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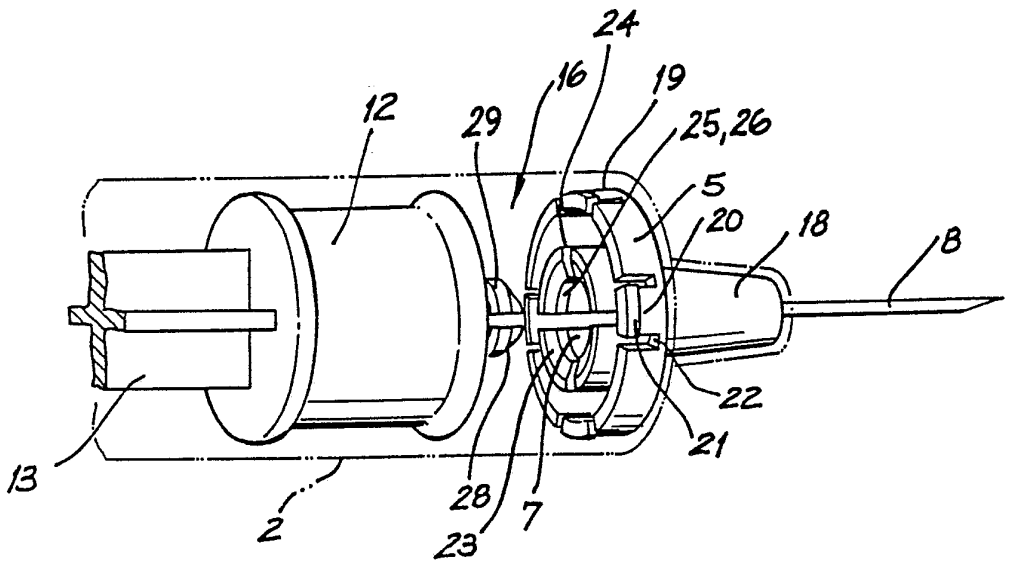
(54) Title: SINGLE USE SYRINGE



(57) Abstract

A syringe (1) comprising a barrel (2) having an opening (3) at one end and a nozzle (4) at the other end. A plunger (11) having a piston (12) and a stem (13) at least partly maintained within the barrel (2). A nozzle arrangement (5) interacts with the plunger (11) after the plunger (11) is pushed thereby emptying the contents of the barrel (2), in such a way that as the plunger (11) is drawn back after emptying, the nozzle arrangement (5) is retracted into the interior of the barrel (2).

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SINGLE USE SYRINGE

The present invention relates to syringes, and in particular to a syringe which is only able to be used once and/or is able to be disarmed.

BACKGROUND ART

It is the modern practice in medicine to dispose of used syringes and needles after only one operation. This practice has arisen due to possible contamination of the needle and syringe when administering to a patient.

Such a practice is strictly adhered to by medical practitioners and other ancillary staff in medical institutions. Therefore, the main problem in this regard in relation to hospitals and the like is not whether the syringes are used more than once but whether the syringes are disposed of correctly. In this case responsible users of the syringes should ensure that the syringes are correctly disposed.

Also with the advent of increased use of intravenous drugs by drug addicts, repeated use of syringes by such users, and even several drug users using the same needle is unhygienic and tends to lead the spread of infectious diseases, in particular hepatitis and AIDS.

It has been noted that the education and free distribution of syringes and needles is one way of overcoming the possibility of spread of such infectious diseases. However, it has been acknowledged that these schemes are only successfull up to a point, whereby it is possible for the syringes to be used more than once and for more than one person thus increasing the risk of spread of disease. The needle exchange programs which have been initiated require for a syringe to be returned before another one issues,and are safer if the syringe has been disabled and/or disarmed for safe disposal thereof.

OBJECT OF THE INVENTION

It is an object of the present invention to provide a syringe which can only be used once and/or is able to be disarmed which substantially overcomes or ameliorates the

the abovementioned disadvantages.

DISCLOSURE OF THE INVENTION

According to one aspect of the present invention there is disclosed a syringe comprising a barrel having an opening at both ends, a plunger having a piston, a stem and a base, said piston and at least part of said stem being located within one end of said barrel, a stop means to prevent plunger from being totally removed from said barrel, a nozzle arrangement to which a needle is fitted being receivable within the other end of said barrel, wherein said piston and said nozzle arrangement interact after the plunger is pushed thereby emptying contents of said barrel and as the plunger is pulled back said nozzle arrangement due to said interaction retracts into the interior of said barrel.

BRIEF DESCRIPTION OF THE DRAWINGS

Some embodiments of the present invention will now be described with reference to the drawings in which:

Fig. 1 is a longitudinal cross-sectional view of a syringe of a preferred embodiment in an unused state,

Fig. 2 is a similar view of the syringe of Fig. 1 in a primed state,

Fig. 3 is a similar view of the syringe of Fig. 1 in a used state,

Fig. 4 is a perspective view of the syringe of Fig. 1 in an unreusable state,

Fig. 5 is a detailed perspective view of a nozzle and piston arrangement of the syringe of Fig. 1,

Fig. 6 is a longitudinal cross-sectional view of a syringe of a second embodiment in an unused state,

Fig. 7 is a similar view of the syringe of Fig. 6 in a primed state,

Fig. 8 is a similar view of the syringe of Fig. 6 in a used state,

Fig. 9 is a similar view of the syringe of Fig. 6 in an unreusable state,

Fig. 10 is a perspective view of the syringe of a

third embodiment in an unused state,

Fig. 11 is a similar view of the syringe of Fig. 10 in a used state, and

Fig. 12 is a similar view of the syringe of Fig. 10 in an unreusable state.

BEST MODES OF CARRYING OUT THE INVENTION

The syringe 1 of the preferred embodiment comprises a barrel 2 with an opening 3 at one end and a nozzle 4 at the other end. A needle carriage moulding 5 is located within the nozzle 4 and seals the tapered inside of the nozzle 4. A hollow needle 8 has a friction fit with an aperture 7 which passes through the moulding 5. The moulding 5 has a tapered section 18 which fits within the nozzle 4 and an annular section 19 which fits within the barrel 2. The annular section 19 has four tabs 20 with ribs 21 located within slots 22. The tabs 20 and ribs 21 are biased radially outwardly against the inside of the barrel 2 in their rest state within the barrel 2.

The moulding 5 has an inner cylindrical section 23 with four splits 24 located around its surface. On the inner circumferal surface 25 of the inner cylindrical section 23 a lip 26 is located.

A plunger 11 is similar to a plunger of a standard syringe, and comprises a piston 12, a stem 13, a base 14, and a locking device 16. All these constituant parts are made of flexible plastics. The piston 12 is located within the barrel 2 whilst the stem 13 passes through the opening 3. On the inside surface of the barrel 2 at the end 3 is a lip 10. The lip 10 prevents the piston 12 of the plunger 11 being removed from the barrel 2.

The locking device 16 located at one end of the piston 12 comprises a tapered plug 28 with an annular rib 29. The plug 28 is able to be locked within the inner cylindrical section 23 of the moulding 5.

The barrel 2 has on its outside surface a shoulder 15 at opening 3. The shoulder 15 is of a conventional construction and in use two fingers are locatable under the shoulder

15 whilst the thumb of the person operates the syringe 1 by pressing down on the base 14 of the plunger 11.

In use the syringe 1 as illustrated in Fig. 1 has the piston 12 of the plunger 11 located within the barrel 2 adjacent the needle carriage moulding 5. The plug 28 is spaced apart from the moulding 5 with air located within the spacing.

The syringe 1 is primed by pulling the plunger 11 away from the nozzle 4 thus partially filling the barrel 2 with liquid medication or the like. Naturally, a small amount of air also fills the barrel 2 because of the spacing between the piston 12 and the needle moulding 5. Once the desired dose is within the barrel 2, the syringe is inverted and the air within the barrel 2 is expelled as the plunger 11 is pressed partially home in the direction of arrow A forcing the piston 12 towards the nozzle 4 thus expelling the air. Then the injection is given and the base 14 is pressed fully so it continues until the plug 28 locks inside the inner cylindrical section 23. These two parts are locked as the rib 29 on the plug 28 locks with the lip 26 on the locking device 16 after the plug 28 is forced within the aperture of the device 16. As the plug 28 is forced into the aperture (not illustrated) the four parts of the inner cylindrical section 23 are forced apart as the outside diameter of the plug is slightly larger than the inside diameter of the inner cylindrical section 23. Once the plug 28 is locked within the aperture (not illustrated), as the plunger 11 is retracted, the needle carriage moulding 5 is likewise retracted inside the barrel 2 in the direction of arrows B. The lip 10 prevents the plunger 11 from being totally removed from within the barrel 2.

The moulding 5 is able to be moved against the bias of the annular section 19 which prior to use maintains the moulding 5 within the nozzle 4.

The aforementioned procedure of retracting the needle 8 within the barrel 2 of the syringe 1 is a means of disarming the syringe 1 so that there is no possibility that the

syringe 1 will be used again as the plug 28 cannot be easily removed from the moulding 5. It is possible to move the plunger 11 once again in the direction shown by arrow A however the syringe will not be able to be filled with any other liquid as the plug 28 and moulding 5 are inextricably linked. A responsible user of the syringe 1 of the preferred embodiment would retract the needle so that it is wholly located within the barrel 2 so that it is safe for disposal. However, it is possible to force the plunger in the direction of arrows A thus allowing the needle 8 to be located on the outside barrel 2. In this respect, the syringe 1 of this embodiment enables the syringe to be disarmed and the needle 8 to be positioned for safe disposal thereof as long as the plunger 11 is retracted.

A second embodiment of the present invention is illustrated in Figs. 6 to 9. A syringe 31 comprising a barrel, 32 an opening 33 at one end and a nozzle 34 at the other end. A needle 38 has a friction fit in a nozzle attachment 35 which fits within the interior of the nozzle 34. The nozzle attachment has an aperture (not illustrated) which connects the interior of the barrel 32 to the hollow needle 38.

A plunger 41 comprises a piston 42, a stem 43 and a base 44. The piston 42 is of flexible plastics material and has two ridges 36 which cause sealing within the interior of the barrel 33.

The stem 43 has a H-shaped cross-section and has a racked ratchet along at least one of the surfaces of the cross-piece 46 of the stem 43. The ratchet 48 is located substantially at the end of the stem 43 near the base 44.

A separate ratchet ring 47 is attached about the stem 43 of the plunger 41. The ring 47 is free to slide on the inside of the barrel 32 and is held on the stem 43 by a detente member (not illustrated).

The ring 47 has sprung locking fingers 49 which are biased radially outwardly but are held in contact with the inside wall of the barrel 32. The ring 47 has a tongue (not

illustrated) which acts against the ratchet 48.

In use the syringe 31 is primed by pulling the plunger 41 away from the nozzle 34. In this embodiment, the piston 42 is bottomed against the nozzle 34 and the ring 47 is positioned in the middle section of the stem 43. As the plunger 41 is retracted in the direction of arrow C, it carries the ring 47 with it until the ring 47 reaches the barrel and closure 49 at which the locking fingers 50 spring into the undercut detail of the end closure 49 preventing any further movement of the ring 47.

The plunger 41 continues to be withdrawn by over-riding the detente between the ring 47 and the stem 43 until the piston 42 contacts the ring at the top of its stroke.

Once the desired dose is within the barrel 32 the syringe 31 is inverted and the air within the barrel 32 is expelled as the plunger 11 is pressed partially home in the direction of arrow D forcing the piston 42 in the direction of the nozzle 34. The injection is given as the plunger 41 continues in the direction of A. At a predetermined point approximately 70 to 80 percent of maximum travel, the racks of the ratchet 48 enter the ratchet ring 47 and any retraction of the plunger is prevented from this point on. As the plunger is pressed fully home the plunger is effectively captured at its bottomed position.

The embodiment as described above is for a automatic single use of a syringe, however, the syringe 31 does not protect the needle for safe disposal. The single use prevision relies on a minimum fluid intake as a proportion of total available dose capacity and an evacuation of inexcess of this minimum. A number of slightly different capacities related to dose capacity may be required for certain operations.

Once again, the embodiment as illustrated in Figs. 6 to 9 is to prevent the use of the syringe 31 more than once. The syringe 31 does not provide for safe disposal thereof. However, in the drawings Figs. 6 to 9, a shroud

40 is located on the outside of the barrel 32 and has an opening 39 corresponding to the needle 38. The shroud 40 has a friction fit with the barrel 32 and is able to be manipulated so that the needle 38 is wholly enclosed by the shroud 40 for safe disposal. Once again, for safe disposal responsible use of the syringe 31 must be undertaken.

Another embodiment of the invention is illustrated in Figs. 10 to 12. A syringe 51 has a cylindrical barrel 52 and is of a conventional construction. A plunger 53 is located within the barrel 52. There are, however, no finger grips on the barrel 52. A needle 54 is bonded into a nozzle (not illustrated).

A transparent plastic sleeve 55 surrounds the barrel 52 and is free to slide over it. A linkage mechanism 56 is attached to the sleeve and also the distil end 57 of the barrel 52 on opposite sides of the barrel 52. To prepare the syringe 51 for use, a plastic strip (not illustrated) which locks the sleeve 55 in position must be torn from the linkage mechanism 56 before the syringe 51 can be operated.

The sleeve 55 is drawn back towards the distal end 57 of the barrel 52 and in doing so the linkage mechanism 56 folds in the manner as illustrated in Fig. 11. When the sleeve 55 is fully retracted, a pair of flaps 58 act as finger grips being folded flat against the other.

The plunger 53 is drawn back to fill the syringe 51 and the preparation injected in the manner of a standard syringe.

After use of the syringe 51, the sleeve 55 is returned to the position where it encloses the needle 54 by straightening the linkage mechanism 56 before disposal of the syringe 51. This action may be assisted or made automatic by integrally moulded or fitted springs incorporated in the mechanism 56.

On completion of the use of the syringe 51, the syringe 51 can then be rendered unusable a second time by drawing down a plastic locking ring 59 from the distal end 57 of the barrel 52. Ratchet teeth (not illustrated)

moulded into the inside surface of the ring 59 slide over racks 60 moulded on the outer surface of the linkage mechanism 56. When the ring 59 reaches the end of the racks 60 it is prevented from moving back by means of the ratchet mechanism 56 and therefore the sleeve 55 is locked in position thus ensuring that the needle 54 is wholly enclosed for disposal thereof.

The embodiment of the syringe 51 requires a conscious effort to prevent a second use, however, it offers the potential for automatic disarming.

The foregoing describes only some embodiments of the present invention, and modifications obvious to those skilled in the art can be made thereto without departing from the scope of the present invention.

CLAIMS

1. A syringe comprising a barrel having an opening at both ends, a plunger having a piston, a stem and a base, said piston and at least part of said stem being located within one end of said barrel a stop means to prevent plunger from being totally removed from said barrel, a nozzle arrangement to which a needle is fitted being receivable within the other end of said barrel, wherein said piston and said nozzle arrangement interact after plunger is pushed thereby emptying contents of said barrel, and as the plunger is retracted said nozzle arrangement is pulled into interior of said barrel.

2. A syringe according to claim 1 wherein piston has a locking device attached to its end which mechanically interlocks with a corresponding locking device on said nozzle arrangement.

3. A syringe according to claim 2 wherein the piston's said locking device comprises a plug which is able to be inserted into an aperture in the nozzle arrangement's corresponding locking device to be mechanically connected.

4. A syringe according to any one of claims 1-3 wherein said nozzle arrangement has an annular section which is radially biased towards the inside surface of said barrel, and has a tapered section which seals against the nozzle.

5. A syringe according to claim 1 wherein said stop means comprises a lip on said one end of said barrel.

6. A syringe comprising a barrel having an opening at both ends, a plunger having a piston, a stem and a base, said piston and at least part of said stem being located within one end of said barrel, a stop means to prevent the plunger from being totally removed from said barrel, a nozzle arrangement to which a needle is fitted being receivable within the other end of said barrel, wherein said stem interacts with a locking means which after use of the syringe locks the plunger into position where it cannot be moved, thus preventing re-use of syringe.

7. A syringe according to claim 6 wherein said stem has a ratchet rack which interacts with a ratchet tongue located within said locking means.

8. A syringe according to claim 7 wherein said ratchet rack interacts with the ratchet tongue at approximately 70-80% of maximum travel during the use stroke of the plunger.

9. A syringe according to claim 8 wherein said locking means is attached to said stem prior to use and during use is locked into place adjacent said one end of said barrel.

10. A syringe according to any one of the preceding claims wherein a sleeve is locatable over the outside of said barrel, covering said needle, said sleeve being able to be moved axially along its longitudinal axis to allow use of said syringe and to expose said needle and after use to be locked into position to wholly enclose said needle.

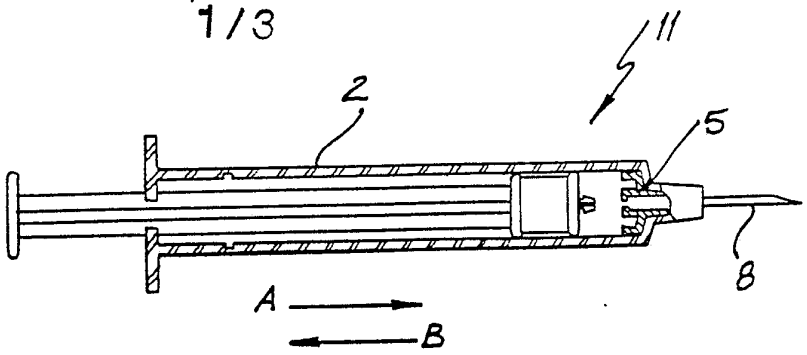

FIG. 1

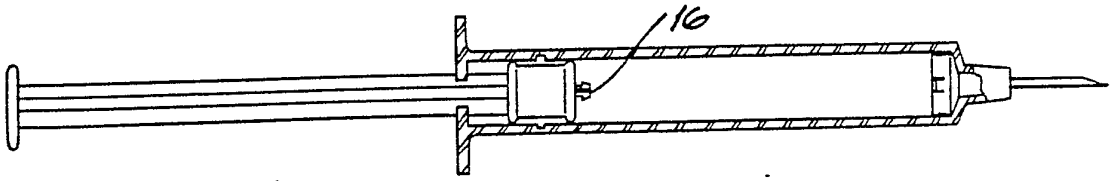

FIG. 2

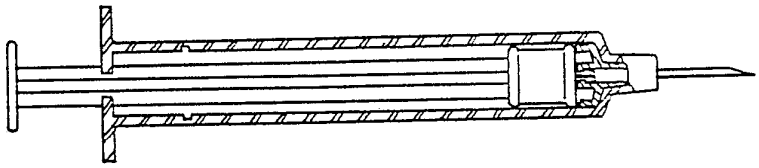

FIG. 3

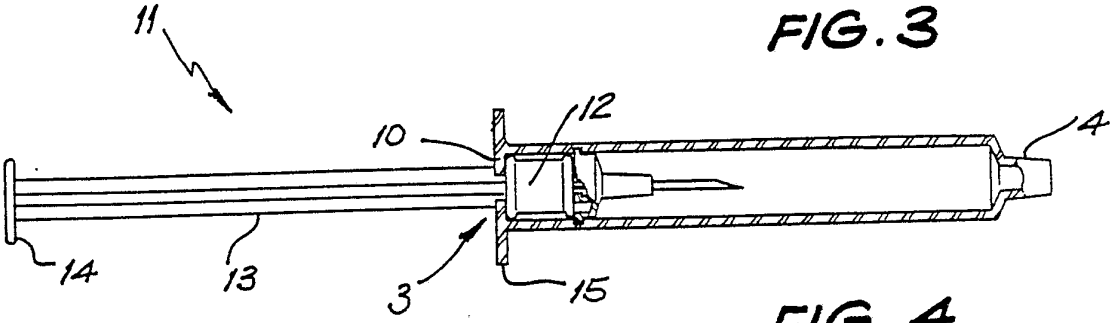

FIG. 4

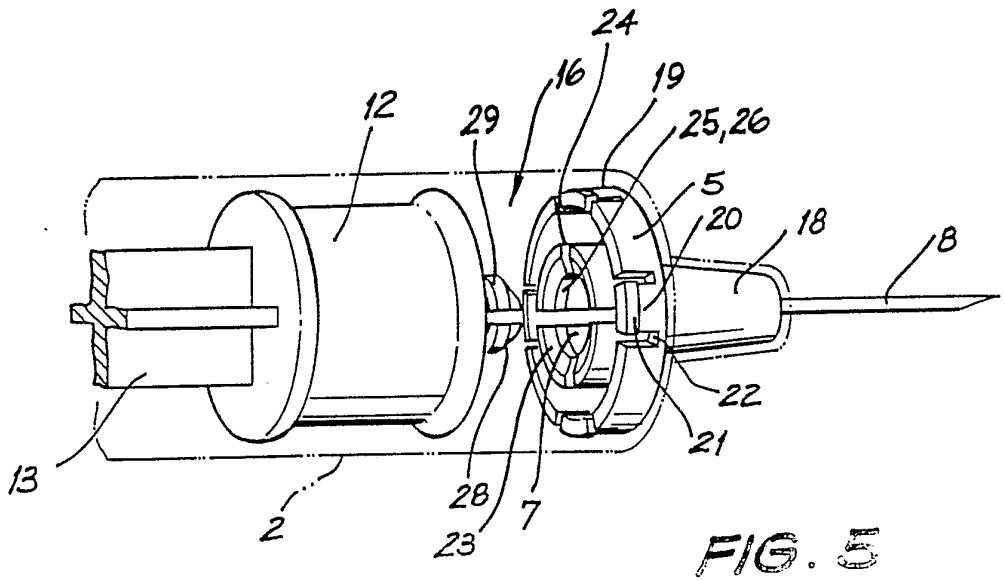

FIG. 5

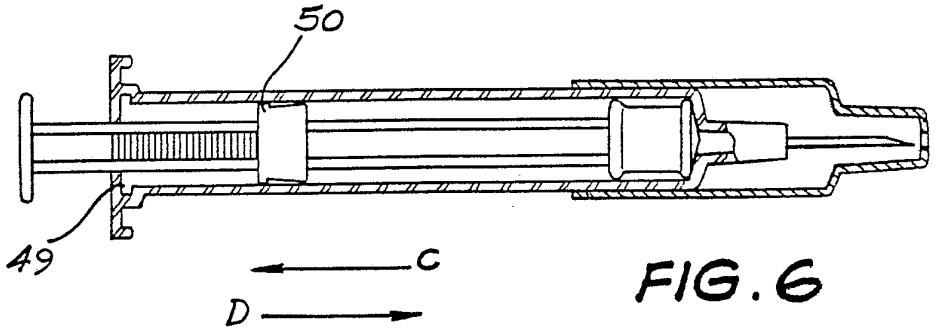

FIG. 6

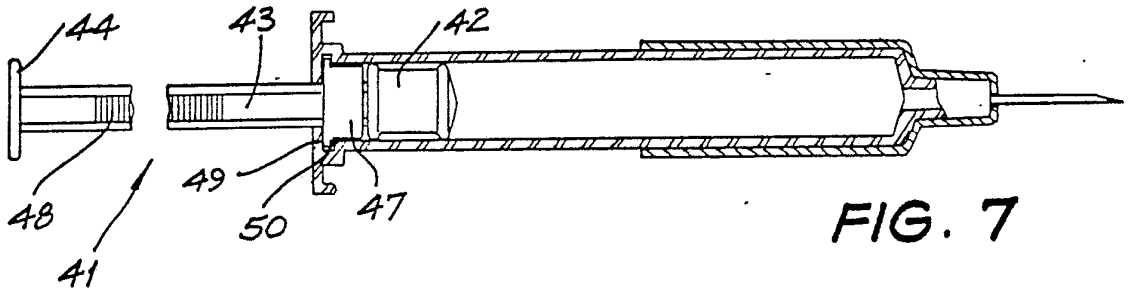

FIG. 7

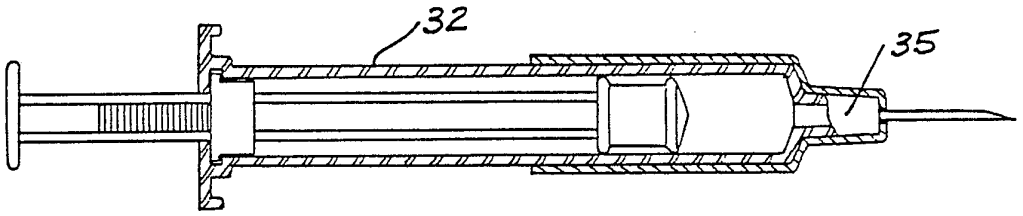

FIG. 8

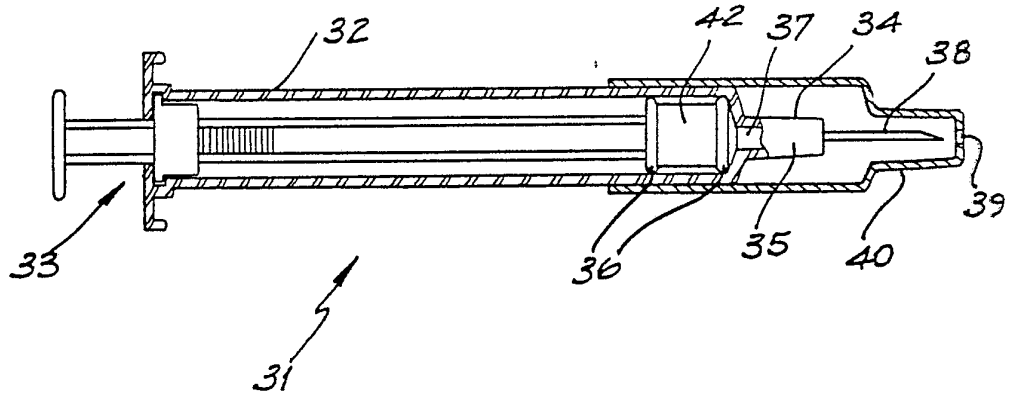

FIG. 9

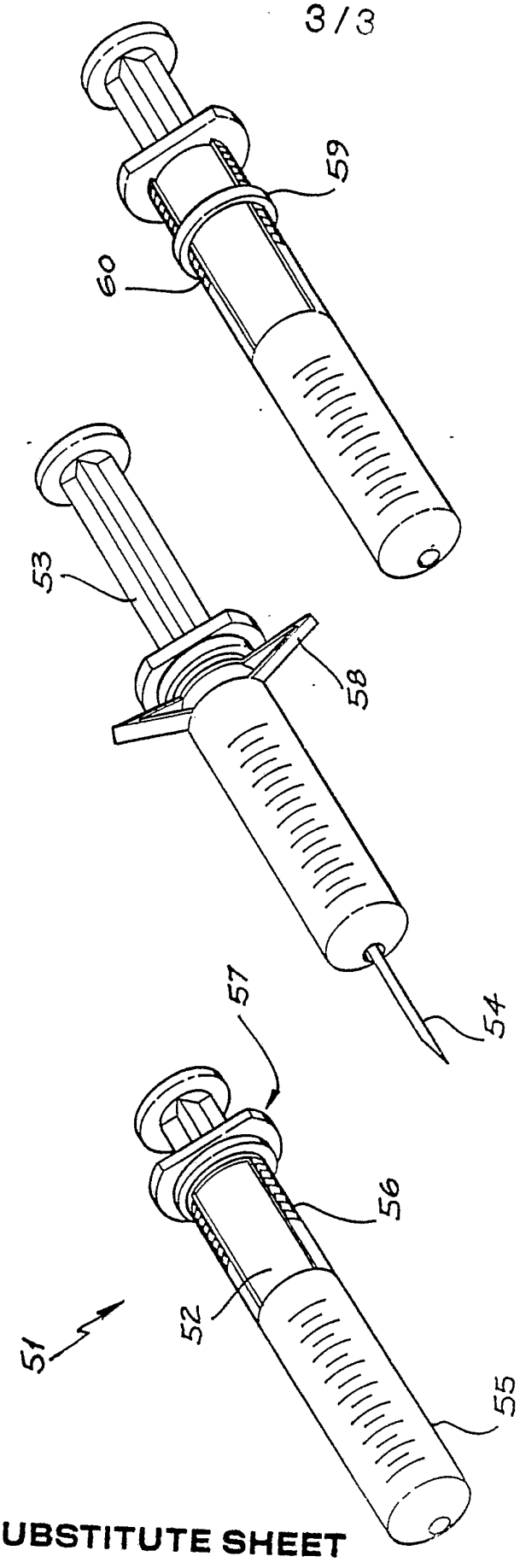

FIG. 12

FIG. 11

FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00441

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[4] A61M 5/31, 5/315

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	A61M 5/31, 5/315, 5/32, 5/34

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

AU : IPC as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X,Y	US,A, 4026287 (HALLER) 31 May 1977 (31.05.77) whole document	(1-5)
X,Y	US,A, 4391272 (STAEMPFLI) 5 July 1983 (05.07.83) whole document	(6)
X,Y	US,A, 3478937 (SOLOWEY) 18 November 1969 (18.11.69) whole document	(6)
P,X,Y	US,A, 4770655 (HABER et al) 13 September 1988 (13.09.88)	(1,2,5)
P,X,Y	US,A, 4747830 (GLOYER et al) 31 May 1988 (31.05.88)	(1-6)
P,X,Y	US,A, 4747829 (JACOB et al) 31 May 1988 (31.05.88)	(1,2)
P,Y	US,A, 4737144 (CHOKSI) 12 April 1988 (12.04.88)	(16)

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
10 February 1989 (10.02.89)	20 FEBRUARY 1989 (20 02.89)
International Searching Authority	**Signature of Authorized Officer**
Australian Patent Office	A. HENDRICKSON

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 88/00441

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members		
US 4747829	AU 10257/88	EP 276160	JP 63183072
US 4391272	AT 1753/79	BE 874689	CA 1144838
	CH 620126	DE 2909002	FR 2419074
	GB 2015883	HK 641/87	JP 54129793
	NL 7901872	SE 7902138	SU 1082305
US 3478937	ZA 7901069	BE 714754	DE 1766748
	FR 1567778	GB 1225793	IL 29964
	NL 6806424		
US 4770655	AU 13088/88	EP 282097	

END OF ANNEX