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G. N. HEIN

PISTON AND PACKING CONSTRUCTION

Filed Aug. 26, 1924

Fig. 1.

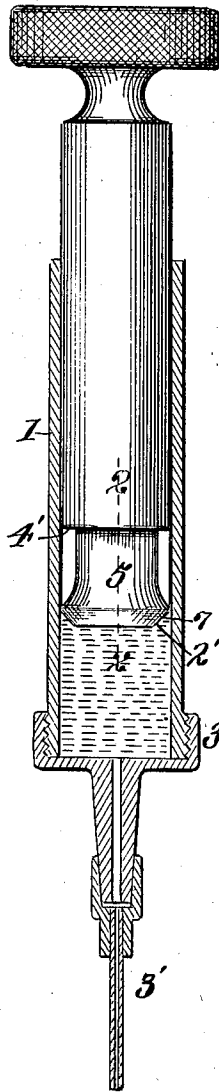
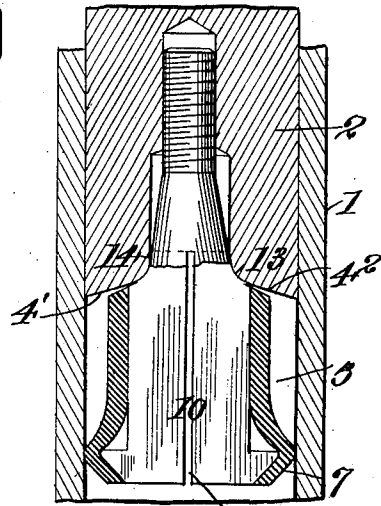


Fig. 5.

Fig. 4.

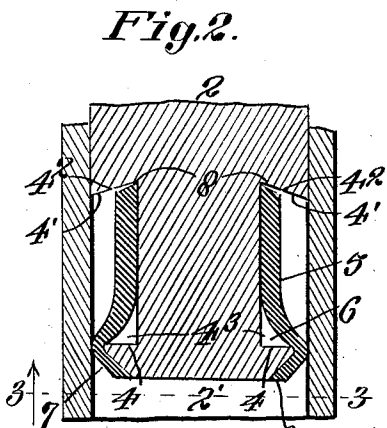


Fig. 3.

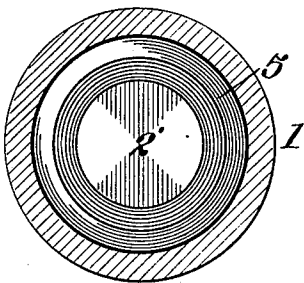
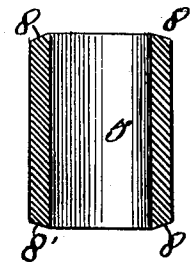
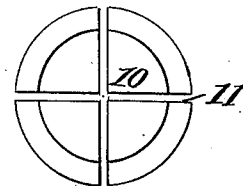


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE N. HEIN, OF SAN FRANCISCO, CALIFORNIA.

PISTON AND PACKING CONSTRUCTION.

Application filed August 26, 1924. Serial No. 734,210.

To all whom it may concern:

Be it known that I, GEORGE N. HEIN, a citizen of the United States, residing at city and county of San Francisco, and State of California, have invented certain new and useful Improvements in Piston and Packing Construction, of which the following is a specification.

This invention relates to a piston and packing construction adapted for use in hypodermic syringes.

One object of the invention is to produce a packing having a relatively small contacting surface with the syringe barrel wall, thus reducing to a minimum piston friction and liability of the packing adhering to the barrel surface when dry. Another object is to provide a piston and packing which may be easily inserted without damage to the packing into the barrel of a hypodermic syringe, the mouth of which is sharp, uneven, or of varying contour. Further objects are to construct an elastic packing adapted to overlie the peripheral edge of the portion of the piston, providing a yieldable leak-proof joint, and to provide an expansible mounting for the packing adapting the packing pressure against the barrel wall to be varied.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings, and set forth in the claims hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a vertical sectional view of the syringe showing the piston in elevation.

Fig. 2 is a vertical sectional view taken along the line 2—2 of Fig. 1, showing the piston and packing construction.

Fig. 3 is a plan view of the syringe taken along the line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view of the tubular washer adapted to overlie the peripheral edges of the piston.

Fig. 5 is a view in section of an adjustable form of the piston head end of the modified form of piston.

Fig. 6 is an end view of the structure illustrated in Fig. 5.

In the drawings, wherein like characters of reference designate corresponding parts, 1 indicates a cylindrical tubular barrel open at one end to admit of the piston 2 to be inserted therein and of reciprocating movement therein, and detachably coupled in any suitable manner to the outlet or discharge end of the barrel is a hypodermic needle 3'. The end of the piston 2 mounts an elongated tubular packing washer 5 positioned on the piston and constructed in a manner hereinafter described. The lower end 2' of the piston 2 is of a smaller diameter than its remaining portion and said lower end portion is circumferentially grooved as at 6, forming the spaced shoulders 4 and 4', the shoulder 4 being disposed at substantially right angles to the base of the groove and the shoulder 4' being inwardly beveled as at 4², the object of the bevel being to retain the washer in position on the piston when rearward lineal movement is transmitted thereto. The extreme end of the piston 2' is circumferentially beveled inwardly from its peripheral edge toward its center as at 7. The tubular packing washer 5 of rubber or other elastic material is provided with a bore of normal diameter less than the diameter of the reduced portion of the piston, thus when stretched thereover providing a leak-proof joint between said reduced portion and the inner surface of the packing. The packing is also of a thickness to extend beyond the surface of the main body of the piston at the point of its overlying the reduced portion 2'. The ends of the packing 5 are inwardly beveled as at 8 and 8', one to conform to the contour of the inwardly beveled wall 4² and the other to lie in a plane substantially parallel with the end wall of the piston as clearly illustrated in Figs. 2 and 5.

In mounting the washer 5 in position on the piston the piston is first withdrawn from the barrel and the packing is stretched endwise over the end portion 2' of the piston until the end of the washer substantially contacts with the shoulder 4', the elasticity of the packing causing the same to tightly grip the base of the annular groove 6 and the outer end thereof to tightly grip the beveled surface 7, providing a space 4³ immediately in rear of the shoulder 4. The

end of the washer or packing 5 overlying the circumferential beveled end 7 of the piston affords a yielding packing of small surface for contacting with the barrel wall, and that portion of the packing overlying the beveled surface is adapted for acting on by the fluid under compression in the barrel and is maintained thereby tightly in contact with said surface, affording a leak-proof joint. The stretching of the member 8 over the flange causes that portion of the elastic material at the point of contact with the barrel to be distended or compressed, and consequently is more compact than the rubber or elastic material on either side of this point of contact, the elastic material gradually decreasing in compactness or density as it recedes from its point of greatest stretch.

The modification illustrated in Figs. 5 and 6 employ the elastic packing illustrated in Fig. 4 with an expansible head 10 split longitudinally at right angles as at 11 and threaded into a bore 12 in the main body of the piston. Bearing shoulders 13 and 14 are formed respectively on the main body of the piston and the head above the threaded seat cooperate to control the expansion or contraction of the split end, dependent on the adjustment of the head in the piston end. An adjusting tool, for example, a screw driver, may be inserted into slots 11 when it is desired to vary the diameter of the packing and in all other respects with the exception of the adjustability the head is the same as that illustrated in Figs. 1, 2 and 3.

I claim:

1. A piston and packing construction for syringes comprising a piston having a body adapted to fit within the syringe barrel, the end of said piston being circumferentially grooved, affording a circumferential flange extending outwardly at right angles from the end of said piston, the diameter of which is less than the diameter of the remainder of the piston, the outer face of said flange being inwardly beveled and a tubular elastic packing fitted over said reduced piston portion and said flange with its end overlying said beveled portion of the flange and with its end wall terminating in a plane substantially parallel and flush with the end of the piston, the portion of said packing in rear of said flange being spaced from the rear flange wall, affording an area for the reception of packing on the increase of pressure between the flange periphery and the barrel wall.

2. A piston and packing construction for

syringes comprising a piston having a body adapted to fit within the syringe barrel, an expansible head threaded into the head of the piston and including a longitudinally slotted yieldable body of a diameter less than that of the piston, said head being formed at one end with an annular flange having an inner wall disposed at substantially right angles to the body wall and its outer face being inwardly beveled, toward the end of the head, a tubular elastic packing fitted over the head with its end overlying said flange and the beveled portion and with its end wall terminating in a plane substantially parallel and flush with one end of the head, and a threaded stem extending from the other end of the head for reception within a corresponding opening in the piston end.

3. A piston and packing construction for syringes comprising a piston having a circumferential flange extending outwardly from its inner end, the periphery of said flange being bevelled inwardly to provide a face disposed toward the end of the piston, and a tubular elastic packing stretched over said flange with its end overlying said bevelled portion of the flange and with its end wall terminating in a plane substantially parallel with and flush with the end of the piston whereby the internal pressure in the syringe barrel will be applied to said packing end to force that portion thereof overlying the bevelled face of the flange longitudinally of said bevelled surfaces.

4. A piston and packing construction for syringes comprising a piston having a flange extending outwardly at right angles from one end, the outer face of said flange being bevelled to afford a surface facing the end of the piston, and a tubular elastic packing of a normal diameter less than that of the flange and stretched over the same, the end of said packing being bevelled to correspond with the bevel of the flange whereby the packing end wall will lie parallel with the end of the piston.

5. In combination with a piston having a flanged end, a piston packing for stretching over said flanged end with its end terminating substantially flush with the piston end, the same comprising an elastic tubular body of a normal inner diameter less than that of the flanged end, one end of said packing being circumferentially bevelled from the inner to the outer edge toward the opposite end of the packing.

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

GEORGE N. HEIN.