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VETERINARY HYPODERMIC SYRINGE

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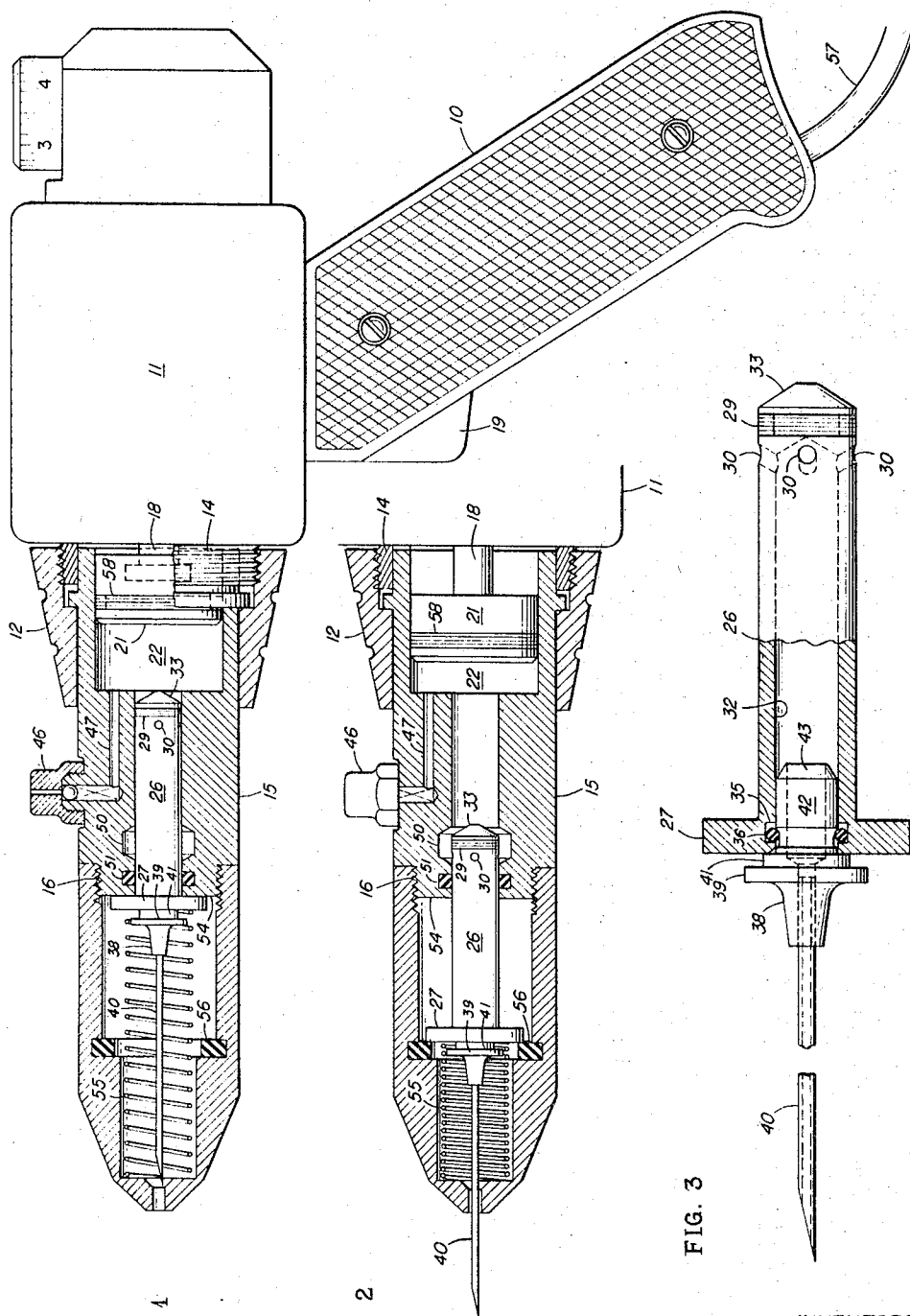


FIG. 1

FIG. 2

FIG. 3

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VETERINARY HYPODERMIC SYRINGE

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This invention relates to hypodermic syringes and has for its principal object the provision of a simple and efficient electrically operated syringe, especially one intended for giving a plurality of successive injections, and providing forward thrust without loss of medication until the needle has reached its full penetration depth.

An object of the invention is to improve the veterinary hypodermic syringe illustrated in our Patent No. 3,051,173 dated Aug. 28, 1962, including replacing the former ball check valve in the piston by a recess in the chamber section located so that the fluid to be discharged passes within the piston only after the piston has traveled substantially its full journey; standardizing the hub of the needle assembly while avoiding the usual taper fit which unfortunately varies considerably in tolerance and therefore ability to seal; joining the needle to the piston which moves with it as a unit in a manner to facilitate separation of the needle and the piston without any tool save a screw driver or a flat piece of metal.

Further objects of the invention include providing adequate friction to prevent the needle hub from dislodging under inertia and pressure, and means to discharge a few drops of medication as the needle is withdrawn from the patient or other subject, this latter term being broad enough to include chickens, for example, as well as persons or veterinarian animals.

In the drawings:

FIGURE 1 is a central section largely in side elevation;

FIGURE 2 is a view showing the piston-needle assembly in fully advanced position.

FIGURE 3 is a side elevation of the piston-needle assembly on a larger scale and with the piston partly in section.

The syringe is of a type for convenient handling much as in our previously mentioned patent. The rear portion of the syringe consists of a handle 10 usually integral with the housing 11. The cylinder section 15 is secured to the housing 11 by a tapered nut 12 threaded to a cylindrical extension 14 projecting forwardly from the solenoid case or housing. The cylinder section 15 has in turn a threaded connection 16 with the forward or nose section of the syringe.

As in our Patent No. 3,051,173, the housing 11 contains a solenoid and its armature, the stem 18 of the latter, upon being energized as by pressing the trigger 19, advances plunger 21 putting pressure upon medication chamber 22, the latter being located in the rear end of cylinder section 15.

Needle-piston assembly includes a piston 26 having a large forward flange 27 which limits both forward and rearward movement of the assembly and at the rear a rubber quad ring 29 is provided located just behind a plurality, preferably four, of slanting ports 30 which communicate with the central passageway 32. The rear end of the piston is preferably domed or conical as at 33 for a purpose later to be described. The piston in its flanged front end has a groove 35 to receive and hold an O-ring seal 36 which resiliently but firmly holds the needle head 38 to the piston so that these two always move together when the syringe is in use.

The needle proper 40 is of a standard size and is permanently joined with needle head 38, the latter carrying a circular flange 39 just forward of circular portion 41 of

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smaller diameter spaced from piston flange 27 a sufficient distance to allow for reception of a piece of metal such as a can opener or preferably a screw driver tip whereby the flanges 39 and 27 can by turning the screw driver be separated by an amount such as to free the needle portion from the piston portion, in other words to pry the needle from the piston. The hub 42 of the needle fits the central bore 32 of the piston preferably quite snugly but in view of the O-ring seal 36 appreciable tolerance may be allowed if desired. The squeeze on the O-ring sealing ring 36 is sufficient to prevent displacement of the hypodermic needle as the assembly is moved forward and the rear of the hub or boss 42 is conical as at 43 in order to avoid a shoulder at this point.

Chamber 22 is filled in desirable fashion as in our patent, here indicated by the ball check inlet nipple 46 which leads through passage 47 to medication chamber 22 and is used only when the piston and the plunger are separated. The usual spring return (not shown) of the armature and its plunger 21 has moved the latter to its rear position at such time. An annular port groove 50 enlarges the bore 32 of cylinder portion 15 near the forward end of the section and is proximate a seal 51 halfway between the forward end of the section 15 and the conical beginning of port groove 50. The front face 54 of cylinder section 15 forms a stop against which the rear face of flange 27 engages in normal position as the spring 55 urges the needle and piston assembly toward its rear position as shown in FIG. 1. The buffer 56 resiliently forms a stop for limiting forward movement of the assembly as in FIG. 2.

In operation, current is admitted to the device through wires 57 when the trigger 19 is pressed. This causes the step 18 of the armature (the latter not shown) to advance plunger 21 which has a channel shaped seal 58 in radial section. Plunger 21 moving forwardly in chamber 22 presses the medication which in turn forces the needle-piston assembly to move forwardly but does not allow any of the medication to pass into the central passageway 32 of the piston because of seal 29. Consequently, the needle-piston assembly moves forward against the fairly light spring 55 in nose section 17 until flange 27 comes near to or against buffer stop 56 at which time the four or more slanting ports 30 and the seal 29 are within port groove 50. Further movement of the plunger 21 now forces the fluid into the central passage 32 of the piston through the bore of hub 42 and into the relatively small canal of the needle and into the subject.

As the fluid pressure on the piston assembly is lowered the light spring 55 returns the piston assembly a fraction of an inch so that seal 29 is seated within bore 32 in rear of ports 30 thus preventing air or anything else from entering the needle. This action is designed to discharge a few drops of medication as the ports 30 pass the port groove 50 during the displacement time so as to insure that no transferral of germs or other matter to the needle or to the medication chamber 22 is permitted. The action requires but a minute portion of time and upon release of the trigger 19 the parts are almost instantaneously returned to full rearward position by the spring (not shown) surrounding the armature stem 18. At such time a fresh supply of medication is drawn into chamber 22 through nipple 46 as in our Patent 3,051,173.

What we claim is:

1. A hypodermic syringe comprising a medication chamber, a power operated plunger, one face of which forms the rear wall of the chamber, a main bore communicating with the chamber, and a needle-piston assembly movable forwardly by fluid pressure as the plunger is moved, said piston having a central bore through which medication passes to the needle, said needle having a cylindrical hub fitting snugly in said central bore and

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resilient coupling means for resisting separation of the hub and the piston, whereby the needle and the piston always move as a unit when the syringe is in use; said resilient coupling means being located within the piston bore and engaging the outer surface of the needle hub.

2. The syringe of claim 2 in which the piston and the hub have cooperating grooves and the resilient coupling means comprises an O-ring seated in both of said grooves.

3. A hypodermic syringe comprising a discharge orifice, a medication chamber, a power driven plunger forming the rear wall of the chamber, said syringe having a main bore discharging from the medication chamber to the discharge orifice, a needle-piston assembly slidable in said main bore and movable forwardly to project the needle into the discharge orifice as the plunger is moved forward; said main bore having an annular enlargement intermediate its ends forming a port groove, said port groove having a trapezoidal radial section with the two shorter sides of the trapezoid converging outward, said piston having an annular seal near its rear end and a plurality of sloping openings adjacent and spaced inwardly from said annular seal, proximate and aligned with the forward sloping end of the port groove when the annular seal is centrally within said port groove, thus permitting fluid to pass through the forward portion of the needle-piston assembly.

4. The syringe of claim 3 with light spring means within the syringe to return the piston assembly just sufficiently to seat said annular seal in the bore, and thereby closing the medication chamber as the fluid pressure on the piston assembly is lowered, whereby to discharge a

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few drops of medication as the openings pass the port groove and thus insuring against transferral of germs to the needle or to the medication chamber.

5. In combination, a piston having a flange at one end and a central bore for receiving a fluid, with a hypodermic needle assembly having a hub slidable within said bore, a seal resiliently holding the hub in position in the bore, said assembly including a hollow hypodermic needle integral with the hub and having a flange spaced from the piston flange to assist prying the assembly out of the piston bore by wedging the flanges apart against the holding action of the seal.

6. The combination of claim 5 in which the piston has a domed end and has a plurality of small passages equally spaced axially proximate the domed end leading to the central bore.

7. The combination of claim 6 in which the piston has a quad seal between the passages and the domed end.

References Cited by the Examiner

UNITED STATES PATENTS

2,399,112	4/1946	Glover	239—205
2,591,046	4/1952	Brown	128—218
2,704,073	3/1955	Jensen	128—218
2,752,918	7/1956	Uytenbogaart	128—218.2
3,051,173	8/1962	Johnson et al.	128—218.2

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