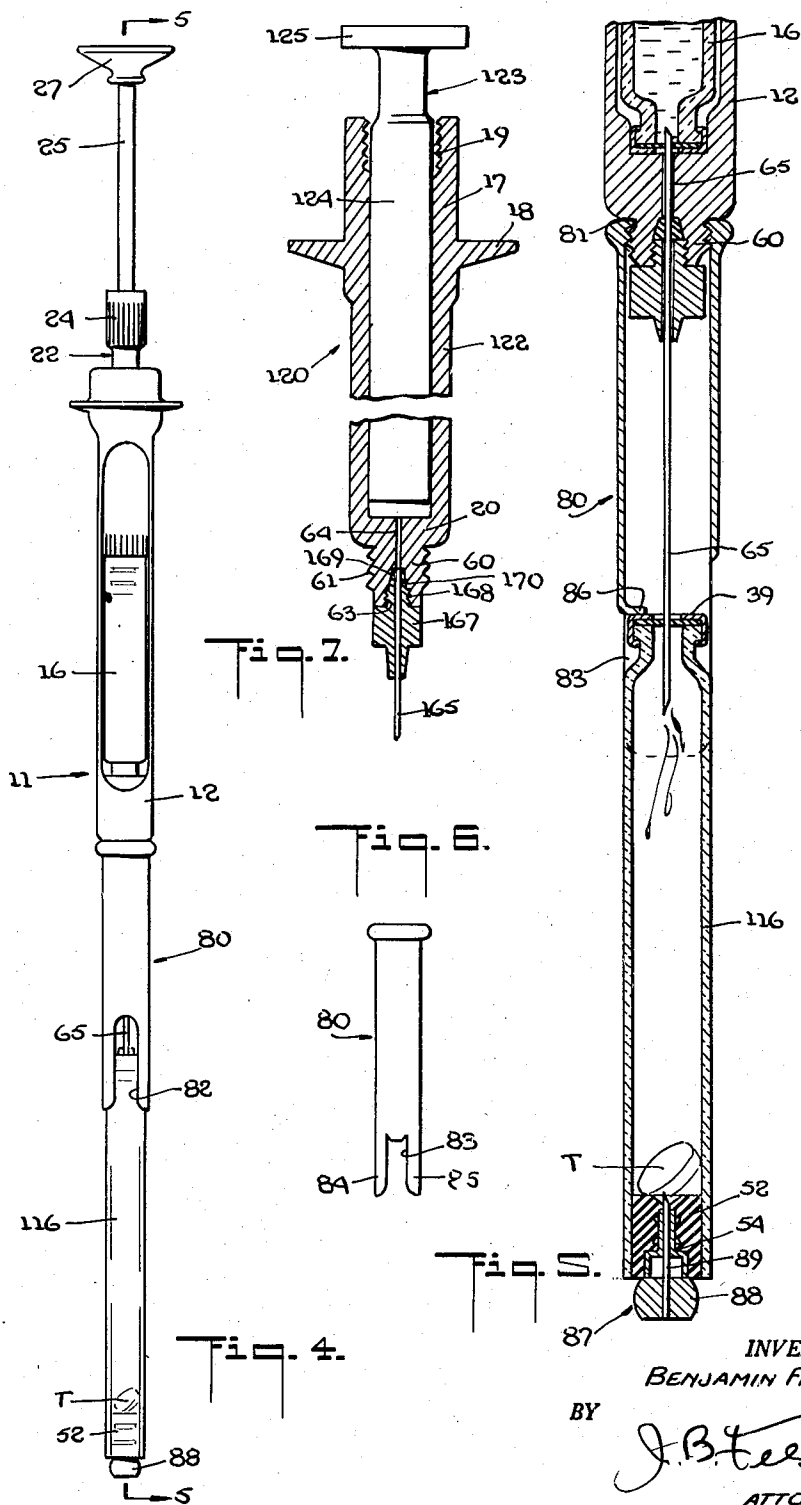
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2 Sheets-Sheet 2



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2,904,043

HYPODERMIC SYRINGES

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Application February 10, 1954, Serial No. 409,440

11 Claims. (Cl. 128—218)

This invention relates to hypodermic syringes.

In my prior co-pending application Ser. No. 331,616, filed January 16, 1953, there are disclosed several novel syringe devices. The present invention resides in several improvements over the device of said prior application.

More specifically, it is an object of the present invention to provide in a device of the character described a novel spacer element to allow for utilization of cartridges which are shorter than the maximum size accommodated by the device.

Another object is to provide a device of the character described comprising a tube having a threaded open end, a threaded bearing member in engagement with said threaded tube end, a rod reciprocally slidably mounted in said bearing member, said spacer element being in engagement with said bearing member whereby rotation of the latter causes it to be adjusted axially to urge the spacer element into abutting engagement with the undersize cartridge and thereby clamp the latter in proper fixed position within the tube, so as not to be dislocated during aspiration of blood.

A further object is to provide the spacer element and the bearing member with interfitting cylindrical portions having engaging abutting shoulder surfaces.

Another object is to provide a device of the character described wherein many of the parts disclosed as separate elements in said prior application are now formed integral with the tube in the present forms of the invention resulting in a more durable, efficient, and economical structure.

A further object is to provide a novel means for mounting the hypodermic needle to the tube, the latter being provided with a bore having a tapered inner end and an internally threaded outer end, the needle having a tapered hub received within the tapered end of the bore, and a needle retaining member having an externally threaded portion in threaded engagement within the internally threaded end of the bore and engaging the needle hub to press the latter into tight secured relation within the tapered end of the bore.

Still another object is to provide a novel syringe combining the objects and advantages noted above with those of the embodiments disclosed in said prior application.

Other objects and advantages of the present invention are inherent in the structure as disclosed and claimed herein or will be apparent to those skilled in the art as the description proceeds in connection with the accompanying drawings wherein:

Fig. 1 is a side elevational view of one form of the present invention;

Fig. 2 is a longitudinal sectional view on line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional view on line 3—3 of Fig. 2;

Fig. 4 is a side elevational view of the embodiment of Fig. 1 with an auxiliary member attached thereto for mounting a second cartridge for a dissolving operation;

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Fig. 5 is a longitudinal sectional view on line 5—5 of Fig. 4;

Fig. 6 is a detail view of the auxiliary member;

Fig. 7 is a longitudinal sectional view of another embodiment of the invention; and

Fig. 8 is a partial sectional view showing the device of Figs. 1 to 6 having therein a different type of cartridge wherein the plunger is provided with a male threaded securing element instead of a female threaded element.

Referring now to the drawing in more detail, the reference numeral 11 indicates generally a preferred embodiment of a syringe in accordance with the present invention and comprising a hollow longitudinal tube 12 of cylindrical configuration. Tube 12 may be formed of metal; plastic, glass or other suitable material and its wall 13 is provided with oppositely disposed openings 14, 15. The latter allow a cartridge 16 to be inserted therethrough into the interior of tube 12 and also permit visual examination of the cartridge 16 when the device 11 is in use, as will be explained in more detail below.

As shown in Fig. 2, the upper end of tube 12 is enlarged at 17 and is provided with an annular hand-engageable flange 18 integral therewith. Tube 12 is open at said upper end and is internally threaded at 19. The lower end of tube 12 is closed by an integral bottom wall 20 having a counterbored recess 21 of lesser diameter than that of the hollow interior of the major portion of tube 12.

A bearing member 22 is externally threaded at 23 to engage within the threaded portion 19 of tube 12, whereby bearing member 22 may be adjusted axially of tube 12 by gripping and rotating the knurled sleeve portion 24 thereof. The latter is provided with a cylindrical bearing opening 24' slidably and rotatably receiving a longitudinal cylindrical rod 25 the lower portion of which extends inwardly into the interior of tube 12, the opposite outer end of rod 25 extending outwardly of bearing member 22.

Secured to the outermost end of rod 25 is an externally threaded member 26 having threadedly mounted thereon a second hand-engageable means comprising a hand engageable knob 27. It will be obvious that when the middle and index fingers engage the lower surface of flange 18 the thumb may engage the top surface 28 of knob 27 to urge rod 25 downwardly or inwardly with respect to tube 12. Thus flange 18 and knob 27 constitute a pair of hand-engageable means for moving the knob relative to the tube 12.

The inner end of rod 25 is externally threaded at 29 and an internally threaded sleeve 30 is threadedly mounted thereon and may be rotated so as to be adjusted axially of rod 25. The innermost end of rod 25 has an externally threaded member 31 of reduced diameter projecting therefrom. Threaded member 31 is provided with an internally threaded bore 32 (Fig. 8) for a purpose to be described.

The lower or inner end of bearing member 22 is provided with a hollow cylindrical portion 33 having a planar end surface 34. A hollow cylindrical spacer element 35 is shown within tube 12 but is easily removable therefrom. The interior surface of the upper end of spacer element 35 is counterbored at 36 to receive cylindrical portion 33 of bearing member 22. The end surface 34 of the latter abuts against the shoulder 37 on the interior wall surface of spacer element 35.

The cartridge 16 may be of conventional construction and comprises a cylindrical glass vial 38 containing a fluid to be injected. The lower end of cartridge 16 rests within counterbored recess 21 of bottom wall 20 and is closed by a cap 39 generally of metal and having a centrally-disposed rubber or plastic plug 49 and a sealing

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diaphragm 50. The peripheral edge of cap 39 is bent about the flange 51 of vial 38.

The upper end of the latter is open and is normally sealed by a rubber plunger 52 reciprocally slidable therein and having external peripheral grooves 53. These plungers are generally of three types. One type shown in Fig. 2 is provided with a female threaded insert 54 embedded therein and comprising a hollow tubular portion 55 the lower open end of which is spaced only slightly above the upper surface of a concave recess 56 formed in the bottom surface of plunger 52.

The upper end of tubular portion 55 is formed integral with an enlarged internally threaded portion 57. It will thus be seen that by rotating rod 25, the externally threaded member 31 may be screwed into the internally threaded portion 57 of plunger 52, thereby securing plunger 52 to rod 25. Thus rod 25 may be pulled upwardly in an aspirating action to draw plunger 52 upwardly within cartridge 16.

Referring to Fig. 8, there is shown a second type of plunger designated 152 having a male threaded securing element 153 in the form of a hollow tube externally threaded at 154 and having a lower portion 155 embedded within plunger 152. The lower open end of element 153 is spaced above the top surface of concave recess 155. It will thus be seen that rotation of rod 25 will cause the threaded portion 154 of securing element to be screwed into the internally threaded bore 32 of member 31.

The third type of cartridge plunger (not shown) generally in use is of the non-aspirating type and is devoid of male or female threaded securing elements. This plunger type is adapted to be merely pushed downwardly and for this purpose the sleeve 30 is rotated on rod 25, until its lower end surface 30' is moved downwardly into a common horizontal plane with the lower end surface 31' of member 31. The surfaces 30', 31' thus cooperate to form a relatively large abutment surface adapted to engage the top surface of this third type of plunger to urge the latter downwardly in response to inward movement of rod 25.

It will thus be seen that member 31 and sleeve 30 enable the syringe to utilize cartridges having all three types of plungers generally in use.

The lower or inner portion of spacer element 35 is counterbored at 58 to receive the upper portion of cartridge 16, the upper end of the latter abutting against a shoulder 59 formed on the interior wall surface of spacer element 35. It will thus be seen that bearing member 22 may be rotated so as to be adjusted downwardly with respect to tube 12 and thereby securely clamp cartridge 16 between the lower end of spacer element 35 and bottom wall 20 of tube 12. Cartridge 16, shown as considerably shorter and narrower than the maximum size cartridge which may be utilized with syringe 11, may be replaced by cartridges of other sizes by unscrewing and removing bearing member 22 and then replacing spacer element 35 with a different spacer element having a longer or shorter length or a different diameter, as may be appropriate. For the largest size cartridge, the spacer element is dispensed with entirely and the end surface 34 of cylindrical portion 33 of bearing member 22 abuts directly against the upper end of the cartridge to retain the latter securely within tube 12.

The lower end of tube 12 is provided with a reduced portion 60 having external threads at 61 and provided with an axial bore, the inner end of the latter being tapered at 62 and the outer end being internally threaded at 63. An axial opening 64 extends through bottom wall 20 and communicates with tapered bore 62. A hollow hypodermic needle 65 is provided with a conical hub 66 secured thereto and mounted within the tapered bore portion 62, needle 65 extending upwardly through opening 64 and piercing plug 49 and diaphragm 50 of cartridge cap 39.

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A needle retaining member 67 is provided with an externally threaded portion 68 screwed into the internally threaded bore portion 63 and abuts against the lower surface of conical needle hub 66 to urge the latter upwardly and wedge it securely within the tapered bore portion 62. The exterior surface of needle retaining member 67 is knurled at 69 so as to be easily gripped and rotated. An axial opening 70 through retaining member 67 receives the intermediate portion of needle 65.

Referring now to Figs. 4 to 6, numeral 80 indicates a hollow tubular auxiliary member having an open internally threaded upper end at 81 adapted to be screwed onto the externally threaded portion 60 at the lower end of tube 12. The opposite wall portions of auxiliary member 80 are slotted at 82, 83 to provide a pair of resilient finger portions 84, 85 for gripping therebetween a second or additional cartridge 116. The latter is similar in construction to cartridge 16 described above and like reference numerals are applied to its various elements, except that cartridge 116 contains a tablet or powder material which is to be dissolved, such as penicillin.

The upper end of slot 83 is provided with a radially inwardly projecting flange 86 acting as a stop engaging the cartridge cap 39 to limit upward movement of cartridge 116 as the latter is slid upwardly through the lower open end of auxiliary member 80. During this upward movement, the lower end of needle 65 will penetrate cap 39.

At the lower end of cartridge 116, plunger 52 is provided with an air vent means 87 comprising a knob 88 having a hollow needle 89 therethrough, needle 89 extending through threaded insert 54 and communicating at its inner end with the interior of cartridge 116. In operation, the entire assembly shown in Fig. 5 is inverted and the fluid in cartridge 16 is injected into cartridge 116 to dissolve tablet T. The rod 25 is then pulled outwardly in an aspirating action to draw the solution from cartridge 116 back into cartridge 16. Auxiliary member 80 and cartridge 116 are then removed and the solution in cartridge 16 is then ready for injection in the usual manner.

The advantage of positively threading the member 31 of rod 25 to plunger 52 of cartridge 16 will thus be apparent. Another function of this arrangement is to permit an aspirating action whereby the plunger 52 may be withdrawn slightly in an aspirating movement to determine if a blood vessel has been pierced by needle 65, the blood being readily observable through openings 14, 15 of tube 12.

Referring now to Fig. 7, there is disclosed another embodiment of the invention indicated generally at 120 and comprising an integral tube 122 similar to tube 12 and having corresponding reference numerals applied to like parts thereof. A rod 123 is reciprocally slidable within tube 122 and is provided with a cylindrical piston portion 124 closely fitting the interior of tube 122 and a knob portion 125 at its upper end. It will thus be obvious that rod 123 may be urged downwardly within tube 122 so that a fluid to be injected may be aspirated into tube 122 in the manner described above. Rod 123 is then urged downwardly to inject the fluid through needle 165, by pressing downwardly on knob portion 125.

Needle 165 extends through and is fixed within a needle retainer 167 having an externally-threaded portion 168 formed integral with a conical portion 169. The latter fits within a tapered bore 170 formed in the reduced portion 60 of tube 122 and threaded portion 168 is screwed into the internally-threaded bore 63 of portion 60. The upper end of hollow needle 165 is in sealed communication with bore 64.

It will be seen that tube 122 is substantially similar to tube 12, whereby rod 123 may be removed for replacement by bearing member 22, rod 25 and spacer element 35 to adapt syringe 120 for use with cartridges

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of the type employed with syringe 11. In this event, needle 165 and retainer 167 are removed and replaced by the needle construction shown in Figs. 2 and 5 or by any other suitable construction providing a needle having an upper pointed end piercing the diaphragm of the cartridge cap.

Referring again to Fig. 8, the cartridge 16a therein is of a wider type than cartridge 16 of Fig. 2. Spacer element 35a is also wider to accommodate cartridge 16a and fits snugly against the interior surface of tube 12. The lower end of spacer element 35a is provided with an enlarged flange 58a abutting against the upper end of cartridge 16a.

It is to be understood that the specific embodiments disclosed are merely illustrative and are not to limit the scope of the invention as delineated in the appended claims unless necessarily so limited by the prior art.

I claim:

1. In an aspiratory cartridge syringe, an integral tube adapted to receive a cartridge having a closure at its bottom end and a slidable plunger at its top end, one end of said tube being threaded and being open, an integral bearing member having threaded means integral therewith in engagement with said threaded tube end and mounted on the latter, a rod reciprocally slidably mounted in said bearing member and extending inwardly into said tube and having one end projecting outwardly from said bearing member, and threaded means on the inner end of the rod for alternatively engaging either male or female threaded elements of cartridge plungers, said threaded means comprising an externally threaded member on the inner end of said rod and extending inwardly therefrom and having an internally-threaded opening, a portion of said rod being externally threaded adjacent the inner end thereof, and an internally threaded sleeve in threaded engagement with said threaded rod portion, said sleeve being thereby adjustably moveable axially of the rod to selectably position the inner end of the sleeve either outwardly of the inner end of said threaded member or in a common plane with said inner end of the threaded member in which latter position the inner ends of both the sleeve and the threaded member cooperate to provide an abutment means for engaging cartridge plungers of the type devoid of threaded connecting elements.

2. In a cartridge syringe, a tube adapted to receive a cartridge having a slidable plunger, said tube having a forward end formed with a stop shoulder, a rod reciprocally movable within said tube and projecting outwardly from the rear end of the tube, a pair of hand engageable means adjacent said rear end of said tube, and on the projecting portion of the rod, respectively, rigid strut like spacer means removably mounted within said tube and slidable therein for engaging the rear end of a cartridge within said tube, a bearing member screwed to the rear end of the tube for engaging the spacer means to stop the latter against movement with respect to the tube, and for unyieldingly pressing said spacer against said cartridge to press said cartridge against said shoulder, said bearing member being formed with an axial passage through which said rod passes, the inner end of said rod having threaded means for alternately engaging either male or female threaded elements of said cartridge plunger.

3. A syringe as recited in claim 2 wherein said threaded means comprises an externally threaded member on the inner end of said rod and extending inwardly therefrom and having an internally-threaded opening.

4. In a syringe as recited in claim 2, said spacer means comprising a tubular element coaxial with said tube, the inner end of said element abutting against the end of the cartridge when the latter is placed within the tube, said tubular element having adjacent its outer end means engaging said bearing member within said tube, said threaded means on the inner end of the rod having an

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externally threaded member extending inwardly therefrom, said externally threaded member having an internally threaded bore therein.

5. In a cartridge syringe, a tube adapted to receive a cartridge having a slidable plunger, a rod reciprocally movable within said tube and projecting outwardly at one end thereof, a pair of hand-engageable means adjacent said one end of the tube and on the projecting portion of the rod, respectively, spacer means removably mounted within said tube for engaging a cartridge to restrain the latter against movement within the tube and means within the tube for engaging said spacer means to restrain the latter against movement with respect to the tube, the inner end of said rod having threaded means for alternatively engaging either male or female threaded elements of cartridge plungers, said threaded means comprising an externally threaded member on the inner end of said rod and extending inwardly therefrom and having an internally threaded opening, a sleeve, and means mounting the sleeve on the inner end of the rod for movement axially thereof to selectably position the inner end of the sleeve in a desired relation with respect to the inner end of said threaded member.

6. In a cartridge syringe, a tube adapted to receive a cartridge having a slidable plunger, a rod reciprocally movable within said tube and projecting outwardly at one end thereof, a pair of hand-engageable means adjacent said one end of the tube and on the projecting portion of the rod, respectively, a spacer means removably mounted within said tube for engaging a cartridge in the tube to restrain the latter against movement within the tube and means within the tube for engaging said spacer means to restrain the latter against movement with respect to the tube, the inner end of said rod having threaded means for alternatively engaging either male or female threaded elements of cartridge plungers, said threaded means comprising an externally threaded member on the inner end of said rod and extending inwardly therefrom and having an internally-threaded opening, said spacer means comprising a tubular element coaxial with said tube, the inner end of said element being adapted to abut against the end of a cartridge when the latter is placed within the tube, said tubular element having adjacent its outer end means for engaging said engaging means within the tube, the inner end of the rod being externally threaded, and an internally threaded sleeve in threaded engagement with said threaded inner end of the rod, said inner end of the rod and said sleeve being located within said tubular element.

7. In a cartridge syringe, a tube adapted to receive a cartridge having a slidable plunger, one end of said tube being open, threaded means on said one end of the tube, a threaded bearing member in threaded engagement with said threaded means, a rod reciprocally slidable in said bearing member and having an inner portion within said tube and an outer portion outwardly of said bearing member, means on the inner end of the rod for engaging the plunger of a cartridge when the latter is placed within the tube, and a spacer element removably mounted within the tube and having one end engaging said bearing member and an opposite end adapted to abut against an end of said cartridge, one end of the spaced element being provided with a cylindrical portion, said bearing member having a cylindrical portion extending projecting inwardly within the tube, one of said cylindrical portions extending within the other of said cylindrical portions, and interengaging abutment surfaces on said cylindrical portions to prevent outward movement of the spacer element with respect to the bearing member.

8. The combination of claim 7 wherein said engaging means on the inner end of the rod comprises an externally threaded member having an internally threaded bore, the inner end of the rod being of larger diameter than said threaded member and being externally threaded, and an internally threaded sleeve in threaded engagement with

said threaded inner end of the rod, said spacer element being of hollow cylindrical configuration and surrounding said sleeve and said threaded inner end of the rod.

9. The combination of claim 8, the end of said tube opposite said one end being provided with an integral end wall having a reduced portion integral therewith, said reduced portion having external threads and an internal bore extending inwardly from the end of said reduced portion, the outer end of said bore being internally threaded and the inner end of said bore being tapered inwardly, said end wall having an opening there-through coaxial with said tube, a needle extending through said opening and said bore, a conical hub secured to an intermediate portion of said needle and located within said tapered end of the bore, a needle retaining member having an externally threaded portion in threaded engagement within said internally threaded outer end of the bore and abutting said needle hub to retain the needle in fixed relation to the tube, and a tubular auxiliary member having an internally threaded end in engagement with said external threads of the reduced portion, the opposite end of said auxiliary member being open to receive a cartridge slidable thereinto.

10. A cartridge syringe comprising a tube adapted to receive a cartridge, a rod slidably mounted in one end of the tube, the end of said tube opposite said one end being provided with an integral end wall having a reduced portion integral therewith, said reduced portion having external threads and an internal bore extending inwardly from the end of said reduced portion, the outer end of said bore being internally threaded and the inner end of said bore being tapered inwardly, said end wall having an opening therethrough coaxial with said tube, a needle extending through said opening and said bore, a conical hub secured to an intermediate portion of said needle and located within said tapered end of the bore, a needle retaining member having an externally threaded portion in threaded engagement within said internally threaded outer end of the bore and abutting said needle hub to retain the needle in fixed relation to the tube, and a tubular auxiliary member having an internally threaded end in engagement with said external

threads of the reduced portion, the opposite end of said auxiliary member being open to receive a cartridge slidable thereinto.

11. A cartridge syringe comprising a tube adapted to receive a cartridge, a rod slidably mounted in one end of the tube, the end of said tube opposite said one end being provided with an integral end wall having a reduced portion integral therewith, said reduced portion having external threads and an internal bore extending inwardly from the end of said reduced portion, the outer end of said bore being internally threaded, said end wall having an opening therethrough coaxial with said tube, a needle extending through said opening and said bore, a hub secured to an intermediate portion of said needle and located within said bore, a needle retaining member having an externally threaded portion in threaded engagement within said internally threaded outer end of the bore and abutting said needle hub to retain the needle in fixed relation to the tube, and a tubular auxiliary member having an internally threaded end in engagement with said external threads of the reduced portion, the opposite end of said auxiliary member being open to receive a cartridge slidable thereinto.

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