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(54) **Bent tile**

(57) A bent tile (1) is provided with an upper surface (2) having a nosing (3) in the part of the tile which goes to be over the underlying tile (1) and said nosing (3) forms a suspended part having protection role from the rain and from other atmospheric agents in the points

where the tiles (1) go to be over. Said suspended part (3) provides a lower cylindrical surface (4). Moreover to eliminate the infiltrations coming under the tiles (1) grooves (7) are provided which stop the drops letting out the same on the upper part of the underlying tile (1).

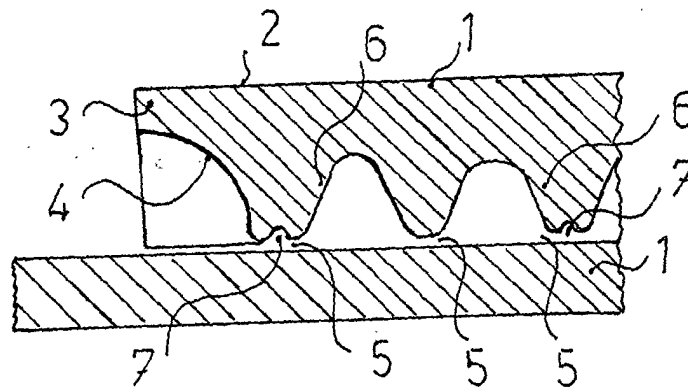


FIG. 3

EP 1 323 877 A1

Description

[0001] In the sector of the coverings to be used in the building the solution more used, that permits a better functionality with an aesthetic pleasant result, is the covering with bent tiles. These kind of covering, to be actuated using like material for the bent tiles cement with plasticized mixture or clays, give the protection of the building from the atmospheric agents permitting the ventilation and permitting to have a good live confort with any climatic condition. Said bent tiles, in working, are placed with fixed joint or with superimposition: that is the bent tiles are positioned with a part of them which puts on the bent tile placed onto the below line to downhill. This kind of positioning gives a good waterproofing and a ventilation favoured to the local microcirculation and to the rising currents that come to act around the building. The invented structure is particularly suitable for bent tiles with high outline and with a determined conformation like which known as "portuguese bent tile", but it is suitable also for other kinds of bent tiles with the characteristic to have a substantial thickness. The invented body is a bent tile for building covering with a particular form to permit a better waterproofing in comparison with the normal bent tiles and, thanks to its characteristics, it permits to reduce the incline of the pitches of the roof. The invented body consists in a bent tile 1 with a hollow 1A which forms the small channel and with a convex 1B which forms the upper arc. Said bent tile 1 provides an upper surface 2 with a nosing 3 in the part of the tile which goes to be over the underlying tile 1. Said nosing 3 forms a suspended part having a protection role from the rain or from other atmospheric agents in the critical points, or rather where the tiles go to be over. This determines an improvement in comparison with the tiles currently in use having a cut perpendicular to the upper surface of the same tile. In the invented tile the suspended part 3 moreover provides in the lower part a cylindrical surface 4 with radius of union in the lower part. This part of the tile 1 is made in such a way that the drops that break down near the same suspended part 3, or rather the parts of the same drop, go to dispers in the focus of the cylinder placed over the suspended part 3, while the stagnant drops which remain into the upper concavity attached to the cylindric surface 4 drop, if they reach a big bulk, onto the underlying tile always for the cylindric convex but is however avoided the liquid stagnation in the critical points, or in the joint positions of the bent tiles. Moreover it is to be considered that the tiles, to be placed in fixed joint or in simply superimposition, have surfaces in contact but without a total adhesion. This is due to the geometric tolerance of the tiles or to the assembling that does not permit, only with the superimposition of the tiles and only with their weight, to have a total adhesion so to seal all the interstices present. In this way very small spaces 5 are created between the upper part of the downhill tile 1 and the lower part of the downdale tile 1. The presence of

said small spaces 5 comes to create phenomenon of water infiltrations. This infiltration essentially due to two causes: 1) infiltration for capillarity between the surfaces, or rather in the surfaces having the small spaces 5, or 2) atomization of water membranes bring to the microcirculation near the tile, to the circulation of the currents around the building or for the wind that is blowing in the surfaces where the water stagnation happened. On this base it is necessary to determine smallest water stagnations in the surfaces of joint of the tiles 1. To eliminate the infiltrations coming under the tiles, the invented tile 1 provides on the conventional ant i drop ribs 6 a groove 7 which stop the drops. Said groove 7 having the function to stop the drops, letting out the same on the upper part of the underlying tile in relation to the sloop of the roof, the same drops then falling down outside the covering. The invented bent tile 1, characterized by suspended part 3, by the cylindric surface 4 and by the groove 7, besides to permit the seal again the infiltrations, permits also to arrange roofs with smallest sloops, such as they are less subject to water stagnations and they have a better fluidodinamic efficiency. Infact in the conventional roofs, with cut of the tile perpendicular to the upper surface, it is developed the meniscus with thickness of bigger dimension near the joint of the tiles. Said stagnation of liquid, subjected to wind currents and nebulized, creates infiltrations undertile. The invented tile 1, thanks to the suspended part 3, avoids the water harvest in said area. Moreover, thanks to the cylindric convex, the parts of the drops bounce on the focus of the cylindric surface placed out of the suspended part while the drops attached or make a meniscus on said convex or falling down on the underlying tile if with big dimension. In an other embodiment a bent tile 8 is provided with a different shape having the cut of the tile round. Said tile 8 has a convex 8a so to make bounce the water drops falling down in this area in a position more distant in comparision with what happens with the tile having cut perpendicular to the upper surface. Moreover, such the adhesion forces come to be perpendicular with the solid surface, the result of said forces is inclined downward and added with the vector of the cohesion forces gives a resultant placed more downward: a meniscus lower is so obtained in comparison with the one that is obtained in the conventional tiles with cut perpendicular to the upper surface. Then, no having a surface perpendicular with the wind direction but rounding and aereodinamic, the wind action will dissipate on said surface, such as on the upper surface of the tile 1, the residual water stagnations placed onto the joint areas of the tiles. The bent tile 8 with rounded cut like the bent tile 1 provides grooves 7 to stop the drops and the water rills eventually infiltrated under the same tiles. The invented bent tile 1 and the tile 8 with rounded cut are illustrated in indicative way in the drawings of sheets 1, 2, 3, 4 and 5. In sheet 1 fig. 1 is section of tiles 1 placed in succession with in evidence the breakdrop suspended part 3. In sheet 2 fig. 2 is schematic view of what

happens with the traditional tile actually in use. Fig. 3 is view of a particular of the part of the upper tile placed onto the lower one and with the meniscus with vectorial view of the adesion forces and of the coesion force with the result. It is noted also che limit surface of the elastic membrane of the meniscus that, as known, is distribuit-ed with minimum volume. Fig. 4 is view of the shape of the tile 8 with rounded cut. In sheet 3 fig. 5 is perspective view of some tiles 1 in position. In sheet 4 fig. 6 is per-spective view of some tiles 8 mounted. In sheet 5 fig. 7 is view of a tile in its lower wall.

Claims

1. "Portuguese" bent tile with frontal breakdrop consists of a bent tile (1) with a hollow (1A) and with a convex (1B) **characterized in that**:
 - an upper surface (2) is provided with a nosing (3) in the part of the tile which goes to be over the underlying tile (1) and said nosing (3) forms a suspended part having a protection role from the rain or from other atmospheric agents in the critical points where the tiles (1) go to be over; and that
 - said suspended part (3) provides a lower cylindrical surface (4); and that
 - to eliminate the infiltrations coming under the tiles (1) grooves (7) are provided which stop the drops letting out the same on the upper part of the underlying tile (1).
2. "Portuguese" bent tile with frontal breakdrop, as for the claim 1, **characterized in that** the drops that break down near the suspended part (3) go to dispers in the focus of the cylinder, placed over the suspended part (3), while the stagnant drops which remain attached to the cylindric surface (4) drop, if they reach a big bulk, onto the underlying tile (1) but is avoided the liquid stagnation in the joint positions of the bent tiles.
3. "Portuguese" bent tile with frontal breakdrop, as for the claim 1, **characterized in that** it permits to arrange roofs with smallest sloops such as they are less subject to water stagnations and they have a better fluidodinamic efficiency.
4. "Portuguese" bent tile with frontal breakdrop, as for claim 1, **characterized in that** in an embodiment a bent tile (8) is provided having the cut of the tile round with a convex (8a) so to make bounce the water drops falling down in this area in a position more distant.

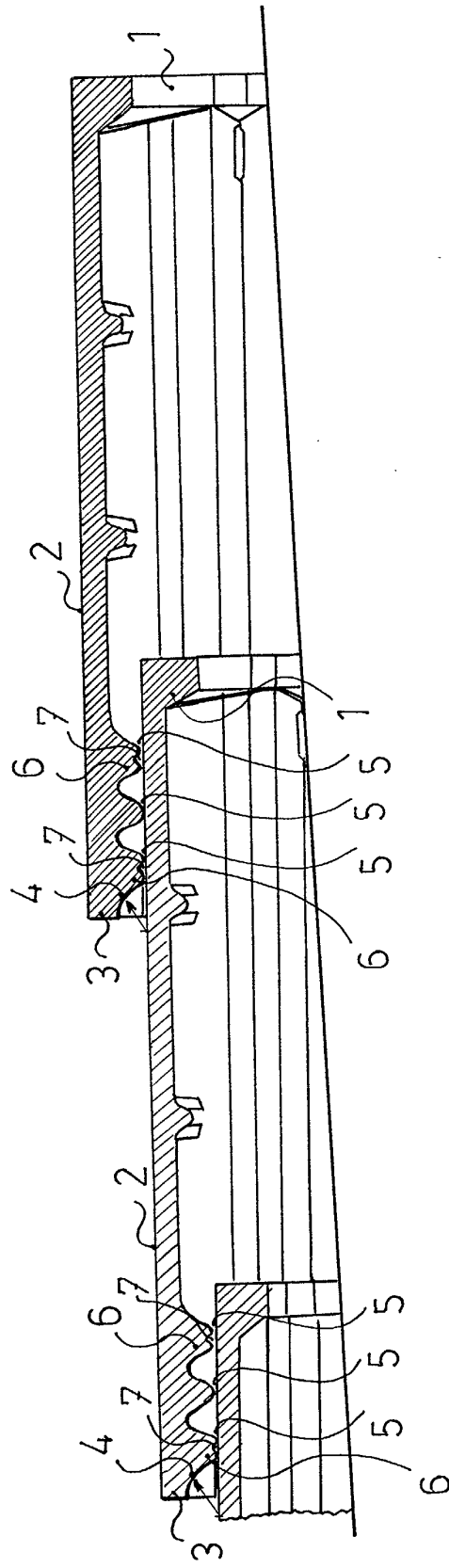


FIG.1

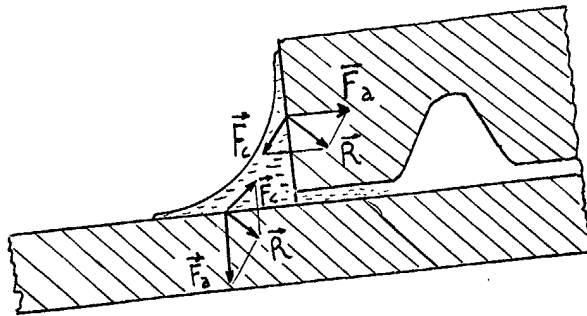


FIG. 2

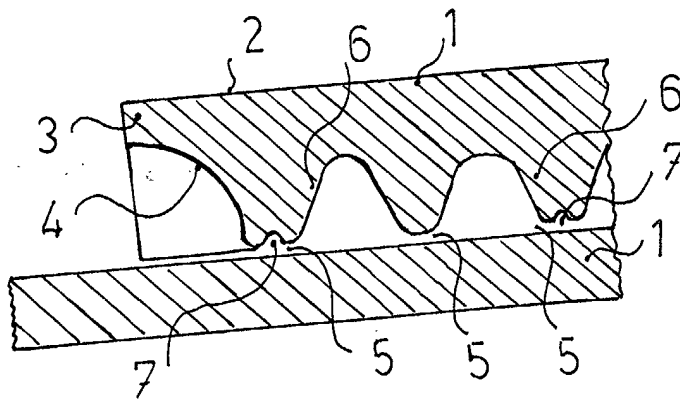


FIG. 3

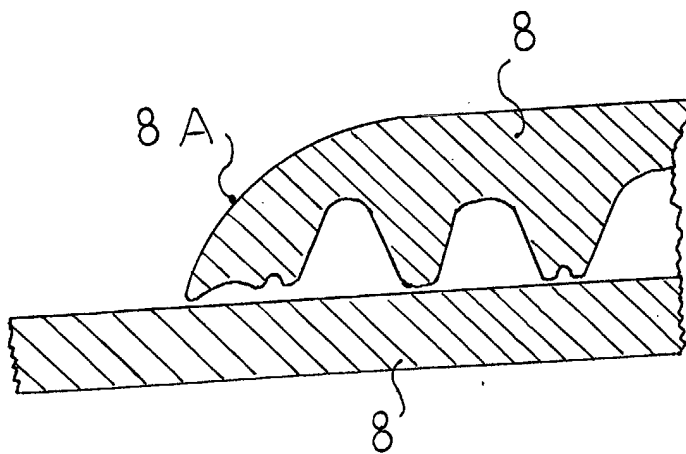


FIG. 4

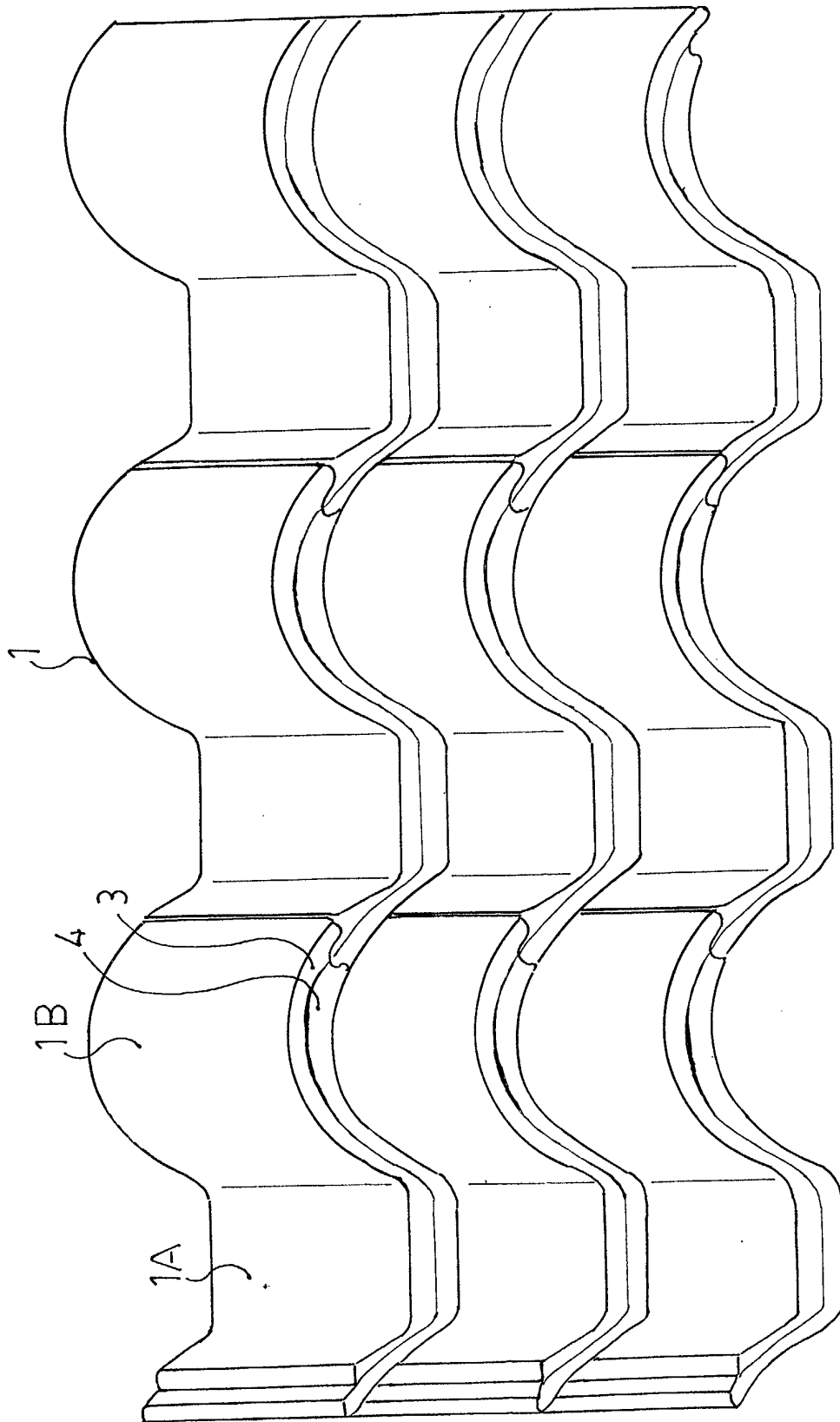


FIG. 5

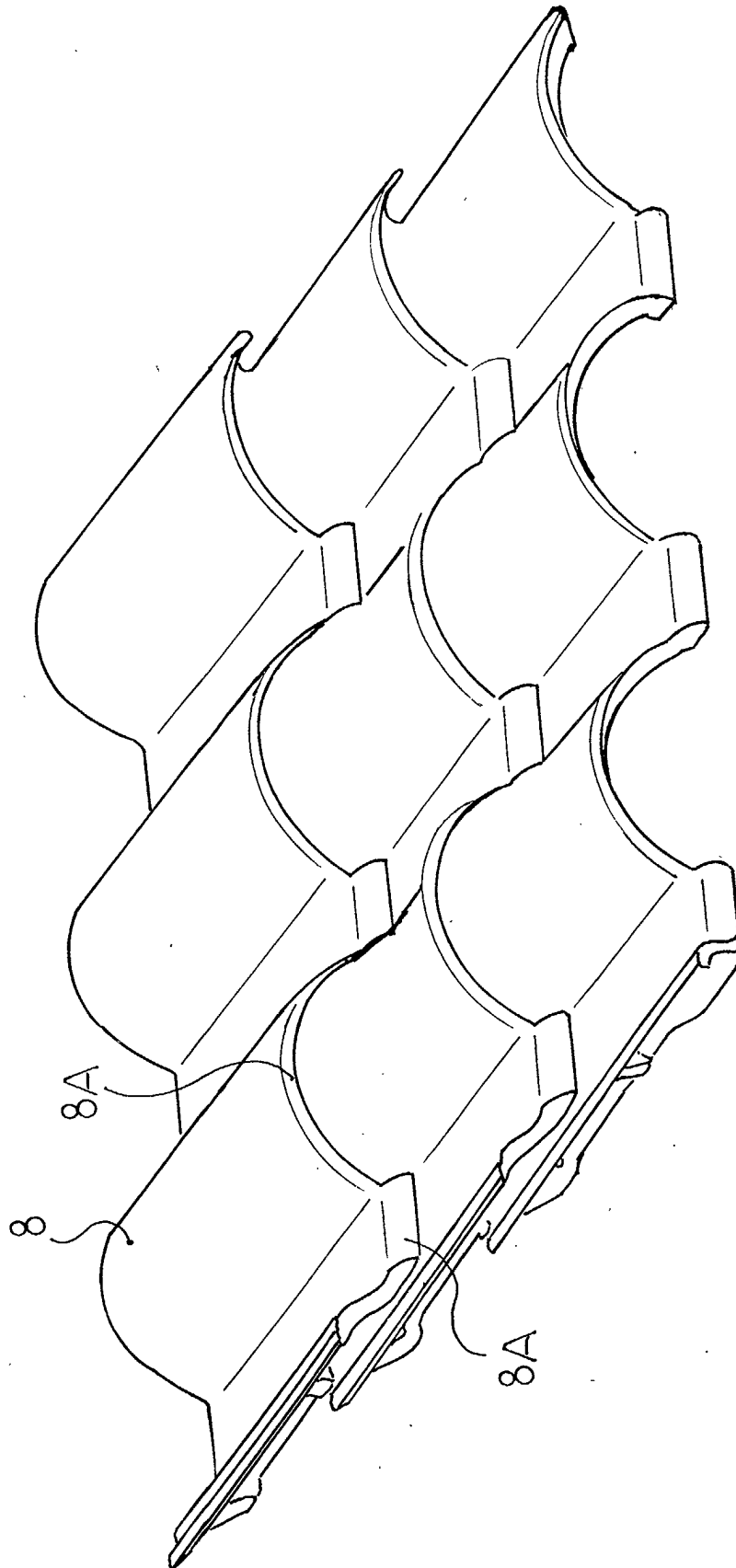
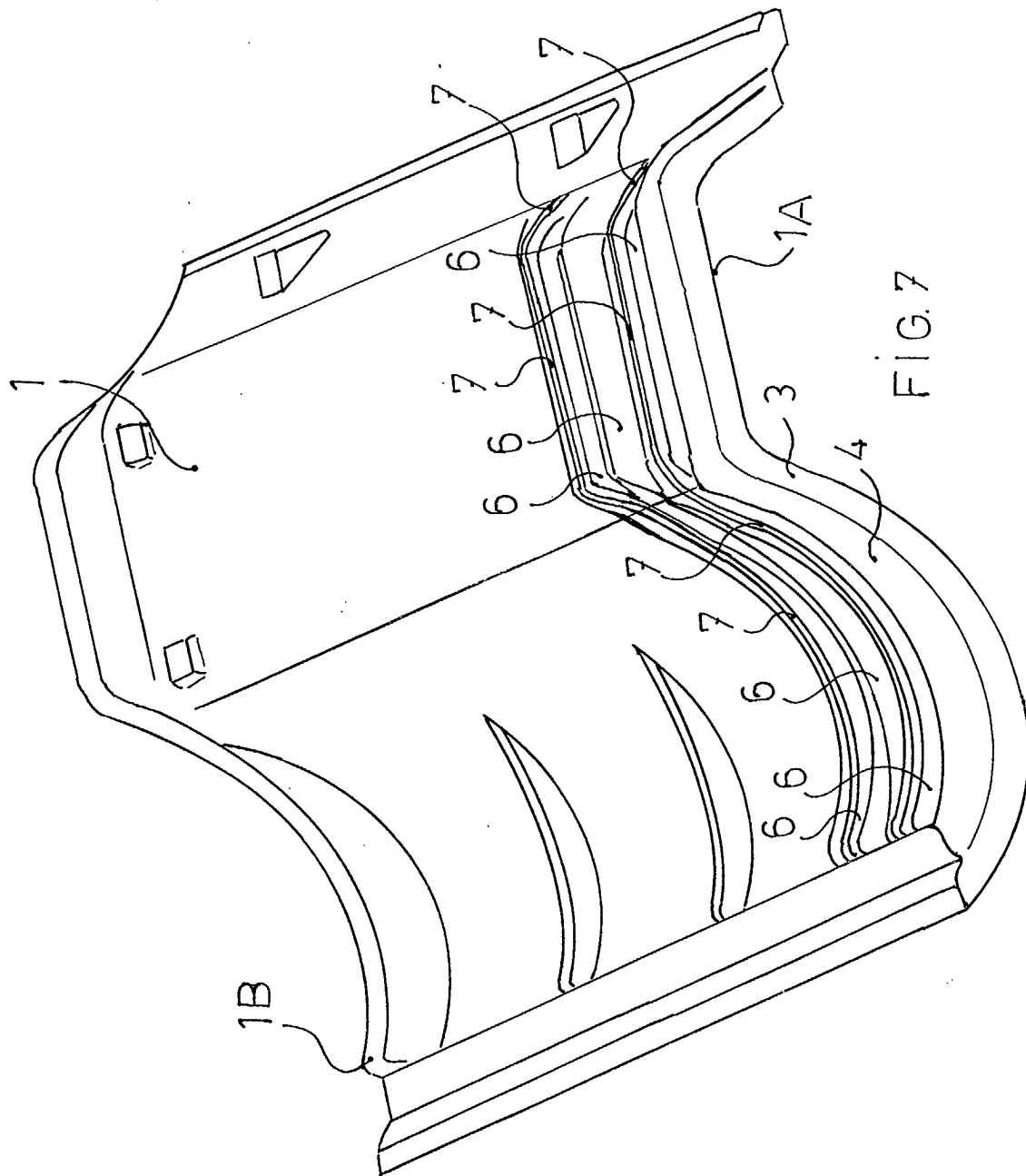


FIG.6





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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0816

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	FR 1 409 205 A (ERNEST FAHR & CARL FAHR) 3 December 1965 (1965-12-03) * figures 4,7,9 *	1	E04D1/04
A	FR 849 766 A (GRANDES TUILERIES DE ROUMAZIER) 1 December 1939 (1939-12-01) * page 2, line 60 - line 77; figure 3 *	1	
A	DE 913 469 C (LUDWIG FRANZ LODUWICI) 14 June 1954 (1954-06-14) * figures 1,6 *	1	
A	GB 494 392 A (CARL LUDOWICI KGAA) 25 October 1938 (1938-10-25) * page 2, line 17 - line 23; figure 4 *	4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E04D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 May 2002	Examiner Demeester, J
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EP FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 83 0816

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
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24-05-2002

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 1409205	A	03-12-1965	NONE	
FR 849766	A	01-12-1939	NONE	
DE 913469	C	14-06-1954	NONE	
GB 494392	A	25-10-1938	NONE	