Feb. 14, 1950 A. E. SMITH 2,497,563

AMPOULE SYRINGE

Filed Aug. 4, 1947

Fig. 1.

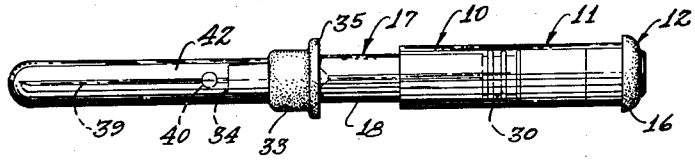


Fig. 2.

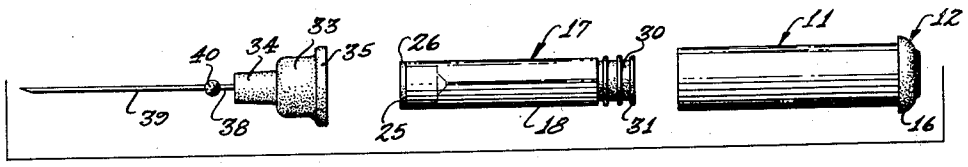


Fig. 3.

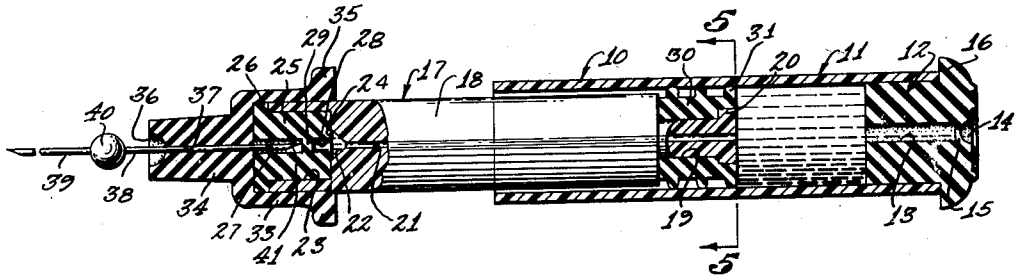


Fig. 4.

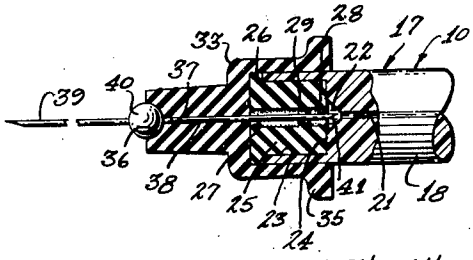


Fig. 5.

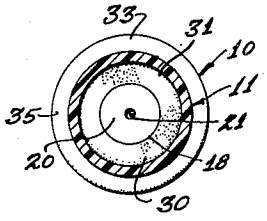
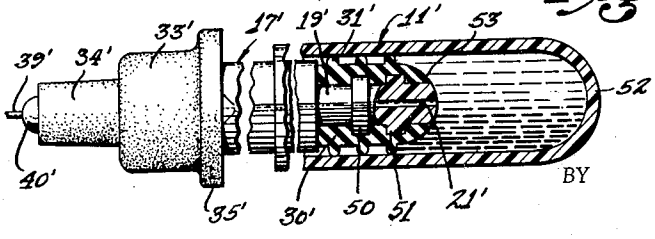


Fig. 6.



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AMPOULE SYRINGE

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5 Claims. (Cl. 128—220)

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This invention relates to an ampule syringe.

The general object of the invention is to provide an improved ampule syringe by means of which a medicinal preparation may be readily injected.

A more specific object of the invention is to provide a syringe including a novel plunger member.

Another object of the invention is to provide a syringe including an ampule and a plunger wherein the plunger is provided with a central bore and wherein the plunger has a stopper with a diaphragm on the stopper in communication with the bore.

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

Fig. 1 is a side elevation showing a syringe embodying the features of my invention;

Fig. 2 is an extended view showing the parts of the syringe;

Fig. 3 is an enlarged, central, sectional view, with parts in elevation, showing the manner in which the syringe is constructed;

Fig. 4 is a fragmentary section, partly in elevation, similar to Fig. 3, with the needle moved to diaphragm piercing position;

Fig. 5 is a section taken on line 5—5, Fig. 3, and

Fig. 6 is a sectional view with parts in elevation, showing a modification of my invention.

Referring to the drawing by reference characters, I have shown my invention as embodied in a syringe indicated generally at 10. The syringe as shown includes a cylindrical, medicinal containing ampule 11 which may be made of plastic or other similar material and which has a stopper 12, preferably made of rubber, and mounted in one end thereof. The stopper 12 has an inwardly directed recess 13 and an end recess 14 with a diaphragm 15 between the recesses. The stopper further includes a projecting flange 16 which engages the end of the ampule 11.

Within the ampule I arrange a plunger, indicated generally at 17. The plunger may be made of plastic as a machine product or may be cast or moulded into shape and in general is a cylindrical body 18 which has a reduced portion 19 and is provided with a flange 20 at the inner end of the portion 19. The plunger is provided with a central bore 21 which communicates with a flaring recess 22 and the recess 22 communicates with a counterbored portion 23 which has a cylindrical inner wall and a plane inner face 24.

Within the counterbored portion 23 I arrange

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a rubber stopper 25 which consists of a cylindrical body having a peripheral end flange 26 which engages the outer end of the plunger. The stopper 25 is provided with an outer end recess 27 and an inner end recess 28 with a diaphragm 29 between the recesses.

At its inner end the plunger 18 is provided with a piston stopper 30 which has an inner wall which conforms to the shape of the reduced portion 19 of the plunger and has a recess to receive the flange 20 on the plunger so that the piston stopper, which, like the stopper 25, is preferably made of rubber, may be held in place upon the plunger. The stopper 30 includes beads 31 which engage the interior of the ampule while the general body 18 of the plunger is spaced from, but coaxial with, the ampule.

At its outer end the plunger is provided with a front member 33 which includes a tapered tip 34 and a projecting flange 35. The flange 35 is adapted to be grasped by the fingers of the operator. The front member may be made of rubber and includes a semi-hemispherical recess 36 at its outer end and has a bore 37 therethrough which is aligned with the bore 21 of the plunger.

A hypodermic needle, which consists of an inner portion 38 and an outer portion 39, with a hemispherical protuberance between the portions, is arranged with the portion 38 in the bore 37. The inner end of the needle is pointed at 41 and arranged in the recess 27 of the stopper 25. The inner end of the needle is arranged close to, but does not pierce, the diaphragm 29.

The hemispherical protuberance 40 is spaced from the hemispherical recess 36 as shown in Fig. 3 when the syringe is in shipping condition.

The ampule may be filled by inserting the hypodermic needle through the diaphragm 15 and as the ampule fills the plunger is moved outwardly relative to the ampule body until the desired amount of material is in the ampule. Thereupon the filling needle is withdrawn from the diaphragm 15 and the latter, being made of rubber, automatically seals the hole therein made by the needle. In order to protect the needle and maintain it sterile, I provide a cap 42, which is cylindrical and which may be made of flexible plastic and which engages the tapered portion 37 on the front member.

To prepare the syringe for use the cap 42 is removed. The protuberance 40 is then moved into the hemispherical recess 36, causing the tip 41 of the needle to puncture the diaphragm 29 and thus establish communication between the

inner end of the needle and the contents of the ampule.

The injection is then made and the ampule 11 is moved slightly towards the front member 33, causing a slight injection of the contents of the ampule. Thereupon the ampule is withdrawn slightly relative to the plunger and if the needle has pierced a blood vessel the appearance of blood within the ampule will indicate such fact, whereupon the operator may withdraw the needle and make a fresh injection. When the needle is satisfactorily placed, the contents may be discharged by moving the ampule along the piston.

In Fig. 6 I show a modification of my invention. In this figure parts similar to those previously described are designated by primed reference numerals. In the modification the reduced portion 19' of the plunger is provided with a pair of spaced shoulders 50 and 51. The inner end of the plunger extends beyond the shoulder 51. The ampule 11' has an integral hemispherical closure 52 at one end. The inner end of the piston stopper 30' is rounded as at 53 to substantially agree with the rounded portion at the end 52 of the ampule. As a result, when the piston is fully moved into the ampule the rounded portions will be in substantial engagement so that the amount of liquid remaining in the ampule when the plunger is moved into its full "in" position will be small.

Having thus described my invention, I claim:

1. A syringe including a tubular ampule, a closure for one end of the ampule, a plunger movable in the ampule, said plunger having a bore therethrough and having a reduced inner portion, said reduced portion terminating in a shoulder, a piston stopper on said reduced portion and engaging said shoulder, said piston stopper having a plane inner end, the outer end of said plunger having a recess communicating with the plunger bore, a stopper in said recess, said stopper having inner and outer aligned recesses, a diaphragm between said stopper recesses, said inner stopper recess communicating with said plunger bore, a front member on said plunger, said front member having a bore therethrough, a hypodermic needle having a pointed inner end and slidably extending through said front member bore and into the outer recess of said stopper, the pointed end of said needle terminating short of piercing the stopper diaphragm, said needle having a protuberance thereon and having an injecting point in advance of the protuberance.

2. A syringe including a tubular ampule, an integral rounded closure for one end of the ampule, a plunger in the ampule, said plunger having a bore therethrough and having a reduced portion, said reduced portion terminating in a shoulder, a piston stopper on said reduced portion and engaging said shoulder, the inner end of said piston stopper being rounded to correspond to the shape of the adjacent end of the ampule, the outer end of said plunger having a recess communicating with the plunger bore, a stopper

in said recess, said stopper having inner and outer aligned recesses, a diaphragm between said stopper recesses, said inner stopper recess communicating with said plunger bore, a front member on said plunger, said front member having a bore therethrough, a hypodermic needle having a pointed inner end and slidably extending through said front member bore and into the outer recesses of said stopper, the pointed end of said needle terminating short of piercing the stopper diaphragm, said needle having a protuberance thereon and having an injecting point in advance of the protuberance.

3. A syringe including a tubular ampule, a closure for one end of the ampule, a plunger slidable in the other end of the ampule, said plunger having a bore therethrough, closure means including a pierceable diaphragm, said closure means being mounted on and movable with said plunger, said closure means closing the outer end of said plunger bore, and a hypodermic needle slidably mounted on said plunger, said hypodermic needle having a pointed inner end slidable to pierce the diaphragm.

4. A syringe including a tubular ampule, a closure for one end of the ampule, a plunger slidable in the other end of the ampule, said plunger having a bore therethrough, said plunger having a piston stopper thereon, the outer end of said plunger having an enlarged recess communicating with the plunger bore, an imperforate stopper in said recess, a front member on said plunger, and a hypodermic needle having a pointed inner end and slidably extending through said front member and adapted to pierce the stopper to establish communication between the needle and the ampule contents.

5. A syringe including a tubular ampule, a closure for one end of the ampule, a plunger movable in the ampule, a piston stopper on the inner end of said plunger, the outer end of said plunger having a recess communicating with the plunger bore, a stopper in said recess, said stopper having inner and outer aligned recesses, a diaphragm between said stopper recesses, said inner stopper recess communicating with said plunger bore, a front member on said plunger, said front member having a bore therethrough, a hypodermic needle having a pointed inner end and slidably extending through said front member bore and into the outer recess of said stopper, the pointed inner end of said needle terminating short of piercing the stopper diaphragm, said needle having a protuberance thereon and having an injecting point in advance of the protuberance.

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