United States Patent [19]

Koenig

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[54] **SYRINGE WITH NEEDLE DESTROYING MEANS**

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[52] **U.S. Cl.** **225/1**; 225/93; 225/102; 128/218; 206/223

[51] **Int. Cl.** **B26f 3/00**

[58] **Field of Search** 225/1, 93, 94, 102, 104

[56] **References Cited**

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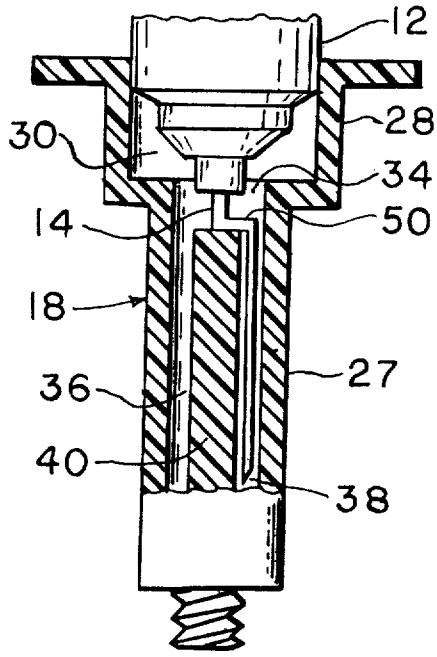
[57] **ABSTRACT**

A syringe is provided with a piston rod having a chamber offset from the longitudinal axis of the rod for receiving a syringe needle for destroying it and a head having a recess coaxial with the rod for receiving a distal portion of the syringe barrel. After use, the needle is inserted into the offset chamber and the distal end of the barrel is inserted into the recess of the head to align the barrel with the rod, and the barrel and rod are rotated relative to each other for twisting the needle about the axis of the rod.

8 Claims, 7 Drawing Figures



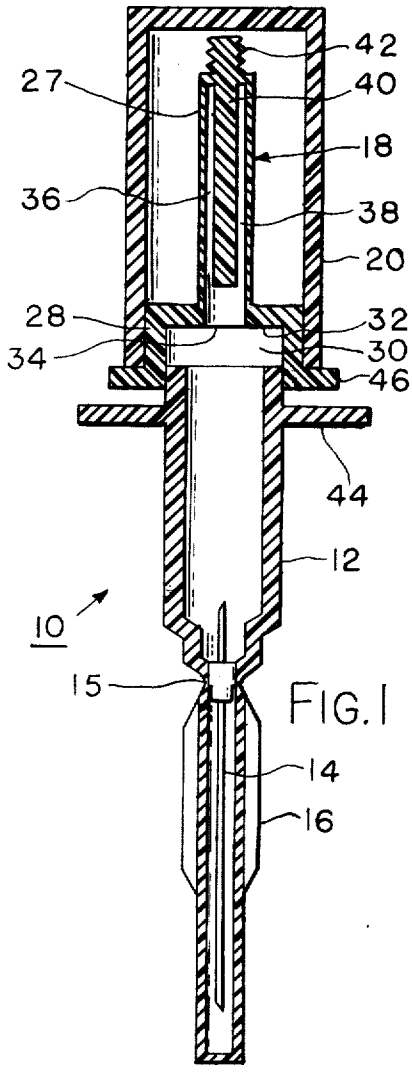


FIG. 1

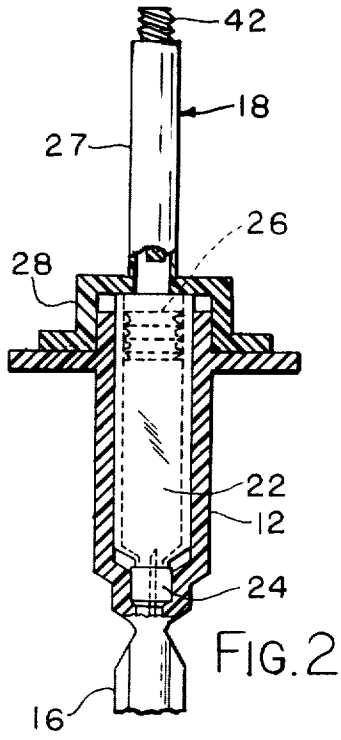


FIG. 2

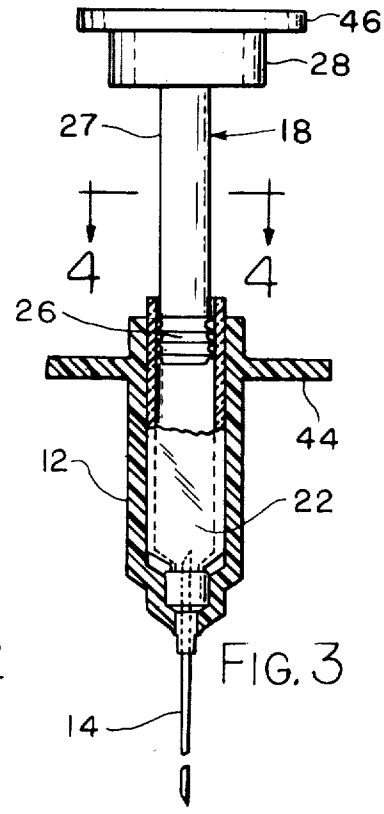
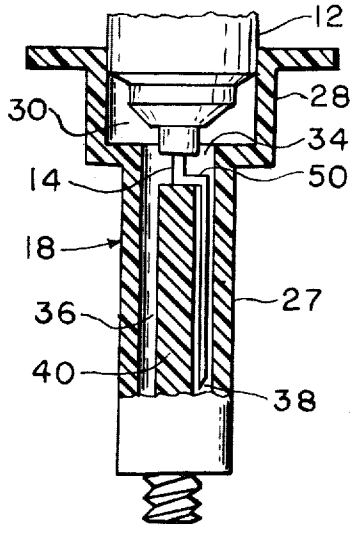


FIG. 3

FIG. 6



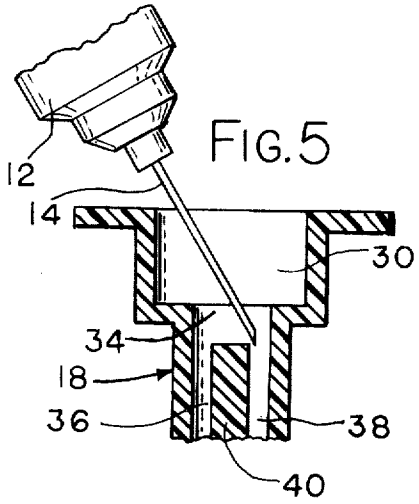


FIG. 5

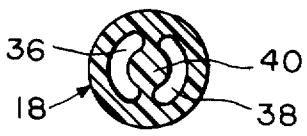


FIG. 4

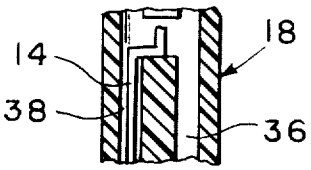


FIG. 7

SYRINGE WITH NEEDLE DESTROYING MEANS

BACKGROUND OF THE INVENTION

This invention relates to syringes and more particularly to disposable syringes adapted to be destroyed before disposal.

Disposable or single-use hypodermic syringes are extensively used in the medical field because they are packaged in sterile condition and ready for immediate use. It is, of course, important to provide for the disposal of single-use syringes so that they cannot be reused by unauthorized persons. To properly perform and encourage the destruction of such used syringes, the destruction must be capable of being accomplished safely, easily and conveniently.

While a member of the syringe package, such as a sheath, is conveniently used, the destruction is not always accomplished in a safe and easy manner. For example, in some cases, the needle is relatively difficult to break, since it often requires considerable back-and-forth bending. This requires time and effort on the part of the user and, in some cases, is dangerous. These difficulties tend to discourage complete destruction of the needle by the user.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a syringe having means for safely, easily and conveniently rendering the needle unusable after use.

Another object of the present invention is to provide a packaged syringe wherein a member thereof is usable to safely and easily break the syringe needle to prevent reuse of the syringe.

Still another object is to provide a relatively simple and safe method of destroying the syringe needle after use.

In accordance with one aspect of the present invention, a member of a packaged syringe is provided with a chamber having at least a portion offset from the longitudinal axis of the member for holding a portion of a bent syringe needle that is offset from the normal axis of the needle for rotating the needle portion relative to the syringe barrel upon relative rotation between the member and the barrel.

These, as well as other features and advantages of the present invention, will become apparent from the following detailed description and accompanying drawing wherein like reference numerals refer to like parts.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational sectional view of a packaged hypodermic syringe in accordance with a preferred embodiment of the present invention;

FIG. 2 is an elevational view, partly in section, of the packaged syringe of FIG. 1 but with the cover removed and an ampoule disposed in the syringe;

FIG. 3 is an elevational view, partly in section, illustrating the syringe of FIG. 2 in condition for use;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary view, partly in section, illustrating initial insertion of the needle into the piston rod of the syringe during the destruction of the needle;

FIG. 6 is a fragmentary view, partly in section, illustrating the position of the needle after it has been fully inserted into the piston rod; and

FIG. 7 is a fragmentary sectional view illustrating a portion of the piston rod containing the needle after the needle has been broken.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and particularly to FIG. 1, a packaged syringe 10 is shown including a barrel 12 having a double-ended cannula or hollow needle 14 fixed to the distal end of the barrel and provided with a needle sheath 16 which may be integrally formed with the barrel and connected by an easily broken section 15 at its upper end. A hollow piston rod 18 is shown closing the proximal end of barrel 12 and may be spot-welded to the barrel. A cover 20 is shown enclosing the piston rod 18 and may be connected by a spot-weld to the piston rod. Where cover 20 is used, it may be conveniently provided with a label. The above-mentioned welds are relatively easily broken by relative rotataion between the syringe package members and provide an indication, when present, that the package was not previously opened. The syringe barrel 12 is adapted to receive a medicament-containing cartridge or ampoule 22, as seen in FIGS. 2 and 3. The ampoule 22 includes a cap 24 having a pierceable rubber diaphragm therein closing the distal end of the ampoule, and a piston 26, such as an internally threaded rubber piston, sealingly engaging the walls of the ampoule above the medicament. Thus, in the illustrated embodiment, the packaged syringe 10 includes the barrel 12 and piston rod 18 that form a cartridge-type syringe which, when assembled with ampoule 22 as seen in FIG. 3, is in condition for use.

The piston rod performs multiple functions which will become apparent hereinafter. The piston rod includes a cylindrical shank 27 and an enlarged cylindrical head 28 having a cylindrical recess or bore 30 which is sized to slidingly receive the proximal end of barrel 12, as seen in FIGS. 1 and 2. Recess 30 has a bottom wall 32 having a centrally located hole 34. The piston rod 18 is provided with a pair of holes shown as elongated passageways or chambers 36 and 38 which are closed at the bottom and are off-center or displaced from the longitudinal axis of the piston rod but open into hole 34 and recess 30. In cross-section, as seen in FIG. 4, each of the holes or chambers 36 and 38 is arcuate and separated by a central core portion 40 so that they are completely closed except where they open into hole 34. Either of these chambers are adapted to be used in destroying the needle 14 after it has been used, as shown in FIGS. 5–7 to be described. The upper end of rod 18, as seen in FIG. 1, is provided with an integral threaded stud 42 which is adapted to be connected with the piston 26 (FIG. 3) during use of the syringe.

In using the syringe, the piston rod 18 and cover 20 are separated from each other and from barrel 12, and the ampoule 22 is inserted into the breech end of barrel 12, the upper end of the ampoule extending above the upper end of the barrel. The piston rod 18 is then positioned so that the recess 30 receives the upper end of the ampoule 22 and barrel 12. The piston rod is then moved downwardly, as seen in FIG. 2, relative to the barrel 12 so that the bottom wall 32 engages the end of ampoule 22 and causes the proximal pointed end of needle 14 to pierce the diaphragm of cap 24 and communicate with the medicament within the ampoule. Next, the piston rod is removed from the position

shown in FIG. 2, inverted, and the stud 42 threaded into piston 26 as seen in FIG. 3. The sheath 16 may then be rotated relative to barrel 12 to break its relatively fragile connection with the barrel. Barrel 12 is shown provided with a radial flange 44 and the piston rod 18 is provided with a flange 46 at its proximal end for facilitating movement of the piston rod and piston 26 during use of the syringe.

After the syringe has been used, destruction of the needle so that it cannot be used again is accomplished, in accordance with the illustrated embodiment, by first removing the piston rod 18 from the barrel 12 and inserting the distal end of needle 14 through the recess 30, opening 34 and into one of the chambers 36 or 38, for example, into chamber 38 as seen in FIG. 5. The piston rod 18 and barrel 12 are then manually moved toward each other. During this movement, the needle necessarily bends, generally in one direction and then in the other, with the distal end of the barrel 12 entering the recess 30 and being engaged and guided by the walls of the recess, as indicated in FIG. 6. As the barrel 12 is forced into the recess, it becomes aligned with the recess, that is, the longitudinal axis of the barrel becomes substantially coincident with the axes of the recess 30 and shank 27 of the piston rod. This produces a severe bend as indicated at 50 which may cause the needle to break or become separated from the needle ferrule and barrel. To insure that the needle has been broken and to break it if it has not previously been broken upon axial movement of the barrel into the piston rod as described, the barrel 12 is grasped with one hand and the piston rod 18 with the other and the two are rotated relative to each other. This relative rotation causes a side wall of the chamber 38 (or core 40) to engage the portion of the needle which is offset from the normal longitudinal axis of the needle and which is disposed in the chamber 38, and rotate or twist it about the normal longitudinal axis of the needle and barrel. This causes the needle to break off if it was not previously broken. As seen in FIG. 7, the broken needle has been rotated 180° from the position shown in FIG. 6. With the syringe barrel closing the proximal end of the piston rod 18, the broken needle is retained in the piston rod which may be discarded without danger of the needle being reused.

With the radially innermost walls of each of the chambers 36 and 38 radially outwardly of the longitudinal axis of the rod 18, and the radially outermost walls of each chamber spaced inwardly from the outer periphery of the rod, as is apparent from FIG. 4, at least a portion of the needle 14 is readily forced into and held in a position radially offset from the axes of the rod and barrel for easy destruction.

The member 18, in addition to serving as a needle destroyer (FIGS. 5–7), serves as a piston rod (FIG. 3), serves to arm the syringe by moving the ampoule axially in the barrel (FIG. 2), and also may serve as a cover where the cover 20 (FIG. 1) is not used.

The members of the packaged syringe, which include the barrel 12, sheath 16, cover 20 and rod 18, may be formed of a suitable plastic such as polypropylene. Also, a needle destroyer in accordance with the present invention may be used in association with various types of syringes other than that of the cartridge or fixed needle type. For example, the present invention may be used with syringes employing detachable, hub mounted needles.

While the core 40 of member 18 is shown extending over a major portion of the length of the shank 27, it may economically be shortened in length. For example, the member 18 may be formed with the core 40 extending downwardly from its upper end, as seen in FIG. 6, for only a fraction of the length of the core shown. Also, in some cases, the core may be provided with a central hole or chamber, that is, on the longitudinal axis of the needle destroying member to receive the needle before use so that the needle destroying member can, in this way, be used as a needle sheath of a syringe package. Also, depending on the type of syringe package, a needle destroying member having an offset needle destroying hole or chamber may be advantageously used although it is not constructed to perform one or more of the above-mentioned functions of member 18.

It is now apparent that there has been provided a novel needle destroyer such as the piston rod 18, which is a member of the syringe package 10, and which is capable of safely, conveniently and very easily destroying a syringe needle. It will be understood that various changes and modifications to the embodiment illustrated and described herein may be made without departing from the true spirit and the scope of the invention as defined in the following claims.

What is claimed is:

1. A packaged syringe comprising a plurality of members in axial alignment including a barrel, a needle connected to the distal end of said barrel, a needle sheath covering said needle, and a piston rod connectable with a piston for moving the piston in said barrel, one of said plurality of members having a chamber offset from the axis of said members to receive a portion of said needle for destroying the same, and a head with a recess open to said chamber and sized to receive a distal portion of said barrel after insertion of said needle into said chamber to guide said barrel into alignment with said one member, said chamber having a wall engageable with said needle for rotating said needle portion relative to said barrel upon relative rotation between said barrel and said one member.

2. The packaged syringe of claim 1 wherein said one member is a piston rod having an end portion adapted for connection with a syringe piston for moving the piston in the syringe barrel.

3. The packaged syringe of claim 1 wherein said recess has a bottom wall engageable with the distal end of a medicament filled ampoule for moving the ampoule distally in the syringe barrel for arming the syringe.

4. The packaged syringe of claim 3 wherein said one member comprises a piston rod connectable with a syringe piston for controlling the movement thereof in the syringe barrel in response to applied forces on said rod.

5. The packaged syringe of claim 1 wherein the radially innermost side wall of said chamber is radially outwardly of the axis of said one member.

6. The packaged syringe of claim 5 wherein said chamber is completely closed except that it is open to said recess.

7. A method of destroying a needle of a packaged hypodermic syringe having a plurality of members in axial alignment, including a syringe barrel, a hypodermic needle connected to the distal end of said syringe barrel, a needle sheath removably covering said needle,

and a piston rod connectable with a piston for moving the piston in the barrel, one of said members having a chamber offset from the axis of said one member and a recess open to said chamber and coaxial with said one member, comprising the steps of inserting the hypodermic needle into the offset chamber of said one member, moving said one member and syringe barrel toward each other with the walls of said recess effecting axial alignment between the barrel and said one member, and rotating said one member and said barrel relative to each other to twist said needle about the axis of the barrel for breaking the same and rendering it useless.

8. The method of claim **7** wherein the step of moving said one member and syringe barrel relative to each other includes engaging the outer periphery of the syringe barrel with the walls of said recess to effect said axial alignment.

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