July 15, 1930. A. E. SMITH 1,770,634

SYRINGE

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Fig. 1

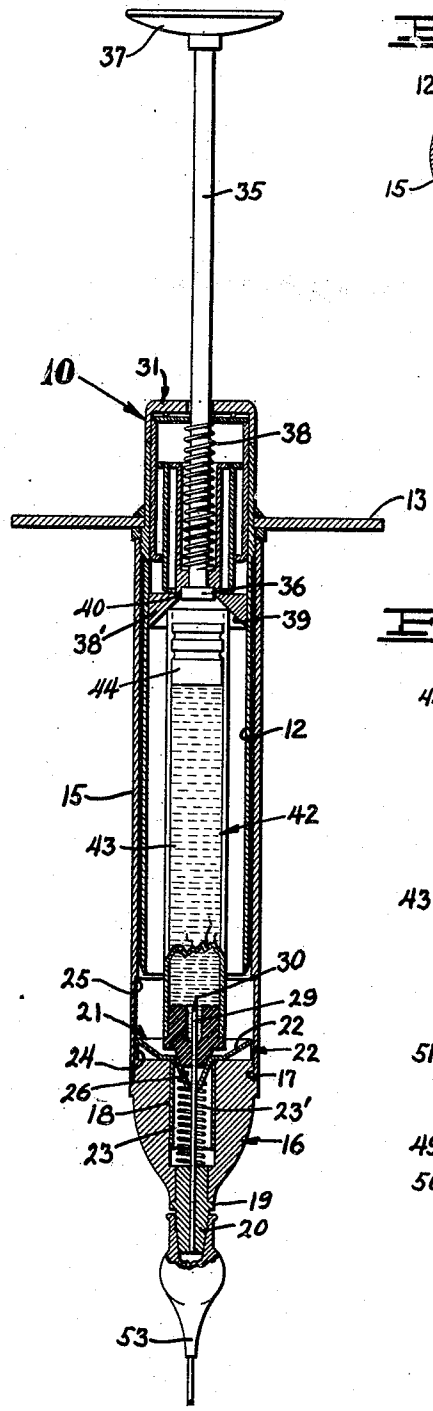


Fig. 3

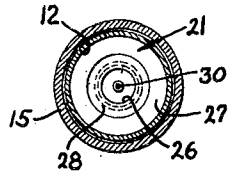


Fig. 4

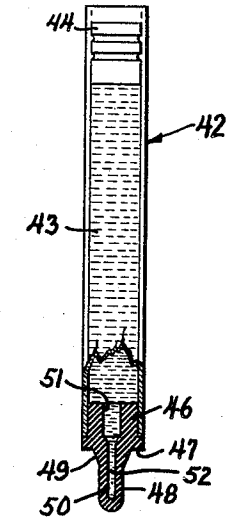
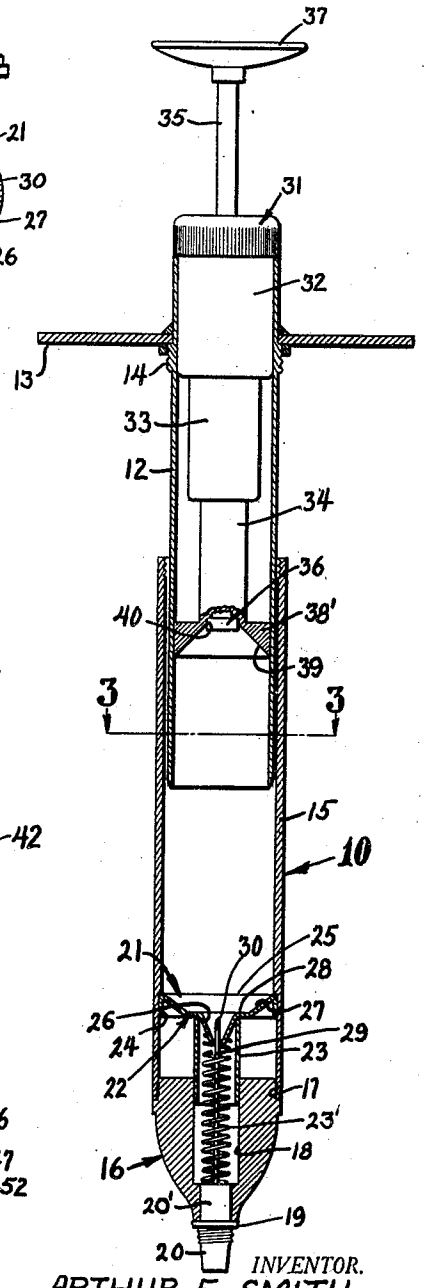


Fig. 2



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SYRINGE

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Fig. 5

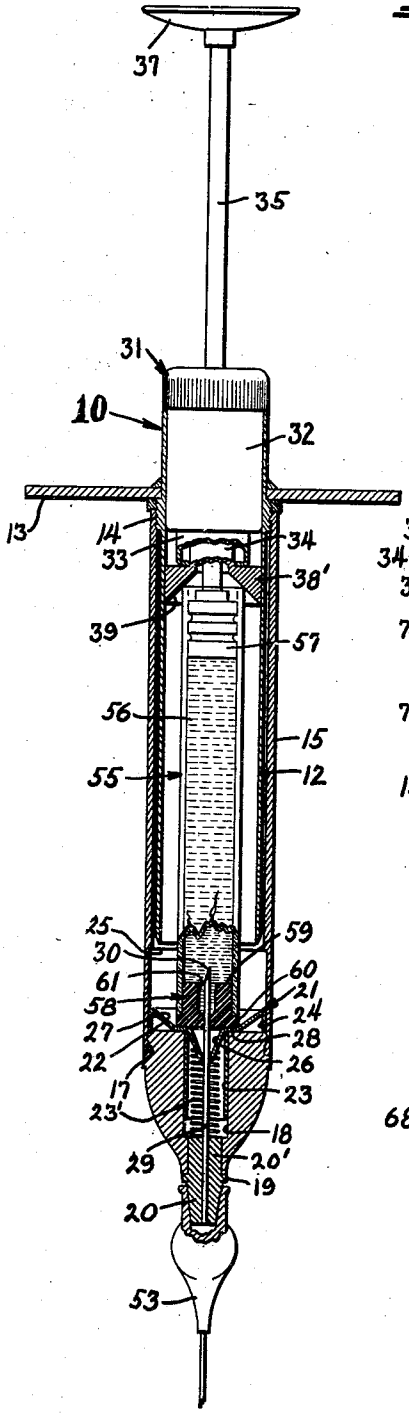


Fig. 7

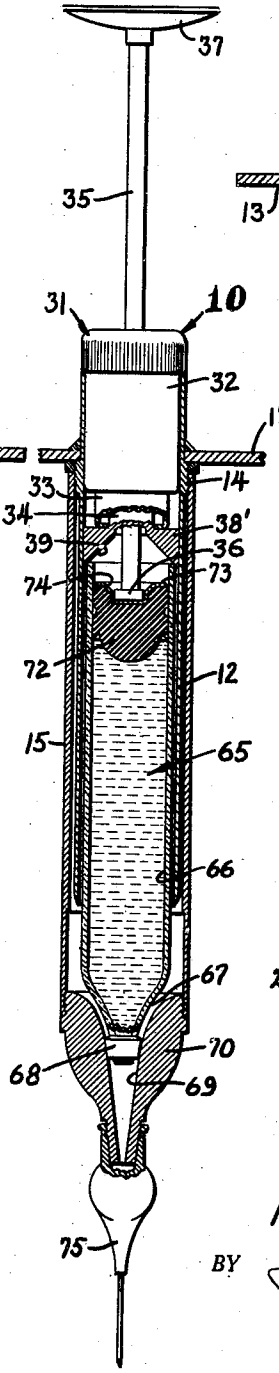
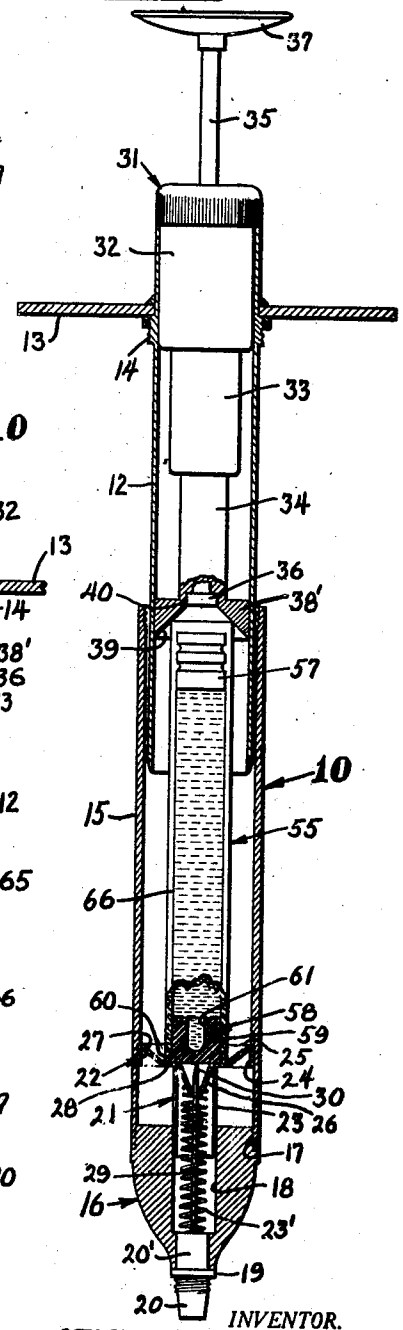


Fig. 6



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Patented July 15, 1930 1,770,634

UNITED STATES PATENT OFFICE

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SYRINGE

Application filed September 26, 1928. Serial No. 308,552.

This invention relates to improvements in hypodermic syringes.

The general object of my invention is to provide a novel hypodermic syringe which is adapted to receive an ampule or cartridge for ejection of the drug contained in the ampule.

Another object of the invention is to provide a syringe having a novel ampule centering member therein.

A further object of the invention is to provide a syringe including a novel barrel and sleeve construction.

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. 2 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 in the syringe.

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

Fig. 7 is a sectional view showing my improved syringe used with another type of ampule.

Referring to the drawings by reference characters I have indicated my improved syringe generally at 10. This syringe comprises a sleeve 12, having a cross bar 13 adjacent one end which is adapted for engagement by the fingers of an operator.

The sleeve 12 is externally threaded at the end adjacent the cross bar 13 as indicated at 14. The threads 14 engage threads on one end of a barrel 15 into which the sleeve fits loosely. On the other end of the barrel I provide a tip 16 which includes a threaded portion 17 adapted to engage the threaded end of the sleeve.

The tip 16 has a central aperture 18 adjacent the lower end of which an end member 19 is located. The end member 19 includes a hub 20 and a shank 20′ 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 21 and which includes a head 22 and a shank 23. The head and shank are preferably metal stampings connected as by welding or brazing. The shank 23 is positioned in the aperture 18 and within the shank a coiled spring 23′ is arranged, to normally urge the lower centering member 21 to an extended position. A cylindrical flange 24 on the head 22 serves to guide the head and engages a shoulder 25 to limit the movement of the head 22. The head 22 has a conical aperture 26 and inclined inner side walls 27 which form a recess 31, the bottom of which forms a shoulder 28.

A hollow needle 29 sharpened at its upper end as at 30 is secured in the end member 19 and extends into the sleeve 12 to a point so that when the member or head 22 is in a fully extended position as shown in Fig. 2 the sharpened end 30 of the needle is just below the shoulder 28.

The end of the syringe sleeve 12 opposite the tip 16 is closed by a cap 31. The cap 31 includes a plurality of telescopic members 32, 33 and 34 which may be multiplied in number to any desired extent. The cap 31 also includes a plunger rod 35 which extends therethrough from end to end and includes an enlarged head 36 and an enlarged thumb piece 37. The uppermost telescopic member 32 fits within the cap 31 and sleeve 12 and may be secured thereto in any desired manner.

For normally urging the telescopic members to an extended position I provide a coiled spring 38 which is located within these telescopic members and surrounds the plunger rod 35. The lower telescopic member 34 is provided with a head 38′ which includes a conical recess 39 and a recess 40 in which the head 36 of the plunger rod 35 is positioned.

In Fig. 4 I have indicated generally at 42 an improved ampule for use in my improved syringe. This ampule includes a body por-

tion 43 closed at one end by a movable stopper 44 and at the opposite end by a stopper 45. The stopper 45 is preferably made of a good grade of rubber and includes a body portion 46 which is adapted to fit within the ampule body 43 and tightly engage the inner side walls thereof. An enlarged flange 47 of the stopper is adapted to engage the end of the ampule and a neck 48 which includes a tapered portion 49 and a tip 50 extends outward from the face of the flange. The body portion 46 is provided with a central recess 51 which communicates with a recess 52 in the neck 48 and terminates a distance from the end of the tip 50.

To prepare the ampule 42 for use in my improved syringe the tip 50 is cut off at its juncture with the tapered portion 49, thereby exposing the recess 52. The ampule is then placed in the syringe sleeve 12 or barrel 15. The sleeve and barrel are then telescoped and as the parts are moved together the tapered walls 39 of the head 38′ automatically centers the ampule in the sleeve. As the parts move the lower centering member 22 slides in the barrel and the needle point 30 enters the recess 52 and the recess 51 of the stopper as shown in Fig. 1. When the parts are assembled the pressure exerted on the ampule forces the tapered portion 49 of the stopper into tight engagement with the side walls of the tapered aperture 26 of the member 21, thereby causing the stopper material to tightly grip the needle 29 thereby forming a fluid tight joint between the stopper and the needle.

To eject the contents of the ampule the plunger rod 35 is moved towards the discharge end of the syringe until the head 42 engages the stopper 44 of the ampule. Upon further movement of the plunger rod the stopper 44 is moved in the ampule body and acts as a piston to force the contents of the ampule through the needle 29 and into a hypodermic needle 53 which is adapted to be positioned on the hub 20.

The more pressure required to expel the contents of the ampule the tighter the material of the stopper 45 grips the needle 29.

In Figs. 5 and 6 I have shown another form of ampule 55 used in my improved syringe. This ampule includes a cylindrical body portion 56 closed at one end by a slidable stopper 57 and at the opposite end by a stopper 58. The stopper 58 includes a body portion 59 and an enlarged flange 60 which engages the end of the ampule. The body portion of the stopper is provided with a recess 61 which terminates short of the face of the flange 60.

When the ampule 55 is used it is placed in the barrel 15 and as the sleeve 12 is moved into the barrel the centering cap 31 is placed on the sleeve the tapered walls 27 of the head 21 correctly centers the front end of the ampule so that the face of the flange 60 rests on the shoulder 28 of the member 21 and the tapered walls of the recess 39 in the telescopic head 38′ correctly centers the rear end of the ampule as clearly shown in Fig. 6. As the sleeve and barrel are given relative movement the member 21 moves down and the needle 29 punctures the material of the stopper 58 between the outer face of the flange 60 and the end of the recess 61 and passes into the recess 61 as shown in Fig. 5. To expel the contents of the ampule 55 the plunger rod 35 is moved towards the discharge end of the ampule until it engages the stopper 57 whereupon on further movement the stopper 57 moves in the ampule body and acts as a piston to force the contents of the ampule out through the needle 29.

In Fig. 7 I have shown an ampule 65 which is also adapted for use in my improved syringe. The ampule 65 is similar to types shown by me in other copending applications and includes a cylindrical body portion 66 having a tapered neck 67 at one end and having a resilient collar 68 thereon. The neck 67 is originally closed by a breakable tip (not shown). The opposite end of the ampule is provided with a stopper 72 which is preferably made of rubber and is provided on its upper face with a metallic disk 73 having a depressed center portion 74. When this ampule is used in my improved syringe the resilient collar 68 is positioned in the tapered aperture 69 of a removable tip 70 which may be substituted for the removable tip 16 previously described.

When the sleeve and barrel are assembled the side walls of the tapered recess 39 of the telescopic head 38′ correctly center one end of the ampule in the syringe while the other end of the ampule is centered by the tapered aperture 69 in the tip 70. The aperture 69 communicates with a needle 75 through which the ampule contents are ejected.

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

Having thus described my invention, I claim:

1. In a syringe, a sleeve, a plunger rod in said sleeve, a barrel surrounding and removably secured to said sleeve, a tip secured to the end of said barrel, said tip comprising a centering member including a head and a shank, said shank being adapted to slide in said tip and resilient means adapted to normally urge said centering member to an extended position, a shoulder on the inner face of said barrel, said shoulder being adapted to limit the extended movement of said centering member and a hollow needle carried by said tip and associated with said centering member.

2. In a syringe, a sleeve, a plunger rod, a cap on said sleeve, a barrel, said barrel surrounding said sleeve and being removably secured to said sleeve, a tip secured to the end of said barrel, said tip including a central recess, a hollow needle carried by said tip and extending into said barrel, a centering member associated with said tip, said centering member including a hollow shank and a separately formed head secured to the shank, said shank being slidable in said tip recess, a spring in said shank surrounding said hollow needle, said spring being adapted to normally urge said centering member to an extended position, said centering member head including a recess having tapered side walls and a conically shaped aperture in said centering member below said recess.

3. In a syringe including a body, a tip on said body, said tip comprising a centering member including a head and a shank, said shank being adapted to slide in said tip, resilient means adapted to normally urge said centering member to an extended position and means within said body to limit the extended movement of said centering member.

4. A syringe of the character described comprising a sleeve, a plunger rod in said sleeve, a centering member movable in said sleeve, a barrel, said barrel surrounding said sleeve and being removably secured to said sleeve, and a second centering member movable in said barrel.

5. A syringe of the character described comprising a sleeve, a plunger rod in said sleeve, a barrel surrounding said sleeve and removably secured to said sleeve, a tip, said tip being removably secured to the end of said barrel, said tip including a centering member including a head and a shank, said shank being slidable in said tip and resilient means adapted to normally 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, a hollow needle carried by said recess in said centering member head when said member is in an extended position.

6. A syringe of the character described comprising a sleeve, a plunger rod, a cap on said sleeve, said cap surrounding said plunger rod, a centering member carried by said plunger rod, a recess in said member, the side wall of said recess being adapted to engage one end of an ampule to correctly center said ampule, a barrel, said barrel surrounding said sleeve and being removably secured to said sleeve, a tip, said tip being removably 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 slidable 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 tapered side wall, a conically shaped aperture in said centering member below said side wall, a hollow needle carried by said tip and normally extending into said sleeve to a point approximately at the bottom of said first recess in said lower centering member head when said member is in an extended position.

In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.