March 27, 1956 D. E. YOCHEM 2,739,591

MULTIPLE DOSE HYPODERMIC SYRINGE CONTROL

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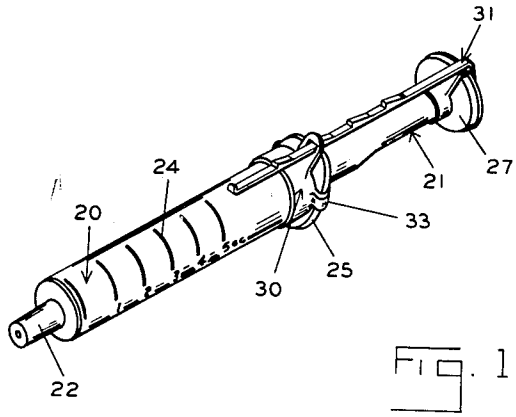

Fig. 1

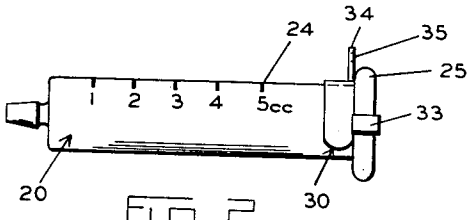

Fig. 2

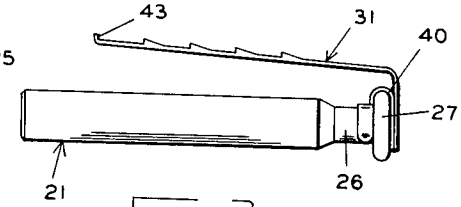

Fig. 3

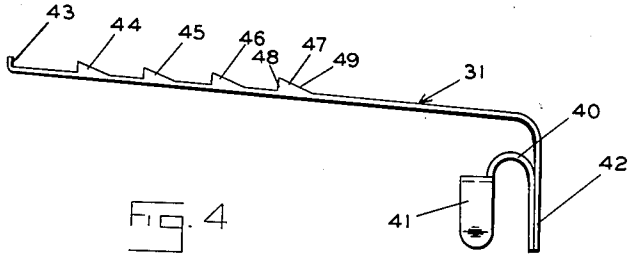

Fig. 4

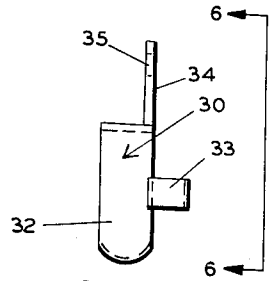

Fig. 5

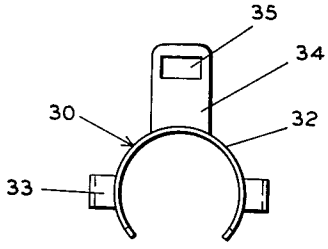

Fig. 6

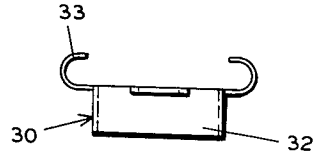

Fig. 7

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MULTIPLE DOSE HYPODERMIC SYRINGE CONTROL

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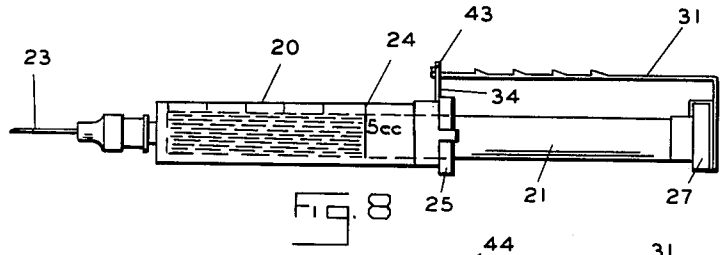

Fig. 8

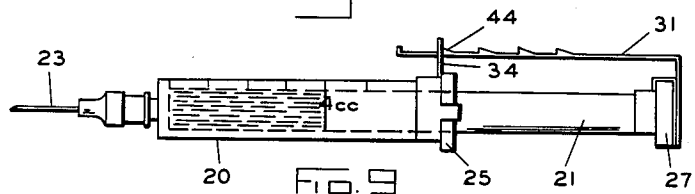

Fig. 9

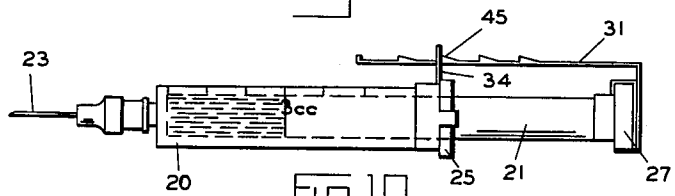

Fig. 10

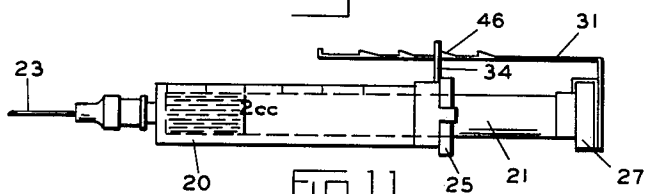

Fig. 11

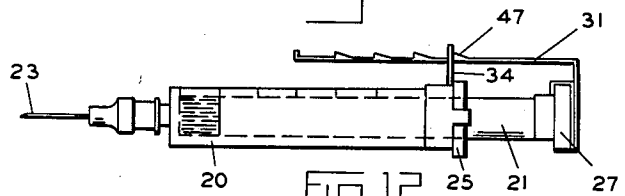

Fig. 12

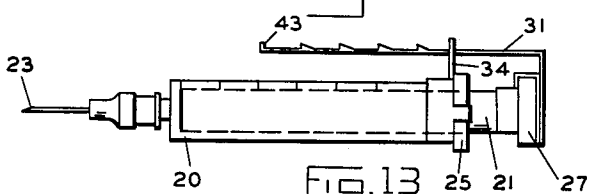

Fig. 13

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MULTIPLE DOSE HYPODERMIC SYRINGE CONTROL

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Application April 12, 1955, Serial No. 500,802

4 Claims. (Cl. 128—218)

My invention relates to a multiple dose hypodermic syringe control. It has to do, more specifically, with a control device which can be readily attached to a hypodermic syringe to facilitate the ejection of successive uniform doses of liquid therefrom.

In the mass inoculation of a population with vaccines for immunization to prevent the contraction of certain diseases, it is necessary to give a large number of people injections of uniform doses with hypodermic syringes. It is usual to provide large syringes filled with the desired liquid and to move the plunger successively forwardly in the barrel to inject a predetermined dose in each successive person, it being understood that the needle is changed for each successive injection. The physician or technician administering the injections must rely on the calibrations on the syringe barrel in relation to the forward end of the plunger in an attempt to accurately select the dose. However, whether or not the dose administered is accurate depends a great deal on how skilled the physician or technician is in accurately moving the syringe plunger relative to the calibrations. The result is that successive persons injected do not always get accurate doses, sometimes receiving overdoses and sometimes receiving underdoses.

It is the object of my invention to provide a simple, inexpensive control device which can be readily attached to a hypodermic syringe and which is provided with positive means for predetermining each successive dose administered from the barrel of the syringe to an accurate amount so that all the doses administered will be uniformly accurate.

In the accompanying drawings I have illustrated an example of my invention. In these drawings:

Figure 1 is an isometric view of a hypodermic syringe having my control device applied thereto.

Figure 2 is a side view of the barrel of the syringe with the guide clasp of the control device clasped thereto.

Figure 3 is a side view of the plunger of the syringe with the control bar of the control device applied thereto.

Figure 4 is an enlarged side view of the control bar.

Figure 5 is an enlarged side view of the guide clasp.

Figure 6 is an end view of the guide clasp taken along line 6—6 of Figure 5.

Figure 7 is a top view of the guide clasp of Figure 5.

Figure 8 is a diagrammatic view showing the initial setting of the control device on the syringe prior to ejecting the first dose from the syringe barrel.

Figures 9 to 13 are similar views showing the syringe plunger pushed forwardly in the syringe barrel in successive steps predetermined and positively controlled by the control device to eject successive uniform and accurate doses until the syringe barrel is empty.

With reference to the drawings, in Figure 1 I have illustrated by control device applied to a hypodermic syringe of the standard or usual type. This type of syringe is usually made of glass and comprises the barrel 20 and the plunger 21 mounted for reciprocation therein.

The barrel 20 is provided on its forward end with the needle stem 22 which removably receives the usual needle 23 (Figures 8 to 13). The barrel is calibrated in the usual way, being provided with the calibrations 24 which indicate dosage. The rear end of the barrel is provided with the usual laterally extending flange 25.

The plunger 21 comprises a body which slidably fits into the barrel 20 and which is provided with a narrowed neck 26 at its rear end which projects from the barrel in the usual way even when the plunger is moved into its forwardmost position. On the extreme rear end of the plunger there is provided the knob or head 27. The head 27 and the narrowed neck 26 serve in the usual way to provide gripping means for retracting the plunger 21 from the barrel and the head 27 serves as pushing means for pushing the plunger into the barrel.

My control device, which is applied to the syringe, consists of two main parts, the guide clasp 30 which is applied to the barrel 20 and the control bar 31 which is applied to the plunger 21 and which cooperate with each other as shown in Figure 1.

The guide clasp 30 includes a clasping spring strap 32 of arcuate form, being greater than a semi-circle, of a proper size to clasp around the barrel, which carries the laterally projecting hooks 33 at diametrically opposed points. These hooks 33 are adapted to snap over the barrel flange 25 when the spring strap 32 is slipped radially on the rear end of the barrel 20. The hooks 33 will cooperate with the flange 25 to prevent axial movement, especially forwardly, of the guide clasp 30 on the barrel 20.

The guide clasp 30 also includes the radially extending arm 34 which is provided with a guide opening 35, the axis of which is parallel to the axis of the clasp 30 and, therefore, parallel to the axis of the barrel 20 when the guide clasp is mounted thereon.

The control bar 31 is a flat bar of suitable spring metal which is provided at its rear end with a plunger-engaging yoke 40. This yoke 40 has a spring clasp yoke portion 41 which will straddle and clasp on the neck 26 of the plunger 21 as shown in Figure 3. It is also provided with a flat disc-like portion 42 which will engage the flat rear side of the head 27 of the plunger. It will be noted that yoke 40 is connected integrally with the bar 31 and that the connection is made so that the forward end of the bar 31 will tend to swing outwardly (Figures 3 and 4) so that the bar will normally be angularly disposed relative to the axis of the plunger 21, as shown in Figure 3.

The bar 31 is provided at its extreme forward end with an upwardly bent right angular stop portion 43. At equally spaced longitudinal intervals rearwardly of the stop 43 on the upper surface of the bar 31, there are provided the stops which I have indicated by the numerals 44, 45, 46, and 47. However, different numbers of these stops may be provided depending upon the number of doses of medication to be provided in the syringe barrel. Each stop member 44 to 47 is in the form of a ratchet tooth having a front stop surface 48 normal to the upper surface of the bar 31 and a rear inclined plane surface 49.

As described above, the guide clasp 30 can be mounted at the rear end of the barrel 20 merely by forcing the spring strap 32 radially inwardly over the barrel 20 so that they will tightly embrace the barrel and the hooks 33 will snap over the flange 25. The control bar 31 is clasped to the rear end of the plunger 21 by similarly forcing the yoke structure 41 around the neck 26 while positioning the disc portion 42 in juxtaposition with the outer surface of the head 27 of the plunger 21. Thus, at this time, the guide clasp 30

will be on the barrel as shown in Figure 2 and the control bar **31** will be on the plunger **21** as shown in Figure 3.

The two parts of the syringe with the gauge parts thereon may now be assembled by slipping the forward end of the plunger **21** slightly into the rear end of the barrel **20**. Then, by pressing down on the control bar **31**, the extreme forward end of the bar **31** is aligned with the opening **35** in the guide clasp **30**. The opening **35** is of a height greater than the thickness of the bar **31** plus the projecting distance of the stop **43** or any of the stops **44** to **47**. Also, the width of the bar and the stops carried thereby is slightly less than that of the opening **35**. Therefore, if the plunger **21** is now pushed farther into the barrel **20**, after depressing the bar **31**, the bar **31** can pass into and through the opening **35** provided the bar **31** is swung downwardly sufficiently to preclude the forwardmost stop **43** and the front surface **48** of any of the stops **44** to **47** from engaging the rear surface of the arm **34** adjacent the opening **35**. The outward force exerted by the spring bar **31** will keep the bar in engagement with the outer or upper edge of the opening **35**. To remove the plunger **21** from the barrel **20** for cleaning and sterilizing, the reverse of the assembling steps described above are followed. The plunger can be pulled rearwardly with the ratchet teeth **44** to **47** permitting this withdrawal without pressing inwardly with the finger on the bar **31**, but inward pressure will be required to release the stop **43** from the guide opening **35**.

With the control device mounted on the syringe, the plunger **21** can be pulled rearwardly, without inward pressure on the control bar **31**, until the forwardmost stop **43** on the bar **31** engages the front side of the guide arm **34** as shown in Figure 8. Retraction of the plunger in this manner while the needle **23** is inserted in a vial containing the liquid to be administered, will result in the filling of the barrel **20** with a predetermined accurate quantity of the liquid, which is positively determined by contact of the forwardmost stop **43** with the front surface of the guide arm **34**. At this time the forward end of the plunger **21** will align with the rearwardmost calibration on the barrel **20** which, for example, may be "5 cc." To inject the first dose, it is merely necessary to push forwardly on the plunger **21** until the stop **44** contacts the rear surface of the guide arm **34** as shown in Figure 9. At this time, the forward end of the plunger **21** will be at the next barrel calibration, for example, "4 cc." if the dose is to be "1 cc." To release the bar **31** and push the plunger forwardly sufficiently to inject the next dose, the bar **31** is pushed inwardly to release the stop **44** from the arm **34** and there the plunger is moved forwardly as the inward pressure on the bar **31** is released so that the plunger can be moved only until the next stop **45** engages the arm **34** as shown in Figure 10, stopping the forward end of the plunger at the barrel calibration "3 cc." These operations are repeated with the stops **46**, and **47**, successively engaging the guide arm **34** to stop the plunger **21** at the succeeding calibrations in the barrel **20**, for example, "2 cc." and "1 cc.," as shown in Figures 11 and 12. After the last dose is injected, the syringe and the control device carried thereby will be in the condition shown in Figure 13. To fill the barrel again, it is merely necessary to retract the plunger **21** in the barrel **20** until the stop **43** engages the forward side of the guide arm **34** as shown in Figure 8.

It will be apparent that with this control device, accurate uniform doses of medication can be administered successively and quickly and the accuracy of the dose will not be dependent upon the judgment and skill of the physician or technician but will be controlled positively by the stops on the control bar.

My control device is of such a nature that it will be difficult for the plunger to accidentally slide from the barrel which might cause breakage of the plunger. The stop arrangements for the plunger can be readily released preparatory to each successive ejection stroke, while making the injection, and this can be accomplished by the use of one hand. This control device is relatively simple and inexpensive to make and can be attached to or removed from the syringe with ease.

Various other advantages will be apparent from the preceding description, the drawings, and the following claims.

Having thus described my invention, what I claim is:

1. In combination with a hypodermic syringe comprising a barrel and a plunger movable therein, a control device on the syringe, said control device comprising a guide member mounted on the barrel of the syringe in a fixed location axially of the barrel, a control member mounted on the plunger of the syringe, said guide member having a portion engaging the barrel of the syringe and a radially disposed guide arm having an opening therein, said control member being in the form of a control bar passing through said opening and having its rear end connected to the plunger and its forward end free from the plunger, spring means tending to move the free end of the bar outwardly in frictional engagement with said opening, spaced stops on the control bar comprising an upstanding forward stop which engages the forward side of the guide arm to limit retracting movement of the plunger and stops at intervals longitudinally of the bar behind the first stop for engaging the rear side of said guide arm successively during the forward movement of the plunger, all of said stops except the first one being provided with stop surfaces at their forward side for engaging the guide arm and inclined plane surfaces at their rear side to permit retracting movement of the plunger.

2. The combination of claim 1 in which the guide opening is of a radial extent slightly greater than the radial extent of the stops plus the thickness of the bar.

3. The combination of claim 2 in which the portion of the guide member which engages the barrel is an arcuate spring clasping portion that carries hook portions which engage the flange on the rear end of the barrel to prevent axial movement of the guide member on the barrel.

4. The combination of claim 3 in which the rear end of the control bar has a spring clasping portion which removably engages the head of the plunger.

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