

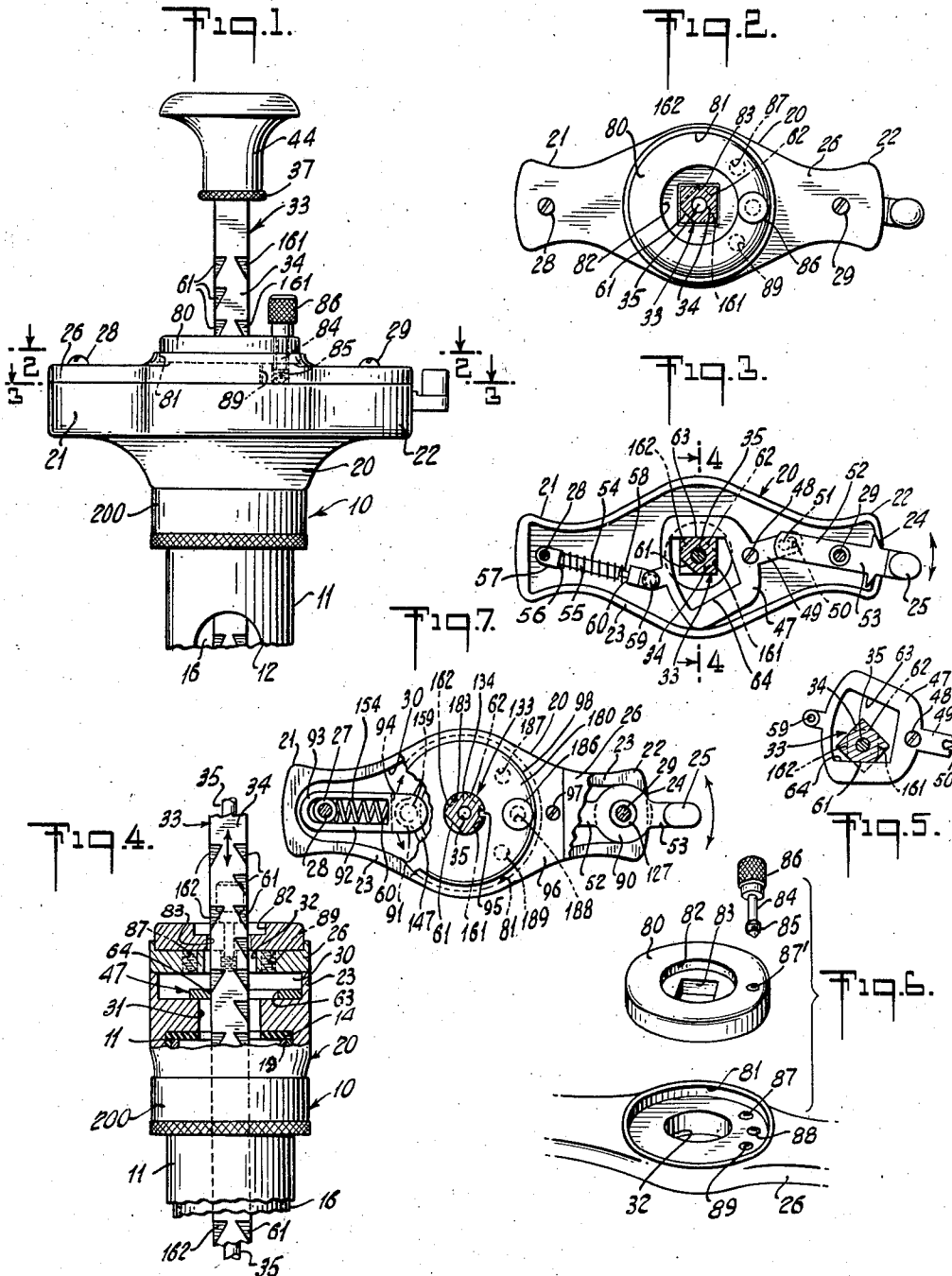
Jan. 4, 1949.

H. S. AUSTIN

2,457,859

HYPODERMIC SYRINGE

Filed July 12, 1947



INVENTOR

HAROLD S. AUSTIN.

BY

Watson, Bristol, Johnson & Leavenworth
ATTORNEYS

UNITED STATES PATENT OFFICE

2,457,859

HYPODERMIC SYRINGE

Harold S. Austin, Dallas, Tex.

Application July 12, 1947, Serial No. 760,677

10 Claims. (Cl. 128—215)

1

The present invention relates to hypodermic syringes and, more particularly, to the type disclosed in my United States Letters Patent No. 2,409,656 of October 22, 1946, being an improvement thereon with respect to means for disabling the step-by-step successive dosage discharge functioning thereof and for altering the size of the successive dosage discharges thereof.

A general object of the present invention is to provide such a hypodermic syringe with simple but efficient means readily and economically incorporated in commercial embodiments thereof which by the simplest of manipulations may permit the syringe to be effectively operated in a normal manner of complete discharge of barrel contents by a full stroke of the plunger, or selectively adjusted to assure successive dosage discharges of different predetermined amounts, while necessitating only rotational adjustment of the plunger.

A more specific object of the present invention is to provide, in that type of syringe apparatus (featured by a flip button control for the plunger to permit each time the control is flipped a foreshortened travel of the plunger), certain adjustment means which can readily be rotated between a plurality of positions and temporarily held in any thereof to carry and hold with it the plunger so that in different radially angular positions of the latter relative to the barrel structure different desired discharge operations may be had without necessitating in the adjustment any removal of the plunger from the barrel or any disabling locking of the control.

Another object of the present invention is to provide, in such syringe construction, guide means for the plunger which effectively prevents the latter from rotating relative thereto and with that means rotatably mounted on the barrel structure and associated with suitable holding means, whereby it may be adjusted to and temporarily held in any of a plurality of different radially angular positions so that in one of those positions the plunger may be freely reciprocated in the barrel, in another of those positions may assure step-by-step forward motion of the plunger successively to discharge doses of certain volume and in still another of those positions may again dictate such successive discharge of doses of different volume.

A further object of the present invention is the provision of structural embodiments of the device which are readily constructed and allow efficient use and operation thereof.

2

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a side elevational view, with parts broken away, of one embodiment of the present invention;

Fig. 2 is a sectional view taken substantially on line 2—2 of Fig. 1, showing parts in plan;

Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 1;

Fig. 4 is another elevational view, with parts broken away, of the structure shown in Fig. 1 as viewed from a position about at right angles to the position from which the structure is viewed in Fig. 1, and taken substantially on line 4—4 of Fig. 3;

Fig. 5 is a plan view, with parts broken away, of the plunger shaft means and stop plate structure shown in Fig. 3, indicating relative positions of parts during stop functioning of the stop plate as it engages in a stop notch on the shaft means;

Fig. 6 is an exploded perspective view of certain of the parts of the structure shown in Figs. 1, 2 and 4, which more particularly relate to the features of novelty; and

Fig. 7 is a view similar to Fig. 2, with parts broken away and in section, of a modified form of the invention.

Referring to the drawing, like numerals identify similar parts throughout. One embodiment of the invention, shown in Figs. 1 to 6 inclusive, employs many parts similar to those proposed in my prior Patent 2,409,656 identified above and, as will be seen, it comprises a casing structure 10 including a casing barrel portion 11 preferably windowed at 12 for sight inspection of contents. The lower portion of the barrel, the needle fitting attached thereto, and the plunger head are not shown, since they may be of common construction or similar to that shown in my prior patent. A circular barrel 16, preferably of transparent material such as glass, is received or telescoped within the barrel portion 11 of the casing structure to be held therein, if desired, in a manner similar to that proposed in my prior patent. The

upper end of the barrel portion 11 is preferably externally threaded to be threadably received within an internally threaded socket of a hub assembly 20 with suitable gasketing 19 interposed between the bottom of the socket in the hub assembly and the top ends of the barrel portion 11 and transparent barrel 16, as indicated in Fig. 4. A lock nut 200 may be employed threadably engaged on the externally threaded top end of barrel portion 11 to cooperate with the hub assembly 20 in securely holding the parts together.

The hub assembly 20 preferably includes a pair of diametrically opposed, laterally extending wings 21 and 22, to serve as finger grips. The wings 21 and 22 and other portions of the hub assembly 20 are adapted to serve as a housing for plunger travel-limiting mechanism and are, for this purpose, provided with an upstanding flange 23 cut away at 24 at the end of wing 22 to provide a passage for projection from the interior of a manually operable control or button 25. Flange 23 is overlaid with a plate 26, preferably held in position by screws 28 and 29 to provide with the wing and flange structure a closed chamber 30.

The base portion of the hub assembly 20 and the cover plate 26 are respectively provided with aligned holes 31 and 32 to receive therethrough a plunger shaft means 33 for free reciprocative action. These holes 31 and 32 are of such diameter as to permit free rotation of plunger shaft means 33 for a purpose to be indicated hereinbelow and, in this respect, the present structure differs from that proposed in my prior patent, in order to accommodate novel means for disabling the step-by-step latch mechanism and also to permit selective alteration of the dosage action of the plunger in accordance with the present invention. The plunger means includes the shaft means 33 and suitable plunger head structure on the lower end thereof (not shown) which may be similar to that proposed in my prior patent. For this purpose plunger shaft means 33 includes a sleeve 34 having a bore receiving a rod 35 which holds the plunger head structure to the bottom end of the sleeve, and also is threadably engaged at its top end through a lock nut 37 into an internally threaded hole in an operating knob 44.

In accordance with the present invention this hypodermic syringe structure, which is generically similar to constructions now in use, is provided with plunger stop mechanism which in some respects is similar to that shown in my prior patent. This plunger stop mechanism preferably is housed in the chamber 30 and may comprise a toggle snap means including a shaped apertured stop plate 47 through which the plunger shaft means 33 extends. As shown in Fig. 3, the stop plate 47 is pivotally mounted at 48 by a pin or screw anchored to the hub assembly 20. The stop plate 47 has an operating arm 49 slotted at 50 slidably to receive a pin or lug 51 on the lower side of a lever operating means. The lever operating means may comprise a lever of the first class, pivotally mounted by means of screw 29 upon the hub assembly 20 and having one arm 52 carrying on its lower side lug 51 slidably engaged in slot 50 of the operating arm 49 on stop plate 47. The operator lever has its other arm 53 provided with a manual control or button 25 projecting through the passage 24 to the exterior of the chamber 30. As a result, when control or button 25 is swung back and forth about an axis through screw 29, stop plate 47 is pivoted

back and forth about its fulcrum pin 48 in the manner of toggle structure. Preferably this action of stop plate 47 is of a snap nature due to the employment of suitable biasing spring means.

Such biasing spring means may comprise a helical compression spring 54 received upon a guiding sleeve 55 provided with a spring abutment 56, and a mounting ear 57 pivoted to the finger grip or wing 21, such as by means of screw 28. The helical compression spring 54 receives therein a pin or plunger 58 slidably mounted in the sleeve 55 and pivotally mounted at 59 upon the stop plate 47. The plunger 58 is also provided with a spring abutment 60 and the spring 54 is held under compression between that abutment and abutment 56.

The shaft sleeve 34, in the embodiment shown in Figs. 1 to 6 inclusive, is in this embodiment polygonal in cross-section, preferably square, and it is provided with a plurality of series of abutment means to cooperate with stop means provided by the stop plate 47; although it may be of other cross-sectional shape as explained later in connection with Fig. 7. Such abutment means may be formed by a plurality of notches in diametrically opposed edges such as the series of notches 61—61 in one edge of the sleeve 34 and the series of notches 62—62 in the diametrically opposed edge thereof, with the latter preferably staggered with respect to the former, so as to be arranged substantially intermediate thereof. The relative arrangement of these two series of notches 61—61 and 62—62 is such as to assure discharge from the barrel 16 of a certain predetermined quantity of fluid when the plunger means is moved a distance equal to the distance between a transverse plane through a notch in one series, such as one of the notches 61—61, and a transverse plane through the nearest notch in the other series, such as the next following notch in the series of notches 62—62.

To assure precise stoppage of the plunger means as dictated by and to cooperate with the two series of notches 61—61 and 62—62, the stop plate 47 has its central portion cut away to receive therethrough the plunger shaft means 33 and to provide on opposite sides of the latter a pair of stops, such as portion 63 for cooperation with the series of notches 62—62 and portion 64 for cooperation with the series of notches 61—61, when snapped back and forth to accomplish the step-by-step successive dosage action.

In the embodiment shown in Figs. 1 to 5 inclusive, the plunger shaft sleeve 34 preferably has its two remaining edges intervening those in which notches 61—61 and 62—62 are formed, provided with two additional series of notches 161—161 and 162—162. These are preferably located so that the distance between transverse planes through the notches 161 and 162 is substantially twice the distance between transverse planes through the notches 61 and 62. Accordingly, these more widely spaced notches 161—161 and 162—162 may be employed in a manner similar to the use of notches 61—61 and 62—62 for increasing the size of the successive doses to about twice the quantity of the doses assured by the notches 61—61 and 62—62. Of course, other relative notch spacings may be employed to permit selective use thereof for delivery of any desired multiple or fraction of the dose quantity dictated by the first series of notches.

This extra pair of series of notches 161—161

5

6

and 162—162 may be brought into cooperative relation with respect to the same stop mechanism merely by rotating the plunger shaft means 33 so as to bring notches 161—161 and 162—162 into opposed relation respectively with the stop portions 64 and 63 of the stop plate 47. The means whereby this is accomplished constitutes structure of the present invention which also is selectively employable to disable the stop mechanism so as to hold the stops 64 and 63 out of the paths of the series of notches 61—61, 161—161, 62—62 and 162—162. For this purpose suitable means are associated with the hub assembly which provides for and permits rotations of the plunger shaft means 33 without necessitating removal of the plunger structure from the barrel structure. For the purposes of identification, this means may be referred to as control means for rotating the plunger means to and temporarily holding it in any selected one of a plurality of positions selectively and alternately to disable and activate the cooperating functioning of the abutment means on the plunger means and the stop means on the barrel structure.

As shown in the drawing, the disabling and activating control means may comprise, for the embodiment of Figs. 1 to 6 inclusive, a circular plate 80 rotatably mounted in a cylindrical recess 81 formed in the top of the housing cover plate 26. The control plate 80 may, if desired, be provided with a centrally located depression 82 in the top thereof, but it is to be understood that that depression is not essential to the functioning of the control mechanism. In the depression 82 of the plate 80 is provided a way, preferably a hole 83, slidably to receive there-through the plunger shaft means 33. Since, in the embodiment shown in Figs. 1 to 6 inclusive, the shaft means 33 is substantially square in cross section, the hole 83 in plate 80 is also substantially square so as to prevent relative rotation between the shaft means and the control plate. Accordingly, the shaft means 33 is permitted freely to reciprocate through the control plate 80 but cannot rotate relative thereto, and can thus be rotated relative to the housing for the stop mechanism by rotation of the control plate. Of course, the function of apertured plate 80 may be served by structure having a shaped groove in the side thereof to serve as the way for slidably receiving and guiding shaft means 33. The control plate 80 can be held by any suitable means relative to the housing in a selected position, such as by a manually-operable, projectable member engageable with housing structure, temporarily to hold the shaft means in a selected radially angular position.

As shown in Figs. 1, 2 and 6, more particularly the latter, the manually-operable means for holding the control plate 80 in a selected position may comprise a bolt 84 having a lower threaded end 85 and a knurled knob head 86 for manual rotation. The control plate 80 may, if desired, be provided with an internally threaded hole 87' to receive therethrough the threaded end 85 of the bolt 84 and, as shown in Fig. 6, the shank of the bolt may be of reduced cross-section, such as may result from removal of external threads therefrom, so that, when the threaded lower end is extended below the bottom face of the control plate, the bolt may be freely rotated in the hole 87' without advance while assuring retention to prevent accidental loss. For cooperating with the bolt 84, the housing plate 26 is preferably provided in the bottom of the recess 81 with a plurality of local-

ized recesses, such as 87, 88 and 89, which, in the preferred form, are internally threaded holes extending into or through the housing plate. The threaded lower end 85 of the bolt 84 is adapted, upon rotation of the manual knob 86, to be threadably received in any one of the recesses or holes 87, 88 and 89.

In operation of the embodiment of the present invention, shown in Figs. 1 to 6 inclusive, the hypodermic syringe may have its stop mechanism in the housing chamber 30 disabled so that it will operate in the usual manner of hypodermic syringes, where the entire contents of the barrel is to be discharged on one stroke of the plunger. This disabling is accomplished by positioning the control plate 80 in an intermediate position, as shown, so that the bolt 84 may have its lower threaded end 85 threadably engaged into the middle recess 88 in housing plate 26 when the manual knob 86 is rotated. This will temporarily hold control plate 80 in its intermediate position with the plunger shaft means 33 held by the control plate in the positions shown in Figs. 2 and 3. As a result, opposite flat sides of the plunger shaft sleeve 34 will be presented to the opposed stop means 63 and 64 so that the latter cannot be engaged in any of the notches 61—61, 62—62, 161—161 and 162—162. Flipping of the finger control 25 back and forth will not effect free sliding movement of the plunger shaft means 33 through the barrel structure and housing thereof.

If, however, step-by-step operating of the hypodermic syringe is desired so that equal dosages of relatively small quantity, for example, about one-eighth of a cubic centimeter ($\frac{1}{8}$ cc.), the control plate 80 may be adjusted to any position of activation of the stop mechanism by manual rotation of the knob 86 to disengage the lower threaded end 85 of the bolt 84 from the recess 88. The control plate 80 can then be rotated counter-clockwise until the lower threaded end 85 of the bolt 84 can be threadably engaged in the recess 87, there to hold the plunger shaft means 33 in a new position. In this position of the plunger shaft means 33 its square sleeve 34 will be oriented as shown in Fig. 5, so that the series of notches 61—61, or the abutments provided thereby, will be presented to the stop portion 64 of the stop plate 47, and the series of notches 62—62, or the abutments provided thereby, will be presented to the stop portion 63 of the stop plate. The manual control button 25 may then be swung over or up, as viewed in Figs. 2 and 3, so as also to swing up the spring-biased stop plate 47 toward the position shown in Fig. 5, i. e. to the path of an abutment provided in the formation of the first notch 61. Depression of the plunger knob 44 will cause the plunger means 33 to move down into the barrel 16 until the stop or engaging means 64 is permitted to click into the notch 61, as shown in Fig. 5, to stop travel of the plunger means. As a result, a precise or predetermined amount of fluid will be discharged from the barrel 16 through the hypodermic needle.

For the next dose the manual control button 25 will then be swung back to the position indicated in Figs. 2 and 3, so that the engaging or stop means 63 of the stop plate 47 will be spring-biased toward the path of the abutment provided in the formation of the next following notch 62, which, as previously indicated, is staggered, with respect to successive notches 61, 61 so as to position its abutment in a transverse plane substantially intermediate of the two transverse

planes of the abutments of the successive notches 61, 61. The plunger means may then again be depressed until the engaging or stop means 63 clicks into that notch 62 and, as a result, a precise or predetermined amount will again be discharged from the barrel through the needle.

If it is desired to alter the amount of the successive dosages provided by the step-by-step operation of the plunger, such as to an amount about twice that provided by the two series of notches 61—61 and 62—62, the plunger shaft means 33 may be rotated to another position to bring into cooperation with the stop mechanism in the housing the two series of notches 161—161 and 162—162. For this purpose, the bolt 84 is disengaged from the recess 87 in the housing cover plate 26 and the control plate 80 is rotated in a clockwise direction so that the lower threaded end 85 of the bolt may be engaged in the recess 89 in the housing cover plate. This will rotate the plunger shaft means so as to present the series of notches 161—161 to the stop portion or engaging means 64 of the stop plate 47 and the series of notches 162—162 to the stop portion or engaging means 63 of the stop plate. The step-by-step operation described above in connection with the series of notches 61—61 and 62—62 are then repeated with the series of notches 161—161 and 162—162 cooperating in similar fashion with the stop mechanism.

In Fig. 7 is shown a modified embodiment of the present invention which includes in the base portion of the barrel structure a housing formed by flanged wings 21 and 22 and overlaid by a housing cover plate 26 to provide an internal chamber 30. In the chamber 30 is mounted stop mechanism, including a stop plate 147, similar to stop plate 47 of the embodiment shown in Figs. 1 to 5 inclusive. However, the control lever for swinging the stop plate 147 has intermediate its arms 52 and 53 an enlarged portion 90, generally cylindrical in outline, to be rotatable snugly against curved inner surfaces of the flange 23 at the end of wing 22 to close off the passage 24 through which the control lever arm 53 extends to the exterior. A circular hole in the enlarged portion 90 rotatably receives a cylindrical land 127 fixed to or made integral with the wing structure 22 in the chamber 30. Screw 29 is threadably engaged in an internally threaded hole in the land 127 to hold the housing cover plate 26 in position which, in turn, keeps the apertured enlargement 90 on the land 127. The lever arm 52 is connected to the stop plate 127 in a manner similar to the connection thereof in the embodiment shown in Fig. 3.

The stop plate 147 of the embodiment shown in Fig. 7 has on its far end an apertured ear 91 in which is pivotally engaged a cylindrical lug or pin 159 on the bottom side of the near end of a link frame 92. The far end 93 of the link frame 92 is looped over a cylindrical land 27 fixed to or made integral with wing structure 22 in the chamber 30, and that land also has an internally threaded hole therein to receive the screw 28 which cooperates with screw 29 in holding the housing cover plate 26 in position. A helical spring 154 is mounted in the link frame 92 between an abutment shoulder 60 at one end and the land 27 at the other end, so as to bias the stop plate 147 for snap action. The major portion of the link frame 92 between its far end 93 and the vicinity of pin 159, as well as at that pin, is of a vertical thickness slightly less than the depth of chamber 30 so that the parts will be

held together in assembled positions by housing cover plate 26, with sufficient clearance to permit free pivoting and sliding action of the link frame and spring therein. The near end of link frame 92 in the vicinity of and about pin 159, is thinner or stepped at 94 on the bottom side to permit overlapping of stop plate ear 91 with pin 159 received in the latter.

In Fig. 7 the various parts of the stop mechanism are shown in a neutral position intermediate swinging to either side of the stop plate 147, the link frame 92 and the control button 25. As indicated therein, in such position the spring 154 is under compression with the end 93 of the link frame 92 pushed back beyond the far side of land 27. When the stop plate 147 is swung to either side by the control button 25, compression spring 154 will tend to pull the end 93 of link frame 92 forward, thereby pushing the pivoting lug or pin 159, connected to the stop plate, to an extreme position of swing on either side of the neutral position, as dictated by the direction in which control button 25 is flipped.

In the embodiment shown in Fig. 7, control plate 180 is similar to the control plate 80 of the embodiment shown in Figs. 1 to 6, inclusive, except that no recess 82 is provided therein, and the hole 183 through which plunger shaft means 133 is slidably mounted, is generally circular in cross section with a longitudinally extending finger 95 provided on one side thereof. The plunger shaft means 133 includes a shaft sleeve 134 which is generally cylindrical in shape but has a longitudinally extending groove on one side thereof slidably receiving the finger 94 to prevent relative rotation between the shaft means and the control plate 180. The shaft sleeve 134 has two pairs of series of notches 61—61, 62—62, 161—161 and 162—162, which may be similar to those series of notches in the embodiment of Figs. 1 to 5 inclusive, to provide the two pairs of cooperating staggered abutments for cooperative action with the engaging means of the stop mechanism.

The housing cover plate 26 of the Fig. 7 embodiment is provided in its recess 81 with three smooth-bored recesses 187, 188 and 189, arranged similarly to the internally threaded recesses or holes 87, 88 and 89 of the embodiment shown in Figs. 1 to 6 inclusive. The means on the control plate 180 to cooperate with the position-determining recesses 187, 188 and 189, may be a spring-biased detent or pin of well known construction having a lifting head 186 for manual engagement, so that when the detent head is lifted by the fingers to withdraw the lower end of the pin out of one of the position-determining recesses 187, 188 and 189 against biasing spring action, the control plate 180 may then be rotated to another position where the detent pin may be aligned with the particular recess for that position. When the detent is freed its spring will cause it to snap into the recess at that position temporarily to hold the control plate 180 in the selected position. In such a structure with a biasing spring for the detent pushing the detent downwardly, tending to lift the control plate 180 up away from the housing cover plate 26, suitable means should be provided to prevent relative separation. For this purpose, there may be provided a separate ring plate 96 fastened on the housing cover plate 26 by any suitable means such as screws 97 and with that ring plate provided with a flange 98 overlying the circumferential edge of the circular control plate 180. The control plate 180 will thus be retained in the recess 81 of the housing

cover plate between the latter and the ring plate 96. Of course it will be understood, that the internally threaded recesses 87, 88 and 89 and the locking screw 84 may be substituted for the detent recesses 187, 188 and 189 and the detent 186 in the embodiment shown in Fig. 7 if desired, and, in which case the ring plate 95 may be omitted. With the use of a circular plunger sleeve, such as 134 of the Fig. 7 embodiment, the lock nut 37 may be made integral with knob 44, with the resulting internally threaded skirt of the knob threadably receiving the externally threaded end of the plunger sleeve and with the end of rod 35 threaded into the knob, cooperatively to lock the parts together.

The functioning of the control plate and its locking means in the embodiment of Fig. 7 is, of course, similar to the functioning of the similar structure in the embodiment shown in Figs. 1 to 6 inclusive, and to accomplish similar results.

Obviously, if the shaft means is provided with more series of notches in other paths for additional dosage adjustment, i. e. to provide a similar step-by-step operation of the plunger means for delivery of dosages of different volume which may be either a multiple of or fraction of the dosages delivered when the abutment means of the plunger means of either of the previously-mentioned series is cooperatively associated with the stop means, the features of the control plate may be extended to accommodate the same by providing additional setting positions for its latch or temporary holding means. Further, it will be obvious that, if desired, a plurality of dosage-measuring positions for the plunger means may be provided without incorporating the disabling position for free reciprocation of the plunger means. For example, the disabling position of the control plate may be eliminated by omission of the recesses 88 and 188 in the embodiments shown in the drawing.

It will readily be seen that the present invention provides simple means which are readily manipulated selectively to change the functioning of the stop mechanism of a hypodermic syringe construction of the type disclosed and claimed in my prior Patent 2,409,656, and to accomplish that end without necessitating complete withdrawal of the plunger means from the barrel structure, partial rotation thereof and reinsertion in the barrel structure in a new radially angular position in order to change the amount of successive dosages deliverable by the step-by-step operation of the plunger means. Disabling of the stop mechanism, so that the hypodermic syringe may be used to discharge the entire barrel contents with a full stroke of the plunger means, does not require the employment or provision of separate latch means for the stop mechanism. These adjustments are provided for by the novel structure of the present invention which allows selective positioning of the plunger means to permit the desired performance thereof by simple rotational manipulation of the control means and its simple holding means. It is thus apparent that the objects set forth above among others made apparent from the preceding description are efficiently attained and, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and a movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising means rotatably mounted on said barrel structure and having a way slidably receiving said plunger means, means substantially preventing relative rotation between said rotatable means and said plunger means, and means temporarily to hold said rotatable means in either of two radially angular positions on said barrel structure reciprocably to guide said plunger means in either of its two positions.

2. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and a movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising means rotatably mounted on said barrel structure and having a hole extending therethrough slidably receiving said plunger means, means substantially preventing relative rotation between said rotatable means and said plunger means, and means temporarily to hold said rotatable means in either of two radially angular positions on said barrel structure reciprocably to guide said plunger means in either of its two positions.

3. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said

barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising means rotatably mounted on said barrel structure and having a hole extending therethrough slidably receiving said plunger means, said plunger means and side walls of the hole being so shaped complementary to each other as substantially to prevent relative rotation between said rotatable means and said plunger means, and means temporarily to hold said rotatable means in either of two radially angular positions on said barrel structure reciprocally to guide said plunger means in either of its two positions.

4. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising means rotatably mounted on said barrel structure and having a way slidably receiving said plunger means, means substantially preventing relative rotation between said rotatable means and said plunger means, and manual means on said rotatable means to engage said barrel structure temporarily to hold said rotatable means in either of two radially angular positions on said barrel structure reciprocally to guide said plunger means in either of its two positions.

5. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising a plate

rotatably mounted on said barrel structure and having a hole extending therethrough slidably receiving said plunger means, enter engaging means on said plate and said plunger means substantially preventing relative rotation therebetween, and means temporarily to hold said plate in either of two radially angular positions on said barrel structure reciprocally to guide said plunger means in either of its two positions.

6. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising a plate rotatably mounted on said barrel structure and having a hole extending therethrough slidably receiving said plunger means, interengaging means on said plate and said plunger means substantially preventing relative rotation therebetween, and manual means on said plate to engage said barrel structure temporarily to hold said plate in either of two radially angular positions on said barrel structure reciprocally to guide said plunger means in either of its two positions.

7. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a series of abutment means arranged longitudinally thereof, and a movable engaging stop means selectively to be positioned in the path of the series of abutment means when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages, said stop means being out of the path of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in one of the two positions selectively and alternately to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising a plate rotatably mounted on said barrel structure and having a hole extending therethrough slidably receiving said plunger means, interengaging means on said plate and said plunger means substantially preventing relative rotation therebetween, means providing a plurality of recesses in said barrel structure beneath said plate, and a manually-operable projectable member mounted on said plate selectively to enter any one of the recesses in said barrel structure when said plate is rotated on the latter from one position to another temporarily to hold said plate relative to said barrel structure in a selected position.

8. In a hypodermic syringe, the combination with barrel structure having a housing, plunger

means reciprocable in said barrel structure through said housing and having a plurality of cooperating series of abutment means arranged longitudinally thereof with each series located in a different path, and a plurality of movable engaging stop means mounted in said housing alternately to be positioned in the paths of the plural series of abutment means when said plunger means is in certain selected radially angular positions with respect to said housing so that said plunger means may be moved longitudinally through said housing step-by-step for successive discharge of dosages, said stop means being out of the paths of the plural series of abutment means when said plunger means is in another radially angular position with respect to said housing; of control means for rotating said plunger means to and temporarily holding it in any one of the mentioned positions selectively to disable and activate the cooperating functioning of said abutment and stop means, said control means comprising a plate rotatably mounted on said housing and having a hole extending therethrough slidably receiving said plunger means, interengaging means on said plate and said plunger means substantially preventing relative rotation therebetween, means providing a plurality of recesses in said housing beneath said plate, and a manually-operable projectable member mounted on said plate selectively to enter any one of the recesses in said housing when said plate is rotated on the latter from one position to another temporarily to hold said plate relative to said housing in a selected position.

9. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a plurality of series of abutment means arranged longitudinally thereof with each series located in a different path, and movable engaging stop means selectively to be positioned in the path of one of the series of abutment means at a time when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages of certain volume, said stop means being in the path of another of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages of certain other volume; of control means for rotating said plunger means to and temporarily holding it in any one of the mentioned positions selectively and alternately to bring into cooperation with said stop means the different series of abutment means, said control means comprising means rotatably mounted on

said barrel structure and having a way slidably receiving said plunger means, means substantially preventing relative rotation between said rotatable means and said plunger means, and means temporarily to hold said rotatable means in any of its rotational positions on said barrel structure reciprocably to guide said plunger means in any of its dosage-measuring positions.

10. In a hypodermic syringe, the combination with barrel structure, plunger means reciprocable in said barrel structure and having a plurality of series of abutment means arranged longitudinally thereof with each series located in a different path, and movable engaging stop means selectively to be positioned in the path of one of the series of abutment means at a time when said plunger means is in one radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages of certain volume, said stop means being in the path of another of the series of abutment means when said plunger means is in another radially angular position with respect to said barrel structure so that said plunger means may be moved longitudinally step-by-step with respect to said barrel structure for successive discharge of dosages of certain other volume, said stop means being out of the paths of all of the series of abutment means when said plunger means is in still another radially angular position with respect to said barrel structure; of control means for rotating said plunger means to and temporarily holding it in any one of the mentioned positions selectively and alternately to bring into cooperation with said stop means the different series of abutment means temporarily to activate the cooperating functioning of said abutment and stop means and at will to disable that cooperating functioning for free reciprocation of said plunger means, said control means comprising means rotatably mounted on said barrel structure and having a way slidably receiving said plunger means, means substantially preventing relative rotation between said rotatable means and said plunger means, and means temporarily to hold said rotatable means in any of its rotational positions on said barrel structure reciprocably to guide said plunger means in any of its dosage-measuring positions and its free reciprocation position.

HAROLD S. AUSTIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,406,656	Austin	Oct. 22, 1946