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2,453,589

HYPODERMIC SYRINGE AND AMPOULE THEREFOR

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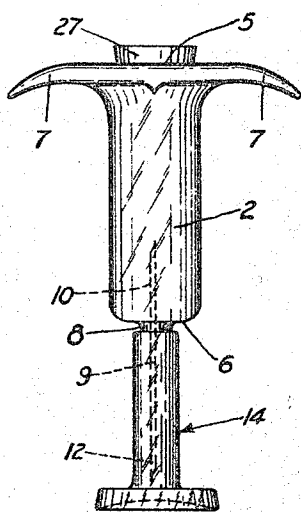


Fig. 1.

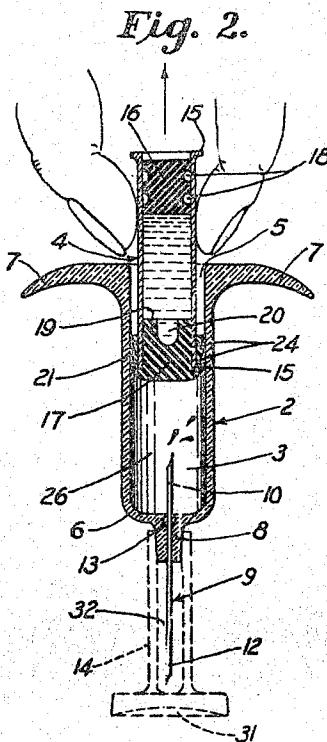


Fig. 2.

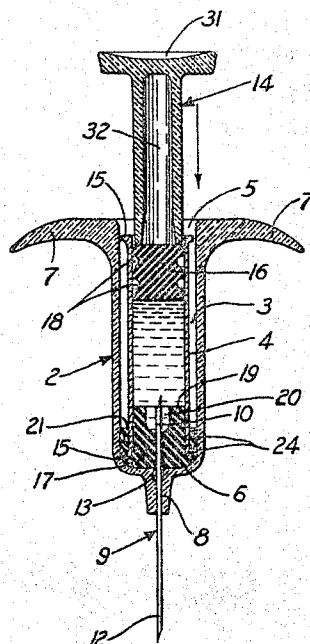


Fig. 3.

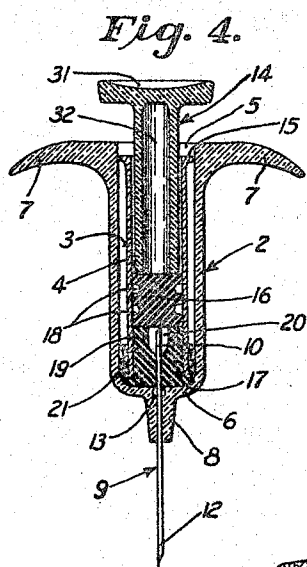


Fig. 4.

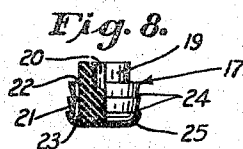


Fig. 8.



Fig. 7.

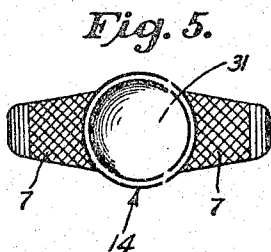


Fig. 5.

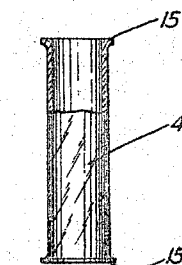


Fig. 6.

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HYPODERMIC SYRINGE AND AMPOULE
THEREFOR

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10 Claims. (Cl. 128—220)

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This invention relates to hypodermic syringes, and particularly to an improved hypodermic syringe which employs a capsule or ampule containing the medicament to be injected, and to an improved capsule or ampule therefor.

The subject matter disclosed herein is related to the subject matter of my co-pending applications Serial No. 707,645, filed November 4, 1946, and Serial No. 707,646, filed November 4, 1946.

Various types of syringes have been heretofore suggested and used which are adapted to be loaded or charged with a capsule or ampule containing the liquid medicament to be injected into the patient. Such an ampule consists generally of an elongated tube having a plug or stopper arranged in each end for sealing hermetically the medicament against contamination. One of these plugs or stoppers is adapted to be perforated by a hollow needle mounted in the syringe through which the liquid is injected into the body of the patient. The other plug or stopper acts as a piston which is moved through the ampule by plunger means carried by the syringe so as to force the liquid through the needle into the patient. While such syringes employing ampules of this type are satisfactory in their use, they are usually cumbersome in their use and construction and oftentimes difficult and expensive in their manufacture.

It is the general object of the present invention to provide an improved hypodermic syringe which is not only simple and easy to use in administering the liquid medicament, but one which is so inexpensive in its manufacture that it can be discarded after one use.

It is an important object of the invention to provide an improved combination of a hypodermic syringe and ampule therefor having means incorporated therewith for easily and quickly determining whether or not the injection needle is positioned properly in the body of the patient for an injection intravenously or into the tissues of the patient.

It is another object of this invention to provide an improved hypodermic syringe which can be easily and conveniently molded from a plastic material at a minimum cost and, at the same time, one which is sufficiently strong and rugged for its intended use.

It is a further object of my invention to provide an improved hypodermic syringe having a member incorporated therewith which acts both as a cap member for protecting the injection needle when the syringe is not in use and as a plunger when in use.

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It is still another object of the present invention to provide an improved hypodermic needle and ampule therefor which is so constructed and arranged that it is impossible to reuse either the syringe or ampule after an injection has been made, thereby eliminating any danger of contamination by reuse.

Various other objects and advantages of this invention will be more apparent in the course of the following specification, and will be particularly pointed out in the appended claims.

In the accompanying drawings, there is shown for the purpose of illustration, an embodiment which my invention may assume in practice.

In these drawings:

Fig. 1 is an elevational view of the improved hypodermic syringe of my invention;

Fig. 2 is a longitudinal sectional view thereof, showing how the ampule is positioned initially therein;

Fig. 3 is a longitudinal sectional view of my syringe, showing the ampule fully seated therein ready for the injection;

Fig. 4 is a view similar to Fig. 3, showing the position of the plunger after an injection has been made;

Fig. 5 is a top view of my improved syringe, as shown in Fig. 4;

Fig. 6 is an elevational view, partly in section, of the body portion of my improved ampule for use with the syringe of the present invention;

Fig. 7 is a detail view of one of the stoppers for the ampule body, as shown in Fig. 6; and

Fig. 8 is a detail view, partly in section, of the other stopper therefor.

Referring more particularly to the drawings, the improved syringe of my invention comprises an elongated cylindrical thin-walled body member 2 having a central cylindrical hollow portion or chamber 3 for housing an ampule or capsule 4 which will be described hereinafter more in detail. This body member is made preferably from a transparent material, such as glass, styrene, or any other suitable moldable material. One end of the hollow portion or chamber 3 is open, as at 5, and the opposite end is closed, as at 6. Adjacent the open end, there is carried by the body member, a pair of diametrically arranged curved finger grasping portions 7 for holding the syringe for an injection. On the outer side of the closed end 6, there is provided a reduced frusto-conical shaped portion 8 so as to provide an outwardly tapered reduced end for a purpose to be described. There is positioned in the closed end 6 and extending therethrough, a

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double pointed hollow injection needle 9 having one end portion 10 extending into the hollow portion or chamber 3 and with the other or injecting end portion 12 disposed centrally of the frusto-conical shaped portion 8 and extending outwardly from that end of the body member. There is securely attached to the needle 9 intermediate the length thereof, preferably by welding, a ball-like member 13 which is embedded in the molded material in the closed end portion of the body member so as to prevent displacement of the needle relative to the body member when the syringe is in use. It will be understood that the needle 9, together with the ball-like member 13, is molded into the body member at the time of the molding thereof.

There is provided an elongated cylindrical combination cap and plunger member 14 having an enlarged head portion which is depressed, as at 31, for receiving the thumb of the user to actuate the plunger in a manner to be described. This member 14 has an axially arranged cylindrical hollow portion 32 open at one end for housing the outwardly extending end portion 12 of the needle 9, as shown in Figs. 1 and 2 of the drawings. The inner diameter of this hollow portion 32 is slightly less than the largest diameter of the frusto-conical shaped portion 8 of the body member 2. When the member 14 is used as a cap member, it is disposed over and around the outer end portion 12 of the needle with the inner end thereof being positioned and forced over the frusto-conical shaped portion 8 into frictional engagement therewith thereby protecting the outer end portion of the needle against contamination. It is preferable that the member 14 be made from the same moldable material of which the body member 2 is made.

The capsule or ampule 4 of my invention consists of a cylindrical tubular member, as shown in Fig. 6, made from glass, styrene, or any other suitable material impervious to liquids and capable of being sterilized, and having a circumferential flange 15 arranged at each end thereof. As shown in Figs. 7 and 8, there is provided a pair of cylindrical plugs or stoppers 16 and 17 with one disposed in each end of the ampule for hermetically sealing the liquid adapted to be contained therein. These stoppers are made preferably of soft rubber or any other suitable material which is easily perforated. One of these stoppers 16 is disposed wholly within the ampule at one end thereof and has a plurality of circumferential grooves 18 arranged therearound to enhance its sealing effect and, at the same time, to permit free sliding of the plug within the ampule. This stopper is adapted to be forced through the ampule and acts as a piston to eject the liquid therefrom in a manner to be described. The other stopper 17 consists of a relatively thick central portion 19 which is axially recessed or cupped, as at 20, so as to facilitate piercing thereof and to enable all of the contents of the ampule to be discharged therefrom, which central portion fits snugly into the bore of the ampule at the end thereof opposite that from the stopper 16. There is provided a skirt portion 21 which is spaced from the central portion 19 by an annular space 22 which is flared outwardly, as at 23. This skirt portion fits over and around the outer end and side wall of the ampule with the flange 15 at that end thereof positioned in the flared end 23 of the annular groove 22 of the stopper. Such flange construction is provided to prevent displacement of the stopper 17 from the end of the ampule

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when it is moved to position in the syringe. On the outer side of the skirt portion 21, there is provided a plurality of circumferential V-shaped grooves or ridges 24 for facilitating insertion and movement of the ampule in the syringe and to obtain a better sealing effect. The outer end of the stopper 17 is rounded, as at 25, so as to aid in inserting and guiding the ampule into the chamber 3.

It will be understood that the syringe is sterilized before it is packaged. In other words, the injection needle 9 and the hollow portion or chamber 3 are sterilized together with the member 14 before packaging. After sterilization, the cap member 14 is positioned over the outer end portion 12 of the needle 9 so as to protect this portion thereof. A cork or stopper 27 is preferably inserted in the open end 5 to maintain the sterility of the hollow portion 3 and the inner end portion 10 of the needle. Thus, it will be seen, as shown in Fig. 1, that after sterilization, it is a sealed sterile medicine package ready for use.

The sterile solution of anesthetic or other liquid medicament is disposed in the ampule 4 and confined between the stoppers 16 and 17 as a separate component. The syringe and ampule may be packaged together or separately depending on the intended use for the syringe and the medicament to be injected.

The syringe of my invention is used in the following manner. The ampule 4 is inserted into the open end 5 of the hollow portion or chamber 3 of the body member 2 with the stopper 17 being on the end first inserted. The cap member 14 is then removed from the closed end of the body member so as to expose the injection end 12 of the needle. The needle is then injected into the body of the patient. In order to ascertain whether or not the end of the needle is positioned properly in the patient to administer the injection, the ampule 4 is retracted or reciprocated slightly and the stopper 17 due to its construction and arrangement acts as a piston to draw fluid out of the body of the patient into the closed chamber 26 at the bottom of the hollow portion 3 formed by the stopper 17 and the closed end wall of the hollow portion 3, as shown in Fig. 2. If the point of the needle is positioned in a vein for an intravenous injection, blood will appear in the closed chamber 26, and if the needle point is positioned in the tissue of the patient, no blood will appear. By providing such a separate closed chamber 26, the blood is prevented from mixing with the medicament in the ampule and is forced from this chamber up past the stopper 17 between the inner wall of the chamber 3 and the outer wall of the ampule. That is to say, the user of the syringe can determine quickly and accurately whether or not the needle is positioned properly in the patient for the desired injection, and this is one of the most important aspects of the present invention. The V-shaped ridges 24 on the stopper 17 are designed to permit air to escape from the bottom of the chamber 3 up between the inner wall of the chamber and the outer wall of the ampule as the latter is forced therein. The V-shaped ridges bear yieldably against the inner wall of the chamber 3 and act as a suction means to draw the blood from the patient into the chamber 26 when the ampule is manipulated, as hereinbefore described.

After the needle has been properly positioned, as above determined, the ampule 4 is fully seated, as shown in Fig. 3, and upon moving to its seat the stopper 17 is perforated by the inner end 10

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of the needle with the extreme end finally being positioned in the recess or well 20 of the stopper when it is fully seated. In such position, it will be seen that the ampule is positioned wholly within the hollow portion or chamber 3 with the upper end thereof being positioned a slight distance below the open end 5 of the hollow portion. In other words, the length of the ampule 4 is slightly less than the depth or length of the hollow portion or chamber 3 in the body member. Such an arrangement prevents the removal of the ampule from the syringe and is important in that it prevents reuse of either of them.

After the ampule has been fully seated in the syringe, the combination cap and plunger member 14 is positioned in the upper end of the ampule 4 against the stopper 16 therein, as shown in Fig. 3. It will be understood that the outer diameter of the member 14 is slightly less than the inner diameter of the ampule. The syringe is then grasped by the finger portions 7 with the thumb of the user resting in the depression or well 31 in the outer end of the member 14. The plunger member 14 is forced inwardly by the thumb which in turn moves the piston stopper 16 inwardly through the ampule thereby ejecting the liquid medicament through the hollow needle 9 into the patient. It will be understood that it is the purpose of the flange 15 at the upper end of the ampule to prevent the ampule from being tilted or cocked when the plunger 14 is forced therethrough. In other words, the outer diameter of the ampule at the flange is slightly less than the inner diameter of the hollow portion 3 so as to prevent any lost motion therebetween. After all of the liquid has been injected, the stopper 16 is seated against the stopper 17 in the bottom of the ampule, as shown in Fig. 4. The needle is then withdrawn from the patient and the syringe together with the ampule contained therein discarded.

As a result of my invention, it will be seen that there is provided a neat and compact syringe which is not only sterile and ready for use, but one which can be easily and conveniently packaged for merchandising purposes. It is so constructed and arranged that it is foolproof and can be used safely by the most inexperienced person. The syringe of the present invention is so simple and inexpensive in its construction that it can be discarded after it has been used but once.

While I have shown and described an embodiment which my invention may assume in practice, it will be understood that this embodiment is merely for the purpose of illustration and description, and that other forms may be devised within the scope of my invention as defined in the appended claims.

What I claim as my invention is:

1. A hypodermic syringe comprising, in combination, an elongated cylindrical hollow body member being open at one end for receiving a cylindrical ampule containing a liquid to be injected with the opposite end being closed, a double pointed injection needle securely arranged in said closed end with one point extending into the hollow portion of said body member and with the other point extending outwardly therefrom, an elongated cylindrical ampule containing the liquid to be injected, a pair of resilient stoppers with one disposed in each end of said ampule for hermetically sealing the same, one of said stoppers disposed wholly within

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the ampule and the other fitting in and around the end thereof so as to fit snugly the hollow portion of the body member and which is adapted to act as a piston when the ampule is manipulated to determine whether or not the injection when the needle is positioned in the patient is positioned in a vein for an intravenous injection or in the tissues, said last mentioned stopper adapted to be perforated by the needle point disposed in the hollow portion of said member when it is fully seated therein, and means for pushing the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

2. A hypodermic syringe, as defined in claim 1, wherein the means for pushing the first mentioned stopper through the ampule consists of an elongated cylindrical hollow member which in one position is adapted to act as a cap disposed over and around the outer end of the injection needle and engaging the closed end of the body member so as to protect said needle when not in use.

3. A hypodermic syringe comprising, in combination, an elongated cylindrical hollow body member being open at one end and closed at its opposite end, a double pointed injection needle securely arranged in said closed end with one point extending into the hollow portion of said body member and with the other end extending outwardly therefrom, an elongated cylindrical ampule containing liquid to be injected positioned in the hollow portion of said body member and inserted through the open end thereof, a pair of stoppers with one disposed at each end of said ampule for hermetically sealing the same, one of said stoppers disposed wholly within the ampule with the other being shaped to fit around the end thereof with its outer part snugly fitting the end of the hollow portion of the body member, said last mentioned stopper adapted to be perforated by the needle point disposed in the hollow portion of said body member, and means for pushing the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

4. A hypodermic syringe, as defined in claim 3, wherein the means for pushing the first mentioned stopper through the ampule consists of an elongated cylindrical hollow member which in one position is adapted to act as a cap disposed over and around the outer end of the injection needle and engaging the closed end of the body member so as to protect said needle when not in use.

5. A hypodermic syringe comprising, in combination, an elongated cylindrical hollow body member being open at one end for receiving a cylindrical ampule containing a liquid to be injected with the opposite end being closed, a double pointed injection needle securely arranged in said closed end with one point extending into the hollow portion of said body member and with the other point extending outwardly therefrom, an elongated cylindrical ampule containing the liquid to be injected, a pair of stoppers with one disposed in each end of said ampule for hermetically sealing the same, one of said stoppers disposed wholly within the ampule and the other fitting in and around the end thereof so as to fit snugly the hollow portion of the body member and which is adapted to act as a piston when the ampule is manipulated to determine whether or not the injection when the needle is positioned in the patient is positioned in a vein for an intra-

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venous injection or in the tissues, said last mentioned stopper adapted to be perforated by the needle point disposed in the hollow portion of said member when it is fully seated therein, said ampule having an outwardly extending flange portion arranged around that end in which the stopper is disposed wholly therewithin with the diameter of this flange portion being slightly less than that of the stopper on the opposite end and the inner diameter of the hollow portion of the body member so as to center the ampule in the hollow portion whereby any tilting action of the ampule relative to the body member is prevented, and means for pushing the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

6. A hypodermic syringe comprising, in combination, an elongated cylindrical hollow body member being open at one end and closed at its opposite end, a double pointed injection needle securely arranged in said closed end with one point extending into the hollow portion of the body member and with the other end extending outwardly therefrom, an elongated cylindrical ampule containing liquid to be injected positioned in the hollow portion of said body member and inserted through the open end thereof, said ampule being shorter in length than the length of said hollow portion whereby the ampule cannot be removed therefrom after it is fully seated therein so as to prevent reuse of the ampule and the syringe, a pair of stoppers with one disposed at each end of said ampule for hermetically sealing the same, one of said stoppers disposed wholly within the ampule with the other being shaped to fit around the end of the ampule and to fit snugly the bottom of the hollow portion of the body member, said last mentioned stopper adapted to be engaged and perforated by the needle point disposed in the hollow portion of said body member, means carried by the ampule for centering it in the hollow portion of said body member so as to prevent any tilting action thereof relative to said body member, and means for pushing the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

7. A hypodermic syringe comprising, in combination, an elongated cylindrical hollow body member being open at one end and closed at its opposite end, a double pointed injection needle securely arranged in said closed end with one point extending into the hollow portion of said body member and with the other end extending outwardly therefrom, an elongated cylindrical ampule containing liquid to be injected positioned in the hollow portion of said body member and inserted through the open end thereof, a pair of stoppers with one disposed at each end of said ampule for hermetically sealing the same, one of said stoppers disposed wholly within the ampule with the other being shaped to fit around the end thereof with its outer part snugly fitting the end of the hollow portion of the body member, said last mentioned stopper adapted to be perforated by the needle point disposed in the hollow portion of said body member, said ampule having an outwardly extending flange portion arranged around each end thereof with the flange portion arranged at that end in which the stopper is disposed wholly therewithin adapted to center the ampule in the hollow portion whereby any tilting action of the ampule relative to the body member is prevented, and

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with the other flange portion engaging the stopper disposed at that end of the ampule so as to prevent displacement of this stopper from the end thereof, and means for pushing the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

8. A hypodermic syringe, as defined in claim 7, wherein the means for pushing the first mentioned stopper through the ampule consists of an elongated cylindrical hollow member which in one position is adapted to act as a cap disposed over and around the outer end of the injection needle and engaging the closed end of the body member so as to protect said needle when not in use.

9. A hypodermic syringe comprising, in combination, an elongated cylindrical body member made from a transparent plastic material, said body having a cylindrical chamber therein so as to provide a relatively thin wall body member with said chamber being open at one end and closed at its opposite end, a double pointed injection needle securely arranged in said closed end with one point extending centrally into said chamber and with the other point extending outwardly from the body member, an elongated cylindrical ampule containing the liquid to be injected, a pair of stoppers with one disposed in each end of said ampule for hermetically sealing the same, one of said stoppers disposed wholly within the ampule and the other fitting securely around the end thereof, said ampule adapted to be inserted through the open end of said chamber with said last mentioned stopper adapted to be perforated by the needle point in said chamber, means carried by said ampule for centering it in the hollow portion of the body member so as to prevent any tilting action of said ampule relative to said body member, and means for pushing the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

10. An ampule adapted to contain a medication comprising an elongated tubular member, a plug slidably arranged in one end of said member, a stopper made from a pierceable material arranged on the opposite end of said member hermetically sealing the same said stopper having a cylindrical portion fitting snugly within the bore of said member and having a skirt portion fitting snugly around the outer side thereof, wherein there is arranged around the skirt portion a plurality of circumferential grooves.

NOEL J. POUX.

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