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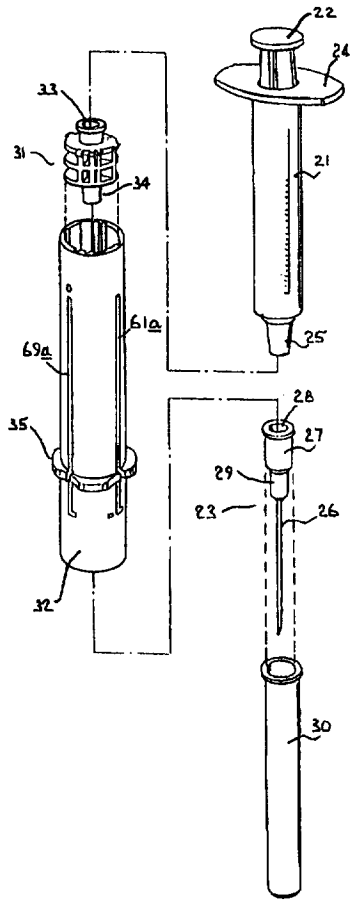
(54) Title: A SAFETY CANNULA

(57) Abstract

A safety cannula which is arranged to be fitted to a hypodermic syringe, a catheter or other similar medical appliance. The cannula comprises a hollow hub (31) which is connected with a hypodermic needle (23) and a sleeve (32) which is located about the hub (31). The sleeve is slidable longitudinally between a first position at which it exposes the needle (23) and a second position at which it surrounds the needle (23). The hub (31) and the sleeve (32) are provided with integrally formed latching elements in the form of projections (56 to 58) on the hub (31) and groove-like flutes (60, 61, 64, 67, 68 and 69) within the sleeve (32). The latching elements interengage when the sleeve (32) is in the first position and may be disengaged when the sleeve (32) is in the first position. Also, the latching elements provide for longitudinal movement of the sleeve (32) relative to the hub (31) from the first to the second position, and they provide positive interengagement to prevent further movement of the sleeve (32) relative to the hub (31) when the sleeve (32) has been moved from the first position to the second position.



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A SAFETY CANNULA

FIELD OF THE INVENTION

This invention relates to a cannula for medical use, and in particular, to a cannula which provides for a reduced possibility of needlestick injury during or following its use. The invention has particular application to a cannula when fitted to a hypodermic syringe and is hereinafter described in this context. However, it will be understood that the invention does have broader application, for example to a cannula for use in conjunction with a catheter or infusion set.

BACKGROUND OF THE INVENTION

Whilst needlestick injuries have always presented a problem to the medical professional, the problem has become significantly greater as a result of the current prevalence of Human Immunodeficiency Virus (HIV) and the acute cross-infection risks that are inherent in treating HIV infected patients. Consequently, there is now a greater responsibility on institutions that employ medical and paramedical personnel to provide equipment that is as safe as possible when used routinely in the provision of emergency aid and home care, as well as in surgery, hospital ward and operating theatre situations. However, there is also a conflicting pressure on the healthcare industry, that is a pressure to reduce expenditure and to minimise costs in relation to both medical equipment and human resources. Therefore, there is a need to provide hypodermic syringes that are both safe to use and inexpensive to produce. Furthermore, there is a need to provide a low-cost attachment which can quickly and easily be assembled to a conventional hypodermic syringe to form a complete unit which functions to minimise the possibility of needlestick injury following use of the syringe.

SUMMARY OF THE INVENTION

The present invention seeks to meet the above stated requirements by providing a cannula which comprises (ie, includes):

(a) a hollow body (hereinafter referred to as a "hub") which in use is connected with a hypodermic needle or with a medical instrument that carries a hypodermic needle, and

(b) a sleeve which is located about the hub and which is slidable longitudinally between a first position at which it exposes the needle and second position at which it surrounds the needle.

PREFERRED FEATURES OF THE INVENTION

The hub and the sleeve preferably are provided with integrally formed latching elements which interengage when the sleeve is in the first position, which can be disengaged when the sleeve is in the first position, which provide for longitudinal movement of the sleeve relative to the hub from the first to the second position, and which positively interengage to prevent further movement of the sleeve relative to the hub when the sleeve has been moved from the first position to the second position.

The latching elements are preferably arranged so that they are disengaged by rotating the sleeve relative to the hub when the sleeve is in the first position.

The hypodermic needle may be connected directly with the hub but, in order to provide greater flexibility, the hub preferably is arranged to be connected indirectly to the needle. In the latter case the hypodermic needle will be formed with a coupling portion for connecting the needle to the hub.

The hub preferably is arrange to connect directly to the spigot of a conventional syringe body. Thus, in this preferred arrangement, the cannula may be provided to adapt an otherwise conventional hypodermic syringe to achieve the features of the present invention.

A cap preferably is provided to cover the needle

portion of the cannula in each of its possible forms.

The latching elements of the invention preferably are formed as interengaging projections and grooves. In a particularly preferred form of the invention the hub is formed with integrally moulded radial projections that engage within groove-like flutes within the sleeve. The sleeve normally is prevented from rotating relative to the hub by engagement of one projection in one of the grooves, and rotation of the sleeve preferably is effected by moving the projection from its accommodating groove to another groove whilst, at the same time, elastically deforming a portion of the hub and/or the sleeve.

The invention will be more fully understood from the following description of a preferred embodiment of a hypodermic syringe that integrates the cannula as previously defined. The description is provided with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings -

Figure 1 shows a side view of the complete hypodermic syringe assembly incorporating a cannula and a needle protecting cap,

Figure 2 shows an exploded perspective view components of the syringe assembly shown in Figure 1,

Figure 3 shows a perspective partial view of conjoined portions of the complete syringe,

Figure 4 shows a perspective view of a sleeve portion of the cannula,

Figure 5 shows a plan view of the upper end of the sleeve as illustrated in Figure 4,

Figure 6 shows a perspective view of a hub portion of the cannula,

Figure 7 shows a plan view of the upper end of the hub as shown in Figure 6,

Figure 8 shows a sectional elevation view of the syringe assembly with the cannula in a first position

surrounding the body of the syringe,

Figure 9 shows a view which is similar to that in Figure 8 but with the sleeve in a second position surrounding the cannula needle,

Figure 10 shows a diagrammatic representation of the interior of the sleeve when in a developed (open) condition and shows also the interrelationship of the sleeve with the hub when the sleeve is in the first position, and

Figure 11 is a view similar to that shown in Figure 10 but with the sleeve and hub portions shown in the second position.

DETAILED DESCRIPTION OF PREFERRED MODE OF PERFORMING THE INVENTION

As illustrated, the complete assembly comprises a syringe 20 having a body portion 21, a plunger 22 and a hypodermic needle 23. The body portion 21 is formed integrally with a pair of lugs 24 at its upper end and with a spigot 25 at its lower end. The plunger 22 is provided for drawing and expelling fluid into and from the syringe body portion 21 and through the hypodermic needle 23 in the usual way.

The hypodermic needle 23 includes a hollow needle portion 26 and a coupling portion 27. The coupling portion 27 includes a socket 28 and a spigot portion 29. The socket 28 is normally fitted in frictional engagement with the spigot 25.

A cap 30 is provided optionally for covering the needle portion 26 and is shaped and sized to engage frictionally with the spigot 29 of the coupling portion 27.

Provided as accessories to the syringe assembly are a hollow hub 31 and a sleeve 32; although, as previously indicated, the hub 31 might actually be formed integrally with or as the coupling portion 27 of the hypodermic needle 23. As illustrated, the hub 31 includes an upper socket portion 33 which is shaped and sized to receive the spigot 25 of the syringe body. Also, the hub 31 is formed at its

lower end with a spigot 34 which is shaped and sized to receive the socket portion 28 of the coupling 27.

As best seen from Figures 2 and 3 of the drawings, the hub 31 is interposed between the syringe body 21 and the hypodermic needle 23. In that position, the hub 31 is employed to carry the sleeve 32.

The sleeve 32 is a neat sliding fit over the hub 31 and is moveable longitudinally between first and second positions that are shown respectively in Figures 8 and 9. Finger grips 35 are provided on the outer surface of the sleeve 32 to facilitate rotational and longitudinal movement of the sleeve.

Prior to use, the syringe assembly would normally be provided in the form shown in Figure 1. That is, with the sleeve 32 located in the first position and the cap 30 covering the hypodermic needle 23. When making the assembly ready for use, the cap 30 is removed and the sleeve 32 is maintained in the first position, as shown in Figure 8. Then, following use of the syringe, involving injection of a patient, the sleeve 32 is moved longitudinally from the first position shown in Figure 8 to the second position as shown in Figure 9, so that the entire hypodermic needle is covered and the possibility of needlestick injury is obviated.

The hub 31 and the sleeve 32 are provided with interengaging latching elements in the form of projections and groove-like flutes for the purpose of holding the sleeve 32 in the first and second positions relative to the hub. These latching elements are described as follows with particular reference to Figures 5 to 7, 10 and 11 of the drawings.

The hub 31 is formed with a first pair of diametrically opposed radial projections 56a and b which have downwardly facing ramp surfaces. Also, the hub is formed with a second pair of diametrically opposed radial projections 57a and b which have downwardly facing ramp surfaces. Furthermore,

the hub 31 is formed with a third pair of diametrically opposed radial projections 58a and b which have upwardly facing ramp surfaces. Finally, the hub is formed with a pair of diametrically opposed radial projections 59a and b in the form of lugs that have rounded peripheral surfaces.

For receiving the hub projections 56a and b to 59a and b, the sleeve 32 is formed internally with a series of groove-like flutes, four pairs of which open to the upper end of the sleeve and two pairs of which have blind ends. Thus, the sleeve 32 is formed with a first pair of diametrically opposed flutes 60a and b which are arranged to receive the first pair of hub projections 56a and b when the sleeve 32 is first assembled to the hub and is moved into the first position, as indicated in Figures 8 and 10.

As shown in Figures 4, 10 and 11, the sleeve is formed also with a second pair of diametrically opposed flutes 61a and b. The flutes 61a and b are separated from the flutes 60a and b respectively by a wall 62 but are joined at their lower ends by a bridging channel 63. The flutes 61a and b are intended to receive the hub projections 56a and b when the sleeve is being moved from its first position to its second position, as shown in Figures 9 and 11.

The sleeve 32 is also formed with a third pair of diametrically opposed flutes 64a and b, these flutes being wider than the others and being intended to accommodate both of the opposed pairs of projections 57a, b and 59a, b of the hub when the sleeve is being assembled to the hub. A rib 65 is located toward the lower end of the flutes 64a and b and is positioned to trap the projections 57a and b when the sleeve is pushed into the first position as indicated in Figure 10.

When located within the flutes 64a and b, the lug-form projections 59a and b bear against a dividing wall 66 which separates the grooves 64a and b from a fourth pair of diametrically opposed flutes 67a and b.

A fifth pair of diametrically opposed flutes 68a and b

are formed within the sleeve 32 and are intended to receive the hub projections 58a and b when the sleeve is first assembled to the hub. The flutes 68a and b are separated from a sixth pair of diametrically opposed flutes 69a and b by a dividing wall 70. The flutes 69a and b are blind but they are indicated by reference 69a in Figures 4, 10 and 11. The flutes 68a and b are intended to receive the hub projections 58a and b respectively when the sleeve 32 is first assembled to the hub 31.

A connecting channel 71 is provided toward the lower end of the flutes 68a, b and 69a, b to permit lateral translation of the hub projections 58a and b.

A ledge 72 is positioned in each of the flutes 69a and b, toward the upper end of the flutes. The ledge 72 provides for interfering engagement between the hub projections 58a and b when the sleeve is moved into the second position (as shown in Figures 9 and 11) relative to the hub.

When the sleeve 32 is assembled to the hub and located in the first position as indicated in Figure 10, the sleeve may be moved from the first to the second position (as indicated in Figure 11) by first rotating the sleeve about the hub, as indicated by the arrow that is designated by numeral 73 in Figure 10. Rotation of the sleeve relative to the hub will be resisted by the lug-form projections 59a and b engaging with the wall 66 of the sleeve. However, the resistance may be overcome by forcing rotation and affecting elastic deformation of the hub and/or the sleeve, so that a positive feel will be obtained as the lug-form projections 59a and b move into the grooves 67a and b.

Thereafter, the sleeve may be moved from the first position (as indicated in Figure 10) to the second position (as indicated in Figure 11), at which time the hub projections 58a and b will interengage with the ledges 72 in the flutes 69a and b. The sleeve 32 will not then be capable of movement from the second to the first position

and, thus, the needle 26 will be permanently surrounded by the sleeve.

Variations and modifications may be made in respect of the invention as above described without departing from the scope of the invention as defined in the appended claims. For example, provision may be made to locate the sleeve in the second position as a starting point and so avoid the need for the cap 30. Then, the sleeve may be moved from the second position to the first position whilst the syringe is being used, and the sleeve may finally be moved from the first position again to the second position where it will function to protect against needlestick injury. However, it will be understood that the specifically described arrangement of projections and flutes will need be modified to accommodate this arrangement.

THE CLAIMS

1. A cannula which comprises:

(a) a hollow hub which in use is connected with a hypodermic needle or with a medical instrument that carries a hypodermic needle, and

(b) a sleeve which is located about the hub and which is slidable longitudinally between a first position at which it exposes the needle and second position at which it surrounds the needle.

2. A cannula which comprises:

(a) a hollow hub which in use is connected with a hypodermic needle, and

(b) a sleeve which is located about the hub and which is slidable longitudinally between a first position at which it exposes the needle and second position at which it surrounds the needle.

3. A cannula which comprises:

(a) a hollow hub which in use is connected with a hypodermic needle, and

(b) a sleeve which is located about the hub and which is slidable longitudinally between a first position at which it exposes the needle and second position at which it surrounds the needle;

the hub and the sleeve being provided with latching elements which interengage when the sleeve is in the first position, which can be disengaged when the sleeve is in the first position, which provide for longitudinal movement of the sleeve relative to the hub from the first to the second position, and which positively interengage to prevent further movement of the sleeve relative to the hub when the sleeve has been moved from the first position to the second position.

4. The cannula as claimed in claim 3 wherein the latching elements are integrally formed with the hub and the sleeve.

5. The cannula as claimed in claim 3 or claim 4 wherein the latching elements are arranged so that relevant ones of

the latching elements are disengaged by rotating the sleeve relative to the hub when the sleeve is in the first position.

6. The cannula as claimed in claim 5 wherein the latching elements are formed as interengaging projections and groove-like flutes.

7. The cannula as claimed in claim 6 wherein the projections are formed integrally with the hub as radial projections and the flutes are formed as longitudinally extending flutes within the wall of the sleeve.

8. The cannula as claimed in claim 7 wherein one of the projections locates within one of the flutes in a manner which inhibits rotational movement of the sleeve relative to the hub when the sleeve is in the first position, wherein a wall separates said one of the flutes from another flute, and wherein the sleeve is arranged to be rotated relative to the hub by affecting elastic deformation of a portion of the sleeve and/or a portion of the hub.

9. The cannula as claimed in any one of claims 2 to 8 wherein the hypodermic needle is connected directly and permanently to the hub.

10. The cannula as claimed in any one of claims 2 to 8 wherein the hypodermic needle is formed with a coupling portion and the hub is connected to the hypodermic needle by way of the coupling portion.

11. The cannula as claimed in claim 7 wherein the hub is formed with at least four projections and the sleeve is formed with complementary flutes which are arranged to accommodate the projections and to permit assembly of the sleeve to the hub by moving the sleeve in a longitudinal direction relative to the hub, and wherein the sleeve is formed with further flutes which are arranged to receive the projections when the sleeve is rotated relative to the hub, and wherein at least one of the projections is engagable in interlocking relationship with a ledge when the sleeve is rotated and thereafter is moved longitudinally from the

first position to the second position relative to the hub.

12. The cannula substantially as shown in the accompanying drawings and substantially as hereinbefore described with reference thereto.

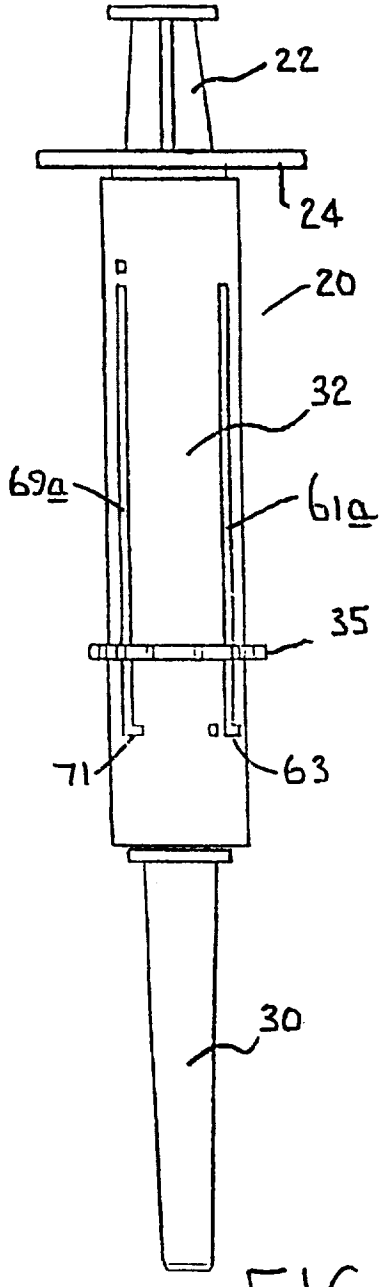
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FIG.1

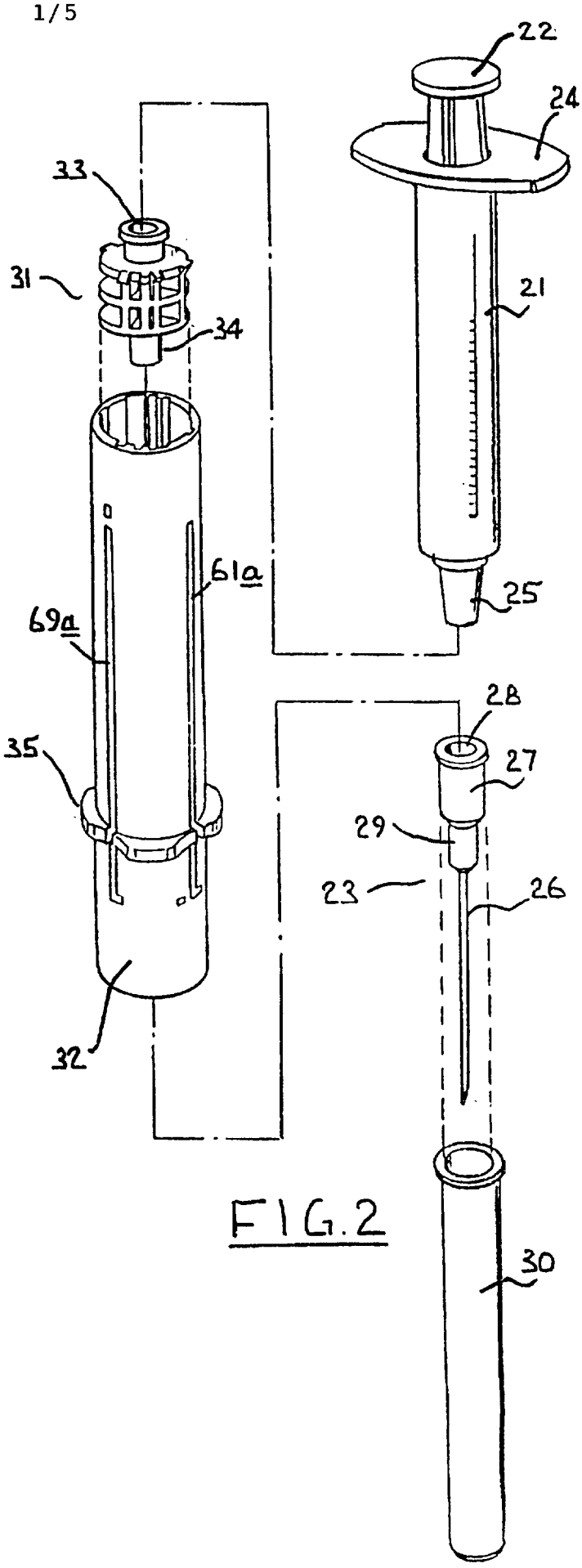
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FIG.2

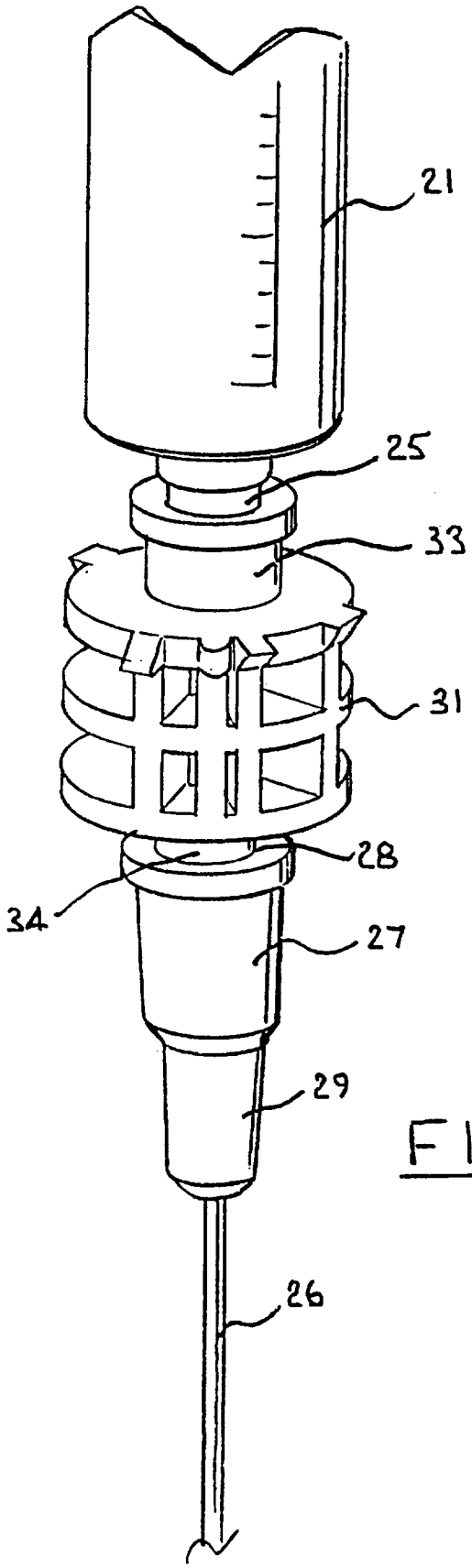


FIG.3

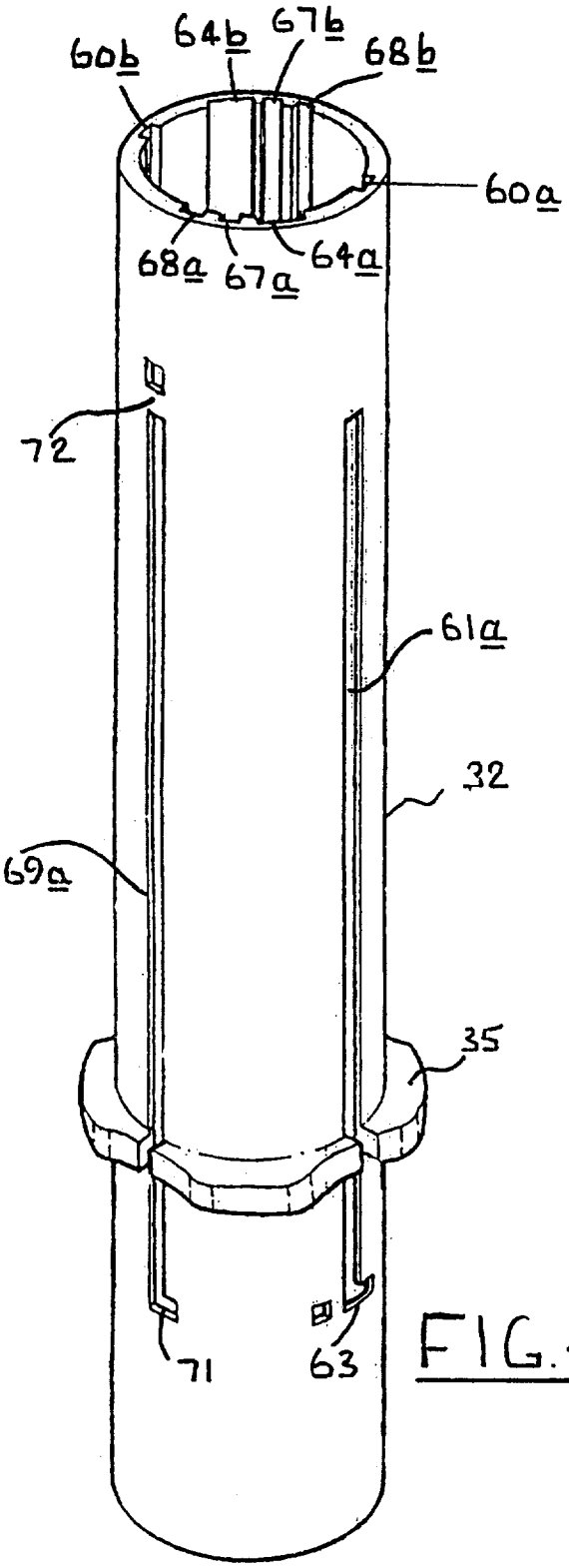


FIG.4

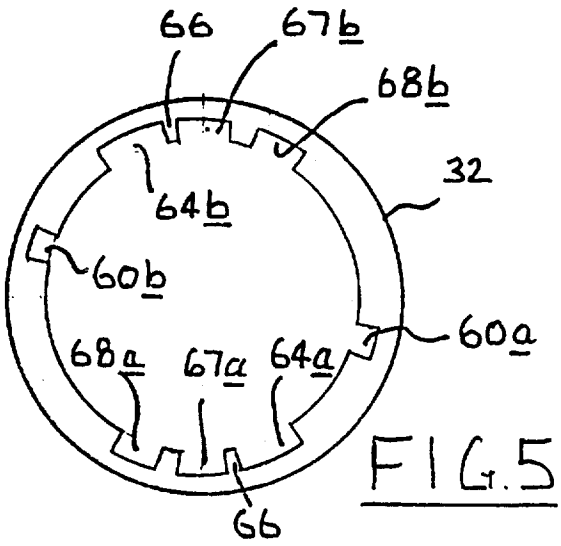


FIG.5

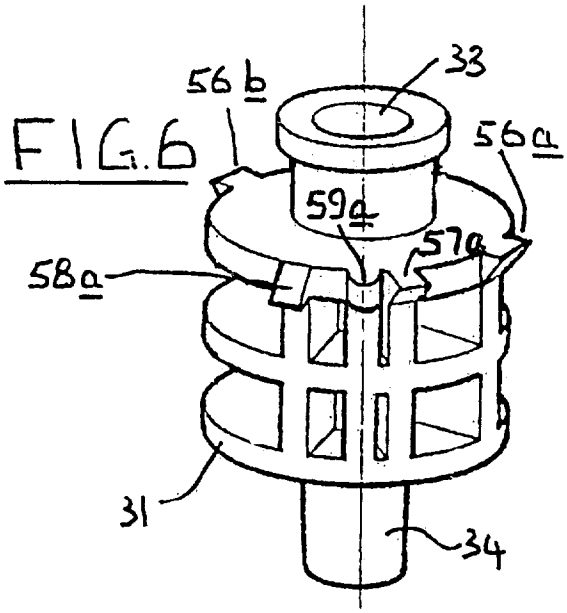
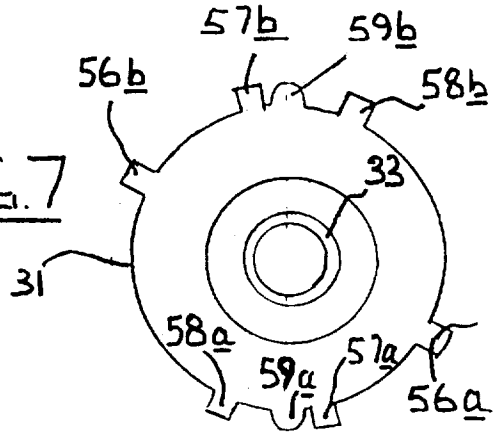


FIG.6



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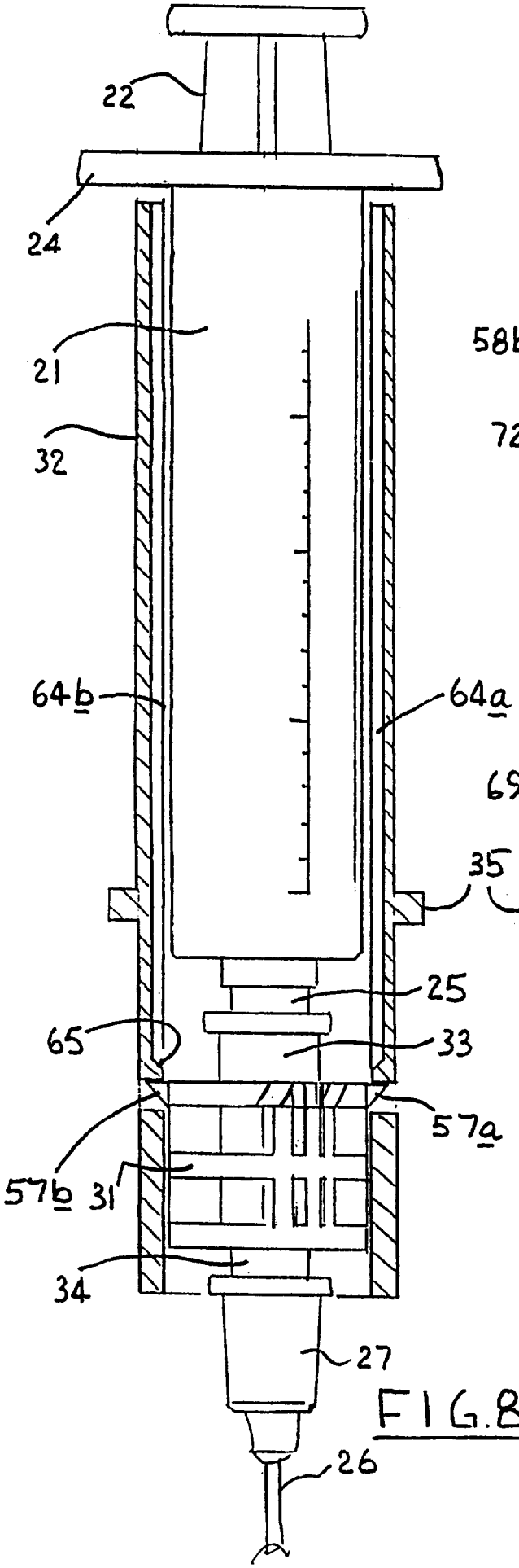
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FIG.8

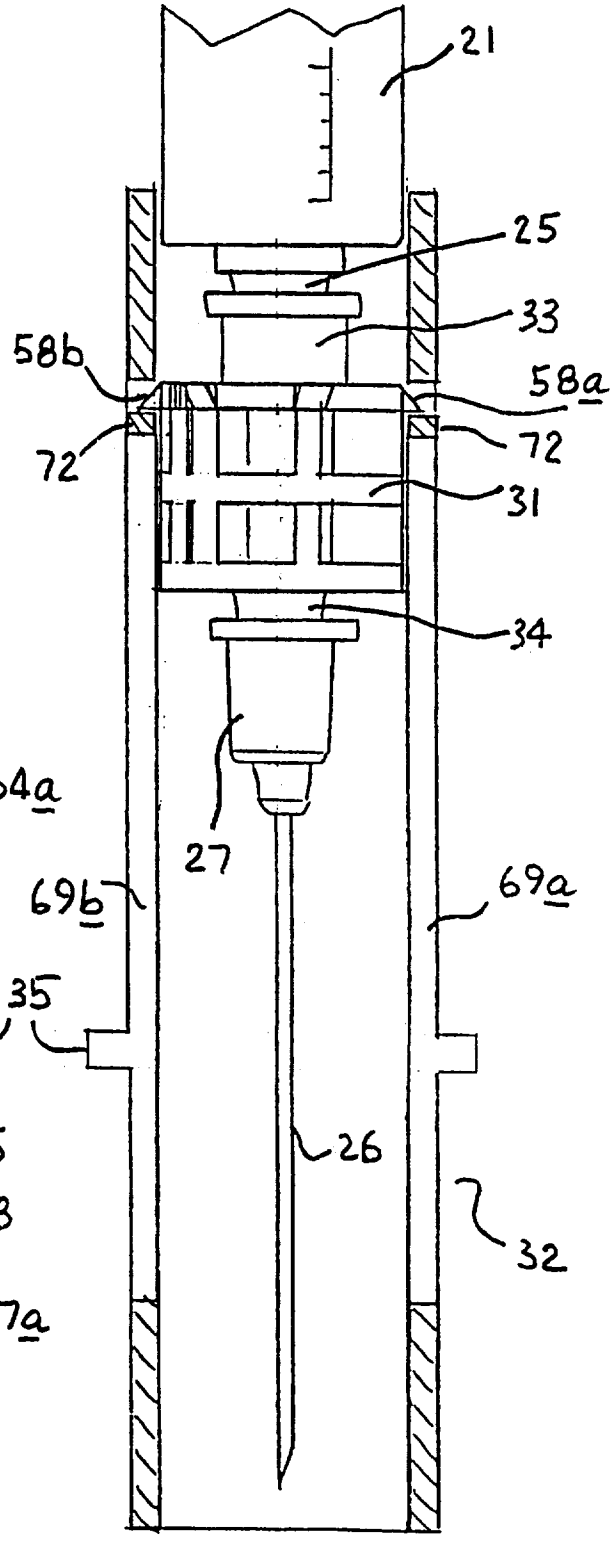
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FIG.9

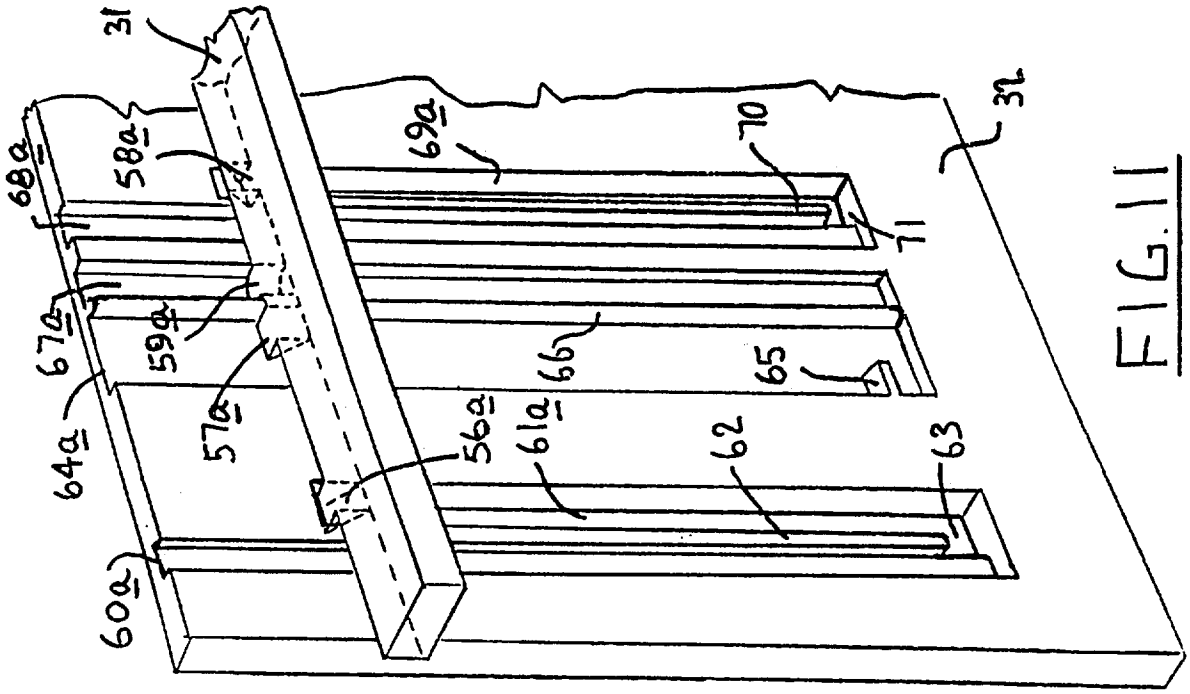
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FIG. 11

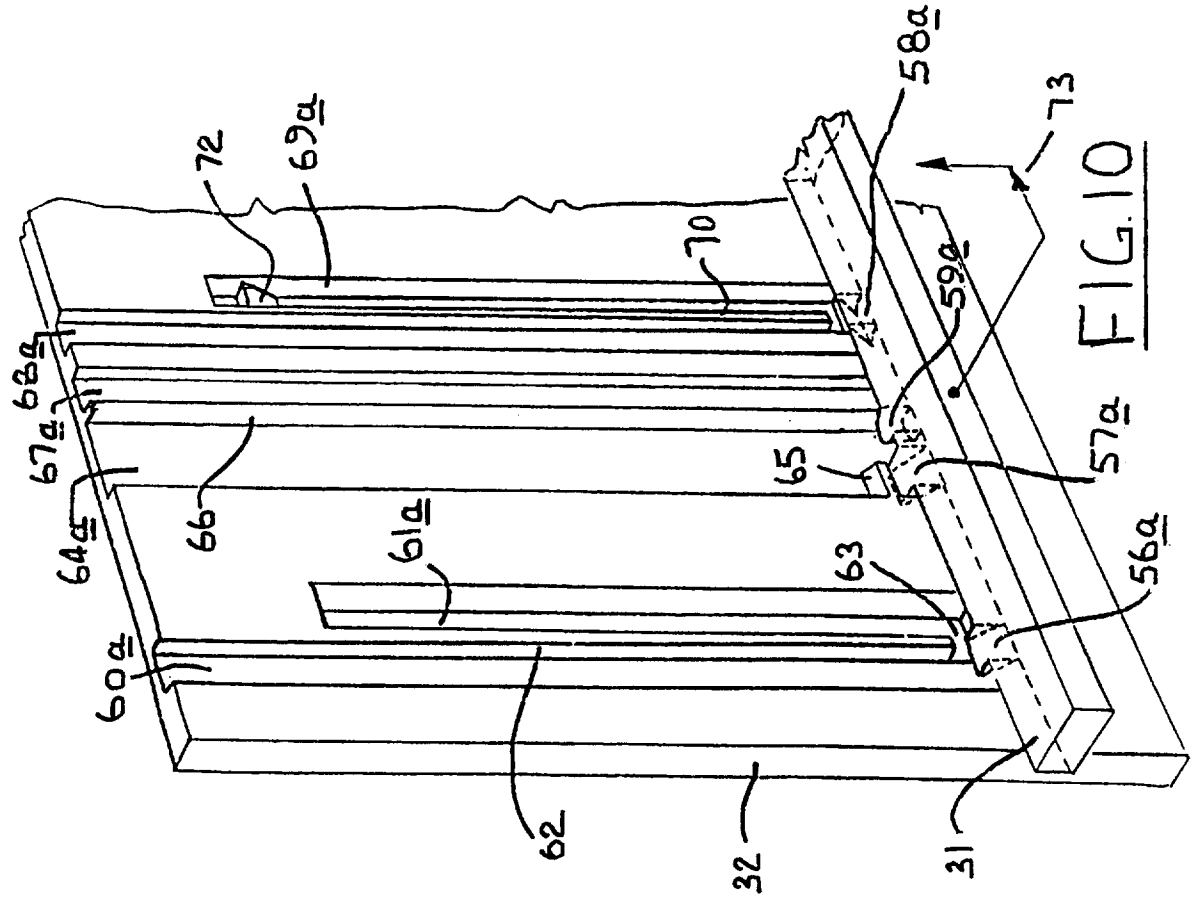
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FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 97/00600

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: A61M 5/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IC[6] : A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IC[6] A61M 5/32

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT, JAPIO with sleev: sheath: cover: shield: protect: slid: retract: telescop: latch: clip: engag: lock: catch: protru: project: lug: groov: flut: slot: channel: slit: aperture: hole: notch:

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 26699/88 A (597855) (HAN, Yu & YANG) 7 June 1990 pages 1a to 3	1, 2, 9, 10
X	WO 9300122 A (INTER-METALLIC, INC.) 7 January 1993 page 5 line 16 to page 9 line 19	1-11
X	US 5254100 A (HUBAND) 19 October 1993 whole document	1, 2, 9, 10

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

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Date of the actual completion of the international search	Date of mailing of the international search report
7 November 1997	13 NOV 1997

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C (Continuation) **DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5106379 A (LEAP) 21 April 1992 whole document	1-11
X	US 5088988 A (TALONN & RANFORD) 18 February 1992 column 2 lines 40 to 62	1, 2, 9, 10
X	EP 573947 A (BECTON DICKINSON & COMPANY) 15 December 1993 whole document	1, 2, 9, 10
X	EP 299287 (PONCY) 18 January 1989 whole document	1, 2, 9, 10

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 97/00600

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 12
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
not being drafted in accordance with Rule 6.2(a) in that it relies on reference to the description and drawings.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
PCT/AU 97/00600

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 Member					
WO	9300122	US	5201721				
US	5088988	AU	37065/89	AU	16055/92	CA	1324937
		DK	3154/89	EP	350186	EP	506204
		JP	2104369	US	5053018	US	5127910
		US	5156599	US	5169392	US	5217437
		US	5312370	US	5403287	US	5522812
		US	5160326				
EP	573947	CA	2097686	JP	6039036		
EP	299287	JP	1086981	US	4842587		

END OF ANNEX