

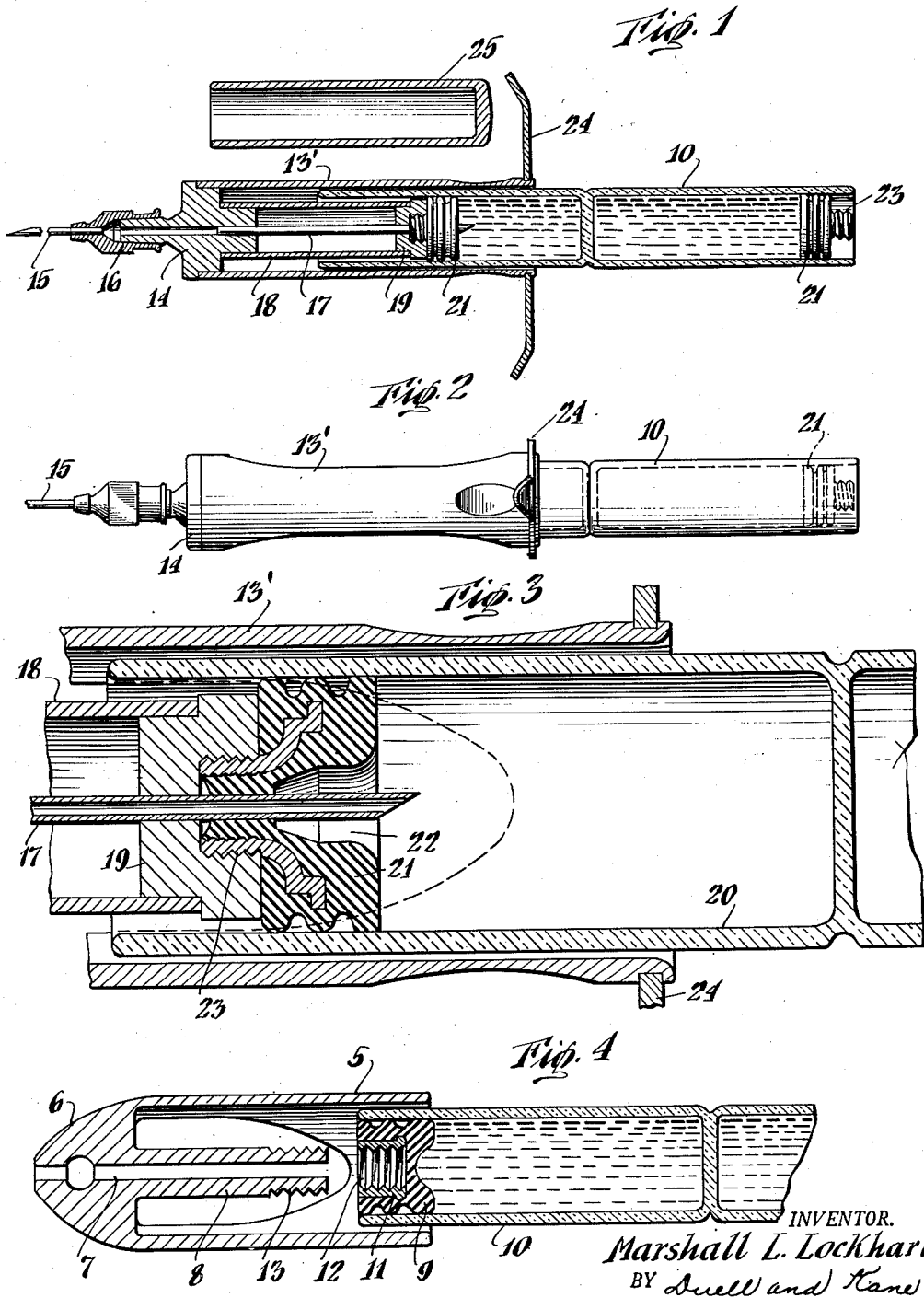
Sept. 18, 1951

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2,568,346

SYRINGE STRUCTURE

Filed Nov. 24, 1947



ATTORNEYS

UNITED STATES PATENT OFFICE

2,568,346

SYRINGE STRUCTURE

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Application November 24, 1947, Serial No. 787,683

9 Claims. (Cl. 128—220)

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This invention relates to a structurally and functionally improved syringe assembly and especially an assembly intended for hypodermic injections.

This application is a continuation in part of my prior application for United States Letters Patent, Ser. No. 658,670 on Closure, filed in the Patent Office on April 1, 1946, and now Patent No. 2,556,331.

In an ordinary type of hypodermic syringe, it has been common practice for a physician to determine whether the needle was lodged in a vein by penetrating the tissue with the needle point and thereafter, retracting the plunger of the syringe to an extent adequate to relieve the pressure within the barrel. That barrel being sufficiently transparent to enable observation of its interior, it is obvious that with the release of pressure, effected by retraction of the plunger, blood would flow from the inner end of the cannula if the needle was lodged in a vein. Thus, a physician has been able to act with assurance when administering venous injections.

Similarly in hypodermic syringe technique as heretofore practiced, it has been customary in connection with certain types of medicaments, to have them available in concentrated or solid forms until just before an injection was to be given. At that time, by using a suitable liquid (such as distilled water, normal saline solution, the patient's blood, etc.), it has been feasible to provide a proper injection solution within the syringe barrel. This has been achieved by placing the medicament within the barrel. Then by drawing a suitable quantity of liquid through the cannula and if necessary shaking the assembly, the medicament has been dissolved and dispersed within the barrel. Such drawing of liquid was conveniently effected by moving the plunger of the syringe assembly rearwardly to exert a suction action within the barrel. The control of the mixture has been capable of being readily supervised by the physician or operator, who after a proper solution was provided, would then inject the liquid medicament.

However, in the case of hypodermic syringe assemblies employing an ampule, it has not generally been feasible heretofore to follow the techniques aforeoutlined in order to aspirate. More particularly, an ampule—whether of the double-ended or single-ended type—has had its outer end or ends sealed by stoppers. These stoppers have been engageable with the thrust portion of the syringe or barrel. Therefore, when pressure has been exerted, the stopper of the ampule

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has been pierced by the inner end of the cannula and the thrust portion of the syringe barrel has caused the stopper to move rearwardly (under continuing pressure) within the ampule chamber to thus act as a piston to express the medicament through the cannula. As will be understood, unless the stopper has been modified so as to permit of an aspirating action, a physician would have great difficulty in determining whether the outer needle end was disposed in a vein. This is because it would not be feasible to move the stopper outwardly to relieve pressures or create a suction within the ampule chamber. Also, in no event has it been feasible to employ a concentrated or solid medicament within the ampule and which medicament would be mixed with a liquid to produce a fluid solution suitable for injection purposes.

With the foregoing in mind, it is a primary object of the present invention to provide in a syringe assembly involving an ampule, an improved structure which will permit of a ready manipulation of the stopper, such that a condition of sub-atmospheric pressure may be developed. Accordingly, it will be feasible for a physician or other operator to either deliberately draw liquids into the ampule or to allow such liquid to flow into the ampule body.

A further object is that of providing a structure which may readily be manipulated by the operator either for permitting a small quantity of blood to flow from the vein through the cannula to the interior of the ampule or else deliberately to draw a quantity of liquid (as in the case of preparing a solution) within the ampule body.

A still further object is that of furnishing a structure by means of which these results may be achieved and which will in no wise interfere with the ordinary manipulation of the parts of the assembly during injection.

Still another object is that of furnishing a design which will embrace parts individually simple in construction and capable of manufacture largely by automatic machinery and methods; such parts operating in a positive manner according to the will of the physician and moreover, allowing of the complete unsealing of an ampule should the operator desire such a result.

With these and other objects in mind, reference is had to the attached sheet of drawings and in which:

Fig. 1 is a sectional side view of a syringe assembly;

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Fig. 2 is a side elevation thereof with the parts axially rotated through a ninety degree angle;

Fig. 3 is an enlarged fragmentary sectional view of certain parts of the assembly; and

Fig. 4 is a sectional side view of an alternative form of construction.

Referring primarily to Fig. 4, it will be seen that an assembly has been illustrated corresponding to that shown in Fig. 8 of the drawings of my previously filed application Serial Number 658,670 lodged in the Patent Office on April 1, 1946 now Patent Number 2,556,331 dated June 12, 1951. Specifically, there has been shown in this view a metal holder including a barrel or tubular body 5 conveniently formed of metal and provided with a nose portion 6. The latter is formed with a slot 7 for the reception of a needle (not shown) but which has opposite pointed ends. One of these is for the penetration of tissue; the opposite end extending beyond the end of the thrust portion 8 to permit a piercing of the stopper 9 mounted by the ampule 10.

The stopper is preferably formed of rubber and has its outer face recessed to receive an insert or ferrule 11. The latter may conveniently be formed of metal. The bore of this insert is threaded as indicated at 12. Corresponding threads 13 are formed at the end of the thrust portion 8. The ferrule is associated with the stopper in a manner such that any probability of accidental detachment of these elements from each other is avoided.

In using an apparatus of this type it is obvious that with the needle in position, the ampule may be projected through the open end portion (not shown) of the barrel until the stopper is in contact with the thrust portion 8. At that point, the needle will conveniently have penetrated the stopper so that communication is established between the needle bore and the interior of the ampule. Continued pressure of the ampule in the direction of the outer end of the needle will result in the stopper moving rearwardly within the bore of the ampule. As a consequence of such movement, the stopper will act as a piston permitting of a hypodermic injection being given.

If the operator desires to relieve the pressure within the ampule body by moving the stopper outwardly, this made readily be achieved by properly rotating the ampule with respect to the thrust portion. Such rotation will have the effect of coupling the threads 12 and 13. Consequently, by a slight rearward movement, the pressure will be relieved to a point such that the physician or operator will be able to determine whether the needle is disposed within a vein or not. In fact, it will be feasible for the operator to completely withdraw the stopper from the ampule, should he so desire. Additionally, where it is desired to prepare a solution and the ampule stopper is accordingly disposed well within the ampule, the stopper may be partially withdrawn to function as a piston to exert suction. Therefore, if the outer end of the needle is immersed in liquid, such liquid will be drawn into the body of the ampule.

In the form of construction shown in Figs. 1, 2, and 3, a syringe has been indicated which may include a barrel 13' and a nose portion 14. This syringe may be formed of metal or may be designed so that it will be capable of manufacture from plastic materials. A needle 15 may be mounted by the nose portion 14 as indicated at 16. This needle may be connected to a second needle portion or be continued to provide an in-

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tegral part 17 extending through the thrust portion 18 and beyond the end 19 of the latter. That end, as shown especially in Fig. 3, may be in the form of a cap. The ampule indicated at 20 may be provided with a stopper 21 conveniently formed of rubber and having its inner face recessed as at 22. An insert may be imbedded in the stopper body 21. This insert preferably takes the form of a truncated cone terminating in a neck portion which is threaded as at 23. The face of the cap 19 is formed with a recess, the walls of which are also threaded so as to correspond to and cooperate with the threads 23.

Therefore, it is obvious that an operator may grasp the barrel 13' and insert an ampule through the open end of the same. Thereupon, the operator may extend his fingers around the wing portions 24 and press or project the ampule inwardly. As in connection with the previously described form of assembly, the end of the thrust portion will bear against the end of the stopper as the ampule is telescopically disposed with respect to that thrust portion. This will cause the inner needle portion 17 to be introduced through the neck of the preferably metallic insert so as to penetrate the stopper. Continued pressure will result in an ejection of the liquid through the cannula. If it is desired to retract the stopper for aspiration purposes, then a turning of the ampule with respect to the thrust portion will cause the threads of the insert and the cap 19 to interengage. Now, by exerting a pull on the ampule, the stopper may be retracted to a greater or lesser extent. When it is desired to detach the parts, this may be achieved by simply reversing the direction of rotation of the ampule with respect to the barrel.

Under certain circumstances, it may be desired to protect the point of the inner needle portion 17. To this end, a cover 25 in the form of a tube having one of its ends closed may be provided. The internal diameter of this tube is such that it may be telescopically disposed with respect to the thrust portion 18. The length of the tube 25 should preferably be sufficiently great that it will extend beyond the wing portions 24. The fit established between this tube or cover and the thrust portion is conveniently of the friction type. It is apparent that other forms of coupling might be employed.

Thus, among others, the several objects of the invention as afore noted are achieved. Obviously numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

What I claim is:

1. In a hypodermic syringe assembly in combination, a syringe including a barrel, a thrust portion extending into said barrel, an ampule having a closed end, a stopper slidably disposed within said ampule and engageable with said thrust portion as said ampule is projected within said barrel, an end forming a part of said thrust portion and provided with a screw threaded recess and an outwardly projecting screw threaded portion forming a part of said stopper and extendable into said recess, whereby—said threads engaging—said stopper may be retracted in a direction away from the closed end of said ampule.

2. In a syringe assembly, a stopper for an ampule, said stopper including a body formed with a recess in its outer face and said recess presenting screw threads.

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3. In a syringe assembly, a stopper for an ampule, said stopper comprising a resilient pierceable body formed with a recess and a tubular interiorly threaded insert disposed with said recess.

4. As an article of manufacture, an ampule stopper comprising a resilient body, a non-resilient insert embedded within said body and extending beyond the same, said insert being tubular and having threads at a point beyond said stopper body.

5. In a syringe assembly, a syringe body, a thrust portion forming a part of said body to engage the stopper of an ampule and the exterior face of said thrust portion being formed with threads adjacent its end to couple with threads formed in a recessed portion of such a stopper.

6. A hypodermic syringe assembly including in combination a barrel having an open end, a thrust portion extending into said barrel from the opposite end thereof, a needle mounted by said barrel and extending inwardly beyond said thrust portion, an ampule having an open end, a resilient stopper closing said ampule end, an insert of non-resilient material mounted against detachment from said stopper and formed with a threaded surface, the stoppered end of said ampule being insertable through the open end of said barrel, the end of said thrust portion being also threaded to engage the insert threads and secure said insert and stopper against movement with respect to said barrel and with the adjacent needle end projecting through said stopper.

7. A hypodermic syringe assembly including in combination a barrel having an open end, a thrust portion extending into said barrel from the opposite end thereof, a needle mounted by said barrel and extending inwardly beyond said thrust portion, an ampule having an open end, a resilient stopper closing said ampule, an insert of non-resilient material mounted against movement by said stopper and comprising a conical body having its reduced end projecting beyond the outer face of said stopper and formed with threads, the stoppered end of said ampule being insertable through the open end of said barrel and the end of said thrust portion being formed with a threaded recess to receive the threaded end of said insert and secure the latter and stopper against movement with respect to said barrel.

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8. A syringe structure including in combination a barrel having an open end and an opposite closed end, a thrust portion extending inwardly of said barrel from the closed end thereof, a needle enclosed by said thrust portion and extending in the direction of said open end to a point beyond said portion, an ampule insertable through the open end of said barrel, a stopper slidably mounted by said ampule and penetratable by said needle, said stopper being engageable with said thrust portion to cause the latter to project said stopper within said ampule as the ampule is moved towards the closed end of said barrel and engageable surfaces forming a part of said stopper and thrust portion whereby they may be coupled against relative movement with the needle extending through said stopper.

9. A syringe structure including in combination a barrel having an open end and an opposite closed end, a thrust portion extending inwardly of said barrel from the closed end thereof, a needle enclosed by said thrust portion and extending in the direction of said open end to a point beyond said portion, an ampule insertable through the open end of said barrel, a stopper slidably mounted by said ampule and penetratable by said needle, said stopper being engageable with said thrust portion to cause the latter to project said stopper within said ampule as the ampule is moved towards the closed end of said barrel and screw threads forming a part of said stopper and thrust portion whereby upon the ampule and barrel being turned with respect to each other said screw threads will be engaged to couple said stopper and thrust portion against relative movement with the needle extending through said stopper.

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