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[54] **DISPOSABLE INJECTOR AND HOLDER THEREFOR**
5 Claims, 5 Drawing Figs.

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 [51] Int. Cl. A61m 05/22,
 A61m 05/32
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 218.218(P), 218(N), 215

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ABSTRACT: A single-hand operated needle-type injector device is provided by a combination of a handle adapted to be held in the palm of the hand, an elongated tubular needle carried on the handle, and a cup-shaped, liquid-carrying cylinder slidably mounted on the handle. The needle has an injection tip at one end and carries a piston means at its other end. The cylinder is open at only one end and is arranged to be moved by the thumb in the direction toward the needle tip in pressurizing the liquid for injection through the needle. Also, the cylinder is provided with a radially outwardly projecting control tab adjacent the open end of the cylinder to facilitate its movement along the handle. In operation, the cylinder is specifically arranged to move in a direction toward the sharpened needle tip in effecting pressurizing of the liquid for injection.

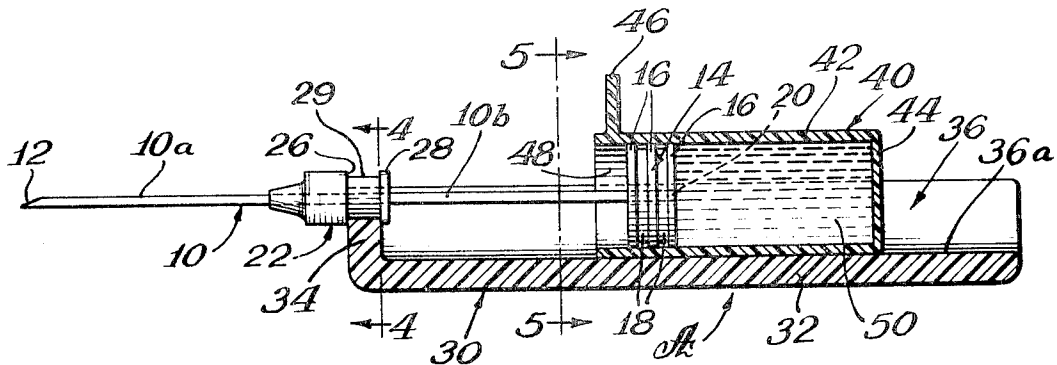


FIG. 1.

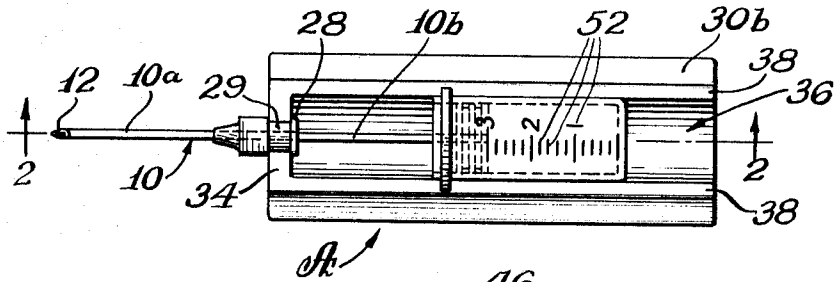


FIG. 2.

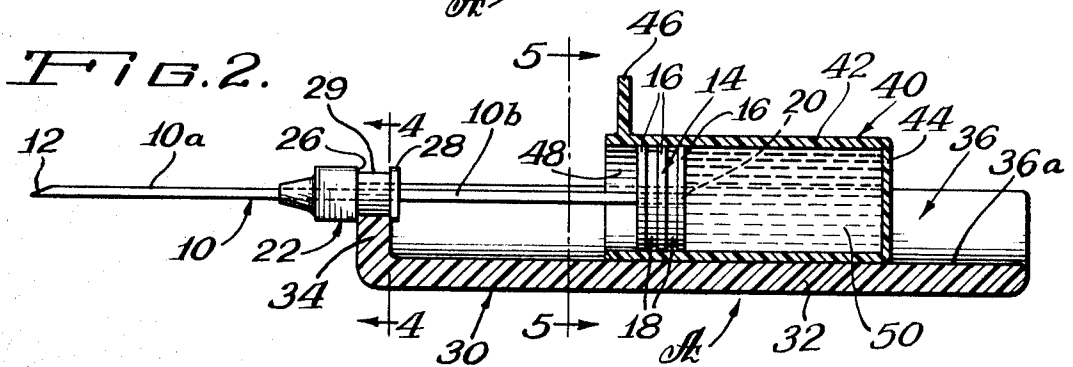


FIG. 3.

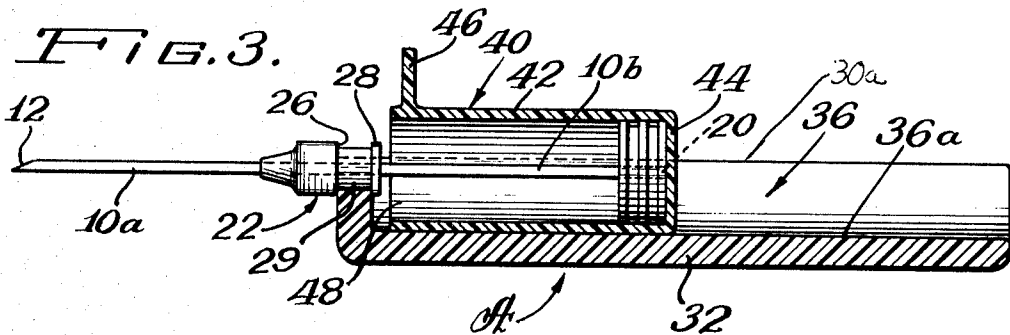
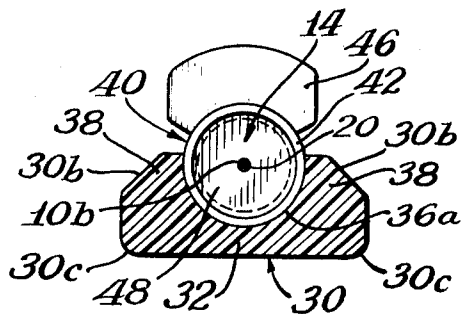
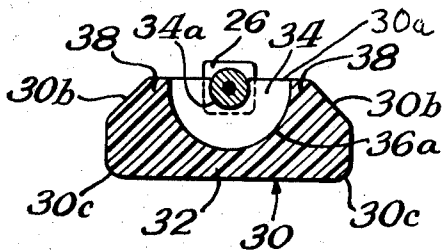


FIG. 5.

FIG. 4.



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DISPOSABLE INJECTOR AND HOLDER THEREFOR

BACKGROUND OF THE INVENTION

This invention relates to a needle-type injector and more particularly relates to a combination injector and manipulative handle therefor by means of which a technician obtains greater one-hand control in the insertion of the needle and in the injection of liquid through the needle.

This invention is an improvement over the device shown in the copending application of Roger L. Larson, Ser. No. 748,258, filed July 29, 1968, and assigned to the assignee of this application.

Hypodermic, or needle-type, injectors have been known for many years. Single-use, or throw-away needle-type injectors have become very popular because of their assurance as to sterility and avoidance of transmission of infection, such as infectious hepatitis. Such single-use injectors may be a discardable plastic syringe and plunger with steel needle that is required to be loaded before use, or may include a preloaded plastic or glass cartridge arranged for single use with a sterile steel needle, both of which are discarded after use. When using the preloaded cartridge, the cartridge is provided with a resilient-edged plunger in the cylinder, and a reusable holder with attached plunger rod and head is used to assemble the cartridge and needle in juxtaposition onto the holder after which the head and plunger rod is manipulated like a hypodermic injector. The reusable holder may be used repeatedly since it neither contacts the liquid or the patient being injected.

In all such prior constructions, whether it be a resterilizable hypodermic, or a wholly discardable plastic syringe and plunger with steel needle, or a discardable plastic cartridge and steel needle that are adapted to be assembled with a reusable holder and plunger, the existence of an extensible plunger for cooperative use with a barrel-like chamber means for holding the liquid to be injected poses disadvantages and problems. In the use of each such device, the technician, such as doctor or nurse, first holds the elongated syringe or barrel-like part with needle assembled thereon like a dart and first seeks to introduce the needle where desired, such as in a muscle. Then the technician must either use one hand to hold the barrel and the other hand operates the plunger that extends rearwardly of the barrel, or if the technician attempts one-hand manipulation, his hand is caused to crawl back to the end of the barrel where the plunger may be engaged by the thumb for manipulation. In such one-hand operation, the location of the hand on the plunger at any substantial distance remote from the needle point makes manipulation of the injector awkward and difficult. An additional disadvantage exists where the plunger is to be first manipulated rearwardly in a suction stroke to load the barrel with liquid because thereafter the plunger must be maintained stationary while removing the needle from the partly evacuated vial carrying the supply of liquid.

The said copending application of Roger R. Larson discloses the combination of basic features used in this application to provide an injector which avoids the problems noted hereinabove.

One object of this invention is to provide in a needle-like, single-use injector, which provides greater control to the technician in inserting the needle where desired and in thereafter effecting injection of liquid through the needle, the improvement feature of arranging the parts of the combination so that the direction of motion by the technician in discharging the liquid through the needle is toward the sharpened tip of the needle.

Another object of this invention is to provide a simplified construction for a needle-like, single-use injector, so as to reduce the number of regions at which sealing is a problem and so as to reduce costs of such constructions.

Further objects and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will

be pointed out with particularity in the claims annexed to and forming part of this specification.

A preferred embodiment of the invention is shown in the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a top plan view of my invention;

FIG. 2 is an enlarged cross-sectional view taken on line 2-2 of FIG. 1 and showing the location of parts with the cylinder filled with liquid prior to an injection;

FIG. 3 is a view similar to FIG. 2 but showing the location of parts when the cylinder is empty, such as either after an injection or prior to manipulation of the cylinder before filling;

FIG. 4 is a cross-sectional view taken on line 4-4 of FIG. 2; and

FIG. 5 is a cross-sectional view taken on line 5-5 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, the injector device A there shown is intended to be held in the palm of one hand by a technician, such as a doctor or nurse, and is adapted for one-hand operation by the technician. The injector device itself includes an elongated tubular means generally indicated at 10 and sharpened at one end 12 to provide an injector needle and having a piston 14 mounted on the other end of said tubular means. The piston 14 is formed either wholly of resilient material, such as rubber or equivalent synthetic material, or has a resilient rubber periphery. The piston 14 is shaped to provide a plurality of spaced peripheral ribs 16 bounding a plurality of spaced annular recesses 18. The other end of tubular means 10, upon which is positioned the piston 14, opens at 20 to the side of piston 14 distally of the sharpened tip 12, so that there is a continuous passage through the entire length of tube 10.

Intermediate the ends of tubular means 10 is an enlargement 22 in the form of a ferrule having spaced sections thereof which define a forward shoulder 26 and a rearward shoulder 28. The enlargement 22 divides tubular means 10 into a forward needle section 10a and a rearward tube section 10b. The shape of said shoulders on ferrule 22 may be either cylindrical or rectangular, but the intermediate portion 29 of ferrule 22 between shoulders 26 and 28 is cylindrical.

The injector device A includes a handle means generally indicated at 30 in the form of an elongated body having an elongated bottom wall 32, an abutment, or end wall, 34 at one end of the body, and with an elongated groove or slideway 36 to one side of one wall 34 and above bottom wall 32 and bounded by spaced elongated sides 38. The end wall 34 is of a thickness to just fit between spaced shoulders 26 and 28 on ferrule 22 so that when assembled the tubular means 10 is restrained against axial movement relative to handle 30.

For cooperation with the tube portion 10b which extends into slideway 36, there is provided an integrally, cup-shaped cylinder means generally indicated at 40 defined by a generally cylindrical wall 42 which is coaxial of tube portion 10b and a substantially flat, imperforate, closed transverse end wall 44. The transverse end wall 44 is at the end of cylinder means 40 furthest from or distal of end wall 34 of the handle. A control means in the form of an upright flange 46 is provided on cylindrical wall 42 adjacent the forward, open end 48 of cylinder means 40. The only open end 48 is adapted to have the piston 14 introduced therethrough to confine the liquid in the cylinder 40 and to slidably seal against the inner periphery of cylindrical wall 42. The liquid to be injected is indicated at 50 and is confined in cylinder 40 between the distal wall of piston 14, which is the wall that contacts the liquid, and transverse end wall 44. The volume of liquid in cylinder 40 may be indicated on the upper exposed portion of cylinder wall 42 by graduated markings 52, as seen in FIG. 1.

The length of the elongated body of handle means 30 is such that at all positions of the cylinder means 40, between the cylinder-filled position of FIG. 2 and the cylinder-empty posi-

tion of FIG. 3, said cylinder means 40 lies within the laterally projected confines of the handle means 30. The handle means 30 are of a selected length and dimension substantially in the proportions shown in the drawings, with the length of handle 30 being between 3 to 4 inches, so that it conveniently fits in the palm of the hand of the technician who is effecting the injection. The upstanding control flange 46 is conveniently positioned to be manipulated by the thumb of the technician's hand, from the position of FIG. 2 to the position of FIG. 3 so as to effect an injection without shifting the hand.

The upper edge of abutment 34 is shaped in the form of a cylindrical saddle 34a so as to receive and seat the cylindrical portion 29 of ferrule 22. The elongated slideway 36 is also shaped to provide a cylindrical saddle 36a for slidably receiving and seating the cylindrical periphery of cylindrical wall 42. The peripheral length of the two saddles 34a and 36a is just slightly greater than 180° so as to provide that both the portion 29 of ferrule 22 and the cylindrical wall 42 must be pressured slightly to snap-fit past the uppermost portions of the handle to be lodged in their respective saddles. This arrangement operates to effectively retain both the ferrule 22 and the cylinder means 40 in position without tendency of either to be inadvertently dislodged from the handle 30. The uppermost extent of both the abutment end wall 34 and the elongated sides 38 of handle 30 terminate substantially in the same plane 30a that is located above the longitudinal axis of tubular means 10 and cylinder means 40, as may be best seen in FIGS. 4 and 5. In order to provide for convenient and comfortable holding of handle 30 in the palm of the hand, the upper longitudinal corners of the handle means 30 are beveled at 30b, and the lower longitudinal corners are rounded at 30c.

The use of the device will be readily understood from the foregoing description of the structure. Thus, with tubular means 10 and cylinder means 40 assembled on handle 30 as in FIGS. 1 and 2, the technician grasps handle means 30 comfortably and securely in the palm of the hand and is thereby able to manipulate the sharpened needle end 12 to effect a proper piercing of the body to lodge the needle in a vein or other body portion, as desired. The handle 30 and its relation to needle portion 10a brings the technician's hand quite close to the body region being pierced and this results in more accurate manipulation. Once the needle 10 is properly lodged where desired, the technician need do no further shifting of his hand but by manipulating control flange 46 forwardly with his thumb, the cylinder 40 is caused to slide forwardly in slideway 36 coaxially of elongated tube 10 from a position distally of end wall 34 toward the sharpened tip 12 to a position adjacent end wall 34 as in FIG. 3. This movement pressurizes the liquid 50 between end wall 44 and the face 14a of piston 14 that is distal from the sharpened tip 12, so that such pressurized liquid will move through the open end 20 of tube 10 and then through tube 10 during the injection process.

The technician may control the amount of liquid being injected by observing the graduated markings 52 on the cylinder means 40. When an injection is completed, the tubular means 10 and cylinder means 40 are removed from the handle by manual transverse pressure in a direction outwardly of the saddles, and the used needle and cylinder should be discarded. The handle 30 may be later reused with another assemblage of

needle and cylinder of the type shown in FIGS. 1 and 2.

While it is contemplated that the needle and cylinder would be packaged in a sterile condition with liquid 50 in cylinder 40, it will be seen that the needle and cylinder could be packaged sterilely without the liquid. Filling of cylinder 40 may be effected by moving the cylinder 40 from its discharge position relative to needle portion 10b as seen in FIG. 3 to the filled position seen in FIG. 2 while the open tip 12 of needle portion 10a is immersed in a supply of liquid to be injected. The suction in cylinder 40 created by movement of cylinder 40 relative to sealing piston 14 to the filled position will draw liquid through tubular means 10 so as to load the cylinder 40.

Although the drawing illustrates a form of device wherein the upright flange 46 and the graduated markings 52 are essentially longitudinally aligned, it may be found more convenient in use if the flange 46 and graduated markings 52 are offset angularly relative to each other about the longitudinal axis of tube portion 10b so that the markings 52 are readily visible even when the flange 46 is being actuated by the technician's thumb. One or both sides 38 of handle 30 may be provided with apertures or cutaway portions through which the indicia or markings 52 may be viewed.

I claim:

1. In a single-hand operated injector device of the type that includes injector needle means, elongated handle means for holding and moving the injector needle means, and an elongated cylinder, with liquid storage capacity therein, arranged to be longitudinally supported exteriorly along at least a portion of its length upon, and to be selectively slidable along, the elongated handle means with respect to the injector needle means, the improvement comprising, in combination: the injector needle means including an elongated tube open at both ends and engaged intermediate its ends by said handle means; the elongated tube having one end sharpened to provide an injection tip and carrying piston means adjacent the other end; the cylinder having an open end arranged to receive therein the piston means; the cylinder extending longitudinally from said open end in the direction opposite from the injection tip of the needle means; and the cylinder being provided with a radially outwardly projecting manual control tab fixed thereon adjacent the said open end of the cylinder to facilitate the movement of said cylinder along said handle means.

2. A device as in claim 1 wherein the cylinder and control tab are integrally formed.

3. A device as in claim 1 wherein the length of the handle means and cylinder are such that the cylinder is supported along its entire length by the handle means for all operative positions of the cylinder relative to the piston means.

4. A device as in claim 3 wherein the handle means define an open longitudinal side, and the tab on the cylinder being of a size and positioned to move longitudinally along only said open longitudinal side of the handle means.

5. A device as in claim 1 including resilient means on said piston means for effecting sealing between the piston means and the inner wall of the cylinder to seal off, except for passage through the elongated tube, a liquid storage chamber defined in the cylinder between the face of the piston means and the end of the cylinder that are both distal from the injection tip of the needle means.