

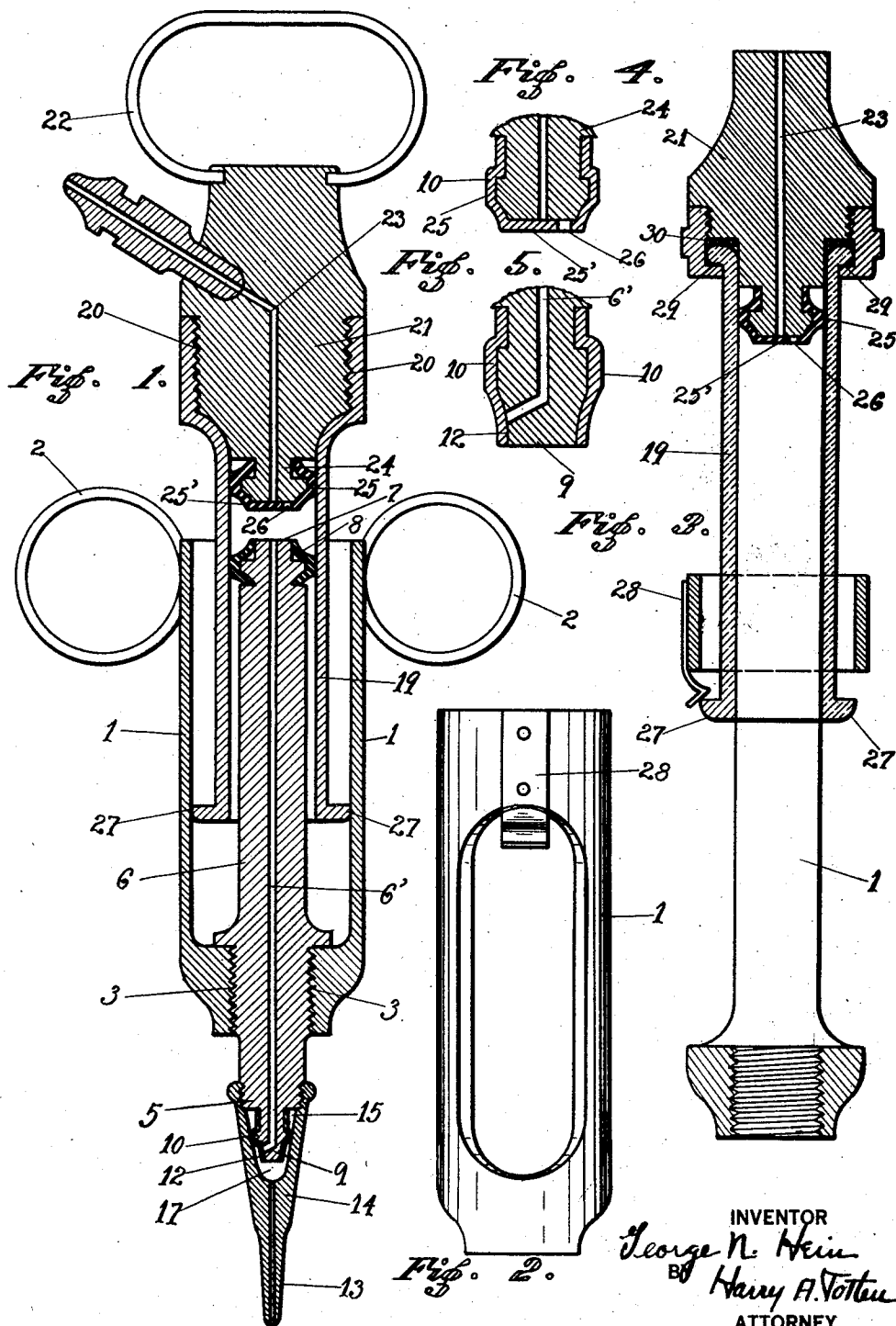
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HYPODERMIC SYRINGE

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HYPODERMIC SYRINGE.

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This present invention relates to a hypodermic syringe of the continuously operated or pump type by which the fluid may be injected in a continuous stream into the body of the patient from a relatively large supply.

Among the objects of this invention are to enable the injection of relatively large volumes of fluid by the aid of an hypodermic syringe without necessitating the insertion and removal of the needle from the body of the patient at each time the syringe barrel is emptied; to provide a construction enabling an operator by the movement of the fingers of one hand to impart a pump action to the relative parts of the apparatus, to enable substantially continuous injection. A further object is to provide a structure by the use of which the fluid may be removed from its original container and injected into the patient without exposure to the atmosphere, thereby reducing contamination.

Another object is the provision of a novel form of piston and check valve.

The invention consists primarily in a structure wherein there is provided a tubular piston surrounded by a tubular guide, the piston at one end mounting a packing and check end valve cooperating with the coupling nut constituting the needle mounting, and with the piston there being cooperatively associated a cylinder capable of telescopic action between the piston and inner guide wall, there being provided at the upper end of the piston a packing and at the upper end of the cylinder a packing and check valve controlling the passage of fluid into the upper end of the cylinder by its reciprocation.

With the above mentioned and other objects in view, the invention consists primarily in the structure hereinafter described, the preferred embodiment of which is illustrated in the accompanying drawings, wherein:—

Fig. 1 is a view in vertical section of the preferred embodiment of the invention illustrating particularly packing and check-valves positioned respectively at the upper end of the cylinder and at the lower end of the piston and the packing positioned at the upper end of the piston.

Fig. 2 is a view in elevation of the guide

illustrating particularly the spring stop for the cylinder and the finger-grip member.

Fig. 3 is a view in vertical section of a structure wherein is illustrated a modified form of cylinder associated with the tubular cylinder closing plug.

Fig. 4 is a view in enlarged detail of the check valve at the inlet end of the cylinder.

Fig. 5 is an enlarged detail view of the check valve at the discharge end of the piston.

In the drawings wherein like characters of reference designate corresponding parts, 1 indicates a tubular guide open at its opposite ends and at one end provided with oppositely disposed finger engaging loops 2. The other end of the guide is provided with a threaded bore 3. Concentrically disposed within the guide 1 is a tubular piston 6, the lower end of which is threaded into the bore 3 and projects below the same. The piston at its upper end is formed with an enlarged head 7 over which is stretched an elastic packing 8, preferably of rubber. An extension 9 similar to the head 7 is provided below the lower threaded end 5 of the piston 6 and through the side wall of which the end of channel 6' of the piston extends. Over the extension 9 is stretched an elastic sleeve preferably of rubber, the side-walls of which constitute a packing 10, and check valve 12 to control the direction of passage of fluid through channel 6'.

Threaded to the end of the piston 6 projecting through the threaded bore 3 is a tubular needle base 14 mounting a needle 13. The head 9 at the lower end of the piston 6 projects into a pocket or recess 15 in the base 14 and the periphery of the packing 10 bears tightly against the wall surface thereof with the skirt 12 overlying the tapered portion to open toward the upper end of the hypodermic needle 17.

A cylinder 19 open at its lower end is positioned over the piston 6 to telescope in the space between the piston and the inner surface of the guide 1. This cylinder in Fig. 1 is preferably constructed of metal and at its upper end is preferably threaded at 20 to a tubular closing plug 21 the end of which mounts a finger loop or grip 22 and the bore 23 of said plug extends angularly through the side wall

thereof as illustrated. The plug 21 is provided with an headed extension 24 similar to the extension 9 and over the same is stretched an elastic cup or hood, the side walls of which engage the inner surface of the cylinder and form a packing 25. The lower end 25' of the hood is in tight contact with the end of extension 24 and is ported as at 26 out of register with the end of ported bore 23 providing a check valve controlling the direction of fluid passage through bore 23. This end 25' bulges inwardly toward the upper end of the piston 6 on a relatively separating movement being imparted to the piston and cylinder, at which time the check valve 12 is unseated and operates to seat on a relatively telescoping movement being imparted to the piston and cylinder, at which time the valve 12 opens. The cylinder at its lower end is formed with a lip 27 which is adapted to engage a spring clip 28 carried by the guide 1 near its upper open end, the cooperation of the two precluding accidental separation of the piston and cylinder during the pumping of the fluid, the member 28 admitting of releasing, however, to admit of the separation of the parts when it is so desired.

In the structure illustrated in Fig. 3, the cylinder 19 is of glass construction, and to attach the same to the closing plug 21 the cylinder is preferably provided with an attaching bead 29 adapted to contact with the packing 30 in the base of the groove within the member 21, a ferrule slipped over the cylinder 19 engaging the bead and threadably uniting the same in a detachable manner to the closing plug 21.

The device being assembled as in the drawings, it will be observed that a relative pumping action or reciprocating movement being imparted to the members 1-6 as a unit and 19 as another unit, that fluid will be drawn inwardly through the bore 23, enter the expanding chamber of the cylinder 19. During one cycle of operation, and passing through the piston 6 and from the needle 17 during the contraction of the cylinder chamber 19 on a succeeding cycle of operation, thus enabling a relatively continuous flow of fluid to be withdrawn from a supply and injected into a patient without the necessity of withdrawing the needle from the flesh of the patient.

The check valves normally by the contraction of the elastic material, seal the outlet ends of the respective bores or channels which they control, and on an internal pressure being created in the bores or channels or a minus pressure being created against the outer wall of the valve, lift from contact with their respective wall surfaces and admit of fluid passing through the valves.

I claim:

1. In a hypodermic syringe, a tubular pis-

ton provided with a packing at one end and a check-valve for controlling the fluid flow through the piston, a tubular guide open at one end, surrounding the piston, and within which the piston is mounted, a tubular cylinder provided with a fluid inlet bore at one end and for positioning over said piston to reciprocate thereover between the piston and the guide with the piston packing engaging the inner cylinder wall, a check-valve opening into the cylinder for controlling the fluid passing through said bore, and finger-grips associated with the cylinder and guide.

2. In a hypodermic syringe, a tubular piston provided with a packing surrounding one end, a check-valve associated with the opposite end, a tubular guide concentrically within which the piston is positioned and within which the piston is detachably secured, a cylinder mounted to reciprocate between the piston and the guide-wall with its inner wall frictionally engaged by said packing, said cylinder provided with a tubular fluid inlet, a check-valve associated therewith for admitting of the passage of fluid into the cylinder, and finger-grips associated with the cylinder end guide.

3. In a hypodermic syringe, a tubular piston provided with a packing surrounding one end, a check-valve associated with the opposite end, a tubular guide concentrically within which the piston is positioned and through the end of which the check-valve end of the piston extends, a needle and needle base for attachment to the end of the piston extending through the guide, a tubular cylinder mounted to reciprocate over the piston and within the cylinder with the surface of the piston packing engaging the cylinder wall, a channeled closure for the upper end of the cylinder, a check-valve associated with the closure and opening into the cylinder, and finger-grips associated with the cylinder and the guide.

4. In combination with a piston provided with a bore, an elastic member stretched over one end thereof with its wall surface due to the elasticity of the member normally in contact with the piston wall sealing said bore, said elastic member provided with a normally open aperture in its wall surface offset from the end of said piston bore, whereby on a pressure in said bore said wall surface of said elastic member separating said bore and aperture is distorted to admit of fluid passage from the bore through the aperture.

5. In a hypodermic syringe, the combination of a channeled piston formed at its outer end with a reduced extension through the side of which the channel of said piston opens; a needle-carrying member fitted to the end of said piston, said member having a pocket in which the reduced extension of the piston is housed; and an elastic sleeve fitted

upon said extension a portion of said sleeve serving as a packing between said extension and the needle-carrying member, and another portion of the sleeve covering the piston-channel opening and serving as a check valve. 10

6. In a hypodermic syringe, the combination of a channeled piston formed at its outer end with a reduced extension; a needle-carrying member fitted to the end of said piston, said member having a pocket in which the reduced extension of the piston is housed; and an elastic sleeve fitted upon said extension a portion of said sleeve serving as a packing between said extension and the needle-carrying member. 15

In testimony whereof I have signed my name to this specification.

GEORGE N. HEIN.