

July 15, 1930.

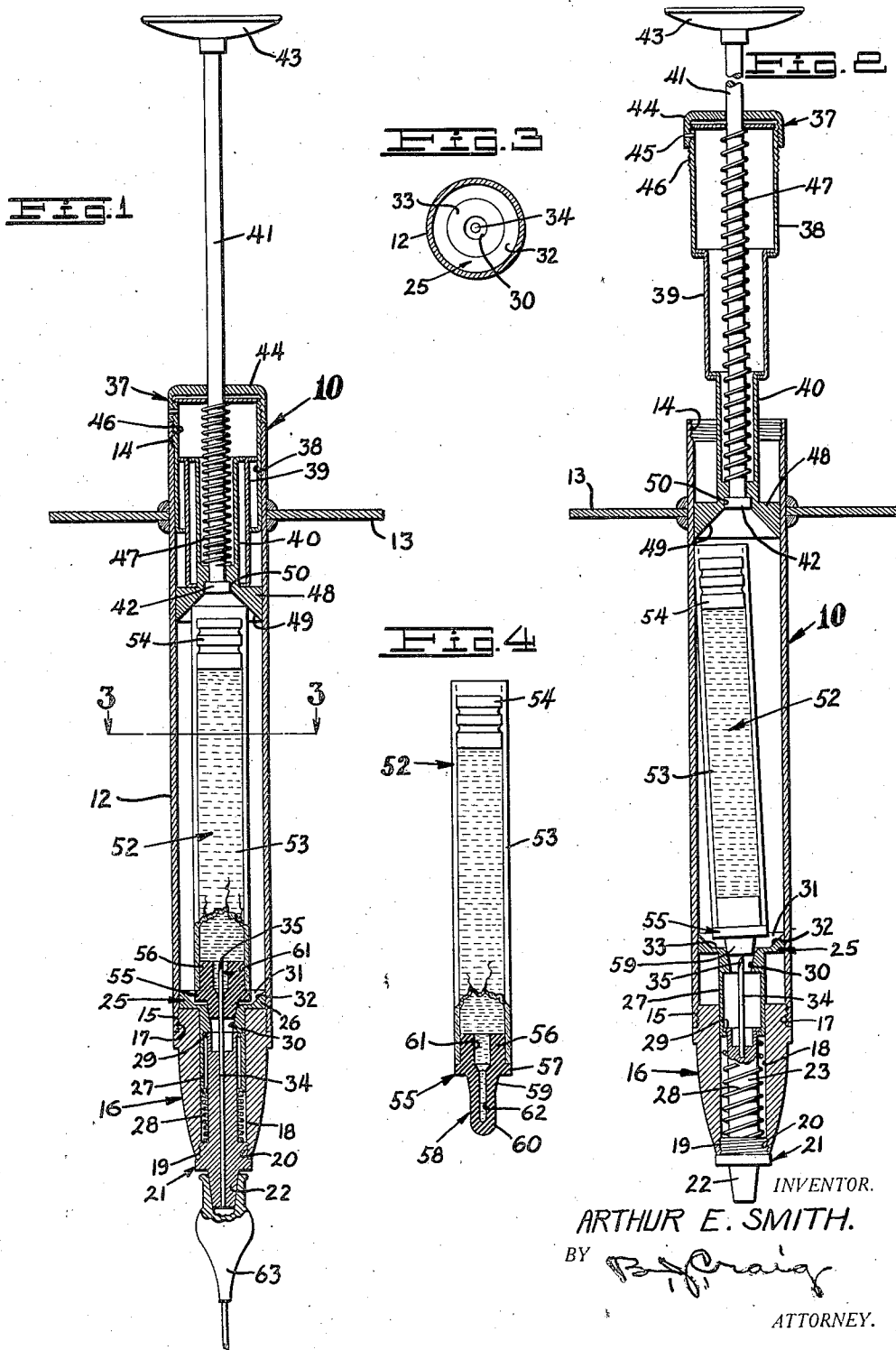
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HYPODERMIC SYRINGE

Filed Sept. 26, 1928

2 Sheets-Sheet 1



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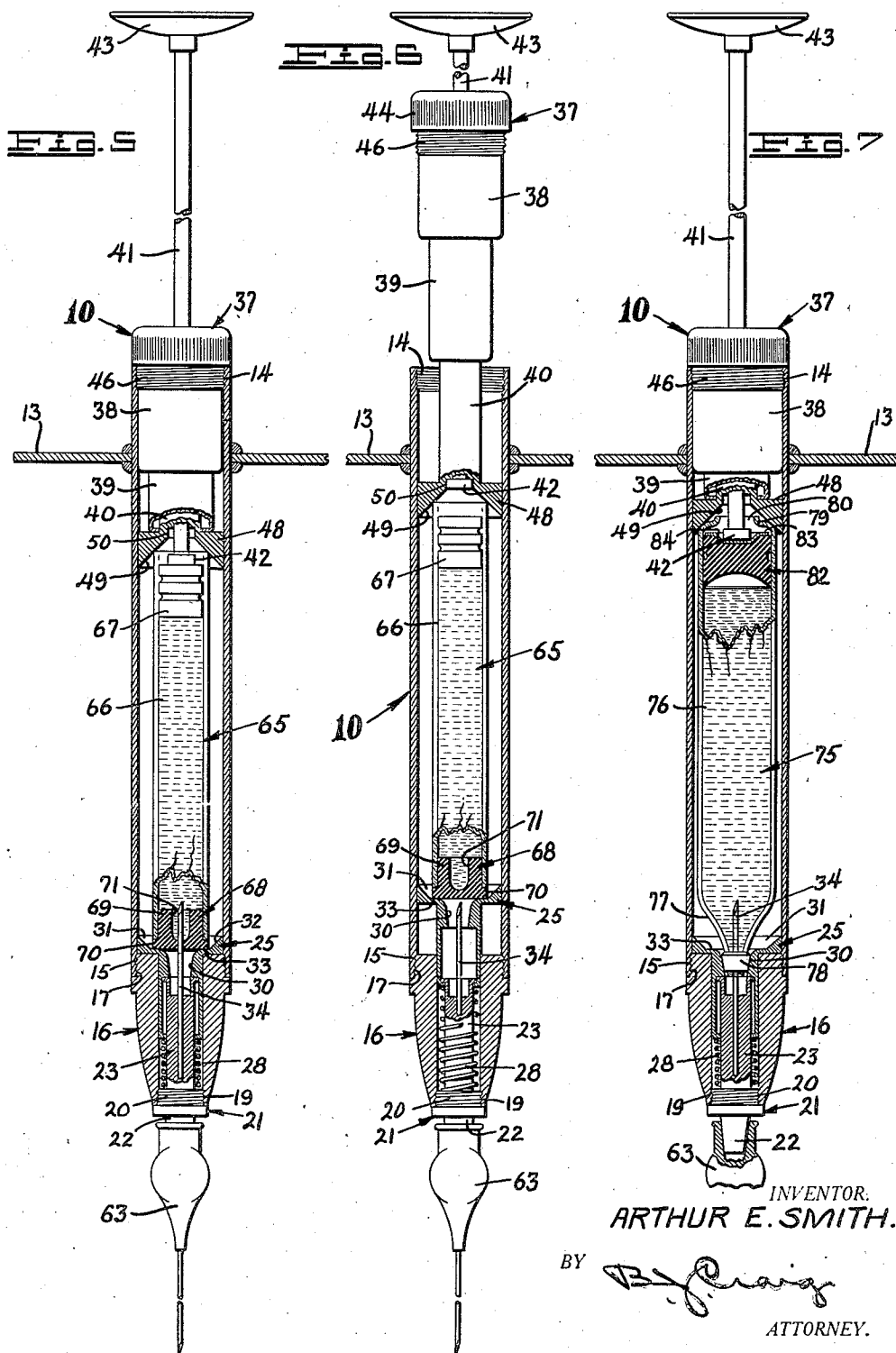
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UNITED STATES PATENT OFFICE

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HYPODERMIC SYRINGE

Application filed September 26, 1928. Serial No. 308,551.

This invention relates to improvements in hypodermic syringes.

The general object of my invention is to provide a hypodermic syringe which is adapted to receive an ampule for ejection of the drug contained in the ampule and which includes a novel means for correctly centering the ampule in the syringe.

Another object of the invention is to provide a syringe of the class described including novel means adapted to engage each end of an ampule to correctly center the ampule in the syringe.

A further object of the invention is to provide a syringe of the class described wherein the resilient member at the discharge end of the syringe is adapted to receive ampules having differently shaped discharge ends.

Another object of the invention is to provide a syringe of the class described which is adapted to receive ampules of varying lengths and diameters.

A further object of the invention is to provide an improved ampule for use in syringes.

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 central vertical section through my improved syringe showing it in an operative position to expel the contents of an ampule.

Fig. 2 is a view similar to Fig. 1 showing the syringe in an extended position before the ampule is correctly centered therein.

Fig. 3 is a section taken on line 3—3 of Fig. 1 with the ampule removed.

Fig. 4 is an elevation partly in section of my improved ampule.

Fig. 5 is a view similar to Fig. 1 showing another form of ampule operatively positioned in the syringe.

Fig. 6 is a view similar to Fig. 5 showing the syringe in an extended position.

Fig. 7 is a view similar to Fig. 1 showing still another form of ampule operatively positioned in my improved syringe.

Referring to the drawings by reference characters I have indicated my improved

syringe generally at 10. This syringe comprises a body portion or barrel 12 having a cross bar 13 adjacent one end which is adapted for engagement by the fingers of an operator.

The barrel 12 is internally threaded at the end adjacent the cross bar 13 as indicated at 14 and at the opposite end as indicated at 15. At the end of the barrel opposite the cross bar 13 I provide a tip 16 which includes a threaded portion 17 adapted to engage the threaded portion 15 of the barrel.

The tip 16 includes a central aperture 18 provided with screw threads 19 adjacent its lower end which are adapted to be engaged by screw threads 20 on an end member 21. The end member 21 includes a hub 22 and a shank 23 which extends into the aperture 18 and is of less diameter than the aperture.

The tip 16 includes a lower centering member indicated generally at 25 which comprises a rigid head 26 and a shank 27. The shank 27 is adapted to be positioned in the aperture 18 surrounding the shank 23. The ends of the shank 27 are turned inwardly and a coiled spring 28 surrounding the shank 23 is adapted to normally urge the lower centering member 25 to an extended position. An outwardly extending flange 29 on the end of the shank 23 prevents the member 25 from becoming disengaged from the tip 16. The head 26 includes a conical aperture 30 and a recess 31 having an inclined inner side wall as indicated at 32 with the bottom of the recess 31 forming a shoulder 33.

A hollow needle 34 sharpened at its upper end as at 35 is secured in the end member 21 and extends into the barrel 12 a distance so that when the member 25 is in a fully extended position, as shown in Fig. 2 the sharpened end 35 of the needle is just below the shoulder 33.

The end of the syringe barrel 12 opposite the tip 16 is adapted to be closed by a cap 37. The cap 37 includes a plurality of telescopic members 38, 39 and 40 which may be multiplied in number to any desired extent. The cap 37 also includes a plunger rod 41 which extends therethrough from end to end and

includes an enlarged head 42 and an enlarged thumb piece 43.

The uppermost telescopic member 38 fits within a top piece 44 and may be secured thereto as by a pin 45 and is provided with screw threads as at 46 for engagement with the screw threads 14 on the syringe barrel 12.

For normally urging the telescopic members to an extended position I provide a coiled spring 47 which is located within these telescopic members and surrounds the plunger rod 41. The lower telescopic member 40 is provided with a head 48 which includes a conical recess 49 and a recess 50 in which the head 42 of the plunger rod 41 is adapted to be positioned.

In Fig. 4 I have indicated generally at 52 an improved ampule for use in my improved syringe. This ampule includes a body portion 53 closed at one end by a movable stopper 54 and at the opposite end by a stopper 55. The stopper 55 is preferably made of a good grade of rubber and includes a body portion 56 which is adapted to fit within the ampule body 53 and tightly engage the inner side walls thereof. An enlarged flange 57 of the stopper is adapted to engage the end of the ampule and a neck 58 which includes a tapered portion 59 and a tip 60 extends outward from the face of the flange. The body portion 56 is provided with a central recess 61 which communicates with a recess 62 in the neck 58 and terminates a distance from the end of the tip 60.

To prepare the ampule 52 for use in my improved syringe the tip 60 is cut off at its juncture with the tapered portion 59, thereby exposing the recess 62. The ampule is then placed in the syringe barrel 12 as shown in Fig. 2. As the cap 37 is positioned on the barrel the top of the ampule engages the tapered walls of the head 48 which automatically centers the ampule in the barrel. As the cap 37 is moved into engagement with the syringe barrel the lower centering member 35 telescopes and the needle 34 enters the recess 62 and the recess 61 of the stopper as shown in Fig. 1. When the cap 37 is in place and secured to the barrel 12 the pressure exerted on the ampule forces the tapered portion 59 of the stopper into tight engagement with the side walls of the tapered aperture 30 of the member 25 thereby causing the stopper material to tightly grip the needle 34, thereby forming a fluid tight joint between the stopper and the needle.

To eject the contents of the ampule the plunger rod 41 is moved towards the discharge end of the syringe until the head 42 engages the stopper 54 of the ampule. Upon further movement of the plunger rod the stopper 54 is moved in the ampule body and acts as a piston to force the contents of the ampule through the needle 34 and into a hypodermic

needle 63 which is adapted to be positioned on the hub 22.

The more pressure required to expel the contents of the ampule the tighter the material of the stopper 55 grips the needle 34.

In Figs. 5 and 6 I have shown another form of ampule 65 used in my improved syringe. This ampule includes a cylindrical body portion 66 closed at one end by a slidable stopper 67 and at the opposite end by a stopper 68. The stopper 68 includes a body portion 69 and an enlarged flange 70 which engages the end of the ampule. The body portion of the stopper is provided with a recess 71 which terminates short of the face of the flange 70.

When the ampule 65 is used it is placed in the syringe barrel 12 and as the cap 37 is placed on the barrel the tapered walls 32 of the member 25 correctly centers the front end of the ampule so that the face of the flange 70 rests on the shoulder 33 of the member 25 and the tapered walls of the recess 49 in the telescopic head 48 correctly centers the rear end of the ampule as clearly shown in Fig. 6. As the cap 37 is moved into engagement with the syringe barrel the member 25 telescopes into the aperture 18 and the needle 34 punctures the material of the stopper 68 between the outer face of the flange 70 and the end of the recess 71 and is positioned in the recess as shown in Fig. 5. To expel the contents of the ampule 65 the plunger rod 41 is moved towards the discharge end of the ampule until it engages the stopper 67 whereupon on further movement the stopper 67 is moved in the ampule body and acts as a piston to force the contents of the ampule out through the needle 34.

In Fig. 7 I have shown a novel form of ampule 75 which is also adapted for use in my improved syringe. The ampule 75 is similar to types shown by me in other copending applications and includes a cylindrical body portion 76 having a tapered neck 77 at one end and having a resilient collar 78 thereon and which is adapted to be originally closed by a breakably tip (not shown). The opposite end of the ampule is constricted as indicated at 79 and is adapted to be originally closed by a breakable tip (not shown) which when removed provides an aperture 80 in the end of the ampule. Adjacent the constricted portion 79 a stopper 82 is provided in the body portion 76.

The stopper 82 is preferably made of rubber and is provided on its upper face with a metallic disk 83 having a depressed center portion 84. When this ampule is used in my improved syringe the resilient collar 78 is positioned in the tapered aperture 30 in the member 25 and as the cap 37 is brought into position on the syringe barrel the side walls of the tapered recess 49 of the telescopic head 48 correctly center the ampule in the syringe

and the ampule forces the member 25 to telescope in the aperture 18, whereupon the needle 34 enters the syringe body as shown in Fig. 7.

To expel the contents of the ampule 75 the plunger rod 41 is moved towards the discharge end of the syringe until the plunger rod head 42 is positioned in the depressed portion 84 of the metallic disk 83 on the stopper 82. Upon further movement of the plunger rod towards the discharge end of the syringe the stopper 82 moves within the ampule body 76 and acts as a piston to force the contents of the ampule out through the needle 34. The pressure exerted on the ampule by the telescopic cap 37, the telescopic member 25 and the action of the stopper when the contents of the ampule is being expelled, forces the resilient collar 78 into tight engagement with the side walls of the tapered aperture 30 in the member 25, thereby forming a fluid tight joint between the end of the ampule and the syringe.

From the foregoing description it will be apparent that I have invented an improved syringe which is adapted for use with different types and sizes of ampules and one which can be economically manufactured and is highly efficient in use.

Having thus described my invention, I claim:

1. In a syringe including an ampule receiving barrel, an ampule in said barrel, and resilient sliding means on each end of said barrel engaging said ampule for automatically and correctly centering said ampule in said barrel.

2. In a syringe including an ampule receiving barrel, a sliding centering member at each end of said barrel, said members being adapted to engage an ampule and correctly center the ampule in said barrel.

3. A syringe of the character described comprising a barrel, a tip, said tip being secured to the barrel, said tip including a centering member, including a head, said head being slidable in said tip and means adapted to normally urge said centering member to operative position, said member head having a tapered portion effective to correctly position an ampule.

4. In a syringe including a barrel, an ampule, a removable cap for said barrel, said cap including resilient means adapted to engage one end of said ampule to automatically correctly center the adjacent end of said ampule in said barrel, a tip on said barrel opposite said cap, said tip including sliding means adapted to engage the discharge end of said ampule and correctly center said discharge end of said ampule.

5. A syringe of the character described comprising a barrel, a plunger rod, a cap on said barrel, a tip on said barrel at the end opposite said cap, said tip including a centering member including a head and a shank,

said shank being adapted to slide in said tip and means to normally urge said centering member to an extended position, said centering member head including a tapered recess and an inwardly extending hollow needle carried by said tip.

6. A syringe of the character described comprising a barrel, a tip, said tip being secured to said barrel, said tip including a centering member having a head and a shank, said shank being slidable in said tip, said centering member head including a tapered recess and a hollow needle carried by said tip and extending into said barrel.

7. A syringe of the character described comprising a barrel, a tip, said tip being secured to the end of said barrel, said tip including a slidable centering member including a head and a shank, means adapted to urge said centering member to an extended position, said centering member head including a recess having a tapered side wall, a conically shaped aperture in said centering member below said recess and a hollow needle carried by said tip and extending into said barrel.

8. A syringe of the character described comprising a barrel, a plunger rod movable in said barrel, a removable cap on said barrel, an ampule, said cap including means adapted to correctly center said ampule in said barrel, a tip on said barrel, said tip including a resilient centering member, a hub on said tip adapted to receive a hypodermic needle, said ampule including a fixed stopper adjacent the discharge end thereof, said stopper being made of a resilient material and including a body portion adapted to be positioned within said ampule and an enlarged flange adapted to engage the end of said ampule, a recess in said stopper, the end of said recess being spaced from the outer face of said flange, the outer face of said flange being adapted to engage said resilient centering member and said hollow needle being adapted when said centering member is depressed to puncture said stopper and enter said ampule.

9. A syringe of the character described comprising a barrel, a plunger rod, a spring surrounding said plunger rod, a removable cap on said barrel, said cap including a plurality of telescopic elements surrounding said plunger rod, said spring being adapted to normally urge said telescopic elements to an extended position, a head carried by the lowermost of said telescopic elements, a conical recess in said head, a tip, said tip being secured to the end of said barrel opposite said cap, said tip including a lower centering member including a head and a shank, said shank being adapted to telescope in said tip and resilient means adapted to normally urge said lower centering member to an extended position, said lower centering member head

including a recess having a tapered side wall, a conically shaped aperture in said centering member below said recess and a hollow needle carried by said tip and extending into said barrel.

5 10. A syringe of the character described comprising a barrel, an ampule in said barrel, a tip secured to the end of said barrel, said tip including a lower centering member in-
10 cluding a head and a shank, said shank being adapted to slide in said tip and resilient means adapted to normally urge said centering mem-
15 ber to an extended position, said centering member head including a recess having ta- pered side walls, a conically shaped aperture
15 in said centering member below said recess, a hollow needle carried by said tip and extend- ing into said barrel a distance approximately
20 just below the bottom of said first recess in said lower centering member head when said member is in an extended position, said am-
20 pule including a fixed stopper adjacent the discharge end thereof, said stopper being made of a resilient material and including a
25 body portion positioned within said ampule and an enlarged flange engaging the end of said ampule, a recess in said stopper, the end
of said recess being spaced from the outer face of said flange.

30 In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.

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