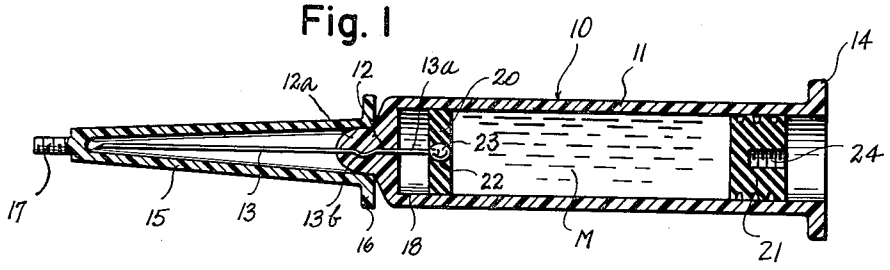
Feb. 21, 1956 R. L. HUBER 2,735,430

HYPODERMIC SYRINGES

Filed Nov. 19, 1954

Fig. 1



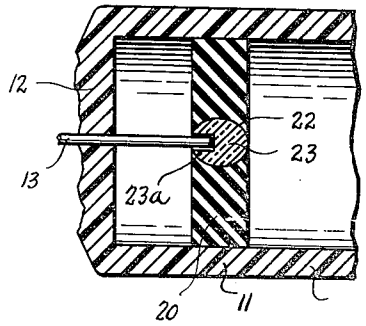
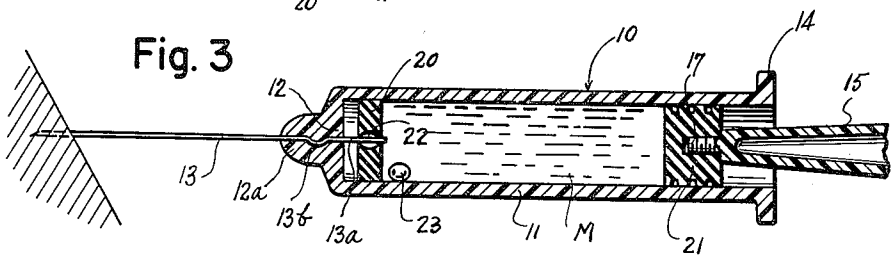


Fig. 2

Fig. 3



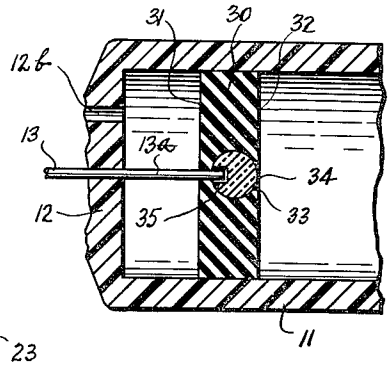


Fig. 4

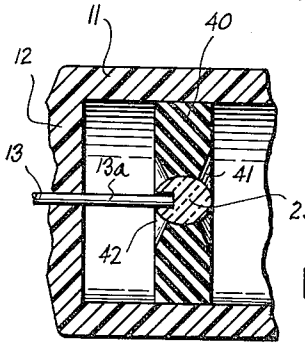


Fig. 5

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HYPODERMIC SYRINGES

Ralph L. Huber, deceased, late of Seattle, Wash., by Jennie L. Huber, administratrix, Seattle, Wash.

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5 Claims. (Cl. 128—218)

This invention relates to hypodermic syringes and it has reference more particularly to syringes commonly referred to as "one shot disposable syringes" which are designed to be used only once and then thrown away. In addition, it refers more specifically to one shot disposable syringes which are "loaded" or filled by the syringe manufacturer or pharmaceutical house with the medicament to be injected into the patient.

It is the principal object of this invention to provide a hypodermic syringe wherein a simple and inexpensive means is provided for preventing the medicament contained in the syringe from entering the bore of the hypodermic needle until immediately prior to the administration of the medicament into the patient.

More specifically stated, the objects and advantages of the present invention reside in the provision of a simple and inexpensive means whereby the syringe may be loaded or filled with the medicament and stored for an indefinite period of time with the inner end of the needle, which extends within the syringe barrel, sealed from the medicament so as to prevent crystallization of the medicament and the resulting plugging or restriction in the bore of the needle.

A further object of this invention is to provide a sealing means for the inner end of the hypodermic needle which may be quickly and easily removed to permit the injection of the medicament from the syringe barrel through the hypodermic needle.

It is another object of this invention to provide a sealing means for the inner end of the needle which is readily removable incident to the inward movement of the syringe plunger against the contained medicament and which is extremely inexpensive in cost and simple to assemble.

Further objects and advantages of the present invention reside in the details of constructions and manner of application of the needle sealing means and in the manner of its removal.

In accomplishing the above mentioned and other objects of the invention, I have 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.

Fig. 2 is an enlarged sectional view illustrating the removable means as embodied in a rubber stopple and enclosing and sealing the inner end of the needle.

Fig. 3 illustrates the sealing means removed from the inner end of the needle and the needle extending beyond the stopple into the medicament.

Fig. 4 illustrates in enlarged sectional detail an alternative construction of a syringe barrel wherein a vent is provided and an alternative manner of mounting the needle sealing means within the stopple.

Fig. 5 illustrates still another alternative form of stopple in which the needle sealing means is contained.

Referring more in detail to the drawings:

In its preferred form of construction, the syringe, designated in its entirety by reference numeral **10**, comprises a cylindrical barrel **11**, preferably of transparent plastic, which is open at one end and closed at the other end by an integral endwall **12** through which a tubular hypodermic needle **13** is sealed to extend in the axial center line of the barrel. As is illustrated in the drawings, the inner end portion **13*a*** of the needle extends a substantial distance into the barrel chamber. The needle is of conventional type and is beveled to a sharpened point at its outer end and the needle is formed with an arcuate bend intermediate its ends, as at **13*b***, which is sealed in the endwall **12** to prevent any possible slippage or rotation of the needle in the endwall. At that end of the barrel which is opposite the closed end, is a circular flange or collar **14** which surrounds the barrel. This flange provides a finger hold to be gripped by the administrator when injecting the medicament.

The outer end portion of the needle **13** is normally, prior to use, contained or enclosed within a hollow guard or sheath **15**, the inner end portion of which is removably fitted about a boss or outward projection **12*a*** on the endwall **12** of the barrel. About the inner end of the sheath is an annularly projecting flange **16** and at the outer end of the sheath is a short threaded stem **17**. When the guard or sheath is removed, it is employed as is illustrated in Fig. 3, as a pusher or operating stem to effect inward movement of the piston stopple and this causes the medicament to be ejected from the barrel.

The medicament is confined within the barrel **11** between two movably disposed stopples **20** and **21**. The stopple **20** is positioned near the forward end of the barrel, spaced from the endwall **12**, and is formed with a central, axial passage therethrough, as at **22**, in which is fitted a bead **23**. The bead, when in place, seals or closes the passage through the stopple. The stopple **21** serves as a medicament ejecting piston and is fitted in the outer end of the barrel, as illustrated in Figs. 1 and 3. Each of the stopples is of rubber or like material and the stopple **21** has a threaded socket **24** open to its outer end. This threaded socket is adapted to receive the threaded stem **17** of the sheath **15** after the sheath has been removed from about the needle and when so assembled, the parts **15** and **21** serve as a plunger for ejection of the medicament through the needle.

The essence of this invention resides in the provision of the stopple **20** in which comprises removably mounted the bead **23** which seals off the inner end **13*a*** of the needle **13** from the medicament. The axial passage **22** through the stopple **20** is of such size as to readily receive the bead **23** and to releasably retain the bead in fixed position and in a liquid tight fit. It is preferable that the stopple **20** be of relatively soft, resilient materials so that it may be readily moved and the bead released.

The bead may be of any desired or required size and shape and as is clearly indicated in Fig. 2, it has an axial bore **23*a*** which extends only a portion of the way through it. The size of the bore is such that the inner end of the needle is freely received thereinto and with clearance thereabout.

When it is desired to administer the medicament, the bead may be easily, and quickly displaced from the inner end of the needle in the following manner.

The guard or sheath **15** is taken from about the needle and its shank **17** is threaded into the socket **24** of the stopple **21**. Then, by slight forward movement of the stopple **21**, a pressure will be exerted through the medicament upon the stopple **20** so as to move it toward the closed end of the barrel as is noted in Fig. 3. This forward movement of the stopple will release its hold upon the bead and so displace it that by an upward inclination

of the syringe, the bead will readily fall or be displaced from about the inner end of the needle. When so removed from the stopple, the bead **23** is free in the barrel and may serve as an agitator to thoroughly dissolve and mix the medicament prior to injection. Once the bead has been removed, the needle is injected into the patient and the administrator may then apply additional pressure on the stem **15** and cause the stopple **21** to be moved inwardly into the barrel and cause the ejection of the medicament through the hypodermic needle into the patient.

In Figs. 4 and 5, I have illustrated slightly modified forms of construction. In these figures, common parts are designated by common reference numerals.

In Fig. 4, the end wall **12** of the barrel has a port or passage **12*b*** formed therethrough from the exterior of the barrel to the interior. The purpose of this passage is to permit the escapement of air which is compressed by the forward movement of the stopple. In this alternative construction, the stopple is designated **30** and has a forward end wall surface **31** and a rearward wall surface **32**. The stopple is formed with an axial passage **33** which is of two diameters. At the forward wall surface **31**, the passage is of relatively small diameter so that the needle projecting therethrough will be gripped or engaged in a sealing engagement by the stopple. The bead **34** is inserted through the opening in the wall surface **32** and the passage at this end is of substantially greater diameter. The purpose of this construction is to seal the stopple about the needle as well as about the bead which is lodged within the bead recess **35**. When provided with the port **12*b***, contaminating air could and would be permitted to enter the barrel and contaminate the inner end of the needle if the inner end of the needle were not sealed as herein illustrated and described.

In this construction, the bead is removed from the needle in substantially the same manner as previously described. A pressure is applied against the stopple **21** and medicament which, in turn, will force the stopple **30** forward and cause the displacement of the bead therefrom into the medicament. The air vent **12*b*** permits the air to escape from the area between the stopple wall **31** and the endwall **12** of the barrel so that there is no entrapped or compressed air to restrain the forward movement of the stopple.

The alternative construction illustrated in Fig. 5 merely shows a stopple **40** wherein there are coaxial conical recesses **41** and **42** in its opposite faces which reduce the area in the stopple passage which engages and retains the bead in position. This construction permits the bead to be more readily assembled in the stopple and it also permits the bead to be more readily removed from engagement or retention with the stopple. If desired, a similar result could be obtained by merely reducing the thickness of the stopple so that it would engage only a portion of the bead as herein illustrated.

The several constructions herein illustrated and described also provide the additional advantage that a syringe employing a stopple **20** such as illustrated in Fig. 1 will permit aspiration prior to the injection of the medicament. This would be accomplished by an outward movement of the stopple **21** so as to cause a decreased pressure in the area **18** which lies between the stopple **20** and the endwall **12** of the barrel. After the administrator has aspirated to determine that the needle is injected in the proper location, he may then proceed to remove or displace the bead from the stopple in the manner hereinbefore described.

While there are above disclosed, several alternative embodiments of my invention, it is believed to be readily apparent that it is possible to produce still additional alternative constructions without departing from the inventive concept herein disclosed. It is desired, therefore, that only such limitations be imposed on the appended claims as are stated therein, or as may be required by the prior art. The invention resides in the provision of means for sealing the inner end of the needle in a manner which may be readily removed at the time it is desired to eject the medicament from the syringe.

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

1. A hypodermic syringe of the character described comprising a barrel formed with a closing end wall at one end, a hypodermic needle sealed through said end wall with the inner end of the needle extending into the barrel, a bead stopple disposed in the barrel adjacent the inner end of the needle, an axial passage through the bead stopple, a bead removably secured in the passage and said bead having a bore therein adapted to receive the inner end of the needle.

2. A hypodermic syringe as in claim 1 wherein a piston stopple is removably disposed in the outer end of the barrel and adapted to exert pressure upon the bead stopple to cause forward movement thereof for disengagement from the bead.

3. A hypodermic syringe as in claim 1 wherein the bead stopple has a coaxial conical recess on its opposite end surfaces.

4. A hypodermic syringe as in claim 1 wherein the passage in the bead stopple is of two diameters and the bead is disposed in the portion of larger diameter.

5. A hypodermic syringe as in claim 1 wherein the end wall of the syringe has a port therethrough and the bead stopple sealingly engages the needle forwardly of the bead.

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