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J. W. HORNER.
HYPODERMIC SYRINGE.
APPLICATION FILED MAY 20, 1905.

Fig. 1

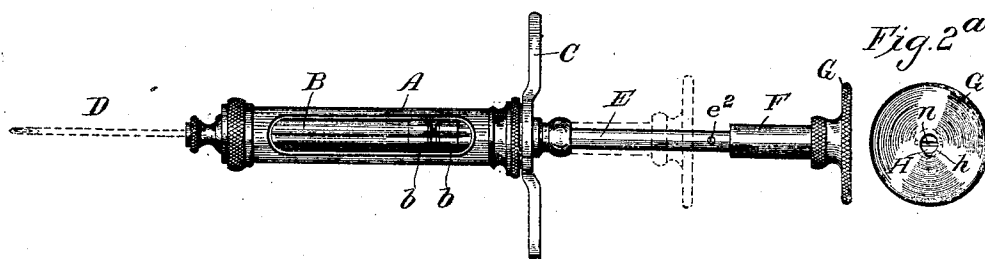


Fig. 2

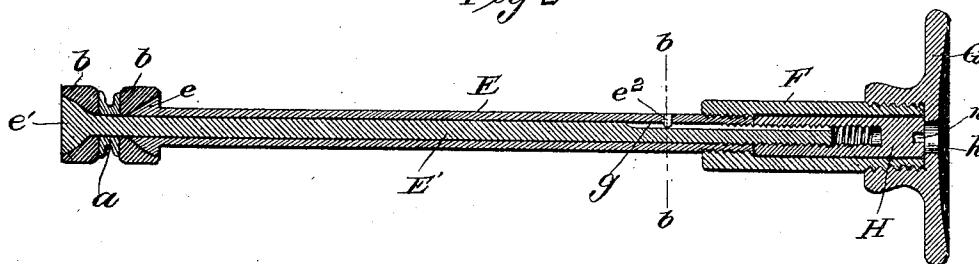
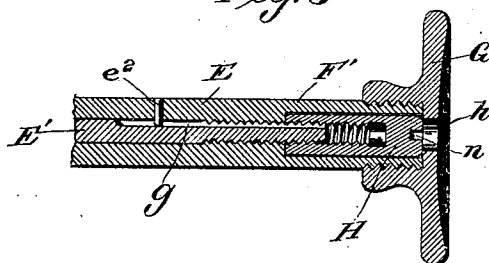


Fig. 2^b



Fig. 3



WITNESSES:

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HYPODERMIC SYRINGE.

No. 814,543.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed May 20, 1905. Serial No. 261,327.

To all whom it may concern:

Be it known that I, JACOB W. HORNER, a citizen of the United States, and a resident of Columbus, in the county of Bartholomew and State of Indiana, have made certain new and useful Improvements in Hypodermic Syringes, of which the following is a specification.

In the ordinary form of hypodermic syringe the piston is packed against leakage from the front side of the piston to the back side of the same by means of two cones whose smaller ends face each other and are made to approach each other to wedge outwardly the elastic packing-ring, one of these cones being formed on a central stem and the other on a concentric encompassing tube, which stem and tube are given the requisite movement to tighten the piston by means of a screw-threaded connection or a nut threaded on one part and bearing against the other part.

My invention consists of a novel form of syringe of this class designed to secure a tight fit of the piston in the syringe-barrel without risk of accidental loosening of the piston and by a very simple and practical construction, as hereinafter described.

Figure 1 is a side elevation of the complete syringe. Fig. 2 is an enlarged longitudinal section of the piston, compound piston-rod, and terminal handle. Fig. 2^a is a face view of the terminal handle. Fig. 2^b is a cross-section of Fig. 2 on the line *b b*, and Fig. 3 is an enlarged sectional view of a modification.

Referring to Fig. 1, A represents the metal frame containing the glass barrel B, the frame being cut away on the sides, as usual, to expose the glass and permit observation of its contents. D is the needle; C, the usual cross-head at the rear end of the frame A; E, the compound piston-rod, and G its terminal handle.

As so far described the parts are of the usual construction, the syringe being operated in one hand to expel the liquid by grasping the cross-head C between the fingers and receiving the terminal handle G in the palm of the hand.

Referring now to Fig. 2, the compound piston-rod consists of a central stem E', bearing at one end a cone *e'* and an outer concentrically-arranged tube E, bearing at one end a cone *e*. Between the cones *e* and *e'* are arranged the two elastic washers or packing-rings *b b* and the intervening metal collar *a*, so that when the cones are made to approach

each other they expand the elastic packing-rings *b b* to a larger circumference and a tighter fit in the barrel. The outer end of the central stem E' is screw-threaded exteriorly and has cut in it a longitudinal groove *g*, which receives a short inwardly-projecting pin *e*², fixed to the outer tube E. This keeps the outer tube and inner stem from having any rotary movement in relation to each other, and yet allows them to have a freely-sliding longitudinal movement in relation to each other. The outer end of the tube E is exteriorly screw-threaded to receive a housing-sleeve F, and the outer end of this sleeve has attached to it a disk-shaped terminal handle G, which fits over the end of the tubular piston-rod and when once fitted to place by a screw-thread or otherwise becomes a rigid part of the piston-rod. In the operation of the syringe and its adjustments the tube E, housing F, and handle G may for all intents and purposes be considered as integral, being made separate and screw-threaded for facility of construction only. Within the sleeve F is housed the elongated tubular nut H. This is screw-threaded interiorly and meshes with the external screw-thread of the central stem, and the inner end of said elongated nut abuts against and turns against the outer end of the piston-rod tube E. The end of this elongated nut is made accessible through a central hole *h* in the terminal handle G, but is prevented from coming out by having the hole *h* somewhat smaller than the end of the elongated nut. To turn this elongated nut, a nick *n* is formed in its end to receive a screw-driver inserted through the hole *h*, or it may have a square end to receive a small key, like a watch-key, or it may be turned in any other way.

Now when the cones *e e'* are to be brought together to tighten the piston it is only necessary to turn the elongated tubular nut H by means of a small screw-driver inserted through the hole *h*, and this nut by pulling on the central stem E' and pushing against the outer tube E serves to give the necessary expansion of the packing of the piston. This elongated nut, it will be seen, is completely housed within the outer sleeve F and by the terminal handle G at the end, so that it is impossible for the operator's hand to disturb its position and loosen the adjustment, and the pin *e*² in the outer tube entering the groove *g* in the stem prevents the two parts from turning on each other. It is obvious that this pin

might be on the central stem and the groove in the sleeve and that these two parts might be assembled in various ways to permit longitudinal sliding without turning on each other; but I prefer the construction shown for the reason that it is easier to construct and assemble.

In Fig. 2 the sleeve F is seen to terminate in an abrupt shoulder on its inner end. This causes it to act as a stop to limit the distance which the terminal handle G may approach the cross-head C, as seen in dotted lines in Fig. 1, and this prevents these two parts from being forced inconveniently close together and also allows the complete range of movement of the piston to be had within the limits of the greatest power of the hand in closing—*i. e.*, it is not necessary to completely shut up the hand in fully advancing the piston. This form is especially desirable for dentists' use, where greater power is required for injecting liquids. In this form of the syringe the parts F and G may be made in one piece.

In Fig. 3 I show a slight modification of my invention in which the detachable sleeve F of Fig. 2 is dispensed with as a separate part and the walls of tube E are simply thickened and the outer end drilled out, as seen at F' in Fig. 3, to form the housing for the elongated nut. Its action is precisely the same; but the increased diameter of the compound piston-rod necessitates a slight enlargement of the sliding bearing in the cross-head. This form of the syringe permits the entire piston-rod to pass into the barrel and allows the terminal handle G to lie close against the end of the barrel, which gives a syringe of such compact form when closed as to be especially well adapted to the limits of the small case forming the physician's outfit.

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

1. A syringe comprising a barrel, an expandible piston, a compound piston-rod con-

sisting of a central stem and an inclosing tube, each having an expanding face for the piston, a tubular nut screwed upon the central stem and bearing against the inclosing tube, a terminal handle fixed rigidly to the end of the hollow piston-rod behind the tubular nut and moving with the compound piston-rod as an integral part whereby it is manually advanced by direct longitudinal pressure the tubular nut being completely housed by the tubular portion of the piston-rod and its terminal handle, substantially as described.

2. A syringe comprising a barrel, an expandible piston, a compound piston-rod consisting of a central stem and an inclosing tube each having an expanding face for the piston, a tubular nut screwed upon the central stem and bearing against the inclosing tube, a tubular housing of larger diameter than the piston-tube and rigidly fixed to the same and a terminal handle fixed rigidly to the end of the housing behind the tubular nut and moving with the same and the piston-rod as an integral part and arranged to be manually advanced by direct longitudinal pressure substantially as described.

3. A syringe comprising a barrel, an expandible piston, a compound piston-rod consisting of a central stem and an inclosing tube each having an expanding face for the piston, a tubular nut screwed upon the central stem and bearing against the inclosing tube, and a terminal handle fixed rigidly to the end of the hollow piston-rod behind the tubular nut and having a central hole of smaller size than the end of the tubular nut within said terminal handle being arranged to be manually advanced by direct longitudinal pressure as described.

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Witnesses:

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