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HYPODERMIC SYRINGE UNIT

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FIG. 1.

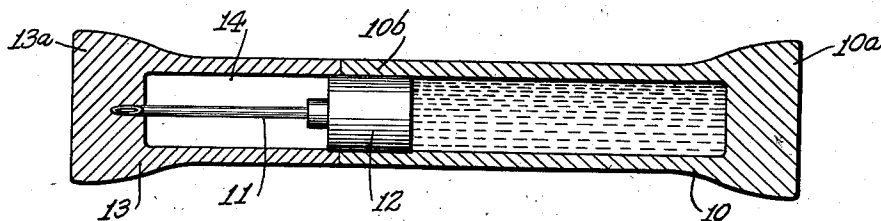


FIG. 2.

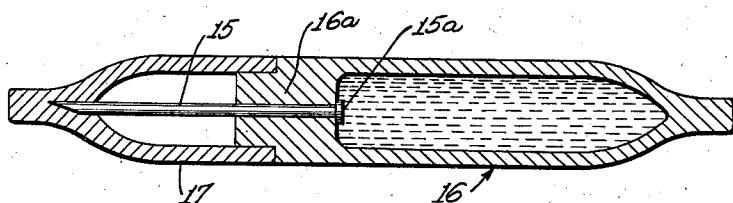
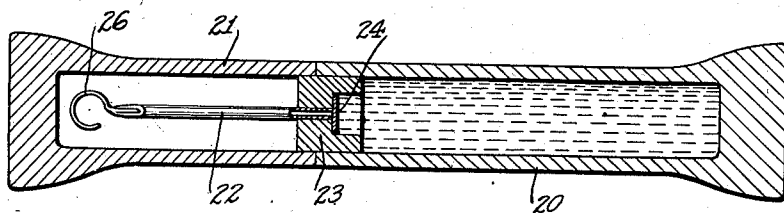


FIG. 3.



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HYPODERMIC SYRINGE UNIT

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2 Claims. (Cl. 128—215)

This invention relates to improvements in hypodermic syringe units and relates particularly to hypodermic syringes that are adapted to be furnished as sealed, sterile units containing such substances as medicines, antitoxins, opiates and the like so that these substances can be quickly and efficiently administered.

Hypodermic syringes of the type commonly used by physicians and in hospitals include a glass barrel having a plunger therein by means of which a syringe can be filled and emptied. These syringes are relatively bulky and, being formed of glass, are easily broken. Moreover, they are intended to be filled when needed, and are not and cannot be furnished as filled, sterile units that are ready for immediate use.

It has been suggested that the barrel and plunger of such syringes may be replaced by a collapsible tube formed of metal such as, for example, tin, so that breakage is reduced and the syringe can be furnished as a disposable, filled, sterile unit. Such an arrangement is useful for only one injection, that is, it cannot be sterilized and reused. Moreover, the collapsible tube may be ruptured by pressure or may leak and, inasmuch as the contents of the tube are not visible, it is not possible to determine whether the syringe contains the proper dosage.

An object of the present invention is to provide substantially unbreakable hypodermic syringes that can be furnished as complete, filled, sterile units.

Another object of the invention is to provide filled, sterile hypodermic syringe units that are capable of reuse after the original contents have been used.

A further object of the invention is to provide substantially unbreakable, sterile hypodermic syringe units that have a sealed container for medicine and the like, through which the contents of the container are visible.

Other objects of the invention will become apparent from the following description of typical forms of hypodermic syringe units embodying the present invention.

Hypodermic syringe units embodying the present invention are provided with a resilient barrel secured in liquid-tight relationship to a hypodermic needle and with a removable cap that covers the needle and is secured in sealed relationship to the needle and the barrel. The needle and the contents of the barrel are sealed within the unit and can be sterilized and retained in sterile condition until ready for use.

The barrel and the cover for the needle pref-

erably are formed of a resilient, transparent rubbery material such as, for example, a rubbery polyvinyl resin. By using material of this type, the syringe units are capable of withstanding shock without breaking and can be heated repeatedly to sterilizing temperatures without damage to the barrel, cover or the needle.

The needle and the barrel may be sealed against leakage by providing a diaphragm at one end of the needle that can be punctured by means of a sterile stylus contained in the unit. In a preferred form, the needle is sealed by embedding its point in resilient material in, or forming, the cover of the syringe.

Hypodermic syringes of the type described generally above are not damaged by heat or cold, and can be sterilized and reused after the original contents of the syringe have been dispensed by pressure on the barrel. They can be manufactured in any desired size and can be easily packaged and distributed without danger of breakage.

For a better understanding of the present invention, reference may be had to the accompanying drawing in which:

Figure 1 is a sectional view of a typical form of hypodermic syringe unit embodying the present invention;

Figure 2 is a sectional view of a modified form of syringe embodying the present invention; and Figure 3 is a view in cross-section of another form of syringe unit embodying the present invention.

The form of the invention illustrated in Figure 1 of the drawing includes a barrel portion 10 that is formed of a resilient, synthetic rubbery material such as, for example, a transparent, plasticized polyvinyl resin that is capable of being sterilized without becoming unduly softened so that the syringe and the contents thereof may be sterilized. The barrel 10 is formed from a tubular element and is illustrated as having one end 10a sealed. The end of the barrel may be sealed by the application of heat and pressure sufficient to cause the opposite walls of the tube to fuse together, or by a solvent or adhesive and pressure.

In the upper end 10b of the barrel is mounted the hypodermic needle 11. The needle has a hub 12 of cylindrical shape formed of metal, hard rubber, or a hard or flexible plastic material such as, for example, a phenol formaldehyde condensation product, or a polyvinyl resin product. The metal or plastic should have substantially the same thermal co-efficient of expansion as the

metal needle 11 to prevent leakage between the needle 11 and the hub 12, even under widely varying temperature conditions.

The hub 12 is secured to one open end of the barrel 10 in liquid-tight relationship. The needle 11 and the exposed portion of the hub 12 are covered by a detachable cap 13 preferably formed of a material like the material of the barrel 10. The cap 13 is a tubular member having a sealed end 13a.

The cavity 14 within the cap 13 preferably is of less length than the needle 11 so that when the cap 13 is seated on the end of the hub 12, the point of the needle will be embedded in the cap 13, thereby sealing the end of the needle. The needle may be thrust into the sealed end of the cap 13 or the cap may be applied to the barrel 10 with both ends open and the end 13a sealed over the end of the needle 11 by heat and pressure or a solvent and pressure. If desired, the cap 13 may be formed of a hard material, such as "Bakelite," having a resilient pad of rubbery material such as the polyvinyl resin referred to above in its end in which the needle 11 may be embedded.

The unit may be filled in several different ways. For example, the barrel 10 may be squeezed and then released to draw the liquid into it, the end of the needle sealed by forcing the cap 13 thereover and the whole unit then subjected to sterilization at a suitable temperature, for example, 250° F. A more convenient method is to leave the end 10a of the barrel open, fill the unit through the open end of the barrel and thereafter seal and sterilize the unit. When filling the units with material that cannot be sterilized by heating, the unit may be sterilized, filled under sterile conditions with a sterile material and the end of the barrel is thereafter sealed. The contents of the unit and the needle will remain in sterile condition until ready for use, at which time the cap 13 may be removed, the contents of the syringe discharged by squeezing the barrel 10 and the unit then discarded.

If it is desired to reuse the syringe, it may be sterilized and reused like an ordinary hypodermic syringe, the resiliency of the barrel 10 permitting filling and emptying of the syringe.

In the form of syringe unit disclosed in Figure 2, the needle 15 is secured in a thickened portion 16a of the barrel 16. The thickened portion 16a preferably is formed of somewhat harder material than the remainder of the barrel and thus constitutes a strong support for the needle 15. The inner end 15a of the needle 15 is swaged over to anchor it more securely in the barrel. In this device the cap 17 is received on the projecting end of the portion 16a and the point of the needle is embedded in the cap 17 as described above.

Another form of hypodermic syringe unit is illustrated in Figure 3. In this form of the device the barrel 20 and the cap 21 are similar to the corresponding parts of the device disclosed in Figures 1 and 2. However, the end of the needle 22 is not sealed by the cap 21 and if the

cap 21 is formed of hard material, the resilient pad may be omitted.

The hub 23 of the needle is provided with a diaphragm 24 adjacent the base of the needle 22 which seals the liquid in the barrel 20. The diaphragm is formed of a brittle material which may be shattered, or of a soft metal which can be punctured by means of the stylus 26 in the needle 22. After the diaphragm 24 has been punctured, the stylus 26 is withdrawn and discarded.

The forms of hypodermic syringe units described above can be dropped or subjected to shock without danger of rupturing or puncturing the barrel or cap or breaking the needle and, therefore, they can be packaged in simple containers and shipped, even under adverse conditions, without damage or loss of contents thereof.

From the foregoing description of typical forms of devices embodying the present invention, it will be apparent that I have provided simple, yet highly effective, hypodermic syringes suitable for use under all conditions, and particularly when time is an important factor and where there are no facilities for sterilization of hypodermic syringes. It will be understood, of course, that the device is susceptible to modification, for example, in the type of materials used in their production and in the shape and size of the unit. Therefore, the forms of the invention described above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. A hypodermic syringe unit comprising a tubular, transparent, rubbery barrel member having an end closure projecting beyond said barrel member and an open end adapted to be sealed to retain liquid in the barrel, a hypodermic needle secured in said end closure having its point projecting from said barrel and its other end communicating with the interior of the tubular barrel, a detachable, rubbery hollow cap member having an open end receivable on said end closure and a thickened closed opposite end portion spaced from said open end such a distance that when the cap member is received on said end closure the thickened end portion is penetrated partially by the point of said needle and seals the latter.

2. A hypodermic syringe unit comprising a tubular, transparent, rubbery barrel member having a less resilient end closure projecting beyond said barrel member and an open end adapted to be sealed to retain liquid in the barrel, a hypodermic needle secured in said end closure having its point projecting from said barrel and its other end communicating with the interior of the tubular barrel, a detachable, rubbery hollow cap member having an open end receivable on said end closure and a thickened closed opposite end portion spaced from said open end such a distance that when the cap member is received on said end closure the thickened end portion is penetrated partially by the point of said needle to seal the latter.

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