

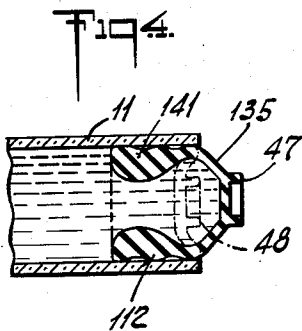
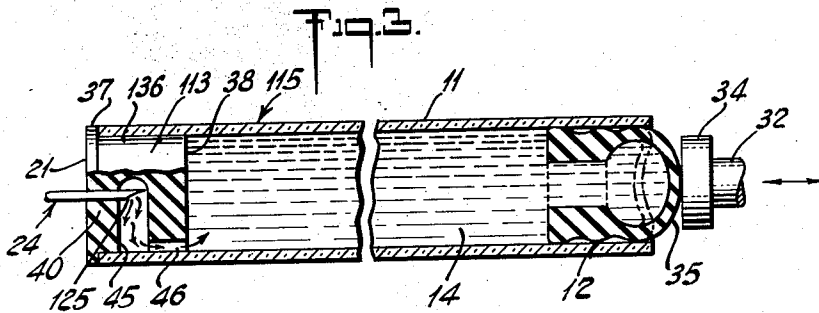
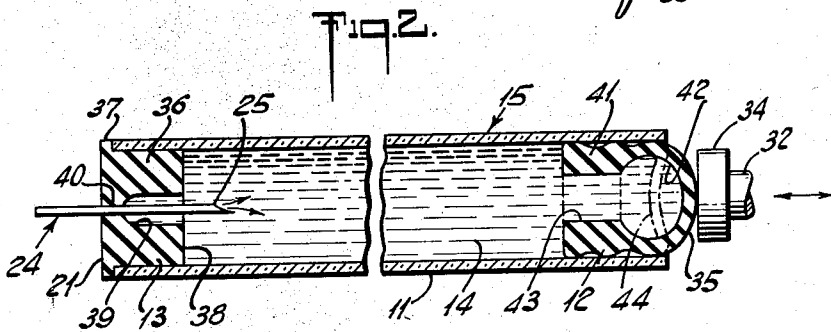
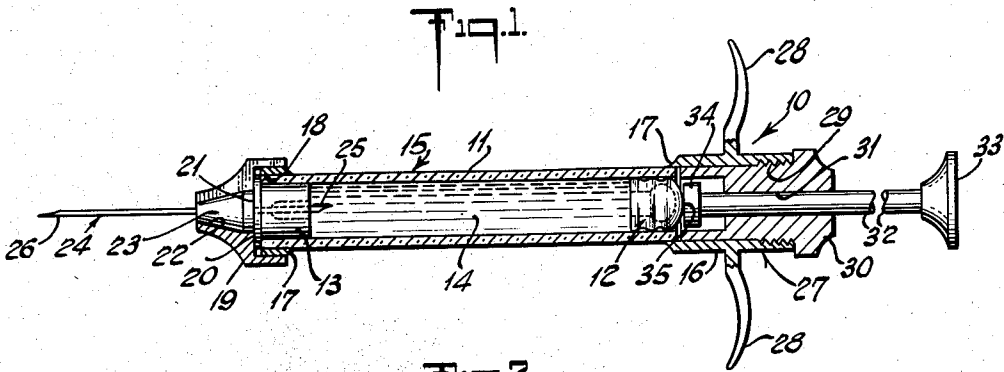
Nov. 2, 1954

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2,693,185

HYPODERMIC SYRINGE AND ASPIRATING AMPOULE THEREOF

Filed Dec. 1, 1951



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HYPODERMIC SYRINGE AND ASPIRATING AMPOULE THEREOF

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Application December 1, 1951, Serial No. 259,472

2 Claims. (Cl. 128—218)

The present invention relates to hypodermic syringes for subcutaneous injection of barrel or ampule contents, and ampule structure thereof, designed in a way to permit simple aspiration in a unique manner for a show of blood of the type proposed in my copending application Serial No. 250,703, filed October 10, 1951.

A general object of the present invention is to provide an improved hypodermic syringe structure of the type disclosed in the Cook Patent No. 1,661,818 of March 6, 1928, and cartridges or ampules therefor, which are unusually simple in construction, readily and economically produced on a commercial scale, easily assembled and efficiently used; and which feature aspirating piston plug means not requiring connection thereof to plunger means.

A more specific object is to provide in such syringes and ampules thereof aspirating piston plugs which, upon partial collapse by pressure physically applied by the plungers and release of that pressure, automatically will apply aspiration to the ampule chambers for an effective show of blood therein, thus eliminating necessity for physical connection between the plungers and piston plugs.

Another object of the invention is to provide in such syringes and ampules a piston plug having an aspirating bulb against which the plunger bears effectively to attain aspiration when a small amount of pressure applied to the plunger is released while permitting it to serve efficiently for piston expulsion of ampule contents when driven into the ampule by greater pressure applied to the plunger.

An additional object of the present invention is to provide structural embodiments which are uniquely effective in attaining the desired ends as will be more fully apparent from the following description of certain forms thereof illustrated by way of example in the accompanying drawing.

Other objects of the invention will be in part obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is an axial section, with parts broken away, of a loaded embodiment of the hypodermic syringe of the present invention;

Fig. 2 is an axial section to an enlarged scale, with parts broken away, of the cartridge or ampule of Fig. 1 which serves as the barrel of that syringe, showing portions of the associated inner end of the hollow needle and the operating end of the plunger with aspirating action illustrated;

Fig. 3 is a view similar to Fig. 2, but illustrating use in that ampule of a certain type of blood telltale plug (partly shown in elevation) substituted for the plug closing the leading end of the ampule illustrated in Fig. 1; and

Fig. 4 is a sectional detail of the piston plug end of the ampule showing a modified form of aspirating piston plug suitable for use in the structures shown in Figs. 1, 2 and 3.

In the drawing, wherein like numerals identify similar parts throughout, there is illustrated, by way of example,

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at 10 an embodiment of the hypodermic syringe of the present invention featuring aspirating means of the invention, and it is an adaptation of the type of hypodermic syringe structure illustrated in the above-identified Cook patent to teachings of the present invention. In that hypodermic syringe 10 tubular barrel 11, which may be formed as a cylinder of light-transmitting or transparent material, such as glass or rigid plastic, is closed off at its back or trailing end by a piston plug 12 and at its leading end by another plug 13, carrying therein a body 14 of injectable medicinal liquid, to form a loaded replaceable cartridge or ampule 15. That loaded ampule 15 is mounted in a suitable tubular syringe casing 16, having at least a windowed portion in the vicinity of the head end thereof through which the leading end of ampule 15 may be observed when loaded therein. The windowing of casing 16 may be provided by forming at least the head end of its side walls or substantially all of the latter from transparent material but preferably is formed as a metallic tubular structure windowed by being cut away on opposite sides at 17, 17 to provide opposed elongated sight slots, all such types of casing structures being known in the prior art.

The leading end of loaded ampule 15 is received in an axial socket 18 in the back end of head 19 with the bottom 20 of the socket providing an abutment against which outer end 21 of closing plug 13 may be rested. As is usual in such a type of syringe, head 19 also has another seat or socket 22 therein which receives enlargement 23 mounted on a double-ended needle 24 intermediate its ends 25 and 26 respectively constituting the inner plug-piercing end and the injecting end.

The back end 27 of the tubular casing 16 carries finger-engaging wings 28, 28, and is internally-threaded at 29 threadably to receive an externally-threaded closure plug 30. Casing closure plug 30 has an axial bore 31 reciprocatively receiving piston plunger stem 32. Plunger stem 32 preferably threadably carries on its outer end a thumb-engaging thrust knob 33 and preferably has its inner end 34 enlarged to provide a head, as shown, to seat against a projecting outer end 35 of piston plug 12. In accordance with features of the present invention necessity of connecting plunger end 34 to piston plug 12 to permit an aspirating action is eliminated.

As best seen from Fig. 2, in the embodiment of the ampule 15 shown in Fig. 1, the closure plug 13 which is seated in the leading end of ampule tube 11 preferably is formed of elastic plastic material having a cylindrical section 36 snugly received within the end of the tube and a laterally-extending circumferential flange 37 formed on its outer end 21 to limit insertion into the ampule tube and to seat against the head socket bottom 20. Closure plug section 36 has in its back or inner end 38 the usual axial recess or pocket 39 to define a relatively thin outer cross sealing portion 40 through which the needle inner end 25 may be readily pierced to bring the needle bore into communication with the interior or chamber of the ampule and the body 14 of medicinal liquid therein. In such embodiment, it is preferred that the needle inner end 25 be of sufficient length as to project into the ampule chamber beyond the inner end 38 of the closure plug 13 so as to be readily observable through the transparent wall of the ampule tube 11 for a show of blood thereat.

Fig. 2 indicates that the aspirating piston plug 12 may comprise a relatively thick-walled base section 41 and a crowned bulbous head providing the outer portion 35, with pocket or chamber 42 provided in the latter forming part of the ampule chamber, or in communication with the ampule chamber and the body 14 of medicinal liquid therein through an axial bore 43 in the base section. Such piston plug bulb structure is designed to serve a dual purpose, viz., initially, of an aspirating bulb to draw blood to the inner end 25 of the hypodermic needle for observation thereat, and, thereafter, of a piston plug when slid forward into the ampule tube 11 by means of the piston plunger head 34.

In operation of the embodiment shown by way of example in Figs. 1 and 2, the operator loads a loaded ampule 15 into the hypodermic syringe casing 16 to provide the structure shown in Fig. 1. He inserts the outer in-

jecting end 26 of the hollow needle or cannula 24 subcutaneously into the patient and then determines whether or not the cannula bore is in communication with a blood vein. This he ascertains by applying slight pressure to the plunger thrust knob 33 so as partially to collapse the piston bulb 35 to the dotted line position indicated at 44 in Fig. 2 by a short plunger stroke. This, of course, reduces the volume of the ampule chamber, and when the pressure applied to the thrust knob and plunger is released, the elasticity of the piston bulb 12 causes its bulbous end 35 to expand to its initial position, as indicated in full lines in both Figs. 1 and 2. This applies aspirating suction to the ampule chamber so that should the cannula or needle bore be in communication with a blood vein, blood will be drawn up through the needle to be observable at its inner end 25. If the medicinal liquid is intended for intravenous injection, the show of blood at the inner needle end 25 will assure that the needle injecting end 26 has been properly inserted. If, however, the medicinal liquid is intended for intramuscular injection, a show of blood at the needle inner end 25 will dictate relocation of the needle outer end 26.

After subcutaneous location of the injecting needle end 26 to the satisfaction of the operator as assured by the aspirating action and blood showing described, the operator then expels or injects the ampule contents, or body 14 of medicinal liquid contained therein, by depressing the thrust knob to cause piston head 34 to drive piston plug 12 forward into the ampule tube 11 by a long plunger stroke. It will thus be seen that it is not necessary to form either a permanent or temporary connection between the hypodermic piston plunger 32 and the ampule piston plug 12 so as to obtain the desired aspirating action.

In the event that the liquid medicament housed in the ampule 15 is of a high degree of opacity making difficult observation of a show of blood at the needle inner end 25, blood telltale closing plug means may be substituted for the closing plug 13, as illustrated in Fig. 3. Such blood telltale closing plug means may comprise an elastic plug 113 having a cylindrical shank section 136 snugly received in the leading end of ampule tube 11 with its outer end 21 provided with insertion limiting flange 37. In a side of the cylindrical section 136 of closing plug 113 is preferably formed a transversely-extending notch 45 which defines the outer cross sealing section 40 and through which the inner needle end 125 is pierceable. Communication between the pocket formed by transverse notch 45 and the ampule chamber is provided by means of a longitudinally-extending notch 46 in the side of closing plug section 136 to provide with that pocket a channel extending to the inner plug end 38, as shown in Fig. 3. Such channel comprising pocket 45 and groove 46 is located immediately adjacent the inner face of a portion of the transparent wall of ampule tube 11 which, incidentally, closes it off on the outer side thereof as shown. Accordingly, when such an ampule 115 of Fig. 3 is loaded in syringe casing structure 10 of the type indicated in Fig. 1 and aspiration is attained by slight depression and release of piston 32, a showing of blood will appear in pocket 45 and groove 46, or portions of the channel formed thereby, to be apparent even though the medicinal liquid 14 is of a high degree of opacity. Variations of the blood telltale closing plug structure 113 will be apparent to one skilled in the art, particularly by reference to the disclosure of my above-identified copending application Serial No. 250,703 of October 10, 1951.

A modified form of aspirating piston bulb is shown at 112 in Fig. 4 which is of the type illustrated in Figs. 4 and 5 of my copending application Serial No. 160,987, filed May 9, 1950, now Patent No. 2,577,780 of December 11, 1951. As therein shown, piston bulb 112 includes a relatively thin-walled cylindrical base section 141 hav-

ing a tapered, crowned outer bulb end 135 stiffened in its mid-section by a concentric, axially-extending circular rib 47 which is to be engaged by piston head 34 for partial bulb collapse. Pressure on plunger 32 will depress bulb crown 135 to the dotted line position shown at 48 for first decreasing the volumetric capacity of the ampule and then, upon release of the plunger, to permit the bulb crown to spring back out to the full-line position there indicated for aspirating action. Piston travel of plug 112 by a long plunger stroke is similar to that of 12.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A hypodermic syringe ample for use in a hollow hypodermic syringe casing fitted with a head through which a double-ended hollow injecting needle coaxially extends and a back end having a plunger stem reciprocally mounted coaxially therethrough with the inner end of the latter forming a force-applying piston head, said casing having at least a windowed portion through which a leading end of an ampule may be observed when loaded therein, said needle having an inner end of certain length; the ampule comprising, in combination, a transparent tubular wall receivable in said hollow casing to serve as the barrel thereof and provide a liquid storage chamber, a needle-pierceable plug closing the leading end of said tubular wall and receivable of the inner end of said needle to communicate the bore of the latter with liquid contents of the chamber in said ampule when said ampule is loaded into said casing, and an elastic aspirating piston bulb closing the other end of said tubular wall and locatable ahead of said piston head so that the latter may push thereagainst for partial collapse to permit release aspiration or forward liquid-expelling drive, said plug having a channel juxtaposed to the inner face of a transparent portion of the ampule wall communicating with the ampule chamber, said inner end of said needle being adapted when piercing said plug to extend to a point communicating its bore with said channel whereby said channeled plug and the covering transparent ampule wall portion serve as a blood telltale means observable through said casing windowed portion.

2. The hypodermic syringe ampule as defined in claim 1, characterized by the provision in said blood telltale closing plug of the channel in the form of a groove in the side of said plug extending from the inner end of the latter to a point in communication with the plug interior to which the needle inner end of certain length is pierceable.

References Cited in the file of this patent

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2,460,039	Scherer et al.	Jan. 25, 1949
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