

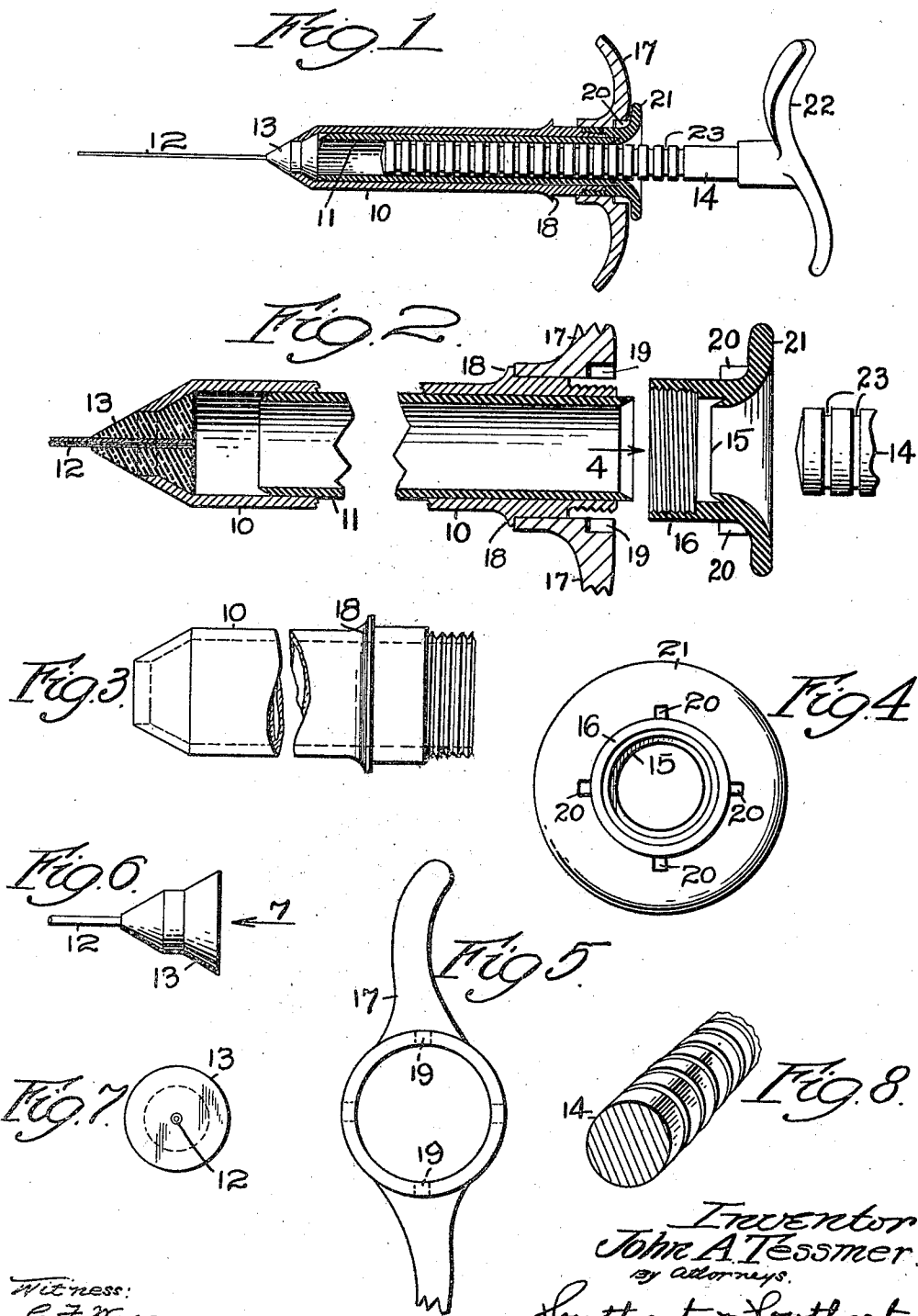
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HYPODERMIC SYRINGE

Filed Oct. 22, 1920



UNITED STATES PATENT OFFICE.

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HYPODERMIC SYRINGE.

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To all whom it may concern:

Be it known that I, JOHN A. TESSMER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Hypodermic Syringe, of which the following is a specification.

This invention relates to improvements in hypodermic syringes as used in dental and surgical practice. It is the object of my invention to improve the construction of such syringes, making them more effective and convenient in operation and better adapted to manufacturing conditions.

With this general object in view, an important feature of my invention relates to the provision of a syringe constructed of few parts, all of which may be readily separated for sterilizing and may be easily re-assembled with no possibility of infection.

Further features of my invention relate to improved devices for supporting and clamping the syringe needle and to the provision of a handle for the syringe also capable of use as wrench in clamping the needle in place.

Another feature of my invention relates to an improved detail of construction which permits the syringe to be more readily filled with injecting fluid.

It is absolutely essential in the use of a hypodermic syringe that no foreign matter shall enter the needle or be carried along with the injecting fluid. For this reason ordinary methods of packing the piston to prevent leakage are unsatisfactory.

An important feature of my invention relates to the provision of an improved piston construction by which the use of packing (as commonly understood) is entirely avoided, while at the same time leakage past the piston is effectively prevented.

As shown herein the piston is formed as a cylindrical metal rod of uniform cross-section and is provided with a series of parallel circumferential grooves. The piston is preferably provided with a thin coating or layer of a softer metal such as gold, which will permit a closer fit and an easier sliding movement of the piston.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of my invention is shown in the drawings in which—

Fig. 1 is a sectional side elevation of my improved syringe:

Fig. 2 is an enlarged sectional side elevation showing certain of the parts in spaced relation;

Fig. 3 is a side view of the syringe casing;

Fig. 4 is an end view of the clamping nut, looking in the direction of the arrow 4 in Fig. 2;

Fig. 5 is an end view of the handle;

Figs. 6 and 7 are side and end views of the needle and its enlarged head; and

Fig. 8 is a perspective view of a portion of the plunger or piston.

Referring to the drawings, I have shown a syringe comprising a casing 10, a cylinder or sleeve 11, a needle 12 having an enlarged head 13, and a piston 14.

The needle 12 is of a usual type and is firmly secured in the enlarged head 13 which is preferably of a relatively soft metal. The outer surface of the head 13 is of the substantially conical shape shown in Fig. 2 and fits closely into the contracted end of the casing 10. The cylinder or sleeve 11 is preferably provided with a beveled or sharpened inner end, adapted to be seated firmly against the relatively soft head of the needle 12.

At its opposite end, the cylinder sleeve is engaged by an internal flange 15 on a nut 16 threaded on the outer end of the casing 10. When the nut is screwed firmly on the casing, the sleeve 11 is clamped therein and is firmly seated against the needle head 13.

A handle 17 is loosely mounted on the casing 10, and is positioned thereon by the projection 18 (Fig. 2). The handle is provided with notches or recesses 19 fitting lugs 20 on the nut 16. When the handle is in the position shown in Fig. 2, it is freely rotatable relative to all other parts of the syringe. When moved to the position shown in Fig. 1, the recesses 19 receive the projections 20 and the handle may be used as a wrench to tighten the nut 16 against the end of the cylinder 11.

The outer portion 21 of the nut 16 is preferably bell-shaped, as shown in the drawings, and this feature is found to be of material advantage when it is desirable to fill the

cylinder by pouring the injecting fluid directly into the cylinder instead of drawing it in through the needle 12.

The piston 14 is formed of relatively hard material and of substantially uniform cross-section throughout its length, steel or other suitable metal being commonly used, and is provided with a suitable handle 22 at its outer end. The piston 14 is a close sliding fit in the cylinder 11 and is provided with a series of parallel circumferential grooves 23, preferably extending throughout the whole working portion of the piston. These grooves are of relatively small dimensions and have abrupt, sharp edges where they meet the cylindrical surface of the piston.

I find it desirable to provide the finished piston with a very thin coating of a softer metal, which may be conveniently accomplished by electroplating the piston with a very thin deposit of gold, or other metal, the deposit being so extremely thin that it is impossible to indicate it in the drawings. This thin layer, however, being of much softer metal, makes possible a closer fit of the piston in the cylinder and a smoother sliding movement thereof, and in fact acts to a certain extent similar to a lubricant.

Having described the details of construction of my improved syringe, the advantages thereof will be readily apparent. The reinforcement of the needle by the relatively large head 13 of softer material greatly reduces the breakage of needles when the device is in use. All parts of the syringe may be separated by removing the single nut 16 and the syringe may be readily reassembled without handling any internal surface of the device, thus avoiding the possibility of infection. The handle 17 may be turned to any desired angle when the device is in use and thus constitutes an adjustable handle as well as a wrench for the nut 16.

The provision of the plurality of grooves 23 in the piston 14 avoids the necessity of using any packing between the piston and the cylinder and has a very important effect in preventing leakage past the piston. Any liquid which succeeds in working past the close fitting end of the piston 14 engages the sharp perpendicular wall of the first groove 23 and is directed into the groove with a more or less rotary motion. Any of the solution which may finally escape from the first groove encounters similar resistance in the second groove while at the same time it is under reduced pressure as it is more remote from the cylinder. As each successive groove is encountered, the pressure is further reduced while the resistance remains unchanged. Consequently, leakage past the piston is substantially eliminated.

Having thus described my invention, it will be evident that changes and modifications can be made therein by those skilled

in the art within the spirit and scope thereof as set forth in the claims and I do not wish to be otherwise limited to the details herein disclosed, but what I claim is:—

1. A hypodermic syringe having, in combination, a cylinder for the injecting fluid, and a piston slidable in said cylinder to force the fluid therefrom, said piston being formed as a metal rod of uniform cross-section throughout its length and having a series of parallel circumferential grooves formed in the cylindrical surface thereof to prevent leakage of the fluid past said piston, the cylindrical wearing surface of said piston being coated with a very thin deposit of a soft metal ensuring close sliding fit of said parts.

2. A hypodermic syringe comprising a casing member having a substantially conical outwardly contracted axial opening, a needle extending therethrough and having an enlarged head with a substantially conical surface fitting said axial opening in said casing member, a seating member engaging the inner and larger end of said needle head, and means to move said seating member relatively to said casing member against said needle head thereby exerting outward pressure on the inner and larger end of said needle head and firmly seating said needle head in the substantially conical axial opening of said casing member.

3. A hypodermic syringe comprising a casing having a relatively fixed end with a contracted opening therein, a needle extending through said opening and having an enlarged head seated within said end, a sleeve slidable in said casing and abutting the inner end of said needle head, and means to force said sleeve firmly against said head to secure said needle in said casing.

4. A hypodermic syringe comprising a casing having a relatively fixed end with a contracted opening therein, a needle extending through said opening and having an enlarged head seated within said end, a sleeve slidable in said casing and abutting the inner end of said needle head and means to force said sleeve firmly against said head to secure said needle in said casing, the head of said needle being of relatively soft material and said sleeve having a thin hard edge seating itself in said head when pressure is applied to said sleeve.

5. A hypodermic syringe comprising a casing having a contracted end, a needle having an enlarged head fitting against the inner face of the contracted end of said casing, a sleeve slidable in said casing and abutting said needle head, and a nut threaded to said casing and effective to force said sleeve against said head, thereby seating the needle firmly in said casing.

6. A hypodermic syringe comprising a casing having a contracted end, a needle hav-

ing an enlarged head fitting against the inner face of the contracted end of said casing, a sleeve slidable in said casing and abutting said needle head, and a nut threaded to
5 said casing and effective to force said sleeve against said head, thereby seating the needle firmly in said casing, said nut being flanged outwardly to provide a bell-shaped mouth for said syringe.

10 7. A hypodermic syringe comprising a casing, a needle having an enlarged head fitting the end of said casing, a cylindrical sleeve in said casing, a nut threaded on said casing and engaging said cylindrical sleeve,
15 and a handle loose on said casing, said nut and said handle having co-operating por-

tions by which said nut may be turned by said handle when said portions are engaged.

8. A hypodermic syringe comprising a casing having an end with a conical inner
20 surface and with a contracted central opening, a needle extending through said opening and having an enlarged head with a conical surface engaging said end, a sleeve slidable
25 in said casing and abutting the head of said needle, and means to force said sleeve against said head to seat the head firmly in said casing.

In testimony whereof I have hereunto affixed my signature.

JOHN A. TESSMER.