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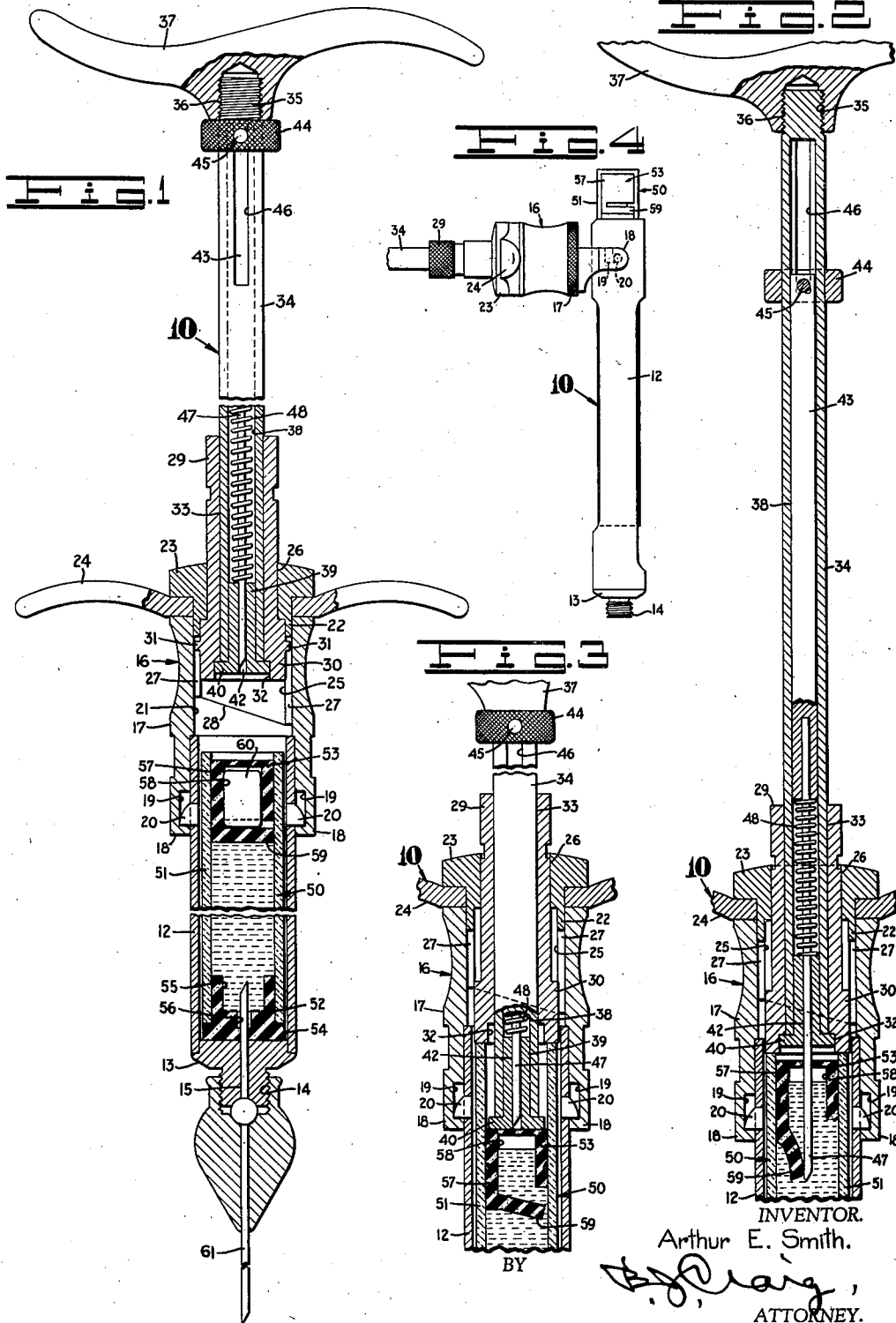
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AMPOULE SYRINGE

Filed May 20, 1940

2 Sheets-Sheet 1



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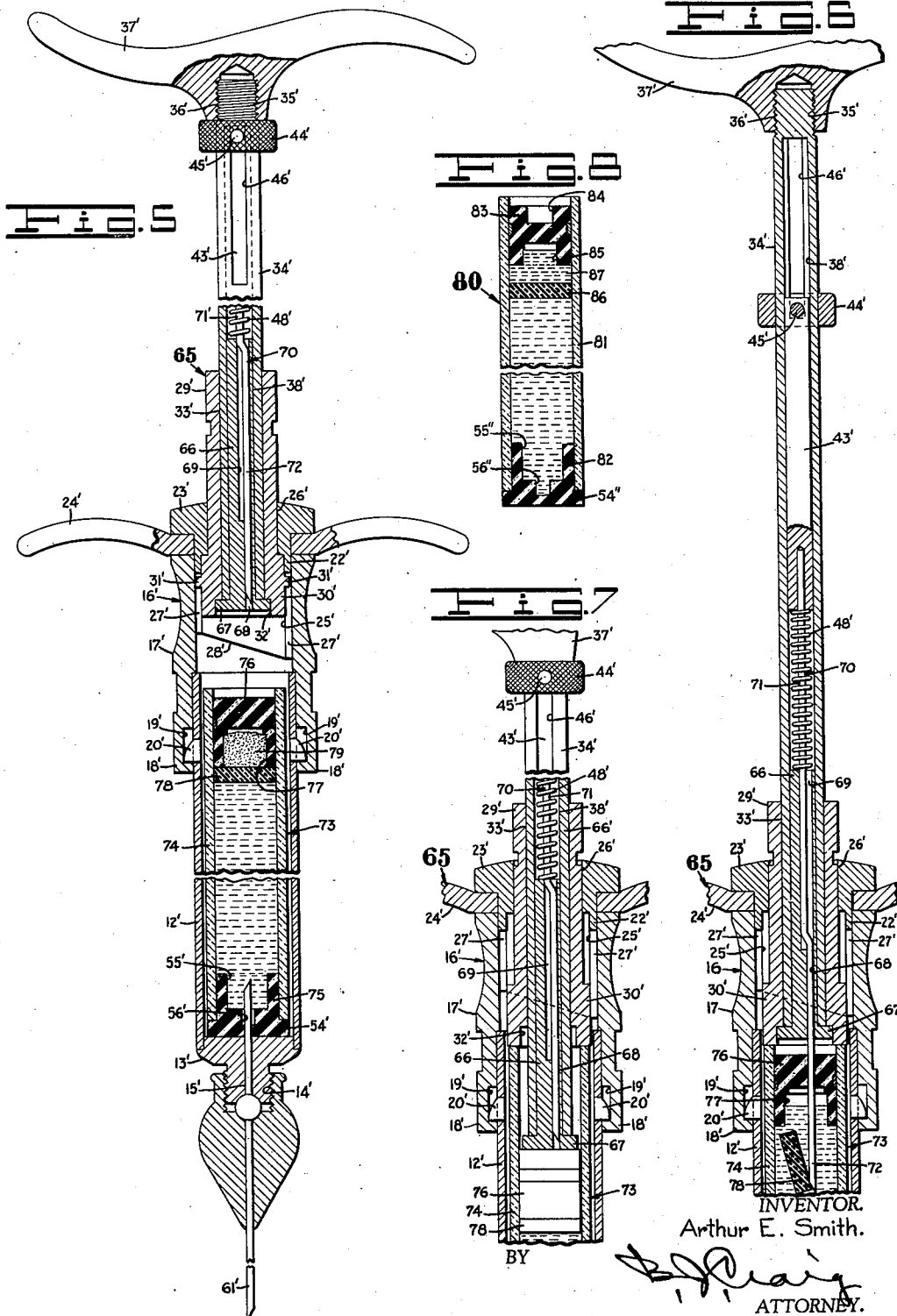
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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AMPOULE SYRINGE

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9 Claims. (Cl. 128—218.1)

This invention relates to improvements in hypodermic syringes.

The general object of the invention is to provide a novel syringe of the ampoule receiving type which is adapted for making fresh anaesthetic solutions prior to injection.

Another object of the invention is to provide a novel syringe of the ampoule receiving type wherein a fresh solution is prepared in the ampoule after the ampoule is placed in the syringe.

A further object of the invention is to provide a syringe of the above mentioned type wherein the ampoule is firmly seated in the syringe before the solution is mixed.

A still further object of the invention is to provide a syringe of the above mentioned type including a novel plunger mechanism which includes means operable to cause the mixture of a fresh solution in the ampoule.

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

Fig. 1 is a fragmentary central longitudinal sectional view partly in elevation of my improved syringe with an ampoule member therein;

Fig. 2 is a fragmentary view similar to Fig. 1 showing the upper ampoule stopper punctured;

Fig. 3 is a fragmentary view similar to Fig. 2 showing the syringe plunger forcing the upper ampoule stopper towards the discharge end;

Fig. 4 is a reduced fragmentary side elevation of the syringe shown in Fig. 1 showing the head member in an open position;

Fig. 5 is a fragmentary central longitudinal sectional view partly in elevation showing a modified form of syringe and ampoule;

Fig. 6 is a fragmentary view similar to Fig. 5 showing the upper ampoule stopper punctured;

Fig. 7 is a fragmentary view similar to Fig. 6 showing the upper ampoule stopper being forced towards the discharge end; and

Fig. 8 is a fragmentary central longitudinal sectional view of a modified form of ampoule.

Referring to the drawings by reference characters I have indicated my improved syringe generally at 10. As shown the syringe 10 includes a barrel portion 12 the lower portion of which includes a front or tip member 13. The tip 13 includes a reduced threaded portion 14 and has a reduced hole 15 therethrough.

The syringe 10 further includes a rear member 16 which includes a base portion 17 having de-

pending ears 18 thereon which are recessed as at 19 to receive pivot pins 20 on the barrel 12.

The head member 16 has a hole 21 there-through in which a sleeve member 22 is secured. The sleeve member 22 includes an enlarged flange portion 23 which is spaced a predetermined distance above the top of the head member 16 and positioned in the space between the flange 23 and the head member a finger grip member 24 is provided.

The sleeve member 22 has a recess 25 therein opening through the bottom thereof and a reduced aperture 26 communicating with the recess and opening through the top. The side walls of the sleeve 22 have a pair of opposed elongated slots 27 wherein opening into the recess 25 and through the bottom of the sleeve. The lower end of the sleeve 22 is inclined from the side of one of the slots 27 to the side of the other slot 27 to provide cam surfaces as indicated at 28.

Positioned in the sleeve aperture 26 a shank member 29 is provided which includes an enlarged head 30 positioned in the sleeve recess 25. The head 30 has opposed extending lugs 31 thereon which in one position of the head 30 are positioned in the sleeve slots 27 as shown in Fig. 1 and in another position of the head engage the cam surfaces 28.

The head 30 has an open bottomed recess 32 therein and the shank 29 has a coaxial bore 33 therein which opens through the top thereof and communicates with the head recess 32.

Positioned in the bore 33 I provide a plunger rod 34 the upper portion of which is externally threaded as at 35 to engage similar threads of a threaded recess 36 in a cross bar 37. The plunger rod 34 has a bore or recess 38 therein which opens through the bottom thereof and terminates adjacent the threaded portion 35 (see Fig. 2).

Positioned in the plunger rod bore 38 adjacent the lower end thereof I provide a plug member 39 which includes an enlarged flanged head portion 40 which extends over the lower end of the plunger rod 34 to provide an enlarged plunger head. The plug member further has reduced aperture 42 therein. Within the plunger rod bore 38 I provide a slide bar 43 of a predetermined length which is connected to an enlarged ring member 44 surrounding the plunger rod 34 by a pin 45 positioned in opposed elongated apertures 46 in the plunger rod adjacent the cross bar 37.

Secured to the slide bar 43 and projecting beyond the lower end thereof I provide a reduced rod 47 having a sharpened lower end which is

positioned in the aperture 42 of the plug member 39. Surrounding the rod 47 between the plug 39 and the slide bar 43 I provide a coiled expansion spring 48 which resiliently urges the slide bar 43 to a retracted position towards the cross bar 37.

When the slide bar 43 is in a fully retracted position as shown in Figs. 1 and 3 the sharpened lower end of the rod 47 is above the lower surface of the plunger rod head 40. Positioned in the syringe barrel 12 I have shown an ampoule which is indicated generally at 50. As shown the ampoule 50 includes an elongated cylindrical glass body portion 51 closed at the lower end by a rubber stopper 52 and at the upper end by a rubber stopper 53.

The lower stopper 52 includes an enlarged flange portion 54 extending over the lower end of the ampoule body. Opening through the top thereof the stopper 52 has a recess 55 therein and opening into the recess 55 the stopper includes a reduced recess 56 the bottom of which is spaced a predetermined distance from the lower face of the stopper.

The upper stopper 53 includes a body portion 57 having an open bottomed recess 58 therein and a trap door-like portion 59 spaced a slight distance below the body and integrally connected thereto at one point by an extended portion of the body.

A medicament shown as a tablet 60 but which may be in liquid form or powder form as shown in Fig. 1 is placed in the stopper recess 58. The space within the ampoule body 51 between the lower stopper 52 and the upper stopper 53 is filled with a suitable vehicle for the medicament such as distilled water.

To load the syringe 10 an operator rotates the shank 29 until the lugs 31 thereon enter the elongated apertures 27 in the sleeve 22 and then moves the shank and plunger rod upward to the position shown in Fig. 1. Thereafter the head member 16 is swung about the pivots 20 to one side as shown in Fig. 4. An ampoule 50 is then positioned in the syringe barrel 12 with the lower ampoule stopper 52 engaging the inner face of the tip 13.

After the ampoule is positioned in the syringe barrel the head 16 is again swung into alignment with the barrel 12 and then the shank 29 is moved downward until the lugs 31 move out of the slots 27 thereafter the shank is rotated whereupon the engagement of the lugs 31 with the cam surfaces 28 move the head 30 into firm engagement with the upper end of the ampoule body.

Thereafter the operator holds the plunger rod 34 in a retracted position and moves the collar 44 towards the syringe barrel. As the collar 44 is thus moved it moves the slide bar 43 and rod 47 against the action of the spring 48 towards the tip 13. As the rod 47 is thus moved it punctures the top wall of the stopper 53 and engages the tablet 60 which in turn forces the stopper flange 59 downward and enters the vehicle within the ampoule wherein it dissolves.

When a powder or liquid medicament is placed in the recess 58 of the stopper 53, the rod 47 continues downward through the medicament and engages the stopper flange 59 and swings it downward as shown in Fig. 2 thereby allowing the medicament and vehicle to mix.

The spring 48 is of sufficient strength that after the rod 47 has punctured the stopper 53 and discharged the medicament it will, when

the collar 44 is released, move the slide bar 43 to a normal fully retracted position as shown in Figs. 1 and 3.

After the medicament has been discharged into the vehicle the operator places a double ended needle 61 on the tip 13 with the hub portion of the needle engaging the threads 14 on the tip. As the double ended needle 61 is placed on the syringe the inner portion of the needle punctures the lower stopper 52 and passes through the stopper recess 56 into the enlarged recess 55 as shown in Fig. 1.

To inject the liquid in the ampoule the operator moves the plunger rod 34 towards the ampoule until the head 40 engages the stopper 53. Thereafter upon further movement of the plunger rod towards the tip the upper stopper 53 acts as a piston and forces the liquid in the ampoule out through the needle 61.

To unload the syringe the plunger rod 43 is withdrawn from the ampoule and through the shank 29 is rotated until the lugs 31 enter the apertures 27 and then both the shank and the plunger rod are moved to a fully retracted position as shown in Fig. 1. Thereafter the head 16 is swung about the pivots 20 and swung to one side as shown in Fig. 4 after which the ampoule may be removed.

In Figs. 5, 6 and 7 I have indicated a syringe generally at 65 which is similar in most respects to the syringe 10 and like portions thereof are indicated by similarly primed reference numerals. The difference between the syringes 10 and 65 is that the upper ampoule stopper puncturing rod is eccentric with respect to the axis of the syringe barrel and necessitates replacing the plug member 39 and the rod 47.

Positioned in the recess 38' of the plunger rod 34' adjacent the lower end I provide an elongated plug member 66 which has an enlarged head 67 thereon overlying the lower end of the plunger rod and of a size to fit in the recess 32' of the shank 29'. The plug member 66 has a reduced longitudinal aperture 68 therein which is offset at one side of the longitudinal axis thereof which at one end opens through the head 67 and at the opposite end opens into an enlarged recess 69.

Secured to the slide bar 43' and projecting beyond the lower end thereof I provide a reduced rod 70 which includes an upper portion coaxial with the axis of the bar 43' and an offset lower portion 72 which is positioned in the offset aperture 68 in the plug member 66.

Positioned in the syringe barrel 12' I have indicated an ampoule generally at 73. The ampoule 73 includes an elongated hollow cylindrical glass body portion 74 closed at the lower end by a rubber stopper 75 and at the upper end by a rubber stopper 76. The lower stopper 75 is similar to the stopper 52 and like portions thereof are indicated by similarly primed reference numerals.

The upper stopper 76 has a recess 77 opening through the bottom thereof.

Positioned in the ampoule below the stopper 76 I provide a rubber disk member 78 which may be spaced a predetermined distance below the bottom of the stopper 76 or it may engage the inner end of the stopper 76 as shown in Fig. 5.

A medicament in any form which in this instance is shown as a powder 79 is positioned in the stopper recess 77. The syringe 65 is loaded and the ampoule clamped in place in the same manner as previously described in connection

with the syringe 10. The space in the ampoule between the upper and lower stoppers is filled with a suitable vehicle such as distilled water.

After the ampoule 73 has been positioned in the syringe the collar 44' is moved towards the barrel 12 whereupon the lower portion 72 of the rod 70 punctures the stopper 76 and passes through the powdered medicament 79 and engages the disk 78 at one side of the axis thereof and swings it to a tilted position as shown in Fig. 6 thereby allowing the liquid vehicle to contact and dissolve the medicament.

The ejection of the liquid from the ampoule 73 and the unloading of the syringe 65 are the same as previously described in connection with the syringe 10.

In Fig. 8 I have indicated an ampoule generally at 80 which may be used in the syringe 65. As shown the ampoule 80 includes an elongated hollow cylindrical glass body 81 closed at the lower end by a rubber stopper 82 and at the upper end by a rubber stopper 83.

The lower stopper 82 is similar in all respects to the previously described stopper 52 and like portions thereof are indicated by similarly double primed reference numerals.

The upper stopper 83 has a recess 84 therein opening through the top thereof and a recess 85 therein spaced from the recess 84 and opening through the bottom thereof. Positioned in the ampoule body 81 a predetermined distance below the stopper 83 I provide a rubber disk 86.

The space between the stopper 83 and the disk 86 is filled with a liquid medicament 87 which extends into the stopper recess 85. The space between the lower stopper 82 and the disk 86 is filled with a suitable vehicle such as distilled water.

To mix the medicament and the vehicle and eject the liquid from the ampoule 80 it is placed in the syringe 65 and the sequence of operations is the same as previously described in connection with the ampoule 73.

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

Having thus described my invention I claim:

1. In a syringe, a barrel having a front member and a rear member thereon, means on said rear member adapted to engage an ampoule in the barrel, a plunger slidable through the rear member, said plunger being hollow, a slide bar slidably mounted in the outer end of said plunger, means for moving the slide bar, means normally urging said slide bar outwardly and a rod mounted on said slide bar, said rod having a pointed end normally disposed in the plunger.

2. In a syringe, a barrel having a front member and a rear member thereon, a shank mounted in said rear member and adapted to engage an ampoule in the barrel, said shank having a bore therethrough, a plunger slidable in said bore, said plunger being hollow, a slide bar slidably mounted in the plunger, means slidable along the plunger for moving the slide bar, means normally urging said slide bar outwardly and a rod mounted on said slide bar, said rod having a pointed end ampoule piercing end normally disposed within the plunger.

3. In a syringe, a barrel having a front and a rear member thereon, a shank member mounted in said rear member and adapted to engage an ampoule in the barrel, said shank member having a bore therethrough, a plunger slidable in

said bore, said plunger being hollow and having a plug member secured in the inner end thereof, a slide bar slidably mounted in the outer end of said plunger, means slidable along said plunger for moving said slide bar, means normally urging said slide outwardly, and a rod mounted on said slide bar, said plug member having a recess receiving said rod, said rod having a pointed inner end and normally disposed in the plug member and movable when the slide bar moving means is moved.

4. In a syringe, a barrel having a front and a rear member thereon, a shank member mounted in said rear member and adapted to engage an ampoule in the barrel, said shank member having a bore therethrough, a plunger slidable in said bore, said plunger being hollow and having a plug member secured in the inner end thereof, a slide bar slidably mounted in the outer end of said plunger, a collar slidable on said plunger, means connecting said plunger and said slide bar, a spring engaging the inner end of said slide bar and the outer end of said plug member, a rod mounted on said slide bar, said plug member having a recess receiving said rod, said rod having a pointed inner end and normally disposed in the plug member and movable when the collar is moved.

5. In a syringe, a barrel having a front and a rear member thereon, a shank member mounted in said rear member and adapted to engage an ampoule in the barrel, said shank member having a bore therethrough, a plunger slidable in said bore, said plunger being hollow and having a plug member secured in the inner end thereof, a slide bar slidably mounted in the outer end of said plunger, said plunger having opposed slots in the outer end thereof, a collar on said plunger, a pin passing through said slots and through said slide bar and through said collar, a spring engaging the inner end of said slide bar and the outer end of said plug member, a rod mounted on said slide bar, said plug member having a recess receiving said rod, said rod having a pointed inner end and normally disposed in the plug member and movable when the collar is moved.

6. In an ampoule syringe, a barrel having a front member thereon, a rear member pivotally mounted thereon and movable from a position closing the end of the barrel to a position at one side of the barrel to permit an ampoule to be inserted in the barrel, a sleeve member mounted in said rear member, a flange on said sleeve member, a finger grip member engaging said flange, a shank slidable in said sleeve member, a head on said shank, lugs on said head, said sleeve member having elongated slots in which said lugs are slidable, the inner end of said slots being open, the inner end of said sleeve member having cam surfaces engageable by said lugs, and an ampoule in said barrel and engageable by the end of said shank head when the lugs engage said cam surfaces.

7. In an ampoule syringe, a barrel having a front member thereon, a rear member mounted on the barrel, a sleeve member in said rear member, a shank slidable in said sleeve member, a head on said shank, an ampoule in said barrel and engageable by the end of said shank head, means to hold said shank head against the ampoule, said shank and said shank head having a bore therethrough, a plunger slidable in said bore, said plunger being hollow and having a plug member secured in the inner end thereof, a slide bar slidably mounted in the outer end

of said plunger, said plunger having opposed slots in the outer end thereof, a collar on said plunger, a pin passing through said slots and through said slide bar and through said collar, a spring engaging the inner end of said slide bar and the outer end of said plug member, a rod mounted on said slide bar, said plug member having a recess receiving said rod, said rod having a pointed inner end normally disposed in the plug member, said rod being movable when said collar is moved, a medicinal compartment forming device in said ampoule, said device including a movable partition member, a medicinal preparation in said device, a stopper in the ampoule remote from the device, a vehicle for the preparation between the stopper and the device, the pointed end of said rod being operable by said collar to move the partition member and permit the medicinal preparation to mingle with the vehicle.

8. In a syringe, a barrel having a front member thereon, a rear member mounted on the barrel, a sleeve member mounted in said rear member, a shank slidable in said sleeve member, a head on the shank and adapted to engage an ampoule in said barrel, said shank and said shank head having a bore therethrough, a plunger slidable in said bore, said plunger being hollow and having a plug member secured in the inner end thereof, a slide bar slidably mounted in the outer end of said plunger, said plunger having opposed slots in the outer end thereof, a collar on said plunger, a pin passing through said slots and through said slide bar and through said collar, a spring engaging the inner end of said slide bar and the outer end of said plug member, a rod mounted on said slide bar, said plug member having a recess receiving said rod, said rod having its entire axis aligned with the axis of the barrel and having a pointed inner end normally disposed in the plug member, and movable when said collar is moved, and adapted to pierce an ampoule closure.

9. In an ampoule syringe, a barrel having a

front member thereon, a rear member pivotally mounted on the barrel and movable from a position across the barrel to a position at one side of the barrel to permit insertion of an ampoule into the barrel, a sleeve member mounted in said rear member, a flange on said sleeve member, a finger grip member engaging said flange, a shank slidable in said sleeve member, a head on said shank, lugs on said head, said sleeve member having elongated slots in which said lugs are slidable, the inner end of said slots being open, the inner end of said sleeve member having cam surfaces engageable by said lugs, an ampoule in said barrel and engagable by the end of said shank head when the lugs engage said cam surfaces, said shank and said shank head having a bore therethrough, a plunger slidable in said bore, said plunger being hollow and having a plug member secured in the inner end thereof, a slide bar slidably mounted in the outer end of said plunger, said plunger having opposed slots in the outer end thereof, a collar on said plunger, a pin passing through said slots and through said slide bar and through said collar, a spring engaging the inner end of said slide bar and the outer end of said plug member, a rod mounted on said slide bar, said plug member having a hole through which said rod extends, said rod including an outer portion coaxial with the plunger axis and a pointed inner end portion at one side of the axis of the barrel and normally disposed in the plug member, a stopper in said ampoule adjacent said shank, said stopper having a hole therein, a medicinal preparation in said hole, said stopper including a closure for the inner and outer ends of the hole, the inner closure being movable, a stopper in the ampoule remote from the shank, a vehicle for the preparation between the stoppers, the pointed end of said rod being operable by said collar to pierce the outer closure and to displace the inner closure to permit the medicinal preparation to mingle with the vehicle.

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