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HYPODERMIC SYRINGE HAND GRIP

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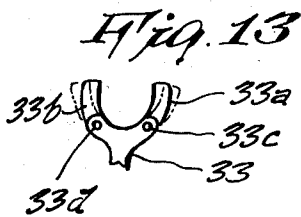
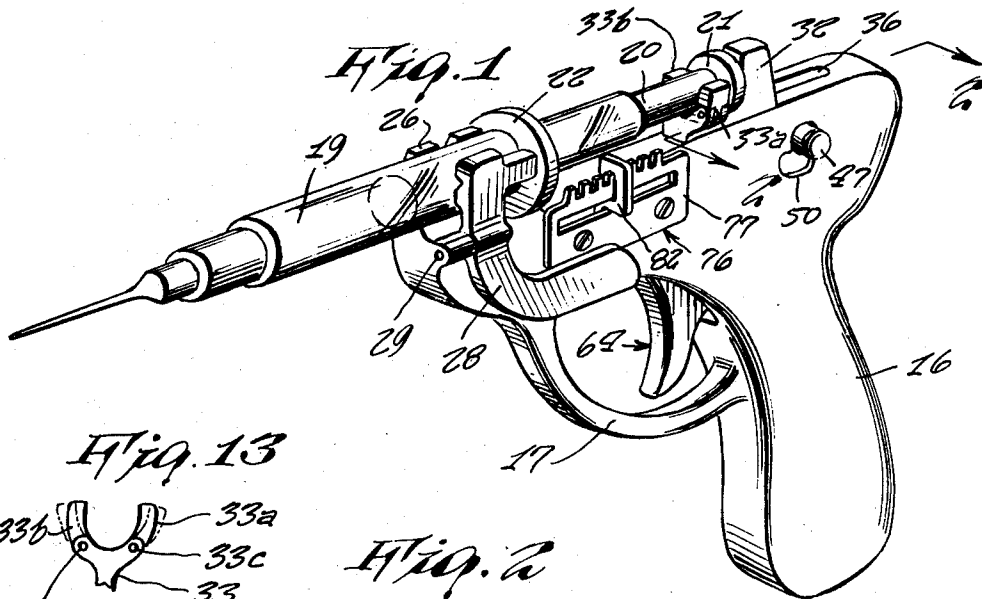
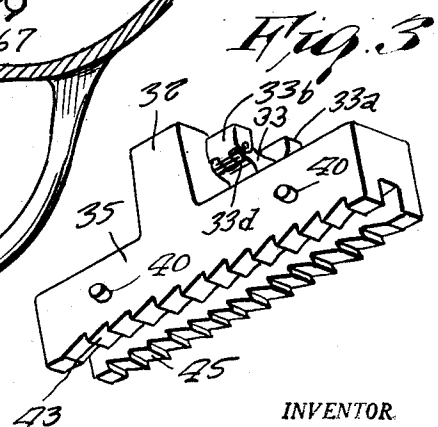
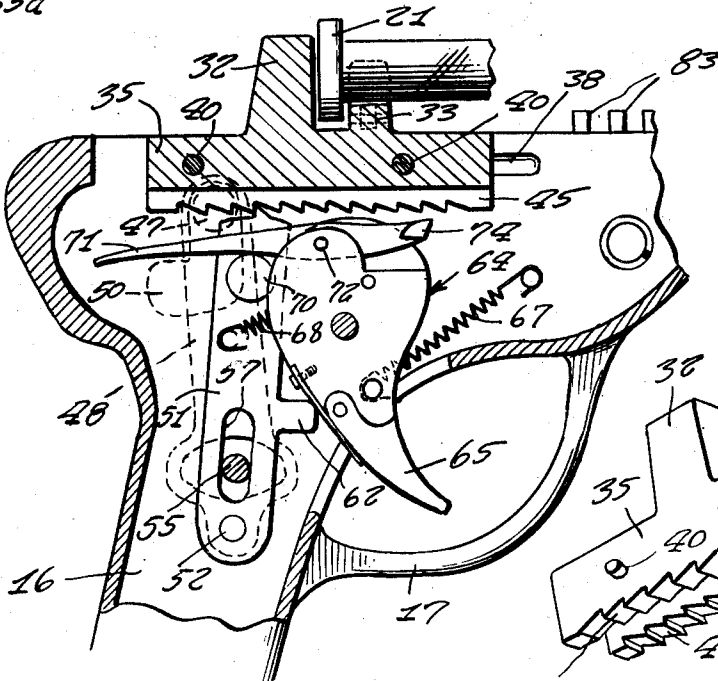


*Fig. 2*



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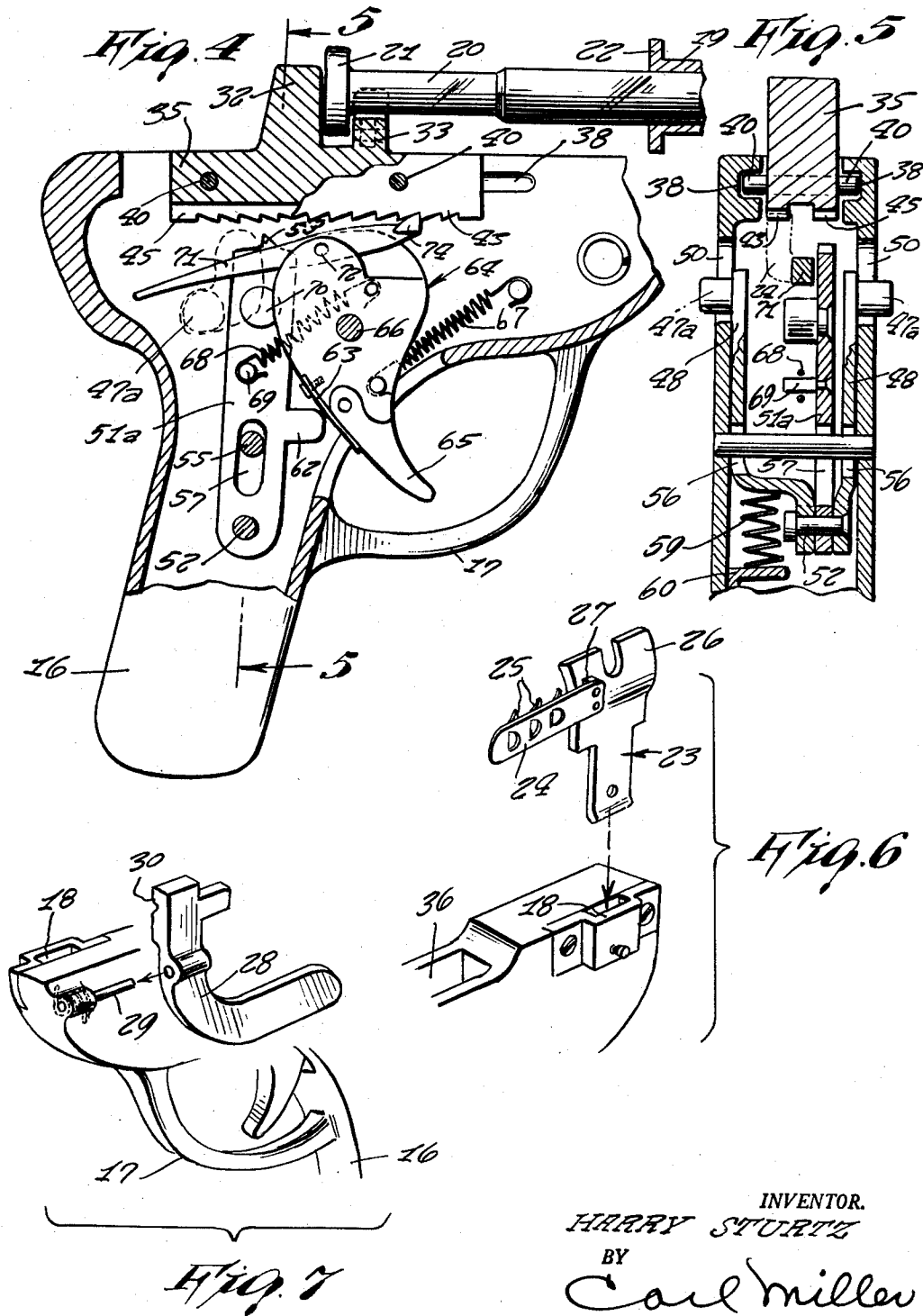
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3 Sheets-Sheet 2



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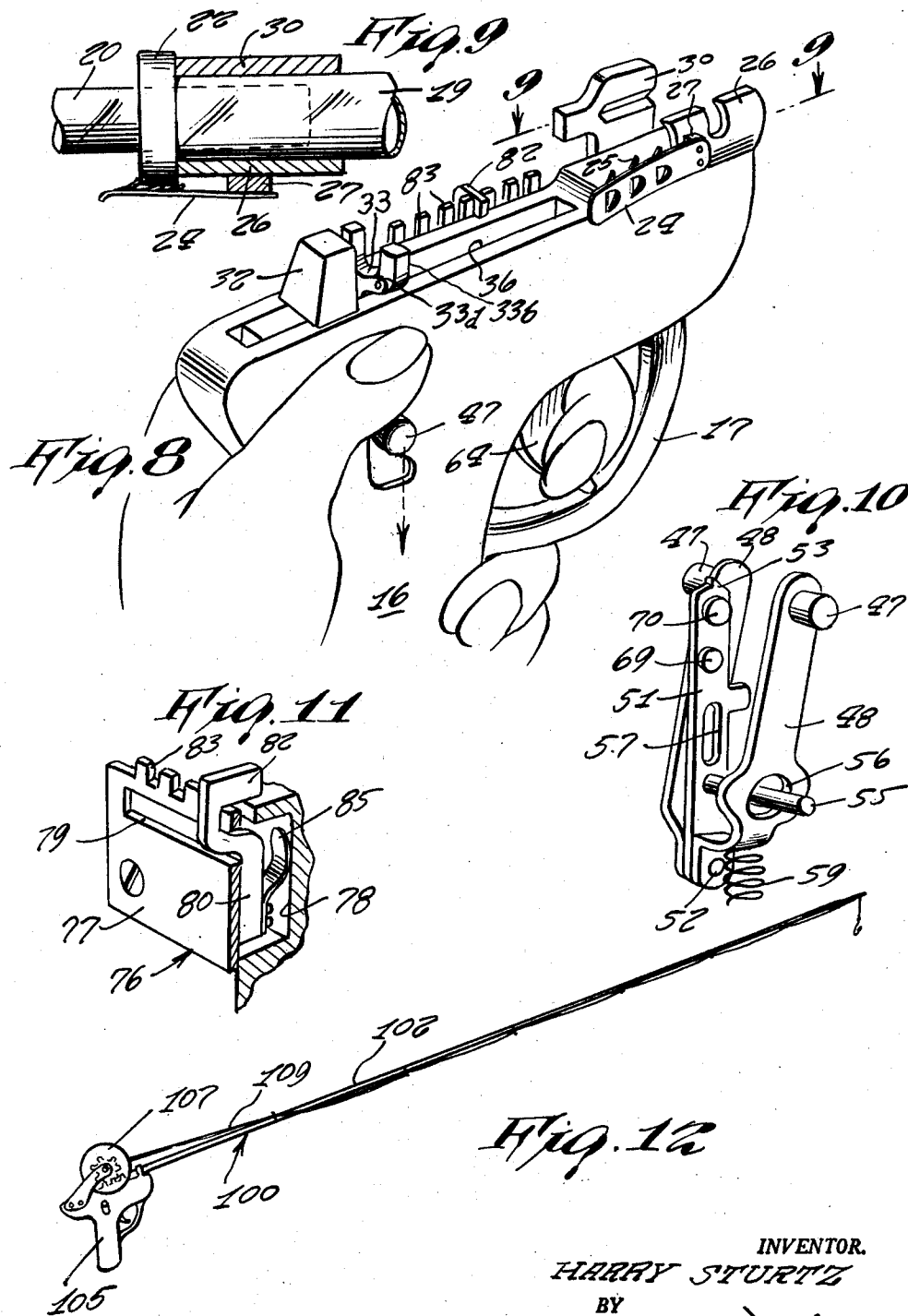
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HYPODERMIC SYRINGE HAND GRIP

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3 Sheets-Sheet 3



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## HYPODERMIC SYRINGE HAND GRIP

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5 Claims. (Cl. 128—218)

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This invention relates to hypodermic syringes and, more particularly, to precision apparatus for use with hypodermic syringes for instilling medication into the body and for removing fluids therefrom.

The present means of grasping a hypodermic syringe with the fingers and injecting or aspirating is an awkward action, thereby increasing the chance of inaccuracy in placing the needle in the desired location, as well as the difficulty of administering anesthesia by advancing the needle and simultaneously injecting. Also, by the present means of grasping the syringe with the fingers, it is very difficult to advance the needle and simultaneously aspirate.

An object of this invention, therefore, is to provide mechanical and controllable apparatus for use with hypodermic syringes that is simple in construction, highly efficient and accurate in operation, and which will overcome the aforementioned difficulties.

Another object of this invention is to provide an actuating mechanism for hypodermic syringes that permits injection and aspiration with the greatest ease and dexterity by physicians and technicians.

Still another object of this invention is to provide an actuating mechanism for hypodermic syringes and the like that is provided with a pistol grip and a trigger having a direct connection with the plunger of a syringe so that the apparatus can be operated with one hand and a graduated dose or a complete dose of medication can be discharged therefrom with each stroke of the trigger.

A still further object of this invention is to provide a gun-like actuating mechanism for hypodermic syringes that has an automatically arranged reversing mechanism permitting the use of the syringe for injecting or aspirating, as the case may be.

A still further object of this invention is to provide a trigger operated mechanical movement that is particularly useful for hypodermic syringe actuating mechanisms and which may also be applied for use with casting reels, dental drills, surgical instruments, chiropody drills, rotary electric drills used by artists and draftsmen for erasures, drills used for surgical skin planing, and the like. Also in industry it may be applied to caulking guns and the like, where the material in the gun has to be filled from the front, and then is to be ejected.

All of the foregoing and still further objects and advantages of this invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of a device made in accordance with this invention, showing a conventional hypodermic syringe in operative engagement therewith;

Figure 2 is a cross-sectional view taken along line 2—2 of Figure 1;

Figure 3 is a perspective view of a gear rack used in the apparatus shown in Figure 1;

Figure 4 is a view similar to Figure 2 showing a reverse travel setting;

Figure 5 is a cross-sectional view taken along line 5—5 of Figure 4;

Figures 6 and 7 are exploded perspective views showing various adjustable securing devices;

Figure 8 is a perspective view showing the manner of operating the directional setting mechanism;

Figure 9 is a cross-sectional view taken along line 9—9 of Figure 8;

Figure 10 is a perspective view of the directional setting mechanism;

Figure 11 is a fragmentary perspective view of an adjustable stop mechanism; and

Figure 12 shows a device made in accordance with this invention applied to a fishing reel and pawl assembly.

Figure 13 is a front view of the adjustable U-shaped yoke.

Referring now to Figure 1 of the drawing, a gun-type operating mechanism for hypodermic syringes made in accordance with this invention is shown to comprise a handle portion 16 having a closed trigger ring 17 associated therewith. The barrel 19 of a hypodermic syringe is shown disposed in operative position with the gun, the plunger 20 thereof having its head 21 disposed towards the rear of the apparatus. The finger grip flange 22 of the barrel is positioned rearwardly of a barrel holding assembly 23 that operatively grips the main syringe barrel 19 by means of a plate 26 that is removably carried in a bracket 18 along the side of the gun. The opposite side of the gun has a clamp handle 28 pivotally mounted thereon by means of a spring biased pivot shaft 29, pressure exerted on the handle 28 being operative to rotate it about a shaft 29 against the action of its associated spring so as to move a grooved anchor plate 30 from an engaged position with the syringe barrel. The head 21 of the plunger is secured to the holder 32 by means of a U-shaped yoke integrally secured to a longitudinally movable gear block 35.

The gear block 35 extends upwardly from its slidable engagement within a longitudinally disposed slot 36 of the gun which has a longitudinally extending groove 38 disposed along each side thereof. A pair of pins 40 extending outwardly from each side of the gear block 35 slidably engage the respective grooves 38 for slidable action therein. The bottom of the gear block is provided with a pair of oppositely directed rack gears 43, 45, the one 43 being operative to effect forward movement of the gear block and the other 45 being operative to effect the reverse or rearward movement of the gear block, all in a manner hereinafter described.

Referring now to Figures 5 and 10, a direction control button 47 extends outwardly from each side of a direction control yoke 48 and through associated L-shaped slots 50 carried by the sides of the gun. An actuator member 51 is pivotally secured to the bottom of the yoke 48 by means of a pivot pin 52 at its lower end and has a rearwardly directed pawl 53 at its upper end for reciprocating engagement with the rearward motion producing gear 45 when the control buttons 47 are positioned at the upper extremities of the slots 50 in the manner shown in Figures 1 and 2. A fulcrum pin 55 extends through enlarged openings 56 in each side member of the direction control yoke 48 and through the lower extremity of the actuator 51, and into engagement with the oppositely disposed handle portions of the gun. A compression spring 59 seated on a bracket 60 and reacting against the bottom of the yoke 48, normally urges the direction control yoke assembly 48 upwardly so that the pawl 53 is adapted to operatively engage its associated rack gear 45 and effecting the rearward movement of the gear block 35 and the connected plunger 20 of the syringe. When so disposed, because of the upward disposition of the control buttons 47, a forwardly directed flange 62

is operative to engage a wear plate 63 of the trigger assembly 64 that may be actuated by a pressure on the finger piece 65. A pressure on the trigger is operative to cause rotation thereof about its pivot pin 66, against the return action of the combination trigger spring 68 and actuator resetter so as to urge the actuator 51 rearwardly against the return action of the spring 68 secured thereto by means of a pin 69, whereby the gear block is urged rearwardly under the action of the pawl 53.

Spring 67 is an auxiliary trigger spring to assist in returning the trigger to its fullest return position.

With the control button and related parts disposed in the aforementioned manner, a longitudinally extending lever 71 pivotally carried at the upper portion of the trigger assembly 64 by means of a transverse pin 72, has a pawl 74 at its forward extremity maintained out of engagement with the forward movement actuating gears 43 by means of the abutment 70 carried adjacent to the upper end of the actuator 51, whereby the pawl 74 is maintained out of engagement with its associated gear. However, when the direction control buttons 47 are moved downwardly in their slots 50, thereby urging the control yoke 48 downwardly so as to remove the pawl 53 from engagement with the reverse gear, the rear extremity of the lever 71 is permitted to drop by gravity so as to raise the pawl 74 at its forward end up into engagement with the forward movement gear 43, whereby a pressure on the trigger assembly is operative to cause the pawl 74 to push the gear block 35 forwardly, as more clearly shown in Figure 4.

Referring to Figures 1 and 11, an adjustable plunger setting assembly 76 is shown wherein the extent of rearward plunger movement may be controlled so that the plunger 20 upon rearward motion of a small size hypodermic, does not leave the barrel. The adjustable plunger assembly is set to the size of the hypodermic syringe, and is matched with the size of the barrel holding assembly. Also, the U-shaped yoke 33 is widened or narrowed to meet the change in the plunger head size. This assembly comprises a plate 77 that overlies and is secured adjacent to a longitudinally extending recessed portion 78 into the side of the gun mechanism. The plate 77 is provided with a longitudinally extending slot 79 that has the leg 80 of an adjustment member extending there-through and into the recess 78, with an upper and outwardly disposed stop portion 82 selectively engageable with any one of the several reentrant portions 83 disposed along the top edge of the plate 77. A leaf spring 85 acting between the member 80 and an associated part of the recess 78, provides a yieldable retaining means for the adjustment member.

Referring to Figure 8 of the drawing, an automatically adjustable ratchet device 24 is shown secured to the barrel engaging plate 26 by means of a spacer element 27. This bar 24 has a plurality of spaced rearwardly extending teeth 25 that are adapted to engage the flange 22 of the syringe barrel when placed in an operative position in the gun. These teeth 25 effectively maintain the syringe barrel in proper position during the retraction of the plunger of the syringe.

In operation, the hypodermic syringe is picked up by the apparatus by pressing the operator's thumb against the barrel release handle 28, and laying the apparatus on the syringe. The syringe barrel is grasped by releasing the thumb from the handle 28, while making certain that the plunger head 21 sets between holders 32 and 33. Set the directional setting button 47 down and squeeze the trigger. The hypodermic syringe will automatically lock itself into the handle.

If the syringe is to be filled, such as with a medication, the directional setting buttons 47 are placed in their upward position as shown in Figures 1 and 2, whereupon the trigger finger piece 65 may be depressed a sufficient number of times to withdraw the plunger rearwardly of the gun to fill the syringe to the desired capacity. The

direction control buttons 47 may then be pushed into their lowered position against the action of the positioning spring 59 so that the pawl 74 is brought into engagement with the forward motion gears 43, whereupon after the needle is inserted into the flesh of the patient, the finger piece 65 of the trigger may be depressed a sufficient number of times to discharge the desired quantity of medication into the body of the patient. When the injection is complete and the operator is finished with the syringe, he presses the barrel release handle 28, and the syringe will disengage itself from the handle.

While the device is a primary benefit in connection with hypodermic syringes, the mechanical movement suggested thereby is also adaptable for use in such devices as fishing poles and the like, as shown in Figure 12. As shown, a fishing pole assembly 100 having an elongated pole 102, has a mechanical movement device 105 made in accordance with this invention at one end thereof. A reel 107 adapted to wind and unwind a fishing line 109 is operatively supported for actuation by the mechanical movement in a manner similar to that hereinbefore described. In this use, however, the mechanical movement is arranged to rotate the wheel 107 rather than to cause reciprocating longitudinal movement of the hypodermic plunger assembly.

It will be further understood that various thickness and length of barrels may be used by changing assemblies 23 and 28, setting assembly 76 for length and widening U-shaped yoke 33, if so desired.

It will also be noted, as especially shown in Figure 13 of the drawings, that the U-shaped yoke 33 is provided with adjustable arms 33a and 33b each of which is frictionally held by the pins 33c and 33d, respectively.

Furthermore, while this invention has been described with particular reference to the specific form shown in the drawings, it is understood that such is not to be construed as imparting limitations upon the invention, which is best defined by the claims appended hereto.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A device for operating hypodermic syringes having a syringe barrel, a needle projecting from the front end of the barrel, and a plunger extending from the rear end of the barrel, said device comprising a holder for the barrel of the syringe and a longitudinally reciprocating holder for the plunger of said syringe, said plunger holder comprising a base, a handle supporting said base for reciprocating longitudinal movement relative thereto, trigger operated means for effecting said reciprocating movement, and direction control means operatively connected between said trigger operated means and said base for controlling the longitudinal direction of movement of said base.

2. A device as set forth in claim 1, wherein said direction control means comprises first gear means carried by said base, second gear means carried by said base, each of said gear means adapted to effect movement of said base in opposite longitudinal directions, and means for drivingly connecting said trigger operated means selectively with one of said first and said second gear means.

3. A device as set forth in claim 2, wherein said gear means comprises a pair of parallel rack gears carried by said base, and said trigger operated means comprises a pair of pawls one each of which is adapted to be selectively engaged with one of each said rack gears to effect selective longitudinal movement of said base.

4. A syringe comprising a barrel and a plunger movable inwardly and outwardly within said barrel, said barrel rigidly supported on handle means, said plunger being rigidly supported at its outer extremity on base means for reciprocating longitudinal movement relative to said barrel, trigger operated mechanical means for effecting reciprocating longitudinal movement of said plunger relative to said barrel, a manually operated reversing mechanism

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for manually effecting reversal of said longitudinal movement in response to continual operation of said trigger means, and adjustable stop means carried by said handle for automatically limiting movement of said plunger in the direction of reverse longitudinal movement.

5. A syringe as set forth in claim 4, wherein said trigger operated means comprises a pair of alternately engageable pawl and rack gear means, and said reversing mechanism is directly connected to one of said pawl means.

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