Jan. 16, 1951 A. E. SMITH 2,538,390

SYRINGE

Filed Jan. 5, 1948

Fig. 1.

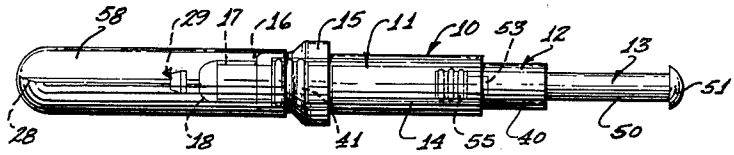


Fig. 2.

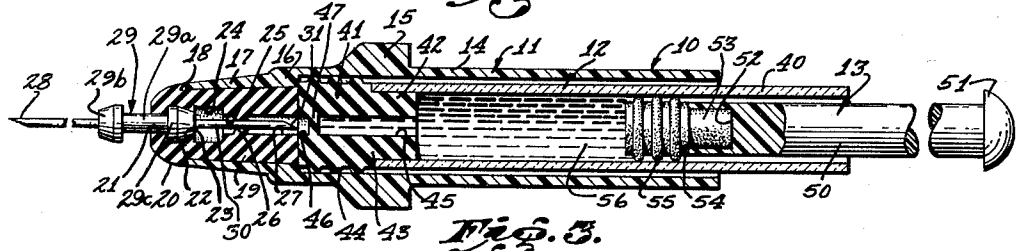


Fig. 3.

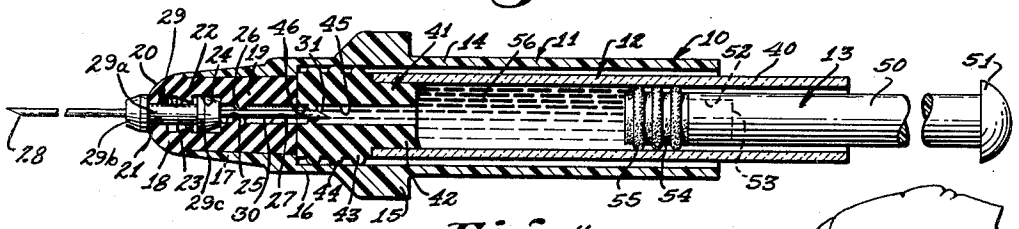


Fig. 4.

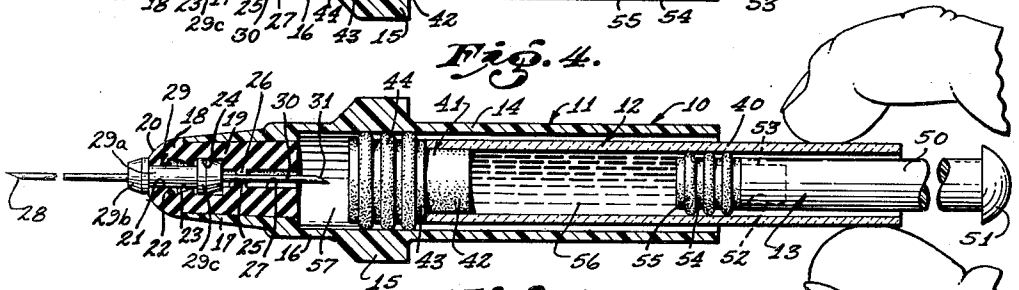
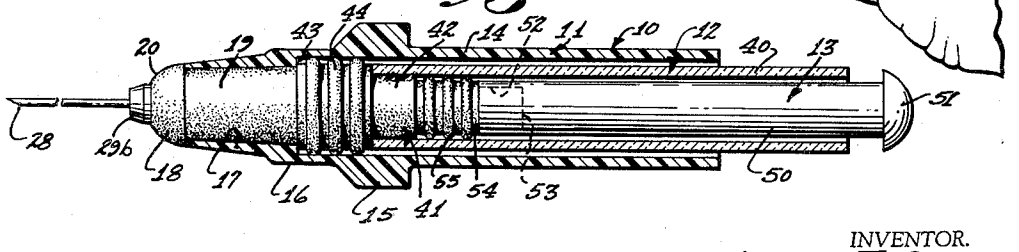


Fig. 5.



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Patented Jan. 16, 1951

2,538,390

UNITED STATES PATENT OFFICE

2,538,390

SYRINGE

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Application January 5, 1948, Serial No. 548

1 Claim. (Cl. 128—215)

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This invention relates to a syringe of the disposable type.

The general object of my invention is to provide an improved disposable syringe wherein the medicinal contents are hermetically sealed and wherein they are readily placed in condition for use and wherein novel means is provided for permitting the operator to determine whether the needle has been inserted in a blood vessel prior to the injection of the medicinal contents.

A more specific object of the invention is to provide a syringe including an outer barrel and a novel inner sliding barrel with a plunger therein.

A further object of the invention is to provide a syringe including a barrel and a sliding medicine containing ampule in the barrel which has means thereon permitting the operator to detect whether the needle carried by the syringe has been inserted into a blood vessel and wherein such testing is free from any likelihood that air will be drawn into the syringe and later injected into the patient.

A further object of the invention is to provide a syringe including a barrel and an inner sliding barrel which contains a medicinal preparation and a plunger and wherein means is carried on the first barrel for piercing a diaphragm carried by the sliding barrel.

A further object of the invention is to provide a novel barrel for a syringe.

Another further object of the invention is to provide a novel sliding ampule for a syringe barrel.

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 a side elevation showing my improved disposable syringe;

Fig. 2 is a central, sectional view showing the syringe in normal position;

Fig. 3 is a view similar to Fig. 2 showing the parts after the syringe has been placed in condition for use;

Fig. 4 is a view similar to Fig. 3 with the parts in the position which they occupy when the test is being made as to whether the needle is in a blood vessel, and

Fig. 5 is a central, sectional view with the parts in elevation showing the syringe after its contents have been discharged.

Referring to the drawing by reference characters, I have shown my invention as embodied in a syringe which is indicated generally at 10.

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As shown the syringe includes an outer barrel 11, an inner sliding barrel or ampule 12 and a plunger 13 which is movable in the ampule 12.

The barrel 11 includes a cylindrical body 14, having a finger engaging shoulder 15 thereon and having a forwardly extending reduced portion 16 and a further reduced portion 17 in advance of the portion 16.

Within the outer end of the portion 16 and in the portion 17 I arrange a front closure 18 which includes an outwardly tapered body portion 19 and a rounded tip 20. The inner wall of the outer end of the portion 16 and the inner wall of the portion 17 are tapered to correspond to the taper of the body portion 19 of the closure 18.

Within the front closure 18 I provide a front recess 21, a second recess 22, which has a beveled wall 23, and a third recess 24, which communicates with a reduced axial recess 25. The recess 25 is separated by a diaphragm 26 from an inner recess 27.

A hypodermic needle having a front end 28, a fixed collar 29 and an inner end 30 sharpened at its tip 31, extends through the diaphragm 26 and is disposed in the recess 27. The collar 29 includes a central sleeve 29^a and similar tapered ends 29^b and 29^c integral with the sleeve. The end 29^c normally is arranged in the recess 22.

When the collar 29 is moved towards the tip 20 the end 29^c rides up the beveled wall 23 and then passes into the chamber 24 and it is held in this position against outward movement. The chamber 24 is shown as slightly longer than otherwise necessary to accommodate the collar end 29^c, to allow the beveled edge 23 to return to its normal position.

The sliding barrel or ampule 12 consists of a tubular body 40 which is cylindrical throughout and at its forward end is provided with a piston closure 41. This closure 41 includes a cylindrical portion 42, fitted within the front end of the cylinder 40, and an enlarged portion 43 which has piston forming beads 44 thereon. The member 42 includes inner and outer coaxial recesses 45 and 46, separated by a diaphragm 47. The portion 43 is of greater diameter than the diameter of the tapered part of the portion 16.

The plunger 13 includes a cylindrical body 50 which has a finger engaging bead 51 thereon and is recessed as at 52 at its front end to receive the reduced portion 53 on a piston head 54, which has piston forming beads 55 thereon. The various parts of my syringe are preferably made of a good grade of rubber, plastic and/or glass.

A medicinal preparation 56, which may include

wax and oil or liquid, is contained in the sliding ampule 12.

In use the parts are normally positioned as shown in Fig. 2. The operator moves the collar 29 inwardly, causing the end 29c to move into the recess 34 and causing the tip 31 on the needle to pierce the diaphragm 47 to place the needle in communication with the drug 56 in the ampule 12. The operator then inserts the needle 28 in the patient and withdraws the inner barrel or ampule 12 to the position shown in Fig. 4 so that a partial vacuum is created at 57 ahead of the piston forming beads 44. The sliding barrel 12, being movable in the outer barrel 11, is adapted to be partially withdrawn after it has been advanced slightly within the outer barrel to free the inner end 31 of the needle from the piston closure diaphragm 47.

By observation it may be learned if any blood has been aspirated into the partial vacuum in the space 57, the blood being visible through the member 15 if the latter is made of transparent material. If blood is observed, a fresh insertion is made.

When the insertion has been properly made the member 40 is released and it will be automatically drawn in by the partial vacuum or may be pushed forward if desired until the parts again assume the position shown in Fig. 3. Thereupon the operator grasps the portion 15 with the fingers and pushes on the head 51 with the thumb to cause the plunger 13 to move inwardly so that the piston 53 will force the drug 56 into and through the needle 20 so that the injection may be thereby made.

The syringe includes a needle protecting cover 58 which engages the barrel portion 15.

In applicant's present application, Serial No. 548, filed January 5, 1948, the claim is directed to the outer barrel with a front closure therein and the claim includes the sliding barrel forming ampule within the outer barrel and with the piston closure in the sliding barrel at its front end. The claim also includes the piston plunger within the sliding barrel and having a piston head thereon.

In applicant's copending application Serial No. 1551, filed January 10, 1948, the claim is directed to the piston stopper which is hollow and has pierceable front and rear closures therein, the front closure acting as a plunger and both closures being pierceable by the needle of a filling apparatus.

Applicant's copending application Serial No. 2900, filed January 17, 1948, relates to a syringe wherein there is a barrel having a front member, a recess and with a needle extending through the front member and recess and having a protuberant portion engageable in the recess and with the needle adapted to be advanced to its seated position by means of a protective cap carried upon the needle.

From the foregoing description it will be apparent that I have invented a novel syringe which can be economically manufactured and which is highly efficient for its intended use.

Having thus described my invention, I claim:

A disposable syringe including an outer barrel having an integral finger engaging flange thereon and having a reduced front end, said barrel having a front closure therein, said front closure being disposed in the reduced portion of the barrel and having a recess, a needle slidable in the recess, a sliding barrel forming ampule within said first barrel, said sliding barrel having a piston closure at the front end thereof, said piston closure having inner and outer axial recesses with a diaphragm between said recesses, said needle having its inner end disposed normally adjacent to said piston closure diaphragm and being adapted to pierce said piston closure diaphragm when the needle is moved inwardly, a piston plunger within said sliding barrel, said piston plunger including a body having a piston head on the inner end thereof, said piston head having a piston ring forming beads thereon, said sliding barrel being movable in the outer barrel and being adapted to be partially withdrawn from the outer barrel to free the inner end of the needle from the piston closure diaphragm, the piston head on said plunger being movable in the sliding barrel to force the contents therefrom.

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