Nov. 2, 1937. C. E. PIECK 2,098,106

SYRINGE

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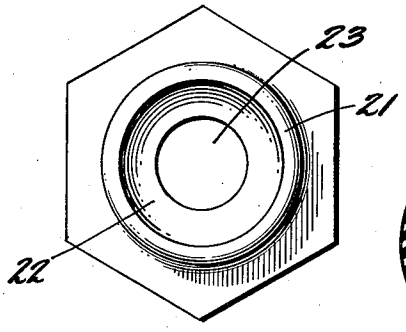
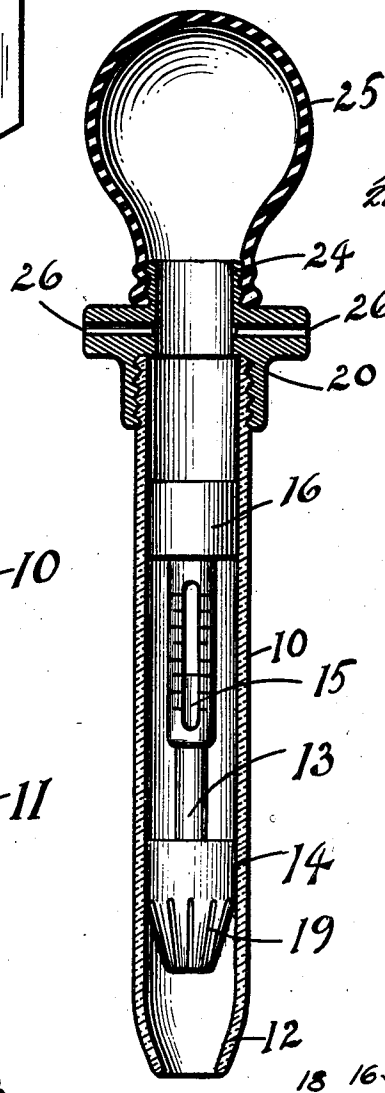


Fig. 6.

Fig. 1.



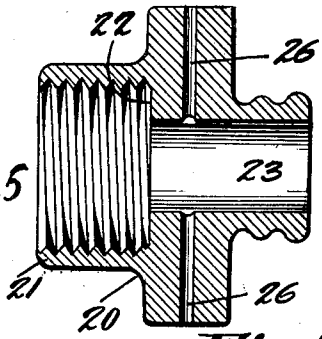


Fig. 5.

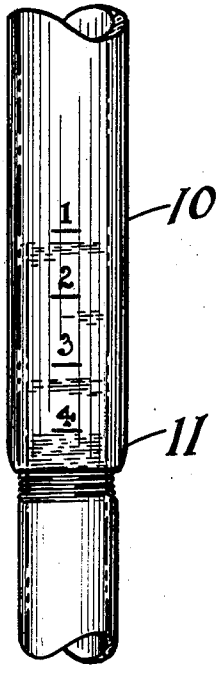


Fig. 3.

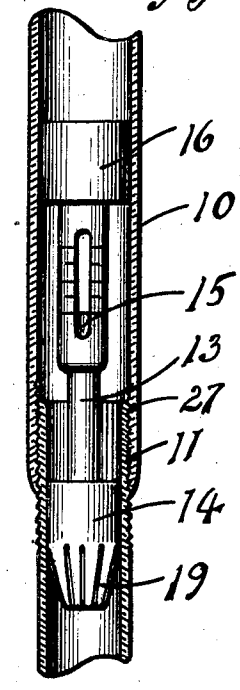


Fig. 2.

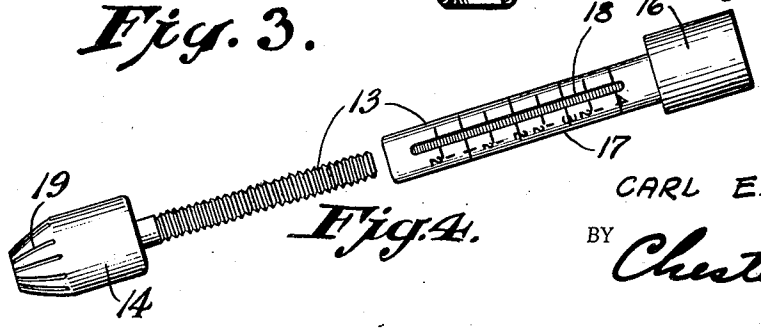


Fig. 4.

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SYRINGE

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10 Claims. (Cl. 128—234)

This invention relates to a syringe which is especially adapted to treatment of local irritations about the cervix uteri.

Among the objects of the invention is to provide such a syringe adapted to measure and to deliver fluids, especially jellies, with positive action, considerable velocity and a high degree of spattering action.

Another object is to provide such a syringe which is practically unbreakable, easily demountable and which can be carried when demounted in a very small space.

Another object is to make the syringe oilproof and of widely variable capacity and adapted to expel practically all of its charge.

Referring to the accompanying drawing, Figure 1 is a longitudinal section thru the middle of the barrel, the piston parts being shown unsectioned.

Figure 2 is a similar view of the barrel portion only, showing a jointed construction of the barrel.

Figure 3 is an exterior view of the barrel only showing the jointed construction.

Figure 4 is a side view of the compound piston; the inner stem being shown unscrewed from the sleeve.

Figure 5 is a cross section of the barrel socket.

Figure 6 is a plan view of the barrel socket, viewed from its lower or threaded end.

In the drawing, 10 is a tubular barrel which is preferably made of the cellulose acetate transparent plastic called "Tenite." It may also be made of transparent synthetic resins of other types, or of glass. The barrel 10 may be threadedly jointed intermediate of its ends, said joint being 11 in Figures 2 and 3. The lower or insertible end 12 has a blunt taper as to both its inner and outer walls. As shown in Figure 3, the sleeve or larger portion of the barrel may bear a scale indicating the amount of fluid that can be charged at different settings of the threaded joint 11, which is sufficiently long to give a considerable range of adjustment.

Within the barrel 10 is a compound piston 13 which is shown separately in Figure 4. It is made in two parts, the lower one comprising a cone-ended plunger 14 and a threaded stem 15. The upper part comprises a cylindrical plunger 16 and a sleeve 17 attached thereto. The sleeve is interiorly threaded to receive the stem 15 and is provided with a long narrow aperture 18, the edges of which are graduated. It is therefore evident that the piston may be shortened or lengthened by screwing the stem 15 into or out of the sleeve 17. By observing the stem thru the aperture, the charge can be regulated according to the scale on the aperture edges, the further the stem is screwed in the larger the charge.

The plungers 14 and 16 are intended to fit with some looseness, but not a great deal, inside the barrel 10. They should be freely movable by ordinary bulb air pressure even when the syringe is dry. The materials preferred for these members are either of the artificial oil-proof soft rubbers known as "Thiokol" or "DuPrene", the first being an olefine polysulfide reaction product of empirical formula $C_uH_{2n}S_x$ and the latter a tough elastic polymer of a plastic polymer of 2-chloro-buta 1:3 diene.

The tapered end of plunger 14 conforms to the inner wall of the lower end 12 of barrel 10. The plunger end is grooved with a plurality of grooves 19 which if prolonged would meet at the apex of the cone. The purpose of the grooves is to prevent the adhering of the plunger 14 to the inner walls of end 12 when a jelly is used; in other words the grooves are an air admitting means adapted to break the vacuum after discharge.

When a jointed barrel is used, the two plungers 14 and 16 may be of different sizes to fit the different internal diameters of the tubing used to form the barrel.

The upper end of barrel 10 is threaded to be received in the barrel socket 20. The latter is made preferably of synthetic resin. The threaded portion 21 ends at a substantial shoulder 22 against which the barrel 10 abuts. Communicating with portion 21 is a round opening 23 of substantial diameter, the wall 24 of which projects a sufficient distance beyond the body of the barrel socket to provide a means for securely attaching a rubber or DuPrene bulb 25. To this end the outer wall 24 is corrugated.

No provision is made in the bulb for admitting air, but two small holes 26 are molded or drilled thru the sides of the socket above the shoulder 21. They communicate with the opening 23 which in turn communicates with the interior of bulb 25. The thumb of the operator may be placed over one of these openings when the syringe is in use so that the amount of air leakage can be reduced if desired. The outside contour of that portion of the socket thru which the holes are drilled is that of a hexagonal flange, as shown in Figure 6, so that rolling of the syringe is prevented.

It is evident that the shorter the compound piston 13 is made by screwing the stem 15 into the sleeve 17, the larger the charge sucked into and ejected from the syringe. In the one tube type of barrel as shown in Figure 1, the limit

occurs when the lower plunger 14 strikes the inner tapered wall 12 of the barrel. In the case of the two piece barrel, the limit may be as above, the stem 15 is sufficiently unscrewed from sleeve 17 or it may be the striking of the lower edge of plunger 16 against the upper end 27 of the inner barrel. Since plunger 14 cannot contact the wall 12 if the stem 15 is adjusted too short, it follows that the liquid, if it is entirely ejected under such circumstances, must have been ejected by reason of its velocity acquired from the motion of the piston before the edge of plunger 16 contacted shoulder 27. While some liquids are too viscous to be entirely ejected by means of a push so acquired, nevertheless the viscosity of others is low enough so that they can be entirely ejected merely on account of their acquired velocity. Consequently the capacity of a two piece barrel syringe with compound piston can be larger than that of a one piece barrel syringe for such liquids if the two piece barrel is extended to maximum length and the piston shortened as much as possible. It may be made so short that the plunger 14 lies within the larger diameter barrel section at the beginning of the stroke, but it will find its way into the smaller section because the front plunger being tapered can center itself. Cooperation therefore exists between the threaded adjusting means of the barrel and the threaded adjusting means of the compound piston, and the holes 26 also cooperate in the unique arrangement because one of them can be closed to assist the action just described.

It is pointed out that in my construction there is no hole thru the soft bulb. The holes cannot therefore, grow larger from use or be the starting point of a tear.

In operation the tip or lower end of the syringe is inserted into the liquid to be charged, the bulb being deflated. The bulb is then allowed to inflate itself, thereby sucking liquid into the barrel and retracting the piston. A quick squeeze is then given to the bulb and the piston flies forward until either the tip of the first plunger contacts the inner walls of the barrel tip, or in the case of a two piece barrel either the lower tip or the rear plunger shoulder comes in forcible contact with the barrel. Either action results in swift ejection of the charge and the spattering action is very pronounced.

I claim as my invention:—

1. In a syringe, a cylindrical barrel, a tapered constriction at the lower end thereof, a rigid socket at the upper end thereof, air inlet means in said socket, a soft pneumatic bulb attached to said socket and in pneumatic communication with the interior of said barrel, a compound piston wholly within said barrel and screw means for adjusting the length of said piston, all of the parts of said piston being arranged to travel in unison during use.

2. In a syringe, a barrel, a compound piston in said barrel, plungers on said piston said plungers being made of soft rubberlike oil-proof substance, screw means for adjusting the length of said piston and a scale on said piston for estimating the amount of charge for a given length, stop means on the lower end of said barrel to restrain said piston and pneumatic means on the upper end of said barrel for actuating said piston.

3. In a syringe, a barrel, a compound piston in said barrel, plungers on said piston at both ends thereof, an internally threaded sleeve attached to one plunger, said sleeve having a long narrow aperture therein and a graduated scale on the edges of said aperture, an externally threaded stem attached to the other plunger, said stem being adapted to be screwed into said sleeve, and stop means for said piston at one end of said barrel.

4. In a syringe according to claim 3, plungers on said compound piston made of soft oil-proof rubber substitute.

5. In a syringe according to claim 3, plungers on said compound piston made of DuPrene, a tough elastic polymer of a plastic polymer of 2-chloro-buta 1:3 diene.

6. In a syringe according to claim 3, plungers on said compound piston made of Thiokol, an olefine polysulfide reaction product of empirical formula $C_uH_{2n}S_x$.

7. In a syringe, a barrel made of transparent molded plastic composition, a tapered lower end on said barrel, screw threads on the upper end of said barrel, a barrel socket threadedly attached thereto, a plurality of airholes transverse of said socket, means for attaching a bulb to said socket so that the latter is in pneumatic communication with said barrel, a bulb imperforate except for one opening, attached to said means and a compound adjustable piston in said barrel.

8. In a syringe, a two piece barrel, screw means for attaching the portions of said barrel together, one within the other, a compound piston within said barrel, plungers of different diameters on the ends of said piston, screw means for adjusting the length of said piston, means including a scale for judging the size of charge, carried on said piston adjusting means, a barrel socket attached to one end of said barrel, a tapered constriction on the other end of said barrel, a plurality of air holes thru the sides of said barrel socket, means for operatively attaching a bulb to said socket and a bulb so attached, said bulb being imperforate except as to the opening by which it is attached.

9. In combination with a syringe, a compound piston, the forward end of said piston being tapered, and a plurality of shallow grooves extending back from the point of said piston over the tapered portion.

10. In combination, in a syringe, a barrel, a tapered forward end thereon, a compound piston in said barrel, a tapered forward end on said piston, the taper thereof and the taper of the barrel-end interior being substantially the same; and a plurality of shallow grooves on said tapered piston end substantially parallel to the longitudinal axis of said piston.

CARL EDWARD PIECK.