

(19)



(11)

EP 2 083 128 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

29.07.2009 Bulletin 2009/31

(51) Int Cl.:

E04B 9/34 (2006.01)

(21) Application number: **09000956.4**

(22) Date of filing: **23.01.2009**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR**

Designated Extension States:

AL BA RS

(30) Priority: **25.01.2008 US 11288**

(71) Applicant: **Armstrong World Industries, Inc.**

Lancaster

Pennsylvania 17603 (US)

(72) Inventors:

- **Waters, James R.**
Lancaster, PA 17603 (US)
- **Woelfling, Joseph R.**
Palmyra, PA 17078 (US)
- **Krantz-Lilienthal, Eric**
25524 Itzehoe (DE)

(74) Representative: **Sloboshanin, Sergej et al**

V. Fünér, Ebbinghaus, Finck, Hano

Mariahilfplatz 3

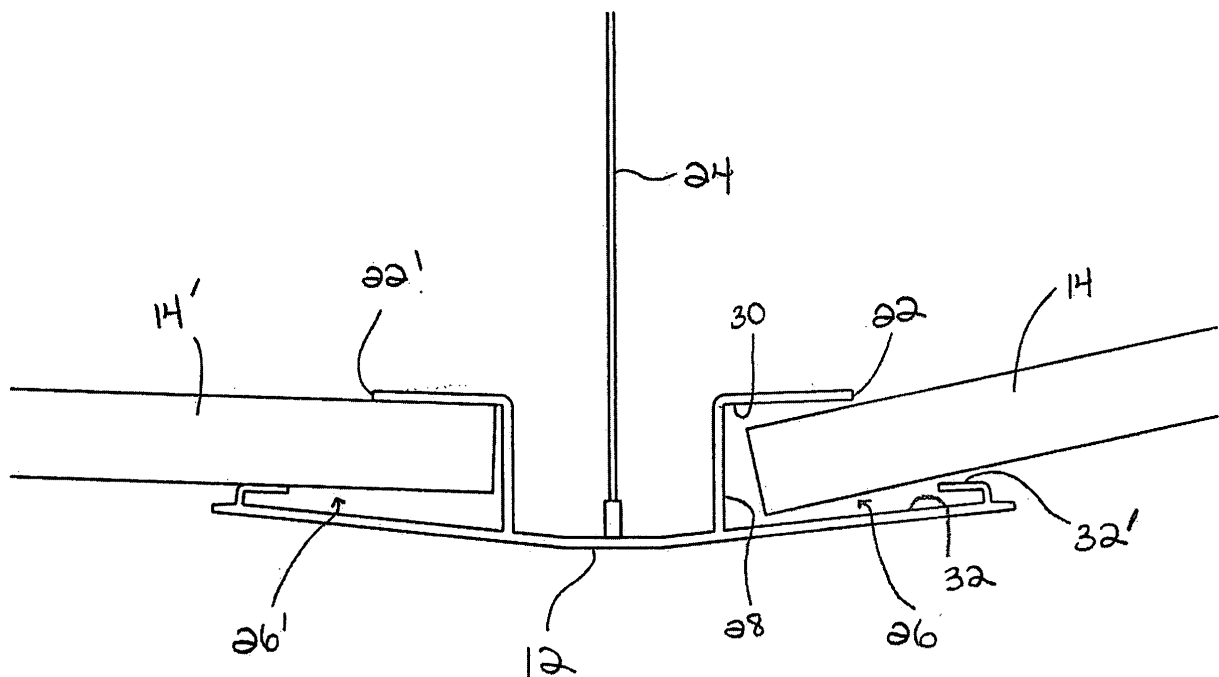
81541 München (DE)

(54) **Cantilevered ceiling system**

(57) The cantilevered ceiling system has a horizontally extending support beam which supports at least two

panels. The panels, when positioned substantially horizontally, are securely maintained to the beam by a gravity operated lock.

FIGURE 3



EP 2 083 128 A1

Description

FIELD OF THE INVENTION

[0001] The present invention is directed to interior building systems, and, more particularly, to a cantilevered ceiling system.

BACKGROUND OF THE INVENTION

[0002] Conventional grid suspension ceiling systems found in offices, retail stores and similar commercial settings typically include suspended grid frameworks which support ceiling tiles. A conventional ceiling grid framework includes main grid elements running the length of the ceiling with cross grid elements therebetween. The main and cross elements form the ceiling into a grid of polygonal openings into which functional devices, such as ceiling tiles, can be inserted and supported.

[0003] Though the grid framework and ceiling tile system provides a visual barrier between the living or working space and the infrastructure systems mounted overhead, designers, architects and building owners often object to the use of these systems for several reasons, including the lack of aesthetic versatility afforded by the grid framework and the number of suspension points required to support the grid framework. For example, from an aesthetic standpoint, designers, architects and building owners desire unique ceiling systems which to have little or no visible suspension hardware. Many known techniques for minimizing the visibility of the suspension hardware, including the technique of moving the grid and grid suspension hardware from the sides of the ceiling panel to the back, i.e. the interior, of the panel, typically require additional parts, additional manufacturing processes or complex field installation.

[0004] As a result, there is an increasing demand for versatile, suspension point-minimizing ceiling systems which provide architects and designers with the ability to create unique structures with dramatic visual effects, as well as the conventional functions of known grid framework and ceiling tile systems.

SUMMARY OF THE INVENTION

[0005] The present invention is a cantilevered ceiling system comprising a support member and at least two panels. The panels are securely maintained to the support member by a gravity-operated lock. The support member has two opposing edges which are substantially parallel to one another. Each edge includes a panel receiving channel.

[0006] The panel receiving channel has an upright surface which integrally connects the second and third surfaces to one another. The second and third surfaces extend in a direction generally transverse to the upright surface and provide the supporting surfaces for the gravity-operated lock.

[0007] The improved suspended cantilevered ceiling system has several advantages including: the ability to support a panel substantially horizontally via single-side contact of the panel and support beam; the ability to positively lock the panels to the support structure without the use of any tools or extraneous fastening elements; the ability to positively lock the panels to the support structure without providing routing or kerfing in the panel; the reduction of the negative visual impact of the supporting hardware; and the reduction and relocation of suspension points which provides designers, architects and building owners with greater versatility in the ceiling environment, including the ability to provide unique visuals in the ceiling environment which are not available in the current marketplace.

[0008] Other features and advantages of the present invention will be apparent from the following more detailed description of the preferred embodiment, taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Figure 1 is a perspective view of a cantilevered ceiling system as viewed from below.

[0010] Figure 2 is a partially exploded perspective view of an example embodiment of a cantilevered ceiling system as viewed from above the system.

[0011] Figure 3 is a partially exploded elevated view of the first example embodiment illustrating the attachment of the panels to the support beam.

[0012] Figure 4 is a partially exploded perspective view of a second example embodiment of the cantilevered ceiling system as viewed from above the system.

[0013] Figure 5 is a partially exploded elevated view of the second example embodiment illustrating the attachment of the panels to the support beam.

[0014] Figure 6 is a partially exploded perspective view of a portion of the second example embodiment illustrating an example mechanism for registering adjacent panels.

[0015] Figure 7 is an exploded perspective view of a portion of the second example embodiment illustrating an example mechanism for the end-to-end linking of the support beams.

DETAILED DESCRIPTION OF DRAWINGS

[0016] Reference is now made to the drawings wherein similar components bear the same reference numerals throughout the several views. Herein, the terms "upper," "lower," "vertical," "upright" and "horizontal" are used to refer to the normal position of the components in use, forming part of the suspended ceiling system.

[0017] Referring to the drawings, Figures 1-3 illustrate the structural arrangement of an example embodiment of the cantilevered ceiling system in accordance with this invention. Figure 1 shows the component elements form-

ing the put-together ceiling system. The ceiling system 10 includes a support beam 12 and at least two panels 14, 14' which are secured to, and are supported by, the support beam 12.

[0018] The support beam 12 is suspended from any overhead ceiling structure (not shown) such as the primary deck of the building interior or a secondary support structure which is supported by the primary deck. The support beam 12 is attached to the overhead ceiling structure by suspension hardware 24 and the support beam 12 is suspended in a substantially horizontal plane. The support beam 12 can be constructed of various materials including, but not limited to metal, wood, plastic or combinations thereof.

[0019] As best shown in Figure 3, the support beam 12 has two opposing edges, 22 and 22' respectively. The edges 22 and 22' of the support beam 12 each include an empty volumetric space into which a panel can be inserted, herein referred to as a panel receiving channel, 26 and 26' respectively. Hereafter, the description of the panel receiving channel will be made with reference to edge 22. However, the following description applies equally to channel 22' as the edges are mirror images of one another.

[0020] The panel receiving channel 26 of edge 22 has a first surface 28 extending generally upright. Integrally extending from the top and bottom edges of the first surface 28 are second and third surfaces 30, 32, which extend in a direction generally transverse to the first upright surface 28. The second surface 30 is positioned above the third surface 32 in substantial parallel relation. It should be noted that the return 32' extending into channel 26 is considered to form a portion of the third surface 32, and, in the embodiment shown herein, forms the portion that is in substantial parallel relation with the second surface 30.

[0021] The types of panels 14 which are usable in this system can be constructed of various materials, including, but not limited to, mineral fiber, fiberglass, metal, wood, plastic or combinations thereof. The panel 14 is readily assembled and interlocked to the support beam 12 without the use of any tools or extraneous fastening elements, such as bolts and screws.

As shown in Figure 3, a panel 14 is inserted into the channel 26 at an angle. The panel 14 is then rotated downward until the top surface of the panel is resting firmly on the second surface 30 of the channel and the bottom surface of the panel is resting firmly on either the third surface 32 or the return portion 32' of the third surface as shown in Figure 3. The locking action is automatic due to gravity and the locked condition will be securely maintained until the panel is swung upward from the locked position to the unlocked position.

[0022] Unlike conventional grid suspension ceiling systems which require the panel to be supported by a support member on at least two opposing sides of a panel, only one side of the panel is required to be directly supported by the support beam. In other words, the side

of the panel opposite the support-beam-engaging side of the panel is free, in that it is not in direct physical contact with a supporting member. This single-sided panel support capability is at least in part due to the fact that each panel counter-balances the weight of an opposing panel. The counter-balancing of weight further allows the suspension points to be moved to the interior of the system, and specifically along the longitudinal centerline of the system. In turn, this reduces the number of accompanying suspension points to the overhead ceiling structure and consolidates the support beam visual to one centrally located area.

[0023] The description of the example embodiments of the present invention is given above for the understanding of the present invention. It will be understood that the invention is not limited to the particular embodiments described herein, but is capable of various modifications, rearrangements and substitutions which will now become apparent to those skilled in the art without departing from the scope of the invention.

[0024] For example, Figures 4-7 illustrate a second example embodiment of the system 100 which provides some enhancements to the cantilevered system of the invention. As best shown in Figures 4 and 5, support beam 112 includes a longitudinally extending protrusion 101 which extends into the panel receiving channel 126. The panel 114 has a corresponding routing detail 120, such as a kerf, extending from a surface, e.g. the top surface, of the panel for receiving and mating with the protrusion 101.

[0025] As shown, the panel 114 is inserted into panel receiving channel 126 at an angle. Panel 114 is then rotated downwardly until the top and bottom surfaces of the panel rest on the second and third channel surfaces of the channel in order to achieve the gravity lock. When the panel is locked in position, the protrusion 101 will be in mating relation with the routing detail 120 of the panel. Thus, in addition to the vertical locking provided by the gravity lock, the engagement of the protrusion with the panel routing detail will effectively provide horizontal locking of the panel to the beam. The combination of vertical and horizontal locking is often desired in geographic areas of seismic activity.

[0026] Also, as best illustrated in Figure 5, the bottom surface of the support beam can be contoured to provide a channel having a larger volumetric space, which, in turn, will allow the panel to be inserted all the way into channel 126 and clear protrusion 101.

[0027] Other modifications include the formation of a box 40 in the lower surface of the beam (Figure 5). This box can be utilized to incorporate, and provide support for, ceiling peripherals such as the luminaire 42 shown in Figure 1.

[0028] Also, as shown in Figure 6, where the panels 114 include an upturned edge, adjacent panels on the same side of the support beam can be connected and aligned using a clip 50. As shown, the configuration of the clip is such that it can straddle the upturned edges

of two adjacent panels.

[0029] Additionally, as shown in Figure 7, the support beam 126 can include built-in splice channels 150 for linking two support beams 126 in end-to-end relation. The channels can accommodate rods 152 which effectively connect and align the support beams to one another. It is worth noting that the return 32', described above, is formed as a portion of the third surface to provide a clearance for the inclusion of these splice channels 150. If no splice channel is required to extend from the third surface of the channel as shown in Figure 7, then the return 32' is not required.

Claims

1. A cantilevered ceiling system comprising: a support beam and at least two panels, the panels being securely maintained to the beam by a gravity operated lock.
2. The cantilevered ceiling system of claim 1, wherein the support beam and the at least two panels are positioned substantially horizontally.
3. The cantilevered ceiling system of claim 1, wherein the support beam has two opposing edges, the edges each having a panel receiving channel.
4. The cantilevered ceiling system of claim 3, wherein the panel receiving channel has an upright surface which integrally connects a second surface to a third surface, the second and third surfaces extending in a direction transverse to the upright surface.
5. The cantilevered ceiling system of claim 4, wherein the second and third surfaces engage the panel and provide, in combination, the gravity operated lock.
6. The cantilevered ceiling system of claim 1, wherein all suspension points to an overhead support structure are positioned along the longitudinal centerline of the system.
7. The cantilevered ceiling system of claim 1, wherein the support beam visual is consolidated to one centrally located area.
8. A cantilevered ceiling system comprising: a support beam and at least two panels of rectilinear configuration, wherein each of the at least two panels has only one side of the panel in contact with the support beam, and wherein the panel is positioned substantially horizontally.

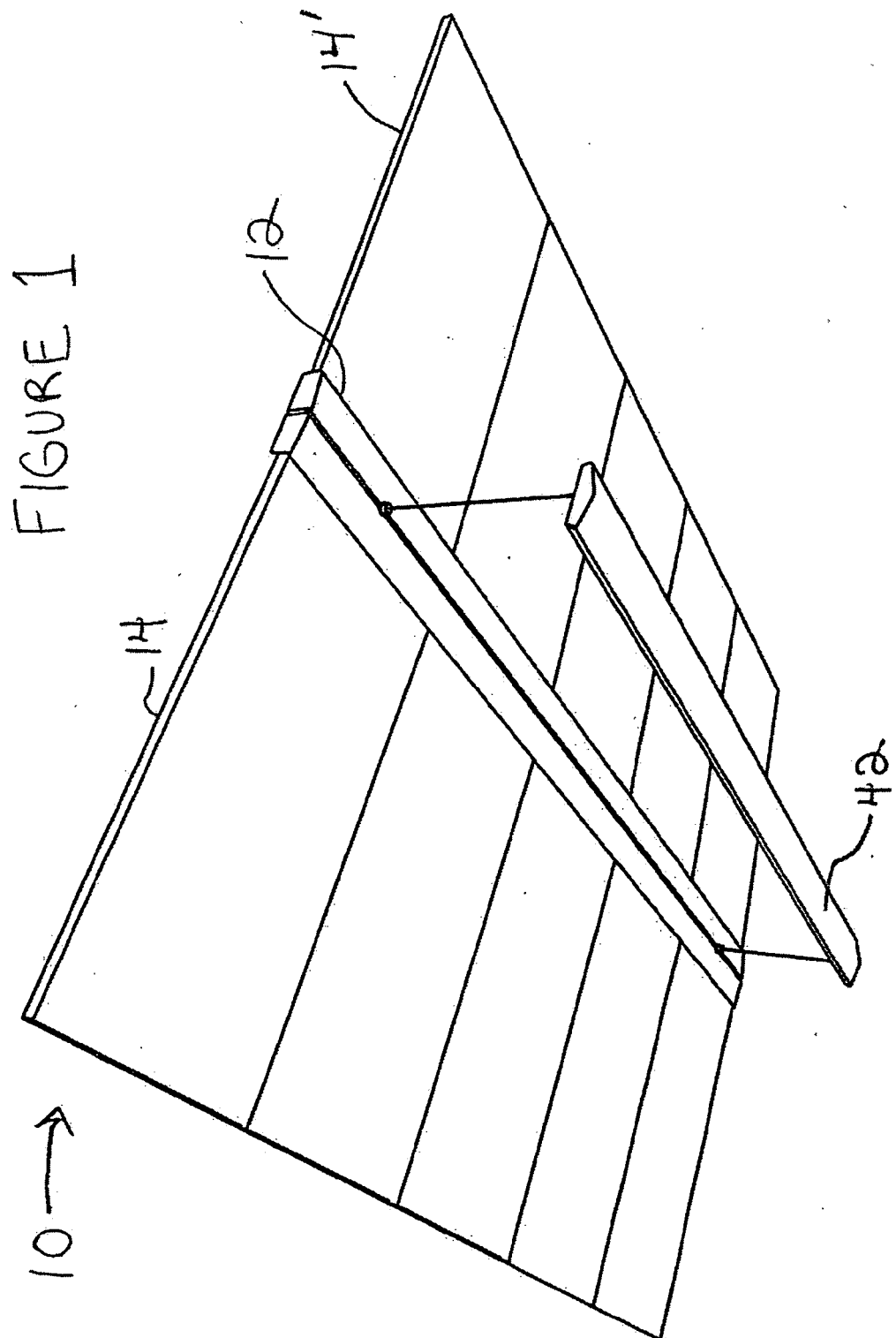


FIGURE 2

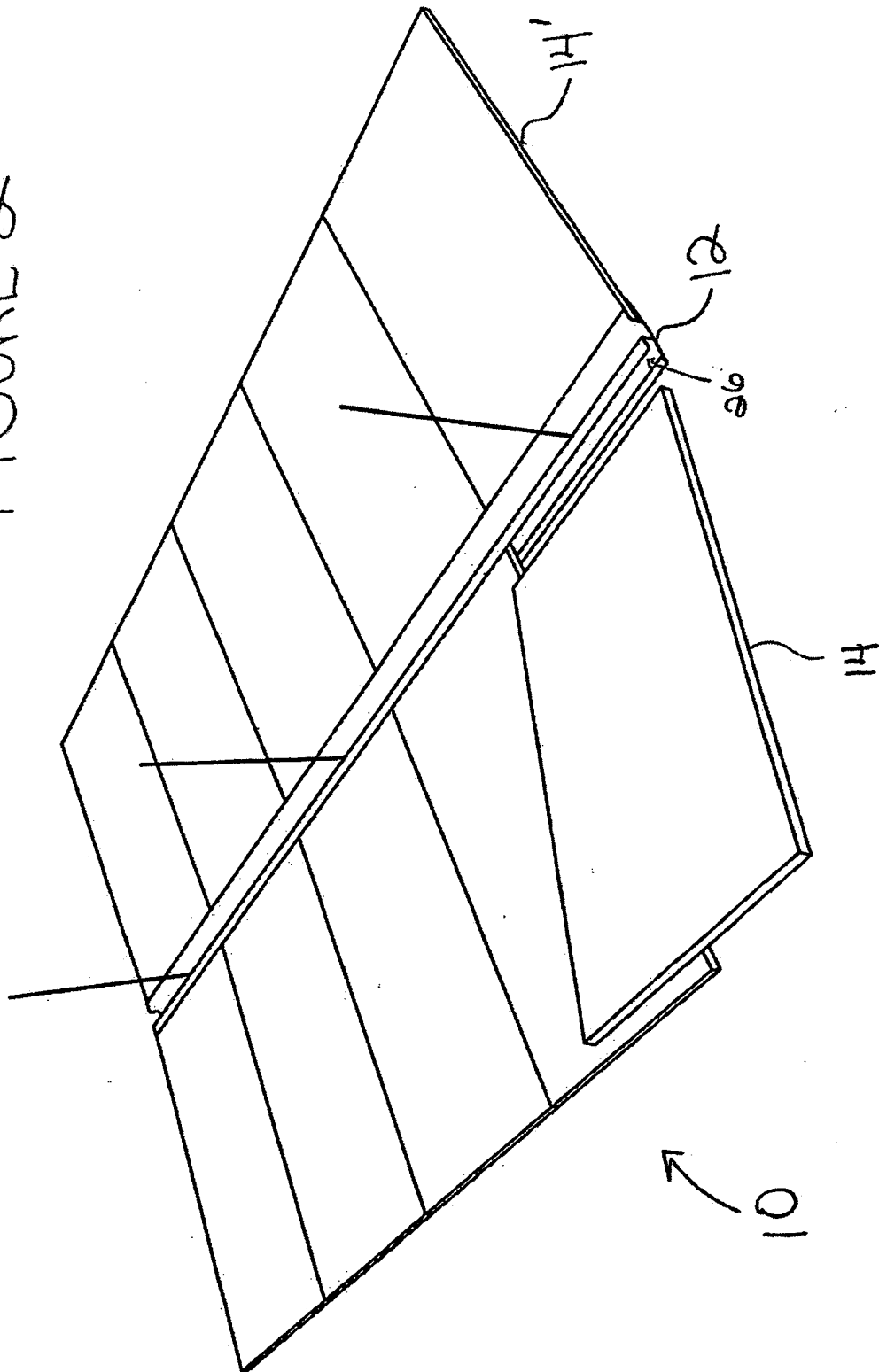
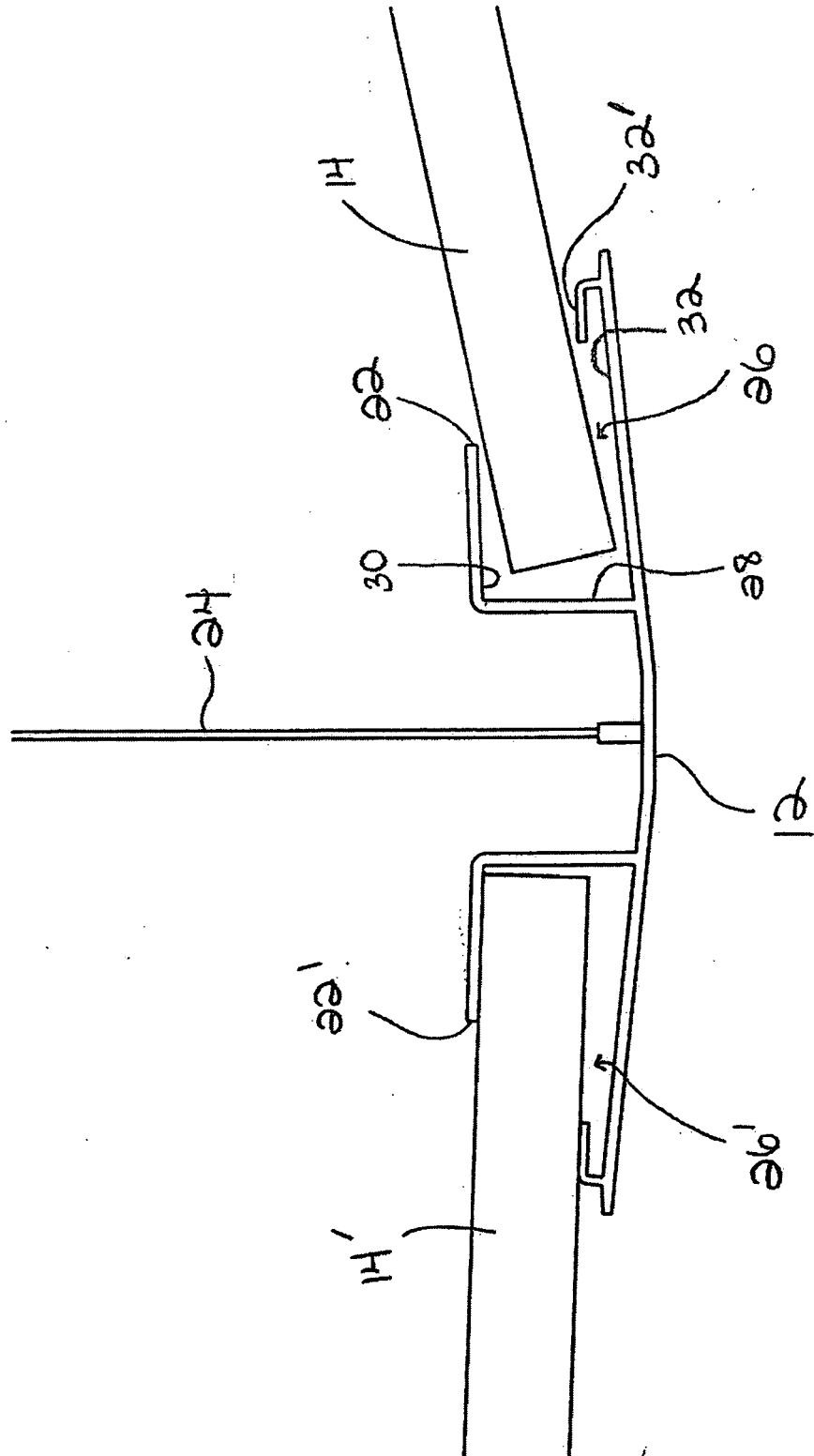


FIGURE 3



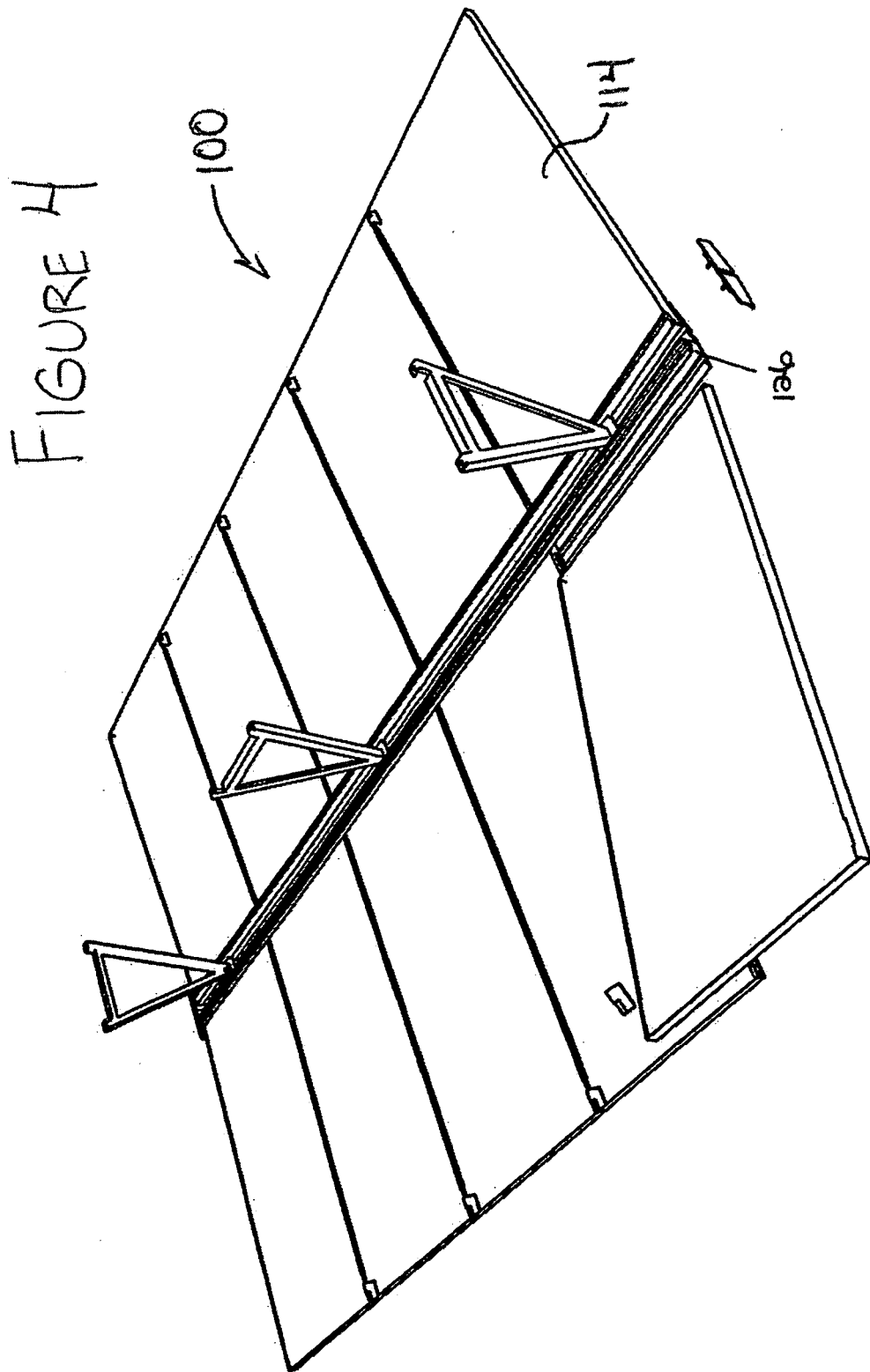
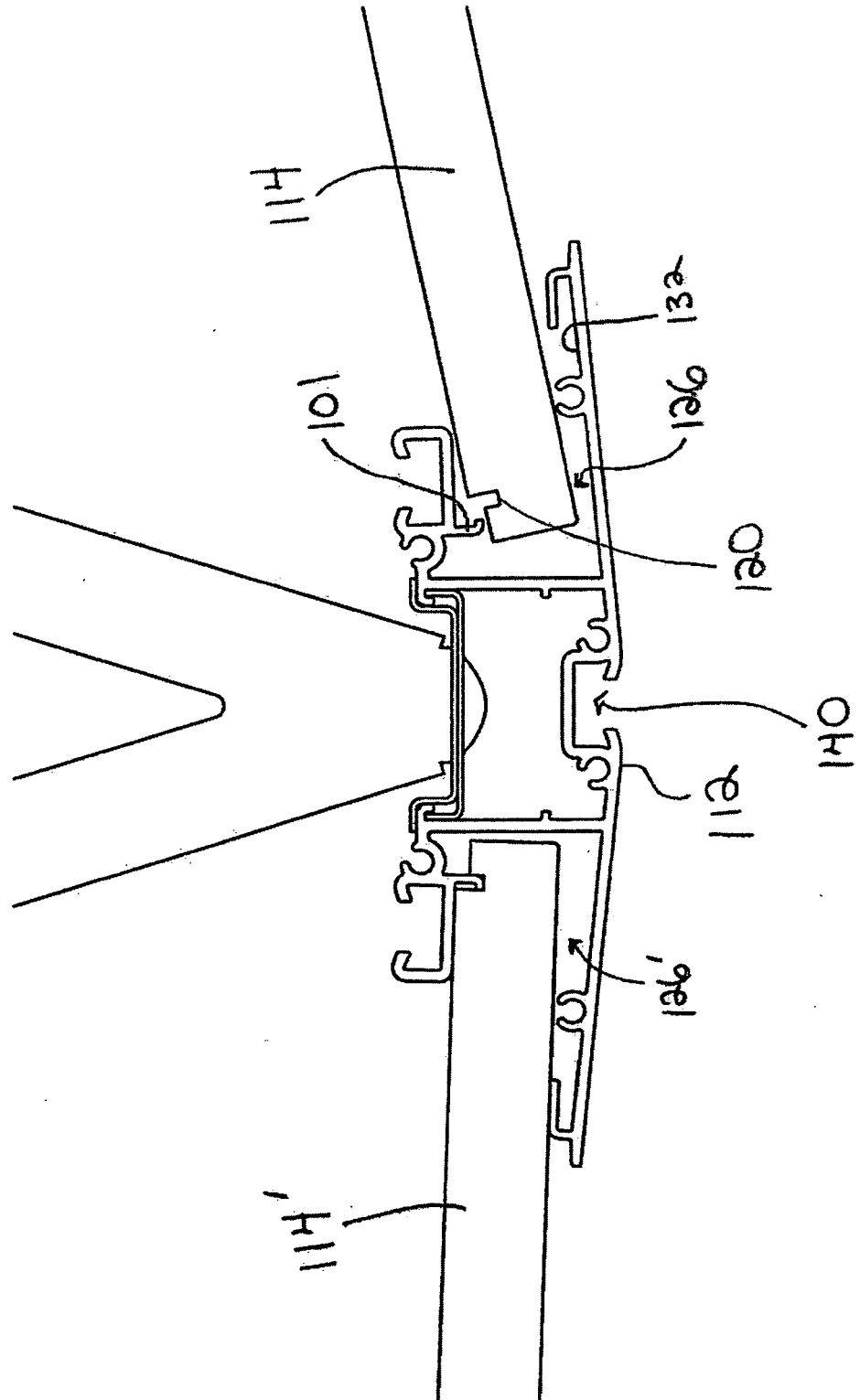


FIGURE 5



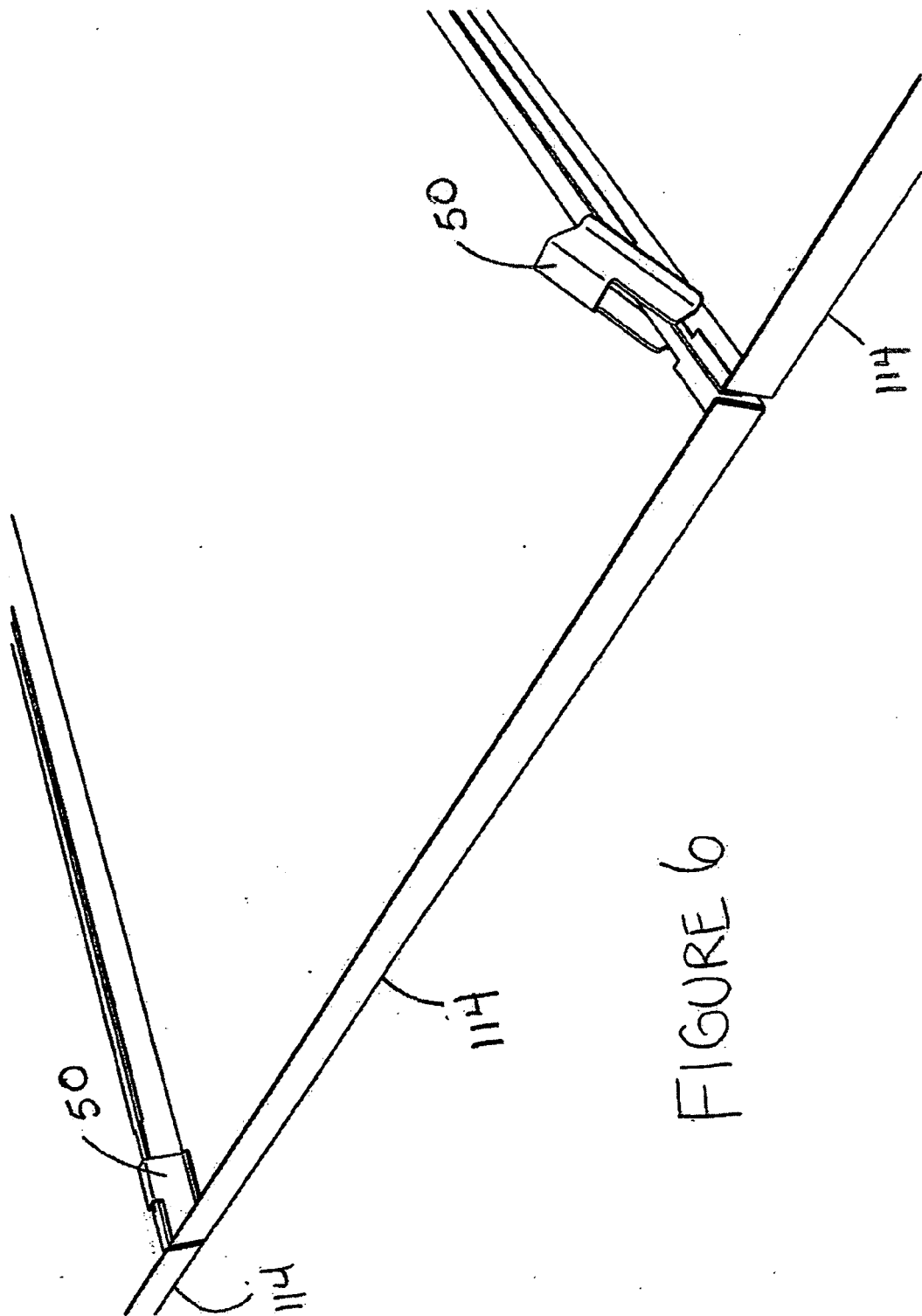
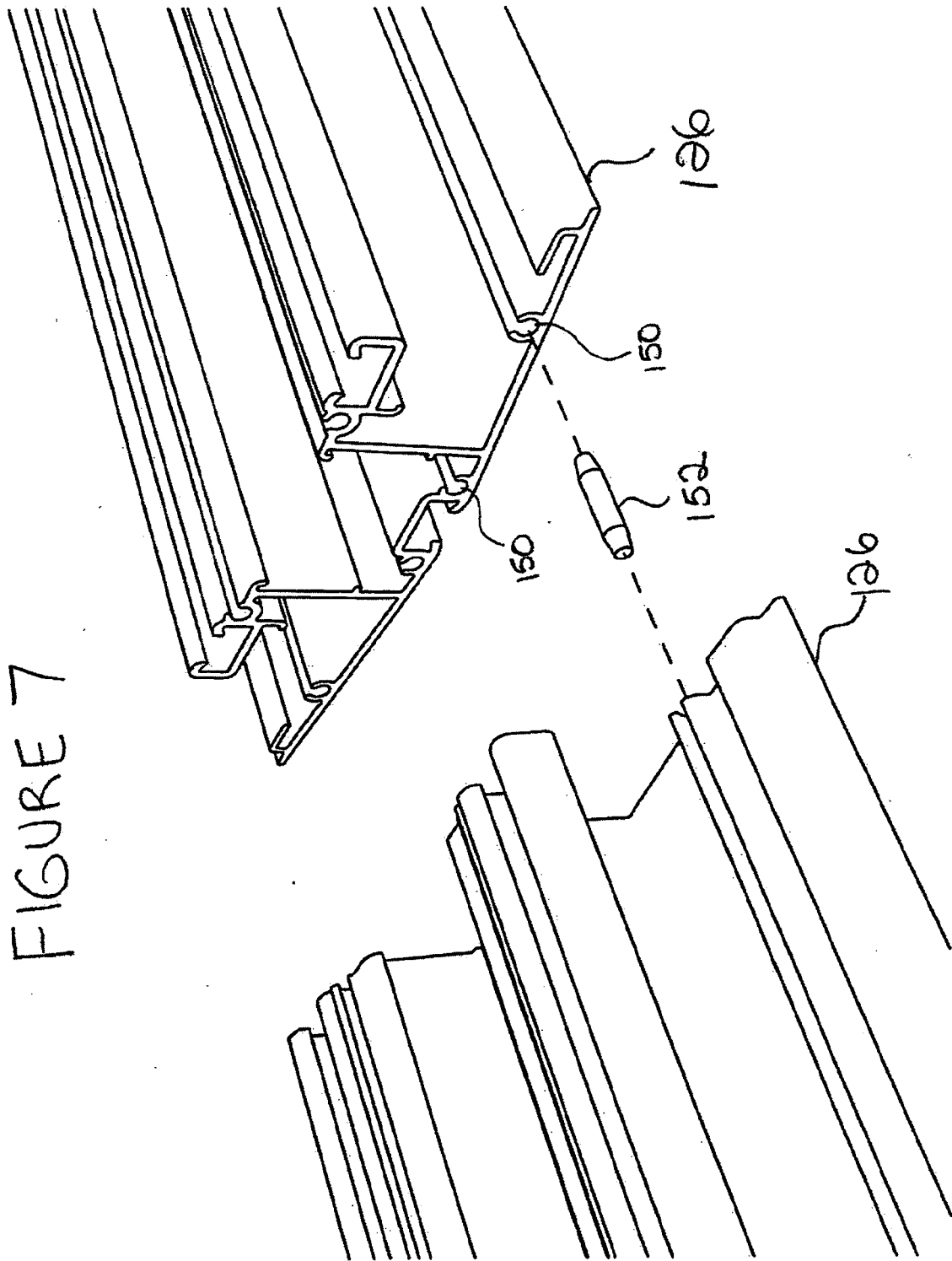


FIGURE 6





EUROPEAN SEARCH REPORT

Application Number
EP 09 00 0956

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 196 20 209 A1 (ZUMTOBEL LICHT [AT]) 27 November 1997 (1997-11-27) * column 6, line 34 - column 7, line 21; figure 1 *	1-8	INV. E04B9/34
X	FR 1 398 060 A (MECI) 7 May 1965 (1965-05-07) * page 2, column 1, line 49 - line 56; figures *	1,2,8	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 March 2009	Examiner Demeester, Jan
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			

1
EPO FORM 1503 03.82 (P04C01)

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

EP 09 00 0956

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-03-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19620209	A1	27-11-1997	
		AT 209316 T	15-12-2001
		AU 3091097 A	09-12-1997
		WO 9744616 A1	27-11-1997
		EP 0898686 A1	03-03-1999
		US 6155693 A	05-12-2000

FR 1398060	A	07-05-1965	NONE
