May 9, 1939. A. E. SMITH 2,157,503

AMPOULE SYRINGE

Filed April 10, 1936 2 Sheets-Sheet 1

Fig. 1

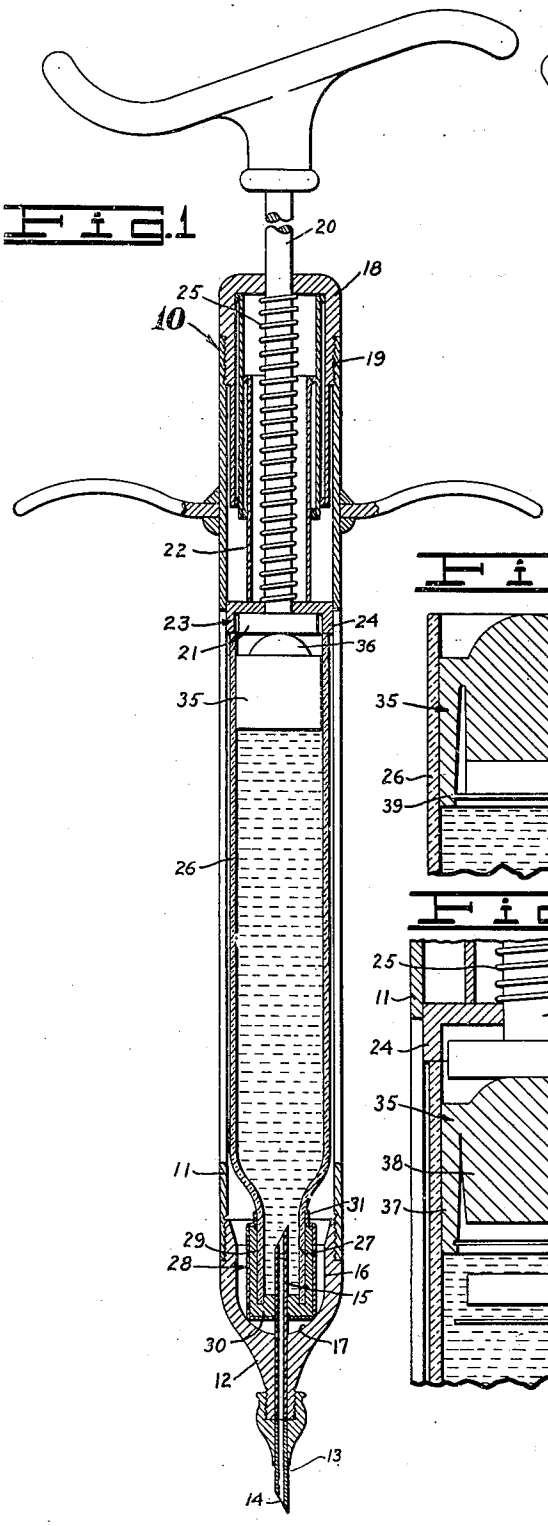
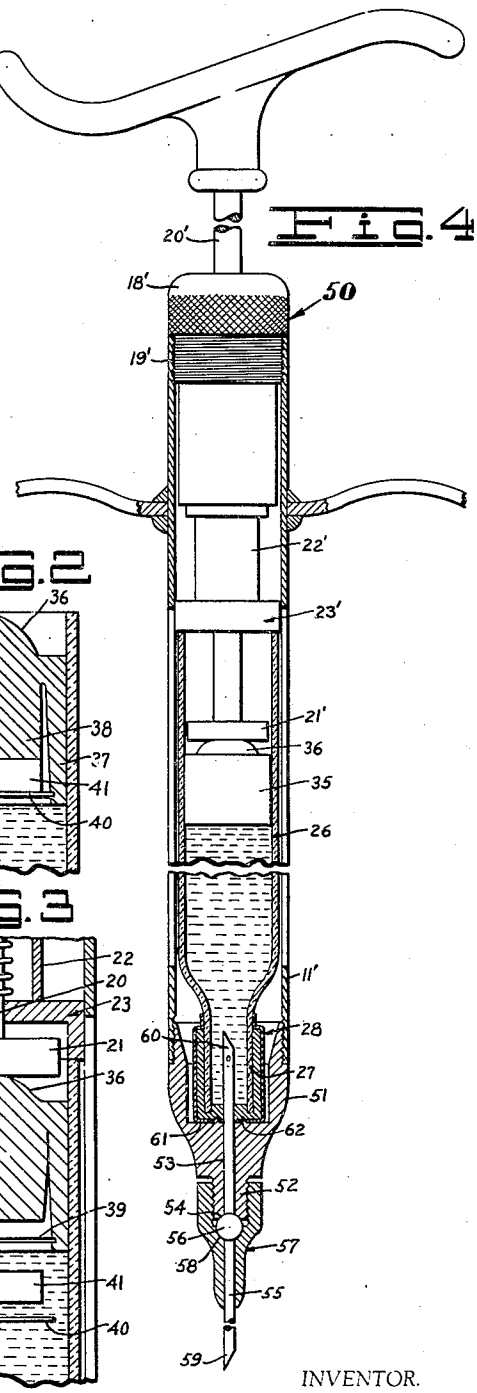


Fig. 2

Fig. 3

Fig. 4



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Filed April 10, 1936 2 Sheets-Sheet 2

Fig. 6

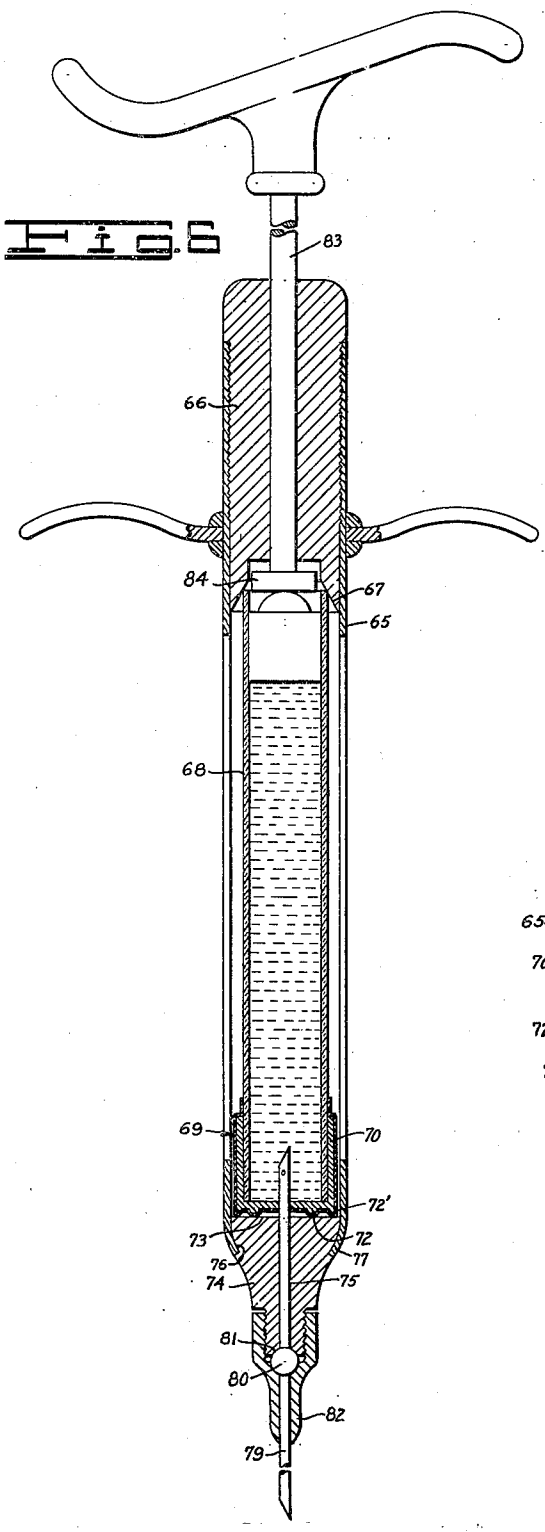


Fig. 5

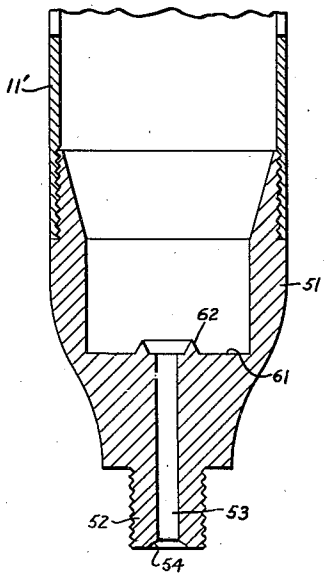
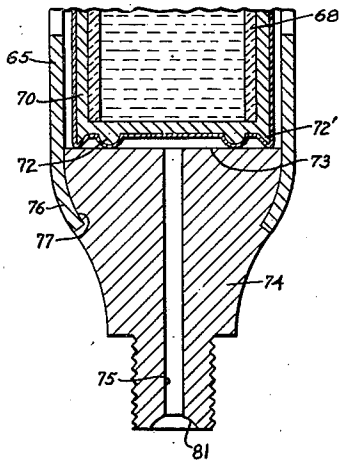


Fig. 7



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AMPOULE SYRINGE

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Application April 10, 1936, Serial No. 73,654

2 Claims. (Cl. 128—218)

This invention relates to syringes.

The general object of the invention is to provide an improved syringe which is particularly adapted for use in connection with ampoules.

A further object of the invention is to provide an improved ampoule for use in a syringe.

An additional object of the invention is to provide a syringe and ampoule wherein novel means is provided for preventing leakage at the front end of the ampoule.

Another object of the invention is to provide a novel cork for use in an ampoule.

Another object of the invention is to provide novel means for sealing an ampoule.

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

Fig. 1 is a central, sectional view through a syringe and ampoule embodying the features of my invention;

Fig. 2 is an enlarged, fragmentary, central, sectional, view through the upper end of my improved ampoule showing the cork therein;

Fig. 3 is an enlarged, fragmentary, central, sectional view showing the upper end of the ampoule with the cork engaged by the plunger;

Fig. 4 is a view similar to Fig. 1 showing a slight modification of my invention;

Fig. 5 is an enlarged, fragmentary, sectional view showing the front end of the modified syringe;

Fig. 6 is a view similar to Fig. 1 showing a further modification; and

Fig. 7 is an enlarged, fragmentary, sectional view showing the lower end of the syringe shown in Fig. 6.

Referring to the drawings by reference characters I have shown my invention as embodied in a syringe which is indicated generally at 10. As shown the syringe includes a barrel 11 having a front member 12 threaded therein. This front member is provided with a threaded front end on which a needle 13 is mounted. The front member is also provided with a closure piercing member or needle 14 which is fixed thereon and which is provided at its inner end 15 with a sharpened portion which projects into a recess in the front member. The outer end of the front member recess is shown as cylindrical as at 16, while the inner portion is rounded as at 17.

Opposite the front member the barrel is provided with a closure 18 which is threaded as at 19 to the barrel and slidably mounted within the closure is a plunger rod 20 having a head 21 on the lower end thereof. Surrounding the plunger rod and fitted within the closure 18 are a plurality of segmental members 22 which are in telescopic engagement with the lower member having an ampoule engaging head 23 thereon. This head includes a skirt 24 which receives the head 21 on the plunger. The plunger rod 20 is surrounded by a spring 25 which engages the head 23 and tends to urge the head away from the closure.

Mounted within the barrel I show a removable ampoule 26 which is preferably made of glass and which is cylindrical in form with the upper end of the ampoule engaged by the skirt 24 on the head 23 of the plunger. The front end of the ampoule is of reduced diameter as at 27 and on the reduced portion I mount a seal 28 comprising an inner cap which is preferably made of rubber. This cap includes a skirt 29 which tightly engages the end of the ampoule and the skirt is provided with an end portion 30 which is shown as slightly thicker than the skirt and which includes a boss which extends into the ampoule. Over the skirt I place a cap or covering of thin, flexible, transparent material such as Celluloid, collodion, regenerated cellulose such as Cellophane, or other material preferably of a nature so that it shrinks when it dries and thus tightly engages the rubber closure and causes this closure to tightly engage the neck of the ampoule. The covering is shown as extending down onto the neck as at 31 and thus a tight seal is secured.

This seal, it will be noted, consists of two separate media both of which are impervious but are capable of being penetrated by the sharpened end 15 of the needle with the outer member tough and more resistant so that it will in a measure serve as a protection for the rubber member.

The rear end of the ampoule is provided with a cork 35 which includes a protuberant head portion 36 and a side wall 37. Within the side wall 37 and preferably spaced therefrom is an internal boss 38 which terminates short of the end of the side wall. The side wall is provided on its inner surface with a peripheral groove 39 in which a sealing disk 40 which may be made of Celluloid is seated. This disk 40 serves to hold a medicinal preparation shown as a tablet 41 in place in the cork. The tablet 41 is shown as contacting the lower face of the boss 38 and the disk 40.

In use pressure is applied to the head portion 36 of the cork thus pushing the boss 38 inwardly so that the tablet 41 causes the disk 40 to be

unseated. The closure 18 is then removed and the ampoule is placed in the barrel of the syringe and the closure is replaced. The spring 25 acting through the skirt 24 pushes the ampoule forwardly so that the needle point 15 pierces the seal 28. The seal 28 engages the rounded portion 17 on the front member on the syringe.

The interior of the ampoule is filled with a suitable vehicle for the medicinal preparation 41 and thus when the steps mentioned have occurred the preparation 41 is discharged into the vehicle in the ampoule and a fresh solution of material is provided. To make an injection the plunger 20 is forced inwardly thus causing the cork 36 to move within the ampoule and causing the material to pass out through the needle 13. The pressure of the spring 25, together with this forward thrust of the plunger causes the seal 28 at its lower edge to tightly engage the curved wall of the end member and thus hold the parts in a leak preventing position. The needle 15 forces the boss on the end member 30 outwardly so that leakage is prevented, also the engagement between the rounded portion 17 of the front member and the seal tends to force the seal against the needle to prevent leakage.

In Figs. 4 and 5 I have indicated a slight modification of my invention generally at 50. In this modification the closure member, barrel, and plunger are similar to those previously described and similar parts have been indicated by similarly primed reference characters.

The front member of the modification indicated at 51 is provided with a reduced portion 52 having an aperture 53 which at its lower end includes a rounded seat 54. A needle 55 has a ball-like member 56 engaging the seat 54 while a cap 57 which is threaded to the front member 51 includes a seat 58 which engages the ball member 56 to hold the parts assembled. The needle includes an injection point 59 and an ampoule piercing point 60. The ampoule shown in Fig. 4 is similar to the ampoule previously described but the front member 51 instead of being provided with a rounded recess to receive the ampoule has a plane end wall 61 and may be provided with a sharpened protuberance 62 surrounding the aperture 53.

In use the ampoule is inserted in the barrel and the closure 18' is replaced. The head 23 then urges the ampoule forward in the barrel. The plunger is then operated causing the head 21 to engage the head portion 36 of the cork and thus pushing the portion inwardly and discharging the medicinal contents into the ampoule. The needle 55 is then inserted so that the point 60 thereof passes through the seal on the ampoule whereupon the cap 57 is secured in place.

In Fig. 6 I have shown a further modification of my invention wherein a barrel 65 is provided with a threaded end closure 66 which includes a tapered recess 67 engaging an ampoule 68. The threads on the closure 66 are preferably triple threads and they are sufficiently long so that the closure will engage ampoules of various lengths. The ampoule 68 is of a uniform diameter throughout and is provided with a seal 69 which includes an inner layer of rubber and an outer layer which is of tough, flexible, material, previously described, such as Celluloid. The rubber seal 70 includes a circumferential bead 72 and a peripheral bead 72' which engage the plane end face 73 of a front member 74 which is provided with a central bore 75. The beads 72 and 72' are within and without the end of the ampoule thus when pressure is applied these tend to force the seal so that it has a tendency to wrap around the end of the ampoule.

The front member 74 is preferably secured to the barrel by spinning the front portion of the barrel 76 into a recess 77 in the front member.

In use of the syringe shown in Figs. 6 and 7 an ampoule is inserted in the barrel and the closure is tightened and the ampoule is pushed forward so that the protuberances 72 and 72' of the seal engage the plane face 73 of the front member. A needle 79 may then be inserted in the bore 75 and forced through the seal with a ball 80 on the needle engaging a recess 81 of the front member after which a cap 82 is screwed onto the front member.

A plunger 83 passes through the closure 66 and has a head 84 thereon which engages a cork 35 similar to the cork previously described so that when the plunger is operated the preparation is first discharged. After this preparation has been distributed throughout the fluid in the ampule the injection is made.

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

Having thus described my invention I claim:

1. A cork for use in an ampoule, said cork including a body having a protuberance at one end, said body having a boss on the face opposite said protuberance and having a skirt surrounding said boss, a disk engaging the inner wall of said skirt and a medicinal preparation in said cork between said disk and said boss.

2. An ampoule having a cylindrical wall and having a cork therein, said cork being made of rubber including a body having a protuberance at the outer end, said body having a boss on the face opposite said protuberance and having a skirt spaced from said boss, said skirt having a circumferential recess on the inner wall thereof, a disk seated in said recess and a medicinal preparation engaging said disk.

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