

May 22, 1951

W. E. WARD ET AL
DISPOSABLE SYRINGE

2,554,352

Filed June 17, 1949

2 Sheets-Sheet 1

FIG. 1.

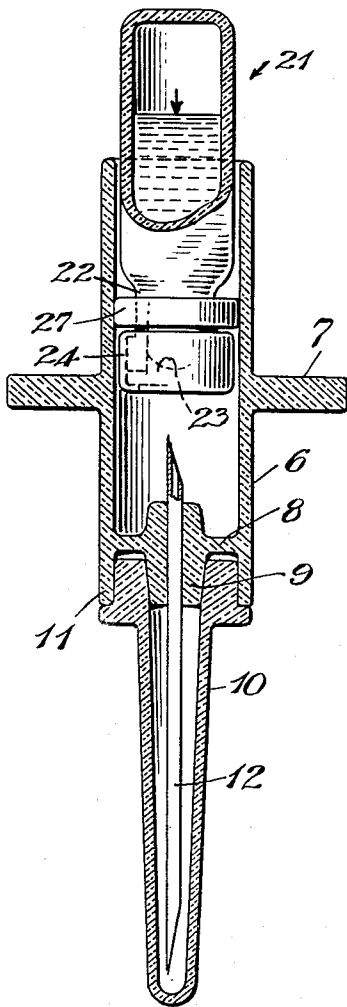
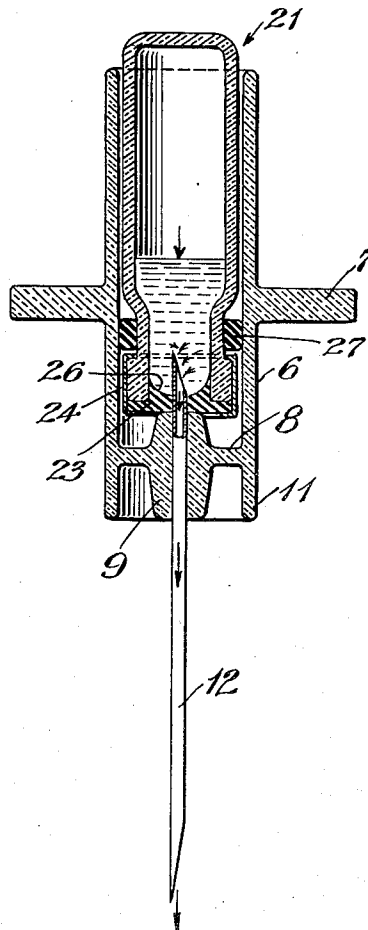


FIG. 2.



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FIG. 4.

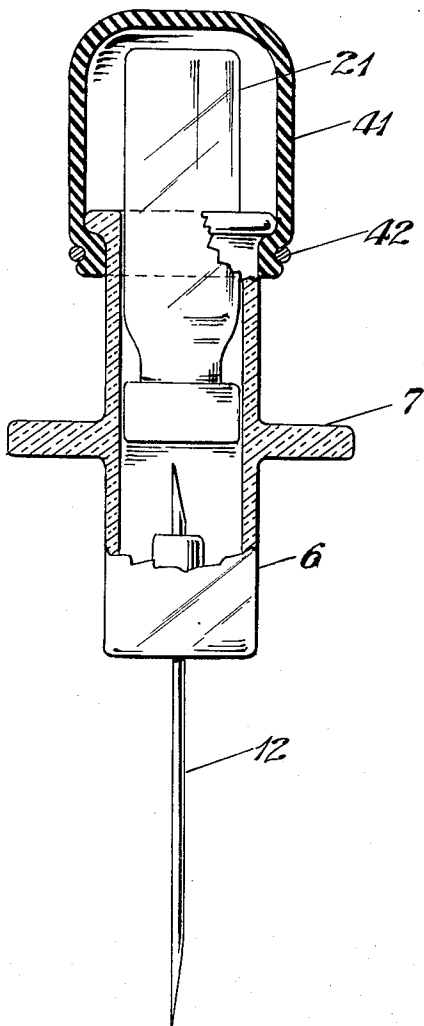
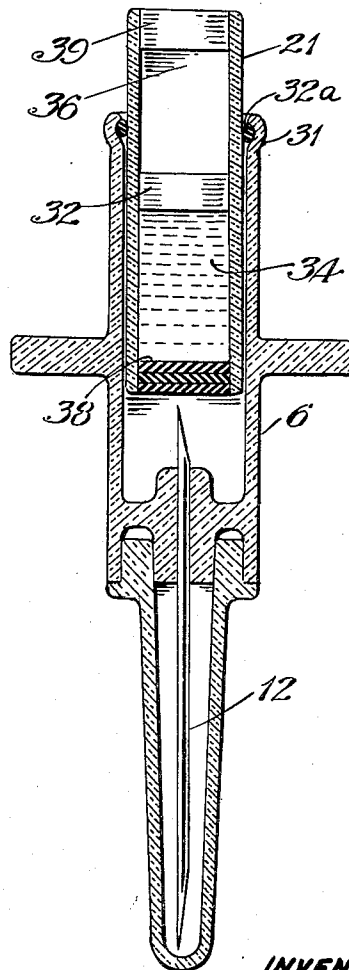


FIG. 3.



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UNITED STATES PATENT OFFICE

2,554,352

DISPOSABLE SYRINGE

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Application June 17, 1949, Serial No. 99,743

4 Claims. (Cl. 128—220)

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This invention relates to a syringe, and particularly to one of the so-called disposable cartridge type.

Various substances must be injected into a human or animal body intramuscularly; the approved technique for effecting such an intramuscular injection is to force the sterile syringe hollow needle into the body at a desired location and, when the needle has attained the approximate depth desired, to apply a reduced pressure to the needle in an attempt to draw blood through the needle and into the syringe barrel; if it is possible to aspirate blood, then the needle must be relocated, the presence of blood being an indication that the needle is in communication with a blood vessel and is not within a muscle.

Various substances, of which penicillin is one example, are of such a viscous nature that they cannot be placed readily in the ordinary syringe; in addition, after use, the syringe must be cleaned with special solvents while if any moisture is present, a gum is formed; further, the ordinary syringe cannot be sterilized readily and is not suited to emergency or home use. For these and other reasons, many substances, such as penicillin, are most advantageously dispensed in a cartridge in conjunction with a syringe structure, the cartridge and frequently the syringe being thrown away after use.

In the disposable cartridge syringes heretofore provided, the problem of aspirating has provided considerable difficulty and various involved techniques and relatively cumbersome devices have been employed. For example, one common form of device includes a removable rubber cap placed over the open end of the syringe barrel; when the needle is supposedly positioned intramuscularly, the rubber cap is worked in an attempt to provide an aspirating pressure upon the needle. The cap is of relatively small extent and the aspirating pressure applied is frequently not sufficient to give a true indication of the location of the needle end. Also, after the aspiration procedure has been followed, it is necessary to remove the rubber cap from the end of the syringe barrel, sterilize the cartridge, insert the cartridge in the syringe barrel, place the cap on the end of the cartridge, then effect the injection. Between the aspiration operation and the actual injection, the syringe barrel and needle can move because of the several manipulations which must be made while the attempt to insert the sterilized cartridge frequently results in what amounts to a

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relocation of the needle. This procedure is typical of the difficulties inherent in the use of various of the prior art syringes.

In accordance with the present invention, we provide a relatively simple and rugged disposable cartridge syringe which, because of its low cost and simplicity of operation, can be manufactured at a relatively low cost and so can be thrown away after use. Briefly, the syringe of the present invention includes the combination of a hollow needle, a syringe barrel and a cartridge which, after removal of the usual sheath which protects the sterile needle, co-acts with the cartridge barrel as a piston to provide an aspirating pressure to determine if the blood can be drawn. Thus, the cartridge is inserted in the barrel by the manufacturer, and the entire syringe unit can be provided by the manufacturer as a sterile unit so that once it has been determined that the end of the hollow needle is in an intramuscular position, it is only necessary to move the cartridge to engage that end of the needle within the barrel to effect a discharge of the cartridge contents. In this way, the entire unit can be handled and the syringe does not have to be taken apart and reassembled while its hollow needle is supposedly in an intramuscular position.

It is in general the broad object of the present invention to provide a novel syringe of the cartridge type and which can be manufactured so inexpensively that, if desired, the syringe can be thrown away after use.

A further object of the present invention is to provide a novel syringe of the cartridge type which is particularly adapted to the intramuscular injection of such materials as penicillin and the like.

The invention includes other objects and features of advantage, some of which, together with the foregoing, will appear hereinafter wherein the present preferred form of syringe embodying the present invention is disclosed.

In the drawings accompanying and forming a part hereof, Figure 1 is a side elevation, partly in section, showing the device assembled but prior to use, while Figure 2 is a generally similar view, but showing the device in use.

Figure 3 is a side elevation, partly in section, through a modified form of the device.

Figure 4 is a side elevation, partly in section, showing a further modified form of the device.

Referring to the drawing, the device comprises a syringe barrel 6 having a suitable handle or grip portion made up of ears 7, extending

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transversely upon the upper end of the barrel 6. The lower end of the barrel is closed as at 2, and includes a projection 9 upon which is seated a sheath 10. The end 8 of the barrel 6 is fitted with an annular extension 11, the end of the sheath fitting between the extension 9 and the annular extension 11 in a sealing relationship. It is to be noted that extension 9 and extension 11 terminate in a common plane, the advantage of this being presently explained.

A hollow needle 12 extends through projection 9 and end 8 into the interior of the barrel 6, the needle being protected prior to use by sheath 10.

A cartridge of the material to be dispensed is generally indicated by numeral 21 and comprises a container in the form of a bottle having a reduced neck portion 22 and an end closure made up of a rubber or other elastic insert 23, held in place by a metal rim 24; the rubber insert has an arcuate face 25 sloping to the central axis of the bottle so the bottle can be drained completely.

The diameter of the container is such that it approximates closely that of the interior of the barrel 6 while the neck portion 22 is reduced. In accordance with this invention, a ring 27 of a sealing material is provided about the lower end of the cartridge 21 and between the bottle and the barrel 6 so that an effective seal is provided between the barrel and the bottle.

In use, the unit is supplied by the manufacturer in that form in which it appears in Figure 1, the sheath being in place, the needle, the interior of the barrel, and the end of the cartridge being sterile. When it is desired to inject the material in the cartridge, the sheath 10 is removed and the needle 12 is forced into the desired location in a patient, usually until the flat and coplanar ends of extension 9 and ring 11 are against the patient's skin. The coplanar termination of extension 9 and ring 11 is advantageous for it ensures that extension 9 will not be forced into the flesh and the needle 12 inserted too deeply. Also, it enables the operator to gauge the depth of insertion of the needle by feel, as well as by sight. Further, it provides lateral support for the syringe so that it will remain erect and will not fall over, thus enabling an operator to release the syringe temporarily, if this is necessary, without danger of the needle being placed under a side strain with possible injury and pain to the patient.

To effect the injection, the upper end of cartridge 21 is first moved rearwardly to apply an aspirating pressure to the interior of the needle to ascertain whether or not blood can be drawn. If blood can be drawn, then it is necessary to relocate the needle. If blood cannot be drawn, then the needle is in position for the patient to receive the injection, whereupon the end of cartridge 21 is moved toward the patient, the projecting transverse ears 7 being grasped as between the middle and the forefinger and the end of the cartridge being forced inwardly by the thumb, until the upper end of the needle is forced through the closure 23 within the cartridge 21.

The substance in the cartridge is packed and sealed therein originally under a pressure in excess of atmospheric so that when the closure 23 is pierced by the hollow needle the content of the cartridge is forcefully projected through the hollow needle and into the patient by the pressure in the cartridge. The rubber closure seals itself about the needle.

The cartridge can be supplied in place as in

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Figure 1, in which instance a unit ready for instant use is available. If desired, however, barrel 6 can be sterilized and closed with a cap which is only removed when the unit is to be used; in this case, the end of the cartridge 21 is sterilized before being inserted in the sterile barrel. The fit between the cartridge 21 and the barrel need only be sufficiently tight to apply the desired aspirating pressure; if aspiration is not necessary, then the seal between the container and the barrel need only be such as will maintain the sterility of the common areas of the container and the barrel; such a seal can be provided by cotton, felt, wax and the like to admit only bacteria-free air to the sterile space between the barrel and the container.

If desired, the sealing means between the barrel and cartridge can be carried by the barrel, as is shown in Figure 3 wherein the upper end of the barrel 6 is provided with a recess 31 in which a sealing ring 32a is carried to provide either a gas-tight or a bacteria-tight seal between the cartridge 21 and the barrel proper.

The structure shown in Figure 3 is further modified in that the cartridge 21 is of tubular form closed by end closures 36 and 39 and includes a separator 32 therein dividing the container into a first region 34 in which the material to be injected is carried, and a second region 35 which is filled with a gas under pressure sufficient to force the separator 32 to move toward the opposite end of the cartridge 21 upon piercing of the frangible end closure 36. This structure permits the syringe to be used to effect an injection even when the hollow needle 12 is projecting upwardly or horizontally.

In the modification shown in Figure 4, a flexible sealing means such as a cap 41, made of rubber or other elastic material, is provided between and about the barrel, being secured to the barrel by a sealing ring 42. In use, the flexible cap maintains the desired sterile condition and permits the cartridge 21 to be suitably manipulated to apply an aspirating pressure so that a gas-tight fit between the cartridge and the barrel is not necessary.

From the foregoing, we believe it will be apparent that we have provided a novel and simple form of cartridge, and of a syringe which can be manufactured so inexpensively that either or both can be disposed of when desired and which enables an injection to be made very simply and with a materially simplified technique.

We claim:

1. In combination, a cartridge comprising a tubular container carrying a material under pressure therein for injection into a patient and having an open end closed by a frangible self-sealing closure; and a syringe for (1) ascertaining the suitability of injection of the container carried material, and (2) injecting said material into a patient, the syringe comprising a tubular barrel, a hollow needle positioned with one end projecting into said barrel in a position to pierce said frangible closure and pass beyond said closure in a sealed engagement with said closure and the other end projecting beyond said barrel into a patient projecting position; and means engaging the cartridge with the tubular syringe barrel and slidably sealing the barrel and the cartridge and adapting the cartridge to cooperate with the barrel as a piston to apply an aspirating pressure to the hollow needle to ascertain whether or not the needle end is in a posi-

tion wherein the cartridge contents can be injected into a patient.

2. A syringe comprising a tubular container having an end closure and a slidable piston therein dividing and separating said tubular container into a gas space containing a gas under a pressure in excess of atmospheric and a space for a material to be injected and which is under a pressure in excess of atmospheric, a barrel adapted to receive said tubular container, means providing a gas tight fit about the tubular container and the barrel adapting the tubular container to act as a piston in the barrel, and a hollow needle in said barrel adapted to pierce said closure.

3. A syringe comprising a container having an end closure therein and having its contents under a pressure in excess of atmospheric, a barrel adapted to receive said container, an air filter between the barrel and the container for admitting only bacteria-free air to between the barrel and the container, and a hollow needle having one end projecting from said barrel and its other end in a closure piercing position in said barrel with respect to said container end closure.

4. A syringe comprising a bottle-like tubular container having a puncturable end closure at one end thereof and having its contents under a pressure in excess of atmospheric and sufficient to discharge the contents thereof upon puncture of said end closure, a tubular barrel open at one end and closed at the other end and adapted to receive said container slidably as a piston therein,

a gas-tight seal between the barrel and the container enabling the container to function as a piston in the barrel with the end closure of the bottle-like container cooperatively adjacent the closed end of the barrel, and a hollow needle having one end projecting beyond said barrel and its other end projecting from the closed end of the barrel inwardly thereof in a closure piercing position in said barrel with respect to said bottle-like container end closure.

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REFERENCES CITED

15 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
20 Re. 19,219	Smith	June 19, 1934
730,557	McElroy	June 9, 1903
743,743	McCulloch	Nov. 10, 1903
921,130	Lockwood	May 11, 1909
1,288,174	Pittenger	Dec. 17, 1918
25 1,315,885	Wackenhuth	Sept. 9, 1919
1,495,924	Quayle	May 27, 1924
1,817,003	Hein	Aug. 4, 1931
2,490,447	Lockhart	Dec. 6, 1949

FOREIGN PATENTS

Number	Country	Date
3,934	Great Britain	Feb. 19, 1903
13,142	Great Britain	May 28, 1914