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

(11) EP 1 826 348 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.08.2007 Bulletin 2007/35

(51) Int Cl.:
E05D 15/26 *(2006.01)* ***E06B 3/46*** *(2006.01)*

(21) Application number: **06425121.8**

(22) Date of filing: **27.02.2006**

(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 NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **GM Morando S.r.l.**
20031 Cesano Maderno MI (IT)

(72) Inventor: **Morando, Graziano**
20031 Cesano Maderno MI (IT)

(74) Representative: **Pizzoli, Antonio et al**
Società Italiana Brevetti S.p.A,
Via Carducci 8
20123 Milano MI (IT)

(54) Angular foldable partition wall

(57) Partition wall comprising one or more series of panels (1, 2) hinged two by two by means of pairs of first upper and lower hinges, which first hinges are alternated with pairs of second upper and lower hinges, wherein the first upper hinges are pivoted under carriages (3) which can run in two upper rails (4, 5) forming an angle (a) and the first lower hinges are provided with cursors (6) which can run in two lower guides (7, 8) forming substantially the same angle (a), the second upper and lower hinges being not restrained to the upper rails (4, 5) or to the lower guides (7, 8), so that the panels (1, 2) can be folded in a bellows-like manner, wherein the upper rails (4, 5) are connected to each other by an upper connection (9) suitable for deviating the carriages (3) from an upper rail to the other, and in that the lower guides (7, 8) are connected to each other by a lower connection (10) suitable for deviating the cursors (6) from a lower guide to the other, so that the panels (1, 2) can be folded together in an upper rail (4).

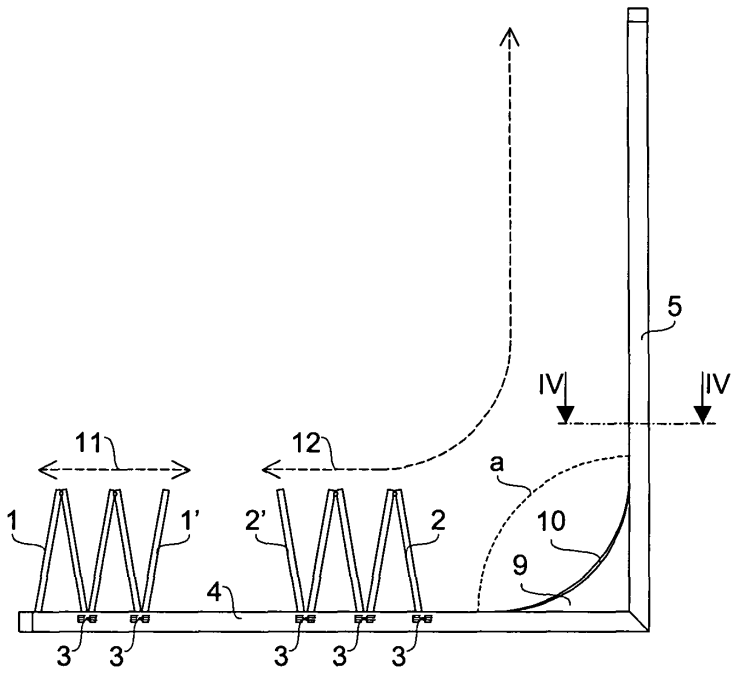

Fig.1

EP 1 826 348 A1

Description

[0001] The present invention relates to an angular foldable partition wall, and in particular to an indoor or outdoor partition wall which can be folded in a bellows-like manner and is provided with two series of foldable vertical panels forming a corner when the partition wall is closed.

[0002] Italian patent 1312771 discloses a partition wall comprising a plurality of panels hinged two by two by means of pairs of upper and lower hinges, some of which provided with carriages or cursors for sliding in rails or guides, so that the panels can be folded in a bellows-like manner on one side of the wall. Two partition walls of this kind can be arranged perpendicularly for closing the corner of a room, however the panels of either wall can be folded only at the ends of the respective rails and guides and not all together on one side, since the rails are formed by aluminum section bars which cannot be easily bent for obtaining curves which deviate the direction of the carriages in correspondence with said corner without locking problems of the carriages in the section bars.

[0003] It is therefore an object of the present invention to provide an angular partition wall which is free from said disadvantage, i.e. a partition wall in which all panels can be folded on either side of the corner, even if rectilinear guides and rails are employed. Said object is achieved with a partition wall, the main features of which are disclosed in the first claim and other features are disclosed in the subsequent claims.

[0004] Thanks to the particular connections arranged between the rails and the guides, all panels of the angular partition wall according to the present invention can be folded together on one side of the same wall.

[0005] Furthermore, thanks to their particular structure, said connections can be easily adapted and fixed to the corner to be closed, without spoiling the aesthetics of the partition wall.

[0006] The panels, the rails, the guides and/or the carriages of the partition wall are provided with particular technical arrangements for allowing their handy, smooth and reliable use.

[0007] Further advantages and features of the partition wall according to the present invention will become clear to those skilled in the art from the following detailed and non-limiting description of an embodiment thereof with reference to the attached drawings, wherein:

- figure 1 shows a top view of the partition wall in a partially open position;
- figure 2 shows a front view of the partition wall of figure 1;
- figure 3 shows a side view of the partition wall of figure 1;
- figure 4 shows an enlarged view sectioned along plane IV-IV of figure 1;
- figure 5 shows an enlarged bottom view of the intersection of the upper rails of the partition wall of figure 1, with the upper connection;
- figure 6 shows an enlarged bottom view of the intersection of the upper rails of the partition wall of figure 1, without the upper connection;
- figure 7 shows an enlarged side view of a carriage of the partition wall of figure 1;
- figure 8 shows an enlarged bottom view of the carriage of figure 7; and
- figure 9 shows an enlarged top view of the lower connection of the partition wall of figure 1, in the closed position.

[0008] Referring from figures 1 to 3, it is seen that the partition wall according to the present invention comprises in a known way one or more series of panels 1, 2, which are hinged two by two by means of pairs of first upper and lower hinges, which first hinges are alternated with pairs of second upper and lower hinges, wherein the first upper hinges are pivoted under carriages 3 (shown with broken lines) which can run in two upper rails 4 and 5 forming an angle a, in particular equal to 90°, but which can also be acute or obtuse, in particular greater than 90°, and can be fixed for example to the ceiling of a room. The first lower hinges are provided with cursors 6 which can run in two lower guides 7 and 8 which form substantially the same angle a and can be fixed for example to the floor of said room under the upper rails 4, 5. The second upper and lower hinges are not restrained to the upper rails 4, 5 or to the lower guides 7, 8, so that panels 1, 2 can be folded in a bellows-like manner, for example toward the inside of said room. Panels 1, 2 generally comprise a central transparent portion, made up of a glass pane. The present embodiment comprises two separate series of panels 1, 2, wherein the two adjacent panels 1', 2' of either series are restrained only to a pair of upper and lower hinges, so that they can freely rotate around a vertical axis passing through these hinges.

[0009] According to the invention, the upper rails 4, 5 are suitably connected to each other by an upper connection 9 suitable for deviating carriages 3 from an upper rail to the other, so that panels 1, 2 can be folded together in an upper rail. Analogously, the lower guides 7, 8 are suitably connected to each other by a lower connection 10 suitable for deviating cursors 6 from a lower guide to the other. The movement of the two series of panels 1 and 2 is shown by arrows 11 and 12 of figure 1.

[0010] Figures 4 and 5 show the upper connection 9 which comprises a curved wall 9a fixed between the side walls of the upper rails 4, 5 which are turned inwards, i.e. on the sides of the rails which delimit angle a, wherein the two tangents to the ends of the curved wall 9a are parallel to the upper rail 4 and to the upper rail 5, respectively. The lower edge of the curved wall 9a is joined to a curved tongue 9b which follows the profile of the curved wall 9a and is turned toward the upper rails 4, 5, so that its ends are partially arranged under these rails. The upper connection 9 also comprises a lower plate 9c which is fixed under the intersection of the upper rails 4, 5 and is provided with an inner curved edge which follows the

profile of the curved wall 9a and/or of the curved tongue 9b. In particular, when the upper rails 4, 5 are perpendicular to each other, i.e. angle a is equal to 90°, the curved wall 9a has the shape of a quarter of cylinder, while the outer edge of the curved tongue 9b and the curved inner edge of the lower plate 9c have the shape of a quarter of a circle.

[0011] The upper rails 4, 5 are formed by section bars, generally made of aluminum, and comprise a longitudinal duct 13 in which carriages 3 (shown with broken lines in figure 4) can run. The longitudinal duct 13 is open downwards through a longitudinal slit 14 which is narrower than the longitudinal duct 13 and allows a shaft 15 (shown with broken lines in figure 4) to connect carriages 3 to the first upper hinges of panels 1, 2. The tangents to the two ends of the curved inner edge of the lower plate 9c and of the outer edge of the curved tongue 9b are aligned with the outer edge and the inner edge, respectively, of the longitudinal slits 14 of the upper rails 4, 5, so that the distance between the curved inner edge of the lower plate 9c and the outer edge of the curved tongue 9b is substantially equal to the width of the longitudinal slits 14. The outer side walls of the upper rails 4, 5 are preferably prolonged downwards and bent inwards so as to form seats 4a and 5a for housing the outer edges of the lower plate 9c. The upper connection 9 further comprises two vertical plates 9d and 9e which join the curved wall 9a to the upper rail 4 and to the upper rail 5, respectively.

[0012] Referring also to figure 6, it is seen that the upper rails 4, 5 are provided with lateral and lower openings 16 and 17 in correspondence with the ends of the curved wall 9a of the upper connection 9, so that carriages 3 can come out of the longitudinal ducts 13 of the upper rails 4, 5 through these openings and go into the upper connection 9, thereby following the trajectory of arrow 18. The lateral and lower openings 16 and 17 are obtained by removing a portion of the inner side wall and of the lower wall adjacent to the longitudinal slits 14 of the upper rails 4, 5.

[0013] Figures 7 and 8 show a carriage 3 which comprises a substantially parallelepiped-shaped central body 3a and a plurality of wheels 3b pivoted to the sides of the central body 3a for rotating around horizontal axes and running both on the edges of the longitudinal slits 14 and on the edges of the curved tongue 9b and of the lower plate 9c of the upper connection 9 (as it is clearly shown in figure 8). The central body 3a is provided with a vertical hole in which shaft 15 is inserted. The front and rear sides of carriage 3 are preferably provided with flexible fins 3c acting as bumpers for the adjacent carriages when panels 1 and 2 are folded. The lower portion of the central body 3a protrudes under wheels 3b and/or is provided with cursors 3d (shown with broken lines only in figure 8) which protrude under wheels 3b, so that said lower portion and/or said cursors 3d are arranged in the slit comprised between the edges of the curved tongue 9b and of the lower plate 9c of the upper connection 9 for guiding carriage 3 when it is in this connection. In particular, said cursors 3d can consist of rollers which are pivoted under the central body 3a of carriage 3 for rotating around vertical axes. The width of the central body 3a and/or of cursors 3d is narrower than the width of the longitudinal slits 14 of the upper rails 4, 5.

[0014] Referring also to figure 9, it is seen that the lower connection 10 comprises a curved section bar which has a U-shaped cross-section and is fixed to the floor between the near ends of the lower guides 7, 8. In particular, when the lower guides 7, 8 are perpendicular to each other, i.e. angle a is equal to 90°, the curved section bar has the shape of a quarter of a circle. The lower guides 7, 8 are also formed by section bars, generally made of aluminum, and comprise a longitudinal groove 19 in which cursors 6 can run.

[0015] The hermetic closure between the two adjacent panels 1', 2' of either series is obtained by means of a gasket 20, preferably transparent, in particular with a minuscule h-shaped cross-section, which is arranged astride the free vertical edge of the first adjacent panel, for example panel 1'. Gasket 20 has a shape suitable for the hermetic coupling with a shaped rod 21, also preferably transparent, which protrudes from one side of the free vertical edge of the second adjacent panel, for example panel 2'. The two adjacent panels 1', 2' are preferably provided with latches 22 suitable for penetrating into holes made in the floor.

[0016] Possible modifications and/or additions may be made by those skilled in the art to the hereinabove described and illustrated embodiment of the invention while remaining within the scope of the following claims.

Claims

1. Partition wall comprising one or more series of panels (1, 2) hinged two by two by means of pairs of first upper and lower hinges, which first hinges are alternated with pairs of second upper and lower hinges, wherein the first upper hinges are pivoted under carriages (3) which can run in two upper rails (4, 5) forming an angle (a) and the first lower hinges are provided with cursors (6) which can run in two lower guides (7, 8) forming substantially the same angle (a), the second upper and lower hinges being not restrained to the upper rails (4, 5) or to the lower guides (7, 8), so that the panels (1, 2) can be folded in a bellows-like manner, **characterized in that** the upper rails (4, 5) are connected to each other by an upper connection (9) suitable for deviating the carriages (3) from an upper rail to the other, and **in that** the lower guides (7, 8) are connected to each other by a lower connection (10) suitable for deviating the cursors (6) from a lower guide to the other, so that the panels (1, 2) can be folded together in an upper rail (4).

2. Partition wall according to the previous claim, **char-**

acterized in that said angle (a) is equal to or greater than 90°.

3. Partition wall according to one of the previous claims, **characterized in that** the upper rails (4, 5) comprise a longitudinal duct (13) in which the carriages (3) can run, wherein the longitudinal duct (13) is open downwards through a longitudinal slit (14) narrower than the longitudinal duct (13), and **in that** the lower guides (7, 8) comprise a longitudinal groove (19) in which the cursors (6) can run.

4. Partition wall according to one of the previous claims, **characterized in that** the upper connection (9) comprises a curved wall (9a) fixed between the side walls of the upper rails (4, 5) which are turned inwards, wherein the two tangents to the ends of the curved wall (9a) are parallel to the first upper rail (4) and to the second upper rail (5), respectively.

5. Partition wall according to the previous claim, **characterized in that** the lower edge of the curved wall (9a) is joined to a curved tongue (9b) which follows the profile of the curved wall (9a) and is turned toward the upper rails (4, 5), so that its ends are partially arranged under these rails (4, 5).

6. Partition wall according to claim 4 or 5, **characterized in that** the upper connection (9) comprises a lower plate (9c) which is fixed under the intersection of the upper rails (4, 5) and is provided with an inner curved edge which follows the profile of the curved wall (9a) and/or of the curved tongue (9b).

7. Partition wall according to the previous claim, **characterized in that** the two tangents to the ends of the curved inner edge of the lower plate (9c) and of the outer edge of the curved tongue (9b) are aligned with the outer edge and the inner edge, respectively, of the longitudinal slits (14) of the upper rails (4, 5), so that the distance between the curved inner edge of the lower plate (9c) and the outer edge of the curved tongue (9b) is substantially equal to the width of the longitudinal slits (14).

8. Partition wall according to claim 6 or 7, **characterized in that** the outer side walls of the upper rails (4, 5) are prolonged downwards and bent inwards so as to form seats (4a, 5a) for housing the outer edges of the lower plate (9c).

9. Partition wall according to one of claims 4 to 8, **characterized in that** the upper connection (9) comprises two vertical plates (9d, 9e) which join the curved wall (9a) to the first upper rail (4) and to the second upper rail (5), respectively.

10. Partition wall according to one of claims 4 to 9, **characterized in that** the upper rails (4, 5) are provided with lateral and lower openings (16, 17) in correspondence with the ends of the curved wall (9a) of the upper connection (9), so that the carriages (3) can come out of the longitudinal ducts (13) of the upper rails (4, 5) through these openings (16, 17) and go into the upper connection (9).

11. Partition wall according to the previous claim, **characterized in that** said lateral and lower openings (16, 17) are obtained by removing a portion of the inner side wall and of the lower wall adjacent to the longitudinal slits (14) of the upper rails (4, 5).

12. Partition wall according to one of the previous claims, **characterized in that** the carriages (3) comprise a substantially parallelepiped-shaped central body (3a) and a plurality of wheels (3b) pivoted to the sides of the central body (3a) for rotating around horizontal axes, wherein the lower portion of the central body (3a) protrudes under the wheels (3b) and/or is provided with cursors (3d) which protrude under the wheels (3b), so that said lower portion and/or said cursors (3d) guide the carriages (3) when they are in the upper connection (9).

13. Partition wall according to the previous claim, **characterized in that** said cursors (3d) consist of rollers which are pivoted under the central body (3a) of the carriages (3) for rotating around vertical axes.

14. Partition wall according to claim 12 or 13, **characterized in that** the width of the central body (3a) and/or of the cursors (3d) of the carriages (3) is narrower than the width of the longitudinal slits (14) of the upper rails (4, 5).

15. Partition wall according to one of the previous claims, **characterized in that** the lower connection (10) comprises a curved section bar which has a U-shaped cross-section and is fixed between the near ends of the lower guides (7, 8).

16. Partition wall according to one of the previous claims, **characterized in that** it comprises two separate series of panels (1, 2), wherein the two adjacent panels (1', 2') of either series are restrained only to a pair of upper and lower hinges, so that they can freely rotate around a vertical axis passing through these hinges.

17. Partition wall according to the previous claim, **characterized in that** the two adjacent panels (1', 2') are provided with latches (22).

18. Partition wall according to claim 16 or 17, **characterized in that** a gasket (20), preferably transparent, is arranged astride the free vertical edge of the first

adjacent panel (1') and has a shape suitable for the hermetic coupling with a shaped rod (21), also preferably transparent, which protrudes from one side of the free vertical edge of the second adjacent panel (2').

19. Partition wall according to the previous claim, **characterized in that** said gasket (20) has a minuscule h-shaped cross-section.

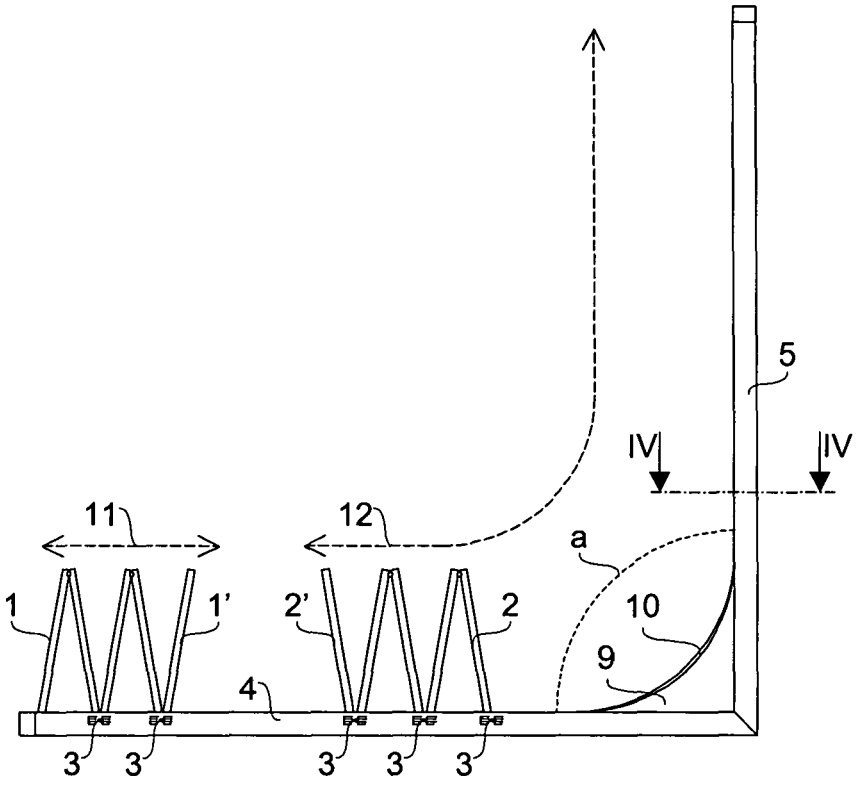

Fig.1

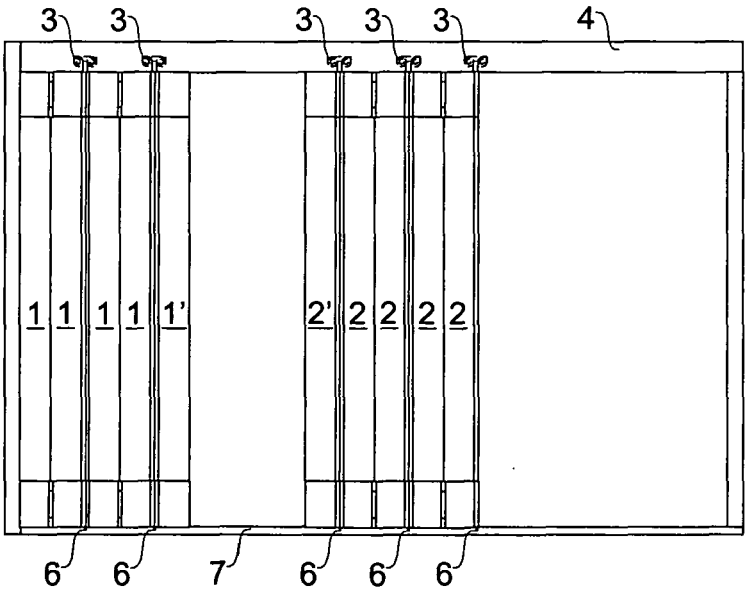

Fig.2

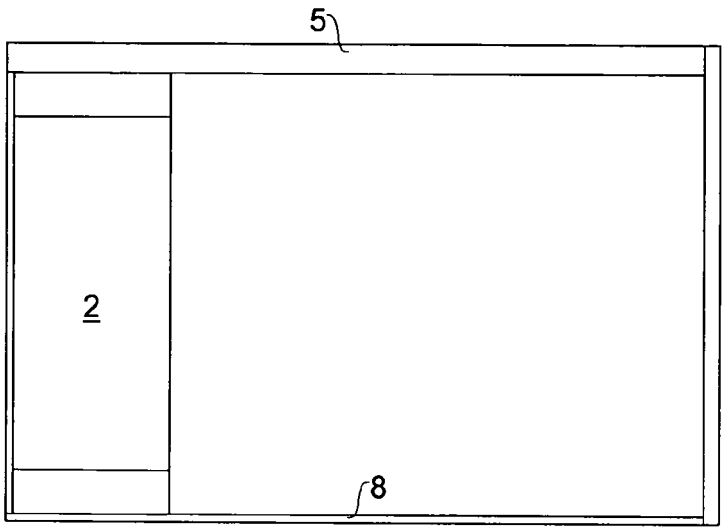

Fig.3

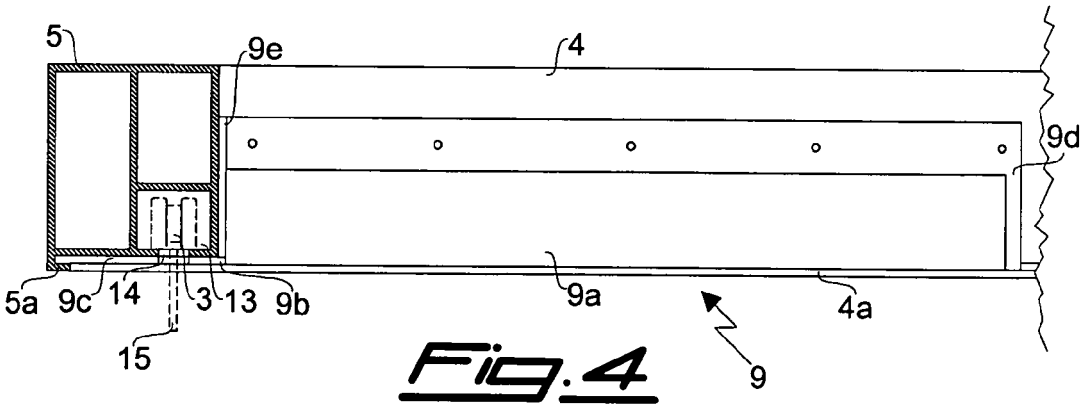

Fig.4

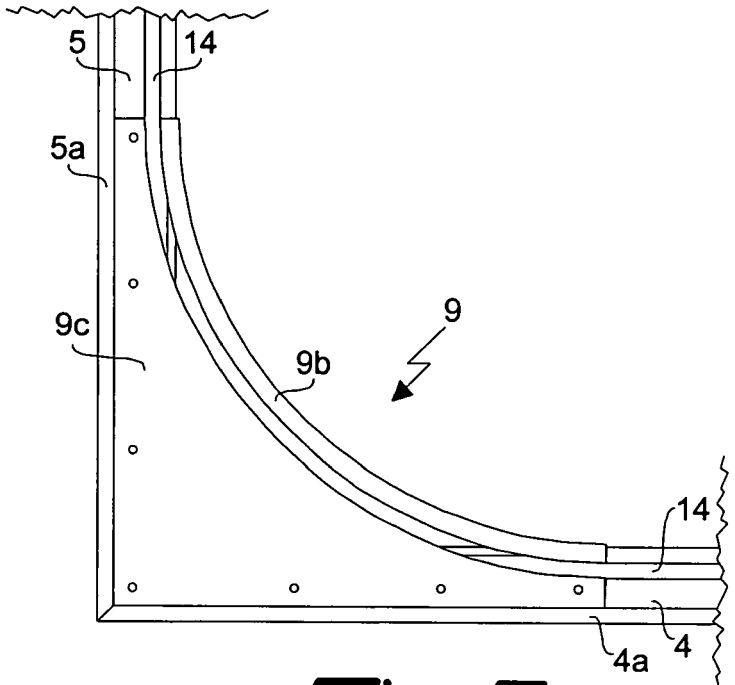

Fig.5

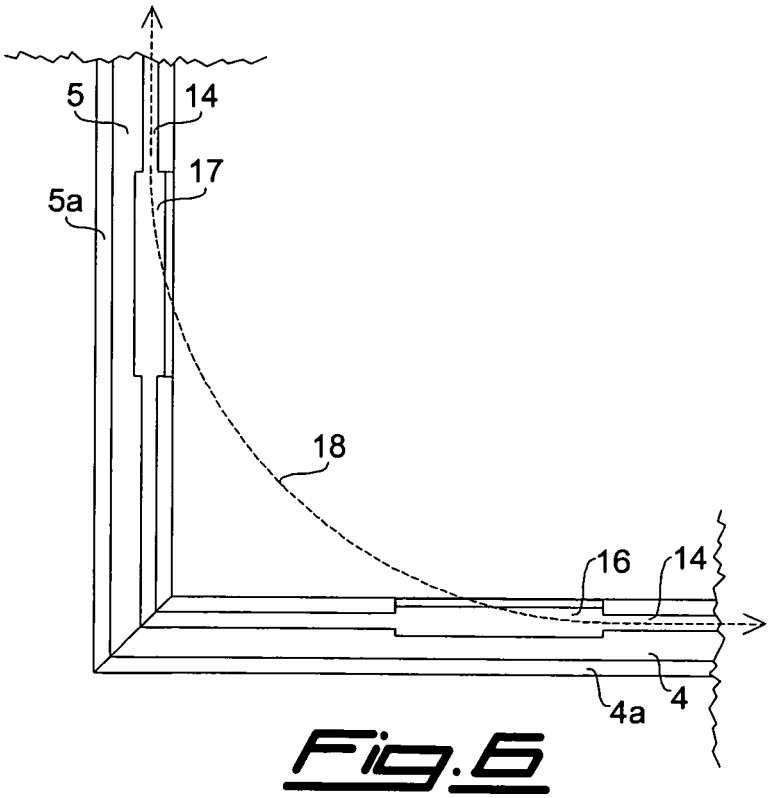

Fig.6

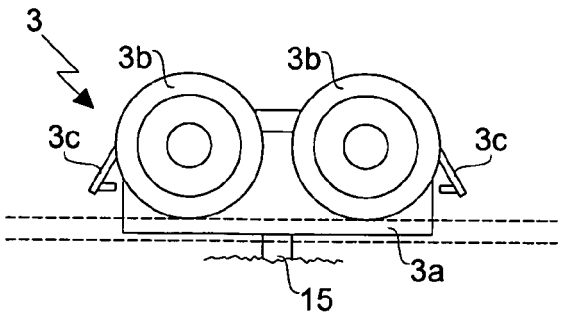

Fig.7

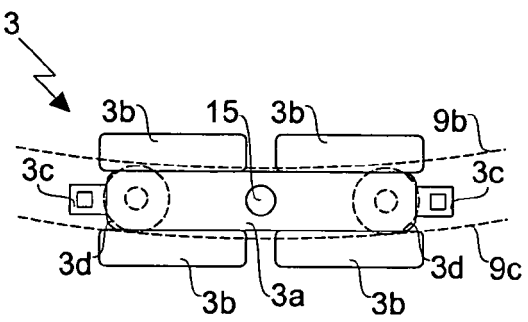

Fig.8

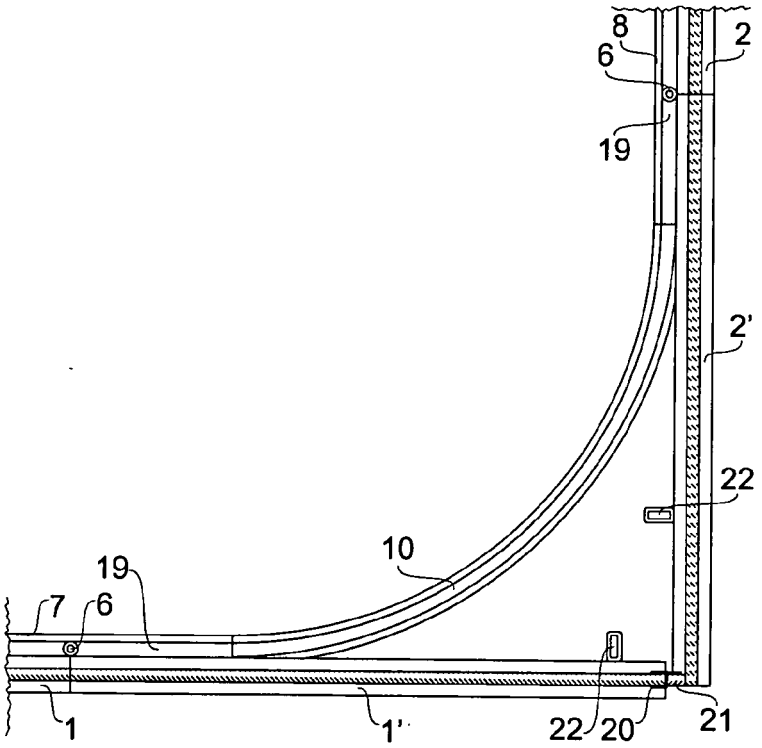

Fig.9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5121

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 A	US 6 220 332 B1 (LAI SHENG-YANG) 24 April 2001 (2001-04-24) * column 2, line 44 - column 5, line 54; figures 1-5 *	1,2,4,5, 8,9, 16-19 3,6,7, 12-15 10,11	INV. E05D15/26 E06B3/46
Y	US 2001/011583 A1 (SPORK NIGEL FRANK) 9 August 2001 (2001-08-09) * abstract; figure 4 *	3,6,7, 12-15	
X	DE 203 00 786 U1 (ALULUX BECKHOFF GMBH & CO) 20 March 2003 (2003-03-20) * page 4, line 31 - page 6, line 21; figure 1 *	1	
A	EP 1 516 994 A (PEERDEMAN, FREDERIKUS JOHANNES GERARDUS) 23 March 2005 (2005-03-23) * abstract; figures 1,2,5 *	1-19	

TECHNICAL FIELDS SEARCHED (IPC)

E06B
E04B
E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 August 2006	Khera, D

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 06 42 5121

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.

07-08-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6220332 B1	24-04-2001	NONE	
US 2001011583 A1	09-08-2001	GB 2341199 A	08-03-2000
		NZ 337626 A	28-10-1999
DE 20300786 U1	20-03-2003	NONE	
EP 1516994 A	23-03-2005	NL 1024340 C2	24-03-2005

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 1312771 **[0002]**