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(71) Applicant: **Lafarge Plasterboard Limited**
Bristol, BS20 0NF (GB)

(72) Inventor: **Walker, Christopher**
Easton-In-Gordano
Bristol BS20 0NF (GB)

(74) Representative: **Hirsch & Associés**
58, avenue Marceau
75008 Paris (FR)

(54) **Device and method for renovating a suspended ceiling**

(57) The invention relates to a kit comprising at least one grid device and at least one plasterboard as combined elements for simultaneous, separate or sequential use in the mounting of a suspended ceiling, wherein the grid device comprises:

- a flat base (1) having a main axis (y) and a width W1 perpendicularly to the main axis (y);

- a snap-on mechanism (2) on one side of the base (1), which defines a housing (3) parallel to the base (1), said housing (3) having a width W2 perpendicularly to the main axis (y);

W2 being less than W1.

The invention also relates to a method of making a suspended ceiling using this kit.

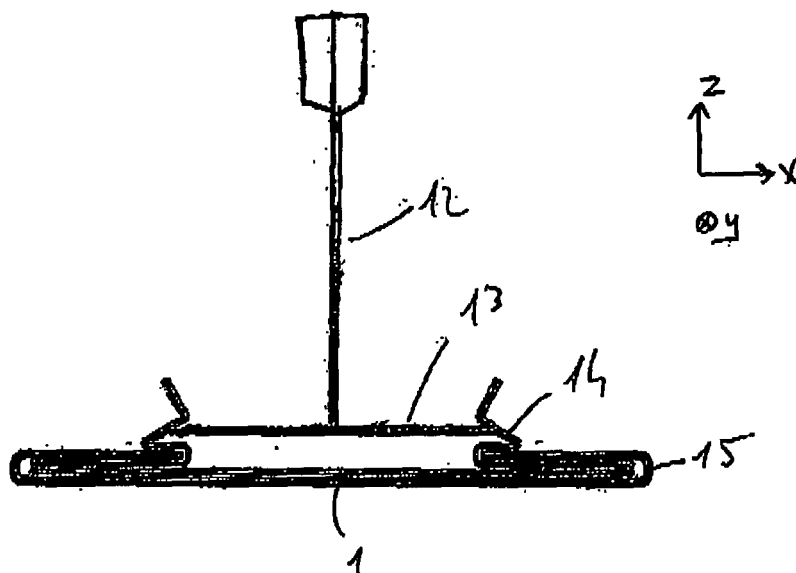


Fig. 5

DescriptionTECHNICAL FIELD

[0001] This invention relates to a grid device for suspended ceiling, to a method of making a suspended ceiling, as well as to a kit for use in the mounting of a suspended ceiling.

TECHNICAL BACKGROUND

[0002] There are two major types of suspended ceilings. The first type corresponds to small tiles of dimensions 600 mm x 600 mm lying on a lay-in tile ceiling grid comprising inverted tee bars. According to the second type, the grid is made of larger beams and larger boards such as plasterboards are screwed to the lower side of the beams. Installing this second type of suspended ceiling is less convenient and more time-consuming than installing the first type of suspended ceiling.

[0003] Besides, these two types of suspended ceilings are incompatible. More precisely, it is impossible to make a suspended ceiling with plasterboards by fixing the plasterboards directly to a lay-in tile ceiling grid because of the narrowness of the tee bars. Correlatively, it is presently also impossible to convert a suspended ceiling of the first type into a suspended ceiling of the second type.

[0004] EP 1081306 discloses a snap-on device for transforming a lay-in tile ceiling grid, but merely to the extent of changing the appearance of the grid system.

[0005] FR 2512863 discloses another device adapted for snapping on a runner on the one hand and maintaining a ceiling tile on the other hand.

[0006] Neither document relates to the making of a suspended ceiling grid adapted for plasterboards.

[0007] There is thus a need for a system which would enable one to quickly and easily install a suspended ceiling comprising plasterboards. There is also a need for a system which would enable one to convert a lay-in tile ceiling grid into a grid suitable for plasterboards, or to convert a suspended ceiling with ceiling tiles into a suspended ceiling with plasterboards.

SUMMARY OF THE INVENTION

[0008] It is a first object of the invention to provide a kit comprising at least one grid device and at least one plasterboard as combined elements for simultaneous, separate or sequential use in the mounting of a suspended ceiling, wherein the grid device comprises:

- a flat base having a main axis and a width W1 perpendicularly to the main axis;
- a snap-on mechanism on one side of the base, which defines a housing parallel to the base, said housing having a width W2 perpendicularly to the main axis;

W2 being less than W1.

[0009] According to an embodiment, W1 is comprised between 38 and 50 mm, preferably between 42 and 48 mm.

[0010] According to an embodiment, W2 is comprised between 15 and 35 mm, preferably between 25 and 30 mm.

[0011] According to an embodiment, the base has a length comprised between 300 and 600 mm, preferably between 550 and 600 mm, along the main axis.

[0012] According to an embodiment, the grid device is made of a single metal sheet, the snap-on mechanism consisting in a folding of the sheet.

[0013] According to an embodiment, the grid device comprises:

- one primary member comprising the base and an additional housing on one side of the base;
- at least two secondary members comprising the snap-on mechanism and having each an additional base;

wherein the primary member is able to be attached to the secondary members by positioning the additional bases in the additional housing.

[0014] According to an embodiment, the primary member is able to slide along the main axis relative to the secondary members, when attached thereto.

[0015] According to an embodiment, the plasterboard is selected from the group consisting of plasterboards with paper facers, plasterboards having a glass-mat facer and acoustical boards.

[0016] It is another object of the invention to provide a method of making a suspended ceiling, comprising:

(i) attaching at least one grid device comprising:

- a flat base having a main axis and a width W1 perpendicularly to the main axis,
- a snap-on mechanism on one side of the base, which defines a housing parallel to the base, said housing having a width W2 perpendicularly to the main axis,

W2 being less than W1, to a pre-suspended beam by using the snap-on mechanism;

(ii) fixing a plasterboard to the base of the grid device.

[0017] According to an embodiment of this method, the grid device is as defined above.

[0018] According to an embodiment, a pre-existing suspended ceiling comprising ceiling tiles is converted into a suspended ceiling comprising plasterboards.

[0019] According to an embodiment, a pre-existing suspended ceiling comprising ceiling tiles is converted into a suspended ceiling having an upper portion comprising ceiling tiles and a lower portion comprising plas-

terboards.

[0020] It is another object of the invention to provide a grid device for a suspended ceiling comprising:

- a flat base having a main axis and a width W1 perpendicularly to the main axis, W1 being comprised between 38 and 50 mm, preferably between 42 and 48 mm;
- a snap-on mechanism on one side of the base, which defines a housing parallel to the base, said housing having a width W2 perpendicularly to the main axis, W2 being comprised between 15 and 35 mm, preferably between 25 and 30 mm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Figure 1 is a side elevational view of the grid device of the invention according to the first embodiment.

Figure 2 is a top view of the grid device of the invention according to the first embodiment.

Figure 3 is a top view of a secondary member of the grid device of the invention according to the second embodiment.

Figure 4 is a side elevational view of the primary member of the grid device of the invention according to the second embodiment.

Figure 5 is a side elevational view of the grid device of the invention mounted on a pre-suspended beam. The various drawings are not at the same scale.

The axes x, y, z are the same on the various drawings, z being the vertical axis, x and y horizontal axes.

DESCRIPTION OF EMBODIMENTS

[0022] The invention will now be described in more detail without limitation in the following description.

First embodiment: grid device made of a single piece, hereafter widening cap

[0023] Making reference to **Figures 1 and 2**, the widening cap according to the invention is made of a single folded metal sheet. The central part of the widening cap forms a flat base 1. In the drawings the base 1 defines a horizontal plane (x, y). The y axis corresponds to the main axis of the widening cap, along which the length of the base 1 is measured, while the x axis is the transverse axis, along which the width W1 of the base 1 is measured.

[0024] The base 1 is preferably devoid of any opening.

[0025] On one side of base 1, the top side on Figure 1, is provided a snap-on mechanism 2 (or locking mechanism). The snap-on mechanism 2 consists in a folding of the two sides of the metal sheet which run in the y direction. This folding may for instance comprise, from the center to the respective side of the metal sheet in the x direction, four successive folds which define:

- a first wall 4a, 4b parallel to the base 1 and situated on top of a portion of the base 1;
- a second wall 5a, 5b parallel to the base 1 and situated on top of a portion of the first wall 4a, 4b (so that the first wall 4a, 4b is sandwiched between the base 1 and part of the respective second wall 5a, 5b);
- a third wall 6a, 6b protruding away from the base 1 (both third walls 6a, 6b pointing towards each other); and
- a fourth wall 7a, 7b protruding away from the base 1 (both fourth walls 7a, 7b pointing away from each other).

[0026] For example the angle between the second wall 5a, 5b and the respective third wall 6a, 6b may be approximately 30°.

[0027] For example the angle between the third wall 6a, 6b and the respective fourth wall 7a, 7b may be approximately 90°.

[0028] The second walls 5a, 5b and third walls 6a, 6b define an open housing 3. The width W2 of the housing 3 is measured along the x axis and it corresponds to the distance between the fold between the second wall 5a and third wall 6a on the one hand, and the fold between the second wall 5b and third wall 6b on the other hand. W1 and W2 are such that $W2 < W1$. By way of example, W2 may be comprised between 15 and 35 mm, preferably between 25 and 30 mm, and is more preferably approximately 27 mm, while W1 may be comprised between 38 and 50 mm, and is preferably approximately 45 mm.

[0029] Still according to this first embodiment, the widening cap has two pointed ends 8a, 8b along the main axis y.

[0030] The total length of the widening cap along the main axis y is preferably slightly less than 600 mm, for instance is approximately 598 mm.

[0031] The widening cap is preferably made of galvanized steel.

[0032] The steel thickness range may for example be from 0.4 mm to 0.6 mm.

[0033] The above-described widening cap is preferably provided in a kit together with one or several plasterboards for simultaneous, separate or sequential use in the mounting of a suspended ceiling.

Second embodiment: grid device made of a primary member (hereafter widening sleeve) and at least two secondary members (hereafter widening clips)

[0034] According to a second embodiment, the grid device comprises at least three separate elements, i.e. a primary member or widening sleeve and at least two secondary members or widening clips.

[0035] Making reference to **Figure 1** each widening clip is very much of the same shape in the (x, z) plane as the above-described widening cap. The base 1 is called additional base 1' in this case, and its width W1' is preferably slightly less than the width W1 of the base

1 of the widening cap. For instance, a preferred width $W1'$ would be approximately 43 mm.

[0036] However, with reference to **Figure 3**, the shape of each widening clip is different from the shape of the widening cap in the horizontal (x, y) plane. Firstly, each widening clip has preferably square ends 9a, 9b along the main axis y. But more importantly the total length of the widening clip along the main axis y is much less than 600 mm. For instance it can be approximately 50 mm.

[0037] With reference to **Figure 4**, the widening sleeve is made of a single folded metal sheet. The central part of the sheet makes up the base 1 of the grid device. The dimensions of the base 1 may be as described above in relation with the widening cap. The two sides of the sheet running in the y direction are folded back onto part of the base 1 and respectively make up two flanges 11a, 11b parallel to the base 1. An additional housing 10 is thus provided between the base 1, the flanges 11a, 11b, and the folds between the base 1 and the flanges 11a, 11b.

[0038] The dimensions of the additional housing 10 of the widening sleeve and of the additional bases 1' of the widening clips are such that the additional bases 1' (together with the first walls 4a', 4b' of the widening clips analogous to the first walls 4a, 4b of the widening cap) can be inserted in the additional housing 10. Thus, the widening sleeve may be attached to the widening clips and may slide along the main axis y relative to them.

[0039] The widening sleeve is for example made of galvanized steel and the widening clips are for example made of spring steel.

[0040] The steel thickness range may for example be from 0.4 mm to 0.6 mm.

[0041] The above-described widening sleeve and widening caps are preferably provided in a kit together with one or several plasterboards for simultaneous, separate or sequential use in the mounting of a suspended ceiling.

Implementation of the grid device in a suspended ceiling

[0042] The grid device according to the invention enables one to convert a lay-in tile ceiling grid into a grid suitable for fixing large sheet materials such as plasterboards and the like.

[0043] Making reference to **Figure 5**, a lay-in tile ceiling grid comprises pre-suspended beams in the form of inverted tee bars. Each inverted tee bar comprises a tee bar stalk 12 and a tee bar table 13. The abovementioned conversion is performed by attaching grid devices according to the invention to the inverted tee bars.

[0044] According to the abovementioned first embodiment of the invention, a widening cap may be attached to a tee bar by inserting the tee bar table 13 in the housing 3 of the widening cap. This insertion is made by pressing the snap-on mechanism 2 (more precisely the fourth walls 7a, 7b) onto the tee bar table 13. Under pressure the snap-on mechanism 2 undergoes an elastic deformation; as a result the gap between the folds between respective third walls 6a, 6b and fourth walls 7a, 7b wid-

ens and enables entry of the tee bar table 13 into the housing 3. Once the tee bar table 13 is inside the housing 3, the pressure is released so that the snap-on mechanism 2 takes its initial form back and maintains the tee bar table 13 inside the housing 3.

[0045] Most tee bar tables have a width of approximately 25 mm so that a housing 3 with a width $W2$ between 25 and 30 mm is suitable. Otherwise, the width $W2$ should be adapted to the actual width of the tee bar tables. For instance with 15 mm wide tee bar tables, the width $W2$ could be between 15 and 20 mm.

[0046] The pointed ends 8a, 8b, when present, enable one to substantially cover the entire network of tee bars with grid devices according to the invention, even at crossings.

[0047] According to the abovementioned second embodiment of the invention, and with reference to **Figure 5**, the two (or more) widening clips 14 are attached to an inverted tee bar in the very same way as described above in relation with the widening cap. The widening clips 14 are positioned at a certain distance from each other on the inverted tee bar. Then in a second phase the widening sleeve 15 is attached to the widening caps 14 by inserting the additional bases 1' of the widening clips 14 into the additional housing 10 of the widening sleeve 15. This insertion as well as an optional adjustment of the position of the widening sleeve 15 are made by sliding of the widening sleeve 15 relative to the widening clips 14. Alternatively, the widening sleeve 15 may be attached by sliding to the widening clips 14 prior to snapping the widening clips 14 (with the widening sleeve 15 attached) onto the tee bar.

[0048] In all cases, the lower surface of the bases 1 of the grid devices of the invention is then available for the subsequent attachment of plasterboards of large dimension for example 1200 mm x 1200 to 3000 mm, for example by screwing.

[0049] Preferably, this subsequent attachment of plasterboards is performed with drywall screws, i.e. screws having a bugle head with either a hardened needle point or a drill point where the latter may be needed to go through two thicknesses of steel.

[0050] Examples of suitable plasterboards include but are not limited to: standard plasterboards with paper facers, plasterboards having a glass-mat facer, acoustical boards including boards with punched holes (e.g. Pregybel®) or any acoustical boards having an NRC above 0.5 (such as disclosed in US6443258 or in WO2004083146).

[0051] Consequently, the present invention may be used for converting a suspended ceiling made of lay-in tiles into a suspended ceiling made of plasterboards: first, the lay-in tiles are removed; then the lay-in tile ceiling grid is converted to a grid suitable for fixing large sheet materials using grid devices according to the invention, as described above; and finally plasterboards are fixed onto the grid devices of the invention.

[0052] According to a possible variant, the present in-

vention may be used for converting a suspended ceiling made of lay-in tiles into a suspended ceiling made of both tiles and plasterboards: first the lay-in tile ceiling grid is converted to a grid suitable for fixing large sheet materials using grid devices according to the invention, as described above, but without removing the lay-in tiles; then plasterboards are fixed onto the grid devices of the invention. This variant enables to improve the sound absorption and sound insulation properties of the ceiling.

[0053] The present invention may also be used for making a suspended ceiling from scratch. Indeed, when one wants to make a suspended ceiling with plasterboards, it can be advantageous first to install a lay-in tile ceiling grid with tee bars, then to convert it to a grid suitable for fixing large sheet materials using grid devices according to the invention, as described above, and finally to screw the plasterboards onto said grid devices. Indeed, this method can be easier and less time-consuming than the direct installment of a classical grid for plasterboards.

Claims

1. A kit comprising at least one grid device and at least one plasterboard as combined elements for simultaneous, separate or sequential use in the mounting of a suspended ceiling, wherein the grid device comprises:
 - a flat base (1) having a main axis (y) and a width W1 perpendicularly to the main axis (y);
 - a snap-on mechanism (2) on one side of the base (1), which defines a housing (3) parallel to the base (1), said housing (3) having a width W2 perpendicularly to the main axis (y);
 W2 being less than W1.
2. The kit of claim 1, wherein W1 is comprised between 38 and 50 mm, preferably between 42 and 48 mm.
3. The kit of claim 1 or 2, wherein W2 is comprised between 15 and 35 mm, preferably between 25 and 30 mm.
4. The kit of one of claims 1 to 3, wherein the base (1) has a length comprised between 300 and 600 mm, preferably between 550 and 600 mm, along the main axis (y).
5. The kit of one of claims 1 to 4, wherein the grid device is made of a single metal sheet, the snap-on mechanism (2) consisting in a folding of the sheet.
6. The kit of one of claims 1 to 4, wherein the grid device comprises:
 - one primary member comprising the base (1) and an additional housing (10) on one side of the base (1);
 - at least two secondary members comprising the snap-on mechanism (2) and having each an additional base (1');
 wherein the primary member is able to be attached to the secondary members by positioning the additional bases (1') in the additional housing (10).
7. The kit of claim 6, wherein the primary member is able to slide along the main axis (y) relative to the secondary members, when attached thereto.
8. The kit of one of claims 1 to 7, wherein the plasterboard is selected from the group consisting of plasterboards with paper facers, plasterboards having a glass-mat facer and acoustical boards.
9. A method of making a suspended ceiling, comprising:
 - (i) attaching at least one grid device comprising:
 - a flat base (1) having a main axis (y) and a width W1 perpendicularly to the main axis (y),
 - a snap-on mechanism (2) on one side of the base (1), which defines a housing (3) parallel to the base (1), said housing (3) having a width W2 perpendicularly to the main axis (y),
 W2 being less than W1, to a pre-suspended beam by using the snap-on mechanism (2);
 - (ii) fixing a plasterboard to the base (1) of the grid device.
10. The method of claim 9, wherein the grid device is as defined in one of claims 2 to 8.
11. The method of claim 9 or 10, wherein a pre-existing suspended ceiling comprising ceiling tiles is converted into a suspended ceiling comprising plasterboards.
12. The method of claim 9 or 10, wherein a pre-existing suspended ceiling comprising ceiling tiles is converted into a suspended ceiling having an upper portion comprising ceiling tiles and a lower portion comprising plasterboards.
13. A grid device for a suspended ceiling comprising:
 - a flat base (1) having a main axis (y) and a width W1 perpendicularly to the main axis (y), W1 being comprised between 38 and 50 mm,

preferably between 42 and 48 mm;

- a snap-on mechanism (2) on one side of the base (1), which defines a housing (3) parallel to the base (1), said housing (3) having a width W2 perpendicularly to the main axis (y), W2 being comprised between 15 and 35 mm, preferably between 25 and 30 mm.

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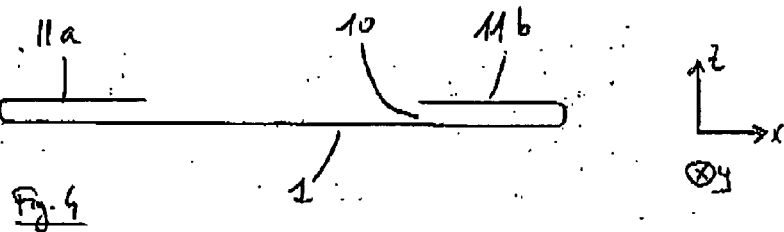
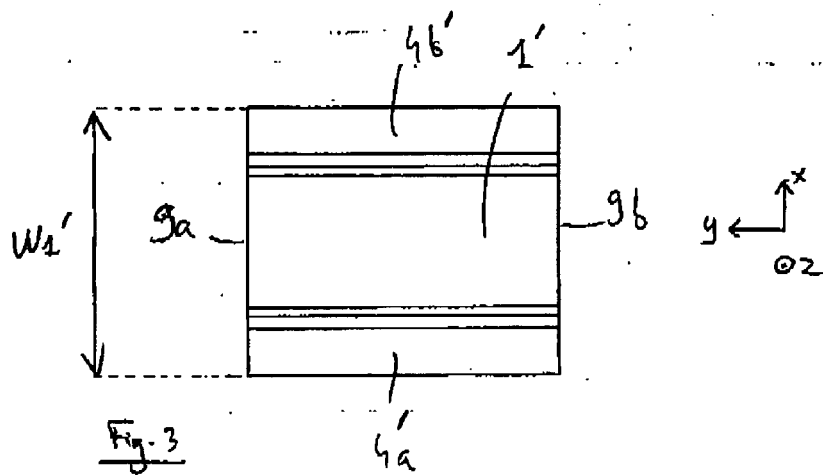
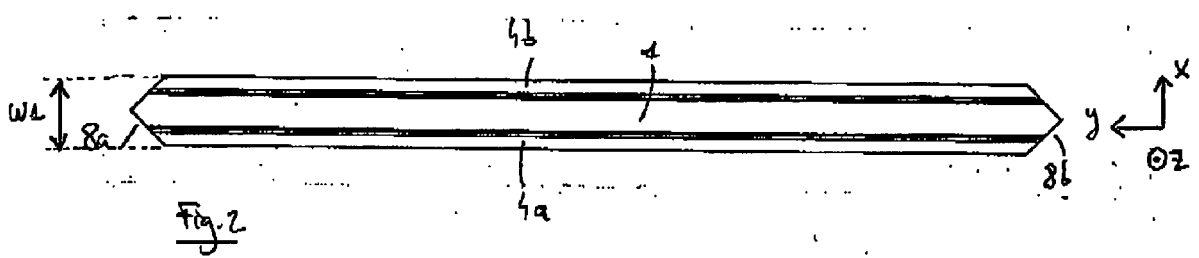
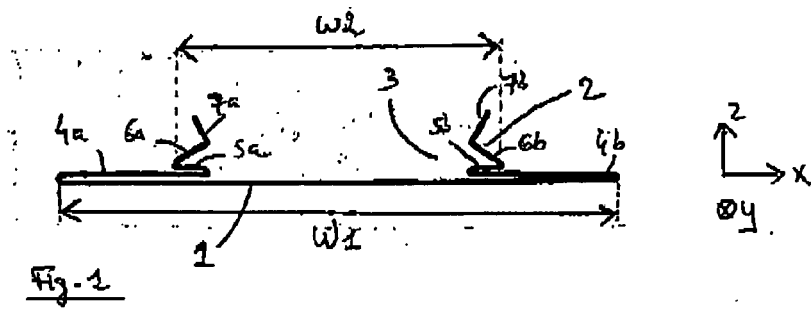
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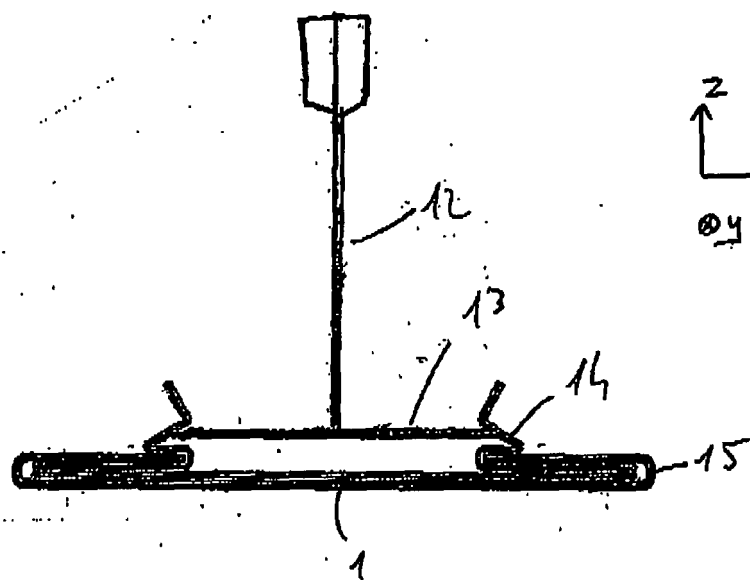


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 25 6213

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 May 2007	Examiner Rosborough, John
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 25 6213

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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10-05-2007

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