Feb. 2, 1954 A. E. SMITH 2,667,872

SYRINGE UNIT

Filed March 19, 1952

Fig. 1.

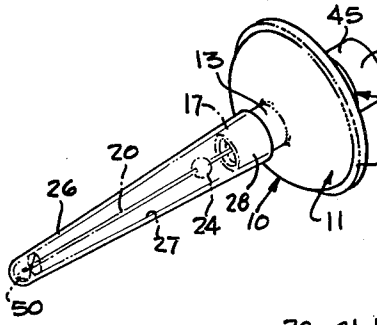


Fig. 2.

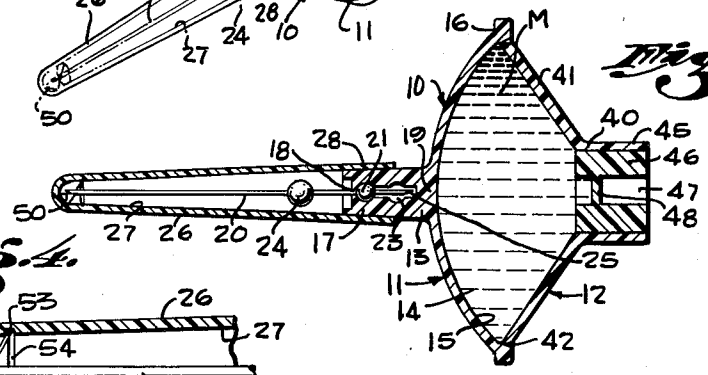


Fig. 4.

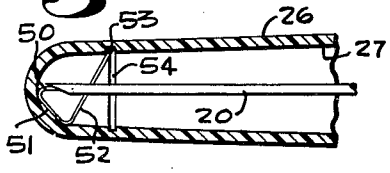


Fig. 3.

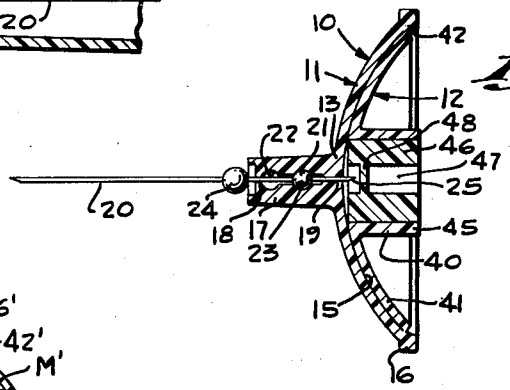
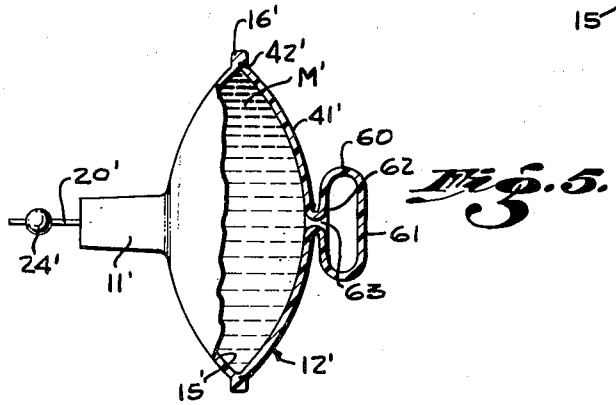


Fig. 5.



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SYRINGE UNIT

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6 Claims. (Cl. 128—216)

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This invention relates to a syringe unit.

The general object of the invention is to provide an improved, highly effective syringe unit.

A more specific object of the invention is to provide a syringe wherein a recessed front member is employed as a needle support and wherein the recess is closed by a rear member integrally united with the front member.

Another object of the invention is to provide a novel disposable syringe which includes a front member and a resilient rear member, with the two members integrally united in curing to form a chamber, the volume of which is reduced when the rear member is operated to thus produce an injecting effect.

Another object of the invention is to provide a novel blown syringe.

An additional object of the invention is to provide a novel rear closure member for a syringe.

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

Fig. 1 is an isometric view of the completed syringe;

Fig. 2 is a central, sectional view through a syringe, showing my invention;

Fig. 3 is a view similar to Fig. 2, showing the parts in the position they assume when the syringe has been discharged;

Fig. 4 is an enlarged fragmentary section detail; and

Fig. 5 is a view similar to Fig. 2, showing a modification.

Referring to the drawing by reference characters, I show a syringe embodying the features of my invention, which is indicated generally at 10. As shown the syringe includes a front member 11 and a rear member 12.

The front member includes a body 13 which has a recess 14 defined by an inner wall 15.

As shown, the body includes a peripheral flange 16 and a forwardly extending, tapered neck 17. The neck 17 has a hole 18 therein which opens outwardly and at its inner end is closed by a diaphragm 19. A needle 20 is arranged in the hole 18. The needle 20 includes a ball-like protuberance 21 which is normally seated in an enlarged recess 22 in the hole 18. The hole 18 includes a second recess 23 which receives the ball 21 when the needle 20 is moved inwardly. To provide means for moving the needle inwardly it is provided with a ball-like protuberance 24. In moving the needle inwardly so that the ball 21 will move from the recess 22 to the recess 23, the

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sharp point of the needle 25 will pierce the diaphragm 19, thus placing the needle into communication with the medicament M contained within the syringe.

A closure cap member 26 surrounds the needle. The closure cap is hollow as at 27 and at its rear end 28 engages the tapered neck 17. Thus the needle 20 will be maintained in a sterile condition.

The rear member 12 includes a cylindrical body portion 40 which has a cupped-shape wall 41 integrally united to the front member 11 adjacent to the flange 16.

In order to assure that all the contents of the ampule may be discharged and to cause the rear portion 12 to engage the inner wall 15 of the front member, I provide a V-shaped groove 42 in the rear member. This groove faces outwardly and is located at the juncture of the front and rear members so that when the rear member moves forwardly as shown in Fig. 3 this rear member will flex with the groove 42 as a hinge line to allow complete discharge of the ampule contents.

The body of the rear member 40 is shown as cylindrical as 45 to form a collar and within the collar I secure a plug 46 which may be cemented in place and which is provided with a center hole 47, closed by a diaphragm 48.

The front and rear members 11 and 12 may be made of a suitable material such as natural rubber, artificial rubber, polyethelyne or other plastics and the parts 11 and 12 may be blown integrally in the manner in which flexible bottles are blown. The plug 46 may be made of material similar to that of which the parts 11 and 12 are made so that the diaphragm 48 may be pierced by a filling needle. The hole made by the filling needle will be closed when the needle is withdrawn due to the resiliency of the material.

In use, after the syringe has been filled, the operator will remove the cap 26 and will place his fingers about the protuberance 24 and will move the protuberance and needle from the position of Fig. 2 to the position of Fig. 3 to place the syringe in condition for use.

The injection will then be made and slight forward pressure will be placed upon the end of the collar 45 so that some of the contents of the syringe will be discharged. The collar 45 will then be pulled rearwardly to produce an aspirating effect and if the needle has been inserted in a blood vessel, blood will appear in the recess within the syringe when the first member is made of material such as polyethelyne and will be visible through the transparent wall of the

syringe, thus enabling the operator to remove the needle and make a fresh injection.

If the needle has been properly located, the collar **45** will be pushed inwardly until the parts assume the position shown in Fig. 3, whereupon full discharge will have been made.

When using viscous or other materials in my syringe it is sometimes desirable to extend a wire through the needle bore so that the viscuous material will not dry in this needle bore and prevent injections of the ampule contents. To overcome such a possibility I may insert a wire **50** in the needle bore. This wire may extend entirely through the needle and may project beyond the front end of the needle, where it is shown as bent at an acute angle to form a portion **51** and then is bent to provide a portion **52** at an acute angle to the portion **51** so that the portion **52** extends substantially across the bore of the needle. The tip of the wire is sheared as at **53**.

When the wire is in the needle and the cap **26** is moved into position, the part **52** moves into the cap readily until opposite a groove **54** whereupon the wire will spring into the groove, thus connecting the wire to the cap so that when the cap is removed the wire is also removed from the needle bore.

In Fig. 5, I show a modification of the invention wherein like parts are indicated by single primed reference numerals. As shown, the wall **41'** of the rear member **12'** is provided with an integral protuberance **60** which is formed with a wall **61** of substantially the same thickness as the wall **41'**, as by blowing in a restricting die. The juncture **62**, between the protuberance **60** and the wall **41'** is reduced in diameter to provide a capillary opening **63** which communicates between the interior of the syringe and the interior of the protuberance **60**. A filling needle may be inserted through the wall **61** and the opening **63**, the construction being such that the medicament M' will be retained in the body of the syringe.

From the foregoing description it will be apparent that I have invented a novel, disposable syringe, which is simple in construction, may be readily made and filled, and which is highly efficient in use.

Having thus described my invention, I claim:

1. In a syringe, a one-piece blown body comprising a front member and a flexible rear member, said front member being shaped to form a recess, and said rear member being shaped to form a second recess substantially complemental to the front member recess, a neck integral with, and extending forwardly from, the front member, said neck having a hole therein opening outwardly, a diaphragm closing the inner end of said hole, said hole having a pair of enlarged, spaced recesses therein, a needle in said hole, a protuberance on said needle normally fitting the outer of said recesses, with the needle spaced from the diaphragm, a second protuberance on said needle beyond said neck, said second mentioned protuberance forming means by which the needle may be moved inwardly so that the inner end thereof pierces said diaphragm and the first mentioned protuberance thereon is engaged in said second recess.

2. In a syringe, a one-piece blown body comprising a front member and a flexible rear member, said front member being shaped to form a recess, and said rear member being shaped to form a second recess substantially complemental to the front member recess, a neck integral with, and extending forwardly from, the front member, said neck having a hole therein opening outwardly, a diaphragm closing the inner end of said hole, said hole having a pair of enlarged, spaced recesses therein, a needle in said hole, a protuberance on said needle normally fitting the outer of said recesses, with the needle spaced from the diaphragm, a second protuberance on said needle beyond said neck, said second mentioned protuberance forming means by which the needle may be moved inwardly so that the inner end thereof pierces said diaphragm and the first mentioned protuberance thereon is engaged in said second recess, the rear member having a circular, hinge forming groove disposed adjacent to the juncture of the front and rear members.

3. In a syringe, a one-piece blown body comprising a front member and a rear member, said front member being shaped to form a recess, and said rear member being shaped to form a second recess substantially complemental to the front member recess, a neck integral with, and extending forwardly from, the front member, said neck having a hole therein opening outwardly, a diaphragm closing the inner end of said hole, said hole having a pair of enlarged, spaced recesses therein, a needle in said hole, a protuberance on said needle normally fitting the outer of said recesses, with the needle spaced from the diaphragm, a second protuberance on said needle beyond said neck, said second mentioned protuberance forming means by which the needle may be moved inwardly so that the inner end thereof pierces said diaphragm and the first mentioned protuberance thereon is engaged in said second recess, the rear member having an open collar thereon, a plug secured in said collar, said plug having a filling hole therein, and a pierceable diaphragm closing said plug filling hole.

4. In a syringe a one-piece blown body comprising a front member and a rear member, said front member being shaped to form a recess and said rear member being shaped to form a second recess substantially complemental to the front member recess, a neck integral with, and extending forwardly from, the front member, said neck having a hole therein opening outwardly, a diaphragm closing the inner end of said hole, said hole having a pair of enlarged, spaced recesses therein, a needle in said hole, a protuberance on said needle normally fitting the outer of said recesses, with the needle spaced from the diaphragm, and a second protuberance on said needle beyond said neck, said second mentioned protuberance forming means by which the needle may be moved inwardly so that the inner end thereof pierces said diaphragm and the first mentioned protuberance thereon is engaged in said second recess.

5. A syringe including a front member and a rear member, said front member including a body having an elongated forward end, a needle in said front member and projecting forwardly therefrom, a cap surrounding said needle, said cap having an inwardly facing recess on the inner wall thereof, and a wire in said needle and having the forward end thereof bent back at an acute angle with the end of the bent back portion disposed in said recess.

6. In a syringe, a body comprising a front member and a flexible rear member, said front member being shaped to form a recess, and said rear member being shaped to form a second recess substantially complemental to the front member recess, a neck integral with, and extend-

ing forwardly from the front member, said neck having a hole therein opening outwardly, a diaphragm closing the inner end of said hole, a needle slidable in said hole, said needle having a pointed end spaced from the diaphragm, a protuberance on said needle slidably engaging the wall of said hole, a second protuberance on said needle and spaced beyond said neck, said second mentioned protuberance forming means by which the needle may be moved inwardly so that the inner end thereof pierces said diaphragm and the first mentioned protuberance is moved along the wall of said hole.

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