Dec. 14, 1948. G. E. JONES 2,456,001

HYPODERMIC AMPOULE SYRINGE

Filed Jan. 9, 1946

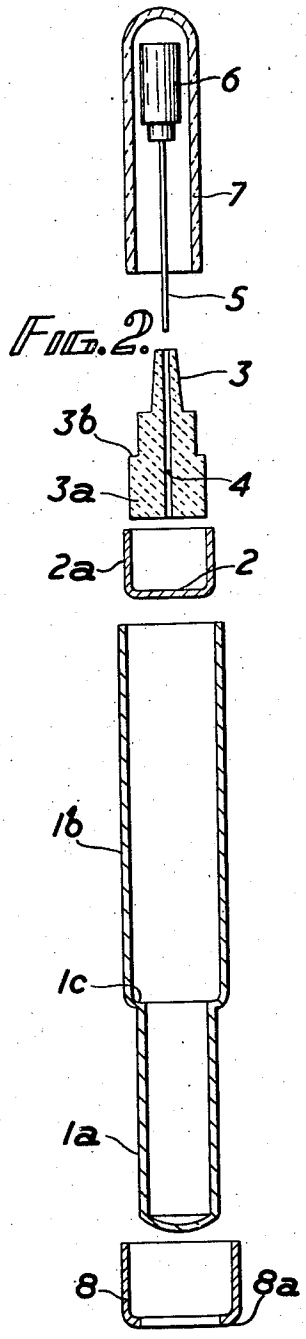


FIG. 2.

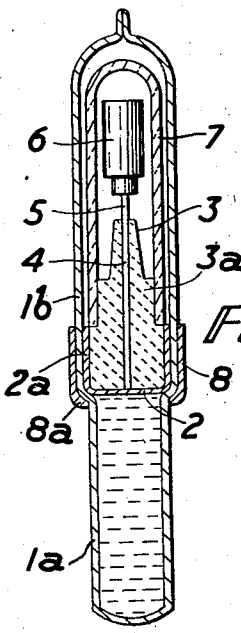


FIG. 1.

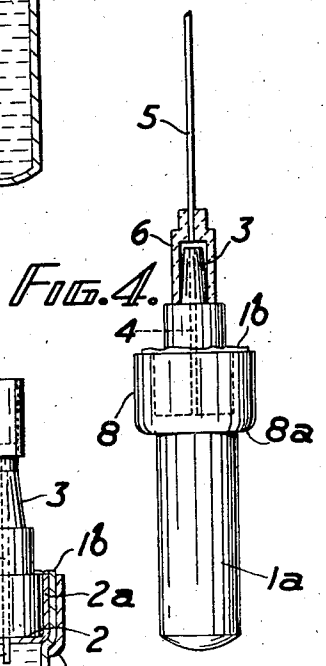


FIG. 4.

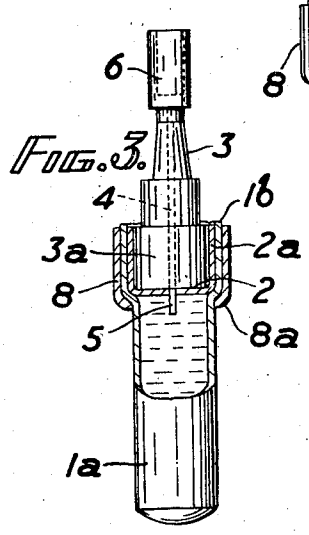


FIG. 3.

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HYPODERMIC AMPOULE SYRINGE

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7 Claims. (Cl. 128—215)

1

This invention relates to hypodermic ampoule syringe constructions of the unitary kind. Such constructions usually comprise a collapsible tube, on which the hypodermic needle is mounted.

The object of the present invention is to ensure that during the storage stage, the needle or the part for supporing it is sealed against contamination from outside sources and that once the seal is destroyed it cannot be restored. The invention in its broadest aspect consists in providing the collapsible tube with an extension so that a chamber is formed which, in the storage state, completely encloses the part for supporting the needle with or without the needle itself.

In order that the invention may be the more clearly understood a syringe in accordance therewith will now be described, reference being made to the accompanying drawings, wherein:

Figure 1 is a sectional elevation of the syringe in the storage state.

Figure 2 is a similar view, showing the several parts of the syringe separated before assembly.

Figure 3 is a similar view of the syringe in process of being prepared for immediate use.

Figure 4 is a similar view of the same ready for immediate use.

Referring first to Figure 1, which illustrates the syringe in the storage state, the syringe comprises an integral tubular envelope of say soft metal divided into two portions *1a* and *1b* by means of a transverse diaphragm **2**. The portion *1a* of said envelope beneath the diaphragm **2** contains the liquid which is to be injected, and immediately above the diaphragm in the portion *1b* is a nozzle element **3** the cylindrical base portion *3a* of which abuts against the diaphragm and is sealed all around the wall of the envelope. The upper portion of said nozzle element forms a nozzle coaxial with the envelope. An axial bore hole **4** passes completely through the nozzle element **3** from the base end to the nozzle end thereof.

The hypodermic needle **5** has its base end sealed in one closed end of a hollow more-or-less cylindrical mount **6** with the needle extending coaxially away from said mount. The other end of said mount is open. In the storage state shown in Figure 1 the needle **5** and mount **6** are contained in the upper portion *1b* of the envelop with the needle inverted and inserted in the bore hole **4** of the nozzle element **3** so that the operative end of said needle rests against the diaphragm **2**. In this position the mount **6** will be held clear of the nozzle portion of the nozzle element as shown.

Between the base portion *3a* and the nozzle portion of the nozzle element **3**, said nozzle element is formed with an annular ledge or shoulder *3b* (Figure 2) and a tube **7** of say glass, with one end open and the other end closed, is arranged in an inverted state over the nozzle portion and the projecting needle and mount, with its rim resting on the ledge or shoulder *3b*. The fit of the tube **7** over the upper portion of the nozzle element may be quite loose, and the fit of the needle **5** in the bore hole **4** is also quite loose, but the dimensions are such that the tube **7** is retained more-or-less in place by the upper portion *1b* of the envelope, and the needle is retained in the bore hole by the tube **7**. No amount of shaking will cause the needle to puncture the diaphragm **2**, and the glass-tube **7** protects the container portion *1b* against collapse.

2

It will be seen that the needle is completely enclosed in the sealed upper portion *1b* and that, however long the device may be kept before use, the needle must remain sterile. In like manner the liquid to be injected is completely enclosed in the hermetically sealed lower portion *1a* and must always remain sterile. When the device is to be used, the upper portion *1b* is held between the fingers and squeezed against the tube **7** and is then torn off and removed together with the tube. Subsequently the needle **5** is first pressed down so as to puncture the diaphragm **2** and make a way of communication for the liquid to pass up the hole **4**, and said needle is then removed from the hole **4** and the inverted mount **6** is force-fitted on the nozzle portion of the element **3** as shown in Figure **4**. Thus, when the envelope portion *1a* is squeezed, the liquid is forced through the bore hole **4**, through the holder **6** and up the bore of the needle.

Turning now to Figure 2, which shows the way in which the device is constructed, it will be seen that the envelope is first made with its upper end—that is the end of the portion *1b*—open. Moreover the portion *1b* is of slightly larger diameter than the portion *1a* so that a shoulder *1c* is provided between said two portions. Moreover the diaphragm **2** is in the form of an inverted pill box, having an annular wall *2a* which upstands from the perimeter of the diaphragm proper. In construction the diaphragm **2** is first fitted on to the base portion *3a* of the nozzle element **3** and the two parts are together slid into the upper envelope portion *1b* so that the diaphragm proper rests on the shoulder *1c*, and the wall *2a* of said diaphragm fits within the wall of said envelope portion *1b*.

The diaphragm and nozzle are then tightly clamped in place by means of a clamping element

8. This clamping element consists of a sleeve with one end 8*a* slightly inturned and it is slid up the container portion 1*a*, with its inturned end lowermost (the aperture within the inturned end being large enough for this) until said inturned end seats against the under side of the shoulder 1*c*. The dimensions are such that, in this position, the wall of the envelope portion 1*b* and the wall portion 2*a* of the diaphragm are tightly clamped between the sleeve 8 and the base portion 3*a* of the nozzle element. If desired the said sleeve and base portion may be slightly coned to enhance this effect.

The needle and its mount, and also the tube 7 are then placed in position as described, and finally the upper end of the envelope portion 1*b* is closed and sealed by bringing the top edges together, clamping them and hermetically sealing, if necessary, by dipping into solder of low melting point. The needle mount 6 and the nozzle element 3 may be of plastic material.

In some cases the user of the device will himself have a supply of sterile hypodermic needles and may therefore not require a hypodermic needle to be supplied with the device. To meet the requirements of such cases the needle, together with its mount 6 and also the tube 7, may be omitted. The envelope portion 1*b* will be sealed as before and thus it will be ensured that the whole of the nozzle element 3 will be kept sterile. The user will tear off the portion 1*b* as before and will then puncture the diaphragm with his own sterile needle which he will then mount on the nozzle element. The device without the needle can obviously be supplied at a reduced cost.

It is to be understood that the needle may be permanently affixed in place, in which case, after the portion 1*b* is ruptured, the diaphragm would be punctured by means of a stilette passed down the bore of the needle.

I claim:

1. A hypodermic ampoule syringe construction, comprising an elongated integral one-piece sealed envelope, said envelope being of two different diameters with an annular shoulder between them, a separate fluid outlet nozzle having an inlet side and an outlet side and a bore through which fluid is adapted to pass from said inlet side to said outlet side, said nozzle fitting within the larger diameter portion of said envelope with its inlet side resting against said shoulder, and thereby dividing said envelope into a compartment of larger diameter and a compartment of smaller diameter, the compartment of smaller diameter forming a collapsible container for the fluid to be ejected and the compartment of the larger diameter forming a hermetically sealed enclosure for the outlet side of said nozzle, and a separate clamping sleeve surrounding said envelope and clamping the same around said nozzle the envelope being adapted to be ruptured to expose the outlet side of said nozzle.

2. A hypodermic ampoule syringe construction, comprising an elongated integral one-piece sealed envelope, said envelope being of two different diameters with an annular shoulder between them, a separate fluid outlet nozzle having an inlet side and an outlet side and a bore through which fluid is adapted to pass from said inlet side to said outlet side, said nozzle fitting within the larger diameter portion of said envelope with its inlet side resting against said shoulder, and thereby dividing said envelope into a compartment of larger diameter and a compartment of smaller diameter, the compartment of smaller diameter forming a collapsible container for the fluid to be ejected and the compartment of larger diameter forming a hermetically sealed enclosure for the outlet side of said nozzle, and a separate clamping sleeve with one end inturned, said clamping sleeve surrounding the larger diameter portion of the envelope, with its inturned edge engaging the outside of the shoulder and thereby clamping the envelope around said nozzle, the envelope being adapted to be ruptured to expose the outlet side of said nozzle.

3. A hypodermic ampoule syringe construction, comprising an elongated integral one-piece sealed envelope, said envelope being of two different diameters with an annular shoulder between them, a fluid outlet nozzle having an inlet side and an outlet side and a bore through which fluid is adapted to pass from said inlet side to said outlet side, a diaphragm with an annular wall upstanding from its perimeter, said nozzle fitting within said annular wall with its inlet side against said diaphragm, said nozzle together with said diaphragm fitting within the larger diameter portion of said envelope with the diaphragm resting against said shoulder, and a clamping sleeve surrounding said envelope and clamping the same around said nozzle with the annular wall between the envelope being adapted to be ruptured to expose the outlet side of said nozzle.

4. A hypodermic ampoule syringe construction, comprising an elongated integral one-piece sealed envelope, a separate fluid outlet nozzle having an inlet side and an outlet side and a bore through which fluid is adapted to pass from said inlet side to said outlet side, said nozzle being located within said envelope intermediate its ends so as to divide it into two compartments, one on the inlet side and the other on the outlet side of said nozzle, and a separate clamping sleeve surrounding said envelope and clamping the same around said nozzle, the envelope being adapted to be ruptured to expose the outlet side of said nozzle.

5. A hypodermic ampoule syringe construction comprising an elongated tubular one-piece envelope closed at both ends and made entirely of easily compressible and rupturable sheet material; a separate fluid outlet nozzle member having an inlet side and an outlet side and arranged inside said elongated tubular one-piece envelope intermediate its ends so as to divide it into two compartments, namely, one on the inlet side and the other on the outlet side of said fluid outlet nozzle member, the compartment on the inlet side forming a collapsible container for fluid to be ejected and the compartment on the outlet side forming a hermetically sealed rupturable enclosure for the outlet side of said nozzle member; a bore through said fluid outlet nozzle member through which fluid is adapted to pass from said collapsible fluid container to said outlet side of said fluid outlet nozzle member; and means securing said fluid outlet nozzle member within said elongated tubular one-piece envelope intermediate its ends.

6. A hypodermic ampoule syringe construction comprising an elongated tubular one-piece container closed at both ends and made entirely of easily compressible and rupturable sheet material; a separate fluid outlet nozzle member having an inlet side and an outlet side and arranged inside said elongated tubular one-piece compressible and rupturable container intermediate its ends so as to divide it into a collapsible fluid compartment on the inlet side of said separate fluid outlet nozzle member and a hermetically

sealed rupturable cover compartment on the outlet side of said separate fluid outlet nozzle member; a bore through said separate fluid outlet nozzle member through which fluid is adapted to pass from said collapsible fluid compartment into said hermetically sealed rupturable cover compartment within said elongated tubular one-piece compressible and rupturable container; and means securing said separate fluid outlet nozzle member inside said elongated tubular one-piece compressible and rupturable container intermediate its ends.

7. A hypodermic ampoule syringe construction comprising an elongated tubular one-piece container closed at both ends and made entirely of easily compressible and rupturable sheet material; a separate fluid outlet nozzle member having an inlet side and an outlet side and arranged inside said elongated tubular one-piece compressible and rupturable container intermediate its ends so as to divide it into a collapsible fluid compartment on the inlet side of said separate fluid outlet nozzle member and a hermetically sealed rupturable cover compartment on the outlet side of said separate fluid outlet nozzle member; a bore through said separate fluid outlet nozzle member through which fluid is adapted to

pass from said collapsible fluid compartment into said hermetically sealed rupturable cover compartment within said elongated tubular one-piece compressible and rupturable container; and a separate clamping member surrounding said elongated tubular one-piece compressible and rupturable container and clamping the same around said separate fluid outlet nozzle member so as to hold said separate fluid outlet nozzle member within said elongated tubular one-piece compressible and rupturable container non-slidably in axial direction of said container.

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