United States Patent

Knox

[15] **3,642,123**

[45] **Feb. 15, 1972**

[54] GUARD ENCLOSED HYPODERMIC NEEDLE AND SYRINGE RECEPTACLE

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[22] Filed: **May 20, 1969**

[21] Appl. No.: **826,142**

[52] **U.S. Cl.** **206/43,** 128/215, 206/DIG. 32

[51] **Int. Cl.** **B65d 85/54,** A45c 11/00

[58] **Field of Search** .....206/63.2, 43, 56 AC, 16.5, 206/DIG. 32; 128/215, 218 S; 21/88, 105; 220/60; 211/60

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[57] **ABSTRACT**

There is described a method for handling reusable hypodermic needles in which the needle does not exist as a separate entity. Rather, the needle is either attached to a hypodermic syringe or encased in an open ended tube which serves as a means for handling the needle and attaching the needle to or removing it from the syringe as well as a protection against damage to the needlepoint during sterilization. The combined needle and tube can be stored in a receptacle which normally supports the combination in a horizontal position, but which permits vertical rotation of the combination to present one end to the user with a popup action.

7 Claims, 6 Drawing Figures

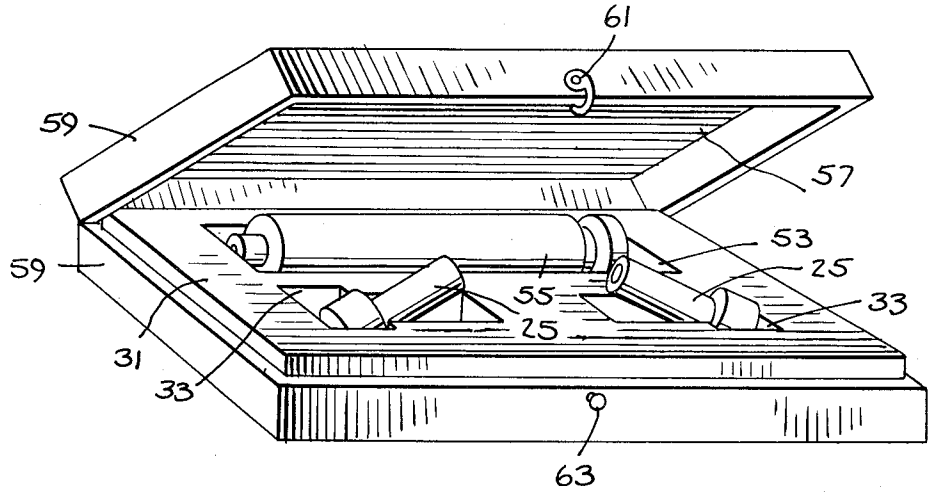


Fig. 1.

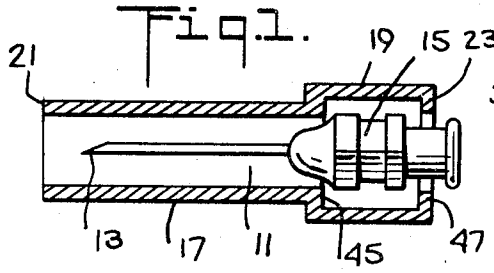


Fig. 2.

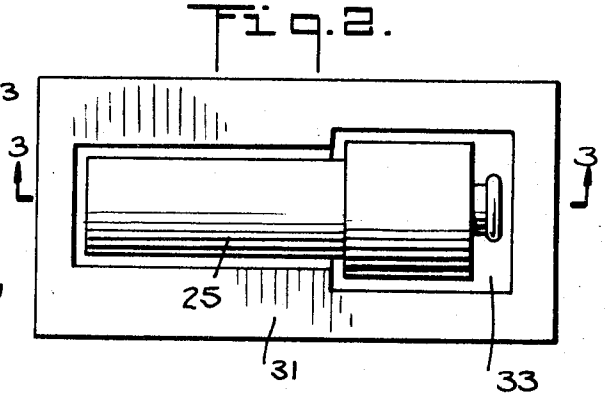
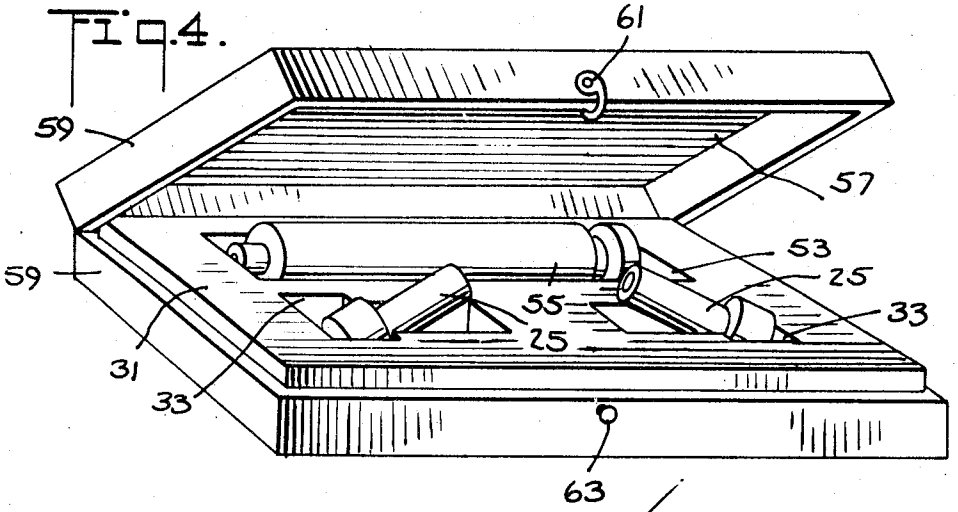


Fig. 4.



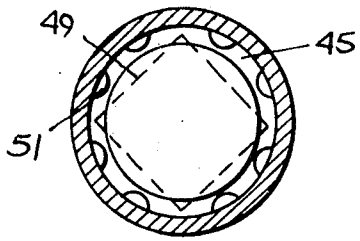


Fig. 6.

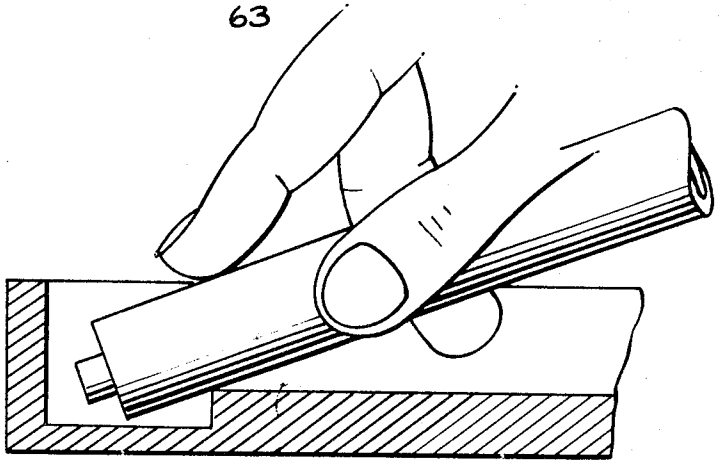


Fig. 5.

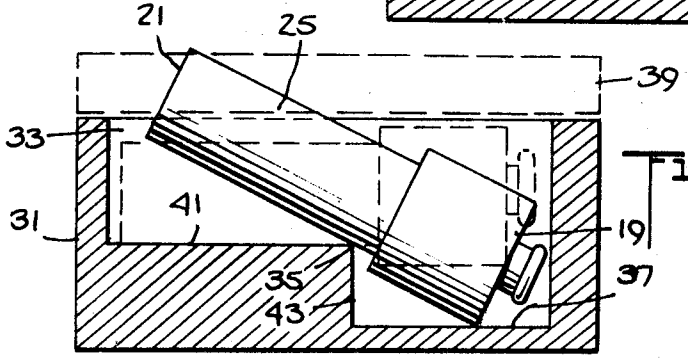


Fig. 3.

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GUARD ENCLOSED HYPODERMIC NEEDLE AND SYRINGE RECEPTACLE

DESCRIPTION OF THE INVENTION

Having provided a brief abstract of this disclosure, this invention is concerned with a method and means for handling hypodermic needles. More particularly, this invention is concerned with a protective package for hypodermic needles to protect against damage to and contamination of the needle during handling and, desirably, to permit sterilization of the needle while packaged. This invention further relates to methods for using, sterilizing and storing hypodermic needles.

The handling and sterilization of hypodermic needles presents problems, both for the individual and the institutional user. The home user, such as the diabetic or allergy sufferer who must self-administer medication by hypodermic injection, ordinarily sterilizes the needle by immersion in boiling water. Because of the turbulence of the boiling water, the needle is frequently thrown against the walls or bottom of the container with sufficient force to blunt the point or bend it into a hook. The pain caused the user on insertion into or withdrawal from the skin of the thus-damaged needle precludes its further use and it must be discarded.

This problem is not serious in the case of hospitals and other large users of hypodermic needles, for the needles are generally inserted into racks or "boats" which are then placed in an autoclave. On the other hand, a common practice is to store used needles in a common receptacle and, when a sufficient number has accumulated manually place the needles in the boat for sterilization. Although some damage to the needles occurs when placed in the receptacle, a more serious problem is the risk of injury and infection to the person who must retrieve the used contaminated needles from the common receptacle. In addition to this health hazard, this process of laboriously sorting the accumulated needles according to length and gauge is time-consuming and represents a substantial labor expense to the large hospital.

As a result, many hospitals are now employing disposable syringes and needles which are supplied in a sterilized condition and discarded after use, thus eliminating the need for sterilization. This has not proven to be a satisfactory solution, however, for satisfactory means for disposing of the used syringes are not presently available. Because of the danger of the syringe falling into the hands of narcotic addicts, it must be broken up before being discarded. Accordingly, there was developed a device to grind up the disposable syringe and permit it to be flushed away through the sewer. However, municipalities have become concerned with the spread of infection if the contaminated used syringes are disposed of in this manner, and as a result, at least one large municipality requires sterilization of the disposable syringe prior to disposal, the very thing the disposable syringes were developed to avoid.

It is an object of this invention to provide a means to store a hypodermic needle.

It is a further object of this invention to provide a means to facilitate sterilization of hypodermic needles.

It is still another object of this invention to provide a means to simplify handling and minimize the danger of contamination of sterile hypodermic needles.

These and other objects of this invention will be apparent from the ensuing specification and claims and accompanying drawings, of which:

FIG. 1 is a longitudinal, cross-sectional view of an assembled hypodermic needle and guard for use in accordance with this invention;

FIG. 2 is a plan view of an article for storing the assembled sterilized needle and needle guard;

FIG. 3 is a longitudinal, cross-sectional view of the article of FIG. 2 taken along line 3—3;

FIG. 4 is a perspective view of an article of manufacture for storing two assembled needles and guards and a hypodermic syringe;

FIG. 5 is a longitudinal, cross-sectional view of the article of FIG. 4 showing a preferred configuration of the syringe-receiving compartment thereof; and

FIG. 6 is a cross-sectional end view of a preferred form of said needle guard.

In general the objects of this invention are attained by providing at least one of (1) a needle assembly comprising a reusable hypodermic needle in a guard, as hereinafter described; and (2) a storage receptacle for the assembly which permits rotational movement of said assembly in said receptacle and has cooperating releasable means for maintaining said assembly in a normally horizontal position until release of said means.

With reference to FIG. 1 a hypodermic needle **11** having a point **13** and a hub **15** is inserted point first into an elongated tubular member or guard **17**, which may have a circular or polygonal cross section, and which has a proximal end **19** and distal end **21**. Proximal end **19** is open and is provided with needle retaining means **23**, more fully described hereinbelow, coacting with hub **15** of needle **11** to securely but releasably retain needle **11** in guard **17**. Distal end **21** may be closed if desired, but in a preferred embodiment of this invention is open as shown, and extends beyond needlepoint **13** when needle **11** is retained in tube **17** by retaining means **23**. As is apparent, the weight distribution is such that the majority of the weight of the assembly is concentrated at proximal end **19**.

With reference to FIGS. **2** and **3**, the assembled needle **11** and tube **17**, hereinafter referred to as needle assembly **25**, are stored in accordance with this invention in a body **31** having a needle assembly receiving compartment **33**. Compartment **33** is provided with means for rotatably supporting said assembly, such as fulcrum **35**, and means for stopping the rotation of said assembly, such as bottom **37**. Fulcrum **35** is so positioned within compartment **33** that the center of gravity of said assembly, i.e., proximal end **19**, is on one side of fulcrum **35**, whereby, unless restrained, said assembly rotates about fulcrum **35** under gravitational force until distal end **19** contacts stop **37**. Body **31** is equipped with a removable cooperating member, such as top **39**, which, when in one position the closed position), urges said assembly into a generally horizontal position but which, when removed, allows said assembly to rotate about fulcrum **35**, whereby distal end **21** of assembly **25** rises in a "popup" action.

In a preferred embodiment fulcrum **35** is at an elevation within compartment **33** such that when assembly **25** is in a generally horizontal position, the topmost portion of assembly **25** is at the level of the top surface of body **31**. In addition, guard **17** is of sufficient length, and stop **37** is so positioned that, after rotation, distal end **21** of assembly **25** is raised above the top surface of body **31**, thereby permitting the user to readily grasp distal end **21**, thereby minimizing the possibility of contaminating the contained needle.

In a particularly preferred embodiment, compartment **33** is provided with a bilevel bottom comprising raised portion **41** and lower portion or stop **37** joined by shoulder **43**. The juncture of raised portion **41** and shoulder **43** forms fulcrum **35**.

FIG. **4** illustrates a package form for selling needles and for storing needles which have been sterilized in accordance with this invention. In this form body **31** has two axially aligned needle-receiving compartments **33**, each containing an assembled needle and guard **25**, and parallel thereto, a hypodermic syringe-receiving compartment **53** containing hypodermic syringe **55**. Body **31** is provided with cooperating top **57** and is contained within a suitable box **59**, which can be closed and sealed with latch **61** and pin **63** or any other suitable closure means.

In a manner analogous to the needle receiving compartment **33**, syringe compartment **53** may be provided with a fulcrum and bilevel bottom to permit rotation of the syringe in a popup action, which desirably presents the plunger end to the user. If a box sufficiently deep to permit rotation under gravity is not desired, a shorter depression may be provided whereby the needle receiving portion of the syringe may be depressed by hand, thereby raising the plunger end as shown in FIG. **5**.

Body 31 is desirably constructed of a material which is bacteria and fungus-resistant and which is nontoxic. A particularly desirable material for this purpose is expanded polystyrene. It is also desirable that cooperating top 57 be constructed of the same material.

As indicated above, guard 17 preferably has an open distal end 21. In this embodiment, and when guard 17 is constructed of a substantially water-insoluble, inert material having good physical stability at elevated temperature, assembly 25 may be sterilized as a unit by suitable means, such as autoclaving, immersion in boiling water and the like. Open distal end 21 allows access of the sterilizing medium (steam or hot water) to needlepoint 13. Since distal end 21 extends beyond point 13, it also prevents damage to needle 11 during sterilization.

Needle-retaining means 23 of proximal end 19 may take any desired form. For example, proximal end 19 may be cylindrical, formed of a resilient material and have a cross section equal to or slightly less than the largest cross-sectional dimension of hub 15, whereby a press fit of hub 15 in proximal end 19 is obtained. In a preferred form, as illustrated by FIGS. 1 and 6, proximal end 19 comprises a cylinder having an inner cross section which is slightly larger than the largest cross-sectional dimension of hub 15, and which is bounded at either end with shoulder 45 and inwardly extending circumferential bead 47, said shoulder and bead being axially spaced a distance at least equal to the axial dimension of hub 15. In addition, shoulder 45 and bead 47 are of sufficient radial dimension that needle 11 is securely held by hub 15 in guard 17. This preferred form of needle-retaining means 23, or at least bead 47 thereof, is constructed of a resilient deformable material to permit insertion and withdrawal of needle hub 15, and yet retain needle 11 in the guard.

In a still further preferred embodiment, for use with needles having a hub of polygonal cross section, such as a generally square cross section as indicated by dotted lines 49 in FIG. 6, the inner surface of proximal end 19 is provided with axially extending beads 51 which coact with the edges of polygonal hub 49 to prevent rotation of the hub. The presence of beads 51 thus permits the use of needle guard 17 as a wrench for attaching needle 11 to a hypodermic syringe, particularly one of the well-known Luer type.

The material of construction for guard 17 is not narrowly critical to this invention, provided, as indicated above, it is insoluble in and inert toward the sterilization medium, is adapted to securely but releasably receive needle 11 and possesses satisfactory mechanical strength at the elevated temperatures of the sterilization. In addition, to minimize sources of contamination, guard 17 should be unitary and have a smooth surface. A preferred material which meets these criteria is molded polypropylene.

It will be readily appreciated that the use of the guard of this invention provides a simple and convenient solution to the above-noted problems. It serves as a wrench to attach the sterile needle to the syringe without contamination by handling of the needle, as well as to remove the needle from the syringe by the nurse or doctor without risk of infection. After removal from the syringe, the entire unit may be placed in boiling water, for sterilization without damaging the point. In the case of institutions, the guard-needle assemblies may be deposited directly in an autoclave, for there is no need to place the used needles in the boat for protection. To assist in sorting the sterilized needle, the guard can be color coded according to needle size and gauge, as well as be formed of a substantially transparent material to permit visual inspection and sorting. Finally, the guard serves to protect the needle against contamination or damage prior to the next use. It will be appreciated that by use of the guard of this invention the hypodermic needle looses its separate existence—that is the needle is associated either with the syringe or the guard, but at no time is present as a separate entity.

When used in conjunction with the storage receptacle of this invention, the needle may be maintained in a sterile condition for an extended period of time and yet, because of the popup feature, is readily available to the individual user. In this embodiment, maintenance of sterile conditions may be assured by treating the needle assembly and/or syringe with alcohol prior to insertion of the needle in and sealing of the receptacle. The alcohol vaporizes and the contained alcohol vapors further aid in the maintenance of sterile conditions.

What is claimed is:

1. A package comprising in combination
   a. at least one assembled needle and tubular needle guard,
   b. at least one hypodermic syringe;
   c. a body having a surface;
   d. in said surface a needle assembly receiving compartment, having sides and a bottom and open at the top, and having means for rotatably supporting said assembly in a position generally parallel to a plane defined by the top edges of said sides, and means for stopping said rotation, said assembly being disposed therein
   e. spaced therefrom a hypodermic syringe receiving compartment having sides and a bottom and open at the top having means for rotatably supporting said member in a position generally parallel to a plane defined by the top edges of said sides, and means for stopping said rotation; and
   f. having removable means cooperating with said support means to retain said assembly and syringe in a parallel position and which, when removed, permits said assembly and syringe to be rotated to a position whereby one end thereof extends out of said plane.

2. A package according to claim 1 having two axially aligned spaced needle assembly receiving compartments and parallel thereto and spaced therefrom a hypodermic syringe receiving compartment.

3. A package comprising a needle-needle guard assembly consisting essentially of a hypodermic needle having a hub in combination with a needle guard;
   a. said needle guard comprising a generally tubular open-ended member having a proximal and a distal end;
   b. said proximal end having means cooperating with said needle hub for securely but releasably retaining said needle in said guard with its point extending axially through said guard in a direction toward said distal end;
   c. said needle guard being of sufficient length to extend axially beyond said needlepoint;
   d. said needle guard being formed of a material capable of sterilization at elevated temperature without loss of structural strength;
   e. said needle retaining means comprises a generally cylindrical portion having an inside diameter at least as great as the largest cross-sectional dimension of said needle hub;
   f. said cylindrical portion being axially bounded at either end by inwardly extending circumferential retaining means having inside diameters less than the maximum cross-sectional dimension of said hub and being axially separated a distance at least as great as the axial dimension of said hub;
   g. the proximal circumferential retaining means being constructed of a deformable material to permit the hub of said needle to be inserted into and withdrawn from said cylindrical portion.

4. A package according to claim 3 wherein:
   a. said needle hub has a polygonal cross section; and
   b. the inner surface of said cylindrical portion is provided with axially extending means which cooperate with the axial edges of the polygonal hub to prevent rotation of said hub.

5. A package according to claim 4 wherein said needle guard is a unitary member molded from polypropylene.

6. A package according to claim 3 wherein said guard is substantially transparent.

7. The package according to claim 3 wherein said guard is provided with indicia indicating the size of the needle contained therein.

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