This invention relates to hypodermic syringe devices, and it is particularly directed to hypodermic syringes for providing quick and easy assembly and disassembly of a medicament vial in a syringe frame with provision for rigidly retaining the vial in position in the frame to enable a user properly to make a blood withdrawal check prior to giving the patient the injection and subsequently to administer the injection.

In the past, it has been customary to make hypodermic syringe devices for use in giving hypodermic injections, with which a blood withdrawal check is to be made and in which the medicament for the injection is contained in a vial or cartridge in a prepared dosage, with means, such as screw threads, for positively and rigidly securing the vial to the syringe frame. This is very important, as it is essential that the vial containing the medicament should not move in relation to the syringe frame during the taking of a blood withdrawal check and during the giving of the injection. One of the main objections to such conventional hypodermic syringe devices is that the mechanism providing for the insertion and removal of a medicament vial from the syringe frame and the secure retention of the vial in the frame, as previously described, has been rather complicated and has required a considerable amount of time for the proper assembly and disassembly of the medicament vial in the syringe frame.

In accordance with the present invention an improved hypodermic syringe device is provided in which a medicament vial or cartridge can be very easily and quickly snapped into position in the supporting frame and be held securely in position relative to the injection operating element of the syringe. This includes a simplified syringe frame structure, which is adaptable to be used with a conventional medicament vial or cartridge or may be used with an improved and simplified medicament vial. The syringe frame includes only three basic elements, a hollow body portion formed with a vial receiving section and an integral gripping section, a vial position securing element, and an element for operating an ejecting piston in a medicament vial. The syringe frame preferably is in the form of a thin hollow cylindrical member with a longitudinally extending slot therein of a width slightly less than the diameter of a medicament vial and slightly longer than a vial to provide for inserting a vial into the frame and readily removing it therefrom through this slot. A shoulder or lip is formed on one end of the vial receiving section of the frame in order to provide for locating and retaining the end of a medicament vial within the hollow body portion and an internal shoulder is formed within the body portion, spaced longitudinally exactly the length of a vial from the vial locating lip. This provides for the easy insertion and removal of a medicament vial through the slot and into positive seated engagement between the lip and the shoulder of the hollow body portion of the frame, so that the operating element easily can be secured to a piston in the medicament vial for operation of the piston in taking a blood withdrawal check and for administering the injection.

Preferably the positive secure positioning and retention of the vial against movement relative to the syringe frame is assured by providing additional vial clamping elements. These clamping elements may comprise a shoulder tapering into the exterior surface of the body portion of the syringe frame, preferably nearer the end thereof adjacent to the lip, and tapering toward the frame gripping section, and a ring slideably longitudinally over the body portion and adapted wedgingly to engage the tapered shoulder for compressing the sides of the vial receiving section into tight gripping engagement with the vial and forming a closure over the longitudinal slot in the vial receiving section, thereby assuring against relative movement between the vial and the syringe frame. For inserting and removing a vial from the syringe frame, the latching ring is adapted to be slid from over the vial receiving section to a position over the gripping section, thereby completely exposing the vial receiving section and permitting the ready insertion and removal of a vial from the frame through the longitudinally extending slot therein. Manufacture of the improved hypodermic syringe device and successful operation thereof by use of the snap assembly and disassembly of a medicament vial in the syringe frame, and retention of these members in assembled relationship, is made possible by forming the syringe frame and the latching ring of resiliently deflectable solid material, such as a suitable plastic or other non-corroding flexible metal.

An object of this invention is to provide an improved hypodermic syringe device in which a medicament vial may be quickly and easily inserted and removed.

Another object of this invention is to provide an improved hypodermic syringe device for quick insertion and removal of a medicament vial and for the secure mounting of the vial in the syringe frame.

A further object of this invention is to provide an improved and simplified hypodermic syringe device having a minimum of parts and being quickly and easily operable.

Further objects and advantages of this invention will become apparent from the following description referring to the accompanying drawings, and the features of novelty which characterize this invention will be pointed out with particularity in the claims appended to and forming a part of this specification.

In the drawings:

Fig. 1 is a perspective view of an improved hypodermic syringe device illustrating the hypodermic syringe frame and medicament vial in disassembled relationship;

Fig. 2 is a side elevational view of the hypodermic syringe device shown in Fig. 1, with the medicament vial in assembled position in the syringe frame;

Fig. 3 is a partial sectional view of the assembled hypodermic syringe device shown in Fig. 2;

Fig. 4 illustrates the first step in assembling a medicament vial in a hypodermic syringe device frame incorporating the present invention;

Fig. 5 illustrates the second step in the assembly procedure for latching the vial securely in position in the syringe frame;

Fig. 6 illustrates the completely assembled hypodermic syringe device, with the vial secured in position in the frame preparatory to the removal of the bacteria-tight sleeve over the hypodermic needle;

Fig. 7 illustrates the completely assembled hypodermic syringe device ready for administration of an injection;

Fig. 8 is an elevational view of another embodiment of a hypodermic syringe device incorporating this invention in which the assembled syringe is illustrated in solid lines, and phantom lines show the position of the
parts of the vial holding body portion in the position for insertion and removal of a vial therefrom;

Fig. 9 is a partial sectional view of the improved hypodermic syringe device shown in Fig. 8 with the section taken at right angles to the view illustrated in Fig. 8;

Fig. 10 is an elevational view of a further embodiment of an improved hypodermic syringe device incorporating this invention;

Fig. 11 is a sectional view of the syringe device taken along line 11—11 of Fig. 10;

Fig. 12 is a perspective view of the ring for clamping together and for biasing apart the two clamping finger sections of the bifurcated body portion of the syringe;

Fig. 13 is a fragmentary partial sectional view of an end of an improved hypodermic syringe device embodying this invention illustrating another embodiment of means for securing the end of an injector piston to the operating rod of the syringe; and

Fig. 14 is a fragmentary partial sectional view of an end of an improved hypodermic syringe embodying this invention illustrating still another embodiment of means for securing the end of an injector piston to the operating rod of the syringe.

Referring to the drawings, a hypodermic syringe device incorporating this invention is illustrated, in which a mechanism or device can be used which may be of the conventional type or of a simplified construction particularly designed for use with the improved syringe frame. The syringe frame is particularly adapted to hold a substantially cylindrical medicament vial and needle unit rigidly in position during normal usage of the syringe.

This syringe frame comprises a hollow, preferably substantially cylindrical, body portion 4, having a vial receiving section 2, which is formed with substantially cylindrical inner sides 3 for the reception of a substantially cylindrical medicament vial 4. The medicament vial 4 is adapted to be received between the sides of the vial receiving section 2 and to be held securely therein. In order thus to secure the vial in position, the receiving section 2 is formed with an internal lip 5 at the end thereof adjacent to the needle end of the vial receiving section. This lip 5 aids in properly locating the end of the medicament vial within the syringe frame and also functions as a stop element engageable by the needle end of the medicament vial for retaining it in position. This is more clearly shown by reference to Fig. 3. If desired, the lip 5 may be made of substantially the same thickness as the space between the needle end 6 of the vial 4 and the adjacent cramped over side of a needle-retaining ferrule 7 of the medicament vial and needle unit. An internal shoulder 8 is formed on the inside of the vial receiving section 2 adjacent to the end thereof opposite to the lip 5, and is spaced substantially the length of a vial longitudinally from the lip, so as snugly and definitely to locate and position the vial 4 within the frame between the lip 5 and the shoulder 8, as is more clearly illustrated in Fig. 3. Medicament vials or cartridges of the conventional type containing a predetermined dosage of medicament are of standardized dimensions, however slight tolerance variations are equally well accommodated and retained securely in the syringe frame by a special latching structure.

In order to facilitate the assembly and disassembly of a medicament vial in the syringe frame, a longitudinally extending slot 9 is formed in the side of the vial receiving section 2 and extends from the lip end 5 to slightly further than the internal shoulder 8. As more clearly shown in Fig. 1, slot 9 is formed of a width slightly less than the diameter of the vial 4, that is, slightly less than the diameter of the vial receiving section 2, with the two side edges thereof substantially parallel, and the ends thereof converging to form a closed slot adjacent to the internal shoulder 8 and terminating in a relatively narrow slot 9' through the lip 5. This provides an open side to the vial receiving section of the body portion through which a vial can easily be snapped into position between the shoulder 8 and the lip 5 and also allows for a visual observation of the contents of a vial to provide a means for determination of the end of an injecting needle in a patient's vein by the performance of the customary aspiration or blood withdrawal check, and also enables the user to determine when the contents of the vial has been completely evacuated.

In order further to assure the secure retention of a vial in position within the vial receiving section of the syringe frame, additional latching elements preferably are provided. These may conveniently comprise a shoulder or stop 10 adjacent to the lip 5, which shoulder preferably is formed with a surface which tapers gradually into the exterior surface of the vial receiving section 2, and extends circumferentially therearound. A retaining ring 11 is arranged around the body portion 1 of the syringe frame and is longitudinally slidably thereover so that it can be withdrawn to a position entirely removed from the vial receiving section, as shown in Figs. 4 and 5, to allow for the insertion or removal of a vial from the syringe frame and is adapted to be slid toward the open lip end 5 of the vial receiving section 2 wedgingly to engage the tapering shoulder 10, as shown in Figs. 2, 3, and 6, for compressing the sides of the vial receiving section into tight gripping engagement with the vial 4 of the retaining ring 11 assures against relative movement between the vial and the syringe frame by maintaining the vial receiving section in vial retaining position around a vial arranged therein and by forming a closure which blocks a portion of the slot 9.

In order more easily to manipulate the hypodermic syringe, the frame is formed with a gripping portion 12, section which may conveniently comprise a shank 12 preferably formed with a pair of substantially flat radially depressed sides 12' integrally formed with and extending from the vial receiving section end adjacent to the internal shoulder 8. A pair of finger rests 13 is integrally formed on the end of the shank 12 away from the vial receiving section, and together with the sides 12' provide for conveniently and securely gripping the end of the syringe frame while administering an injection. As is readily seen in Figs. 1 and 3, the improved syringe gripping section provides a minimum overall tip-to-tip dimension to the finger rests 13 and, therefore, to the syringe, as these rests form the widest part of the device. The width is actually reduced over considerable length of the remainder of the device. The width is actually reduced over considerable length of the remainder of the device. The width is actually reduced over considerable length of the remainder of the device.
be easily die molded or cast and which will form a resilient deflectable solid material structure into which a medicament vial can easily be snapped into position and readily removed, as desired. This type of material is essential in the proper construction of this improved hypodermic syringe frame, as no screw threaded or level type latching elements are provided for securing the vial in position in the syringe frame. The syringe frame enables the use of a more complex conventional threaded ferrule type of medicament vial and needle unit, or a simplified unit in which the ferrule 7 is a simple smooth hub member.

Furthermore, the formation of the slot 9 of a width slightly less than the diameter of the vial receiving section 2 requires that the sides of the vial receiving section 2 be spread apart in order to admit a vial into the vial receiving recess, and this can readily be done by simply pressing the vial into position in the syringe frame. The entire assembly operation is a very simple procedure and involves essentially only three simple steps, which are best illustrated in Figs. 4, 5, and 6. As shown in Fig. 4, the piston end of a vial 4 is first inserted between the sides of the vial receiving section of the syringe frame by simply snapping it through the slot 9 a short distance away from the positioning shoulder 8. The vial then slides longitudinally until the piston end thereof rests against the shoulder 8, and the needle end of the vial is simply pressed into the vial receiving section, as shown in Fig. 5. The resilient deflectable character of the material of which the syringe frame is made allows for the ready deflection of the sides of the vial receiving section 2 to allow the vial 4 to be snapped into position, as shown in Fig. 5. After this, the latching ring 11 is slid longitudinally over the vial into wedging engagement with the tapered shoulder 10, so as to compress the sides of the vial received section 2 into tight gripping engagement with the vial. This provides means around the body of the vial receiving section 2 which prevents spreading apart of the sides thereof and holds the vial 4 in the space 6 at the end of a vial 4 for securely fastening the vial in position as shown in Fig. 3, even if the diameter and length of the vial are not accurately those of the vial receiving section of the syringe frame. In this condition the hypodermic syringe is ready for immediate use or may be set aside for future use if desired.

Preferably, the medicament vial and needle unit is provided with a needle 21 secured in any suitable manner in the end of the vial 4 and covered with a bacteria-tight sleeve 22, so that the vial can be conveniently handled without contamination of the needle 21 and can even be set aside for future use without danger of contaminating the injecting needle. As shown in Fig. 7, after a medicament vial has been properly assembled in the improved syringe frame, and the operating rod 15 has been securely operatively connected to the piston 16 in the vial 4, a simple removal of the sleeve 22 exposes the hypodermic needle 21 for immediate injection into a patient. In this manner no particular precautions are necessary in the assembly of a medicament vial in the syringe frame, and a very quick method is provided for repeatedly inserting medicament vials into a syringe frame, removing the protective sleeve over the hypodermic needle, and administering an injection, removing the evacuated vial from the syringe frame, and repeating the process for another injection in a very short space of time. Also, the simplicity of the hypodermic syringe device and the ease with which a vial is assembled into the syringe frame and removed therefrom, makes it possible for anyone to use such a hypodermic syringe after very little instruction.

Figs. 8 and 9 illustrate another embodiment of an improved hypodermic syringe device incorporating the present invention. In order to simplify an understanding of this embodiment of the invention and to correlate it to the previously described embodiment, similar parts will be given the same reference numbers as those in the previously described embodiment. As in the previously described embodiment of this invention, the hypodermic syringe device is constructed so as rigidly to hold a medicament vial-needle unit to enable the making of a blood withdrawal check and subsequently to administer an injection of the medicament contained in the vial. These functions of the syringe device are made possible by an improved syringe frame structure, which also provides for a rapid insertion of a medicament vial in position in the frame and for a rapid replacement of a medicament vial after an injection has been administered. This improved syringe frame includes a body portion 1 which, in this embodiment, is formed with a substantially cylindrical vial-receiving section which is bifurcated by a pair of diametrically opposite slots 23 having substantially parallel sides extending longitudinally of the position of the outer end thereof for substantially the length of a medicament vial and spaced apart to provide a width less than the diameter of a conventional vial. In most instances, it will be found preferable to have the slots 23 just slightly longer than a conventional medicament vial, such as the vial 4, and to have each slot terminate in a circular section 24 to minimize the possibility of fracture of the syringe body portion at the end of the slot. These circular slot sections 24 also provide additional hinge springings to base portions 25 of the pair of vial gripping fingers 26 formed by the bifurcating slots 23. These fingers 26 are integrally connected by the base portions 25 to a shank 12 which is formed with a longitudinally extending passage or a similar operating rod 15 slidably extends. This operating rod 15 is provided with a head or handle 19 which is extended, and is adapted to have a positive operating connection with a piston 16 in a medicament vial 4. This positive connection may be made in any suitable manner, as by a screw threaded joint, such as that illustrated in Fig. 1 and 3.

In this construction, the medicament vial 4 is adapted to be inserted into and removed from the hollow body portion 1 of the syringe by spreading apart the outer ends of the fingers 26, as shown in phantom lines in Fig. 8. When the fingers 26 are spread apart in this manner, a vial 4 may easily be slipped between the outer ends of the fingers 26 into the vial receiving section formed by the inner sides of these fingers. After a vial has been fully inserted into the vial receiving section, the inner end of the vial rests against a shoulder 8, formed on the inner side of the hollow body portion, and the needle end 6 of the vial is adapted to be located and retained in position by an internal flange 5 formed near the end of each finger 26. As is more clearly seen in Fig. 9, the flanges 5 extend between the needle end 6 of the vial and a ferrule 7, which secures the needle structure 21 to the end of the vial, and, in most instances, the conventional medicament vial will have a snug fit between the fingers 26 and the shoulder 8 and flanges 5.

In the administration of injections, it generally is desirable to make a blood withdrawal check after a hypodermic needle has been inserted into body tissue in order to determine whether or not the end of the needle is in a vein, and, in doing so, it is essential that the medicament vial and the syringe body portion be securely connected together, so that they may act as a single unit and prevent possible further movement therebetween when the medicament injecting piston is pressed forwardly, so as to assure that the end of the hypodermic needle remains in the same position during the injection of medicament. In the present embodiment of this invention, the resiliency of the fingers 26, forming the vial-receiving section of the syringe, will normally provide a tight gripping engagement with the sides of a vial arranged therebetween. In order further to assure against relative movement between the vial and the syringe frame, a clamping ring 11 is arranged longitudinally slidable over the body portion 1 of the syringe frame for compressing
together the sides of the vial receiving section into tight gripping engagement with a vial 4 arranged therebetween. This tight gripping engagement is achieved by forming the clamping ring 11 with an inner diameter slightly larger than the outer diameter of the substantially cylindrical vial receiving section of the body portion 1 and providing a tapered shoulder 10 on each of the clamping fingers 26 having a tapered wedge surface which extends from the outer end of the shoulder 10 into a smooth meeting with the outer cylindrical surface of the fingers 26. In order to insert a medicament vial 4 into the vial receiving section formed by the fingers 26, the clamping ring 11 is moved away from the shoulder 10 to a position substantially over the shank 12, as shown at 11', so that the fingers can easily be spread apart for the insertion of a vial 4. After a vial has been inserted into position between the fingers 26, the clamping ring 11 is slid from the position 11' longitudinally over the fingers 26 until the outer end thereof engages the tapered wedge surface of the shoulder 10 on each finger 26 and, as is more clearly shown in Fig. 9, compresses the fingers into tight gripping engagement with the vial 4, thereby assuring against any displacement between the vial and the syringe frame. This construction also assures a secure clamping of a vial 4 in position in the syringe frame, even though the length or the diameter of the vial may have slightly different dimensions from the conventional size, within limited tolerances.

As in the previously described construction, this syringe frame is provided with finger rests 13, which aid in properly gripping the body portion of the syringe when administering an injection and also provide a stop back for limiting the movement of the clamping ring 11 when it is slid axially of the syringe frame away from the tapered shoulder 10. This construction of the syringe device provides a very simple and sturdy construction having all of the advantages of more complicated hypodermic syringes, with the additional advantage of providing for a ready sharpened removal of a vial into and out of the slotted vial receiving section of the syringe frame, thus saving a very substantial amount of time in the preparation and administration of injections.

A still further embodiment of an improved hypodermic syringe device incorporating the present invention is illustrated in Figs. 10, 11, and 12. This construction is similar to that shown in Figs. 8 and 9, and parts of the device shown in Figs. 10, 11, and 12 correspond to similar parts in the previously described embodiments will be identified by the same reference numerals.

In this construction, a hypodermic syringe device is provided with a syringe frame having a body portion 1 with a substantially cylindrical medicament vial receiving section formed very similar to the bifurcated construction illustrated in Figs. 8 and 9. As in this latter construction, the vial receiving section is formed by a pair of vial gripping fingers 26 which are adapted to be spread apart for receiving a medicament vial and holding it securely therebetween, both for a blood withdrawal check and for an injection of medicament into a body. The medicament vial 4 is adapted to be located and retained in position by shoulders and flanges similar to those shown in the embodiment of Figs. 8 and 9, and the flanges on the ends of the fingers are adapted to engage the vial end 6 and ferrule 7, as in the previously described construction. In this arrangement, a pair of bifurcating slots 27 are arranged on diametrically opposite sides of the vial receiving section and have relatively angularly extending sides forming tapered slots with the wider ends 27' thereof adjacent to the flange end of the fingers 26 next to the ferrule 7. These slots are sufficiently wide to provide for a good visual examination of the interior of the vial 4 to determine the presence or absence of blood therein during a blood withdrawal check and are smaller in width than the diameter of a vial so as to prevent the accidental sidewise displacement of a vial through these slots. Preferably the slots 27 extend longitudinally of the body portion 1 of the syringe frame from the outer end thereof for a distance substantially equal to the length of a conventional vial.

In this construction, each of the fingers 26 is formed with a shoulder 10 on the outer surface thereof having an inwardly tapered wedge surface which extends longitudinally inwardly similar to the shoulders 10 in the previously described embodiments. A clamping ring 11 is mounted longitudinally slidably over the main body portion 1 of the syringe frame and is adapted to be slid into engagement with the outer tapered surfaces of the shoulders 10 so as to bias these fingers towards each other and securely clamp the fingers 26 into gripping engagement with the surfaces of the vial 4 arranged therebetween. In order to remove the vial 4 from the vial receiving section of the syringe frame, the fingers 26 are adapted to be biased apart, so as to move the retaining flanges on the ends of the fingers out of the groove between the end 6 of the vial and the ferrule 7. In this construction, this spreading apart of the fingers 26 is achieved automatically by the simple movement of the clamping ring 11 from its clamping position shown in Fig. 10 toward the shank end of the slot 27. This action of the clamping ring 11 is obtainable through the coaction of the sides of the slots 27 and a pair of inwardly extending bosses 28 on the inner surface of the clamping ring 11 adjacent to the end thereof nearest to the outer ends of the slots 27. The sides 28' of each of these bosses 28 are tapered from the outer end of the ring 11 towards the interior of the ring, so as to form a pair of wedges which extend inwardly into the slots 27 and are longitudinally slidable through these slots. As is more clearly shown in Figs. 10 and 11, the width of the bosses 28 is less than the width of the slots 27 between the shoulders 10 so that they do not hinder the action of the clamping ring 11 in biasing the fingers 26 toward each other for securely engaging the sides of the vial 4. These wedges however are of a size so as to engage the sides of the slots 27 as the clamping ring 11 is slide away from the shoulders 10 and, in so engaging the sides of the slots 27, to wedge apart the gripping fingers 26 and to release the clamping engagement of the fingers 26 in the vial 4. The inner diameter of the clamping ring 11 is made slightly larger than the outer diameter of the cylindrical vial receiving section formed by the fingers 26, so as to provide for easy sliding of the ring over these fingers and to allow these fingers to be spread apart as the clamping ring is slid from over the tapered shoulders 10 toward the shank 12 of the syringe frame. The movement of the ring 11 toward the shank 12 and the body portion gripping finger rests 13 causes the fingers 26 to assume a position similar to the fingers 26 shown in phantom in Fig. 8, thus providing for the easy removal of the medicament vial 4 and its replacement with another vial.

This construction includes all of the advantages of the previously described embodiments, which facilitate the assembly and disassembly of a medicament vial and needle unit in a syringe frame, and, in addition, provides for the automatic release of the medicament vial by the clamping fingers 26 as the clamping ring 11 is moved out of its clamping position away from the shoulders 10. The operation of the vial piston 16 for providing a blood withdrawal check and for the administration of an injection is performed as in the previously described embodiments by the longitudinal movement of an operating rod 15 which is adapted to be actuated through a handle or head 19. This operating rod 15 is adapted to be operatively secured to the piston 16 in any suitable manner, as by a screw threaded engagement therewith shown in Figs. 1 and 19.

Fig. 13 is a fragmentary sectional view of an improved hypodermic syringe embodying this invention, which may
include the structural syringe frame features of any of the preceding embodiments. In this construction, the medicament vial cylinder 16 is adapted to be secured to the ejection rod 15 by a simple snap engagement with a plurality of resilient, curved fingers 31 formed on the end of the operating rod 15. The ball 29 is secured to the rod 15 when a vial 4 is inserted into the vial receiving section of the body portion 1 by simply pressing the ball 29 into the socket formed between the fingers 31. This provides a quick and simple connection which does not require the screwing together of cooperating parts and can easily be disconnected by a simple quick pull on the end of the vial needle unit. This type of improved and simplified operating connection may be utilized with any of the preceding embodiments of this invention, and further simplifies the syringe construction and lessens the time required for removal of a vial from a syringe frame and its replacement by another vial.

As illustrated by the improved hypodermic syringe incorporating this invention in which all of the parts of the syringe are substantially the same as those of the previously described embodiments, except for the means for securing the medicament ejecting piston to the operating rod of the syringe. The parts of this syringe which correspond to similar parts in the previously described embodiments of the improved syringe are given reference numerals and a complete description of the syringe and its operation will not be repeated, as such details are essentially the same as for the previously described embodiments.

In this construction, a medicament ejecting piston 16 is arranged in a vial 4 at one end thereof so as to seal the vial 4 to 20 within the vial 4. The vial 4 is adapted to be secured in position with a vial receiving section 2 of the syringe frame with the end of the vial adjacent to the ejecting piston 16 abutting against an internal shoulder 8 at the end of the syringe frame adjacent to a shank 12 of finger rests 13.

As in the previous constructions, an operating rod 15 slidable extends through a passage 14 in the shank 12 and is adapted to be operatively secured to the end of the ejecting piston 16. In this construction, this operative connection is formed by the ejecting piston so that the connection can be made by simply pressing the medicament vial with its ejecting piston into position in the syringe frame. Similarly, the operative connection can be broken by simply removing the vial from the syringe frame. This operative connection includes a pair of resilient fingers 32, each of which is formed with an intumescence end 33, which is adapted to engage a circumferential groove 34 extending between the outer end of the piston 16 and shoulder 35 on the inner side of a substantially conical head 36. The conical head 36 is secured to the body portion 16 by a neck portion 37 around which the circumferential groove 34 extends. The operating connection between the ejecting piston and the operating rod 15 is made by simply inserting the vial 4 into the vial receiving section 2 and pressing the piston end thereof against the shoulder 8 of the syringe frame. This action presses the conical head 36 between the intumescence 33 of the fingers 32 and biases them apart until the vial 4 is placed in position at which time the ends 33 of the fingers 32 snap into the groove 34 and form an operative clamping connection with the head 36. In some instances, it may be necessary to press inwardly slightly on the operating rod 15 to provide this snap connection, if the vial is slightly under standard length. Disconnection of this operating joint between the piston 16 and the operating rod 15 is simply made by lifting out the vial 4 from the syringe frame. This operation tilts the conical section 36 and tends to bias apart the fingers 32, so that the ends 33 thereof become disengaged from the groove 34 and the vial and piston then be simply lifted out of the syringe frame and another vial inserted in position for ready use, thus providing for a quick connect and disconnect operating joint between the ejecting piston and the operating rod.

While particular embodiments of this invention have been illustrated and described, modifications thereof will occur to those skilled in the art. It is to be understood, therefore, that this invention is not to be limited to the particular arrangements disclosed, and it is intended in the appended claims to cover all modifications within the spirit and scope of this invention.

I claim:

1. A hypodermic syringe device comprising a syringe frame having a substantially cylindrical hollow body portion formed with a flexible material vial receiving section having an open side of lesser width than the vial receiving section diameter, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said flexible material body portion with said open side providing for snap insertion and removal of a vial thereof, said retention thereof in said receiving section, means including an internal shoulder on the inner side of said vial receiving section spaced longitudinally from said vial end locating means and engageable by the end of a vial opposite to the needle for definitely positioning the vial in said frame, means for forming a closure blocking at least said open side and for retaining a vial in said vial receiving section, and means operable axially of said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

2. A hypodermic syringe device comprising a hollow body portion with a vial receiving section formed of flexible material, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion having a longitudinal slot extending from said locating means along said vial receiving section and being slightly less than the vial receiving section diameter in width providing for snap insertion and removal of a vial provided with slot and the retention thereof in said receiving section, means movable relative to said vial receiving section for maintaining said said section in vial retaining position around a vial arranged in said section for definitely positioning a vial in said body portion, and means operable axially of said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

3. A hypodermic syringe device comprising a substantially cylindrical hollow body portion with a vial receiving section formed of flexible material and having an open side of lesser width than the vial receiving section diameter, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion open side providing for snap insertion and removal of a vial therethrough and the retention thereof in said receiving section, means including an internal shoulder on the inner side of said vial receiving section spaced longitudinally from said vial means and locating means and engageable by the end of a vial opposite to the needle for definitely positioning the vial in said body portion, means for compressing the sides of said vial receiving section into tight gripping engagement with a vial whereby assuring against relative movement between the vial and said body portion, and means operable axially of said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check
and pressed through the vial for ejecting fluid from the vial.

4. A hypodermic syringe device comprising a substantially cylindrical hollow body portion with a vial receiving section formed of flexible material and having an open side of lesser width than said hollow body portion axial diameter, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion open side providing for snap insertion and removal of a vial therethrough, a tapering shoulder on the exterior surface of said body portion extending circumferentially therearound, means including a longitudinally extendable longitudinally over said body portion and adapted wedgingly to engage said tapered shoulder for compressing the sides of said vial receiving section into tight gripping engagement with a vial thereby assuring against relative movement between the vial and said body portion, and means operable axially of said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

5. A hypodermic syringe device comprising a hollow body portion with a vial receiving section formed of flexible material, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion having a longitudinal slot extending from said locating slot and means for substantially the length of a vial along said vial receiving section and being slightly less than the vial receiving section in diameter in width providing for snap insertion and removal of a vial through said slot and the retention thereof in said receiving section, means for compressing the sides of said vial receiving section into tight gripping engagement with a vial, and means operably axially of said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

6. A hypodermic syringe device for rigidly holding a medicament vial-needle unit and to provide for a blood withdrawal check comprising a syringe frame having a hollow body portion with a vial receiving section formed of flexible material, means providing a locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion having a longitudinal slot extending from said locating slot and means for substantially the length of a vial along said vial receiving section and being slightly less than the vial receiving section in diameter in width providing for snap insertion and removal of a vial through said slot and the retention thereof in said receiving section, means for compressing the sides of said vial receiving section into tight gripping engagement with a vial thereby assuring against relative movement between the vial and said syringe frame, means for gripping said body portion, and means operable axially of said body portion for positive connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

7. A hypodermic syringe device for rigidly holding a medicament vial and needle unit and to provide for a blood withdrawal check comprising a syringe frame having a hollow body portion with a vial receiving section formed of flexible material, an intumescence lip on the outer end of said hollow body portion providing an end locating and retaining element engageable by the needle end of a medicament vial, said body portion having a longitudinal slot extending from said intumescence lip for substantially the length of a vial and being slightly less than the vial receiving section in diameter in width, means including an internal shoulder on the inner side of said hollow body portion spaced longitudinally from said lip for definitely positioning a vial in said frame, means for compressing the sides of said vial receiving section for tight gripping engagement with a vial thereby assuring against relative movement between the vial and said syringe frame, a means closing the end of said body portion adjacent to said vial receiving section for a passage therethrough, means extending through said passage for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

8. A hypodermic syringe device comprising a hollow body portion with a vial receiving section having substantially cylindrical inner sides formed of flexible material, an intumescence lip on the outer end of said hollow body portion providing an end locating and retaining element engageable by the needle end of a medicament vial, said body portion having a longitudinal slot extending from said intumescence lip for substantially the length of a vial and being slightly less than the vial receiving section in diameter in width, means including an internal shoulder on the inner side of said hollow body portion spaced longitudinally from said lip for definitely positioning a vial in said body portion, means for compressing the sides of said vial receiving section for tight gripping engagement with a vial, a shank extending axially from said internal shoulder end of said body portion, said shank having an axially extending central passage, a rod axially slideable through said shank passage and having means on the end thereof toward said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

9. A hypodermic syringe device for rigidly holding a substantially cylindrical medicament vial-needle unit and to provide for a blood withdrawal check comprising a syringe frame having a hollow body portion formed with a vial receiving section having substantially cylindrical inner sides, an intumescence lip on the outer end of said hollow body portion providing a locating and retaining element engageable by the needle end of a medicament vial in said vial receiving section, said body portion having a longitudinal slot extending from said intumescence lip for substantially the length of a vial along said vial receiving section and being slightly less than the vial receiving section in diameter in width, means including an intumescence lip on the outer end of said hollow body portion providing an end locating and retaining element engageable by the needle end of a medicament vial, said body portion having a longitudinal slot extending from said intumescence lip for substantially the length of a vial along said vial receiving section and being slightly less than the vial receiving section in diameter in width, means including an internal shoulder on the inner side of said hollow body portion spaced longitudinally from said lip for definitely positioning a vial in said frame, means for compressing the sides of said vial receiving section for tight gripping engagement with a vial thereby assuring against relative movement between the vial and said syringe frame, a shank extending axially from said internal shoulder end of said body portion, a pair of finger rests extending transversely of the end of said shank away from said body portion, said shank having an axially extending central passage therein, a rod axially slideable through said passage and having means on the end thereof toward said body portion for positive operating connection to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial, and a means on the outer end of said rod for operatively grasping the same, said body portion and shank being formed integral with said finger rests whereby a rigid unitary syringe frame is provided.

10. A hypodermic syringe device for rigidly holding a medicament vial and needle unit and to provide for a blood withdrawal check comprising a syringe frame having a hollow body portion with a vial receiving section...
having substantially cylindrical inner sides formed of flexible material, a substantially cylindrical vial and needle unit in said vial receiving section, means on the outer end of said hollow body portion providing an end locating and retaining element engageable by the needle end of said vial, said body portion having a longitudinal slot extending from said inner end of said vial inwardly of the vial receiving section of said housing and means for compressing said fingers forming the sides of said vial receiving section into tight gripping engagement with a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

11. A hypodermic syringe device comprising a syringe frame having a hollow body portion with a vial receiving section formed of flexible material, an insurmountable lip on the outer end of said hollow body portion providing an end locating and retaining element engageable by the needle end of a medicament vial, said body portion having a longitudinal slot extending from said insurmountable lip and being slightly less than the vial receiving section diameter in width, means including an internal shoulder on the inner sides of said hollow body portion spaced longitudinally from said lip for defining a vial in said frame, a shoulder tapering into the exterior surface of said vial receiving section and extending circumferentially therearound, means for wedgingly engage said tapering shoulder for compressing the sides of said vial receiving section into tight gripping engagement with said vial thereby assuring against relative movement between said vial and said syringe frame, and means operable axially of said vial and the retention thereof in said vial receiving section, means on the inner side of said vial receiving section spaced longitudinally from said vial end locating means for positioning a vial in said frame, means for compressing the sides of said vial receiving section into tight gripping engagement with a vial thereby assuring against relative movement between the vial and said syringe frame, and means operable axially of said body portion and being snap connectable to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

12. A hypodermic syringe device for rigidly holding a medicament vial-needle unit and to provide for a blood withdrawal check comprising a syringe frame having a hollow body portion with a vial receiving section formed of flexible material, means providing a locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion being slotted by a pair of diametrically opposite slots from said vial locating means end thereof for substantially the length of said vial receiving section forming a pair of vial gripping fingers and said body portion of a vial and the retention thereof in said vial receiving section, means on the inner side of said vial receiving section spaced longitudinally from said vial end locating means for positioning a vial in said frame, means for compressing the sides of said vial receiving section into tight gripping engagement with a vial thereby assuring against relative movement between the vial and said syringe frame, and means operable axially of said body portion and connectable to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.
vial arranged therebetween thereby assuring against relative movement between the vial and said syringe frame, means for gripping said body portion, means including a pair of wedge shaped bosses extending inwardly of said longitudinally slideable means into said slots and being of such size as to be out of engagement with sides of said slots when slid toward said internal flange end of said body portion and being of a size to engage the sides of said slots and wedge apart said vial gripping fingers when slid toward said body portion gripping means, and means operable axially of said body portion and connectable to a piston in a vial whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting fluid from the vial.

16. A hypodermic syringe device comprising a hollow body portion with a vial receiving section formed of flexible material, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion having a longitudinal slot extending from said locating means along said vial receiving section and having a width slightly less than the diameter of the vial receiving section providing for snap insertion and removal of a vial through said slot and for the retention thereof in said receiving section, means slideable longitudinally along said body portion for maintaining said vial receiving section in vial retaining position around a vial arranged in said section, and means operable axially of said body portion for positive operating connection to a piston in a vial in said receiving section whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting medicament from the vial.

17. A hypodermic syringe device comprising a hollow body portion with a vial receiving section formed of flexible material, means providing an end locating and retaining element engageable by the needle end of a medicament vial in said receiving section, said body portion having a longitudinal slot extending from said locating means along said vial receiving section and having a width less than the diameter of the vial receiving section providing for snap insertion and removal of a vial through said slot, means movable relative to said vial receiving section for maintaining said section in vial retaining position around a vial arranged in said section, means operable axially of said body portion for positive operating connection to a piston in a vial in said receiving section whereby such piston may be withdrawn for a blood withdrawal check and pressed through the vial for ejecting medicament from the vial, and means forming a gripping section on said body portion at the end thereof opposite to said locating means comprising a shank having a pair of radially depressed sides and a finger rest extending outwardly from the outer end of each of said sides.

References Cited in the file of this patent

FOREIGN PATENTS

741,604 Great Britain December 7, 1955
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,956,563

Stanley J. Sarnoff

October 18, 1960

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

Column 2, line 68, for "administration" read -- administration --; column 5, line 6, for "level" read -- lever --; line 34, for "received" read -- receiving --; column 6, line 65, for "injecting" read -- ejecting --; column 9, line 40, for "with" read -- within --; line 58, after "and" insert -- a --.

Signed and sealed this 11th day of April 1961.

(SEAL)
Attest:
ERNEST W. SWIDER

Attesting Officer

ARThUR W. CROCKER
Acting Commissioner of Patents