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(71) Applicant
Bespak plc

(Incorporated in United Kingdom)

Bergen Way, North Lynn Industrial Estate, King's Lynn, Norfolk, PE30 2JJ

(72) Inventor
Stephen Douglas Scott

(74) Agent and/or Address for Service
Boult, Wade & Tennant,
27 Furnival Street, London, EC4A 1PQ

(54) A syringe needle disarming device

(57) The device comprises an elongate sheath 2 having an open end 4 and a shield 7 connected to the sheath at the open end. Needle retaining means 26, for example barbs, are provided at the open end of the sheath whereby in use the sheath may be hand held and a needle inserted into the sheath through the open end and retained therein by means of the hub of the needle being gripped by barbs or the like. The device has application in hospital wards where a used needle must be transported to a sharps bin. The device enables the needle to be disarmed immediately following use to remove any hazard prior to disposal.

FIG.4.

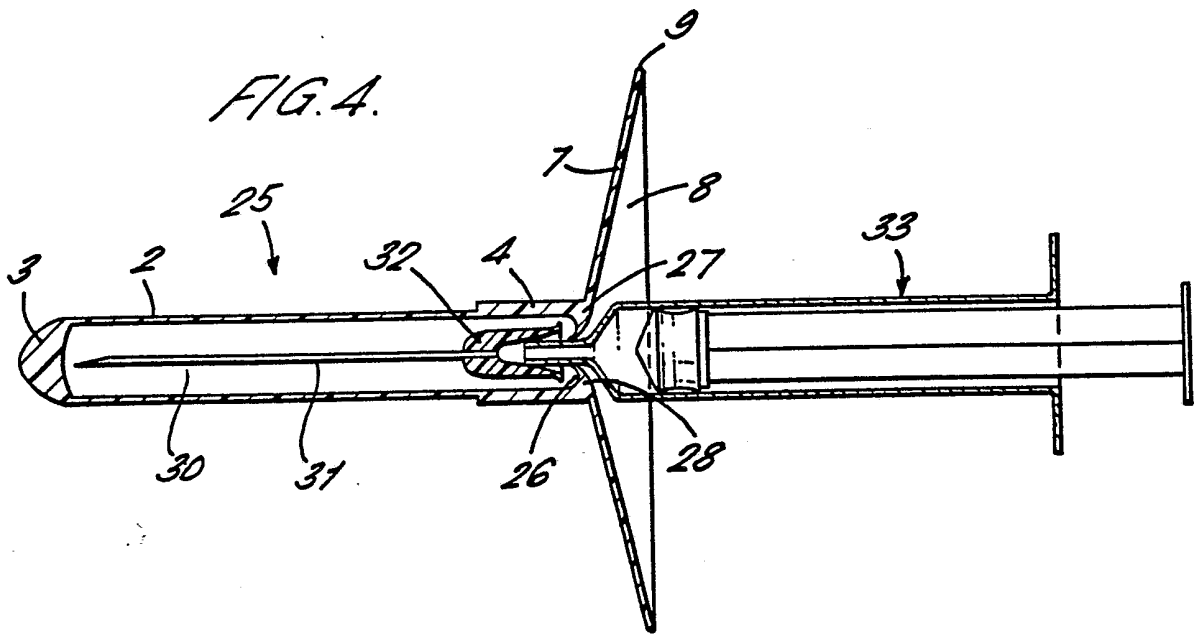

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FIG. 1.

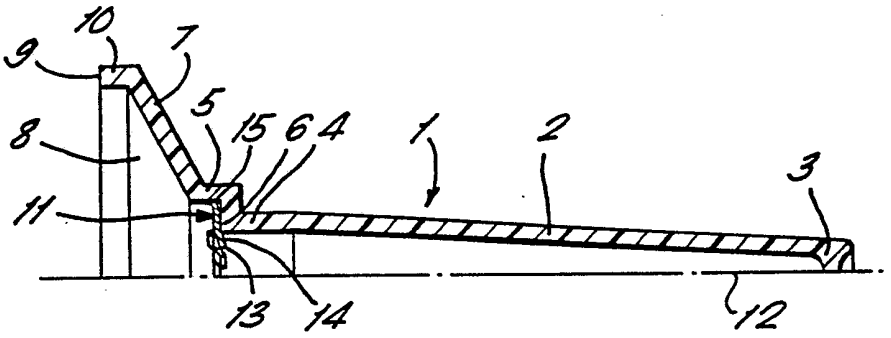


FIG. 1A.

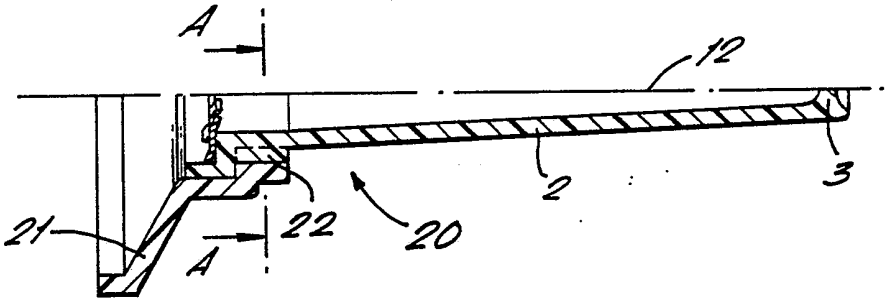


FIG. 2.

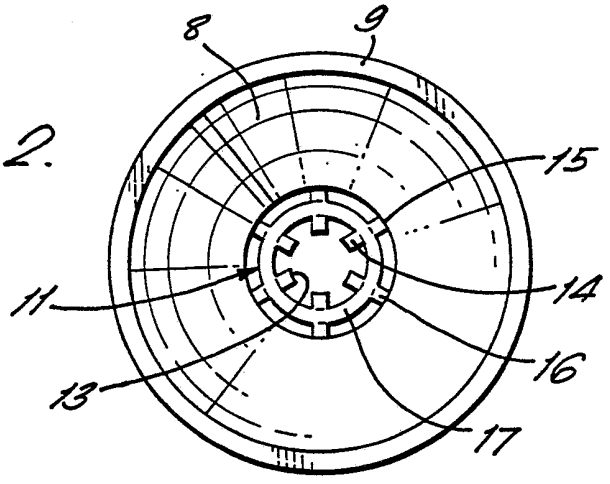


FIG. 3.

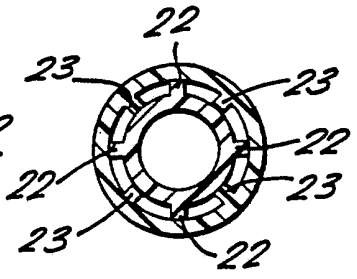


FIG.4.

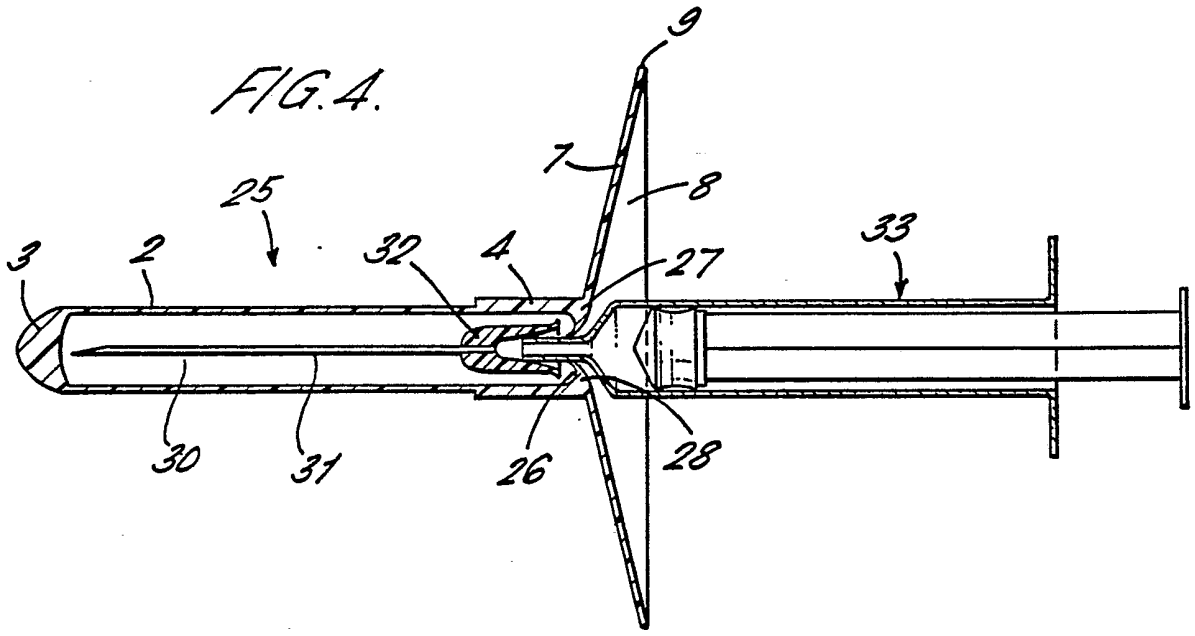
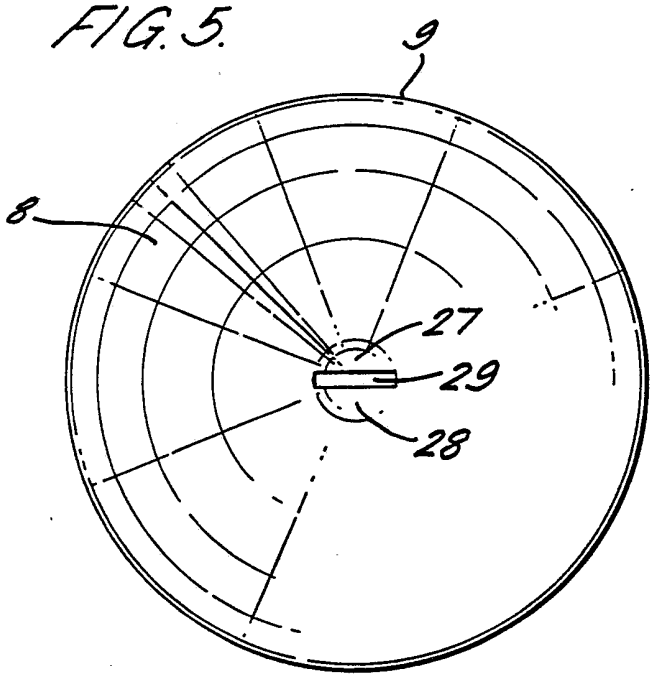


FIG.5.



A SYRINGE NEEDLE DISARMING DEVICE

This invention relates to a syringe needle disarming device for use in the safe disposal of hypodermic needles of the type comprising a cannula which is sharpened at one end and has a hub at the other end for connection to a syringe.

The safe disposal of used hypodermic needles is essential to minimise the risk of accidental skin puncture to the user of a syringe or to persons disposing of such hazardous waste since any such skin puncture may incur a risk of communicating disease from an infective patient.

According to the present invention there is disclosed a syringe needle disarming device comprising an elongate sheath having an open end, hand shielding means connected to the sheath at or adjacent to the open end and needle retaining means at the open end of the sheath whereby in use the sheath may be hand held and a needle inserted into the sheath through the open end and retained therein by the retaining means.

An advantage of such a device is that it may be hand held by the syringe user so that the needle may be disarmed by sheathing in the device immediately following use and the disarmed needle may then be taken to a point of safe disposal.

Preferably the retaining means comprises means for gripping a hub of the syringe needle.

Advantageously the gripping means comprises barb means facilitating insertion of the hub relative to the sheath and resisting removal by indentation of the hub.

The device and needle thereby become inseparable and are disposed of together. When used with a disposable syringe the syringe and needle may

remain connected and disposed of together with the device or alternatively the needle gripping action of the device may be used to separate the needle from the syringe for separate disposal.

Preferably the barb means comprises an annular member having a castellated inner edge providing a plurality of barbs.

Conveniently the sheath includes a throat portion of enlarged radius at the open end, the annular end being located in the throat portion such that only the barbs of the member project inwardly of the sheath. Conveniently the annular member includes a castellated outer edge providing gripping formations for securing the member in the throat portion.

Alternatively the needle retaining means may comprise a one way closure permitting the passage of a needle hub solely in a direction in which the needle enters the sheath and thereby retaining the needle by preventing the return passage of the hub. The entire needle including the hub may thereby pass through a one way closure to be retained therein.

Preferably such a one way closure comprises a pair of opposed jaws at the open end of the sheath, which jaws are resiliently deformable between a normally closed position preventing return passage of the needle hub and an open position facilitating passage of the hub during needle entry into the sheath.

Preferably in any such device the hand shielding means comprises a funnel shaped shield defining a progressively constricted duct communicating with the open end of the sheath whereby in use a needle presented for insertion into the device may be guided to the open end of the sheath.

An advantage of such an arrangement is that the

device may be safely hand held with minimum risk of the syringe user incurring a self inflicted puncture whilst holding the device.

Advantageously the shield is formed integrally with the sheath. Conveniently the free end of the shield comprises a cylindrical lip portion.

Preferably the sheath in any such device is a tapered tube accomodating a single needle.

Specific embodiments of the present invention will now be disclosed by way of example only and with reference to the accompanying drawings of which:

Figure 1 is a sectional view of one half of a device having barbed gripping means and a shield integrally formed with the sheath,

Figure 1A is a similar mirror imaged view of a variant of the device of Figure 1 in which the sheath and shield are separately formed and assembled together by an interference fit,

Figure 2 is an end elevation of the complete device of Figure 1 looking into the open end of the sheath,

Figure 3 is a sectional elevation of the complete device of Figure 1A viewed in the direction of arrow A,

Figure 4 is a sectional side elevation of an alternative device having a one way closure, and

Figure 5 is an end view of the device of Figure 4 as viewed in a direction looking into the open end of the sheath.

The device 1 of Figures 1 and 2 comprises a tapered tubular sheath 2 having a closed end 3 and an open end 4, the sheath being tapered towards the closed end. An enlarged throat portion 5 is formed at the open end 4 such that the internal diameter of

the sheath 2 is stepped to define an annular shoulder 6.

A funnel shaped shield 7 merges with the throat portion 5 so as to define a progressively constricted duct 8 communicating with the open end 4 of the sheath. The shield 7 has a free end 9 in which is formed a cylindrical lip 10 through which the duct 8 is of uniformed cross section. The cylindrical lip 10 serves to reinforce the shield 7. This is particularly useful when the device is moulded from a plastics material and is ejected from a mould by means of an ejector tool impacting upon the free end 9 of the shield 7.

An annular member 11 is located in the throat portion 5 so as to extend generally radially with respect to the longitudinal axis 12 of the sheath 2. The inner edge 13 of the annular member 11 is circumferentially castellated to provide a plurality of circumferentially spaced barbs 14 which project radially inwardly beyond the shoulder 6.

The annular member 11 has an outer edge 15 which is similarly castellated to provide a plurality of outwardly extending gripping formations 16. The annular member 11 is made of steel and formed as a flat annulus 17 with the barbs 14 being bent slightly out of the plane of the annulus so as to form an interrupted frusto conical surface tapering in a direction towards the closed end of the sheath 2. The gripping formations 16 are similarly bent out of the plane of the annulus 17 to define a similarly orientated surface.

In use the device of Figures 1 and 2 is hand held by a syringe user who grasps the sheath 2 in the opposite hand to that which is holding the syringe (not shown). In order to dispose of a used syringe needle (not shown) the sharp end of the needle is

directed towards the open end 4 of the sheath 2 preferably along the longitudinal axis 12. The shield 7 serves as a guide to ensure that the needle is safely located within the open end 4 without risk to the hand of the operator. Once located within the open end 4 the needle is further advanced within the sheath 2 until the hub of the needle encounters the barbs 14 of the annular member 11. The hub of the needle being generally of a plastics material may then be securely gripped by applying pressure to the needle such that the hub advances through the barbs 14 sufficiently to be indented and gripped against any attempted removal.

The needle together with the device 1 may then be disposed of as a single item.

The sheath 2 and the shield 7 are integrally formed from a plastics material and the annular member 11 is an interference fit within the throat portion 5. The inclined gripping formation 16 resists removal of the annular member 11 once fitted and ensures that the needle together with the annular member may not be withdrawn once inserted into the sheath 2. Some pulling force on the needle may be encountered for example when it is required to disconnect the syringe from the needle by pulling the syringe whilst manually gripping the device 1. It will therefore be apparent that the annular member 11 must be gripped sufficiently securely to withstand any such pulling force.

An alternative device is shown in Figure 1A in which the shield 21 is formed separately from the sheath 2 and is retained as an interference fit by means of axially extending ribs 22 and 23 formed externally on the sheath 2 and internally on the shield 21 respectively. The interference fit is designed to provide a permanent fixture of the sheath

2 and the shield 21 and is not intended to facilitate separation by the user.

A futher embodiment of the invention is shown in Figures 4 and 5 in which a further device 25 is shown. Corresponding numerals are used to indicate components common to the device of Figures 1 and 2 where appropriate.

The sheath 2 of the device 25 has an open end 4 at which is located a one way closure 26 comprising opposed jaws 27 and 28 of a resilient plastics material. The shield 7 is formed integrally with the jaws and provides a smooth walled duct 8 for guiding a needle into the open end 4.

As shown in Figure 5 the jaws 27 and 28 are normally closed to provide a narrow slot 29 at the open end 4 through which the cannula portion 30 of a needle 31 may be inserted. The hub 32 of the needle 31 may pass through the one way closure 26 by deformation of the jaws 27 and 28 which snap back to their original closed position once the hub 32 has entered the sheath 2.

The jaws 27 and 28 are formed with an inward taper with respect to the sheath 2 such that subsequent withdrawal of the needle 31 is prevented by the jaws 27 and 28 having increased resistance to deformation in the returned direction required for needle withdrawal. This one way action is enhanced by the shape of the hub 32 typically being tapered at its forward end whilst being stepped at its rear end such that passage through the jaws 27 and 28 is accompanied by a ratchet action.

A syringe 33 is shown connected to the needle 31 in Figure 4 by means of a luer connection within the hub 32. The syringe 33 may thereby be disconnected from the needle 31 by applying a pulling force between the sheath 2 and the syringe 33.

Alternative embodiments of the present invention may include alternative gripping means such as single or multiple barbs which are separately mounted within the sheath. The sheath itself may be of any suitable length or diameter to accommodate various sizes of needle.

The embodiment shown in Figures 4 and 5 could alternatively include a diaphragm having a circular aperture of smaller diameter than the needle hub. Such an arrangement would appear similar in cross section to the embodiment shown in Figure 4 with the circular aperture being dilated during passage of the needle hub and relaxing to a smaller diameter thereafter to retain the needle within the sheath.

The embodiment of Figures 4 and 5 is shown as a single piece item but in practice when moulding the device from a plastics material the device would need to be of two part construction and assembled by solvent bonding or ultrasonic welding. One of the parts would comprise the sheath and the other part would comprise the shield together with the jaws and a sleeve portion overlaying the sheath which would then be bonded to and form part of the sheath.

The invention has application to all uses of hypodermic needles for example in hospital wards where a sharps bin is provided in a clinical preparation room and it is necessary for a syringe user to leave the ward in order to dispose of a used needle. In this case the immediate disarming of the needle following use prevents any hazard before the needle is disposed of in the sharps bin. A further example of use is where doctors or nurses make home visits to patients and may then need to transport the used needle for disposal at a central location. It is envisaged that devices in accordance with the present invention will be provided in equal number to

syringe needles. Each device is to be regarded as a disposable item for use with a single syringe needle.

CLAIMS

1. A syringe needle disarming device comprising an elongate sheath having an open end, hand shielding means connected to the sheath at or adjacent to the open end and needle retaining means at the open end of the sheath whereby in use the sheath may be hand held and a needle inserted into the sheath through the open end and retained therein by the retaining means.

2. A device as claimed in claim 1 wherein the retaining means comprises means for gripping a hub of the syringe needle.

3. A device as claimed in claim 2 wherein the gripping means comprises barb means facilitating insertion of the hub relative to the sheath and resisting removal by indentation of the hub.

4. A device as claimed in claim 3 wherein the barb means comprises an annular member having a castellated inner edge providing a plurality of barbs.

5. A device as claimed in claim 4 wherein the sheath includes a throat portion of enlarged radius at the open end, the annular member being located in the throat portion such that only the barbs of the member project inwardly of the sheath.

6. A device as claimed in any of claims 4 or 5 wherein the annular member includes a castellated outer edge providing gripping formations for securing the member in the throat portion.

7. A device as claimed in claim 1 wherein the needle retaining means comprises a one way closure permitting the passage of a needle hub solely in a direction in which the needle enters the sheath and thereby retaining the needle by preventing the return passage of the hub.

8. A device as claimed in claim 7 wherein the closure comprises a pair of opposed jaws at the open end of the sheath, which jaws are resiliently deformable between a normally closed position preventing retraction of the needle hub and an open position facilitating passage of the hub during needle entry to the sheath.

9. A device as claimed in any preceding claim wherein the hand shielding means comprises a funnel shaped shield defining a progressively constricted duct communicating with the open end of the sheath whereby in use a needle presented for insertion into the device may be guided to the open end of the sheath.

10. A device as claimed in claim 9 wherein the shield is formed integrally with the sheath.

11. A device as claimed in either of claims 9 or 10 wherein the free end of the shield comprises a cylindrical lip portion.

12. A device as claimed in any preceding claim wherein the sheath is a tapered tube accomodating a single needle.

13. A device substantially as hereinbefore described with reference to and as shown in Figures 1

and 2 of the accompanying drawings or as modified in Figure 1A or Figures 4 and 5.

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