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G. L. KING

1,991,103

SYRINGE PROJECTOR

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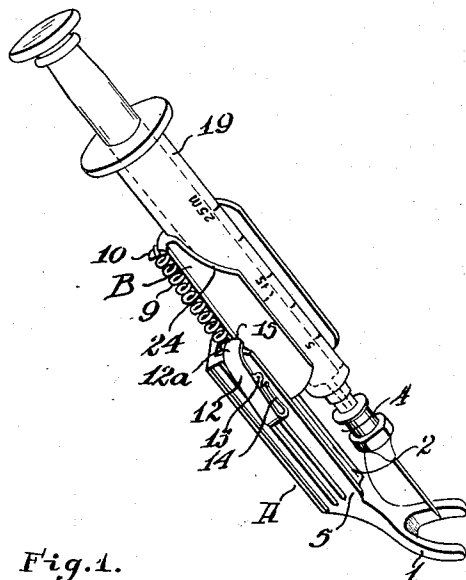


Fig. 1.

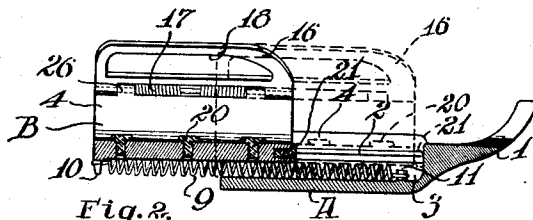


Fig. 2.

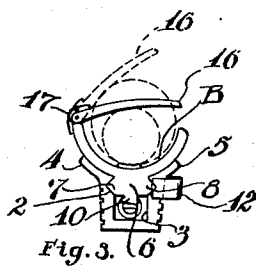


Fig. 3.

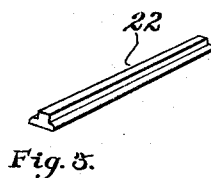


Fig. 5.

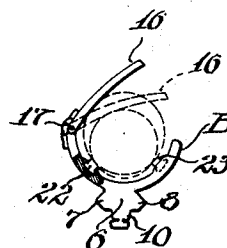


Fig. 4.

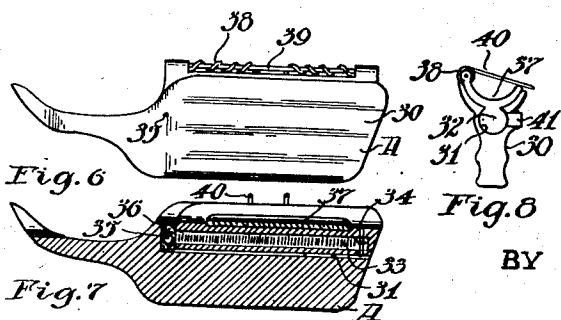


Fig. 6

Fig. 7

Fig. 8

BY

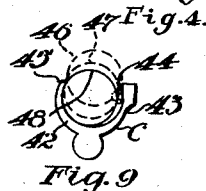


Fig. 9

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## UNITED STATES PATENT OFFICE

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## SYRINGE PROJECTOR

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4 Claims. (Cl. 128—218)

The present invention relates to a hypodermic syringe projector.

Various types of syringe projectors have been previously devised, but most of these have either been adapted for only one size of syringe or have been of a type wherein the syringe gripping device has been of a type which was apt to cause breakage of the syringes in use.

An object of the present invention is to make an improved and simplified hypodermic syringe projector.

Another object of the present invention is to make a syringe projector universally adapted to use different sizes of ordinary hypodermic syringes with different lengths of needles.

In order to accomplish these objects, there is provided, in accordance with one feature of the invention, a support member having a foot piece adapted to rest on the patient's skin adjacent the desired point of penetration, and a spring propelled carriage slidably mounted on the support member and having resiliently actuated means mounted to hold a syringe in close frictional engagement with a carriage element. These and other features of the invention will be more fully brought out in the following description and the accompanying drawing, wherein:

Figure 1 is a view in perspective of a syringe projector embodying the present invention, with a hypodermic syringe positioned therein.

Figure 2 is a longitudinal sectional view through the device shown in Figure 1, with syringe removed.

Figure 3 is an end view of the device shown in Figure 1, the cover being shown in engagement with a small syringe in solid lines, and with a large syringe in dotted lines.

Figure 4 is a view similar to that of Figure 3 with a modified frictional syringe engaging arrangement.

Figure 5 is a view in perspective of a frictional syringe engaging member as shown in Figure 4.

Figure 6 is a side view of a modified form of syringe projector.

Figure 7 is a view in longitudinal, vertical, central section of the device shown in Figure 6.

Figure 8 is a rear end view of the device shown in Figures 6 and 7; and

Figure 9 is a modified form of carriage to be used with a body portion such as is shown in Figures 6 to 8, inclusive.

Referring to the drawing in detail, the device comprises a body portion A having a forked

foot piece 1 projecting downwardly therefrom. A pair of grooves 2 are provided, one on each side of a longitudinally disposed recess 3 in the body portion A. A pair of arcuately curved flanges 4 and 5 are provided, one on each side of the body A to receive a cylindrically curved carriage B.

The carriage B has a downwardly projecting ridge 6, extending longitudinally thereof, with tracks 7 and 8 projecting one on each side thereof for free, slidable movement in the grooves 2.

A coil spring 9 is connected at one end to a lug 10 on the outer end of the ridge 6, and at the other to a lug 11 in the bottom of the recess 3.

A trigger 12 is pivotally mounted as at 13 to be resiliently held in engaging position, as by means of the looped end portion 14 (see Figure 1) with its upper end 12—*a* in inwardly pressed position. A notch 15 is provided in the track 8 to receive the upper end 12—*a* of the trigger 12 when the carriage B is drawn back against the tension of the spring 9 to a cocked position, as shown in Figure 1, and in solid lines in Figure 2.

A spring pressed cover 16 is hingedly mounted as at 17 on an edge of the carriage B and is resiliently held in closed position by a spring 17. The cover 16 is preferably cut away as at 18 to disclose the syringe 19 when mounted therein.

A plurality of friction plugs 20 are mounted along the center of the carriage B to frictionally grip the syringe 19 when pressed against them by the resilient cover action. A buffer plug 21 is also provided in the lower end of the carriage to encounter the lower end of the recess 3 to cushion the impact on releasing the carriage during an operation of the device.

In the form shown in Figures 4 and 5 a pair of frictional strips 22 and 23 are mounted in longitudinally disposed grooves in the carriage to resiliently support a syringe mounted in the carriage and to frictionally hold it against material longitudinal displacement during actuation when the syringe is gripped by the cover 16.

The rear corner 24 of the carriage B, opposite to the cover hinge, is cut away at an angle so that by holding the syringe at an angle of about forty-five degrees to the longitudinal axis of the carriage and pressing it inwardly, this surface 24 acts as a cam to raise the cover and admit the syringe.

In the modified form shown in Figures 6 to 8, inclusive, the body portion A is deeper and narrower than that shown in Figures 1 to 3, and is provided with flutings 30 to provide a suitable grip for the operator's hand. A cylindrical recess 31 is provided in the body portion A' to slidably receive a tubular projection 32 on the carriage B'. A coil spring 33 is mounted within the tubular carriage projection 32 and is fastened to the carriage by a pin 34 and to the body portion by a pin 35, to normally hold the carriage in the actuated position shown in Figures 6 and 7. A short piece of rubber tubing 36 is placed over the forward end of the spring 33 to act as a buffer between the forward end of the carriage and the forward end of the recess 31. A frictional cushion 37 is mounted in the curved upper face of the carriage to frictionally engage a syringe when mounted therein in the same general manner as shown in Figures 1 and 3. As a syringe retaining element, a coil spring 38 is mounted around a pin 39, and is provided with a straight sided loop 40 which lies transversely across the top of the carriage and is resiliently held down toward the carriage by the action of the coil spring 38.

A trigger 41 is mounted similarly to the trigger 12 shown in Figures 1 and 3 to releasably hold the device in cocked position.

In the modified carriage C, shown in Figure 9, the side walls 42 and 43 of the syringe are carried up a distance greater than the radius of the syringe barrel for which the device is designed. A resilient friction pad 44 is mounted in the carriage wall 43 to be spaced from the upper end 45 of the opposite wall 42 a distance slightly less than the diameter of the syringe barrel.

The method of inserting the syringe in the carriage is illustrated by the two dotted and one solid circles in this view. The syringe barrel indicated by these circles is laid along the top of the carriage in the position shown by the upper circle 46 to rest on the pad 44 and the upper edge 45 of the opposite wall. The syringe barrel is then forced downwardly, compressing the pad 44 by means of the cam action exerted by the engagement of the syringe with the opposite wall, to the position indicated by the middle circle 47. This is the dead center position after the passing of which the resilience of the pad forces the barrel down to the solid line position 48 in which position the syringe is firmly held in the carriage. To remove the syringe the above procedure is reversed. While not having the wide latitude with respect to the sizes of syringes which the device is capable of handling as the structures shown in Figures 1 to 8, inclusive, the carriage shown in Figure 9 is preferred for certain specific uses, as will be apparent to those versed in the art.

In using the device the syringe is assembled with a suitable needle and filled in a customary manner, and is then inserted in the carriage with the device in the operated or released position, as shown in dotted lines in Figure 2. The syringe is then adjusted longitudinally of the carriage so that the needle projects beyond the forked foot piece 1 a distance approximately equal to the amount of penetration required. This adjustment may be readily accomplished

by grasping the sides of the carriage with one hand and moving the syringe slidably longitudinally thereof with the other hand, since the frictional grip of the device, while sufficient to hold the syringe in adjusted position during operation, may be readily overcome by manual manipulation in this manner. The carriage B is then drawn back until the notch in the track 3 is engaged by the trigger 12 which holds the device in cocked position.

The footpiece 1 is then placed on the patient's skin around the desired point of penetration and the trigger 12 moved to release it from the notch in the track 8. The spring 9 drives the carriage downward, plunging the needle into the patient's flesh to the required depth.

A slight slippage occurs between the syringe and the carriage during the actuation of the device, in actual use between one thirty-second and one-sixteenth of an inch, which is believed to be a material advantage in that it prevents undue strain on the syringe. In actual use with all types and sizes of syringes over a period of more than a year, and including over two thousand actual injections as well as experimental usage in cotton and rubber compositions, not one syringe or needle has been broken.

The device is simple and positive in operation, and universal in its application within the extreme limits of its capacity so that it accommodates all syringes in common use for subcutaneous injection.

I claim:

1. A hypodermic syringe projector, comprising a body portion, a spring propelled carriage slidably mounted on said body portion and formed with a rest support for a hypodermic syringe, and a resiliently controlled cover mounted on one side of said body portion in position to engage the syringe, for the purpose set forth.

2. A hypodermic syringe projector, comprising a body portion, a spring propelled carriage slidably mounted on said body portion and formed with a supporting seat for the syringe, a spring-pressed cover mounted upon said body portion in opposed position to the supporting seat for the syringe, and a friction pad carried by said body portion in position to engage with said syringe when the same is seated in position.

3. A hypodermic syringe projector, comprising a body portion, a spring propelled carriage slidably mounted on said body portion and formed with a supporting seat for the syringe, a spring-pressed cover mounted upon said body portion in opposed position to the supporting seat for the syringe, a friction pad carried by said body portion in position to engage with said syringe when the same is seated in position, and releasable trigger means for holding said carriage in withdrawn position.

4. A hypodermic syringe projector, comprising a body portion, a spring propelled carriage mounted thereon, said carriage being formed with a seat portion for the syringe, means resiliently supported by said body portion in opposition to the seat portion of said carriage to grip an intermediate syringe, said means being relatively adjustable to make contact with varying sizes of syringes, and a pad element engaging with said syringe when in gripping position.

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