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CARTRIDGE-SYRINGE ASSEMBLY

Filed Dec. 11, 1958

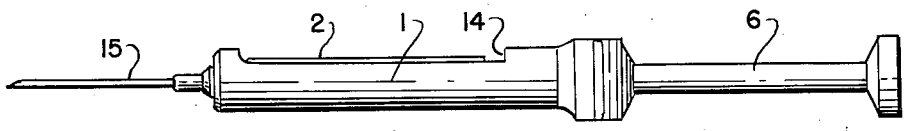


FIG. 1

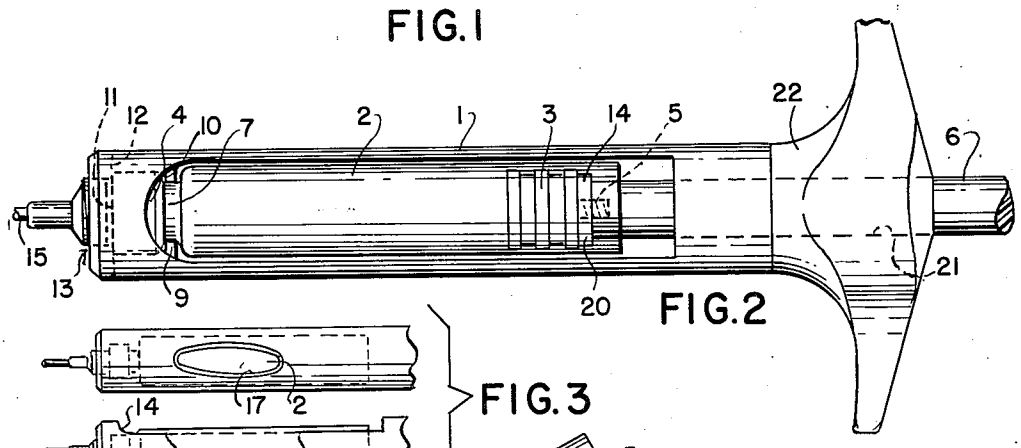


FIG. 2

FIG. 3

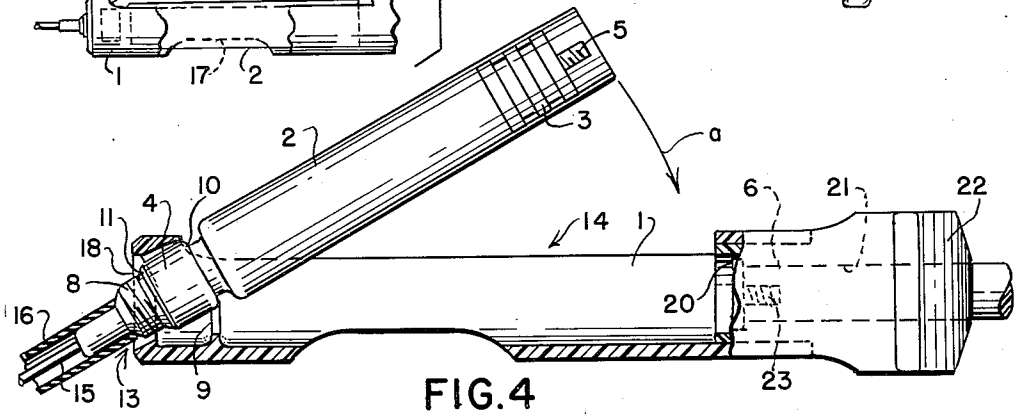


FIG. 4

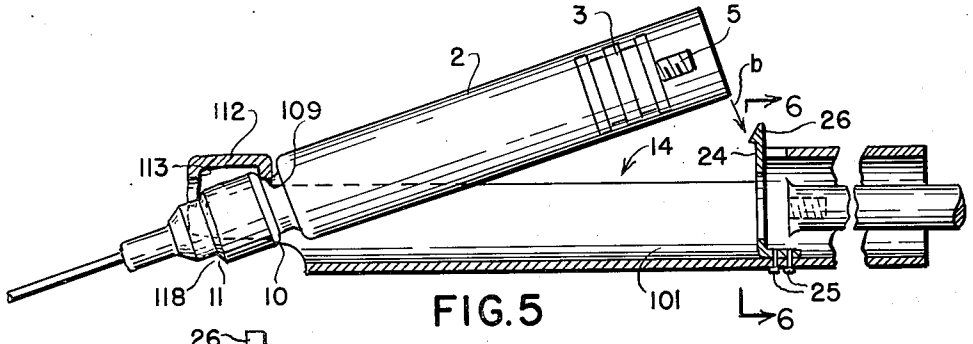


FIG. 5

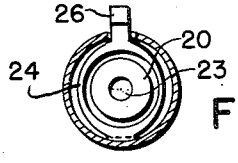


FIG. 6

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CARTRIDGE-SYRINGE ASSEMBLY

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This invention relates to a cartridge-syringe assembly including a one-piece syringe body provided with a slideable push rod and adapted to contain various types of cartridges in usable position securely held against lengthwise displacement.

In the development of injection syringes of the type employing a disposable sealed cartridge, it was early recognized that means must be provided to secure the cartridge against lengthwise displacement to permit both aspiration and injection. In Dann Patent No. 2,671,450 such means is provided in the form of screw thread **15** on the needle hub of the cartridge-needle unit mating with complementary thread **16** in the syringe body.

It is one object of the present invention to provide cartridge-securing means that does not require a screw thread.

It is a further object of this invention to provide a one-piece syringe body that may be used either with cartridges provided with a threaded hub or cartridges not provided with such a hub.

It is an additional object of this invention to provide a simplified integral syringe body for the above described purpose which has no separate parts other than the functionally esssential push rod.

According to our invention, we provide a syringe body comprising a barrel closed at both ends and having a central longitudinal portion exposed by an opening as wide as the internal diameter of the barrel and sufficiently long to permit insertion and seating of a cartridge within the barrel, the ends of the opening being spaced respectively from the proximal and distal closures.

The sides of the longitudinal opening may be made tangential to the inner surface of the opening so that, viewed from the side, the outer edges of the opening are above the longitudinal axis of the syringe body.

The proximal closure of the barrel has a central hole slideably accommodating a push rod, and the distal closure has a central hole large enough to permit the passage of an injection needle (which may be covered by a rubber sleeve) but small enough so that the closure wall forms an abutment for the distal end of the cartridge. The proximal closure of the barrel may advantageously be provided with a pair of finger pieces cooperating wtih a finger piece or button on the proximal end of the push rod, and a small finger hole to facilitate the removal of a cartridge may be provided in the side of the barrel opposite the larger opening through which the cartridge is inserted.

The inner surface of the barrel is provided near its distal end with a protuberance adapted to engage the distal end of the cartridge and to cooperate with the distal closure wall in preventing lengthwise displacement of the cartridge during aspiration and injection. This protuberance is advantageously in the form of a raised arcuate internal fillet having an angular extent of less than 180°, or it may be an inwardly directed flange at the distal end edge of the central opening, but other forms are possibly.

Our syringe body is adapted to be used with any type of injection cartridge having a slideable plunger at one end and a shoulder at the other capable of being engaged by the protuberance. It is particularly adapted to be used with cartridge-needle units as described below.

Our invention includes the novel syringe body and the

combination of the springe body with an injection cartridge.

The following description and accompanying drawing of preferred embodiments of our invention are intended to be illustrative only and not to limit our invention, the scope of which is defined in the appended claims.

In the drawing:

FIG. 1 is a side view of our syringe assembly containing a cartridge-needle unit ready for use;

FIG. 2 is a top view on a larger scale of the assembly of FIG. 1;

FIG. 3 comprises a top view and a side view of a portion of our syringe body illustrating the position of the finger hole;

FIG. 4, partly in section, illustrates the method of loading a cartridge-needle unit into one type of our syringe body;

FIG. 5, partly in section, illustrates the loading of a cartridge-needle unit into a modified type of our syringe body; and

FIG. 6 is a section on line **6—6** of FIG. 5.

In FIGS. 1–3, the syringe barrel **1** contains a cartridge 2, closed at one end by a slideable plunger **3** and closed at the other end by a hub **4**. Plunger **3** has a threaded stud **5** for connection with slideable push rod **6**. Cartridge **2** has a neck **7** of reduced diameter, and needle hub **4** serves to secure a penetrable closure to the distal end of the cartridge as disclosed in Dann Patent No. 2,671,450, FIG. 2. In the present case, however, the hub may (FIG. 4) or may not (FIG. 5) be provided with an external screw thread **8**. If present, it is nonfunctional in our syringe, but since cartridges of this type are in current use, it is an advantage of our syringe that it can handle both types.

A raised internal arcuate fillet **9** at the distal end of the barrel and extending slightly less than halfway around the barrel on the side opposite opening **14** is so located longitudinally as to secure the cartridge against longitudinal movement, when the latter is seated in the barrel, by bearing against the proximal surface **10** of the hub, while the distal surface **11** of the hub bears on inner surface **12** of distal closure **13** of the barrel.

In the figures, cartridge **2** is shown provided with an injection needle **15** which may be covered with a rubber sleeve **16**, but it is clear from the drawings that our syringe is equally usable with cartridges having no attached needle provided the cartridge has a shoulder or equivalent feature capable of engaging fillet **9** or flange **109** (FIG. 5).

A small finger hole **17** (FIGS. 3) may be formed in the side of the syringe barrel opposite opening **14** to assist in disengaging the cartridge from the barrel when an injection is completed, but this feature is not essential to our invention.

The method of loading the syringe of FIGS. 1–3 is illustrated in FIG. 4. A cartridge **2**, provided with a needle and sleeve, **15** and **16**, is advanced at an angle into the barrel by passing the covered needle through opening **18** in distal closure **13** until surface **11** of hub **4** abuts on inner surface **12** of the distal closure. The cartridge is then swung as shown by arrow *a* around the edge of the hub as a fulcrum and seated in the barrel through elongated opening **14** as shown in FIGS. 1, 2 and 4. Opening **14** has a width equal to the internal diameter of the barrel as shown in FIG. 2; its sides may be tagential to the bore of the barrel rather than radial, so that its edges, viewed from the side (FIGS. 1, 4 and 5), are above the axis of the barrel.

The diameter and location of opening **18** are such as to retain the distal end of the cartridge solidly seated in the barrel when the cartridge is in position for injection.

Push rod **6** is made with an enlargement **20** at its distal end only slightly smaller than the internal diameter of

the cartridge and is provided with a relatively long bearing in hole **21** in proximal closure **22** of the barrel. Accordingly when push rod **6** is engaged with plunger **3** by stud **5** and internally threaded hole **23**, cartridge **2** is securely held against rising out of the barrel and against lengthwise movement in either direction. On removal of sleeve **16** (assuming that cartridge **2** is, as customary, preloaded with an injectable drug), the syringe is ready for insertion of the needle, aspiration and injection.

A modified form of our syringe body is shown in FIG. 5. The barrel **101** is provided with a relatively large opening **118** in its distal closure **113**. Instead of fillet **9**, a functionally equivalent inwardly directed flange **109** is provided at the distal end edge of opening **14** to engage proximal surface **10** of the hub. The cartridge is loaded into the syringe at an angle as in FIG. 4, and rotated as shown by the arrow *b* around flange **109** as a fulcrum until seated in the barrel. Distal surface **11** of the hub **4** then bears on inner surface **113** of distal closure **112** and proximal surface **10** of hub **4** bears on flange **109**. The push rod may then be engaged with plunger **3** as described above. If it is not desired to rely on the push rod to prevent accidental dislodgment of the cartridge, a spring latch **24** may be provided; screws **25** fixedly attach the latch to the syringe body, thus making the latch an integral part of the body. The latch is designed to be flexed away from the path of cartridge **2** by finger pressure on tab **26** but to snap back into position to retain the cartridge when the pressure is released. After use, finger pressure on tab **26** will release the cartridge.

Our syringe body may be fabricated of a synthetic plastic or of metal and may be transparent or opaque since most of the cartridge is exposed to view through the long opening in the barrel. The syringe body being of one piece is extremely economical to produce, and since it can be used equally well with cartridges having either threaded or unthreaded hubs, it is versatile in its applications.

It will be noted also that the cooperating securing means to prevent lengthwise movement of the cartridge are entirely at the distal end of the syringe and are integral with the syringe—viz. the fillet **9** or flange **109** and the inner wall **12** or **112** of the distal closure. This construction has two important advantages: it eliminates the need for separate parts at the other end of the syringe such as compression springs, spring followers, sliding tubes, threaded plugs and the like; it is independent of variations in the length of the cartridge, this dimension being at times subject to somewhat wide tolerances.

In the specification and claims the term "distal" is used to denote a position or direction towards the needle end of the syringe and "proximal" towards the push-rod end.

We claim:

1. A one-piece injection syringe body provided with a slideable push rod and adapted to be used with a cartridge having a slideable plunger at one end and a shoulder at the other end, said syringe body comprising a tubular barrel, a proximal closure and a distal closure, a slideable push rod mounted in an axial opening in the proximal closure and having means adapted to engage a cartridge plunger, an opening in the distal closure less in diameter than the internal diameter of the barrel but sufficient to permit the passage of an injection needle, the barrel having an internal diameter adapted to accommodate a cartridge and being provided with a central elongated longitudinal opening as wide as the internal diameter of the barrel and adapted to permit the insertion and seating of a cartridge within the barrel, the ends of said opening being spaced respectively from the proximal and distal closures, and a protuberance having an angular extent about the axis of the barrel of not more than 180° formed on the inner surface of the barrel near its distal end adapted to engage a cartridge shoulder and to cooperate with the distal closure wall in preventing lengthwise displacement of a cartridge during aspiration and injection.

2. A syringe as defined in claim 1 in which the protuberance is a raised arcuate fillet on the internal surface of the barrel opposite the central longitudinal opening and has an angular extent not over 180°.

3. A syringe as defined in claim 1 in which the protuberance is an inwardly directed flange formed on the distal end edge of the central longitudinal opening.

4. A syringe as defined in claim 1 in which the axial opening in the distal closure has a diameter sufficient to accommodate a needle covered by a rubber sleeve and the longitudinal distance between the protuberance and the inner wall of the distal closure is adapted to accommodate and secure the needle hub of a cartridge-needle unit.

5. In combination: a syringe as defined in claim 4 and a cartridge-needle unit mounted in the syringe, the cartridge-needle unit comprising a cartridge having a slideable plunger at one end connected to the slideable push rod of the syringe, a needle hub secured to the other end of the cartridge, a needle mounted in the needle hub, and a protective sleeve surrounding the needle, the protected needle projecting through the opening in the distal closure and the needle hub being firmly seated between the protuberance on the inner surface of the barrel and the inner wall of the distal closure.

6. A combination as defined in claim 5 in which the protuberance is a raised internal arcuate fillet having an angular extent not over 180°.

7. A combination as defined in claim 5 in which the protuberance is an inwardly directed flange formed on the distal end edge of the central longitudinal opening.

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