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HYPODERMIC AND OTHER SYRINGES OR DRENCHERS

Filed Sept. 12, 1950

2 Sheets-Sheet 1

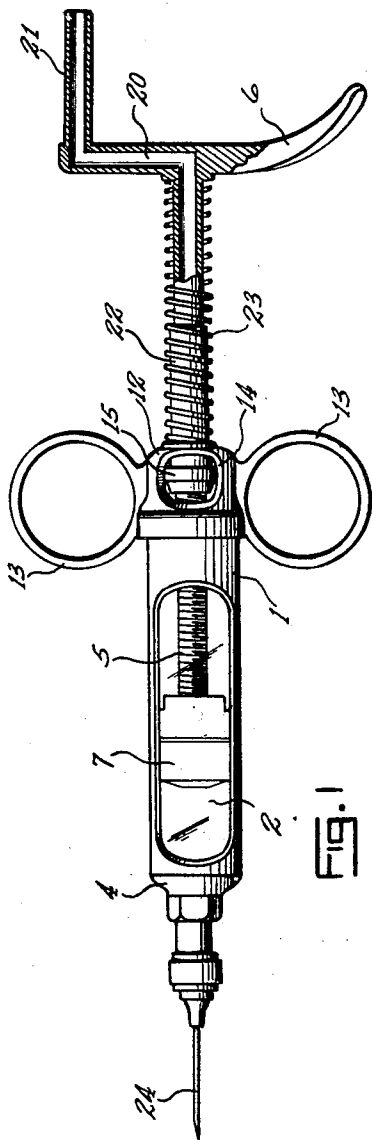


FIG. 1

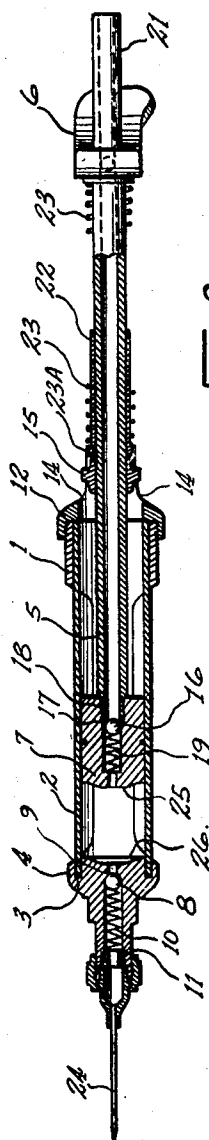


FIG. 2

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2 Sheets-Sheet 2

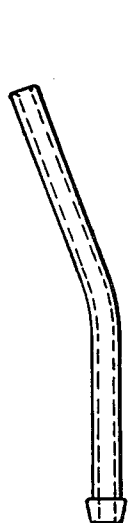


Fig. 3



Fig. 5

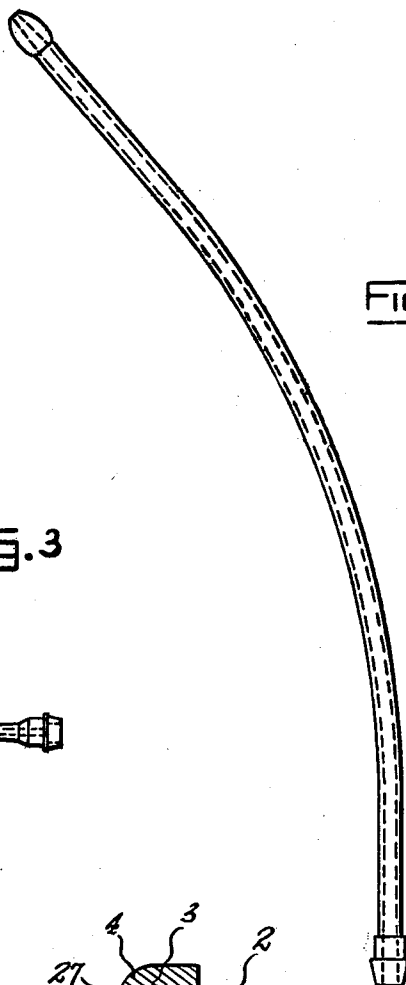


Fig. 4

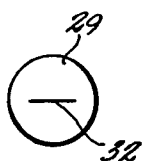


Fig. 7

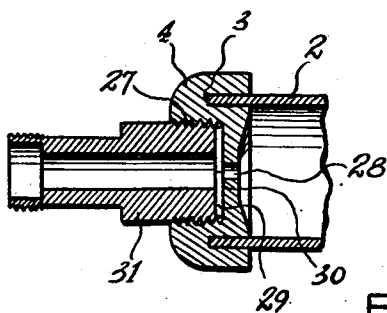


Fig. 6

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UNITED STATES PATENT OFFICE

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HYPODERMIC AND OTHER SYRINGES OR
DRENCHERSAngus Conrad McKay, Forrester, Canberra,
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6 Claims. (Cl. 128-220)

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This invention relates to syringes and the like which may be used for hypodermic injections, drenching, blood transfusions, measuring quantities of liquids, and other purposes, and more particularly relates to such syringes and the like provided with means to ensure the repeated ejection and automatic replenishment of any selected measured quantity of liquid within the capacity range of the syringe barrel upon each operation of a hand piece.

In a known type of syringe liquid is fed to the barrel through a straight hollow piston rod, its entry and ejection being controlled by valves within the piston or supply line and in the outlet nozzle respectively. The dosage regulation is effected by adjusting the hollow piston rod within an outer sleeve adapted to grip frictionally the rod in the desired position. This method of dosage regulation is inconvenient, does not permit of rapid adjustment, and is not positive. This construction also necessitates attachment of the hand piece in such a way that the downward thrust during ejection of the liquid is to one side of the piston rod, thus setting up a bending moment which has been found to be detrimental to the continued correct operation of the syringe, sometimes causing jammed pistons or broken glass barrels.

The object of this invention is to eliminate the external frictional dosage adjustment and to provide adjusting means which is positive in action, capable of rapid adjustment, and compact.

In the preferred form of syringe, the hand piece is so arranged as to allow a direct thrust substantially along the axis of the hollow piston rod.

According to this invention a syringe or the like of the type in which liquid is fed to the barrel by a hollow piston rod is characterised in that the dosage regulating means comprises a dosage regulating member coaxial with the piston rod and adjustable along its length, and a coacting stop formed as an extension of the barrel or its casing and coaxial with the piston rod, the dosage-regulating member being accessible for adjusting purposes without having to dismantle the syringe.

Reference will now be made to the accompanying drawings in which:

Figure 1 is a plan view of a syringe according to this invention, partly in section;

Figure 2 is a vertical section through the syringe of Figure 1, but with the handle not in section, and with a portion of the return spring omitted;

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Figures 3, 4 and 5 illustrate attachments for the syringe;

Figure 6 is a section through an alternative form of outlet valve, and

Figure 7 is a plan view of the rubber valve insert in the valve of Figure 6.

Referring now to Figures 1 and 2, the syringe comprises a casing 1 having cut out portions on opposite sides thereof to form windows, a graduated glass barrel 2 held at one end in a groove 3 in the outlet end 4 of the casing 1, a hollow piston rod 5, a hand piece 6, and a piston 7. The outlet end 4 of the syringe is provided with a ball valve comprising a ball 8 held against a seat 9 by a spring 10. The spring is retained in position by a hollow externally threaded nut 11 screwed into the end of the syringe casing. The upper end of the glass barrel abuts against a head piece 12 screwed onto the upper end of the casing 1 and which forms a substantially cylindrical extension of the barrel having a lip or stop 23A closely engaging the piston rod 5. This head piece is provided with oppositely disposed finger grips 13, and is cut away at two oppositely disposed parts 14 to provide access to a dose adjusting nut 15.

The piston 7 is conventional in construction and is provided with an internal inlet valve comprising a ball 16 held against a seat 17, provided by the end 18 of the piston rod, by a spring 19. The end 18 of the piston rod is screwed into the piston 7. The piston rod 5 is externally threaded along at least a substantial part of its length near the piston 7 and the nut 15 is screwed onto the piston rod. The piston rod 5 is formed integrally with, or is secured to, as by welding or brazing, a hand piece 6 shaped to a comfortable fit with the palm of the hand. Part of the hand piece is hollow forming a channel 20 communicating with the hollow piston rod, and is provided with a tubular extension 21 to which a rubber tube from the liquid source may be connected. The head piece 12 is provided with a tubular extension 22 which is a close sliding fit around the piston rod and provides a substantial bearing surface for the piston rod. A compression spring 23 is provided around the piston rod and abuts at its ends against the hand piece 6 and the head piece 12. The spring 23 returns the handle and piston to the position shown where the nut 15 abuts against the stop 23A formed by the end of the head piece 12, as is best seen in Fig. 2, after each operation of the syringe. The piston and portion of the casing forming the end of the barrel are provided with mating surfaces 25, 26.

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Any suitable means may be provided for attaching a hypodermic needle 24 to the syringe. The needle shown in Figures 1 and 2 is suitable for animal inoculation. Alternative fittings which may be attached to the syringe are shown in Figures 3 to 5 in which Figure 3 shows a sheep drenching nozzle, Figure 4 shows a fowl drenching nozzle, and Figure 5 shows a needle suitable for human inoculation.

To use the syringe, for example for animal inoculation, the needle 24 is secured to the syringe, the hand piece extension 21 is connected by a rubber or flexible tube to a source of inoculating liquid, and the dose adjusting nut 15 is rotated until the end of the piston comes opposite the graduation on the glass barrel 2 indicating the desired dose. The syringe is held in the hand with the hand piece 6 in the palm of the hand and the first and second fingers hooked through the finger holes 13. The hand piece is forced toward the head piece 12 until the piston 7 has been displaced as far as possible and abuts against the mating surface 26. The piston is now allowed to return to its initial position, the outlet valve closing, and the inlet valve opening to allow liquid to flow along the passage 29 and hollow piston rod 5 to the barrel of the syringe. If the hand piece is again forced toward the head piece the inlet valve 16, 17 closes and outlet valve 8, 9 opens, and the liquid in the barrel is forced through the needle 24.

An alternative outlet valve construction is shown in Figures 6 and 7 employing the principle of the Bunsen valve. These figures are to an enlarged scale compared to the previous figures. The end 4 of the casing is provided with an internally threaded bore 27 communicating with the valve opening 28 to the barrel. A resilient valve member 29 is placed over the valve opening 28 and is held against the shoulder 30 by a substantially tubular member 31 screwed into the bore 27. The valve member 29 is cut along part of a diameter as shown diagrammatically at 32. Liquid can pass from the barrel through the valve member by opening the lips of the cut 32, but the shoulder 30 prevents the lips from opening in the opposite direction and allowing liquid to pass back into the barrel. The inlet valve may also be of the Bunsen type.

Dosage regulation can be effected very rapidly with the syringe of this invention, it being necessary only to rotate the adjusting nut 15 on the piston rod 5 to cause it to move longitudinally along the piston rod. It is not necessary to dismantle the syringe to effect dosage adjustment, the nut 15 being accessible through the cut away parts 14. The construction is compact, the stop 23A being formed by a short extension of the head piece 12, and the nut 15 being wholly contained within the head piece. The dosage adjustment is positive in action, and does not rely on frictional engagement between the parts.

While the invention has been described in its application to a syringe having a glass barrel contained in a cut-away casing, it is obvious that the barrel need not be of glass, and that in such a case the casing 5 would be unnecessary, and the head piece 12 would be attached directly to the barrel.

I claim:

1. A syringe or the like comprising a barrel, a discharge valve at one end of the barrel, a piston in the barrel having an inlet valve, a hollow piston rod attached at one end to the piston and through which fluid is fed to the barrel, an ap-

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proximately thimble-shaped headpiece with its open end detachably secured to the other end of the barrel, an opening in the closed end of the headpiece through which the piston rod extends, a dosage adjusting nut adjustably secured to the piston rod and inside the bore of the headpiece, cut-away openings in the cylindrical side of the headpiece to enable ready access to the dosage adjusting nut, and a handpiece at the other end of the piston rod.

2. A syringe or the like comprising a barrel of glass or other suitable material, a metal casing housing the barrel, a discharge valve at one end of the casing, a piston in the barrel having an inlet valve, a hollow piston rod attached at one end to the piston and through which fluid is fed to the barrel, an approximately thimble-shaped headpiece with its open end detachably secured to the other end of the casing, an opening in the closed end of the headpiece through which the piston rod extends, a dosage adjusting nut adjustably secured to the piston rod and inside the bore of said headpiece, cut-away openings in the cylindrical side of the headpiece to enable ready access to the dosage adjusting nut, a handpiece at the other end of the piston rod, and finger grips secured to the casing.

3. A syringe or the like comprising a barrel of glass or other suitable material, a metal casing housing the barrel, a piston in the barrel having an inlet valve, a discharge valve at one end of the barrel, a hollow piston rod attached at one end to the piston and through which fluid is fed to the barrel, said piston rod being externally threaded, an approximately thimble-shaped head piece with its open end secured to the said casing and with its bore forming a substantially cylindrical extension of the barrel, an opening in the closed end of the head piece through which the piston rod extends, cut-away openings in the cylindrical side of the headpiece, and a dosage adjusting nut screwed on the piston rod and inside the bore of said headpiece.

4. A syringe or the like comprising a barrel of glass or other suitable material, a metal casing housing the barrel, a discharge valve at one end of the casing, a piston in the barrel having an inlet valve, an externally threaded hollow piston rod attached at one end to the piston and through which fluid is fed to the barrel, an approximately thimble-shaped headpiece with its open end screwed to the other end of the casing and with its bore forming a substantially cylindrical extension of the barrel, an opening in the closed end of the headpiece through which the piston rod extends, a dosage adjusting nut screwed on the piston rod and inside the bore of said headpiece, a pair of oppositely disposed cut-away openings in the cylindrical side of the headpiece to enable ready access to the dosage adjusting nut, a tubular extension to the headpiece which is a close sliding fit around the piston rod and extends away from the barrel, a handpiece at the other end of the piston rod, and a compression spring between the handpiece and the headpiece.

5. A syringe or the like comprising a barrel, a discharge valve at one end of the barrel, a piston in the barrel having an inlet valve, a hollow piston rod attached at one end to the piston and through which fluid is fed to the barrel, an approximately thimble-shaped headpiece with its open end detachably secured to the other end of the barrel, an opening in the closed end of the headpiece through which the piston rod passes,

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a tubular extension to the headpiece which is a close sliding fit around the piston rod and extends away from the barrel, a dosage adjusting nut adjustably secured to the piston rod and inside the bore of the headpiece, cut-away openings in the cylindrical side of the headpiece to enable ready access to the dosage adjusting nut, and a handpiece at the other end of the piston rod.

6. A syringe or the like comprising a barrel, an outlet valve at one end of the barrel, finger grips at the other end of the barrel, a piston having an axial bore, a hollow piston rod secured to the piston, a hand-piece secured to the other end of the piston rod and adapted to fit in the palm of the hand, the hand-piece extending on opposite sides of the piston rod so that the thrust on the piston rod during operation of the syringe is substantially along its axis, a channel in the hand-piece communicating at one end with the hollow piston rod, means for attaching a feed tube to the other end of the channel, the piston rod being externally threaded over at least a

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portion of its length, a dose adjusting nut screwed on the piston rod, and a cylindrical extension of the barrel adapted to receive the dose adjusting nut and having a lip closely engaging the piston rod to serve as a stop for the dose adjusting nut, a portion or portions of the cylindrical extension being cut away to allow access to the dosage regulating member.

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