Nov. 9, 1948. N. J. POUX 2,453,591

HYPODERMIC SYRINGE

Filed Nov. 4, 1946

Fig. 1.

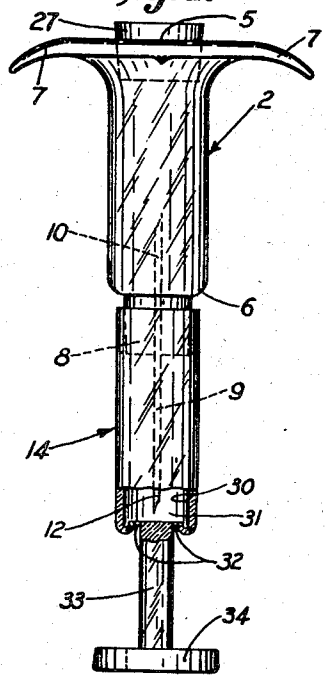


Fig. 2.

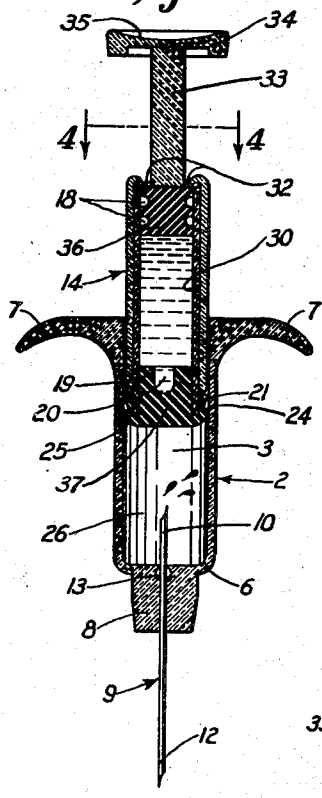


Fig. 3.

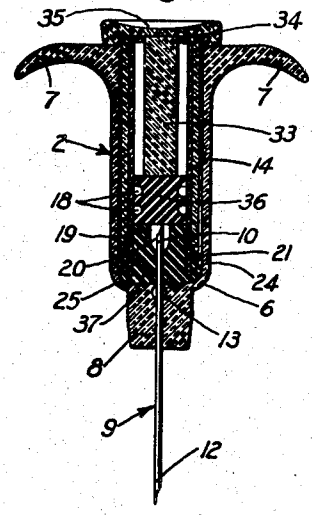
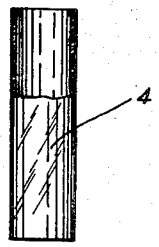


Fig. 4.



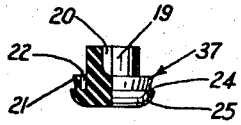


Fig. 6.

Fig. 7.

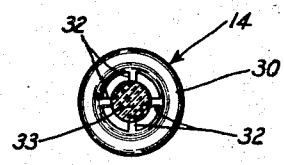
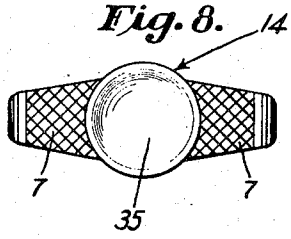


Fig. 5.

Fig. 8.



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HYPODERMIC SYRINGE

Noel J. Poux, Meadville, Pa.

Application November 4, 1946, Serial No. 707,646

8 Claims. (Cl. 128—220)

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The subject matter disclosed herein is related to the subject matter of my copending applications Serial No. 707,644, filed November 4, 1946, and Serial No. 707,645, filed November 4, 1946.

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.

Various types of syringes have been heretofore suggested and used which were 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 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. While syringes employing ampules of this type are satisfactory in their use, they are generally 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 syringe of this type 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 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 and guiding member when in use.

Various other objects and advantages of this invention will be more apparent in the course of

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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, partly in section, of the improved hypodermic syringe of my invention;

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

Fig. 3 is a longitudinal sectional view of my syringe, showing the ampule fully seated therein, and the position the plunger assumes after an injection has been made;

Fig. 4 is an elevational view, partly in section, of the body portion of the ampule to be used with my syringe;

Fig. 5 is a sectional view taken on line 4—4 of Fig. 2;

Fig. 6 is a detail view, partly in section, of one of the stoppers for the ampule body, as shown in Fig. 4;

Fig. 7 is a detail view of the other stopper therefor; and

Fig. 8 is a top view of my improved syringe, as shown in Fig. 3.

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 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 needle 9 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 consisting of a cylindrical thin-walled portion 30 which is compressible. This portion 30 has an axially arranged cylindrical hollow portion 31 open at one end for housing the outwardly extending end portion 12 of the needle 9, as shown in Fig. 1 of the drawings. The inner diameter of this hollow portion 31 is slightly less than the largest diameter of the frusto-conical shaped portion 8 of the body member 2. There is connected to the other end of the cylindrical portion 31 by means of relatively thin radial extending connecting portions 32, a solid plunger portion 33 having an enlarged head portion 34 which is depressed, as at 35, so as to provide a depression for receiving the thumb of the user to actuate the plunger in a manner to be described. 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 is a cylindrical tubular member, as shown in Fig. 4, made from glass, styrene, or any other suitable material impervious to liquids and capable of being sterilized. There is provided a pair of cylindrical plugs or stoppers 36 and 37 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 36 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 37, as shown in Fig. 6, 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 36. There is provided a skirt portion 21 which is spaced from the central portion 19 by an annular groove 22. This skirt portion fits over and around the outer end and side wall of the ampule end thereof being positioned in the annular groove 22 of the stopper. Such a construction is provided to prevent displacement of the stopper 37 from the end of the ampule when it is positioned in the syringe. On the outer side of the skirt portion 21, there is provided one or more 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 37 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 with the cylindrical portion 30 fitting around the frusto-conical shaped portion so as to protect this portion of the needle. A cork or stopper 27 is preferably inserted in the open end 5 to maintain the hollow portion 3 and the inner end 10 of the needle sterile. 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 medicant is disposed in the ampule 4 and confined between the stoppers 36 and 37 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 of the hollow portion or chamber 3 of the body member 2 with the stopper 37 being on the end first inserted. The member 14 is then removed from the closed end of the body member so as to expose the injecting end 12 of the needle. The combination cap and plunger member 14 is then positioned over the upper end of the ampule 4 with the walls of the cylindrical portion 31 extending down around the ampule and with the end of the solid plunger portion 33 positioned against the stopper 36 therein, as shown in Fig. 2. It will be understood that the outer diameter of the solid portion 33 is slightly less than the inner diameter of the ampule and that the inner diameter of the cylindrical portion 30 is slightly greater than the outer diameter of the ampule and that the outer diameter of the portion 30 is slightly less than the inner diameter of the hollow portion 3. 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 properly, the ampule 4 is withdrawn slightly or reciprocated by grasping the ampule holding portion 30 and compressing it so that the ampule is firmly grasped in order to draw fluid from the body of the patient into the closed chamber 26 at the bottom of the hollow portion 3, as shown in Fig. 2. This chamber is formed by the stopper 37 which acts as a piston when the ampule is reciprocated to withdraw liquid from the patient. 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 merely 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 37 between the inner wall of the chamber 3 and outer wall of the ampule. That is to say, the user of the syringe can determine 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. After the needle has been properly positioned, as above described, the ampule 4 is fully seated, and upon moving to its seat the stopper 37 is perforated by the inner end

10 of the needle with the extreme end being positioned in the recess or well 20 of the stopper. The V-shaped ridges 24 on the stopper 37 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 blood from the patient into the chamber 26 when the ampule is manipulated in the manner as hereinbefore described.

The syringe is then grasped by the finger portions 7 with the thumb of the user resting in the depression or well 35 in the outer end of the member 14. The radial portions 32 are then broken by twisting or forcing inwardly the plunger portion 33 relative to the cylindrical portion 30 so as to break the connection therebetween. The plunger portion is then forced inwardly by the thumb which in turn moves the piston stopper 36 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 cylindrical portion 30 to fill the space between the ampule and the inner wall of the hollow portion 3 so as to pilot the ample from being tilted or cocked when the plunger 33 is forced therethrough and acts to guide the plunger into the ampule. After all of the liquid has been injected, the stopper 36 is seated against the stopper 37 in the bottom of the ampule, as shown in Fig. 3. 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 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 for determining whether or not the injection when the needle is positioned in the patient is intraosseous or intravenous, 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 a combination cap and plunger member consisting of an open-ended hollow cylindrical portion adapted to fit around the ampule having a plunger portion detachably attached thereto at one end thereof, said plunger portion adapted to push 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 cylindrical portion is detachably connected to the plunger portion by means of a plurality of relatively thin radial extending portions.

3. A hypodermic syringe comprising, in combination, an elongated cylindrical hollow body member being open on 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 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 resilient 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 have its outer part snugly fit the end 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, and a combination cap and plunger member consisting of a hollow cylindrical portion adapted to act both as a cap portion and as a guide for said ampule having a plunger portion detachably connected thereto at one end thereof, said plunger adapted to push the first mentioned stopper inwardly through the ampule to force the liquid through said needle.

4. 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 through the open end thereof, a pair of resilient 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 a combination cap and plunger member consisting of a hollow cylindrical portion adapted to act both as a cap portion and as a guide for said ampule having a plunger portion detachably connected thereto at one end thereof, said plunger adapted to push the first

mentioned stopper inwardly through the ampule to force the liquid through said needle.

5. 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 resilient 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 inserted through the open end of said chamber with said last mentioned stopper adapted to be perforated by the needle point in said chamber, and a combination cap and plunger member consisting of a hollow cylindrical portion adapted to act both as a cap portion and as a guide for said ampule having a plunger portion detachably connected thereto at one end thereof, said plunger adapted to push 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 with said closed end being transparent, 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 the ampule and the other fitting in and around the end thereof and having an outer diameter slightly greater than the diameter of said hollow portion, said ampule disposed in said hollow portion and in one position adapted to be spaced from the inner bottom end of said hollow portion so as to provide a compartment in the bottom thereof, said last mentioned stopper adapted to act as a piston when the ampule is manipulated reciprocably so as to determine whether or not the needle is positioned correctly in the patient for an intravenous injection or one into the tissues with blood entering the transparent compartment in the bottom of said hollow portion and visible therein if the needle is positioned correctly for an intravenous injection, said last mentioned stopper adapted to be perforated by the needle point when said stopper is fully seated in another position in said hollow portion, and a combination cap and plunger member consisting of a hollow cylindrical portion adapted to act both as a cap portion and as a guide for said ampule having a plunger portion detachably connected thereto at one end thereof, said plunger adapted to push 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 through the open end thereof, a pair of resilient 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 a combination cap and plunger member consisting of a hollow cylindrical portion adapted to act both as a cap portion and as a guide for said ampule, said cylindrical portion being open at one end which end is adapted to engage the closed end of the body member when said member is disposed over and around the injection needle to protect the same, a cylindrical plunger portion of a smaller diameter having one end thereof detachably connected to the opposite end of said cylindrical portion which is adapted to be broken loose therefrom and forced against the first mentioned stopper and moved into and through the ampule together with the stopper to force the liquid from the ampule and through said needle.

8. A hypodermic syringe, as defined in claim 7, wherein the means detachably connecting the plunger to the cylindrical portion consists of a plurality of relatively thin radial extending portions.

NOEL J. POUX.

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