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(54) Roof assembly

(57) The invention provides a roof assembly (2) comprising an outer roof component (4, 104, 204) that is arranged, in use, to be mutually interlocked with an inner roof component (6, 106, 206). The outer roof component (4, 104,204) comprises a depending key element (14) (14) that is a snap-fit in an upwardly facing dovetail slot (36) provided in the inner roof component (6, 106, 206). Embodiments of the invention enable roofs of various pitches to be assembled, the components (204, 206) having mutually inter-engaging bulbous configurations for this purpose. The key element (14) and the inner roof component (6, 106, 206) are moulded from foamed polystyrene. The invention also provides a method of forming a roof using the roof assembly (2).

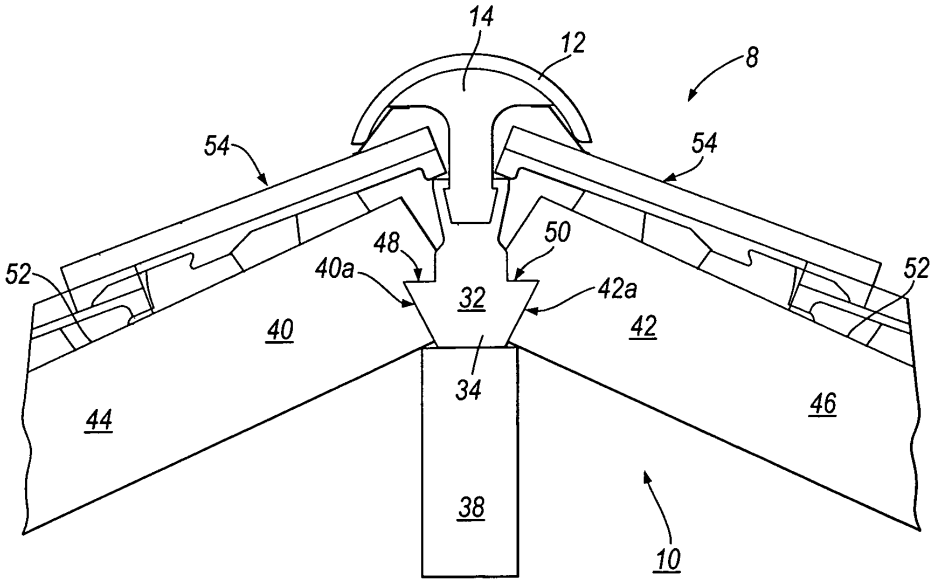

Fig.7

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Description

[0001] This invention is concerned with a roof assembly and is particularly concerned with a roof assembly utilising novel arrangements of mutually interlocking components.

[0002] Traditional methods of roof construction require skilled labour on site and long build times, resulting in high costs. In the prior art, the final roof covering, for example roof tiles, is fixed in situ on the roof. This requires skilled roofers to mark the roof, fix battens, lay roof tiles and secure joints, which involves considerable costs on site, including the cost of health and safety measures to mitigate the risk of working at height. To reduce costs and satisfy the growing demand for high-quality, energy-efficient and sustainable methods of construction, new materials and techniques are increasingly being used. These include for example, use of prefabricated roof panels or so-called structural insulated panels (SIPS), which integrate several components in a complete assembly and can be installed with little site labour.

[0003] The construction of the joints of a tiled pitched roof, for example the ridge and hips, presents particular challenges. It requires the use of multiple components and several operations on site to provide a weather tight joint. In the case of a roof ridge, these components may include a ridge batten or ridge board to fix the ridge tiles, a means to provide sealing against driving rain as well as various fasteners. In warm roof constructions with insulation at rafter level, canister applied foam may also be used to fill the gap at the ridge between the roof pitches and provide a continuous insulating layer.

[0004] It is the object of the present invention to provide a roof assembly and a method of roof assembly that overcomes the disadvantages of the prior art. Specifically, the invention allows rapid installation of weather tight joints without use of fasteners or tools and without the need for skilled labour; such joints could be at the ridge or hips of a roof or between pre-tiled roof panels. Also, the invention ensures continuity of the insulation layer in a warm roof with rafter-level insulation.

[0005] According to the present invention there is provided a roof assembly comprising an outer roof component configured for mutual interlocking engagement, in use, with an inner roof component, which is adapted to be supported in a roof structure.

[0006] Preferably, the inner roof component comprises an aperture for receiving, in use, a depending key element of an outer roof component. In this manner the outer roof component is secured to the roof structure.

[0007] Conveniently, the key element of the outer roof component may be a snap fit, when in use, in the aperture of the inner roof component.

[0008] The key element of the outer roof component is preferably configured in cross section as an arrow head, preferably as a truncated arrow head, to facilitate the retention thereof in the aperture of the inner roof component, which aperture is configured to be of a shape corresponding to that of the key element. Other shapes of interlock are possible, such as ones with round edges.

[0009] In a preferred embodiment, the outer roof component comprises a separately formed key element. Alternatively, the key element is formed integrally with the outer roof component. The outer component could be made as a long unit incorporating several roof tiles. This would give the traditional tiled appearance but with fewer components and joints. This applies especially where the outer component is a unitary component made from plastics, metals or composites, with an integral key element, because these materials can be easily formed into complex shapes.

[0010] Conveniently, the key element may be a moulding for attachment to a roof tile. In particular the key element may be moulded from an expanded foamed material such as polystyrene, or a foamed polystyrene based composition. It will be realised that the mouldings may be a composite provided with a tougher outer skin portion in order to enhance the performance of the products in use bearing in mind that these components, are effective, in use, to seal and insulate the roof. The inner roof component can be formed in plastics, metal or composite materials which either are or can be designed to be flexible so as to allow snap fitting of the outer roof component.

[0011] The inner roof component may conveniently also be moulded from an expanded foamed material such as polystyrene.

[0012] In one embodiment of the invention, the assembly is a ridge assembly and the outer roof component has a ridge tile as its outer covering.

[0013] In such an embodiment, the outer roof component may conveniently comprise a filler element to prevent, in use, the ingress of driving rain or snow. The filler element may be of a flexible webbed comb-like configuration and may conveniently be secured to the key element of the outer roof component. In use on the roof, such a filler element either automatically adjusts to fit around the profile of adjacent roof tiles or is moulded manually to seal the gaps with adjacent roof tiles. Several materials or combinations of materials may be used to make such flexible elements including plastics, rubber, metal gauze and non-woven fleece made for example from polypropylene or polyacrylonitrile.

[0014] The side edges of the ridge tile will normally be straight. However, instead of being straight, the side edges of the outer ridge component could be profiled so as to mate with the profile of the top row of tiles and have integral sealing features and have integral sealing features instead of a filler element. Advantageously the outer component is formed of a plastics material to achieve the complex shape required.

[0015] Preferably, the outer roof components are each provided with an over-lock at one end thereof and an under-lock at an opposite end thereof to facilitate, in use, mutual interlocking relationship between juxtaposed roof components along a roof structure. Alternatively, the

ends of the outer components are butted together with a plastic seal in-between or the outer components have a longitudinal taper so that they can be laid one on top of the other.

[0016] In other embodiments of the invention the outer roof component is a roof tile or a hip tile. Whatever its form, the outer roof component may be made from a tile mortar composition as a unitary component, e.g. it is a concrete roof tile. Alternatively, the outer roof component may be made from a ceramic composition, e.g. it is a clay roof tile. In a further preferred embodiment the outer roof component is made from a plastics material composition.

[0017] The inner roof component may be in the form of a prefabricated insulated roof panel. In use, such panels are laid side by side on the roof from ridge to eaves. In one embodiment the panels are pre-tiled, for example with conventional roof tiles, except at the side edges. Once installed, the non-tiled area along the joint between panels would be covered by a special tile. This special tile carries a depending key element which is a snap fit in an aperture formed in the non-tiled edge area of the panel.

[0018] This invention also provides a combination of the roof assembly and a roof structure.

[0019] Preferably, the inner roof component comprises a moulding, configured to be retained and supported in complementary configurations formed in the roof structure.

[0020] The inner roof component may conveniently be retained and supported by elements of the roof structure, which elements are provided with the complementary configurations for facilitating, in use, the retention and support of the inner roof component in the roof structure.

[0021] Preferably, where the roof assembly is a ridge assembly, the complementary configurations of the structural elements are formed to facilitate the construction of roofs with various pitches. In one convenient embodiment the inner roof component is configured with a bulbous lower end portion for engagement, in use, with complementary configurations formed in juxtaposed upper end portions of the elements to facilitate the construction of a roof of various pitches.

[0022] The roof structure supporting the inner roof component can be made of wood, metal, plastics or composites; where prefabricated insulated roof panels are used, it may be either independent of or integrated into those panels.

[0023] The present invention may also provide a method of forming a roof comprising the steps of:-

a) providing a roof structure having provision for the retention and support of a series of inner roof components there-along;

b) installing a series of inner roof components along the roof structure; and,

c) securing a series of outer roof components in mutual engagement with the inner roof components along the roof structure, thereby to form a roof assembly.

[0024] The so-formed roof assembly is preferably as described above.

[0025] In a preferred method of forming a roof provided by the present invention a series of inner roof components are offered up seriatim at one end of the roof structure and moved there-along to create a continuous line thereof along the roof structure to thereafter enable a series of outer roof components to be secured in mutual engagement therewith to form a roof.

[0026] In a further method of forming a roof provided by the present invention a series of inner roof components may conveniently be positioned in a continuous line thereof, each inner roof component being supported between an associated pair of retaining hangers to thereby provide support for a series of outer roof components arranged in a continuous line thereof each of which may be located in mutual interlocking engagement with an associated inner roof component to thereby form a roof.

[0027] In a further method of forming a roof provided by the present invention, the inner roof component may be in the form of pre-tiled insulated roof panels laid side by side from ridge to eaves, which thereafter enable a series of outer roof components to be secured in mutual engagement therewith to form a roof.

[0028] There now follows by way of example detailed descriptions of the invention in various forms and methods of forming a roof structure, which description is to be read with reference to the accompanying drawings in which:-

Figure 1 shows an end elevation of a first embodiment of the invention;

Figure 2 is an underside perspective view of an outer ridge component of the first embodiment shown in Figure 1;

Figure 3 is an upper perspective view of the component shown in Figure 2;

Figure 4 is a side elevation in the direction of the arrow IV of Figure 3;

Figure 5 is an underside view of the component shown in Figure 4;

Figure 6 is an upper perspective view of the inner ridge component (6) of the first embodiment shown in Figure 1;

Figure 7 is an end section view through a ridge portion of a roof incorporating the first embodiment of the invention;

Figure 8 is an upper perspective view of an inner component of a second embodiment of the invention;

Figure 9 is an end section view through a ridge portion of a roof incorporating a second embodiment of the invention;

Figure 10 is an upper perspective view of an inner component of a third embodiment of the invention;

Figure 11 is an end section view through a ridge portion of a roof incorporating a third embodiment of the

invention;

Figure 12 is a cross-section of a pair of roof panels utilizing a roof assembly according to a further embodiment of the invention; and

Figure 13 is an end section through a hip portion of a roof incorporating an embodiment of the invention.

[0029] As a departure from traditional roof construction for the roofs of dwellings, the present invention generally provides a novel roof assembly 2 comprising an outer ridge component 4 for mutual interlocking engagement, in use, with an inner ridge component 6 that is supported in a roof structure 8 comprising structural elements 10, see especially Figures 7, 9 and 11.

[0030] Specifically, the outer ridge component 4 comprises a half round ridge tile 12 of concrete, clay or plastic composition, which roof tile 12 is provided with a depending key element 14 integrated with the underside 16 thereof by a suitable means, see Figures 1 to 7. The key element 14, which is moulded from a foamed polystyrene composition, comprises a depending portion 18 of truncated arrowhead cross-section, see particularly Figures 1, 2 and 7.

[0031] The key element 14 is of the same length as the roof tile 12 to which it is attached; however, the element 14 is offset along the length of the roof tile 12, as shown in figures 2, 3, 4 and 5. This arrangement facilitates closure of a gap between adjacent tiles 12, in use on a roof, with an end portion 20 of a first roof tile 12 overlying a protruding end portion 22 of a key element 14 protruding from an adjacent roof tile 12 along a roof ridge.

[0032] The key element 14 provides support for two filler elements 24 and 26 attached to underside wing portions 28 and 30 respectively, see Figures 1, 2 and 5. Each filler element 24 and 26 is of a webbed comb-like configuration 27. The filler elements 24 and 26 are secured in situ on their respective wing portions 28 and 30 by any appropriate means, e.g. an adhesive.

[0033] The inner ridge component 6 is moulded as an elongate element 32 of a foamed polystyrene composition and comprises a lower truncated arrowhead portion 34 and an upwardly facing, open topped, dovetail slot 36 extending along the length thereof, see Figures 1, 6 and 7. The elongate element 32 is supported, in use, on a ridge beam 38 of the roof structure 8 and is held captive by juxtaposed upper end portions 40 and 42 of roof elements 44 and 46 respectively, see Figure 7. The end portions 40 and 42 are configured at 40a and 42a respectively to restrain from uplift portions 48 and 50 of the arrowhead portion 34 when the elongate element 32 is in use on a roof.

[0034] The elements 44 and 46 also provide engagement means such as battens 52 for roof tiles 54.

[0035] After assembly of the ridge beam 38 and the roof elements 44 and 46 of the roof structure 8, a series of elongate elements 32 is introduced at an end of the roof structure 8. The elements 32 are each moved along the roof and into place between adjacent roof elements 44, 44 and 46, 46. When in position, the elongate elements 32 are held captive by the configurations 40a and 42a of their respective roof elements 44 and 46, see Figure 7.

[0036] Roof tiles 54 are then placed on the engagement means 52, as shown in Figure 7, and the roof is completed by the assembly thereon of a series of the outer ridge components 4, the key elements 14 thereof being received in a snap-fit relationship within the dovetail slots 36 of associated inner ridge components 6, see Figure 7.

[0037] A modified roof ridge assembly 102 of the invention is shown in Figures 8 and 9 wherein an outer ridge component 104 is the same as the outer ridge component 4 described herein; however, an inner ridge component 106 comprises a lower platform portion 134 that is received, in use, between configured end portions 140a and 142a of elements 144 and 146 respectively. The assembly of the first modified embodiment is essentially the same as that described above with reference to the Figure 7 embodiment.

[0038] A further modified roof ridge assembly 202 of the invention is shown in Figures 10 and 11 wherein an outer ridge component 204 is the same as the outer ridge components 4 and 104 described herein; however, an inner ridge component 206 is provided with a lower bulbous configuration 234 that is received, in use, between configured end portions 240a and 242a of elements 244 and 246 respectively. The assembly of the further modified roof ridge assembly 202 is essentially the same as those described above with reference to the Figures 7 and 9 embodiments.

[0039] The roof ridge assembly 202 facilitates the formation of a roof of various pitch, that is, the bulbous configuration 234 enables the elements 244 and 246 to be set at any chosen angle within accepted limits for a roof.

[0040] It will be appreciated that many variations and modifications may be made within the scope of the present invention and the roof structures upon which the roof assemblies are used. For example, the roof structure is:-

a) a conventional trussed rafter configuration; or,

b) of structural insulated panel (SIP) configuration; or,

c) of SIP configuration pre-fitted with roof tiles; or,

d) of a special type of SIP that includes cassettes for the location and support of roof tiles.

[0041] The outer ridge component is formed as a single moulded unit of concrete, clay or any convenient mouldable material.

[0042] The ridge tiles and the unitary moulded outer ridge components may comprise over-locks and underlocks at opposite ends thereof for mutual interlocking in use and for sealing the ridge line of a roof against the ingress of driving rain, etc.

[0043] The foamed polystyrene may be replaced by any other suitable composition that may be readily moulded and or machined to obtain the mutually interlocking configurations of the key element 14 and the elongate element 32.

[0044] The filler unit may also be changed for any like product commensurate with preventing the ingress of driving rain or snow to the inside of a roof.

[0045] Referring to the embodiment of the invention shown in Figure 12, adjacent parts of two insulating roof panels 300, 302 are shown, having their side edges in mutual abutment. The panels are pre-assembled with standard roof tiles of which only two 308a and 308b are shown. Each of these standard roof tiles has an underlock 312 formed along one edge and an overlock 314 formed along the opposite side edge. The arrangement is such that, except as indicated below, each of the overlocks 314 mates with an underlock 312 of an adjacent tile to form a weatherproof joint. These roof tiles 308a, b etc. are secured to the panel 300 or 302 by means not shown.

[0046] In the case of the panel 300, the tile 310 pre-assembled thereon is a special tile having a different construction from that of the roof tiles 308a, b etc., being formed with a standard underlock 312 and another underlock 316 along the opposite side edge. The right hand side edge of the roof tile 310 is located short of the side edge 304 of the panel 300.

[0047] In the case of the panel 302, the left hand tile 308a pre-assembled thereon has a left hand edge located somewhat short of the left hand edge 306 of the panel 302.

[0048] The panel 300 has a channel 318 formed therein, adjacent the side edge 304. Along this channel is formed an element 320 defining an upwardly facing open-top dovetail slot 336. The channel 318 and the element 320 extend along the length of the panel, and are formed, for example by moulding, from a foamed material such as foamed polystyrene.

[0049] After the insulating panels 300 and 302 have been positioned on a roof structure (not shown) and fixed thereto by suitable means, the joint between the panels is covered by a special roof tile 322, which is again of different construction from the roof tiles 308a, b etc., being formed with a standard overlock 314 and another overlock 324 along the opposite side edge. The arrangement is such that the overlocks 314, 324 mate with the underlocks 312, 316 of adjacent tiles 308a, 310 respectively to form a weatherproof joint.

[0050] The special roof tile 322 carries on its underside a separately formed depending key element 326 formed, for example, of a foamed material such as foamed polystyrene. The key element has, in cross section, a truncated arrowhead form, so shaped and formed to correspond to the dovetail slot 336 in the element 320, so as to be a snap-fit therein.

[0051] In this embodiment the insulating panel 300 constitutes the inner roof component of the present invention, while the special roof tile 322 constitutes the outer roof component.

[0052] It can be appreciated that the principles described above for constructing a ridge or the joints between pre-tiled insulated roof panels can be adapted to make the hips on a roof. Such a hip assembly is shown in Figure 13 wherein an outer hip component in the form of a hip tile 412 is configured for inter-engagement with an inner hip component 406 supported by roof elements 444 and 446, in a manner similar to the embodiment shown in Figure 9.

Claims

1. A roof assembly (2) comprising an outer roof component (4) configured for mutual interlocking engagement, in use, with an inner roof component (6), which is adapted to be supported in a roof structure (8), **characterized in that** said inner roof component comprises an aperture (36) for receiving, in use, a depending key element (14) of an outer roof component and wherein said outer roof component comprises a separately formed said key element.

2. A roof assembly according to claim 1, wherein said key element of said outer roof component is a snap fit, when in use, in said aperture of said inner roof component.

3. A roof assembly according to either one of claims 1 and 2, wherein said key element of said outer roof component is configured with a shaped protrusion (18) to facilitate the retention thereof in said aperture of said inner roof component, which aperture is configured to be of a shape corresponding to that of said key element.

4. A roof assembly according to any preceding claim, wherein said outer roof component comprises a ridge or hip tile (12) including a filler element (24, 26) and side seals (27) to prevent, in use, the ingress of driving rain or snow.

5. A roof assembly according to claim 4, wherein said filler element is of a webbed comb-like configuration.

6. A roof assembly according to claim 1, wherein the inner roof component (6) is in the form of a prefabricated insulated roof panel (300, 302), the panel being pre-tiled except along at least one side edge (304), and the outer roof component (4) is in the form of a separate roof tile (322), adapted to be positioned in use over the non-tiled side edge (306).

7. The combination of a roof assembly according to any preceding claim with a roof structure, wherein said inner roof component comprises a moulding configured to be retained and supported in complementary

configurations formed in said roof structure.

8. The combination a roof assembly according to any preceding claim with a roof structure (8), wherein said inner roof component is retained and supported by elements (10) of said roof structure, which elements are provided with the complementary configurations for facilitating, in use, the retention and support of said inner roof component in said roof structure.

9. The roof assembly according to claim 8, wherein said roof assembly is a ridge assembly and said complementary configurations (240a, 242a) of said elements are formed to facilitate the construction of roofs with various pitches.

10. A roof assembly comprising an outer roof component (322) configured for mutual interlocking engagement, in use, with an inner roof component (300), which is adapted to be supported in a roof structure, **characterized in that** the inner roof component is in the form of an insulated roof panel comprising an aperture (336) for receiving, in use, a depending key element (326) of said outer roof component.

11. A roof assembly according to claim 10, wherein said key element of said outer roof component is a snap fit, when in use, in said aperture of said inner roof component.

12. A roof assembly according to either one of claims 10 and 11, wherein said key element of said outer roof component is configured with a shaped protrusion to facilitate the retention thereof in said aperture of said inner roof component, which aperture is configured to be of a shape corresponding to that of said key element.

13. A roof assembly according to any one of claims 10 to 12, wherein said outer roof component comprises a separately formed said key element.

14. A roof assembly according to any one of claims 10 to 12, wherein said outer roof component is made as a unitary component.

15. A roof assembly according to claim 1, wherein the inner roof component is in the form of a prefabricated insulated roof panel, the panel being pre-tiled except along at least one side edge (304), and the outer roof component is in the form of a separate roof tile (322), adapted to be positioned in use over the non-tiled side edge (306).

16. A method of forming a roof comprising the steps of:-

a) providing a roof structure (8) having provision for the retention and support of a series of inner roof components there-along;
b) installing a series of inner roof components (6) along said roof structure (8); and,
c) securing a series of outer roof components (4) in mutual engagement with said inner roof components along said roof structure (8), thereby to form a roof assembly,

characterized in that each said inner roof component comprises an aperture (36) for receiving, in use, a depending key element (14) of a said outer roof component and wherein each said outer roof component comprises a separately formed said key element.

17. A method according to claim 16, wherein the roof assembly is according to any one of claims 1 to 6.

18. A method of forming a roof according to claim 16 or 17, wherein said series of inner roof components are offered up seriatim at one end of said roof structure and moved there-along to create a continuous line thereof along said roof structure to thereafter enable said series of outer roof components to be secured in mutual engagement therewith to form the roof.

19. A method of forming a roof according to any one of claims 16 to 18, wherein said series of inner roof components are positioned in a continuous line thereof, each inner roof component being supported between an associated pair of retaining hangers to thereby provide support for said series of outer roof components arranged in a continuous line thereof, each of which is located in mutual interlocking engagement with an associated said inner roof component to thereby form a roof.

20. A method of forming a roof according to claim 16, wherein said inner roof components are each in the form of a pre-tiled insulated roof panel and are laid side by side from ridge to eaves, which thereafter enable said series of outer roof components to be secured in mutual engagement therewith to form the roof.

21. A method of forming a roof comprising the steps of:-

a) providing a roof structure having provision for the retention and support of a series of inner roof components (6) there-along;
b) installing a series of inner roof components along said roof structure; and,
c) securing a series of outer roof components (322) in mutual engagement with said inner roof components along said roof structure, thereby to form a roof assembly,

characterized in that each said inner roof component is in the form of an insulated roof panel (300, 302) comprising an aperture (336) for receiving, in use, a depending key element (326) of a said outer roof component.

22. A method according to claim 21, wherein the roof assembly is according to any one of claims 10 to 15.

23. A method of forming a roof according to claim 21, wherein the said inner roof components are each in the form of a pre-tiled insulated roof panel and are laid side by side from ridge to eaves, which thereafter enable said series of outer roof components to be secured in mutual engagement therewith to form the roof.

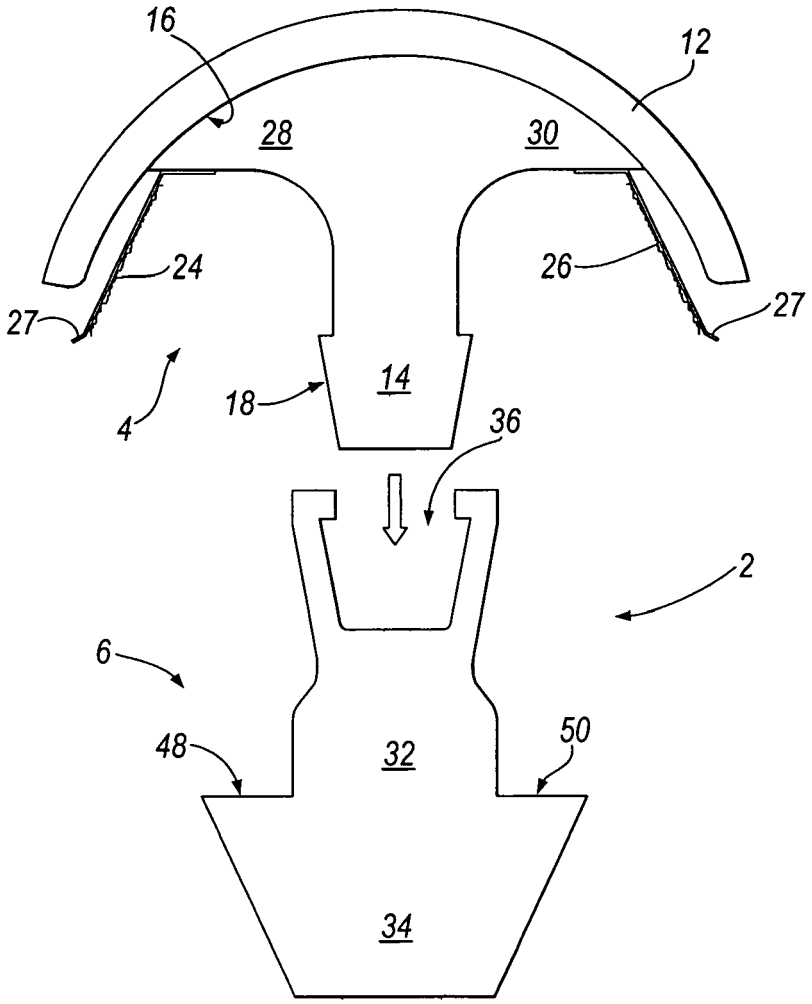

Fig.1

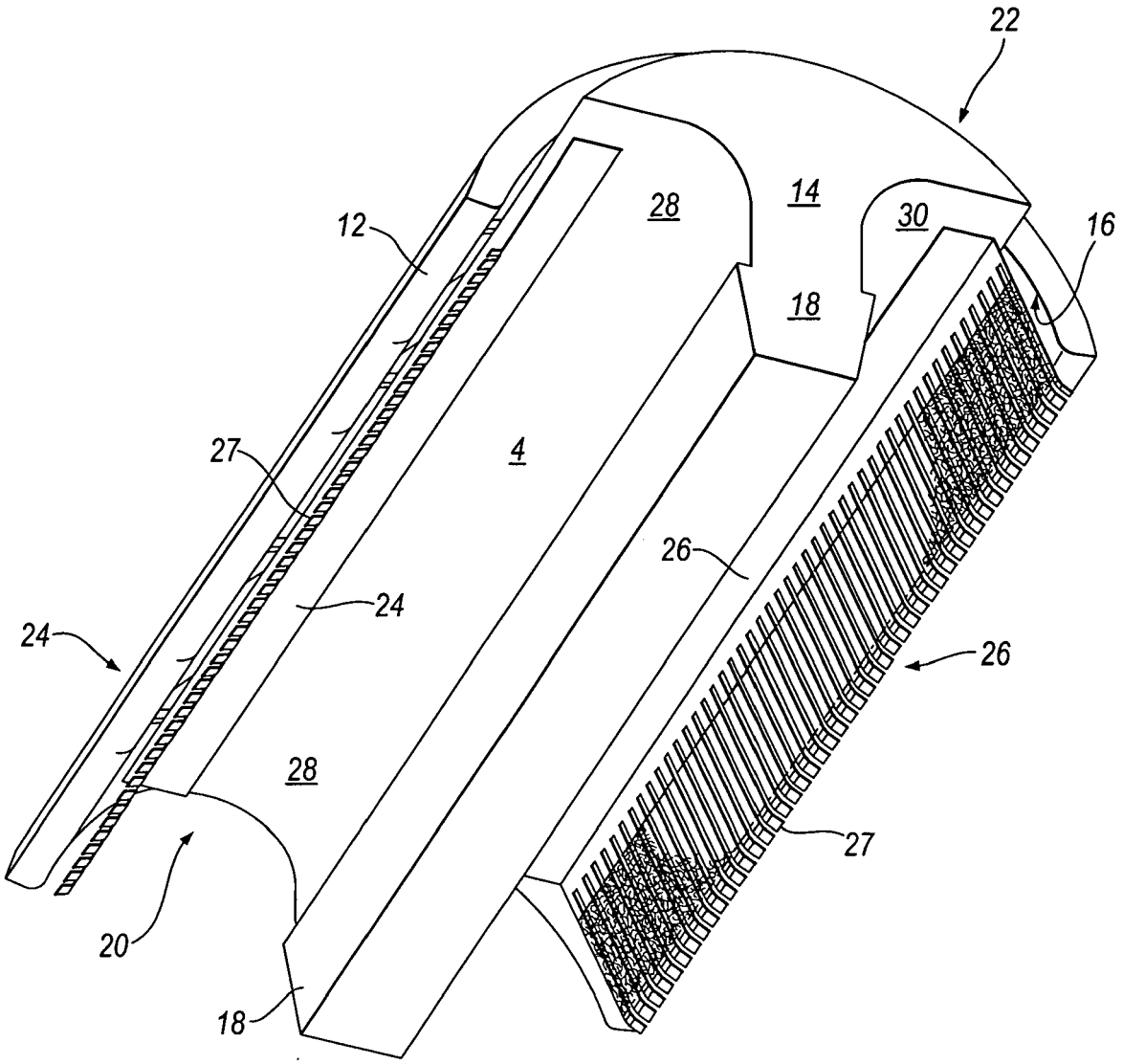

Fig.2

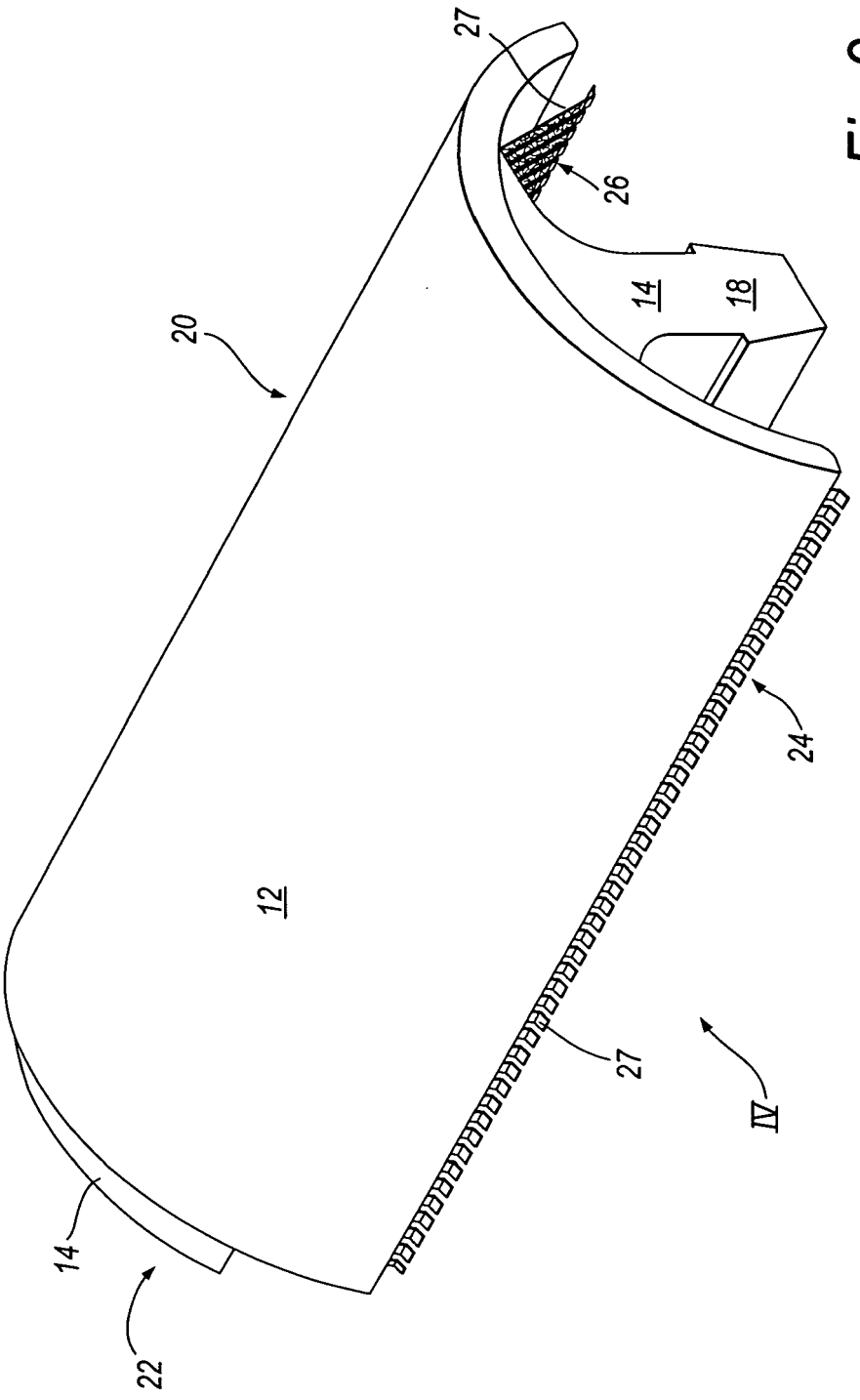

Fig.3

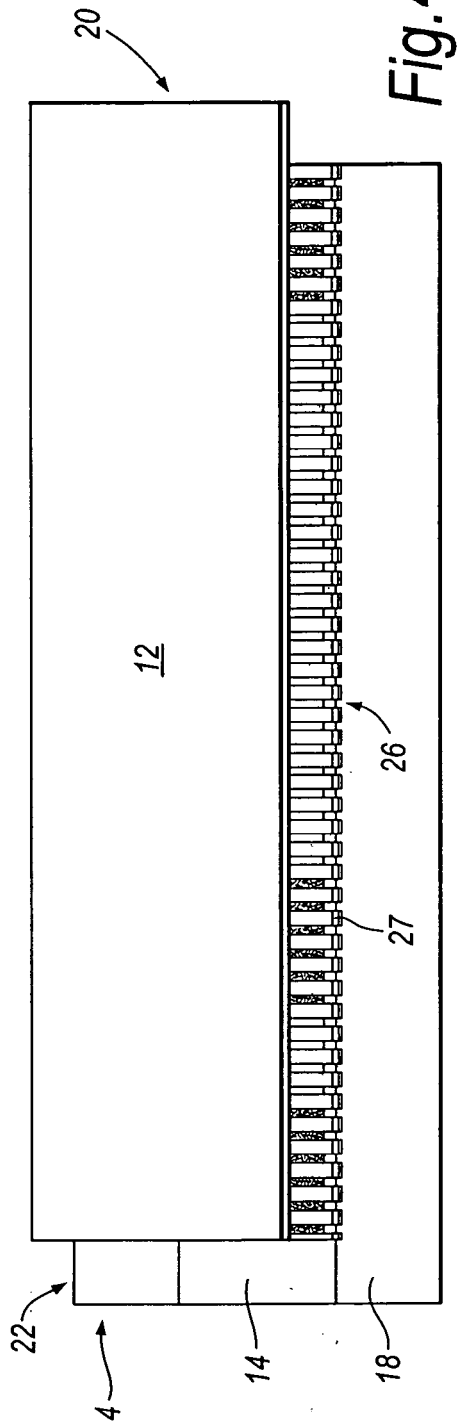

Fig.4

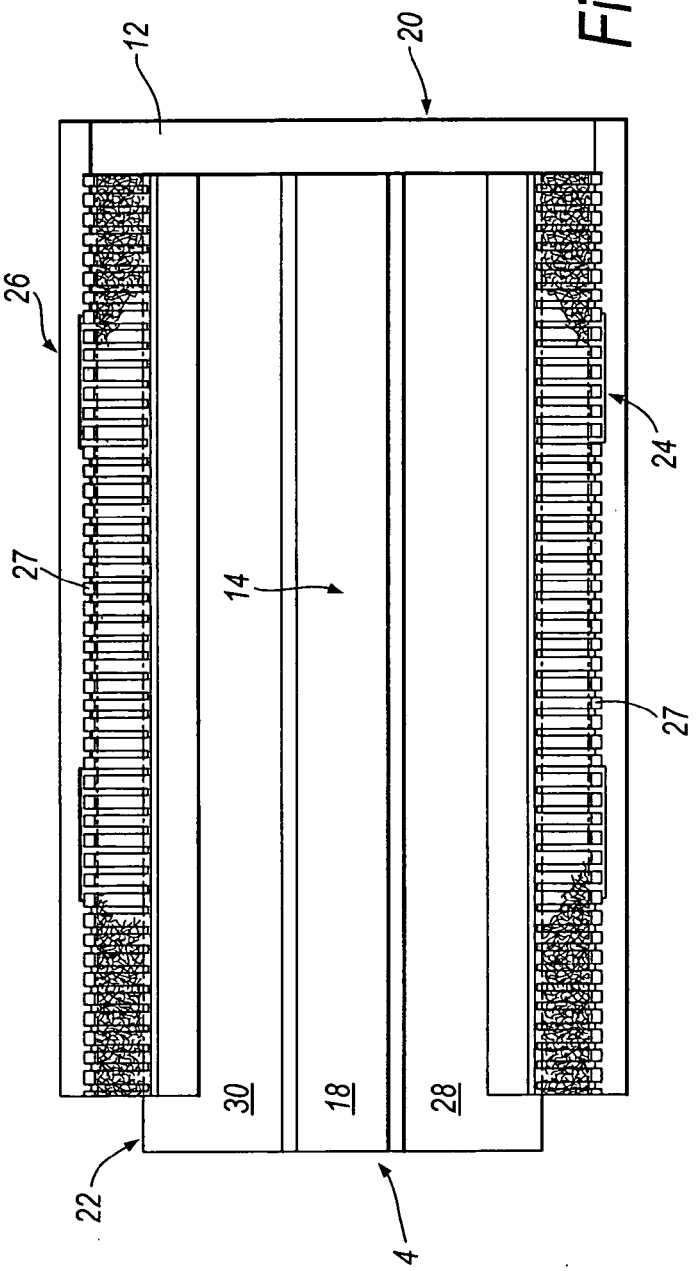

Fig.5

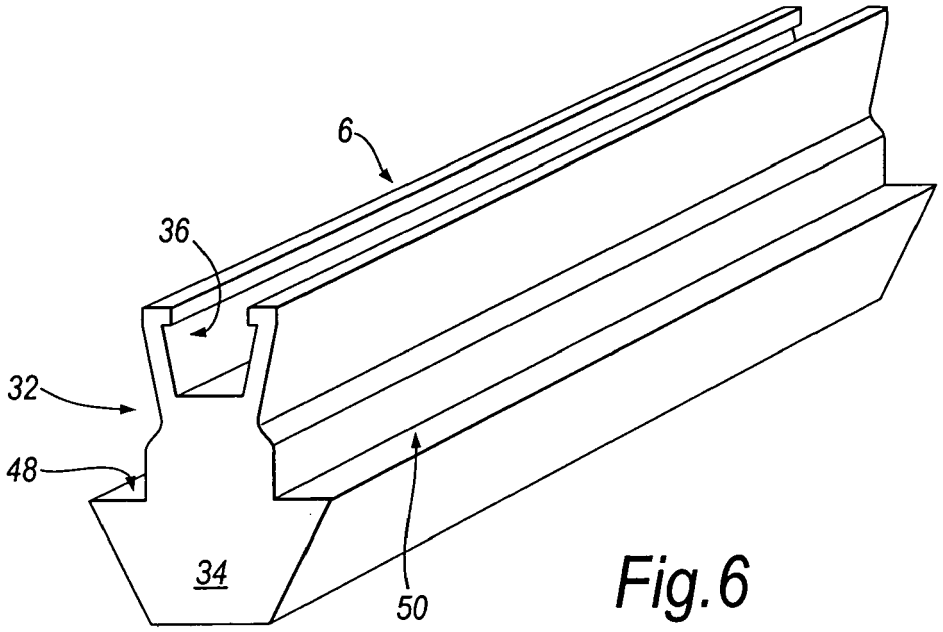
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Fig.6

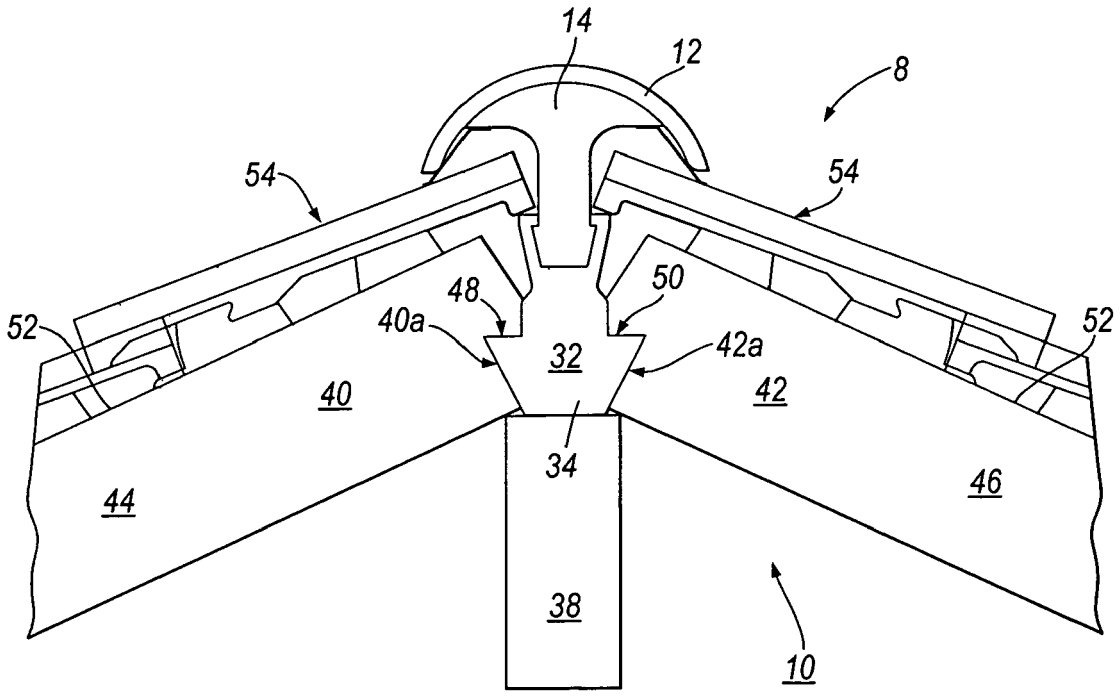
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Fig.7

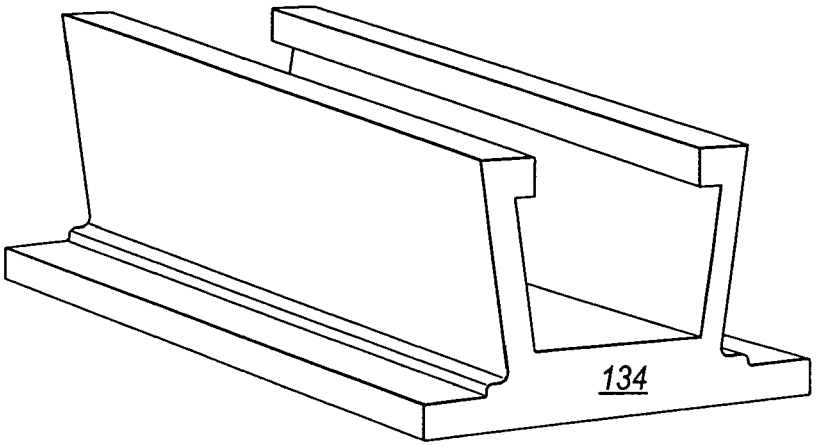


Fig.8

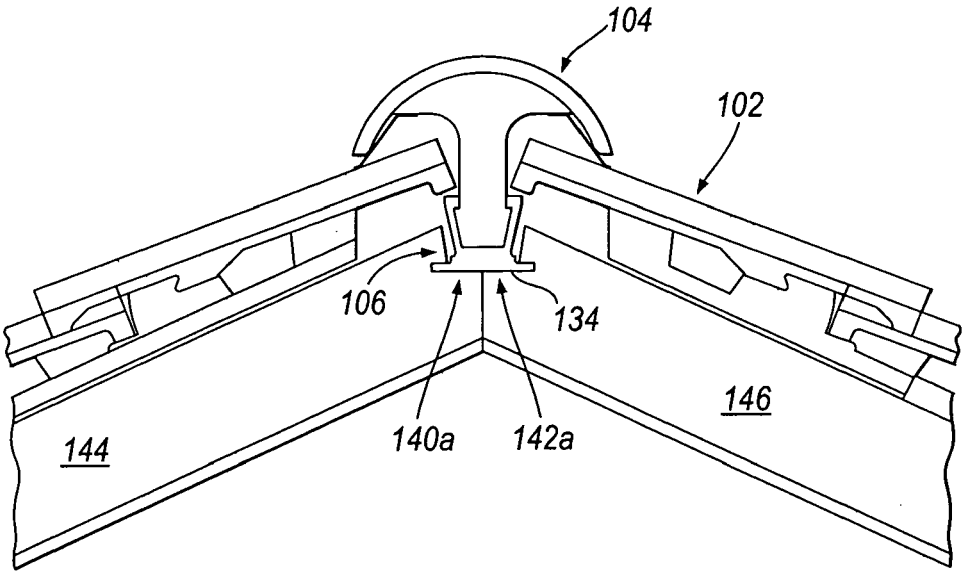


Fig.9

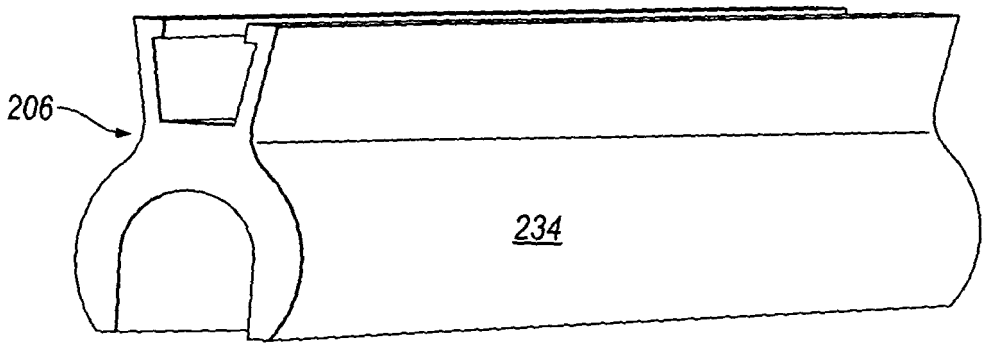


Fig.10

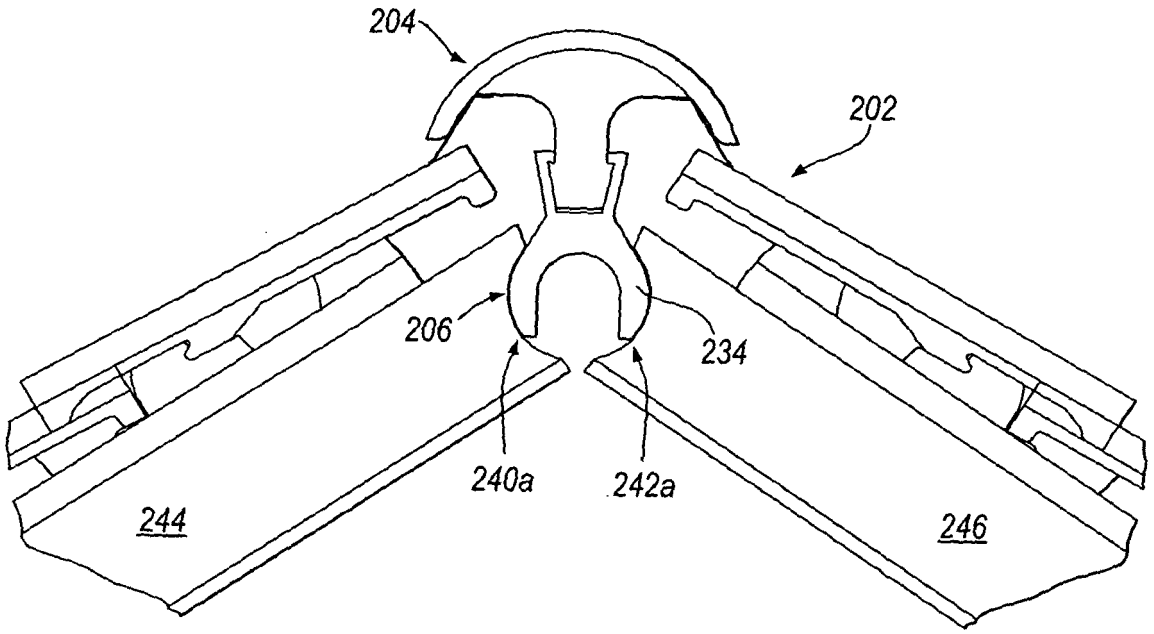
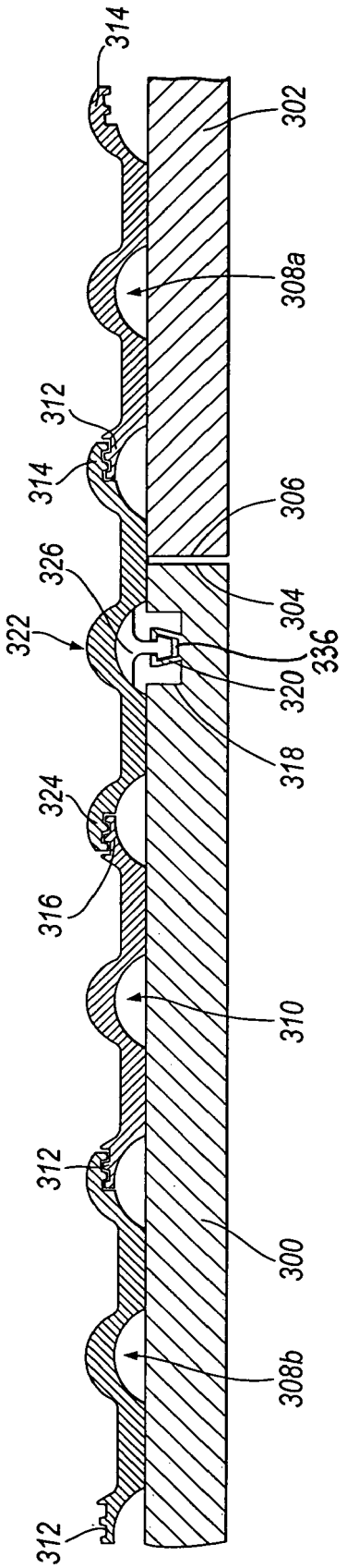


Fig.11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308b
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Fig.12

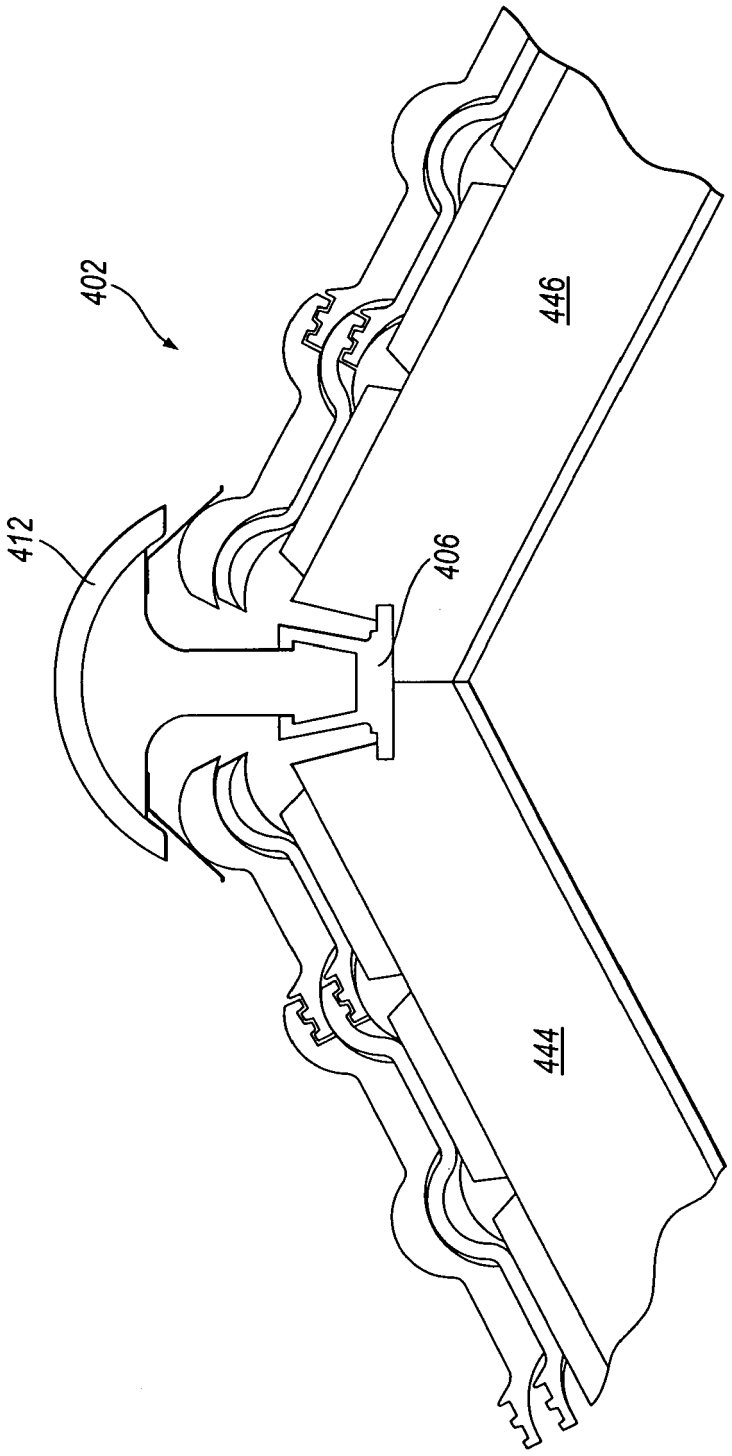

Fig.13

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 3389

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	WO 00/60190 A (LAFARGE DAKPRODUCTEN B V [NL]; VERBOOM BASTIAAN MAARTEN [NL]) 12 October 2000 (2000-10-12) * page 3, lines 19-30; figures 2-4 *	1,3,16, 17 2,4,5, 7-9, 18-20	INV. E04D1/30 E04D1/34 E04D3/35 E04D3/366 E04D3/40 E04D13/17
X	WO 97/25850 A (TIEFENTHALER CARLOS GERMAN [ZA]; BAUER MICHAEL [AT]) 24 July 1997 (1997-07-24) * page 6, paragraph 4; figure 16 *	1	E04B7/22
X Y	FR 93 135 E (BRAAS & CO. GMBH) 14 February 1969 (1969-02-14) * pages 2,3; figures 1,3 *	10-12, 14,21-23 2,7-9, 18-20	
Y	EP 0 117 391 A (BRAAS & CO GMBH [DE]) 5 September 1984 (1984-09-05) * page 6, lines 7-23; figure 1 *	4,5	
X	EP 1 103 669 A (CAPDEVILA BIARNAU RICARD [ES]; MIRALVES SIMO MANEL [ES]) 30 May 2001 (2001-05-30) * paragraphs [0036], [0038], [0042], [0055]; figure 7 *	10,12, 13,21-23	TECHNICAL FIELDS SEARCHED (IPC) E04D E04B
A	FR 2 756 308 A (HUGUENOT FENAL [FR]) 29 May 1998 (1998-05-29)		
A	GB 1 330 711 A (TENAPLAS LTD) 19 September 1973 (1973-09-19)		
A	DE 297 01 169 U1 (OSSENBERG SCHULE & SOEHNE [DE]) 13 March 1997 (1997-03-13)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 November 2007	Vratsanou, Violandi

CATEGORY OF CITED DOCUMENTS

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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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14-11-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0060190 A	12-10-2000	AU 3844800 A	23-10-2000
		EP 1165904 A1	02-01-2002
		NL 1011716 C2	10-10-2000
WO 9725850 A	24-07-1997	AT 6296 A	15-06-1998
		AU 1359497 A	11-08-1997
		EP 0815333 A2	07-01-1998
		NO 974207 A	14-11-1997
FR 93135 E	14-02-1969	NONE	
EP 0117391 A	05-09-1984	AU 561702 B2	14-05-1987
		AU 2506784 A	30-08-1984
		DE 3306837 A1	04-10-1984
		DK 10184 A	27-08-1984
		FI 840750 A	27-08-1984
		GR 81658 A1	12-12-1984
		HU 35318 A2	28-06-1985
		IE 55877 B1	14-02-1991
		JP 1700008 C	14-10-1992
		JP 3064664 B	08-10-1991
		JP 59165754 A	19-09-1984
		NO 840711 A	27-08-1984
		US 4573291 A	04-03-1986
		ZA 8400425 A	27-02-1985
EP 1103669 A	30-05-2001	NONE	
FR 2756308 A	29-05-1998	NONE	
GB 1330711 A	19-09-1973	NONE	
DE 29701169 U1	13-03-1997	NONE	

EPO FORM P0459

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