Feb. 21, 1956 R. L. HUBER 2,735,428

HYPODERMIC SYRINGES

Filed April 26, 1954

Fig. 1

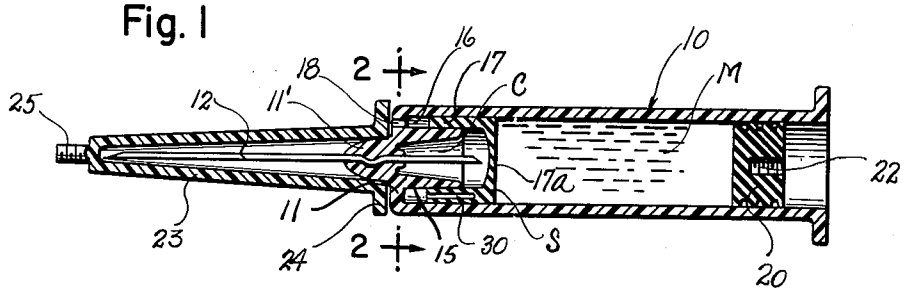
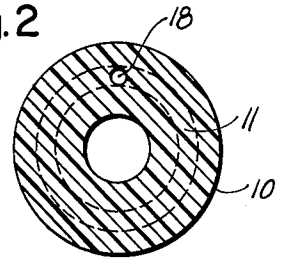



Fig. 2



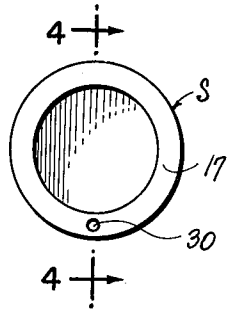




Fig. 3

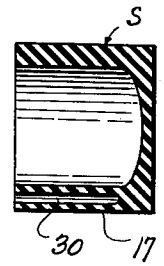



Fig. 4

Fig. 6

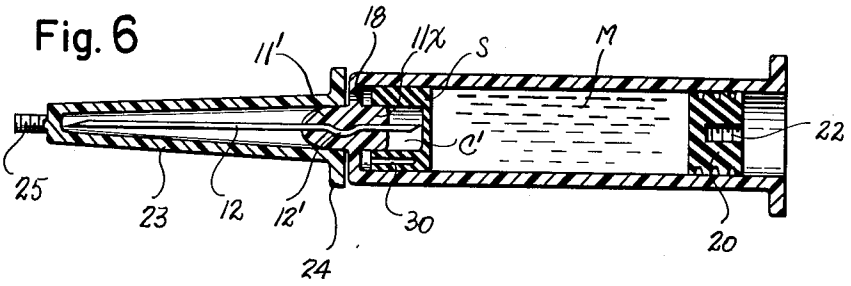
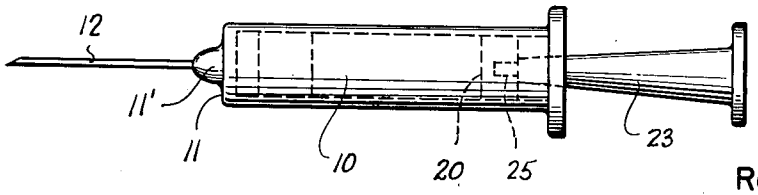



Fig. 5




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# HYPODERMIC SYRINGES

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Application April 26, 1954, Serial No. 425,443

4 Claims. (Cl. 128—218)

This invention relates to hypodermic syringes and it has reference more particularly to instruments of that kind known by persons of the medical profession as "one-shot disposable syringes," that is, syringes that are designed to be used but once and then thrown away.

It is the principal object of this invention to provide a hypodermic syringe having a barrel or cylinder with the hypodermic needle sealed therein, and so equipped with stopples that it serves as the container for the medicament to be injected and thus eliminates the usual costs and handling of the conventional glass ampoule for the medicament; this characterizing feature of the invention placing the present syringe within the range of practical economy.

More specifically stated, the objects and advantages of the present invention reside in the provision of a syringe comprising a cylindrical barrel containing the medicament, equipped at one end with a closing wall through which a hypodermic needle is sealed, and fitted with a partitioning stopple normally protectively overlying the inner end of the needle and sealing the medicament therefrom, and a piston stopple that is fitted in the other end of the barrel and is movable to effect the movement and piercing of the partitioning stopple by the needle and the forcible ejection of the medicament through the needle.

It is also an object of the invention to provide a syringe as above stated wherein the extended outer end portion of the needle, prior to its use, is encased by and aseptically sealed within a removable sheath or guard; this being so designed that upon its removal from the needle, it is readily attachable to the piston stopple as an actuator therefor to effect injection.

It is a further object of the invention to provide a hypodermic syringe of the character above stated wherein the needle has a pointed inner end portion normally extended into the barrel within a blood cup; this cup being defined by the partitioning stopple the side walls and end wall of the barrel. The partitioning stopple is adapted to respond to variations in pressures as applied thereagainst by manipulation of the piston stopple, thus providing for aspirating by a proper manipulation of the piston stopple, without admittance of aspirated blood to the medicament. The construction and arrangement of these parts providing also for the forcing, by pressure applied against the medicament by the piston stopple, of the partitioning stopple against the needle point to cause the latter to pierce the stopple wall and permit ejection of the medicament by the inward movement of the stopple.

Further objects and advantages of the present invention reside in the details of construction and use of the barrel as a container for the medicament; in the provision of the blood cup to a separate aspirated blood from the medicament; in the form of needle and in its relationship to the blood cup and its enclosing stopple, and in the provision of means for the escapement of trapped air from the barrel and from the cup.

In accomplishing the above mentioned and various other objects of the invention, he has provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:



Fig. 1 is a longitudinal sectional view of a "one-shot disposable syringe" embodying the improvements of the present invention therein.

Fig. 2 is an enlarged, cross-sectional view through the end closing wall of the barrel, taken on line 2—2 in Fig. 1.

Fig. 3 is an end view of the closure cap and stopple that is directly associated with the blood cup.

Fig. 4 is a longitudinal section of the blood cup closure or cover stopple taken on line 4—4 in Fig. 3.

Fig. 5 is a side view of the syringe with parts as assembled ready for an injection.

Fig. 6 is a longitudinal section of the syringe illustrating an alternative structure of the sealed needle chamber.

Referring more in detail to the drawings:

In its present preferred form of construction, the syringe of this invention comprises a cylindrical barrel 10, preferably of transparent plastic, or the like, open at one end, and closed at its other end by an integral wall 11 through which a tubular needle 12 is sealed to extend in the axial center line of the barrel; the needle being beveled to sharpened points at its outer and inner ends, and as applied it comprises a relatively long outer end portion extending from the wall 11 into the barrel. As herein shown, the needle is formed with an arcuate bend, as at 12', which is sealed in the end wall 11 to prevent any possible slippage of the needle in the wall.

Formed within the barrel, integral with the end wall 11 thereof is a cylindrical cup *c*; this is referred to as the "blood cup" and it comprises a cylindrical body 15 that is coaxial of the barrel 10, spaced slightly from the cylindrical walls of the barrel thus providing the intermediate annular channel 16. Applied within the barrel and over the open end of the blood cup, is the barrel partitioning stopple S comprising a cylindrical body 17 of rubber that is slidably fitted for limited longitudinal movement in the annular channel 16 between the cup and barrel walls, and having a thin closing wall 17*a* at one end. It will be noted that stopple S performs two separate and distinct functions. It seals the needle from the medicament and also is so constructed as to seal the needle in a sterile chamber and thus prevent contamination by air entering through the air relief hole 18.

The inner end portion of the needle 12 is contained coaxially in the blood cup and its point projects slightly therefrom and is normally close to the wall 17*a* as seen in Fig. 1. Thus the blood cup is normally covered by the transparent stopple S which operates as a closure for that end of the medicament containing compartment of the barrel 10.

In the bottom of the annular channel 16, as formed by the end wall 11 of the barrel 10, is a small hole or perforation 18 serving as an air vent. By provision of this vent, air trapping in the channel 16 that would be detrimental, by reason of the creation of recoil pressure against the stopple is avoided.

The liquid medicament M is contained in the barrel 10 between the stopple S and a piston stopple 20 fitted in the other end portion of the barrel as seen in Figs. 1, 5 and 6. This latter stopple is of rubber, or the like, and is formed with a central, threaded socket 22 open to its outer end.

The outer end portion of the needle 12 is normally encased in a hollow guard or sheath 23, the inner end portion of which is removably fitted over a central boss or projection 11' on the end wall 11 of the barrel. About this end of the sheath is an annular, projecting flange 24. At the outer end of the sheath is a short threaded stem 25. When the sheath has been removed from about the needle, the stem 25 thereof can be threaded into the socket 22 of the stopple 20, to attach the part 23 to the stop-

ple as an operating stem. The flange **24** about the larger end of the sheath serves as a finger grip in the manipulation of the syringe. The open end of barrel **10**, likewise, is formed with an extended annular flange **10***f* serving as a finger hold.

Fig. 6 illustrates an alternative construction wherein a boss or protrusion **11***x* is of substantial size and extends a substantial distance into the barrel. The inner wall of the stopple S fits about this boss and forms the sealed chamber C' wherein the needle is protected against contamination. The stopple S may be moved inwardly or outwardly as previously described in relation to the construction of Fig. 1.

It is observed in Figs. 1 and 4 that the wall **17** of stopple S is formed with an air cell **30** opening to channel **16**. This cell extends substantially the full length of and is quite close to the inner surface of wall **17** and permits of a certain amount of collapse of this wall away from the cup wall for escape of trapped air from within the cup as the stopple is forced toward the end wall **11**.

Instead of the needle herein shown, one may alternatively employ a detachable bi-pointed needle with screw on hub for its securement to the barrel.

Preferably the barrel **10** is treated with silicon before loading for protection of the medicament.

Assuming the various parts to be so constructed and to be assembled as shown in Fig. 1, and with the barrel properly charged with the liquid medication, the normal use of the syringe would be as follows:

First, the needle sheath or guard **23** is removed from about the outer end of the needle and its attaching stem 25 is threaded into the socket **22** of the piston stopple **20**. The parts then assume the relationship shown in Fig. 5. The needle is then inserted into the proper site in a muscle of the patient. Aspiration is then effected by a slight outward drawing of the stopple **20** by means of the attached member **23**. If a drop of blood appears at the inner end of the needle this is an indication that the needle is in a blood vein, and it should be partly withdrawn, its direction slightly changed, and again inserted to proper depth where aspiration can be repeated. This partial withdrawal spares the patient unnecessary painful repenetration of the sensory nerve layer in the region of the skin.

When the needle is properly set, the medication is injected by applying the injecting pressure to the piston actuating stem **23**. When pressure is applied, the stopple S is moved inwardly and its end wall **17***a* is pressed against the inner end point of the needle and is pierced thereby. Then continued forward pressure on the piston stopple discharges the liquid medicament through the needle into the patient. When injection has been completed, the needle is withdrawn from the patient and the syringe thrown away.

As thus provided, the syringe is a practical, easy to use instrument, and by reason of the elimination of requirement for use and handling of the usual glass ampule for containing the medicament, it is brought within the range of practical economy.

This application is a continuation-in-part of allowed application, Serial No. 307,066, filed August 29, 1952, and now abandoned.

Having thus described the invention, what is claimed as new therein and desired to secure by Letters Patent is:

1. A hypodermic syringe comprising a cylindrical barrel formed with a closing wall at its outer end and a hypodermic needle sealed through the closing wall with one end of the needle extending into the barrel said closing wall having an air relief port therethrough, a needle pierceable stopple fitted in the barrel adjacent said end of the needle, means integral with said closing wall and means integral with said stopple co-acting to form a sealed chamber surrounding said inner end of the needle, a piston stopple in the inner end of the barrel and a medicament compartment between the stopples.

2. A hypodermic syringe comprising a cylindrical barrel formed with a closing wall at its outer end and a hypodermic needle sealed through the closing wall, a blood cup formed within the barrel integral with the closing wall and about the inner end of the needle, said cup having cylindrical side walls spaced from the barrel walls and providing an annular channel between the barrel and cup walls; a needle pierceable partitioning stopple having a cylindrical body adapted to be slidably fitted in the barrel between the barrel and cup walls within annular channel and having an end wall overlying the inner end of the needle for piercing thereby; a piston stopple fitted in the inner end portion of the barrel for confining a liquid medicament between the stopples; said partitioning stopple serving as a closure cap for the blood cup and being movable under the influence of suction or pressure created by the actuation of the piston stopple to effect aspirating suction in the cup or piercing of the partitioning stopple by the needle for injection of the medicament.

3. A hypodermic syringe as recited in claim 2 wherein the closing end wall of the barrel has an air port formed therethrough, opening into said annular channel.

4. A hypodermic syringe as recited in claim 2 wherein the closing end wall of the barrel has an air port formed therethrough, opening into said annular channel and wherein the cylinder body of said pierceable stopple is formed with a cell extending longitudinally of a side wall thereof and close to the cup wall, thus to permit an outward collapse of an inner portion of said cup wall along the said cell under influence of air trapped under pressure in the cup, for the escape of trapped air from the cup along the collapsed wall into the said annular channel.

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