(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 882 789 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.01.2008 Bulletin 2008/05

(51) Int Cl.:
E04B 2/88 *(2006.01)*

(21) Application number: **07105196.5**

(22) Date of filing: **29.03.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **27.07.2006 CN 200620131021 U**

(71) Applicant: **Bai, Baokun**
Xinxiang County, Henan 453000 (CN)

(72) Inventor: **Bai, Baokun**
Xinxiang County, Henan 453000 (CN)

(74) Representative: **Viering, Jentschura & Partner**
Postfach 22 14 43
80504 München (DE)

(54) A point-fixed curtain wall hanging system

(57) A point-fixed curtain wall hanging system comprises: a plurality of pole members, being long straight poles and connected to each other to form a plurality of hanging poles fixed vertically on the portions of a building close to a rib-board or a panel-board of a curtain wall; a plurality of support members fixed on the top portions of said hanging poles and fastened on a curtain wall support structure; and a plurality of hanging members fixed between two said pole members and connecting said pole members to each other to form said hanging poles. Due to adopting the above structure, and adopting the hanging system described in the present invention to install the glass curtain wall, the panel-board and the rib-board are both hanged to form the curtain wall and bear the pull force, more satisfying the theory of the optimization of the mechanics and meeting the requirements for the safety and the stability.

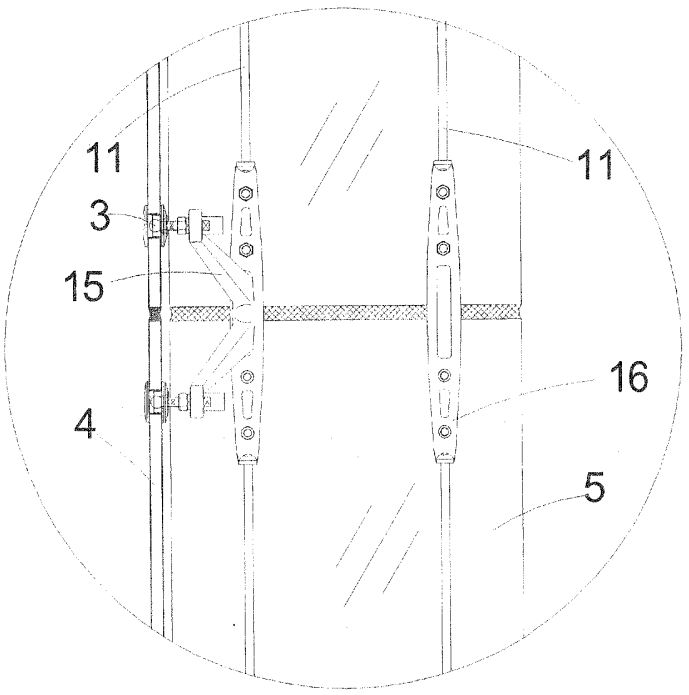

FIG. 4B

EP 1 882 789 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a device of a curtain wall. More particularly, the present invention relates to a point-fixed curtain wall hanging system implementing the hanging frame with the rib-boards and/or the panel-boards of the curtain wall.

BACKGROUND OF THE INVENTION

[0002] It has been widely applied in the current world to apply the glass curtain wall as the building exteriors. For the aesthetic concern, many buildings have adopted the super-high glass in a whole breadth to compose the curtain wall. The point-fixed glass curtain wall has great security, good transparence, and diversiform structure, convenient maintained and advanced technology. So it has been applied in the modern building applied as large public works as wide as possible.

[0003] The current available installation means for the super-high glass panel in a whole breadth usually comprises: providing an installation slot defined on the ground, insert the bottom end of the glass panel in the installation slot, and fastening the upper part of the glass panel on the glass rib-board through a claw. Under the condition, the glass panel bears the pressure. When the height of the glass panel is too high, like more than 5 meters, the stability of the glass panel is very poor, unable to meet the requirements for the safety and the stability.

[0004] As described above, in the actual application, the current available installation means and the device for the super-high glass panel in the whole breath obviously have the inconveniences and limitations, and it is necessary to be improved.

SUMMARY OF THE INVENTION

[0005] The purpose of the present invention is to provide a point-fixed glass curtain wall hanging system implementing hanging frame with the rib-boards and/or the panel-boards of the curtain wall, of which the panel-board and the rib-board bear the pull force so as to ensure the safety and the stability of the glass of the curtain wall, especially the super-high glass in the whole breadth.

[0006] A point-fixed curtain wall hanging system comprises: a plurality of pole members, being long straight poles and connected to each other to form a plurality of hanging poles fixed vertically on the portions of a building close to a rib-board or a panel-board of a curtain wall; a plurality of support members fixed on the top portions of the hanging poles and fastened on a curtain wall support structure; and a plurality of hanging members fixed between two the pole members and connecting the pole members to each other to form the hanging poles.

[0007] The support members are fixed on the top portions and the bottom portions of the hanging poles and are fastened on a ceiling or a floorboard of the building.

[0008] The support member comprises: a fixing piece having a square-piece-shaped body and a plurality of fixing apertures disposed on the four corners of the body; and a fixing pole extending vertically from the center of the fixing piece and having a screw portion on the outside end thereof connected to the hanging pole.

[0009] The hanging members are fixed on the rib-boards.

[0010] The hanging member comprises: a sleeve having a screw portion on each of the two ends thereof; an extension pole extending vertically from the side surface of the sleeve; and a fixing board, fixed on the outside end of the extension pole, and being vertical to both the sleeve and the extension pole, and having two installation apertures arranged symmetrically to the sleeve and connected to the rib-boards.

[0011] The hanging members are fastened on the rib-board, an d the panel board is fastened on the rib-board through a claw, the hanging member and the claw are piled up internally and externally to be fixed on the same place of the panel-board.

[0012] The hanging member comprises: a rib-board connecting member, being a rectangle board which has a plurality of installation apertures for the rib-board, and fastened on the rib-board by installing a bolt in each of the installation apertures and an installation aperture on the rib-board; and a hanging pole connecting member, extending vertically from the end of the rib-board connecting member and having an installation aperture receiving the end of the pole member in a screw manner.

[0013] The hanging members are connected to the panel-boards.

[0014] The hanging member comprises: a rib-board connecting member, being a rectangle board which has a plurality of installation apertures for the rib-board, and fastened on the rib-board by installing a bolt in each installation aperture and an installation aperture on the rib-board; and a hanging pole connecting member, extending vertically from the end of the rib-board connecting member and having an installation aperture receiving the end of the pole member in a screw manner; and a panel-board connecting member comprising a claw-arm extending outward from the middle portion of the rib-board connecting member and a claw-head provided on the outside end of the rib-board connecting member and connected to the panel-board.

[0015] The point-fixed curtain wall hanging system further comprises a plurality of hanging equipments connected to the curtain wall support structure and fixed on the top of the rib-boards.

[0016] Due to adopting the above structure, and adopting the hanging system described in the present invention to install the glass curtain wall, the panel-board and the rib-board are both hanged to form the curtain wall and bear the pull force, more satisfying the theory of the optimization of the mechanics and meeting the requirements for the safety and the stability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Combining the attached drawings, the following will describe the specific implementation means for the present invention in details, which will make the technical solution and other beneficial results for the present invention become obvious.

Fig. 1A is a front view of the first embodiment of the hanging system installed on the glass curtain wall of the present invention.
Fig. 1 B is a left view of Fig. 1A.
Fig. 1 C is a sectional view taken along the line A-A of Fig. 1 B.
Fig. 2A is a front view of the support member in Figs. 1A to 1C.
Fig. 2B is a left view of Fig. 2A.
Fig. 2C is a bottom view of Fig. 2A.
Fig. 2D is a top view of Fig. 2A.
Fig. 3A is a front view of the hanging member in Figs. 1A to 1C.
Fig. 3B is atop view of Fig. 3A.
Fig. 3C is a right view of Fig. 3A.
Fig. 3D is a left view of Fig. 3A.
Fig. 4 is a left view of the second embodiment of the hanging system installed on the glass curtain wall of the present invention.
Fig. 4A is an enlarged view of part A in Fig. 4.
Fig. 4B is an enlarged view of part B in Fig. 4.
Fig. 4C is an enlarged view of part C in Fig. 4.
Fig. 4D is an enlarged view of part D in Fig. 4.
Fig. 4E is an enlarged view of part E in Fig. 4.
Fig. 5 is a perspective view of the two-board hanging member shown in Fig. 4A.
Fig. 6 is a perspective view of the two-board hanging member shown in Fig. 4B.
Fig. 7 is a perspective view of the one-board hanging member shown in Fig. 4B.
Fig. 8 is a perspective view of the claw shown in Fig. 4E.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[The first embodiment of the hanging system, the first embodiment of the hanging member]

[0018] Figs. 1A to 1C show the first embodiment of the hanging system of the point-fixed curtain wall of the present invention.

[0019] The hanging system 1 of the present invention comprises a plurality of pole members 11, a plurality of support members 12 and a plurality of hanging members 13.

[0020] The pole member 11 is a long and straight pole; each of the two end portions thereof has an external screw thread.

[0021] Figs. 2A to 2D show the support member 12 in the first embodiment of the hanging system of the present invention. The support member 12 comprises a fixing piece 121 and a fixing pole. The fixing piece 121 has a square-piece-shaped body and a plurality of fixing apertures 123 disposed on the four corners of the body. The fixing pole 122 extends vertically from the center of the fixing piece 121 and has a screw aperture on the outside end of the fixing pole 122.

[0022] Fig. 3A to Fig. 3D shows the hanging member 13 in the first embodiment of the hanging system of the present invention. The hanging member 13 comprises a sleeve 131, an extension pole 132 and a fixing piece 133. The sleeve 131 has a screw aperture on each of the two ends thereof. The extension pole 132 extends vertically from the side surface of the sleeve 131. The fixing piece 133 is fixed on the outside end of the extension pole 132, and is vertical to both the sleeve 131 and the extension pole 132, and has two installation apertures 134 arranged symmetrically to the sleeve 131.

[0023] The hanging member 13 is fixed between the two pole members 11 through the two screw apertures of the two ends of the sleeve 131 receiving the ends of the pole members 11. Thereby, the pole members 11 are connected to each other through the hanging members to form the handing poles. The support member 12 is fixed on the ceiling 61 and the floorboard 62 of the building by installing the bolts 124 in the fixing apertures 123 of the fixing piece 121. The support member 12 can be fixed on the other support structure of the curtain wall instead of the ceiling and the floorboard. In order to form the curtain wall hanging system of the present invention, the two ends of the hanging pole are received respectively in the screw apertures of the fixing poles 122 of the support members 12.

[0024] The point-fixed curtain wall in the first embodiment comprises the panel-boards 4, the rib-boards 5, the claws 2 and the hanging system 1.

[0025] By installing two bolts 135 in the installation apertures 134 of the fixing piece 133, the fixing piece 133 of the hanging member 13 is fastened on the rib-board 5. Shown as Fig. 1C, through the same group of bolts 135, the claw 2 is also fastened on the same position of the rib-board 5. In other words, the claw 2 and the fixing piece 133 of the hanging member 13 are piled up internally and externally. The claw-arm of the claw 2 is connected to the connection head 3 fastened on the panel-board 4.

[0026] Each claw 2 is installed on and between two proximate pieces of panel-board 4 to connect the two pieces of the panel-board 4. Two claws 2 are symmetrically fixed on both sides of the rib-board 5 to connect the adjacent four pieces of the panel-board, shown as Fig. 1A, to form the curtain wall. The specific structure of the claw 2 is not the characteristics of the present invention, therefore the unnecessary details will not be given here.

[0027] In order to ensure the stability of the structure, in the first embodiment, shown as Fig. 1C, two sets of the hanging systems1 and 1a are installed symmetrically on the two sides of the rib-boards 5 close to the panel-

boards 4. The claws 2 and the fixing pieces 133 of the hanging members 13 of both the hanging system 1 and the hanging system 1a are respectively piled up internally and externally to. In other words , the hanging system1 and the hanging system 1a support the panel-boards 4 and the rib-boards 5 in the same time. And another two sets of the hanging systems 1b and 1 c are installed symmetrically on the positions of the rib-boards 5 away from the panel-board 4, which do not have the claws and only support the rib-boards 5.

[The second embodiment of the hanging system]

[0028] Fig. 4 to Fig.4E shows the second embodiment of the hanging system of the present invention.

[0029] The second embodiment is similar to the first embodiment. The support member 12 is fastened on the ceiling 61. The pole members 11 are connected to each other through the hanging members 14 (or 15 or 16 or 17 or 18) to form the hanging poles. The two ends of the hanging pole are fastened on the support member 12 in a screw manner to form the hanging system 1 which supports the panel-boards 4 and/or the rib-boards 5. The handing system 1 can be designed to support both the panel-boards 4 and the rib-boards 5 in the same time. The handing system 1 also can be designed to support either the panel-boards 4 or the rib-boards 5.

[0030] The second embodiment differs from the first embodiment on the following characteristics. The hanging member connects not only two pole members 11, but also the panel-board 4 or/and the rib-board 5. The second embodiment of the hanging system has five different kinds of hanging members 14, 15, 16, 17, 18.

[The second embodiment of the hanging member]

[0031] Shown as Fig. 4A and Fig. 5, the two-board hanging member 14 connects the adjacent two pole members 11, the panel-board 4 and the rib-board 5. The two-board hanging member 14 comprises the rib-board connecting member 141, the hanging pole connecting member 142 and the panel-board connecting member 143. The rib-board connecting member 141 is a rectangle board which has many installation apertures 1411. By install the bolts in the installation apertures 1411 and the installation apertures of the rib-board 5, the rib-board connecting member 141 is fastened on the rib-board 5. The two hanging pole connecting members 142 extend vertically from the two ends of the rib-board connecting member 141, and have the installation apertures 1421 receiving the ends of the pole members 11 in a screw manner. The panel-board connecting member 143 comprises a claw-arm 1431 and a claw-head 1432. The claw-arm 1431 extends outward from the middle part of the rib-board connecting member 141. The claw-head 1432 is provided on the outside end of the claw-arm 1431 and is connected to the panel-board 4.

[The third embodiment of the hanging member]

[0032] Shown as Fig. 4B and Fig. 6, the two-board hanging member 15 which is similar to the two-board hanging 14 comprises a rib-board connecting member 151, a hanging pole connecting member 152 and a panel-board connecting member 153. And the panel-board connecting member 153 comprises two claw-arm 1531 and two claw-head 1532. The tow claw-arms 1531 extend outward from the middle part of the rib-board connecting member 151. The claw-head 1532 are provided on the outside ends of the claw-arms 1531 and are connected to the panel-board 4.

[The fourth embodiment of the hanging member]

[0033] Shown as Fig. 4B and Fig. 7, the one-board hanging member 16 only comprises a rib-board connecting member 161 and a hanging pole connecting member 162. The one-board hanging member 16 connects the adjacent two pole members 11 and the rib-board 5, but does not connect the panel-board 4. The rib-board connecting member 161 is a rectangle board which has many installation apertures 1611. By installing the bolts in the installation apertures 1611 and the installation apertures of the rib-board 5, the rib-board connecting member 161 is fastened on the rib-board 5. The two hanging pole connecting members 162 respectively vertically extend from the two ends of rib-board connecting member 161. And the hanging pole connecting members 162 have the installation apertures 1621 receiving the pole members 11 in a screw manner.

[The fifth embodiment of the hanging member]

[0034] Shown as Fig. 4C, compared with the one-board hanging member 16, the one-board hanging member 17 differs from the one-board hanging member 16 on having only one hanging pole connecting member 172 provided on the end of the rib-board connecting member 171.

[The sixth embodiment of the hanging member]

[0035] Shown as Fig. 4D, compared with the two-board hanging member 15, the two-board hanging member 18 differs from the two-board hanging member 15 on having only one hanging pole connecting member 182 provided on the end of the rib-board connecting member 181.

[The supplement of second embodiment of the hanging system]

[0036] Fig. 4 to Fig.4E shows the second embodiment of the hanging system of the present invention. It adopts diversified hanging members on the fixing points of the curtain wall. They can be selected conveniently in the real construction.

[0037] Considering that the rib-boards 5 are used as the support structure of the curtain wall and in order to ensure the stability of the rib-boards 5, shown as Fig. 4, Fig. 4A and Fig. 4E, another connecting equipment joins the rib-board 5 with the ceiling 61 or the floorboard 62 of the building. Through the hanging members or other members, a plurality of rib-boards 5 is connected to form the support structure. By connecting a supporting seat 51 and a connecting seat 52 in a pivotal manner, the top of the rib-board 5 is installed on the ceiling 61 of the building. The supporting seat 51 is fastened on the ceiling 61, and the connecting seat 52 is fastened on the rib-board 5. The bottom of the rib-board 5 is installed on the floorboard 62 by adopting the same seats. The rib-boards 5 are hanged on the building based on the pivot connection. The apertures on the supporting seat 51 and the connecting seat 52 receiving the pivots are designed to be ellipse-shaped to bear diversified loads and avoid concentred stress of the glass of the curtain wall. It can repair the displacement and the distortion caused by the wind, snow and temperature change and earthquake etc. The installation positions of the members can be adjusted to finish the installation conveniently.

[0038] In addition, shown as Fig. 4E to Fig. 8, the second embodiment of the hanging system adopts the general claws 7 fixed on the panel-boards 4 and the rib-boards 5.

[0039] Many kinds of connecting members of this embodiment can be selected and assembled in real construction.

[0040] The hanging system of the present invention is applicable for the point-fixed curtain wall made of no matter what the glass or other material.

[0041] While the present invention has been described in connection with the preferred embodiment of the various figures, it is to be understood that other similar embodiments may be used or modifications and additions may be made to the described embodiment for performing the same function of the present invention without deviating there from. Therefore, the present invention should not be limited to any single embodiment, but rather construed in breadth and scope in accordance with the recitation of the appended claims.

Claims

1. A point-fixed curtain wall hanging system, comprising
   a plurality of pole members, being long straight poles and connected to each other to form a plurality of hanging poles fixed vertically on the portions of a building close to a rib-board or a panel-board of a curtain wall;
   a plurality of support members fixed on the top portions of said hanging poles and fastened on a curtain wall support structure; and
   a plurality of hanging members fixed between two said pole members and connecting said pole members to each other to form said hanging poles.

2. The point-fixed curtain wall hanging system of claim 1, wherein said support members are fixed on the top portions and the bottom portions of said hanging poles and are fastened on a ceiling or a floorboard of said building.

3. The point-fixed curtain wall hanging system of claim 1, wherein said support member comprises:
   a fixing piece having a square-piece-shaped body and a plurality of fixing apertures disposed on the four corners of said body; and
   a fixing pole extending vertically from the center of said fixing piece and having a screw portion on the outside end thereof connected to said hanging pole.

4. The point-fixed curtain wall hanging system of claim 1, wherein said hanging members are fixed on said rib-boards.

5. The point-fixed curtain wall hanging system of claim 4, wherein said hanging member comprises:
   a sleeve having a screw portion on each of the two ends thereof;
   an extension pole extending vertically from the side surface of said sleeve; and
   a fixing board, fixed on the outside end of said extension pole, and being vertical to both said sleeve and said extension pole, and having two installation apertures arranged symmetrically to said sleeve and connected to said rib-boards.

6. The point-fixed curtain wall hanging system of claim 4, wherein said hanging members are fastened on said rib-board, and said panel board is fastened on said rib-board through a claw, said hanging member and said claw are piled up internally and externally to be fixed on the same place of said panel-board.

7. The point-fixed curtain wall hanging system of claim 4, wherein said hanging member comprises:
   a rib-board connecting member, being a rectangle board which has a plurality of installation apertures for said rib-board, and fastened on said rib-board by installing a bolt in each of said installation apertures and an installation aperture on said rib-board; and
   a hanging pole connecting member, extending vertically from the end of said rib-board connecting member and having an installation aperture receiving the end of said pole member in a screw manner.

8. The point-fixed curtain wall hanging system of claim 4, wherein said hanging members are connected to said panel-boards.

9. The point-fixed curtain wall hanging system of claim 8, wherein said hanging member comprises:

a rib-board connecting member, being a rectangle board which has a plurality of installation apertures for said rib-board, and fastened on said rib-board by installing a bolt in each installation aperture and an installation aperture on said rib-board; and
a hanging pole connecting member, extending vertically from the end of said rib-board connecting member and having an installation aperture receiving the end of said pole member in a screw manner; and
a panel-board connecting member, comprising a claw-arm extending outward from the middle portion of said rib-board connecting member, and
a claw-head provided on the outside end of said rib-board connecting member and connected to said panel-board.

10. The point-fixed curtain wall hanging system of claim 1, further comprising a plurality of hanging equipments connected to said curtain wall support structure and fixed on the top of said rib-boards.

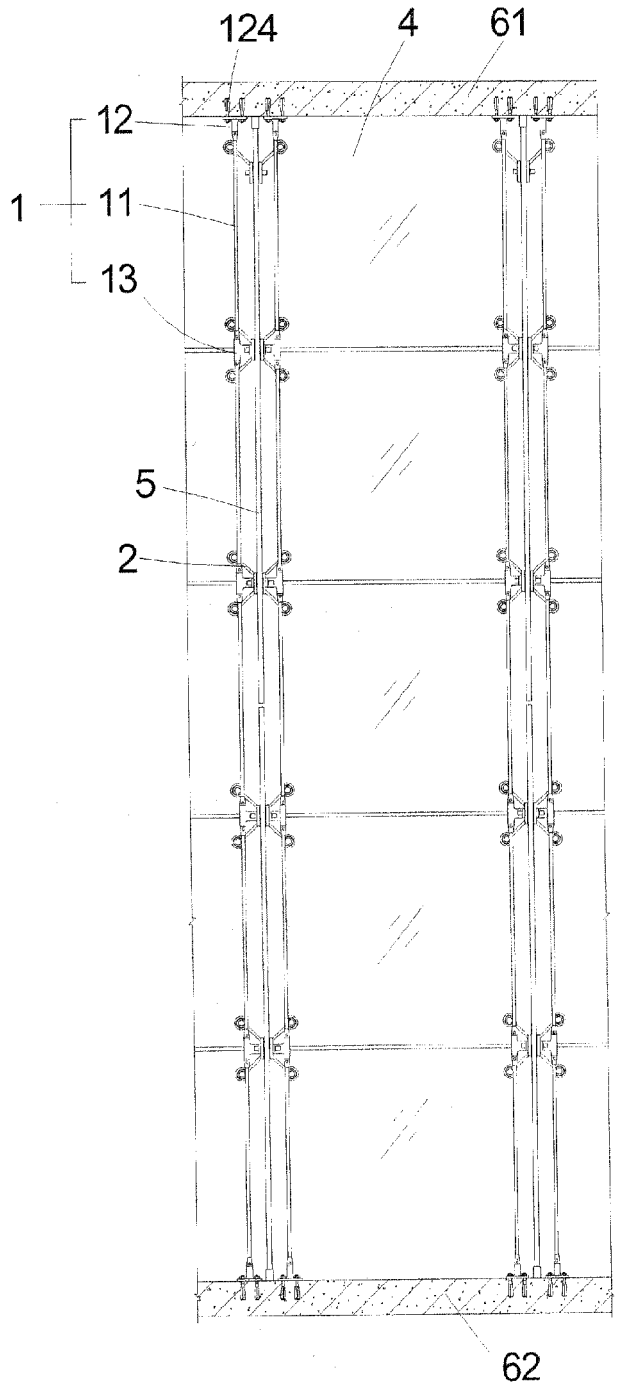

FIG. 1A

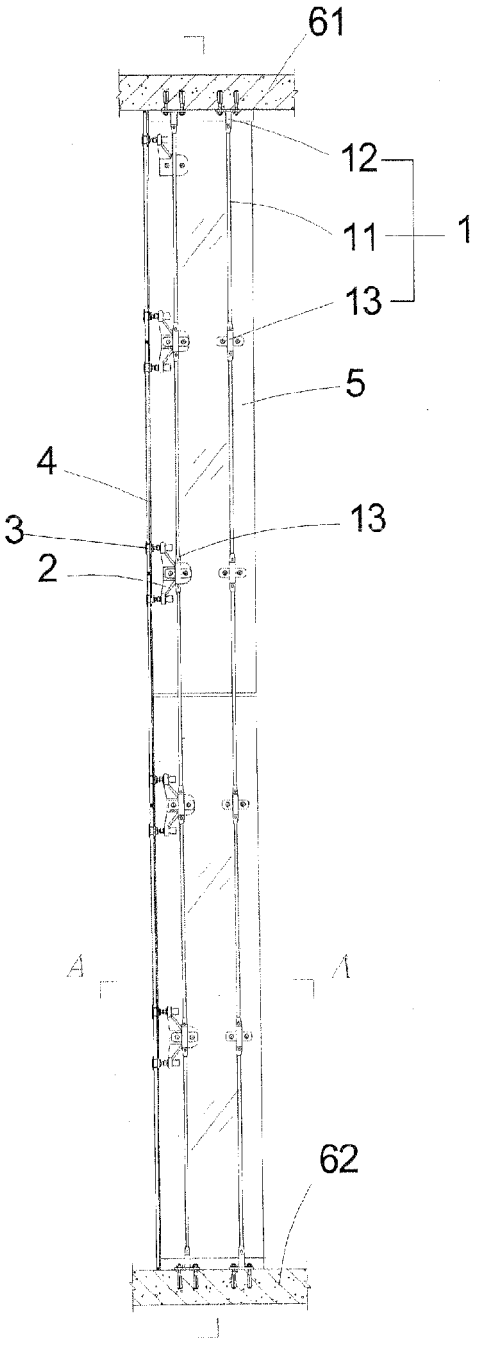

FIG. 1B

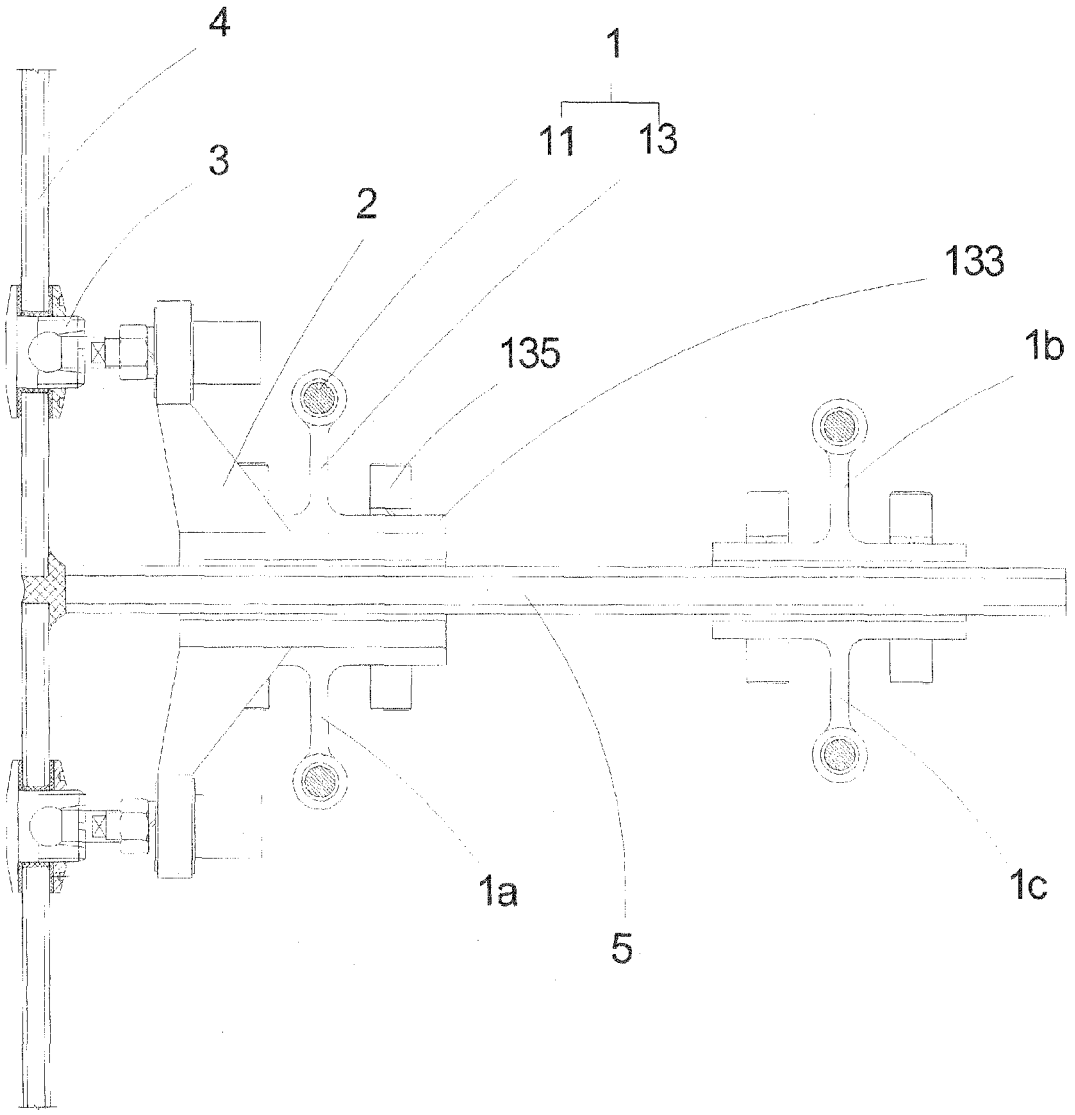

FIG. 1C

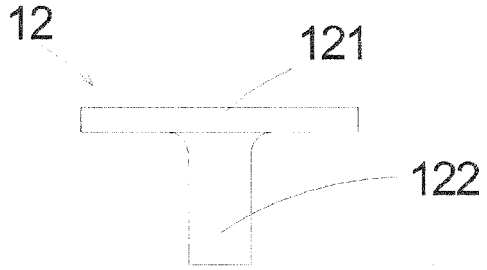

FIG. 2A

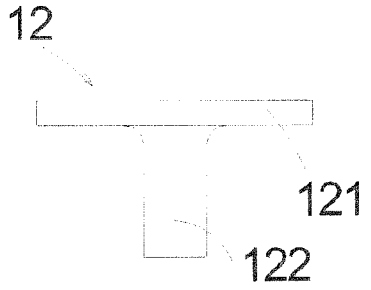

FIG. 2B

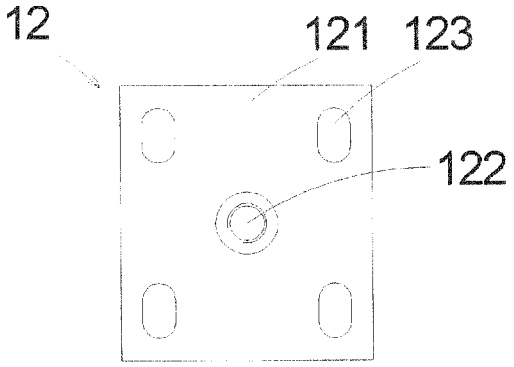

FIG. 2C

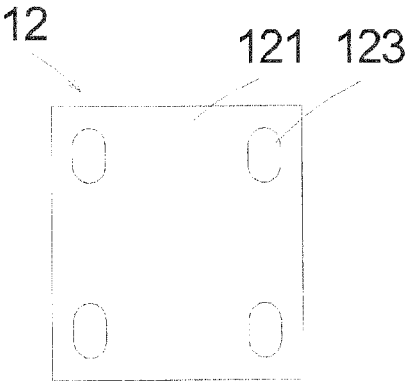

FIG. 2D

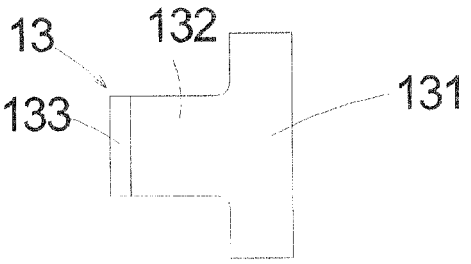

FIG. 3A

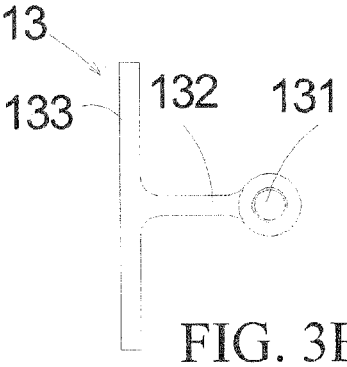

FIG. 3B

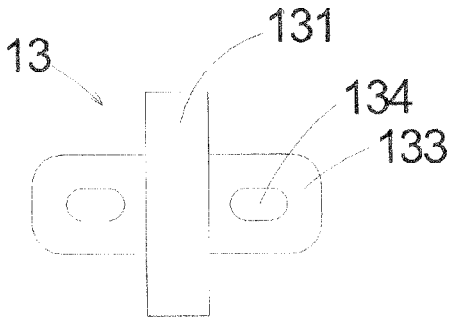

FIG. 3C

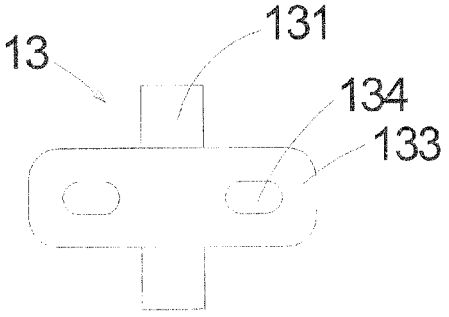

FIG. 3D

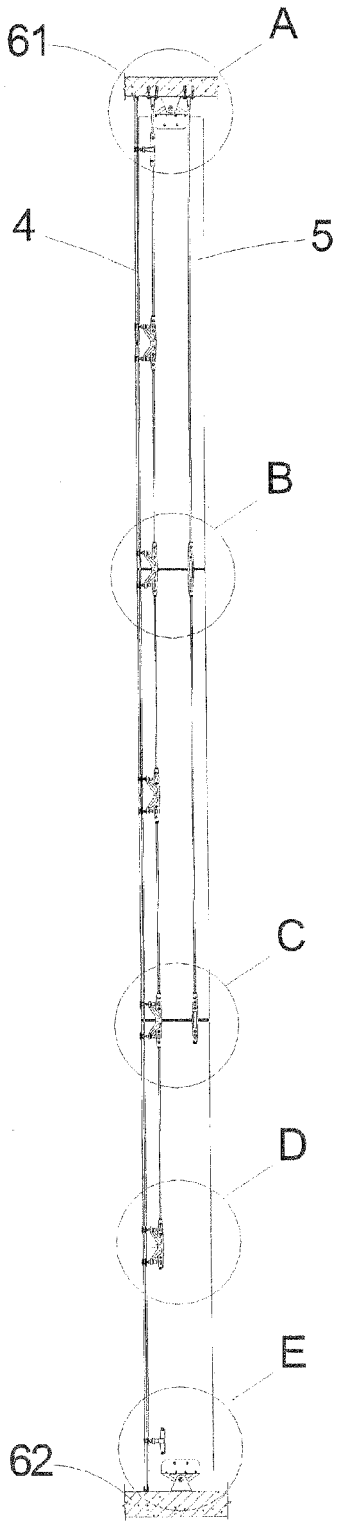

FIG. 4

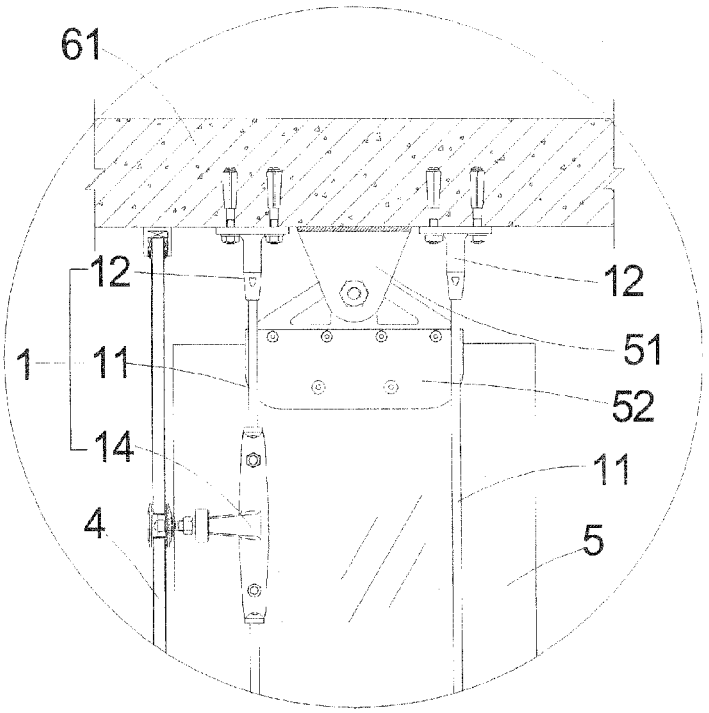

FIG. 4A

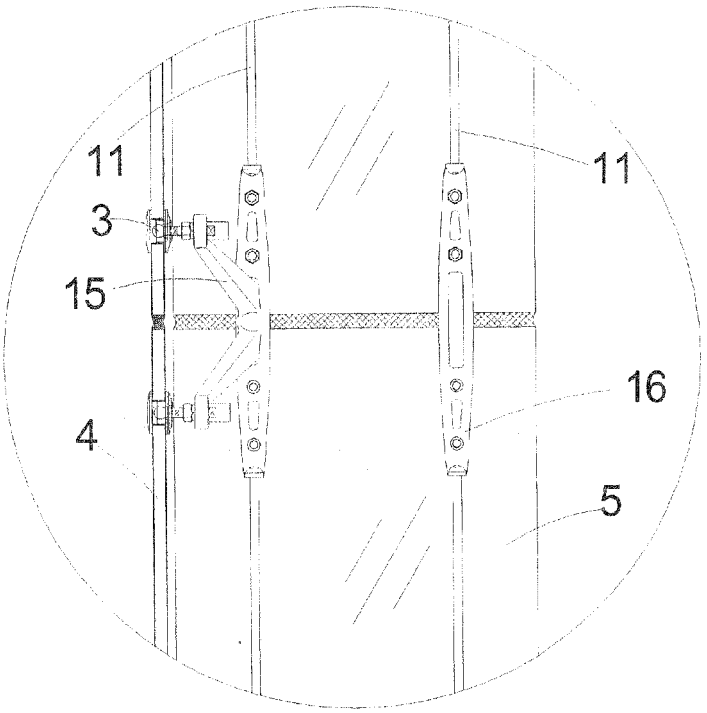

FIG. 4B

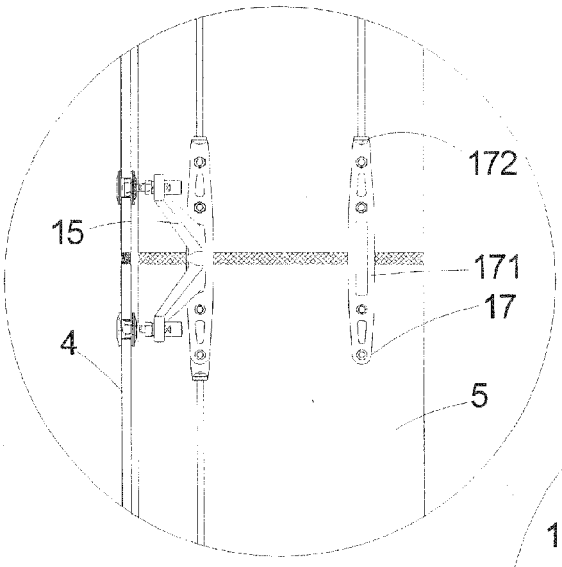

FIG. 4C

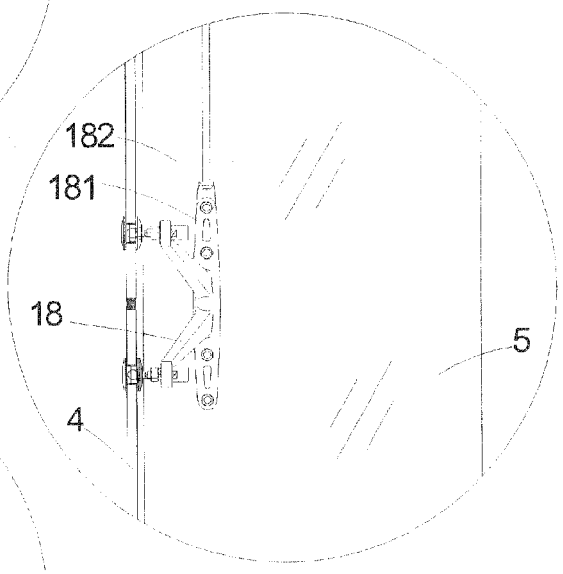

FIG. 4D

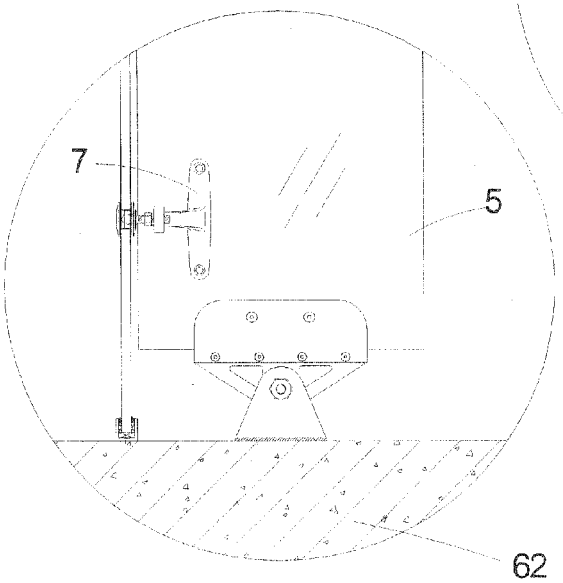

FIG. 4E

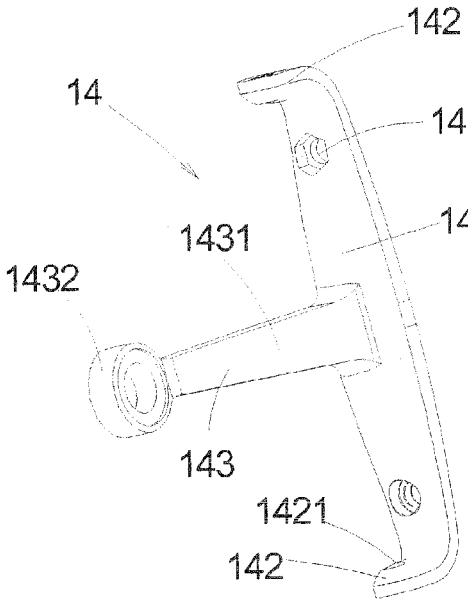

FIG. 5

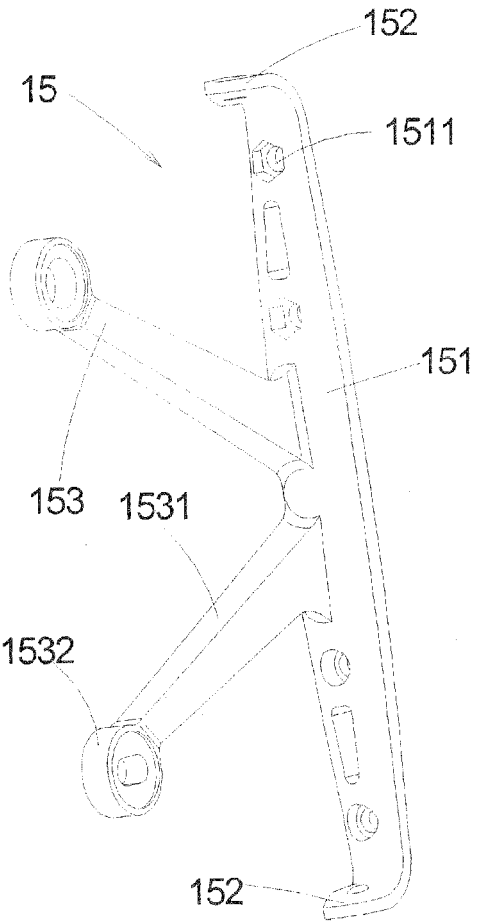

FIG. 6

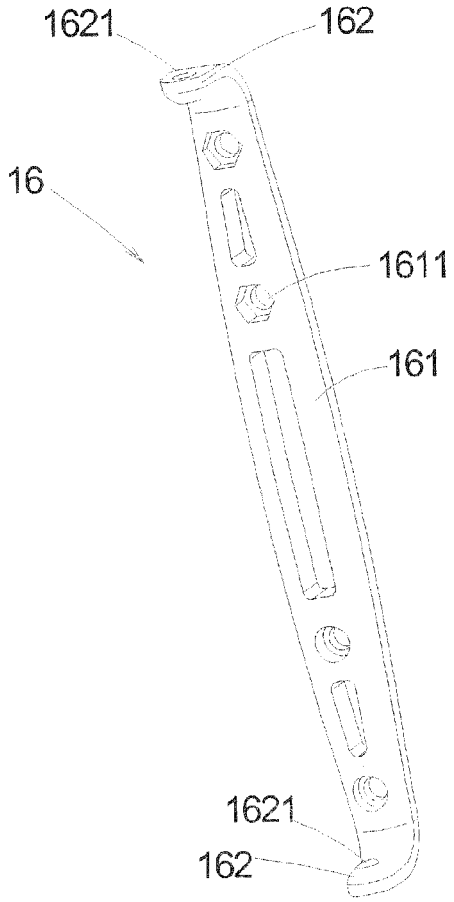

FIG. 7

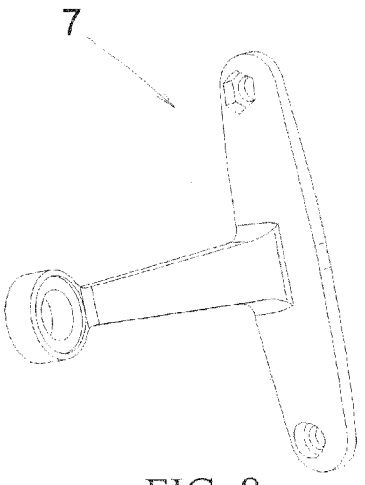

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 5196

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 Y	JP 10 231571 A (ASAHI GLASS CO LTD) 2 September 1998 (1998-09-02) * abstract *	1-6,8 7,9,10	INV. E04B2/88
Y A	JP 2000 017763 A (YKK ARCHITECTURAL) 18 January 2000 (2000-01-18) * abstract; figures *	7,9 1,2,4,6,8	
Y A	DE 298 07 619 U1 (BASTIAN VOLKER [DE]; LINDNER ANTON [DE]) 13 August 1998 (1998-08-13) * page 2, paragraph 5 * * page 4, paragraph 4 - page 6, last paragraph * * page 7, paragraph 4 - page 8, paragraph 1; figure 3 *	10 1	
X	FR 2 674 884 A1 (CIAC [FR]; EUROFACADE [FR]) 9 October 1992 (1992-10-09) * the whole document *	1-4,8	
X	JP 2000 080740 A (CENTRAL GLASS CO LTD) 21 March 2000 (2000-03-21) * abstract; figures *	1-5,7	TECHNICAL FIELDS SEARCHED (IPC) E04B E06B
X A	EP 0 595 317 A1 (CENTRAL GLASS CO LTD [JP]; OCTATUBE SPACE STRUCTURES BV [NL]) 4 May 1994 (1994-05-04)	1,2 3,10	
P,X P,A	WO 2007/006363 A (DORMA GMBH & CO KG [DE]; SCHULTE DIRK [DE]) 18 January 2007 (2007-01-18) * the whole document *	1,2 3	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 June 2007	Fordham, Alan

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 10 5196

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.

25-06-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 10231571 A	02-09-1998	JP 3835632 B2	18-10-2006
JP 2000017763 A	18-01-2000	JP 3453520 B2	06-10-2003
DE 29807619 U1	13-08-1998	NONE	
FR 2674884 A1	09-10-1992	NONE	
JP 2000080740 A	21-03-2000	JP 3415774 B2	09-06-2003
EP 0595317 A1	04-05-1994	DE 69313773 D1	16-10-1997
		DE 69313773 T2	22-01-1998
		JP 2702050 B2	21-01-1998
		JP 6193171 A	12-07-1994
		US 5425208 A	20-06-1995
WO 2007006363 A	18-01-2007	DE 102005032169 A1	18-01-2007

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82