(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 December 2009 (23.12.2009)

PCT

(10) International Publication Number
WO 2009/153273 A1

(51) International Patent Classification:
E04B 1/58 (2006.01) *A47B 47/00* (2006.01)
E04B 2/76 (2006.01) *A47B 47/02* (2006.01)
F16B 12/40 (2006.01) *A47F 5/00* (2006.01)
F16B 7/18 (2006.01)

(21) International Application Number:
PCT/EP2009/057501

(22) International Filing Date:
17 June 2009 (17.06.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
BZ2008A000025 18 June 2008 (18.06.2008) IT

(71) Applicant *(for all designated States except US)*: **KUNSTDÜNGER DI WALZL CHRISTIAN SNC** [IT/IT]; Industriezone Vetzan 112, I-39028 Schlanders (BZ) (IT).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **LINTER, Adalbert** [IT/IT]; Rosengartenstrasse 9b, I-39022 Algund (IT).

(74) Agent: **HANSMANN & VOGESER**; Albert-Roßhaupter-Str. 65, 81369 München (DE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,

[Continued on next page]

(54) Title: SYSTEM CONSISTING OF SECTIONS AND JUNCTION ELEMENTS FOR FORMING LOAD-BEARING STRUCTURES

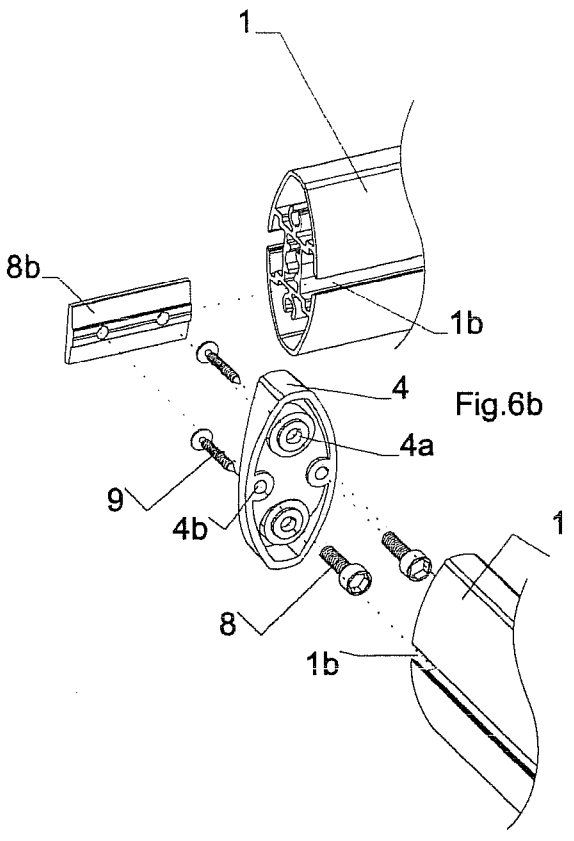

Fig.6b

(57) Abstract: A system consisting of sections, junction elements and connector elements for forming load-bearing structures is described, the sections having at least one outwardly open longitudinal groove for receiving known anchor elements and at least one inner longitudinal groove or channel for receiving screwed, press-fitted or hammered fasteners, such as screws, rivets, nails.

WO 2009/153273 A1

TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

KUNST DÜNGER DI WALZL CHRISTIAN SNC

System consisting of sections and junction elements for forming load-bearing structures

Load-bearing structures are known, particularly for making display assemblies and booths, structures and shelves for stores or warehouses or partition structures, such as in offices or residential buildings, or movable wheeled assemblies. These structures may be assembled to a fixed configuration and be easily assembled, dismantled and reassembled from their individual parts and adapted to be equipped with furniture, partition elements, storage and display hardware, devices such as feet and bases, possibly of adjustable type, equipment for wall- or ceiling-mounted installation, coupling, fixation of panels or plates and the like.

These prior art systems generally use extruded aluminum sections, for instance of square, round or polygonal shape, having outer longitudinal grooves and an inner structure adapted to receive junction or fixation elements similar and functionally identical to furniture fittings used in the art for obtaining junctions at right angles or even at varying angles between the sections, and for providing support to structural elements such as panels, plates and devices for coupling, fixation, adjustment, compensation and the like.

Sections, elements and junction systems as mentioned above are disclosed, for instance, in DE 29821204, DE 29818474, DE 29912201, DE 202004011392; when these prior art systems use junction elements with screws or screwdriver- or wrench-driven coupling and

fixation elements, they require processing of at least one of the sections to be jointed to enlarge at least one of the outer grooves of the section to access the screw or the operating member of the junction device, the screw or operating member being usually oriented with its axis transverse to the longitudinal axis of the section and the groove of the section. Besides being unpleasant to the view, such enlargement of the outer longitudinal grooves require accuracy and precision during machining or assembly, possibly with the use of special equipment.

The invention has the object of providing a system for assembling structures as described above using multipurpose junction elements that do not require machining of the grooves of the sections to be jointed, and also allow the use of sections having no outer grooves, which grooves are replaced, in this case, by corresponding inner longitudinal channels, that are designed to be milled at the ends of the sections only or at the junction areas for access to the screws in the junction element or the fitted anchor elements.

In order to fulfill the above object, the invention suggests the use of sections obtained, for instance, by extrusion, which may have a variety of outer cross-sectional shapes, such as oval or drop shapes, said sections having an inner core formed of various open or closed longitudinal channels for receiving in a known manner well-known fasteners that are driven in by screwing, press-fitting or hammering such as screws, rivets, nails with or without plugs, and outer grooves like in prior art, for receiving longitudinally driven anchor screws, nuts, bushings, plates having at least one threaded hole, which are

designed to be displaced along said grooves, and held therein against axial removal and, in the case of nuts and elements with a threaded hole, locked against rotation. According to a further development of the inventive concept, these open grooves may be wholly or partially replaced by closed channels in a corresponding internal position within the outer wall of the section, and in this case the outer wall is milled or punched, level with these channels, near the ends of the sections and/or in the positions in which screws, nuts, bushings, plates or other fastening, anchor or junction elements are required to be driven in, to obtain in that position an open groove that acts as a housing for the fastening, anchor or junction elements, and for a wrench or a screwdriver to access said elements which are oriented, in the case of screws, nails or rivets, with their axis coaxial with said groove or channel and, in the case of anchor nuts, bushings or plates, with the threaded holes oriented with their axis transverse to the longitudinal extension of the groove or channel.

According to the invention, the screws designed to be tightened within the grooves or the inner longitudinal channels of the sections may be self-tapping screws or, if holes have been previously tapped, screws having, for instance, a metric thread.

As a junction element, the invention suggests the use of a simple plate having holes formed therein, which plate may have either two parallel flat surfaces or one flat surface and one opposite surface that is designed to laterally lie on a non-flat, e.g. convex surface, of a section, of corner elements. The junction plate may be also equipped with tabs projecting out of

the outline of the corresponding section, the tabs having holes therein, allowing them to be fastened by screws, e.g. self-tapping screws. According to the invention, the junction elements may also have a wall adapted to retain the end of the corresponding section, thereby peripherally covering the end portion of the section, or projections adapted to be fitted by their front sides into the inner cavities of the section, for secure fixation, possibly using a single fastening screw, e.g. at the center. These junction elements essentially have one central hole and possibly two holes preferably disposed on the same axis of symmetry and/or also on a second axis of symmetry of the plate, and holes formed in an area proximate to the periphery for the passage of screws that are driven in through the grooves of the section or the milled portions at the inner channels of the section.

The junction system is essentially based on the arrangement that the junction element is fastened to the end of one of the sections first by fasteners such as screws, rivets, nails with or without plugs, with the shanks passing through the holes at the center and immediately afterwards by other fasteners, such as screws, rivets or nails with the shanks passing through the holes at the periphery of the junction element and longitudinally introduced into the open grooves, or the closed or open channels formed by milling or punching at the requested areas of the first section and tightened into threaded holes formed in a corresponding position, such as a connector element, a nut, a bushing or a stud within a groove of the second section, oriented for instance at 90° to the former, or, if self-tapping screws are used, into specially formed

holes. According to the invention, the connector elements may be of various types, e.g. of angular type, at right angle or with different angles, for T, V, Y or X junctions: these connector elements may have threaded or unthreaded holes or bushings or plugs possibly of different materials that are held within respective seats to act as anchor elements. If the junction element is secured, for instance, by a single central self-tapping screw, it will be convenient to use junction elements with outer walls enclosing the outer surface of the end of the corresponding section or with projections designed to be fitted by their front sides into the cavities at the end of the section. In order to secure the ends of the system sections to sections of different types, various structural elements, a wall or a ceiling, the invention suggests of equipping the junction elements with perforated tabs projecting out of the outline of the section against which they are fixed, for fixation to occur by screws passing through the holes of these tabs.

With the system of the invention a variety of junctions may be obtained using simple, easily manufactured and low cost elements, without requiring any machining of the grooves on the sections, or using sections with no outer grooves, in which case machining is required at the junction points only.

The invention will be described in greater detail with reference to certain embodiments of sections and junction elements of the invention, adapted to form load-bearing structures, which are diagrammatically shown in the accompanying drawings for illustration purposes and without limitation.

Fig. 1 is a perspective view of one end of an oval

section of the invention, having two open outer longitudinal grooves and three inner grooves for receiving self-tapping screws.

Fig. 2 is a perspective view of one end of a drop-shaped section of the invention, having two open outer longitudinal grooves and three inner grooves for receiving self-tapping screws.

Fig. 3 is a perspective view of one end of a square section of the invention, having four open outer longitudinal grooves, one inner groove and four corner channels for receiving self-tapping screws.

Fig. 4 is a perspective view of two ends of sections joined together by an angular junction element of the invention.

Fig. 4a is an exploded view of the junction as shown in Fig. 4.

Fig. 5 is a perspective view of two ends of sections joined together in aligned positions by two junction plate elements of the invention.

Fig. 5a is an exploded view of the junction as shown in Fig. 5.

Fig. 6 is a perspective view of two sections joined together into a T configuration using a specially shaped junction element of the invention.

Fig. 6a is an exploded view of the junction as shown in Fig. 6.

Fig. 6b is a further exploded view of the junction as shown in Figs. 6, 6a, which clearly shows the anchor plate 8b.

Fig. 7 is a perspective view of two sections of different shapes joined together into a T configuration using a junction element of the invention.

Fig. 7a is an exploded view of the junction as

shown in Fig. 7.

Fig. 8 is a perspective view of a junction element of the invention having a simple perforated plate, to be with oval sections.

Fig. 9 is a perspective view of a junction element of the invention having a specially shaped plate, to be laid at the end and at the side of respective oval sections.

Fig. 10 is a perspective view of a junction plate element of the invention, with projecting perforated tabs, for use at the end of oval sections and at the flat surface of sections or other structural elements having a flat surface.

Fig. 11 is a perspective view of a junction element of the invention consisting of a plate having a wall that encircles the outer surface of the end of a corresponding oval section.

Fig. 12 is a perspective view of a junction element of the invention consisting of a plate with one side equipped with projections designed to be fitted by their front sides into the corresponding oval section.

The system for forming load-bearing structures according to the invention includes sections 1 and junction elements 3, 4, 5, 6, 7. The sections 1 may be of various shapes and essentially have an inner area consisting of at least one longitudinal groove or channel 1d for receiving screwed, press-fitted or hammered fasteners, such as screws rivets or nails with or without plugs, and an inner area away from the center, with one or more longitudinal grooves or channels 1e for receiving any additional fasteners, such as self-tapping screws 9. The sections 1 have at least one open 1a outer groove 1b of known type, for

receiving captive anchor elements such as nuts, bushings 8a, plates 8b or elements having at least one threaded hole, which are retained by the geometry of the groove against any rotation but are capable of displacement in the longitudinal direction thereof. According to the invention, all or some of said open grooves 1b may be replaced by longitudinal channels with no longitudinal opening 1a, whose outer wall is milled or punched only at the ends of the sections and in the areas designed for junction, for longitudinal insertion of externally driven screws 8, or nuts, bushings 8a, plates 8b or anchor elements having at least one threaded hole. The open 1a grooves 1b, or channels, which have been milled or punched at appropriate areas for access thereto from the outside, may be utilized as is known for receiving a variety of known elements and fittings, so that the structure composed of sections 1 may be equipped with various elements, such as hooks, supports, panels, elements for coupling or fastening, for instance brackets and/or supports, etc. The longitudinal inner grooves or channels 1d, 1e may be in turn used, as is known, for fixation of feet, bases, height-adjustable elements, bearing elements, wheels or the like.

The junction elements 3, 4, 5, 6, 7, in combination with an angular connector 2, provide a corner junction (see Fig. 4) of two sections 1, a junction of two sections with their longitudinal axes aligned (see Fig. 5), a junction of two sections 1 into a T configuration (see Fig. 6) or a junction of a section 1 of the invention and a section 10 of different type, and having at least one flat outer surface (see Fig. 7) or any other structural element

having at least one flat surface.

The base junction element 3 is a plate with opposite flat surfaces whose outer peripheral shape corresponds to the outer shape of the sections 1 to be jointed, and has at least one hole 3a, 3c for self-tapping screws 9 that are designed to be tightened within the inner grooves or channels 1d, 1e of the sections. The screws 9 that pass through these holes 3a, 3c shall be tightened in a first assembly step to fix the junction element to the end of the section 1, said screws 9 being no longer accessible thereafter.

In corner junctions, using for instance a 90° angular connector 2 (see Fig. 4) or a connector forming a different angle, a T, Y or arc-shaped connector; in a later assembly step, screws 8 are driven in, and are held within the grooves 1b of the section 1, pass through the holes 3b of the junction elements 3 and are tightened into threaded holes 2a or in anchor elements laid or attached onto the corner connector element 2; the screws 8 are tightened through the opening 1a of the groove 1b on the section, and does not require said groove to be enlarged or otherwise machined. In junctions of two longitudinally aligned sections 1 (see Figs. 5, 5a), two junction elements 3 are used, which are laid, during a first assembly step, onto the two ends of the sections 1 to be jointed; at a later step, the screws 8 are driven into the longitudinal grooves 1b of a section 1, whereas the bushings 8a or other anchor elements having a threaded hole are inserted into the corresponding grooves of the second section 1. The screws 8 pass through the holes 3b of the two mated junction elements 3 and are tightened through the longitudinal opening 1a of the grooves 1b into the

bushings 8a whose outer shape prevents them from rotating within the grooves 1b.

The junction element 4 may be laid by its front side onto a section 1 (see Figs. 6, 6a) and be secured by self-tapping screws 9 passing through the holes 4a, and tightened into the inner channels 1e of the section 1 whereas it may be attached on the opposite side to the side of an identical section 1 by screws 8 held in the grooves 1b of the first section 1, passing through the holes 4b and tightened into nuts, bushings, plates 8b of anchor elements having a threaded holes and held within the groove 1b of the second section 1.

The junction element 4 of the invention has a shape on one of its sides that corresponds to the shape, e.g. convex or inclined, of the corresponding contact surface of the second section.

The junction element 5 has the same features as the junction element 3 and preferably has two tabs 5b projecting out of the outline of the section 1. These tabs 5d have through holes 5e formed therein, through which screws 9a may be tightened into sections 11, structural elements, walls, ceilings or other elements having at least one flat bearing surface. This junction element 5 is attached by its front to the section 1 by screws 9 passing through the holes 5a, 5c and tightened as described into the longitudinal channels 1d, 1e on the section 1.

The junction elements 6 and 7 have the same features as the junction element 3 except that they include either an enclosing wall 6p for retaining the end of the attached section 1, or tabs 7t projecting by their fronts into the free cavities of the attached section 1. The junction elements 6, 7 are suitable, for

instance, for ensuring fixation by a single central screw 9 passing through the hole 6c, 7c, for instance to the ends that form the feet or the ceiling mounts of bearing structures.

CLAIMS

1. A system consisting of sections, junction elements and connector elements for forming load-bearing structures, the sections having at least one outwardly open longitudinal groove for receiving known anchor elements and at least one inner longitudinal groove or channel for receiving screwed, press-fitted or hammered fasteners, such as screws, rivets, nails, characterized in that said outwardly open (1a) longitudinal grooves (1b) are adapted to receive screws (8) and nuts, bushings (8a), plates (8b) or known anchor elements having at least one threaded hole, the shanks of the fasteners (8) being oriented with their axis parallel to the axis of said groove (1b), whereas the axes of the threaded holes of the anchor elements are oriented transverse to the longitudinal axis of the grooves (1b), that the screws (8) can be driven through the opening (1a) of said groove (1b) without requiring said opening (1b) to be enlarged, and that the junction between the sections (1), or between the sections and the angular, arched, T-, Y- or X-shaped connector elements (2), or different structural elements such as sections, panels, plates, etc. having a flat or specially shaped surface, e.g. a convex, angled, inclined surface, is obtained using at least one interposed junction element (3, 4, 5, 6, 7).

2. A system for forming load-bearing structures as claimed in claim 1, characterized in that the junction elements (3, 4, 5, 6, 7) have an outline that corresponds to the outline of the sections (1) to be jointed and have at least one through hole (3a, 3b; 4a, 4b; 5a, 5b; 6a, 6b; 7a, 7b) at their center, corresponding to the position of the longitudinal

grooves or channels (1d, 1e) within the section (1) for receiving the tightened screws (9) that are used to fix the junction element by its front to the end of the section (1) and that such junction elements (3, 4, 5, 6, 7) have through holes (3b, 4b, 5b, 6b, 7b) at their periphery, corresponding to the position of the longitudinal grooves (1b) on the sections (1) to be jointed.

3. A system for forming load-bearing structures as claimed in claims 1 and 2, characterized in that the outwardly open (1a) grooves (1b) are wholly or partially replaced by closed channels, whose outer walls are partially removed at the ends of the sections and in the intermediate connection areas, to form open portions in said areas, with undercuts acting like the outwardly open (1a) grooves (1b) for receiving fasteners (7) and anchor elements (8a, 8b).

4. A system for forming load-bearing structures as claimed in claims 1, 2 and 3, characterized in that the junction element (5) has at least two tabs (5d) projecting out of its peripheral outline and that said tabs have through holes (5e) formed therein.

5. A system for forming load-bearing structures as claimed in claims 1, 2 and 3, characterized in that the junction element (6) has a laterally projecting wall (6p) for retaining the end of the section (1) to be jointed or fitted with a foot, a wheel a bearing surface or another known element fitted thereon by its front.

6. A system for forming load-bearing structures as claimed in claims 1, 2 and 3, characterized in that the junction element (6) has projecting tabs (7t) designed to fit by their fronts into the free cavities

of the section (1).

7. A system for forming load-bearing structures as claimed in claims 1, 2 and 3, characterized in that the angular or arched connector elements (2) have threaded holes (2a) or holes for receiving self-tapping screws (13) at the position of the longitudinal grooves (1b) or the longitudinal channels of the sections (1) to be attached.

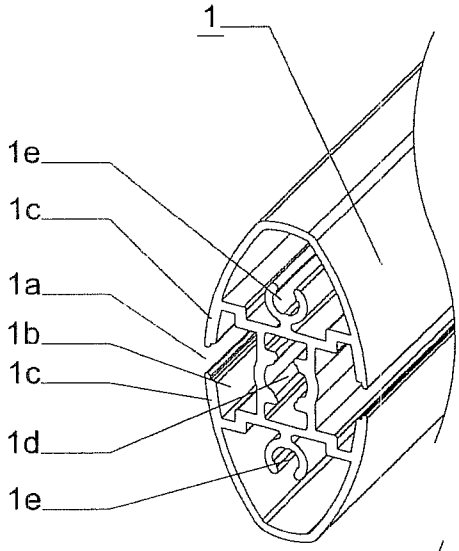

Fig.1

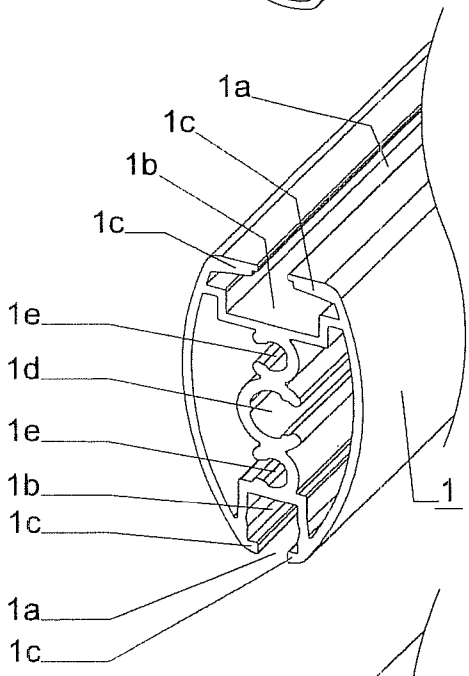

Fig.2

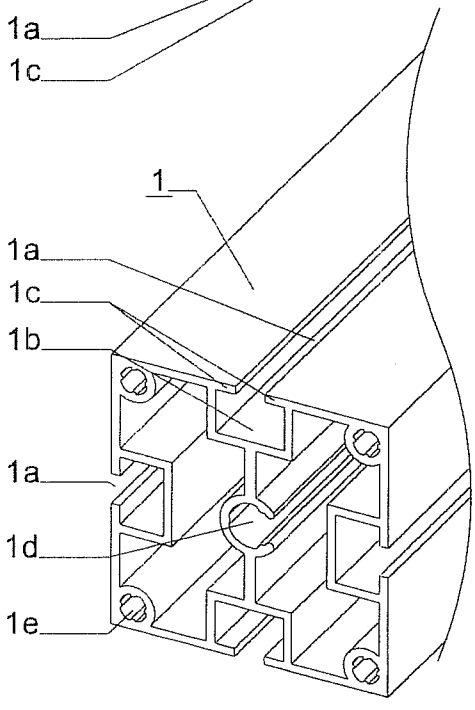

Fig.3

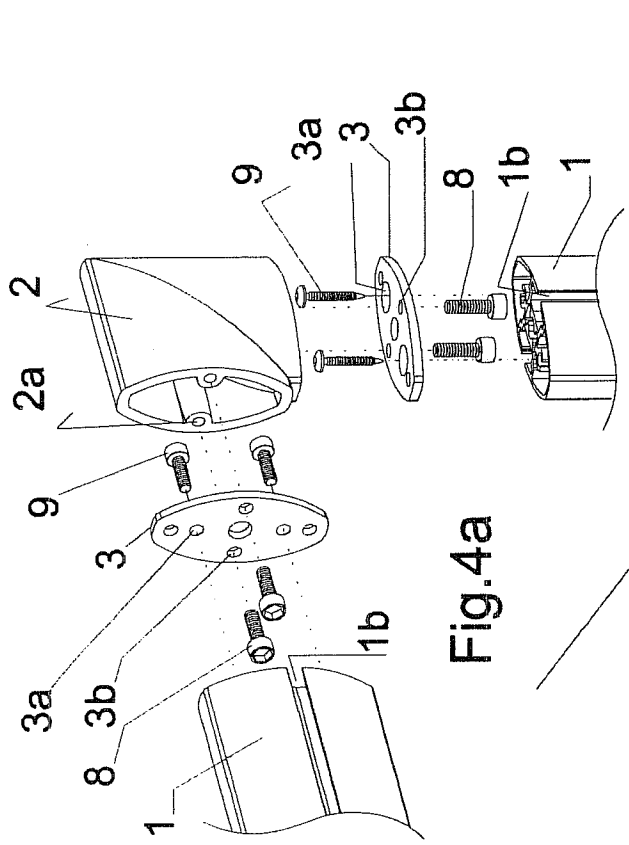

Fig.4a

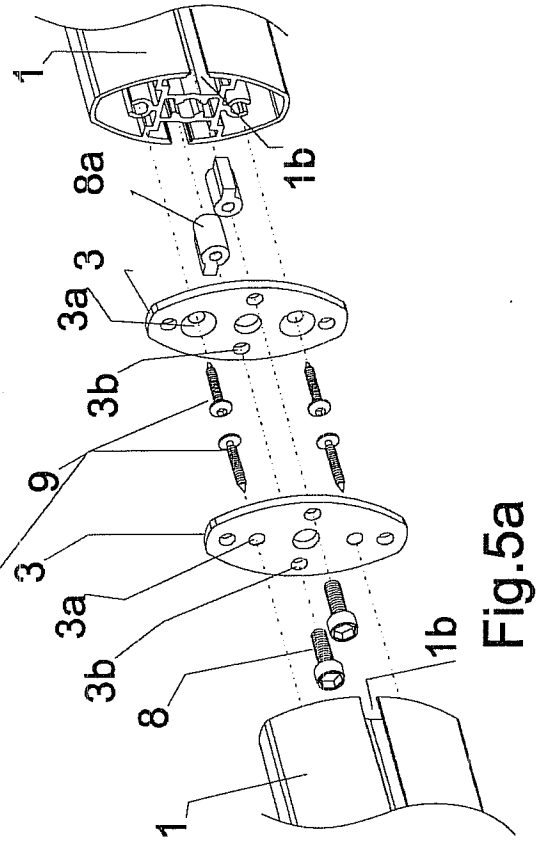

Fig.5a

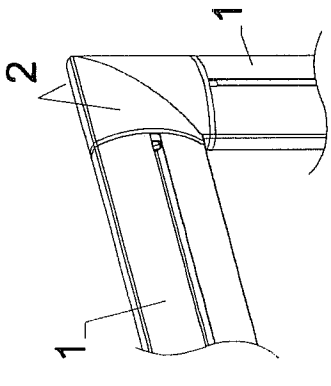

Fig.4

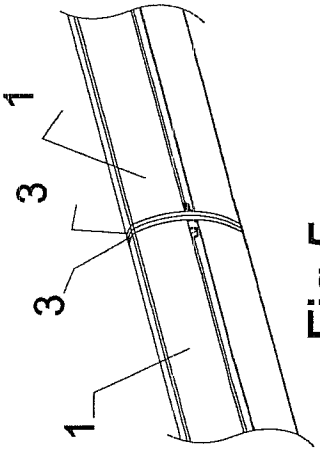

Fig.5

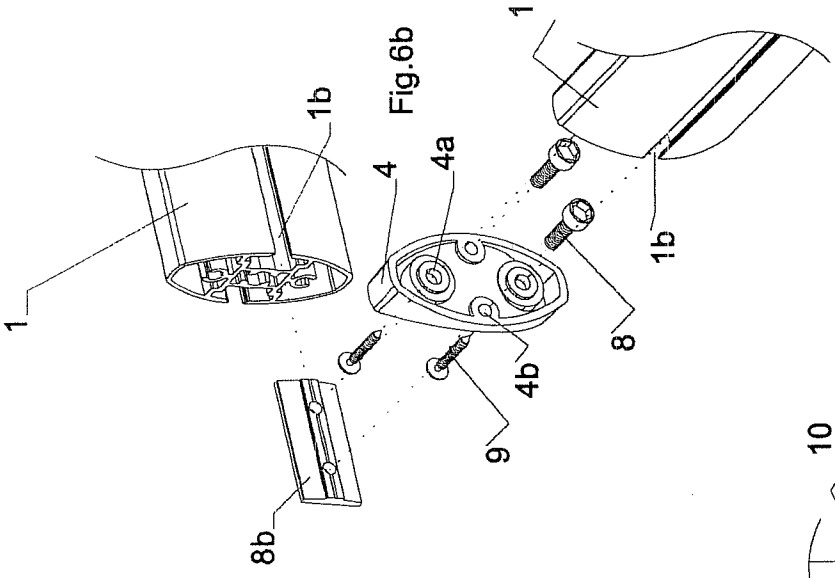

Fig.6b

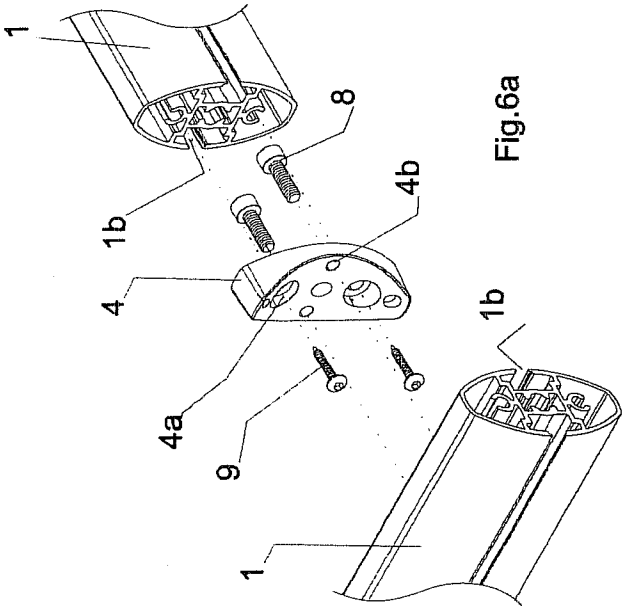

Fig.6a

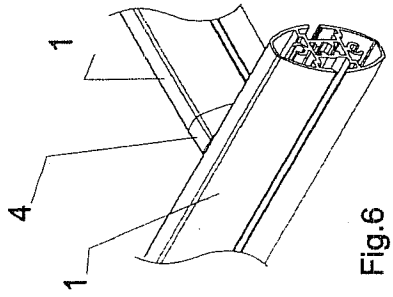

Fig.6

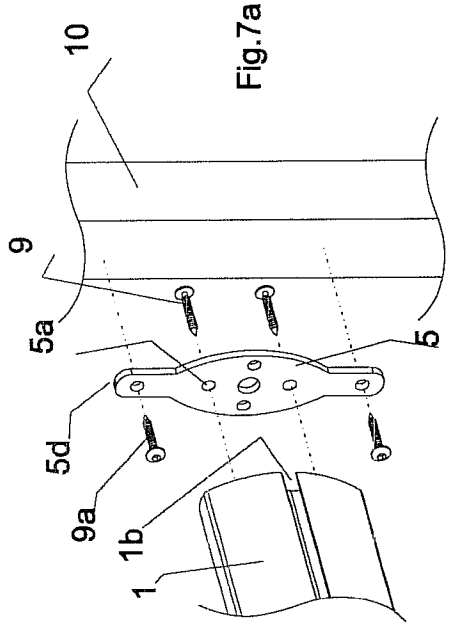

Fig.7a

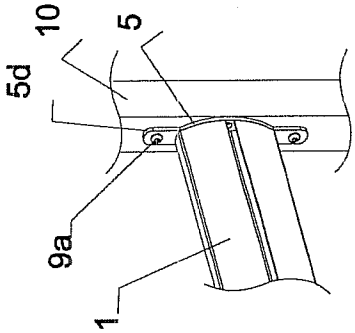

Fig.7

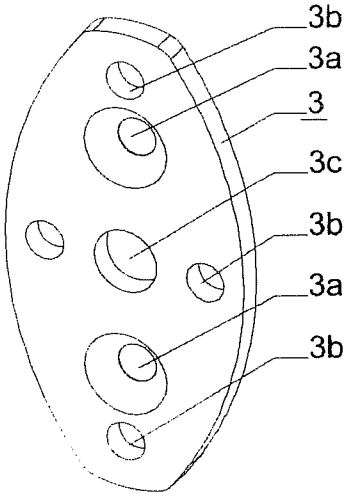

Fig.8

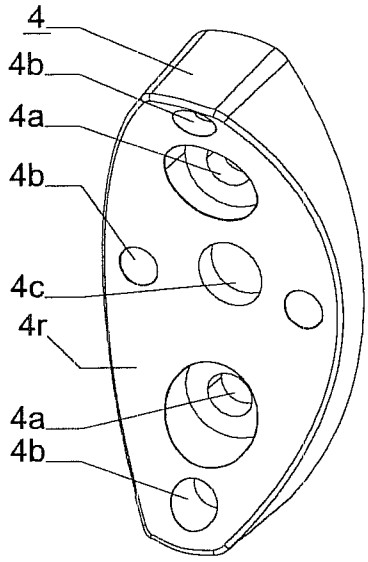

Fig.9

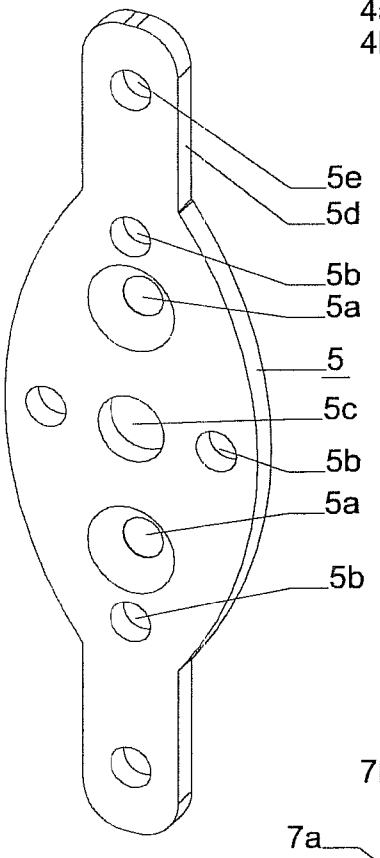

Fig.10

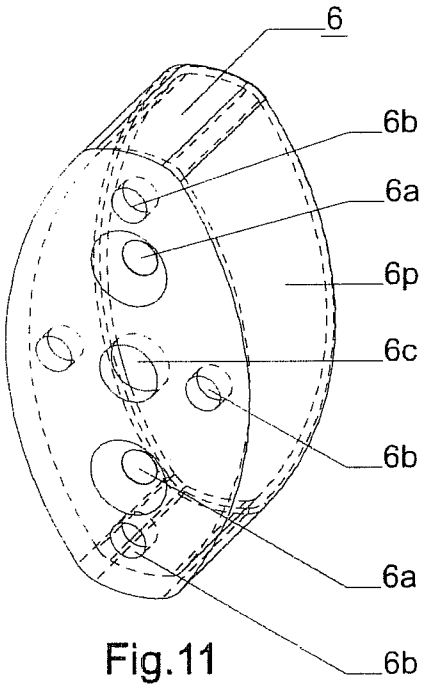

Fig.11

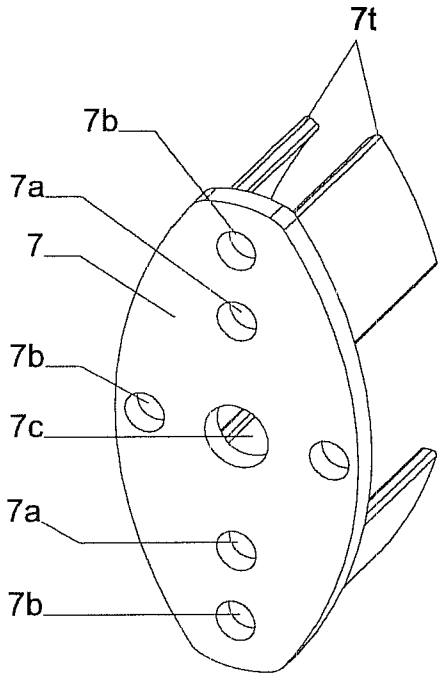

Fig.12

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/057501

A. CLASSIFICATION OF SUBJECT MATTER
INV. E04B1/58 E04B2/76 F16B12/40 F16B7/18 A47B47/00
A47B47/02 A47F5/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E04B F16B A47F A47B E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 86 04 195 U1 (RK, ROSE + KRIEGER GMBH & CO KG INDUSTRIELLE ROHRSPANNSYSTEME, 4950 MI) 28 May 1986 (1986-05-28) figures 1,2 claims 1,2,6,8 page 1, lines 14-24 page 2, lines 1-13 page 5, lines 25-31 page 6, lines 1-3,12-18	1-7
X	US 6 712 543 B1 (SCHMALZHOFER RAINER [DE]) 30 March 2004 (2004-03-30) figures 1-13 claims 1,3 column 4, line 6 - column 5, line 9	1-7

-/--

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

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 October 2009	05/11/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Schnedler, Marlon

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/057501

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 86 22 738 U1 (ROBERT BOSCH GMBH, 7000 STUTTGART, DE) 23 December 1987 (1987-12-23) figures 1,2 page 3, paragraph 3 - page 4, paragraph 2 page 4, paragraph 4 - page 5, paragraph 1	1,7
A	EP 1 710 452 A (RIXEN WOLFGANG DIPL-ING [DE]; PIES GERRIT [DE]) 11 October 2006 (2006-10-11) the whole document	1,3
A	EP 0 802 334 A (SMC KK [JP]) 22 October 1997 (1997-10-22) column 8, line 18 - column 9, line 3; figures 8-11	1,5,6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2009/057501

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 8604195 U1	28-05-1986	NONE	
US 6712543 B1	30-03-2004	NONE	
DE 8622738 U1	23-12-1987	NONE	
EP 1710452 A	11-10-2006	AT 398243 T	15-07-2008
		DE 202005005687 U1	07-09-2006
EP 0802334 A	22-10-1997	AU 693059 B2	18-06-1998
		AU 3833497 A	11-12-1997
		AU 693060 B2	18-06-1998
		AU 3919897 A	18-12-1997
		AU 679244 B2	26-06-1997
		AU 7084094 A	06-02-1995
		DE 69430544 D1	06-06-2002
		DE 69430544 T2	05-12-2002
		WO 9502128 A1	19-01-1995