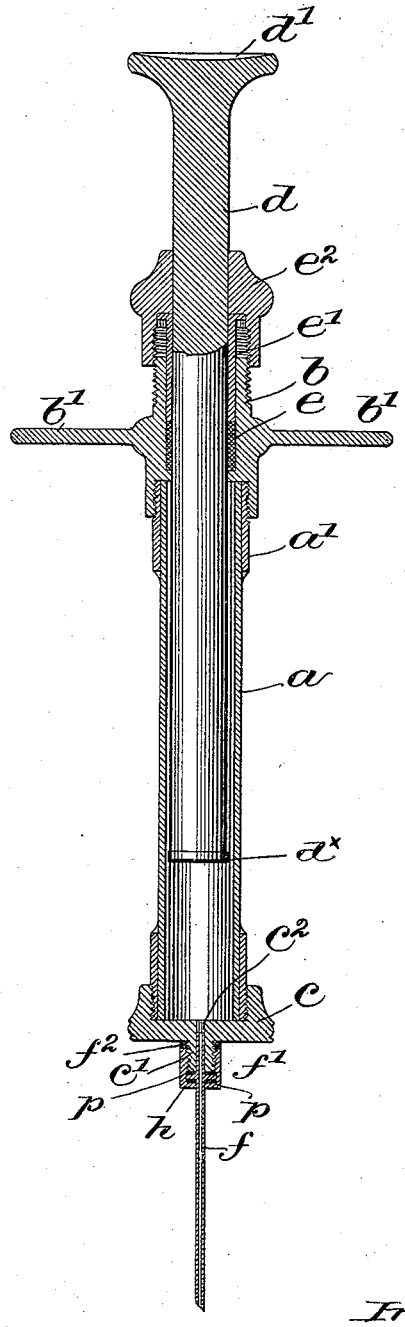
(No Model.)

W. H. BREWSTER.

HYPODERMIC SYRINGE.

No. 490,842. Patented Jan. 31, 1893.



Witnesses.
Edward F. Allen.
Louis N. Gouell

Inventor.
William H. Brewster;
by Crosby & Gregory Attys.

UNITED STATES PATENT OFFICE.

WILLIAM H. BREWSTER, OF BOSTON, MASSACHUSETTS.

HYPODERMIC SYRINGE.

SPECIFICATION forming part of Letters Patent No. 490,842, dated January 31, 1893.

Application filed September 24, 1892. Serial No. 446,796. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BREWSTER, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Hypodermic Syringes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawing representing like parts.

In hypodermic syringes as now commonly constructed, the piston which moves within the barrel is packed to fit and move tightly in contact with the interior or annular surface of the barrel, and the perfect operation of the syringe depends entirely upon the tightness of this packing, for should the packing deteriorate or lose its adjustment the piston will fail to create a vacuum when drawn back for the purpose of filling the barrel, and will also fail to properly expel the fluid from the barrel when pushed toward the outlet of the same. The packing for pistons of this kind must necessarily be somewhat small and delicate, and as in the use of syringes of this class great pressure must frequently be exerted in order to force the fluid under the skin, the packing frequently gets out of order rendering the syringe useless. Again, as the packing almost universally employed consists of leather, felt or some other similar material, if the syringe remains for some time unused, the packing will shrink, or if used continuously will become so saturated that it will not properly fill the barrel.

One object of this invention is to overcome these objections, and in accordance with this invention I pack the piston at that end of the barrel through which the piston or piston-rod protrudes from the barrel, the piston proper within the barrel moving free from contact with the annular surface of the barrel, the vacuum within and the expulsion of the fluid from the barrel being created and effected solely by the displacement of the piston, which displacement is greater or less according as the piston is moved farther into or withdrawn from the barrel. The only packing which I employ is that upon the exterior and end of the barrel, and said packing may be of any usual character.

Another part of this invention relates to the needle attached to the barrel and through which the fluid from the barrel is forced beneath the skin.

In syringes as now commonly constructed, the cap upon the closed end of the barrel is provided with a threaded nipple upon which the enlarged end of the needle is screwed, and if as is frequently the case, the needle becomes broken or unfit for use, it is necessary to destroy or discard the entire needle including its threaded end which is the most difficult and expensive to construct.

In seeking to provide a better construction of needle and a better manner of attaching the same to the barrel to avoid throwing away the most expensive part of the needle and the part which never becomes broken or unfit for use, I have devised a needle which is clamped to the end of the barrel by an independent threaded collar which may be used for any number of needles. When the needle becomes broken or unfit for use, the collar may be unscrewed, the needle withdrawn and thrown away, and replaced by a new needle, the same collar being employed to attach each.

The drawing represents in enlarged longitudinal sectional view, a syringe embodying this invention.

Referring to the drawing, *a*, represents a usual barrel preferably of glass protected by a metallic protecting tube *a'* threaded at its opposite ends to receive respectively the caps *b* and *c*. The cap *b* is provided with a central opening through which is extended the piston *d* provided with an enlarged finger piece *d'* at its outer end by which the piston may be pushed into and withdrawn from the barrel, the cap *b* being provided with the customary ears or finger pieces *b'* to facilitate the movement of the piston by the operator. The opening in the cap *b* through which the piston extends is counter-bored to receive a packing *e* which may be of any material preferably a string or strip of leather or other similar material, said packing being compressed within the cap to hug tightly the piston by means of a gland *e'* acted upon by a nut or cap e^2 threaded upon the exterior of the cap *b*, as

shown, rotation of the cap e^2 moving the gland to compress the packing about the piston. The piston d as shown in the drawing is of uniform diameter from the point at which it passes through the packing e to its inner end, and the piston is entirely free from contact with the interior or annular surface of the barrel, so that the operation of the syringe depends entirely upon the displacement of the piston within the barrel, a vacuum being created by withdrawing the piston more or less from the barrel, the fluid within the barrel being expelled by pushing the piston into the barrel to thereby displace a corresponding amount of the fluid therein.

The packing e and its adjusting nut e^2 being at the end and upon the outside of the barrel are easy of access for adjustment and renewal, and will not easily become disarranged or out of adjustment, there being no packing whatever within the barrel to necessitate taking the syringe apart. The packing e may be made of greater or less length to thereby increase the packed surface to any extent necessary to withstand the pressure exerted in expelling the fluid from the barrel.

The inner end of the piston is preferably provided with a flange $d^\times$ to prevent accidental complete withdrawal of the piston from the barrel.

In the construction shown the cap c is provided with the usual threaded nipple c' in which is the outlet opening c^2 for the barrel.

In accordance with this invention, the needle f is provided with an annular flange or enlargement f' adapted to rest against the end of the nipple c', and the end of the needle will preferably project at f^2 at some distance within the nipple, as shown, although the needle may terminate at the flange f if desired. The needle is secured or clamped to the cap by means of the flanged collar h threaded upon the portion of the cap constituting the nipple as shown and acting upon the flange f' of the needle to draw the latter tightly against the nipple, one or more packing washers p being inserted between the flange and collar or nipple to render air tight the joint between the needle and the nipple. By this improved construction, should the needle become broken or unfit for use, the needle itself alone need be discarded or destroyed, for when the collar is unscrewed from the nipple, the needle may be withdrawn from the collar and discarded, and a new needle inserted in its place and clamped to the nipple by the same collar. The most expensive part of the needles which, as at present constructed, must be thrown away with the needles, is thus preserved, and the less expensive part, the needle proper, alone discarded.

The surrounding metallic tube a' may be cut away as at a^2 to expose the inner glass barrel a, in order that the operator may at all times see the quantity of fluid within the barrel.

This invention is not restricted to the particular construction of the various parts herein shown. I prefer that the piston d should be of uniform diameter throughout its length, but such is not absolutely necessary, the essence of this part of the invention lying in the packing of the piston at the end of the barrel and permitting the piston proper, whether of the same or different diameter from that where packed, to move within the barrel but free from tight contact with the interior annular surface of the barrel, the ejection of the fluid from the barrel being effected not by the shortening of the barrel by the movement of an air tight piston as in the syringes now constructed, but solely by the displacement of the body of the piston forced into the barrel. Any style or shape of needle may be employed in connection with the threaded collar h.

In the claim the term "free from operative contact with the interior annular surface of the barrel" in connection with the piston is used in contradistinction to a piston which is packed, or otherwise constructed, to move in operative contact with the said interior annular surface of the barrel.

So far as I am aware, syringes have heretofore depended for their operation upon the direct operative or tight contact or packing between the piston and the surrounding wall of the barrel, while in my improved syringe, as herein shown, the contact between the piston and barrel, if there be any contact at all, may be as imperfect as desired and the piston need not contact at any point with the surrounding wall, but may be free therefrom, as shown, the operation of the syringe depending entirely upon the packing at the end of the barrel through which the piston enters, the latter forcing the fluid from the valve simply by reason of its displacement and not by reason of any contact between it and the surrounding barrel.

I claim—

1. In a syringe, a barrel provided at one end with an outlet, combined with an unperforated piston movable within and free from operative contact with the interior annular surface of the said barrel, and a packing for the piston at that end of the barrel through which the piston enters, substantially as described.

2. In a syringe, the combination with a barrel provided at one end with an outlet, of a cap secured to the opposite end of the barrel and provided with finger pieces as b', a counterbored opening in said cap through which the piston may enter the barrel, a packing placed in the counterbored portion of said opening, a gland to act upon said packing,

and a nut threaded upon the end of the cap to act upon said gland and compress the packing, substantially as described.

3. In a syringe, a barrel having a closed end provided with an outlet, combined with a flanged needle and an independent threaded collar adapted to be screwed to the outlet end of the barrel and to act upon the flange of the needle to clamp the latter to the barrel, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. BREWSTER.

Witnesses:
FREDERICK L. EMERY,
A. H. GAYNOR.