June 25, 1929. A. E. SMITH 1,718,605

HYPODERMIC SYRINGE

Filed Jan. 28, 1928

Fig. 1

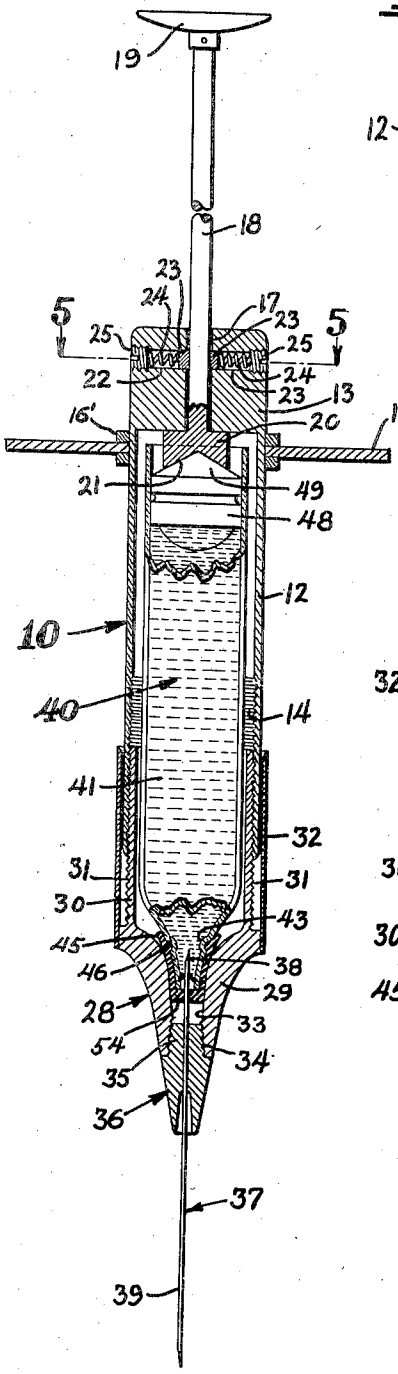


Fig. 3

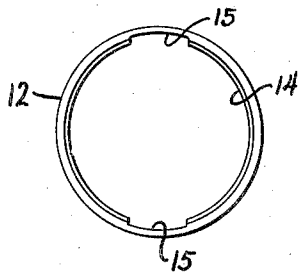


Fig. 4

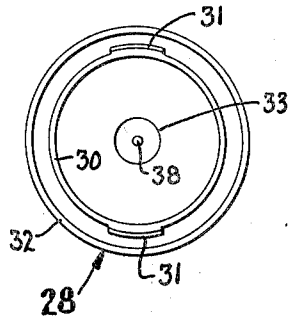


Fig. 2

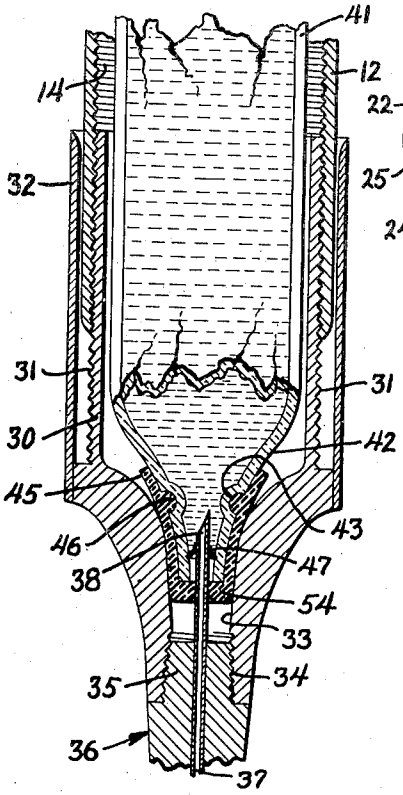
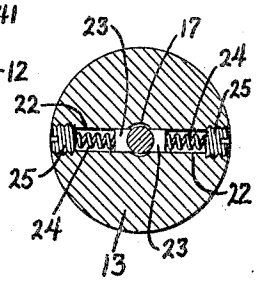


Fig. 5



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UNITED STATES PATENT OFFICE.

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HYPODERMIC SYRINGE.

Application filed January 28, 1928. Serial No. 250,124.

This invention relates to improvements in hypodermic syringes.

The general object of this invention is to provide an improved syringe of the class described wherein the substance to be ejected is contained in a cartridge-like ampule.

A specific object of this invention is to provide an improved syringe of the class described which is adapted to be loaded from the discharge end and having means provided whereby ampules of different length may be used in the syringe.

A further object of the invention is to provide a novel means for automatically and correctly positioning the ampule in the syringe.

Other objects of this invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a central longitudinal section through my improved syringe showing an ampule operatively positioned therein for making an injection.

Fig. 2 is an enlarged central longitudinal section of the loading and discharging end of my improved syringe.

Fig. 3 is a bottom plan view of the syringe barrel.

Fig. 4 is a top plan view of the removable cap and

Fig. 5 is an enlarged section taken on line 5—5 of Fig. 1.

Referring to the drawings by reference characters I have indicated a hypodermic syringe embodying the features of my invention generally at 10. This syringe as shown comprises a hollow body portion or barrel 12 having at one end a solid head 13 formed integral with the barrel and being internally threaded at the opposite end as at 14. The threads 14 extend from the end of the barrel towards the head 13 for a considerable distance. Oppositely disposed longitudinal cut away portions or notches 15 are provided in the threaded area.

The barrel of the syringe also includes adjacent the head 13, a finger grip cross bar 16 which may be held in place by rings 16' secured to the barrel 12 as by welding.

A central longitudinal aperture 17 is provided in the head 13 in which a plunger rod 18 is positioned. The plunger includes at one end an enlarged thumb piece 19 held in place by threads and at the opposite end an enlarged head 20, in the under face of which is provided a recess 21 shown as of a conical shape.

The head 13 also includes aligned oppositely disposed apertures 22 which intersect the central aperture 17 at right angles. Within each of the apertures 22 I position a slidable plug 23 which is adapted to be resiliently urged towards the central aperture 17 by a coiled compression spring 24. The coiled springs 24 are shown as adapted to be retained in the apertures 22 by screw threaded plugs 25 which engage like screw threads provided in the head.

The adjacent faces of the slidable plugs 23 are formed concave to conform to the periphery of the plunger 18. The slidable plugs 23 engage the plunger 18 and provide tension thereon which maintains the plunger in any position to which it may be stopped or adjusted.

The threaded end of the syringe barrel 12 is adapted to be closed by a cap indicated generally at 28. This cap includes a body portion 29 having a sleeve 30 extending therefrom which is provided with external threaded oppositely disposed bosses 31 which are adapted to engage the threads 14 of the barrel 12.

Secured to the body portion 29 and surrounding the sleeve 30 I provide another sleeve 32. The body portion 29 of the cap also includes a tapered recess 33 which communicates with an oppositely disposed screw threaded tapered recess 34 in which a threaded tip 35 of a hypodermic needle hub 36 is adapted to be positioned.

As shown, a hollow hypodermic needle 37 is secured to the hub 36, and projects beyond each end of the hub as at 38 and 39.

By constructing the syringe cap 28 as described it will be apparent that ampules of various lengths may be used in my improved syringe, since to accommodate the ampules of various lengths it is only necessary to adjust the sleeve 30.

The ampule which I have shown used in connection with my improved syringe is indicated generally at 40 and includes a body portion 41 provided at one end with a tapered neck 42 in which I preferably provide a peripheral groove 43. The end of the tapered neck 42 is left open and is adapted to be closed by a resilient cap 44.

The cap 44 is preferably made of a good grade of rubber and includes a skirt portion 45 which is adapted to surround a portion

of the tapered neck 42 and is provided with an internal bead 46 which is adapted to fit within the groove 43 in the tapered neck of the ampule to retain the cap on the ampule.

The open end of the tapered neck 42 may also be hermetically sealed closed by a frangible metallic partition 47 which is preferably a metal foil disk fused in place.

The end of the ampule body 41 opposite the tapered neck 42 is shown as adapted to be closed by a stopper 48 which is normally spaced adjacent the end as shown in Fig. 1, and is adapted to be moved within the ampule body. This stopper 48 is preferably made of a good grade of rubber and the top surface is formed conical as at 49.

When it is desired to make an injection with my improved syringe 10 the cap 28 is removed and the ampule 40 positioned in the syringe so that the straight open end of the ampule body is positioned adjacent the inner face of the syringe head 13. The cap 28 is then replaced on the syringe barrel. When the cap 28 is positioned on the syringe barrel 12 the threaded portions 31 of the cap are positioned in the grooves 15 in the barrel 12 and the cap moved towards the head 13.

As the syringe cap 28 is thus moved the ampule cap 44 enters the tapered recess 33 and the end 38 of the needle 37 punctures the ampule cap, fractures the metallic portion 47 and projects into the ampule. After the syringe cap 28 has been moved as far as possible towards the head 13 it is turned about a half of a turn to the right, whereupon the threaded portions 31 of the cap engage the threaded portion 14 of the syringe barrel 12 thus securing the syringe cap 28 to the barrel 12 and at the same time forcing the ampule cap 44 into fluid tight engagement with the side walls of the conical recess 33.

As the syringe cap 28 is being positioned on the syringe barrel the conical portion 49 of the ampule stopper 48 enters the conical recess 21 in the plunger head 20 and automatically correctly positions the ampule in the syringe barrel.

To make an injection with my improved syringe 10 the plunger 18 is moved towards the syringe cap 28 thereby moving the stopper and causing it to act as a piston to expel the contents of the ampule into and through the hypodermic needle 37.

To remove the syringe cap 28 the cap is turned to the left until the threaded portions 31 thereof are positioned in the grooves 14 of the syringe barrel 12, whereupon the cap 28 may be readily removed from the barrel by moving it away from the syringe head 13.

From the foregoing description it will be apparent that I have provided a novel form of hypodermic syringe which can be economically manufactured, which is simple in construction and highly efficient in use.

Having thus described my invention, I claim:

1. An ampule including a body portion having a reduced tapered neck at one end, an internal frangible metallic diaphragm fused to said neck to close the same, a rubber member surrounding said neck and a stopper in said ampule and remote from said neck.

2. In a syringe device adapted to receive an ampule, a barrel comprising two members, said members being relatively movable to alter the effective length of the barrel, said barrel having a front and a rear portion, a plunger rod supported in said rear portion and movable into said barrel, means on said front portion for engaging an ampule, said front portion including means for engaging a hypodermic needle.

3. An ampule including a body portion having a reduced open ended tapered neck at one end, a resilient cap adapted to close the open end of said tapered neck, the open end of said tapered neck also being closed by an internal frangible metallic portion and a stopper in the opposite end of said ampule body.

4. In a syringe, a barrel, a closure head for one end of said barrel, said head being formed integral with said barrel, a plunger rod movable through said head and in said barrel, means in said head adapted to frictionally engage said plunger rod, a cap for the opposite end of said barrel, said cap including a body portion having a conical recess therein, a sleeve and a hypodermic needle, said sleeve having means thereon adapted to coact with means on said barrel for detachably securing said cap to said barrel, said means also allowing use of ampules of different length in said syringe, an ampule in said syringe, said ampule including a body portion having a reduced open ended tapered neck at one end, a resilient cap adapted to close the open end of said tapered neck, the open end of said tapered neck also being closed by an internal frangible metallic portion, a stopper adjacent the opposite end of said ampule body, said stopper including means adapted to coact with means on said plunger rod head to automatically correctly position said ampule in said syringe, said hypodermic needle being adapted when said cap is operatively positioned on said barrel to puncture said ampule cap, fracture said metallic partition and enter said ampule.

In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.