This invention relates to a hypodermic syringe. The general object of the invention is to provide an improved hypodermic syringe by means of which a fresh solution may be quickly prepared.

A more specific object of the invention is to provide an improved ampule for use in a hypodermic syringe.

Another object of the invention is to provide an improved hypodermic syringe barrel for use with disposable ampules.

Another object of the invention is to provide a novel front member for use with a hypodermic syringe.

A further object of the invention is to provide an improved barrel for a hypodermic syringe.

Other objects and advantages of my invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is an extended view showing my improved hypodermic syringe front member and an ampule used therewith;

Fig. 2 is an enlarged fragmentary central section view showing the front member with the ampule partly inserted therein;

Fig. 3 is a view similar to Fig. 2 with the ampule fully seated in the front member;

Fig. 4 is a side elevation showing the ampule barrel;

Fig. 5 is an enlarged, fragmentary, sectional view showing the barrel secured to the front member;

Fig. 6 is a view similar to Fig. 5, showing the plunger threaded to the piston cork and in partly advanced position;

Fig. 7 is an enlarged, fragmentary, sectional view showing the inner end of the tube, and

Fig. 8 is an enlarged sectional view showing the front end of the ampule.

Referring to the drawing by reference characters, I have shown my invention as embodied in a syringe, indicated generally at 10. As shown, the syringe includes a front member 11, a barrel 12 and an ampule 13.

As shown, the front member includes a body 14, preferably made of metal, which has a bore 15 and a threaded rear end 16. The forward part of the front member includes a tapering tip 17 at the inner end of which I arrange a tapered portion 18. The front member includes a reduced bore 19 in which a tube 20 is secured as by brazing. The tube 20 is pointed at the inner end as at 21 and includes a plurality of holes 22 which afford communication between the interior and exterior of the tube.

Upon the tip 17, I arrange the hub 23 of a hypodermic needle 24 which has a sharpened front end 25. The hub 23 includes a tapering portion 26 which corresponds to the tapering tip 17 and an internally threaded portion 27, the threads of which engage the threads 18 on the front member to produce a fluid-tight joint between the front member and the hub 23. The inner end of the needle 24 is disposed in a recess 27 in the hub which communicates with the tube 19.

The ampule 13 in its rear end includes a piston cork 30 which may be made of rubber and has a threaded recess 31 adapted to receive a plunger, 26 to be later described. At its forward end the ampule 13 has a stopper which consists of a rubber sleeve 31' which has a peripheral outwardly directed flange 32 thereon which engages the end of a cylindrical member forming a circular wall of the ampule. Arranged within the sleeve 31' is a container member, preferably made of frangible plastic, and consisting of a tubular body 33, having an integral end disc 34, which is shown as plano-convex, with the convex portion disposed inwardly and with a narrow web 35 connecting the disc to the tubular body 33. A peripheral outwardly directed flange 36 arranged upon the end of the body 33 engages the outer end of the sleeve 31'. A rubber tubular closure 38 is disposed within the tube 33 and has a peripheral flange 41 which engages the flange 36 on the holder. The flange 36 seats in a recess 42 on the flange 32 and the flange 41 extends out to cover the flange 36 on the member 33.

The closure 40 has a recess 43 which is closed by a diaphragm 44 and there is a space between the diaphragm and the disc 34 and in this space I arrange a medicinal pellet or tablet 45 which when discharged into the vehicle, such as distilled water, in the body of the ampule, makes a fresh solution for injection purposes.

The barrel consists of a tubular body 50, having viewing apertures 51 and having threads 52 at the forward end which engage the threads 16 to hold the barrel on the front member. The barrel includes a finger gripping member 53 and the rear portion of the barrel includes a closure 54 which has an end portion 55 with a hole 56 therein, through which a plunger 57 reciprocates.

The plunger 57 is arranged within a stepped sliding sleeve 68 which is urged forwardly by a spring 59 and which in its extreme forward position engages a shoulder 66 within the barrel. The sleeve 68 has a beveled front end 61 which is adapted to engage and center an ampule in the barrel. The rear end of the plunger includes a finger engaging portion 62 and at the forward
end the plunger includes a shoulder 33 which is adapted to abut against the piston cork. In advance of the shoulder the plunger includes a threaded portion 64 which is adapted to engage the threads 31 in the piston cork 30.

In use the operator takes the parts shown in Fig. 1, i.e. the front member and the ampule, and moves the ampule first to the position shown in Fig. 2 and then to the position shown in Fig. 3, in which latter position the pointed tip 21 on the tube 20 has pierced the diaphragm 44 and has advanced through the tablet 45. The web 35 has been fractured and the disc 34 displaced so that the tablet 45 is discharged into the vehicle within the ampule. The holes 22 now afford communication between the interior of the ampule and the needle 24 through the tube 20 and the recess 27.

After the ampule is in place in the front member, the barrel 12 has its threads 52 secured to the threads 15. The plunger 51 is then rotated to cause the threaded portion 64 thereon to engage the threads 31 in the piston cork. The assembly is then complete and the syringe is prepared for making an injection.

The arrangement of the container member 33, with rubber inside and outside thereof, prevents breakage, and the resiliency of the rubber compensates for variations in diameter of the cylinder.

In using my syringe the operator is assured of having a fresh solution of the proper characteristics and is assured that the solution and the parts through which it is administered are sterile. The use of the plunger threaded to the stopper allows the stopper to be pulled slightly rearwardly after the preliminary injection is made so that the operator may test to determine whether the needle is in a blood vessel, in which case it is withdrawn and another injection is made.

Having thus described my invention, I claim:

1. An ampule for use in a hypodermic syringe, said ampule comprising a cylinder having a rubber sleeve therein, said sleeve having a flange engaging the end of the cylinder, a container member between said sleeve, said container member having a frangible disc at one end thereof and a table between said diaphragm and said disc, and a piston cork in said ampule remote from said sleeve.

2. An ampule for use in a syringe, said ampule comprising a cylinder having a rubber sleeve therein at one end, said sleeve having a flange engaging the end of the cylinder, a tubular container member within said sleeve, said container member having a frangible disc at one end thereof, a tablet between said diaphragm and said disc, said sleeve having a flange at the other end thereof, said peripheral flange engaging the outer end of said rubber sleeve, a hollow closure within said container member, said hollow closure having an integral diaphragm, said hollow closure having a peripheral flange at the outer end thereof, said hollow closure peripheral flange engaging the flange on said container member, and the flange on said sleeve, there being a space between said diaphragm and said disc, a tablet in said space, and a piston cork in said ampule remote from said sleeve.

ARTHUR E. SMITH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,776,584</td>
<td>Smith</td>
<td>July 15, 1930</td>
</tr>
<tr>
<td>2,388,394</td>
<td>Smith</td>
<td>Jan. 6, 1942</td>
</tr>
<tr>
<td>2,377,274</td>
<td>Smith</td>
<td>May 22, 1945</td>
</tr>
</tbody>
</table>