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

(11) EP 1 662 068 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.05.2006 Bulletin 2006/22

(51) Int Cl.:
E04F 15/024 *(2006.01)*

(21) Application number: **05077539.4**

(22) Date of filing: **04.11.2005**

(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

(30) Priority: **04.11.2004 NL 1027424**

(71) Applicant: **Van Geel Legrand B.V.**
5281 RS Boxtel (NL)

(72) Inventor: **Van den Ekart, Martinus Maria**
5271 AM St. Michielsgestel (NL)

(74) Representative: **Land, Addick Adrianus Gosling et al**
Arnold & Siedsma
Sweelinckplein 1
2517 GK Den Haag (NL)

(54) Floor and floor construction

(57) The present invention provides a modular floor (1) constructed from floor tiles (2) which are supported by supports (8) resting on a ground surface, wherein the floor tiles are provided on their longitudinal edges with bent flanges (4) which are received in grooves (6) arranged in the upper ends of the supports such that a flange of a first floor tile and a flange of an adjacent floor tile lie in one groove, wherein at least some measure of interspacing is present between flanges lying opposite each other in the groove.

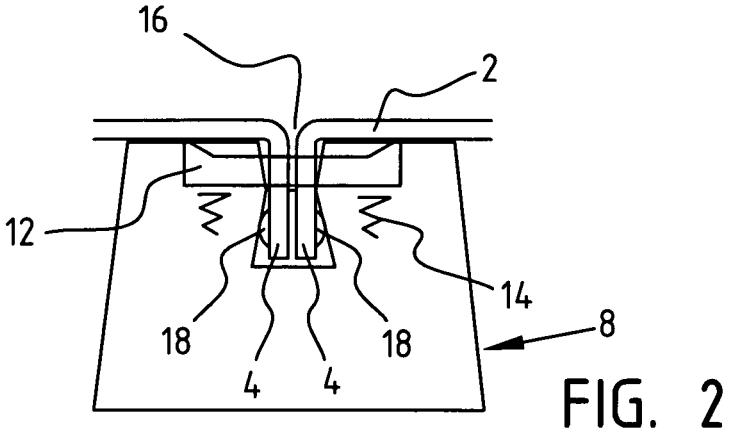

FIG. 2

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Description

[0001] The invention relates to a floor which is constructed from floor tiles which are supported by supports resting on a substructure, wherein the floor tiles are provided on their longitudinal edges with bent flanges which are received in the upper ends of grooves arranged in the supports such that a flange of a first floor tile and a flange of an adjacent floor tile lie in one groove.

[0002] The invention has for its object to obtain a floor of the above stated type wherein, while maintaining an effective clamping of the flanges of the floor tiles in the grooves of the support, the floor can follow possible unevenness in the surface of the ground on which the support rest, while in addition the floor tiles can be arranged and removed in simple manner.

[0003] This can be achieved according to the invention in that at least some measure of interspacing is present between flanges lying opposite each other in the groove.

[0004] When a floor according to the invention is applied the tiles can follow a sloping floor surface, since the parts of the flanges lying in the grooves can, within certain limits, pivot relative to each other. Movements between the floor tiles occurring for instance as a result of temperature changes and/or stresses in the floor can further be absorbed by the space present between the floor tiles.

[0005] The interspacing is preferably in the order of 0.4 to 1 mm, this space being found adequate for a sufficient pivoting to make it possible to follow slopes in the ground surface occurring in (office) buildings, as well as to absorb expansion of commonly occurring materials, wherein deforming of the tiles is prevented since they are always arranged without mutual contact.

[0006] The flanges can be connected continuously along their whole length to the remaining parts of the floor tiles, so that a reliable connection is obtained between flanges and floor plates, which will prevent undesirable deformation of the flanges.

[0007] In a preferred embodiment the floor tiles are electrically conductive and the supports are provided with electrical conducting means which make contact with the floor tiles for electrical interconnection thereof. In addition to the above stated advantages, an electrical earthing of the floor tiles is thus obtained for the purpose of greater safety.

[0008] The electrical conducting means preferably comprise a conductive profile, such as a metal sleeve or extrusion profile, in which the grooves are arranged.

[0009] In a further preferred embodiment the flanges on the side of the floor tile are provided with scraping protrusions which are in contact with the electrical conducting means. In addition to an electrical connection for earthing of the tiles, the scraping protrusions also provide a clamping for a more robust fixing of the tiles in the supports.

[0010] The supports are preferably provided with damping means, whereby vibrations from footsteps and the like are absorbed.

[0011] In yet another preferred embodiment the floor tiles are provided on the underside with centring protrusions which drop into centring openings in the top side of the supports. This construction is found to provide a more robust and precise fixing and positioning.

[0012] The invention will be further elucidated hereinbelow with reference to the accompanying figures, in which:

Figure 1 shows a top view of an assembly of support and floor tiles according to a first preferred embodiment of the present invention;
Figure 2 shows a side view in cross-section of the assembly of figure 1;
Figure 3 shows a top view of an assembly of support and floor tiles according to a second preferred embodiment of the present invention;
Figure 4 shows a side view in cross-section of the assembly of figure 3;
Figure 5A is a perspective view of a third preferred embodiment of a floor according to the present invention;
Figure 5B is a side view in cross-section of a stop of the floor tile of figure 5A against a projection of a support;
Figure 6 is a perspective view of a fourth preferred embodiment according to the present invention;
Figure 7 shows a side view in cross-section of a groove having therein two adjacent flanges in a fifth preferred embodiment;

[0013] Figure 8 shows a side view in cross-section of a groove having therein two flanges in a sixth preferred embodiment; and

[0014] Figures 9 to 12 show further preferred embodiments of floor tiles according to the present invention.

[0015] Figures 1 and 2 show a first preferred embodiment of an assembly 1 according to the present invention, comprising rectangular or square floor tiles 2 having bent flanges 4 on the edges. In the assembled situation the flanges drop into grooves 6 which are arranged for this purpose in an upper outer end of support 8, with which the assembly rests on a ground surface which is further not shown.

[0016] In the exemplary embodiment shown in the figures floor tile 2 has a square form with four flanges 4 on the edges of floor tile 2 and bent at right angles relative thereto. Flanges 4 are arranged connecting to floor tile 2 along their whole length and end close to the corner points of floor tile 2.

[0017] Arranged in the upper outer end of support 8 at equal distances from each other are four centring holes 10 into which drop centring protrusions (not shown) arranged on the underside of floor tiles 2 for the purpose of positioning floor tile 2 in correct manner relative to support 8.

[0018] In a side view are shown electrical conducting means, in a first preferred embodiment a contact ring 12

which is pressed by means of a spring construction 14 against flanges 4 for electrical interconnection thereof. A floor constructed from floor tiles 2 and supports 8 of assembly 1 are earthed electrically on at least one floor tile. Owing to the interconnection provided by the electrical conducting means the whole floor is thus earthed for greater safety.

[0019] A further provision is an interspace 16 which in the assembled situation is present between the edges and flanges 4 of adjacent floor tiles 2. This gap is preferably larger than 0.2 mm and up to for instance 2 mm, and most preferably in the order of 0.5 mm. In order to fix floor tiles 2 with sufficient clamping so as to prevent vibrations and loosening by vibration, flanges 4 are preferably provided on the side directed toward floor tile 2 with protrusions 18 with which the flanges are arranged clampingly in the groove 6 which in side view is diabolo-shaped.

[0020] The gap 16 is advantageous in making the upper surfaces of floor tiles 2 sufficiently pivotable relative to each other to be able to follow slopes and other unevenness in the ground surface. Gap 16 also ensures that possible expansion of floor tiles 2, as a consequence of for instance temperature, is absorbed without deformation of the floor tiles occurring, this due to the absence of contact between the floor tiles. This pivotability is also made possible by the diabolo shape of the side walls of grooves 6 (Fig. 2).

[0021] In a second preferred embodiment according to the present invention a floor is constructed from an assembly 28 comprising floor tiles 30 with bent flanges 32 on the side edges thereof as according to the above described first embodiment. The flanges drop into grooves 34 of supports 36. In the assembled situation a gap 38 is present between floor tiles 30 and between flanges 32 which has the advantages and features in accordance with the above described gap 16. The flanges are further fixed clampingly by protrusions 40 into the groove 34 which in side view is diabolo-shaped (Fig. 4).

[0022] The electrical conducting means are formed in this second variant by a peripheral contact wire 42 which is arranged running around the top end of support 36 and touches the centring holes 44 therein. Floor tiles 30 are herein provided with threaded pins 46 which fall into centring holes 44 for the purpose of positioning the floor tiles relative to the supports and which also contact the contact wire 42 for electrical interconnection of the floor tiles. The floor tiles are herein manufactured from an electrically conductive material, for instance a metal or preferably galvanized steel.

[0023] A third embodiment variant relates to a floor constructed from an assembly 50 as shown in figure 5A. The assembly comprises floor tiles 52 having bent flanges 54 on the side edges thereof, which flanges are arranged connecting along practically the whole length to floor tiles 52. The bent flanges 54 drop into grooves 56 arranged in supports 58 for the purpose of supporting the floor tiles at a height relative to a ground surface 60.

[0024] At both outer ends the flanges of the floor tiles are interrupted at some distance before the end of floor tile 52. A standing cylindrical projection 59 is arranged in the middle of support 58. The projection takes a form corresponding to the outer ends 55 of flanges 54, so that it acts as a stop against which the flanges of the floor tiles come to rest (fig. 5B). The projection thus also provides the correct gap between the floor tiles, preferably about 0.4 - 1 mm.

[0025] A support 58 in this third variant comprises a bottom mat 62 of a suitable material. In the shown variant these bottom mats 62 are approximately round and mutually connected by a grid of strips 64, which enables quicker laying of the floor. A support preferably comprises a roughly cylindrical steel sleeve 66 which provides the electrical interconnection of floor tiles 52 arranged therein, so that these tiles are earthed electrically despite the gap present between them. A cup-shaped damper 68 of an appropriate material such as plastic is arranged inside sleeve 66 for the purpose of damping shocks caused by for instance footsteps on the floor. Grooves 56 are arranged continuously in both sleeve 66 and damper 68.

[0026] In order to ensure an electrical contact between the floor tiles and the conductive sleeve or the conductive part of the support, the flanges 72 arranged on floor tiles 70 are provided in a preferred embodiment with protrusions 74 which make a scraping contact with edges 76 of a groove arranged in the support (Fig. 7).

[0027] It remains possible here to arrange a gap 78 between the floor tiles, wherein an electric contact is still ensured and sufficient clamping is obtained.In a further preferred embodiment grooves are arranged in a support, with in each case a groove 80 and a second groove 82 separated by a dividing wall 84 with a width preferably lying between about 0.4 and 1 mm (Fig. 8). Floor tiles 86 once again have bent flanges 88 provided with protrusions 90 which come into scraping contact with walls 92, 94 of grooves 80, 82 respectively. Electrical interconnection is obtained in that floor tiles 86 and protrusions 90, as well as a part of the supports, are electrically conductive. Sufficient space is present here in grooves 80, 82 to ensure that floor tiles 86 are at least slightly pivotable relative to the support, and that (thermal) expansion of the floor tiles can also be absorbed (Fig. 8).

[0028] The embodiments described with reference to figures 7 and 8 can also be combined with a further variant shown in Fig. 6. A floor 100 herein comprises floor tiles 102, only a fourth part of which is shown here, which floor tiles comprise on the edges bent flanges 104 which rest in groove-like recesses 106 in supports 108. Close to the corner points of floor tiles 102 centring protrusion 110 are arranged by being pressed through which drop into openings 112 arranged in the top side of supports 108.

[0029] The supports comprise an extrusion form 114 of a suitable material such as plastic, aluminium or zamak. In the shown form the extrusion form 114 has a practically cylindrical outer surface, and continuous openings 116 are arranged therein along the whole

length which correspond with centring openings 112. A damper 118 is arranged on top of extrusion form 114. The damper is roughly cylindrical and grooves 106 are arranged therein at angles of 90° to each other, and a centring opening 112 is arranged in each case between the grooves. In the middle of damper 118 is arranged a cylindrical projection 120 against which the corner points of floor tiles 102 come to rest for the purpose of better positioning thereof. Damper 118 serves to damp shocks and is preferably manufactured from a conductive plastic which provides a correct damping and also for electrical interconnection of floor tiles 102 (Fig. 6).

[0030] Figures 9 to 12 show further possible preferred embodiments of floor tiles. Fig. 9 thus shows a practical embodiment of a floor tile 140, which in practice has sides in the order of 200 to 300 mm. In the shown embodiment the supports 142 are arranged with a mutual spacing in the order of 125 mm and are optionally provided with a reinforcement. Also shown are connecting pieces 114 for mutual connection of supports 142.

[0031] Fig. 10 shows a tile 140 as in Fig. 9 provided with supports 142, wherein a foot connecter 144 is also shown which on the upper side has four square recesses in which the square supports 142 come to rest. A further foot connecter 146 is also shown wherein an earth clip 148 is arranged in the middle thereof for electrical interconnection of the supports resting on foot connecter 146 for the purpose of earthing thereof.

[0032] Fig. 11 shows a larger floor tile 160 with sides of for instance 450 mm. Supports 162 are arranged at a mutual spacing of 150 mm.

[0033] A larger tile 170 has for instance sides in the order of 600 mm and is arranged on a plurality of supports 172 which are arranged not only at the corner points of tile 170 but also therebetween, at a mutual distance of for instance 133 mm. The height of the foot is in this case the same as that of the above stated feet, but can also amount to about 55 mm. Such larger tiles have in the middle of the tile a support (not shown) arranged on the underside. The thickness of the tile is further in the order of 2 mm, just as the above mentioned tiles.

[0034] The present invention is not limited to the above described preferred embodiments thereof, in which many modifications can be envisaged within the scope of the appended claims.

Claims

1. Floor constructed from floor tiles which are supported by supports resting on a ground surface, wherein the floor tiles are provided on their longitudinal edges with bent flanges which are received in grooves arranged in the upper ends of the supports such that a flange of a first floor tile and a flange of an adjacent floor tile lie in one groove, wherein at least some measure of interspacing is present between flanges lying opposite each other in the groove.

2. Floor as claimed in claim 1, wherein the interspacing is in the order of 0.5 mm.

3. Floor as claimed in either of the foregoing claims, wherein a floor tile is constructed from a floor plate and flanges extending at right angles on the edges of this floor plate and formed integrally with the floor plate, wherein the flanges are connected continuously along their whole length to the floor plate.

4. Floor as claimed in any of the foregoing claims, wherein the floor tiles are electrically conductive and wherein the supports are provided with electrical conducting means which make contact with the floor tiles for electrical interconnection thereof.

5. Floor as claimed in claim 4, wherein the electrical conducting means comprise a conductive profile, such as a metal sleeve or extrusion profile, in which the grooves are arranged.

6. Floor as claimed in either of the foregoing claims 4 or 5, wherein the flanges on the side of the floor tile are provided with scraping protrusions which are in contact with the electrical conducting means.

7. Floor as claimed in any of the foregoing claims, wherein the supports are provided with damping means.

8. Floor as claimed in any of the foregoing claims, wherein the electrical conducting means comprise a peripheral contact ring or contact wire arranged in the support.

9. Floor as claimed in any of the foregoing claims, wherein the floor tiles are provided on the underside with centring protrusions which drop into centring openings in the top side of the supports.

10. Support evidently intended for use in a floor as claimed in any of the foregoing claims.

11. Floor tile evidently intended for use in a floor as claimed in any of the foregoing claims.

12. Assembly of two or more floor tiles and one or more supports for the purpose of constructing a floor, wherein the supports are provided with a groove and the floor tiles are provided with flanges fitting into the groove, wherein the groove and/or flanges are embodied such that the flanges engage in clamping manner on walls of the groove, and in the assembled situation are pivotable relative the groove due to a gap present between the flanges.

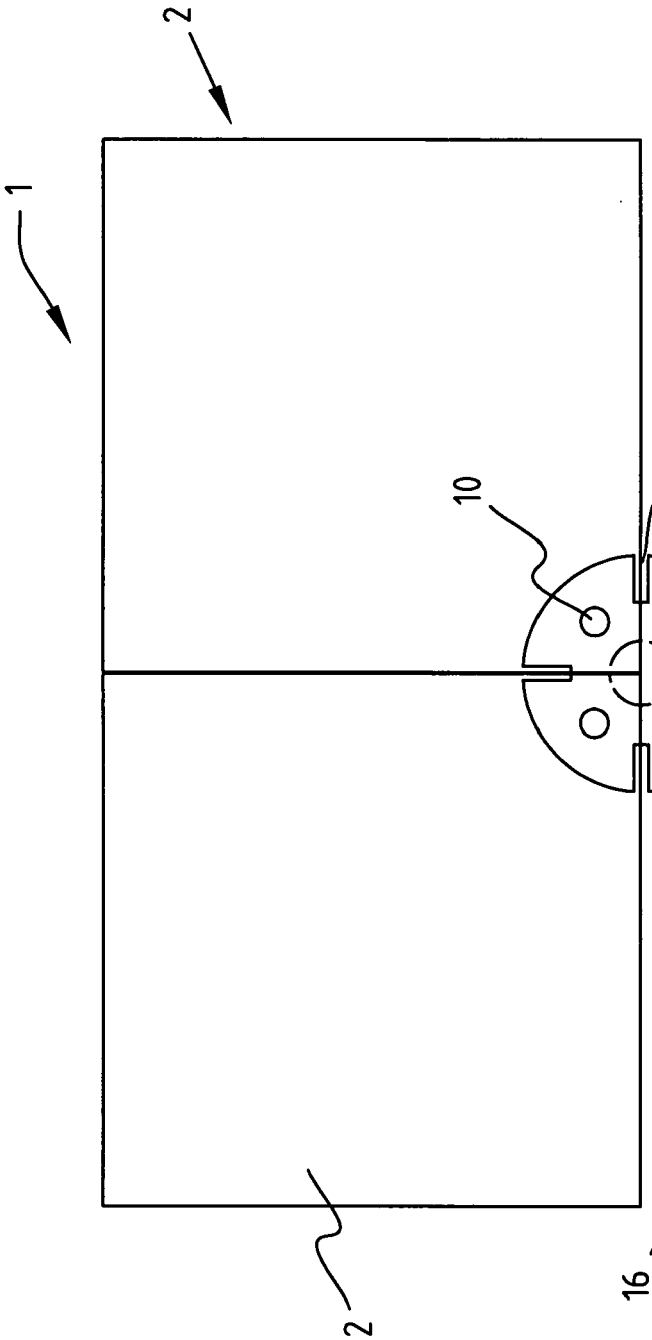

FIG. 1

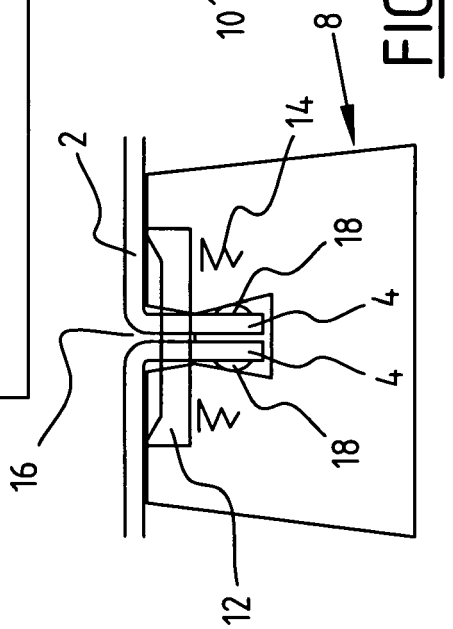

FIG. 2

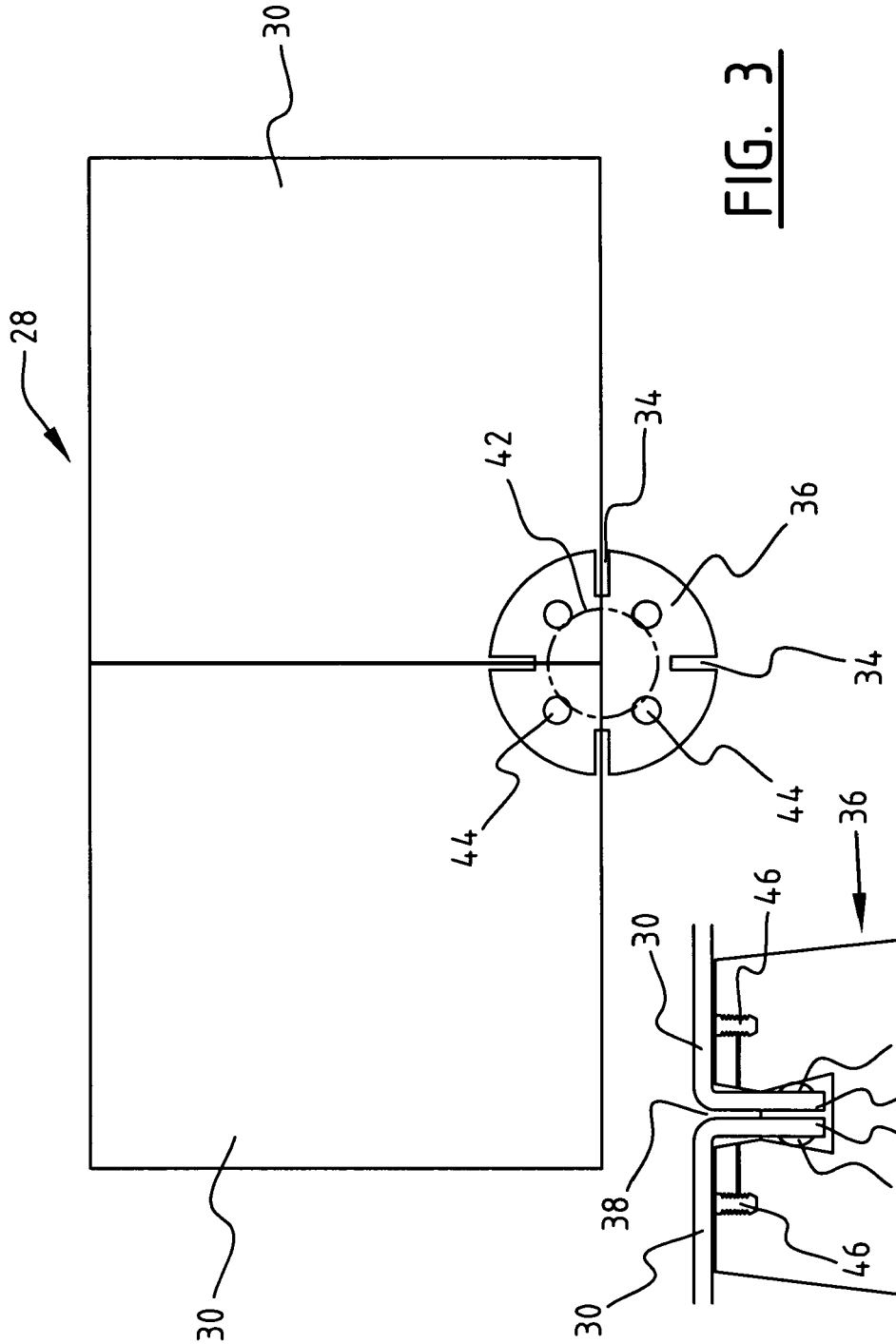

FIG. 3

FIG. 4

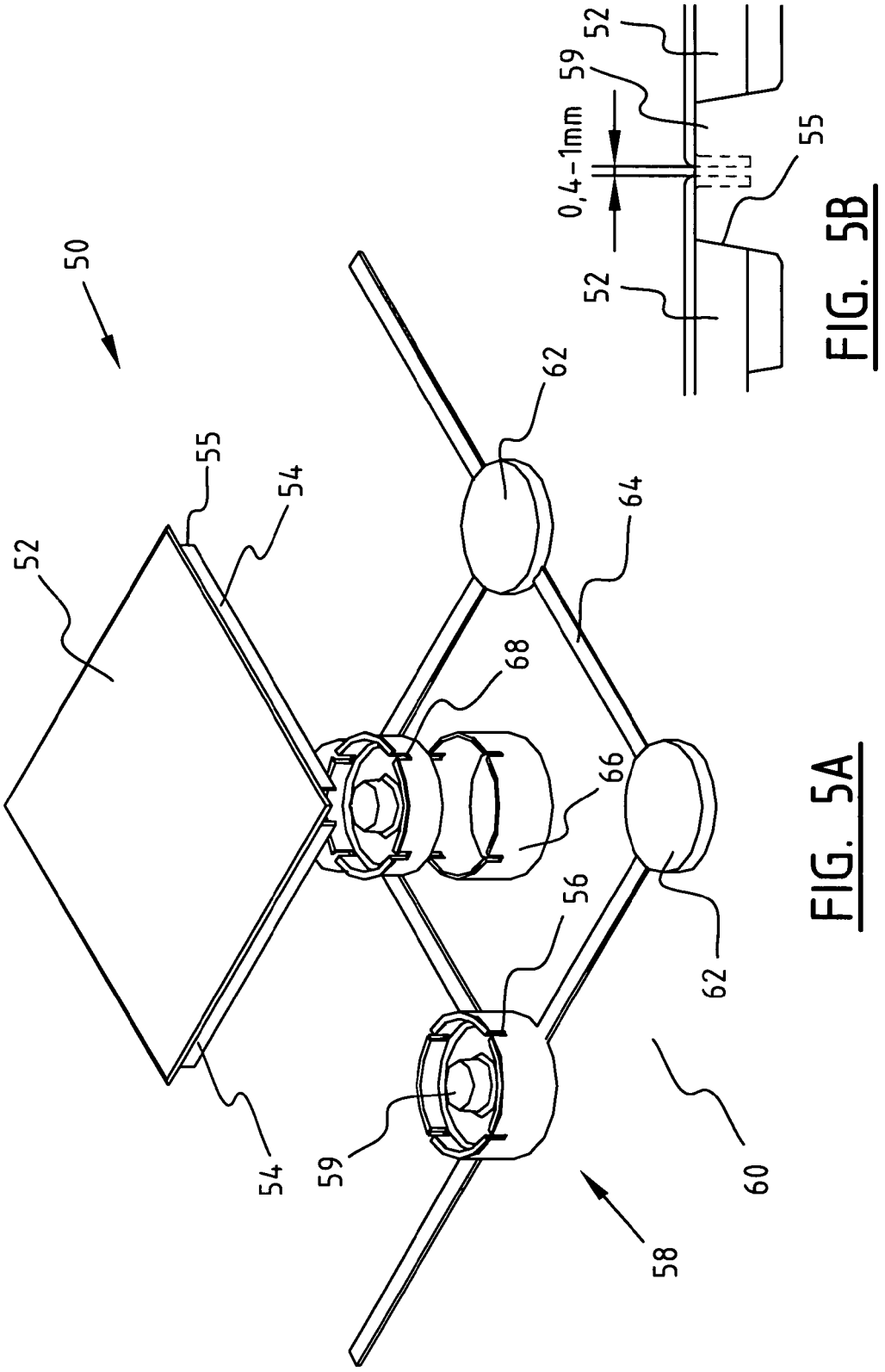

FIG. 5A

FIG. 5B

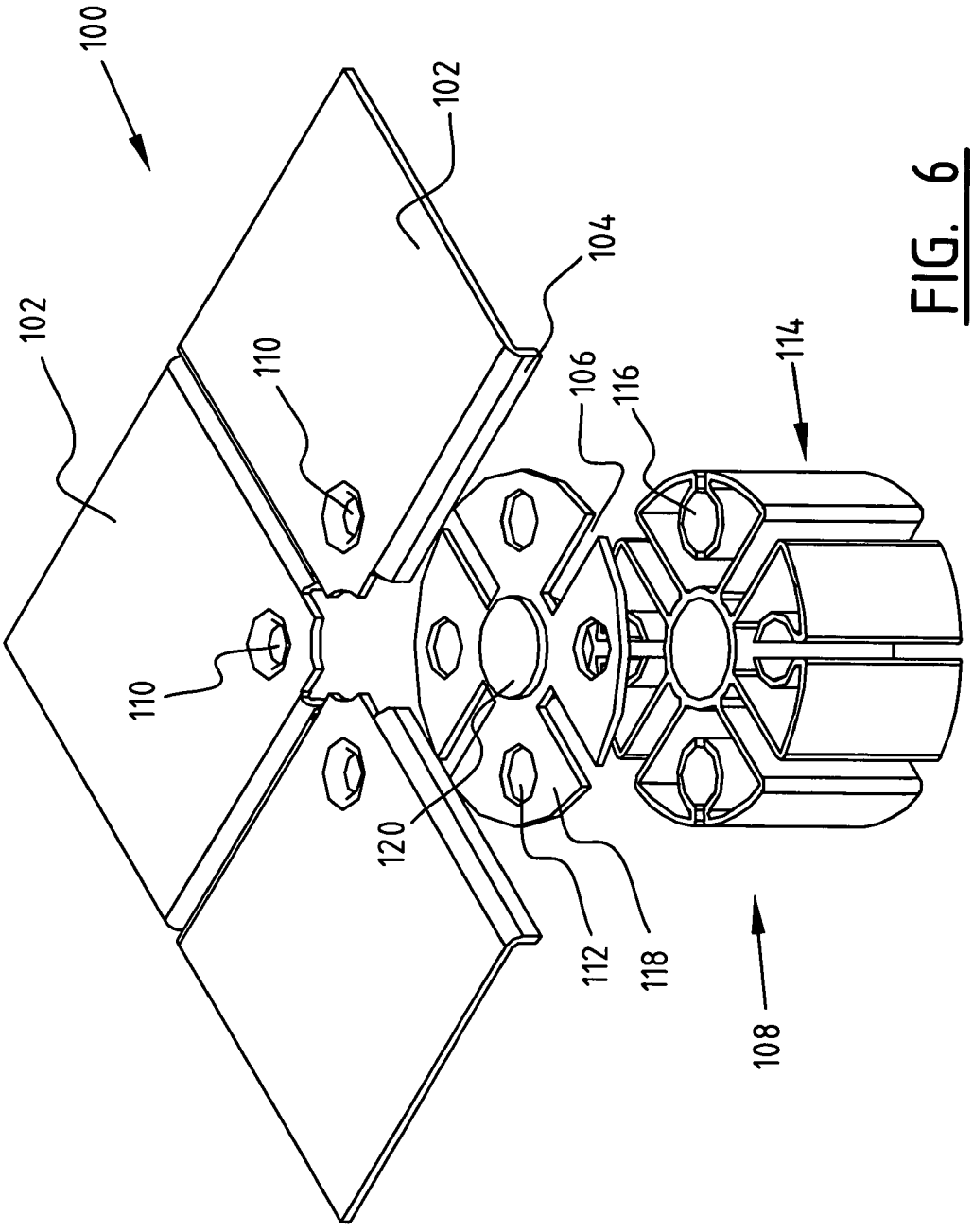

FIG. 6

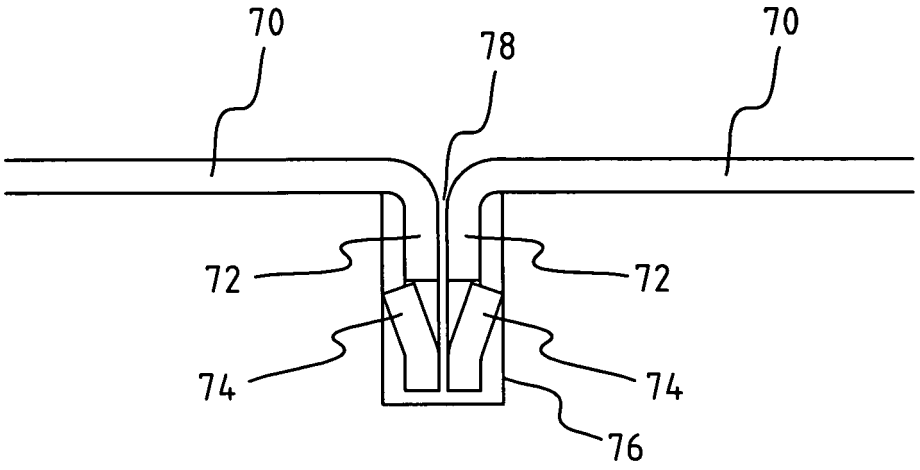

FIG. 7

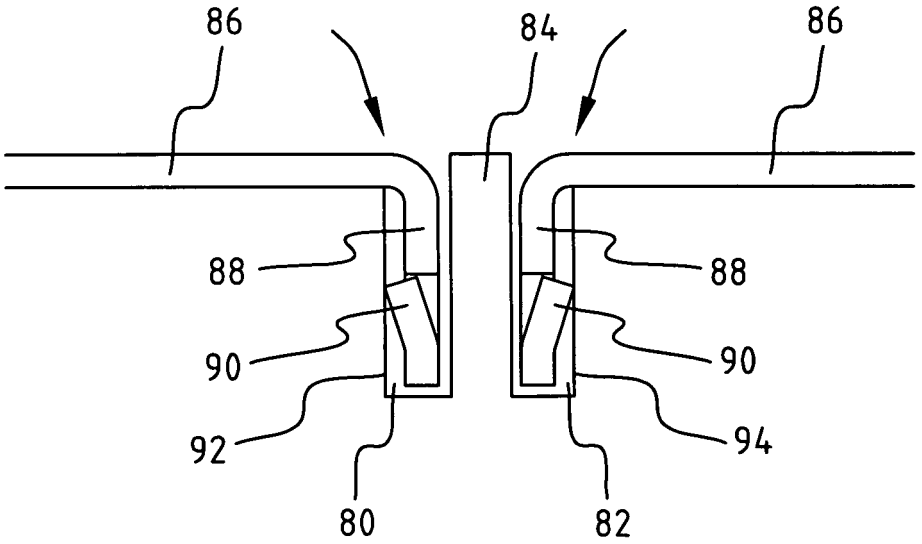

FIG. 8

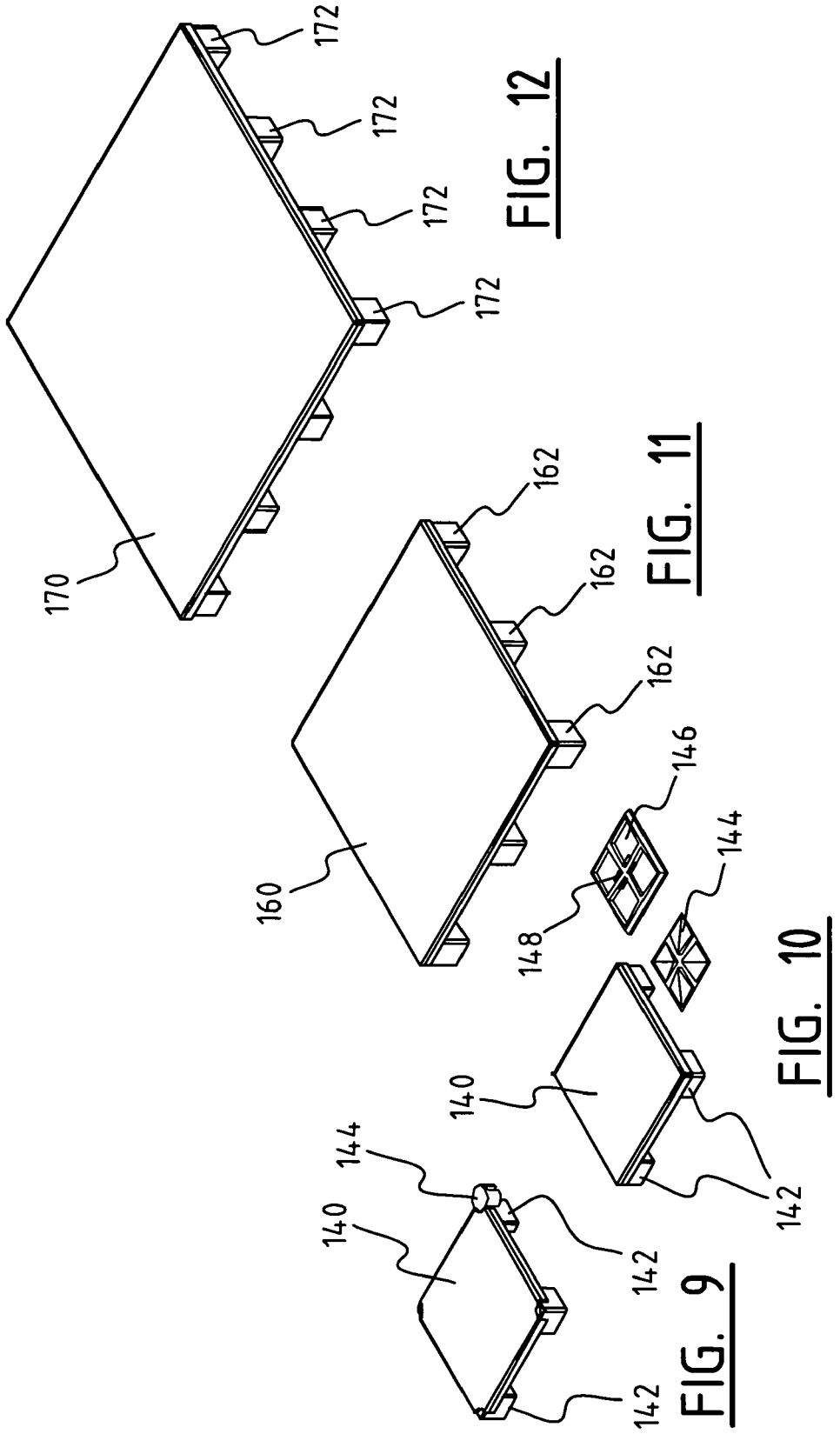

FIG. 9

FIG. 10

FIG. 11

FIG. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7539

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	US 5 749 188 A (BELBENOIT ET AL) 12 May 1998 (1998-05-12) * column 3, line 55 - column 3, line 67 * * column 4, line 7 - column 4, line 33 * * column 5, line 62 - column 5, line 65 * * column 6, line 13 - column 6, line 18 * * figures 1-27 *	1,2,4,5, 10-12 7,9	E04F15/024
X	EP 0 381 571 A (DUCROUX, ALAIN RENE EMILE; NOVAKOVIC, MIODRAG) 8 August 1990 (1990-08-08) * column 4, line 2 - column 4, line 5 * * column 4, line 20 - column 4, line 35 * * column 4, line 41 - column 4, line 43 * * claim 7; figures 1-4 *	1,3, 10-12	
X	US 5 499 476 A (ADAMS ET AL) 19 March 1996 (1996-03-19) * column 4, line 4 - column 4, line 11 * * column 4, line 24 - column 4, line 26 * * column 4, line 46 - column 4, line 53 * * column 5, line 22 - column 5, line 38 * * figures 1-5 *	1-5, 10-12	TECHNICAL FIELDS SEARCHED (IPC) E04F
Y	GB 2 330 595 A (* KYODO KY-TEC CORP) 28 April 1999 (1999-04-28) * page 24, line 22 - page 25, line 4 * * figures 1,6-9,11 *	7	
Y	EP 1 143 083 A (LANGE, MARTIN) 10 October 2001 (2001-10-10) * claim 1; figures 1,2,7,8 *	9	
A	FR 2 501 758 A (PLAQUETTES INDLES SA) 17 September 1982 (1982-09-17) * page 1, line 21 - page 1, line 27 * * figures 1-3 *	2	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 January 2006	Severens, G

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7539

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 813 906 A (INFRA +) 15 March 2002 (2002-03-15) * page 10, line 5 - page 10, line 12 * * figures 1-4 * -----	5,6,8	
A	FR 2 703 385 A (BELBENOIT MAURICE) 7 October 1994 (1994-10-07) * figures 1-5 * -----	1,9	
			TECHNICAL FIELDS SEARCHED (IPC)

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

23-01-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5749188 A	12-05-1998	AT 167912 T	15-07-1998
		AU 687046 B2	19-02-1998
		AU 6506494 A	24-10-1994
		BG 62217 B1	31-05-1999
		BG 100103 A	29-03-1996
		BR 9406169 A	09-01-1996
		CA 2159361 A1	13-10-1994
		CN 1123563 A	29-05-1996
		CZ 9502545 A3	17-04-1996
		DE 69411379 D1	06-08-1998
		DE 69411379 T2	27-05-1999
		EP 0694105 A1	31-01-1996
		ES 2120617 T3	01-11-1998
		WO 9423152 A1	13-10-1994
		HU 73603 A2	28-08-1996
		JP 8512371 T	24-12-1996
		PL 310947 A1	08-01-1996
		RU 2126479 C1	20-02-1999
		SK 122895 A3	08-05-1996
EP 0381571 A	08-08-1990	CA 2009061 A1	03-08-1990
		DE 69000666 D1	11-02-1993
		DE 69000666 T2	15-07-1993
		DK 381571 T3	19-04-1993
		ES 2038495 T3	16-07-1993
		FR 2642782 A1	10-08-1990
		GR 3007488 T3	30-07-1993
		JP 2236353 A	19-09-1990
		JP 3035311 B2	24-04-2000
		JP 2000220279 A	08-08-2000
US 5499476 A	19-03-1996	AT 177499 T	15-03-1999
		AU 687438 B2	26-02-1998
		AU 7633294 A	22-03-1995
		BG 100441 A	28-02-1997
		BR 9407373 A	16-07-1996
		CA 2169844 A1	09-03-1995
		CN 1132537 A	02-10-1996
		CZ 9600543 A3	11-09-1996
		DE 69417042 D1	15-04-1999
		DE 69417042 T2	23-09-1999
		DK 716723 T3	27-09-1999
		EP 0716723 A1	19-06-1996
		FI 960936 A	28-02-1996
		HU 74140 A2	28-11-1996
		JP 3231328 B2	19-11-2001

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23-01-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5499476 A		JP 9504583 T	06-05-1997
		MD 960108 A	31-01-1998
		NO 960821 A	28-02-1996
		OA 10573 A	26-06-2002
		PL 313262 A1	24-06-1996
		RO 118214 B1	28-03-2003
		RU 2116412 C1	27-07-1998
		SK 27296 A3	07-10-1998
		WO 9506793 A1	09-03-1995
GB 2330595 A	28-04-1999	AU 4687897 A	20-02-1998
		HK 1018296 A1	10-08-2001
		WO 9804795 A1	05-02-1998
		KR 2000029708 A	25-05-2000
		TW 387028 B	11-04-2000
EP 1143083 A	10-10-2001	NONE	
FR 2501758 A	17-09-1982	NONE	
FR 2813906 A	15-03-2002	NONE	
FR 2703385 A	07-10-1994	NONE	

EPO FORM P0459

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