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(56) Documents Cited:
GB 2465389 A **GB 2425062 A**
GB 2424836 A **GB 0927626 A**
WO 2003/095002 A2 **US 6053892 A**

(58) Field of Search:
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(54) Title of the Invention: **Needle shield arrangements**
 Abstract Title: **Frangible needle shield for syringe**

(57) A needle shield assembly 18 for a syringe 10, having a generally cylindrical body with a needle 16 at its forward end, comprises a shield portion 20 adapted for shielding the needle 16; a syringe engaging portion 22 for engagement with the syringe body; and a frangible connecting portion 24 connecting the shield portion and the syringe engagement portion. A rubber boot 28 may be retained within the shield portion. The needle shield portion 20 can be detached from the syringe by pulling, twisting or levering. In particular, the device may be inserted into the forward part of an autoinjector housing 32. In use, shield remover cap 38 may be pulled forwardly so that barbed fingers 42 capture the rib 26 on the needle shield 20 and the shield is pulled off, breaking frangible tabs 24. A stop surface 36 and compression spring 34 prevent further forward movement of the syringe by abutting collar 22.

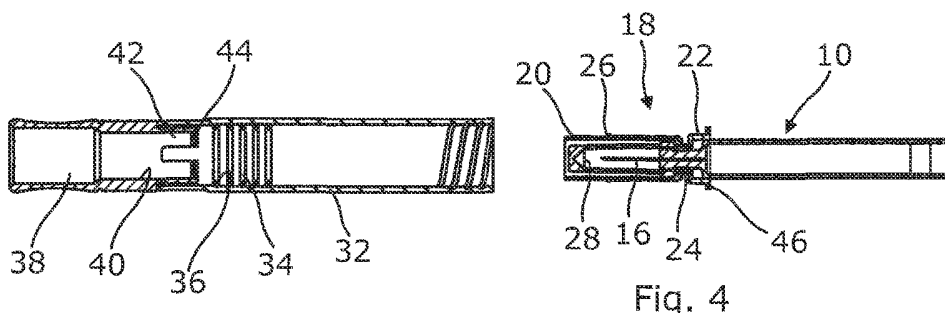


Fig. 4

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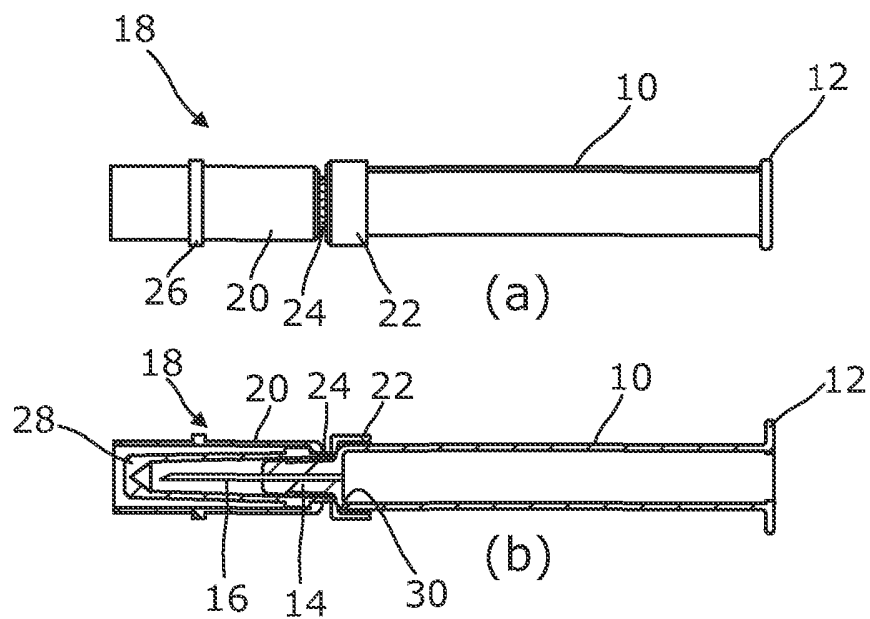


Fig. 1

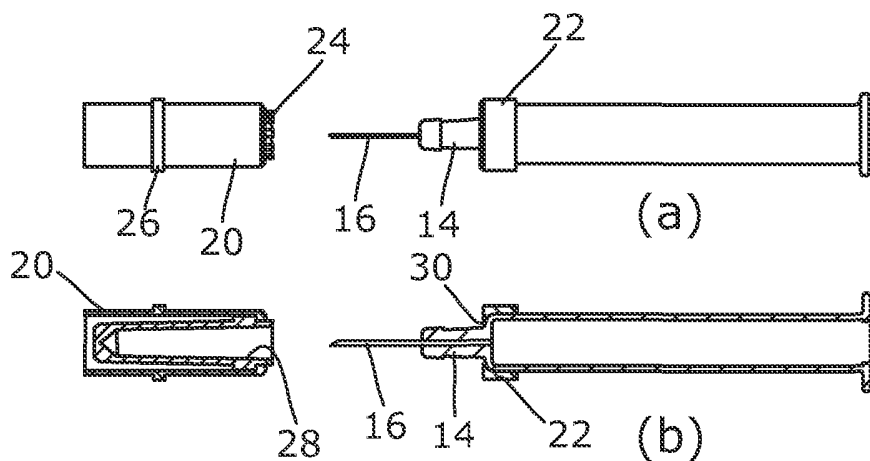


Fig. 2

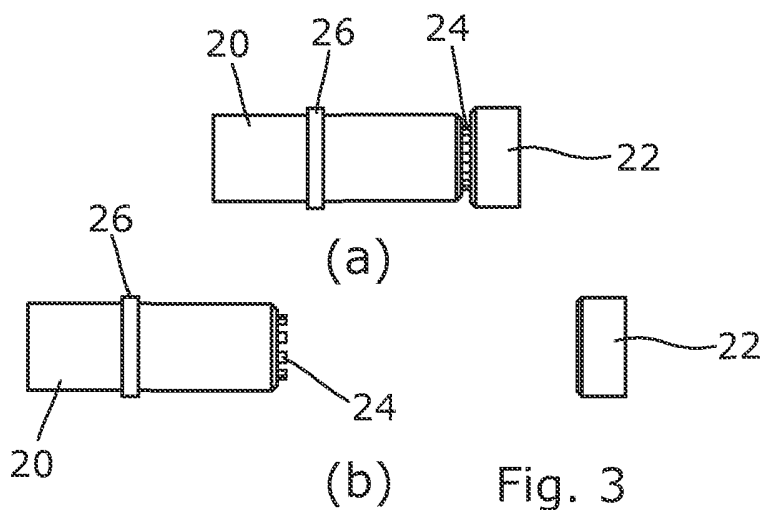
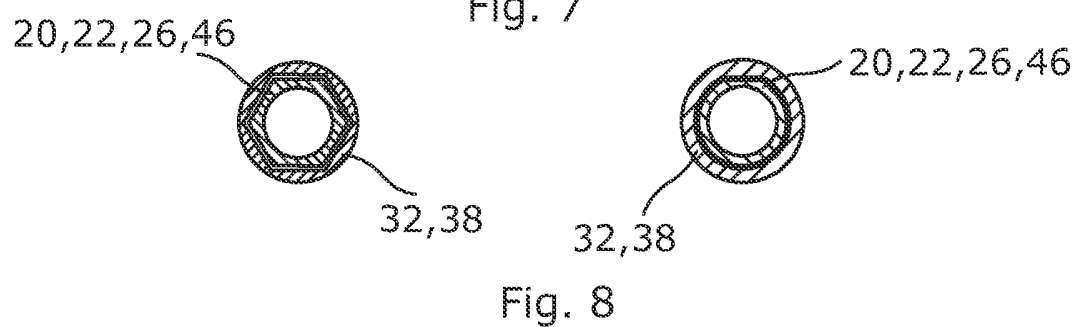
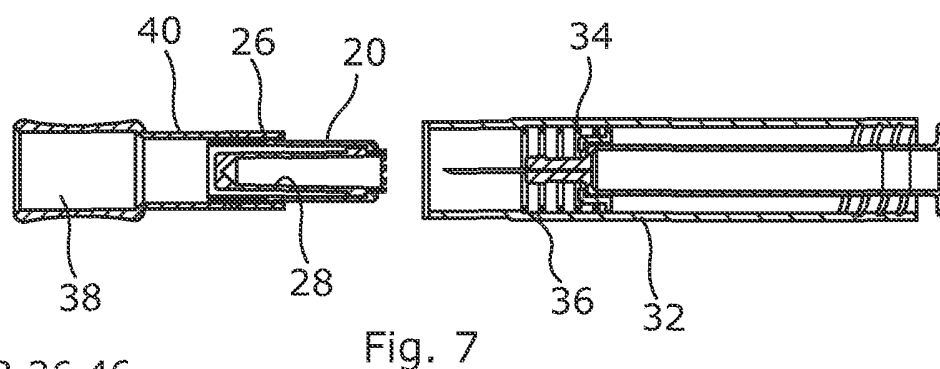
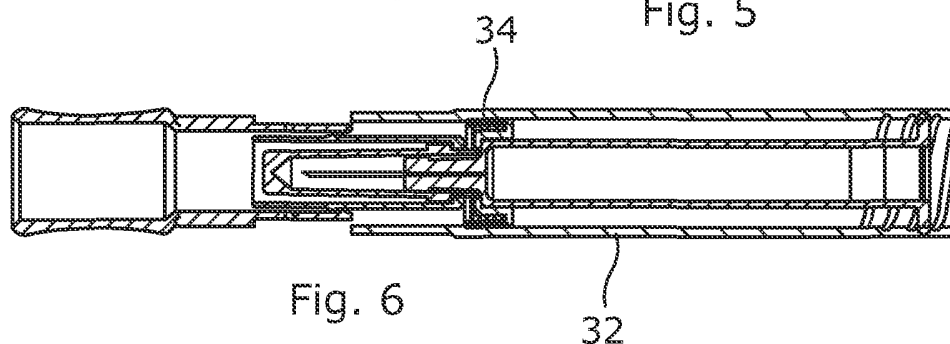
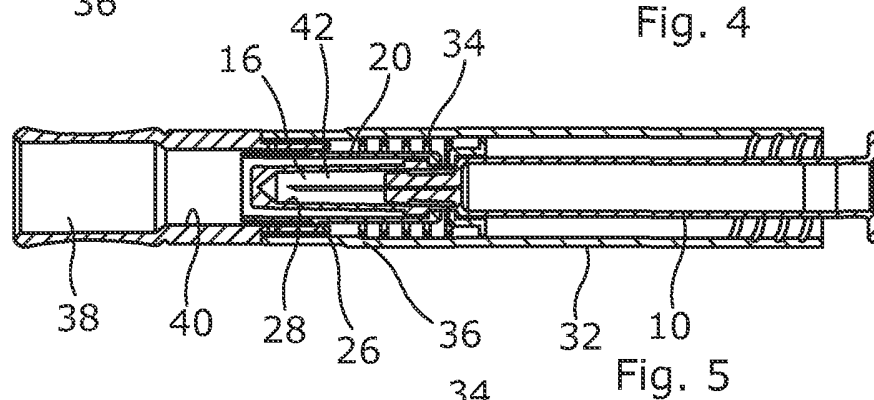
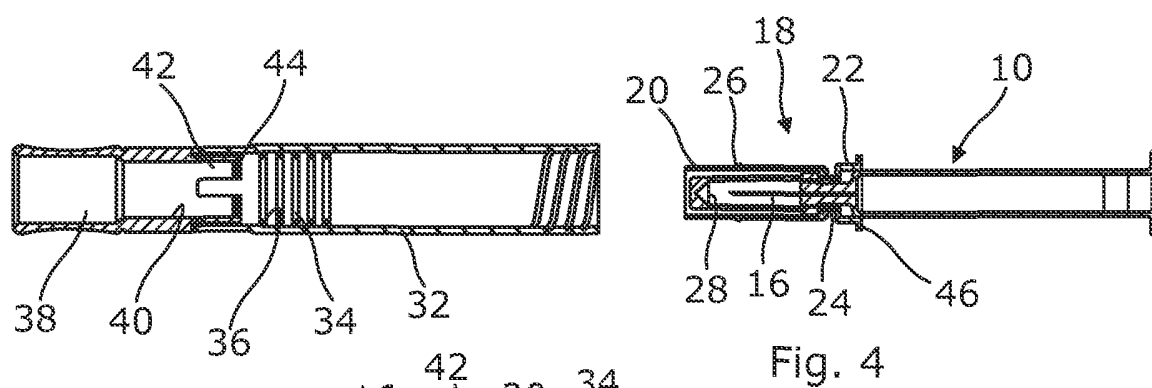


Fig. 3



NEEDLE SHIELD ARRANGEMENTS

This invention relates to needle shield arrangements and to injection apparatus incorporating such arrangements. It is known to provide a syringe shield to cover the needle of a syringe prior to injection to maintain sterility of the needle, to avoid evaporation of a medicament contained within the syringe, to prevent needle stick injuries and also to protect the needle during manufacture and assembly of injection devices. In a known form of rigid needle shield arrangement, a soft rubber inner boot fits over a ribbed spigot at the forward end of the syringe body and the boot is contained by an outer rigid cylindrical portion. In such arrangements, the needle shield is a slip fit over the spigot and there is no connection between the shield and the syringe body.

In addition, in autoinjector devices where a syringe or cartridge is initially driven forwardly in a penetration phase to insert the needle into the flesh, there is usually some arresting action on the syringe when it is in its forwardmost position. Often, that arresting force is passed to the syringe flanges either directly or via a cylindrical syringe carrier or the like. Because the flanges extend at right angles to the barrel of the syringe, the angle acts as a stress magnifier and there is a risk that the flange breaks off so that the syringe shoots forwardly beyond its required position. Also, we have found that, because of an accumulation of tolerances the tolerance of the distance between the needle tip and the flange surface is relatively large. This would be reduced if the critical forwarding facing load-bearing surface on the syringe were forwardly of the flange.

In order to address at least some of these issues, we have designed a needle shield assembly where the assembly is removably secured to the main body of the syringe thereby providing stability for the needle shield and also preferably providing a reaction surface through which loads may be transmitted to or sustained by the syringe body, rather than through the syringe flange.

Accordingly, in one aspect, this invention provides a needle shield arrangement for a syringe, the syringe having a generally cylindrical body with a needle at its forward end, the arrangement comprising:

- a shield portion adapted for shielding said needle;
- a syringe engaging portion for engagement with said syringe body, and
- a frangible connecting portion connecting said shield portion and said syringe engagement portion.

In the above arrangement the shield arrangement is at least partly supported relative to the syringe by the syringe engaging portion. Prior to use, the shield portion may be detached by breaking the connecting portion, leaving the syringe engaging portion in place. The syringe engaging portion can be used to react or transfer loads on the syringe for example when a dose is expressed from the syringe or, in some instances, where the syringe is mounted in a housing for movement between retracted and extended positions.

Although the syringe engaging portion could engage or be secured to the syringe body at any point along its length, it is preferred for the syringe engaging portion to engage a forward end portion of the syringe. In this manner, loads may be transferred to and from the syringe body through the body itself rather than through the rearward flange of the syringe.

Where the syringe is of typical form with a forward facing circumferential shoulder at its forward end, the syringe engagement portion is conveniently complimentarily shaped to engage said shoulder. For example it may form a syringe engaging cup with angular contact around the forward facing shoulder of the syringe which provides a structurally strong region to transmit load.

Although it would be possible for the syringe engaging portion to be bonded to or to grip the associated surface of the syringe, it is preferred for the syringe engaging portion to be a sliding fit with the front end of the syringe, with the grip between the needle shield and the needle spigot initially holding the syringe engaging portion against forward movement.

Conveniently, the shield portion and the syringe engaging portion are each solids of revolution about a longitudinal axis, and the frangible connecting portion comprises a concentric plurality of frangible tabs connecting the two.

The invention also extends to a needle shield arrangement separate from a syringe and also in combination therewith.

The invention further extends to an injection apparatus comprising:

an elongate housing;

a syringe mounted in said housing for longitudinal movement and having a generally cylindrical body with a needle at its forward end;

a needle shield arrangement comprising;

a shield portion adapted to shield said needle;

a syringe engaging portion for engagement with said syringe body; and

a frangible connecting portion connecting said shield portion and said syringe engaging portion;

the apparatus including a stop surface for arresting forward movement of said syringe beyond a forward position, wherein at least part of the arresting load is transmitted to said syringe via said syringe engaging portion.

5 Whilst the invention has been described above it extends to any inventive combination of features set out herein or in the attached drawings.

The invention may be performed in various ways, and, by way of example only, the specific embodiment herein described, reference being made to the accompanying drawings, in which:-

10 Figures 1(a) and (b) are side and longitudinal section views respectively through a syringe fitted with a needle shield assembly of this invention;

Figures 2(a) and (b) are side and longitudinal section views similar to Figure 1 but showing the needle shield portion after detachment from the syringe, leaving the syringe engaging portion in place;

15 Figures 3(a) and (b) are side views showing the needle shield assembly before and after detachment of the needle shield portion;

Figure 4 shows the assembly of Figure 1 prior to installation into an injection housing;

Figure 5 is a view similar to Figure 4 but after installation;

20 Figures 6 and 7 are successive views showing removal of the needle shield portion as a forward cap is removed from the autoinjector housing, and

Figure 8 shows various interfaces for use between the cap and the exterior of the needle shield portion, and between the interior of the housing and the syringe engaging collar.

Referring initially to Figures 1(a) and (b), there is shown a syringe of

conventional form comprising a generally cylindrical barrel 10 having a flange 12 at its rear end and a spigot 14 from which projects the needle 16 at its forward end. Fitted on the forward end of the syringe body is a needle shield assembly 18 comprising a needle shield portion 20 connected to a syringe engaging collar 22 by means of frangible tabs 24. The needle shield portion, syringe engaging collar and tabs are a one piece plastics moulding. The needle shielding portion 20 is of cylindrical form and provided with an integral circumferential rib 26 partway down the body. Retained inside the needle shielding portion 20 is a soft rubber boot 28 which is a slideable friction fit at its rear end over the spigot 14.

The syringe engagement collar 22 is of cup shaped form and engages the forward facing shoulder 30 of the barrel 10. As shown in Figure 2, the syringe shielding portion, with soft rubber boot 28 inside it can be detached from the syringe to expose the syringe needle 16, leaving the collar 22 in engagement with the syringe. The needle shielding portion 20 can be detached by pulling or twisting, or a claw, lever or the like may be inserted in the gap between the collar 22 and the shield portion 20 to prise the two apart.

Referring now to Figures 4 to 7, as shown in the schematic representation of the assembly and operation of one particular embodiment. In this arrangement, the syringe 10 with needle shroud assembly 18 attached is inserted into the generally cylindrical forward housing 32 of an autoinjector. In the rear part (not shown) there is provided a drive mechanism for applying a forward drive force to urge the syringe forwardly to a limit position and thereafter to expel a dose through the needle. Suitable such mechanisms are well known to those skilled in the art and so will not be described in detail here. A

compression spring 34 is located in a forward end of the housing 32 with the forward end of the spring 34 abutting an internal shoulder 36 in the housing. A shield remover cap 38 is slideably received in the forward end of the housing 32 and has a rearwardly extending cylindrical portion 40 slotted to provide resiliently deformable fingers 42 with inwardly directed barbs 44. During assembly, the syringe and needle shield assembly are inserted longitudinally into the housing and pushed forwardly so that the barbed fingers 42 snap past the cylindrical rib 26 on the needle shield portion, and an outer flange 46 on the syringe engaging collar 22 faces the rear end of the spring 34, as shown in Figure 5. In order to prepare the syringe for injection, the cap 38 is pulled forwardly so that the barbed fingers 42 capture the rib 26 and the needle shield portion is pulled off the syringe, breaking the tabs 24. As this happens the syringe is pulled forwardly, with the spring 34 compressing and bottoming out.

In use, the injection device is offered up to the injection site and the drive mechanism fired. During an initial phase of the autoinjection movement, the syringe is moved bodily forward relative to the housing 32 until it is arrested by the spring 34 bottoming out. It will be noted that the arresting force is therefore applied to the front end of the syringe rather than the rear end. Thereafter the dose is expressed and the injection complete.

In a modified arrangement, one or more of the outer flange 46, the collar 22, the needle shielding portion 20 and the circumferential rib 26 may have an outer periphery of non-circular form adapted to engage a complementary shaped cooperating portion on the interior of the syringe housing 32, or the interior of the cap 38 respectively so that twisting motion may be applied to the needle shield

18 and the collar 22 by twisting the cap 38 relative to the syringe housing, thereby to break the tabs 24 by torsion. Examples of suitable inner and outer interfaces 48, 50 between the components are shown in Figure 8. Thus, one interface is hexagonal and another is circular with a flat.

CLAIMS

1. A needle shield arrangement for a syringe (10), the syringe having a generally cylindrical body with a needle (16) at its forward end, the arrangement comprising:

a shield portion (20) adapted for shielding said needle (16);

a syringe engaging portion (22) for engagement with said syringe body, and

a frangible connecting portion (24) connecting said shield portion and said syringe engagement portion.

2. A needle shield arrangement according to Claim 1, wherein said syringe engaging portion (22) is adapted to engage a forward end portion of the syringe.

3. A needle shield arrangement according to Claim 2, wherein said syringe body is formed with a forward facing circumferential shoulder (30) at its forward end, and said syringe engagement portion (22) is complementarily shaped to engage said shoulder.

4. A needle shield arrangement according to Claim 2 or Claim 3, wherein said syringe engaging portion (22) is adapted slideably to receive a forward end of a syringe body.

5. A needle shield arrangement according to any of the preceding Claims, wherein said shield portion (20) and said syringe engaging portion (22) are each solids of revolution about a longitudinal axis, and said frangible connecting portion comprises a concentric plurality of frangible tabs (24) connecting said shield portion and said syringe engaging portion.

6. A needle shield arrangement according to any of Claims 1 to 4, wherein an outer peripheral portion of at least one of the shield portion (20) and the syringe engaging portion (22) is non-circular, thereby in use allowing non-rotational engagement with an outer component.

5 7. An injection apparatus comprising:

an elongate housing (32);

a syringe (10) mounted in said housing for longitudinal movement and having a generally cylindrical body with a needle (16) at its forward end;

a shield arrangement comprising;

10 a shield portion (20) adapted to shield said needle (16);

a syringe engaging portion (22) for engagement with said syringe body;

and

a frangible connecting portion (24) connecting said shield portion and said syringe engaging portion;

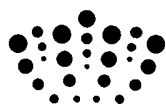
15 the apparatus including a stop surface (34; 36) for arresting forward movement of said syringe beyond a forward position,

wherein at least part of the arresting load is transmitted to said syringe via said syringe engaging portion (22).

8. An injection apparatus according to Claim 7 wherein said syringe body is
20 formed with a flange (12) at its rearward end and said syringe engaging portion engages said syringe body at a location spaced forwardly of said flange (12).

9. An injection apparatus according to Claim 7 or Claim 8, wherein a region of the syringe engaging portion (22) is in non-rotational engagement with said housing (32), and thereby prevented from rotation with respect thereto.

10. An injection apparatus according to any of Claims 7 to 9, including a cap (38) fitted into the forward end of the housing (32) and adapted to engage and remove the shield portion (20) upon withdrawal of the cap from the forward end of the housing, and a region of the shield portion is in non-rotational engagement with said cap, whereby rotary motion applied to said cap is transmitted to said shield portion.
- 5



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Examiner: Gabrielle Cowcill

Claims searched: 1-10

Date of search: 15 December 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X,&	1-10	GB 2424836 A (CILAG GMBH INTERNATIONAL) See pages 5-6, and figures 6-9 at least
X,&	1-10	GB 2425062 A (CILAG GMBH INTERNATIONAL) See page 5, first paragraph, page 9 and figure 7
X	1-6	US 6053892 A (MEYER) See column 4, lines 45-63, claim 1, and figure 1 at least
X	1-5	WO 03/095002 A2 (NORTH AMERICAN MEDICAL PRODUCTS, INC.) See detailed description on pages 6-7, and figure 1 at least
X	1-5	GB 927626 A (BRUNSWICK CORPORATION) See page 3, line 100 to page 5, line 37, and figures 1 and 9 in particular
A	-	GB 2465389 A (OWEN MUMFORD LIMITED) See detailed description and figures 1 and 8 in particular

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

A61M

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI



International Classification:

Subclass	Subgroup	Valid From
A61M	0005/32	01/01/2006