

(19)



(11)

EP 4 541 981 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.04.2025 Bulletin 2025/17

(21) Application number: **24206981.3**

(22) Date of filing: **16.10.2024**

(51) International Patent Classification (IPC):

E04B 7/02 (2006.01) **E04B 7/20** (2006.01)
E04D 1/34 (2006.01) **E04D 13/16** (2006.01)
E04D 13/17 (2006.01) **E04D 12/00** (2006.01)

(52) Cooperative Patent Classification (CPC):

E04D 13/1612; E04B 7/024; E04B 7/20; E04D 1/34;
E04D 13/1618; E04D 13/1637; E04D 13/172;
E04D 12/006; E04D 2001/347; E04H 9/02

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR

Designated Extension States:

BA

Designated Validation States:

GE KH MA MD TN

(30) Priority: **18.10.2023 IT 202300021678**

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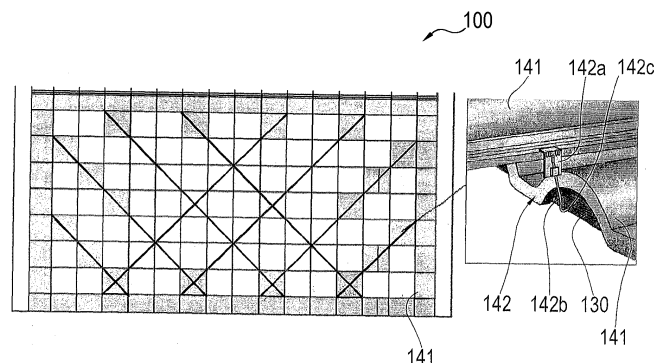
Remarks:

In accordance with Article 14(2), second sentence EPC the applicant has filed a text with which it is intended to bring the translation into conformity with the original text of the application.

(54) **EARTHQUAKE-RESISTANT ROOFING SYSTEM AND METHOD FOR BUILDING LOAD-BEARINGS STRUCTURES**

(57) Earthquake-resistant roofing system comprises one or more pitches (100) for roofing an upper exterior area (2) of a supporting structure (1), each extending in length parallel to a longitudinal direction (X-X) and in width parallel to a transverse direction (Y-Y) and comprising a layer of insulation (110), comprising one or more panels of insulation material and transverse battens (112) rigidly joined to the panels (111) for fastening to the supporting structure by means of first fasteners (113), an aeration layer (120), comprising of transverse laths (121) of aeration, each overlapping in a vertical direction and attached to one of said laths (112) of insulation,

longitudinal laths (130) of anchorage, arranged orthogonally above the laths (121) of aeration at predetermined intervals in the transverse direction and attached to the transverse laths (121) of ventilation by fasteners (131). A roofing membrane (140) comprises a plurality of roofing elements (141) arranged in longitudinal rows and transverse columns above the anchor laths and defining an outer lateral perimeter of the pitch roofing membrane (100). At least all of the perimeter roofing elements (141) arranged along the (144,145) lateral perimeter of the pitch roofing membrane are anchored to an underlying anchor lath (130) by a respective fastener (142).

**Fig.6**

Description

[0001] Form the subject matter of the present invention a roofing system for covering an upper area of a building and a method of making a roofing system for covering an upper area of a building.

[0002] This patent application relates to the technical field of construction engineering and nonstructural roofing (or roofing) systems for covering upper exterior areas of the load-bearing structures of a building, focusing in particular on the earthquake resistance of fastening systems for nonstructural roofing elements, such as the roofing membrane (generally composed of tiles).

[0003] In the context of construction, nonstructural roofing elements are commonly used for aesthetic and practical purposes in order to cover the load-bearing structure of a building with a roof top.

[0004] In this context, a roofing system is known to form the roof of a building. Depending on the conformation of the building, the supporting structure may have an external upper area to be covered with different geometry, usually polygonal, or even a plurality of different upper areas, separated by architectural elements and/or arranged on different levels. Each upper area is covered by one or possibly a plurality of pitches of the roof system, each pitch comprising a plurality of superimposing functional layers. The last layer is generally the roofing membrane, consisting of tiles attached to one of the layers below.

[0005] However, the current technique of attaching these layers to the supporting structure and to each other has significant limitations with regard to their ability to keep the roofing membrane anchored to the supporting structure during seismic events, jeopardizing the safety of the structures and their surroundings.

[0006] Examples of roof coverings that do not provide earthquake resistance are described in CH 702 527.0, DE 35 15 419 and EP 1 582 649 that anchor the supporting battens of the shingles, but not the shingles themselves, which are only supported and therefore subject to uplift in the event of wind or seismic shaking.

[0007] Therefore, the technical problem arises of improving the earthquake resistance of the attachment of the nonstructural roofing elements, particularly the roofing membrane (shingles), in order to ensure that they remain anchored to the supporting structure during seismic events.

[0008] It is also required that the system be easy and inexpensive to manufacture and assemble and easily installed on load-bearing structures of buildings. An additional desirable aspect is that the system be adaptable for covering buildings with upper exterior areas having different geometries and extensions.

[0009] According to one aspect of the invention, such results are achieved by a roofing system comprising one or more pitches for covering an upper exterior area of a load-bearing structure, the one or more pitches being extended in length parallel to a longitudinal direction and

in width parallel to a transverse direction and comprising: a layer of insulation, comprising one or more panels of insulation material and a plurality of transverse battens, each rigidly joined to one of the panels and capable of being attached to the supporting structure by first fasteners so that the one or more panels are attached to the supporting structure; an ventilation layer, comprising a plurality of transverse ventilation battens, each superimposing in a vertical direction and attached to one of said insulation battens; a plurality of longitudinal anchor battens, arranged orthogonally above the ventilation battens at predetermined intervals in the transverse direction, the anchor battens attached to the transverse ventilation battens by fasteners, with at least one fastener arranged at each intersection between a transverse ventilation batten and a longitudinal anchor batten; a roofing membrane, comprising a plurality of roofing elements arranged in longitudinal rows and transverse columns above the anchor battens and defining an outer lateral perimeter of the pitch roofing membrane.

[0010] A subset of selected roofing elements is anchored to one of the longitudinal anchoring battens by a respective anchoring element, so as to anchor the roofing membrane to the underlying layer of anchoring battens; said subassembly includes at least all the perimeter roofing elements arranged along the lateral perimeter of the pitch roofing membrane, which are anchored to an underlying anchoring batten by a respective anchoring element, and starting from the second order inward rows and columns of the roofing membrane (140), the density of anchoring elements (142) is lower than that along the perimeter (144,145) of the roofing membrane (140).

[0011] The applicant surprisingly found that this arrangement, in combination with the attachment of the battens at each intersection with a transverse ventilation batten, gives the roofing system improved earthquake resistance because in the event of a seismic event, the roofing membrane remains anchored to the underlying battens firmly attached to the structure by the underlying insulation and ventilation layers, while retaining some flexibility in anchoring that allows sufficient energy dissipation capacity at the plane of the pitch

[0012] According to a further aspect, the invention pertains to a method of covering an upper exterior area of a load-bearing structure, in which on the upper exterior area to be covered, a covering pitch is formed, extended in length parallel to a longitudinal direction and in width parallel to a transverse direction, by the following steps:

forming an insulation layer, comprising one or more panels of insulation material and a plurality of transverse battens, each rigidly joined to one of the panels, wherein the one or more panels are attached to the supporting structure by first fasteners that secure said transverse battens to the supporting structure; forming a ventilation layer by arranging a plurality of transverse ventilation battens each superimposing

in a vertical direction with one of said insulation battens and fastening each transverse batten to the underlying insulation batten;
 arranging a plurality of longitudinal anchor battens orthogonally above the ventilation battens at predetermined intervals in the transverse direction, and securing the anchor battens to the transverse ventilation battens by fasteners, with at least one fastener arranged at each intersection between a transverse ventilation batten and a longitudinal anchor batten;
 arranging a plurality of roofing elements on longitudinal rows and transverse columns above the anchor battens to form a pitch cover and define an outer lateral perimeter of the pitch cover;
 anchoring a subassembly of selected roofing elements to the longitudinal anchor battens by respective anchoring elements, so as to anchor the roofing membrane to the underlying layer of anchor battens, wherein said subassembly includes at least all perimeter roofing elements arranged along the lateral perimeter of the roofing membrane of the pitch, which are anchored to an underlying anchoring batten by a respective anchoring element, and starting from the second order inward of rows and columns of the roofing membrane (140), the density of anchoring elements (142) is lower than along the perimeter (144,145) of the roofing membrane (140).

[0013] Preferred forms of implementation are described in the attached dependent claims, referred to here in full. More details may be gleaned from the following description of a non-limiting example of the implementation of the subject matter of this invention made with reference to the attached drawings, which show:

in figure 1: a partially exploded and sectioned view of a roof covering comprising an example of the implementation of the roofing system according to the present invention, comprising two pitches side by side along a ridge line;

in figure 2: a partially exploded schematic view of a phase of fixing the insulation layer of one pitch of the roofing system in fig. 1;

in figure 3: a partially exploded schematic view of a phase of fixing ventilation battens of one pitch of the roofing system of fig. 1;

in fig. 4: a partially exploded schematic view of a phase of fixing roofing membrane anchoring battens of one pitch of the roofing system in fig. 1;

in figure 5: a partially exploded schematic view of a phase of anchoring the roofing membrane of one pitch of the roofing system in fig. 1;

in figure 6: a schematic view of the arrangement of the anchoring elements of the roofing membrane of one pitch of the roofing system of fig. 1, with an enlargement of an example of anchoring a tile to the anchoring batten.

[0014] Figure 1 schematically shows the load-bearing structure 1 of a building whose upper exterior surface includes two areas 2 sloping convergent and flanked along an upper perimeter line. A roof covering 10 comprises an example of the implementation of the roofing system according to the present invention, comprising two pitches 100 converging and flanking each other along a ridge line 3 at which the roof 10 is closed by a row of ridge tiles.

[0015] Each stratum 100 covers an upper area 2 extended in a plane parallel to a transverse axis Y-Y in width and a longitudinal axis X-X in length; in the transverse direction Y-Y, the area 2 is extended between the upper perimeter line and a lower perimeter line 2b, while in the longitudinal direction X-X the area 2 is extended between opposite lateral perimeter lines 2a. Although pitches 100 are illustrated for covering areas 2 with rectangular shape, it is understood that the perimeter lines 2a,2b are not necessarily straight or parallel and that each area 2 to be covered may have different shape of the lateral perimeter, e.g. polygonal with four or more sides, with the perimeter lines including one or more of said sides. Conventionally, in preferred forms of implementation, at the side perimeter 2a sides of area 2, preferably at the side perimeter sides of each stratum 100, lateral retaining planks 5 may be arranged, attached to the supporting structure 1 and in the example extended parallel to the Y-Y transverse direction. Similarly, at the lower perimeter line 2b one or more starting planks 4 may be arranged. At the upper perimeter line there may generally be a sub-ridge assembly supporting the ridge tiles 3.

[0016] In particularly preferred forms of implementation, to improve the seismic resistance of the roofing system, the sub-ridge assembly includes a longitudinal ridge-holding batten, and preferably all ridge caps 3 are attached to the ridge-holding batten by a respective ridge-holding hook. The end 3 ridge tiles of the ridge row are also preferably fastened to the sub-colm batten by appropriate wood screws.

[0017] With continuous reference to Fig. 1 and further reference to Figures 2-6, some non-limiting examples of a roofing system 10 and a related method of realization for roofing an area 2 of the supporting structure 1 of a building to be covered with a roof will be illustrated below.

[0018] The examples are given with reference to the realization of a single pitch 100 of roofing system 10 covering a designated area 2; however, it will be apparent to the experienced technician that the lessons provided are readily applicable for the realization of roofing systems with multiple pitches, arranged side-by-side or otherwise connected, or for the roofing of load-bearing structures having multiple areas to be covered. The experienced technician will therefore be able to adjust the design to achieve an appropriate geometry and arrangement of the single- or multiple-pitch roofing system such that it meets the architectural and design requirements of the building.

[0019] A pitch 100 of the roof system of the present invention is itself extended in the longitudinal-transverse X-Y direction with a lateral perimeter, generally polygonal and having a shape corresponding or similar to the lateral perimeter of the area 2 to be covered. System 100 comprises a plurality of layers stacked along a vertical height direction, comprising: a vapor barrier layer 101 (optional), an insulation layer 110, a layer comprising transverse ventilation battens 120, a layer 130 of longitudinal anchoring battens, and a roofing membrane 140.

[0020] Referring to Fig. 2, the insulation layer 110 is interposed between the supporting structure 1 and the roofing membrane 140 and includes one or more panels 111 of suitable insulation material to thermally insulate the supporting structure from the external environment. A preferred material may, for example, be expanded polystyrene. In the example in Fig. 2, six 111 panels are shown side by side in the longitudinal X-X direction.

[0021] Each panel 111 has at least one batten 112 integrated or preassembled within it, extended in the Y-Y transverse direction between two opposite longitudinal sides 114 perimeter of panel 111. The battens 112 are specifically of wood material.

[0022] The insulation layer 110 is attached to the supporting structure by a plurality of first fasteners 113, particularly comprising wood/cement fastening screws. Preferably, at least two fasteners 113 are used for each transverse batten 112, arranged spaced apart in the transverse direction. A distance between fasteners 113 along the same batten is preferably a maximum of 120cm.

[0023] According to a particularly preferred aspect, each fastener 113 is arranged at a distance d2 less than or equal to 65cm, preferably about 60cm, from the longitudinal perimeter side 114 of the insulating layer 110 closest to it. A depth of penetration of the fasteners 113 into the supporting structure is preferably at least 3cm.

[0024] The fasteners 113 allow optimal attachment of the roofing system to the supporting structure 1 even during seismic events.

[0025] Also shown schematically in Fig. 2 are the starting plank 4 and the side planks 5 that can be fixed at the perimeter sides of area 2 by respective structural screws arranged, for example, every 60cm.

[0026] Fig. 3 shows the fixing stage of ventilation layer 120 on insulation layer 110. The ventilation layer 120 comprises a plurality of transverse ventilation battens 121, each fixed on a respective batten 112 of the insulation layer. Each ventilation batten 121 is attached to an underlying batten 112 by a plurality of second fasteners 122, particularly wood-to-wood fastening screws.

[0027] Preferably, a transverse distance d3 of the first fastener 122 from the outer longitudinal side of the panel 111 is between 1/3-2/3 of d2, preferably 1/2 of d2. This particularly avoids damaging the insulation layer 110 batten with screws 113, 122 that are too close together.

[0028] A distance d4 between successive fasteners

122 along batten 121 is configured to avoid overlap with screws 113 below, and is preferably greater than d3 and d2, preferably equal to 90cm. The number of fasteners 122 is for each batten 121 preferably greater than the number of insulation-structure fasteners 113 of the underlying batten 112, preferably at least 3 fasteners per panel 111.

[0029] A waterproofing sheathing 115 may be interposed between the insulation layer panels 110 and the ventilation battens 121.

[0030] Fig. 4 shows the stage of fixing the layer of longitudinal 130 anchoring battens for the 140 roofing membrane. The longitudinal anchorage battens 130 are mounted orthogonal to the ventilation battens 121. At each junction between transverse 121 ventilation batten and longitudinal 130 anchorage batten there is a third wood-wood 131 fastener that attaches the anchorage batten to the ventilation batten 121 below.

[0031] A transverse distance D5 between third 131 fasteners mentioned above can be chosen based on a desired pitch between roofing shingles 140 and is generally less than the previous distances d2, d4 and greater than d3.

[0032] Fig. 5 shows the roofing system 100 at a stage of laying and anchoring the roofing membrane 140.

[0033] The roofing membrane 140 of a pitch comprises a plurality of roofing elements 141, generally in the form of tiles, arranged on longitudinal rows and transverse columns. Adjacent roofing elements in the transverse direction are partially superimposing so that the elements 141 of an upper row partially retain the elements 141 of the lower row toward the supporting structure 1.

[0034] A subset of selected roofing elements 141 is anchored to the underlying layer of anchoring battens 130 by a respective anchoring element 142, which anchors the roofing element 141 to one of the longitudinal battens 130.

[0035] Referring to Fig. 6, each anchoring element may be a hook 142 with a head 142a configured for stable coupling to an edge of the roofing element 141 and an arm 142b extended from the head 142a toward the longitudinal batten 130 to which it is attached by means of a free fastening end. Preferably, the arm 142b is L-shaped with a long side extended vertically from the head 142a and a short side conformed with said fastening end 142c.

[0036] Once laid, the roofing membrane 140 defines a lateral perimeter of the pitch 100, in the example having longitudinal sides 144 and transverse sides 145, which in the example substantially corresponds to the lateral perimeter of the area 2 to be covered.

[0037] According to a novel aspect of the finding, at least all of the perimeter 141 roofing elements arranged along the perimeter 144, 145 of the pitch 100 of the roofing system, i.e., in the first top row, the first bottom row, and the first side columns, are anchored to an underlying anchor batten 130 by a respective attachment element 142.

[0038] The applicant surprisingly found that such an

arrangement, in combination with the attachment of the battens 130 at each junction with a cross ventilation batten 121, gives the roofing system 100 improved earthquake resistance because, in the event of a seismic event, the roofing membrane 140 remains anchored to the underlying battens 130 firmly attached to the structure by the underlying insulation 110 and ventilation 120 layers, while retaining some flexibility in the anchoring 142 that allows sufficient energy dissipation capacity in the X-Y plane of the pitch.

[0039] Having generally predefined dimensions of the roofing 141 elements, depending on the actual longitudinal and transverse dimensions of the area 2 to be covered and thus of the 100 pitch it may be that it is not possible to cover the entire area 2 with an exact number of roofing 141 elements of the roofing membrane of predefined size. In such cases, one or more of the perimeter roofing elements of stratum 100 may include an additional part of roofing element, which is cut to size and glued in an outer lateral position to a whole roofing element to form a single solid body. In order to impart satisfactory earthquake resistance to the perimeter roofing elements formed in this way, it is preferred to use a single-component polyurethane adhesive for bonding, e.g., the turret adhesive produced by BMI Group, which is a solvent-free single-component polyurethane adhesive that reacts by exposure to atmospheric moisture and has excellent water resistance (according to EN 204, D4) and good chemical resistance.

[0040] It is understood that in these cases the perimeter roofing element 141 consists of the whole element and the cut element glued together, and the anchoring element 142 is preferably attached to the whole element of the perimeter tile. From the second-order inward rows and columns of the roofing membrane 140, the anchor density 142 is preferably lower than that along the perimeter 144, 145.

[0041] As detectable in Fig. 6, under preferred forms of implementation, there is preferably one 142 anchor element for every three 141 roofing elements in the second order of rows and columns of the roofing membrane, although different distributions are possible depending on the specific design.

[0042] According to a further preferred form of implementation, it is envisaged that the perimeter (141) roofing elements arranged along the perimeter (144, 145) side of the pitch (100) roofing membrane and the roofing elements placed from the second order inward of rows and columns of the roofing membrane (140), equipped with a respective anchor element (142) are arranged in a diagonal crisscross pattern.

[0043] As shown in Figure 6, it is preferably expected that the shingles 141 arranged in the innermost portion of the pitch of the fourth order of columns and the third order of rows may be substantially free of anchoring elements 142.

[0044] Thus, it appears that the roofing system of the present invention allows for roofs that can withstand most

seismic events without the roofing membrane being detached from the supporting structure.

[0045] The special arrangement of the anchors and fasteners of the superimposing layers ensures both that the entire roofing system remains integral to the load-bearing structure and that the engaged roofing membrane is retained while still allowing the necessary flexibility of the anchorage for energy dissipation.

Claims

1. Earthquake-resistant roofing system comprising one or more pitches (100) for covering an upper external area (2) of a load-bearing structure (1), the one or more pitches (100) extending in length parallel to a longitudinal direction (X-X) and in width parallel to a transverse direction (Y-Y) and comprising:

an insulation layer (110) comprising one or more panels of insulating material and a plurality of transverse battens (112), each rigidly joined to one of the panels (111) and designed to be fixed to the load-bearing structure by means of first fasteners (113) so that the one or more panels (111) are fixed to the load-bearing structure (1); a ventilation layer (120) comprising a plurality of transverse ventilation battens (121) ventilation, each superimposed in a vertical direction and fixed to one of said insulation battens (112); a plurality of longitudinal anchoring battens (130), arranged orthogonally above the ventilation battens (121) ventilation at predefined intervals in the transverse direction, the anchoring battens (130) fixed to the transverse ventilation battens (121) ventilation by means of fasteners (131), with at least one fastener (131) arranged at each intersection between a transverse ventilation batten ventilation (121) and a longitudinal anchoring batten (130);

a roofing cover (140), comprising a plurality of roofing elements (141) arranged in longitudinal rows and transverse columns above the anchoring battens and defining an outer lateral perimeter of the roofing cover of the pitch (100),

characterized in that

a sub-set of selected roofing elements (141) are anchored to one of the longitudinal anchoring battens (130) by a respective anchoring element (142), so as to anchor the roofing cover (140) to the underlying layer of anchoring battens (130); said sub-set includes at least all the perimeter roofing elements (141) arranged along the lateral perimeter (144, 145) of the roofing cover of the pitch (100), which are anchored to an underlying anchoring batten (130) by means of a respective anchoring element (142).

starting from the second order inwards of rows and columns of the roofing cover (140), the density of anchoring elements (142) is lower than that along the perimeter (144, 145) of the roofing cover (140).

2. Earthquake-resistant roofing system (100) according to claim 1 **characterized in that** the perimeter (141) roofing elements arranged along the perimeter (144, 145) side of the roofing cover of the pitch (100) and the roofing elements placed from the second order inwardly of rows and columns of the roofing cover (140), equipped with a respective anchoring element (142) are arranged in a diagonal crisscross pattern.
3. Earthquake-resistant roofing system (100) according to any one of the preceding claims, wherein the insulation layer (110) comprises a plurality of panels (111) of insulating material arranged alongside each other in the longitudinal direction (X-X), each panel (111) having within it at least one batten (112) extended in the transverse direction (Y-Y) between two opposing longitudinal perimetral sides (114) of the panel (111).
4. Earthquake-resistant roofing system (100) according to any one of the preceding claims, wherein each of the panels (111) comprises longitudinal perimetral sides arranged opposite each other in a transverse (Y-Y) direction, the system comprising at least two first fasteners (113) for fixing each transverse batten (112) to the load-bearing structure, at least one first fastener (113) being arranged at a distance transverse (d2) smaller than or equal to 65 cm, preferably of about 60 cm, from each longitudinal perimeter side (114) of the panel (110).
5. Earthquake-resistant roofing system (100) according to any of the preceding claims, wherein each ventilation batten (121) is secured to an underlying transverse batten (112) of the insulation layer (110) by a plurality of second fasteners (122), and wherein:
 - a. One of the second fasteners (122) is arranged at a distance (d3) in the transverse direction (Y-Y) from each longitudinal perimeter side of the associated panel (111) between 1/3 and 2/3 of d2, preferably about 1/2 of d2; and/or
 - b. A distance (d4) between successive second fasteners (122) along the ventilation batten (121) is configured to avoid superimposition on first fasteners (113) of the underlying insulation batten, and is preferably greater than d3 and d2; and/or
 - c. The number of second fasteners (122) is for each ventilation batten (121) greater than the number of first fasteners (113) of the underlying insulation batten (112), preferably including at

least three second fasteners per panel (111).

6. Earthquake-resistant roofing system (100) according to any one of the preceding claims, wherein a waterproofing sheath (115) is interposed between the panels (111) of the insulation layer (110) and the ventilation battens (121).
7. Earthquake-resistant roofing system (100) according to any one of the preceding claims, wherein adjacent roofing elements in the transverse direction are partially superimposing so that the roofing elements (141) of an upper row partially retain the roofing elements (141) of the lower row toward the supporting structure (1).
8. Earthquake-proof roofing system (100) according to any one of the preceding claims, wherein the anchoring elements comprise a hook (142) with a head (142a) configured for stable coupling on an edge of the covering element (141) and an arm (142b) extending from the head (142a) toward the longitudinal batten (130) to which it is fixed by means of a fastener free end.
9. Earthquake-resistant roofing system (100) according to the preceding claim, wherein the arm (142b) is L-shaped with a long side extending downwards from the head (142a) and a short side formed with said fastener end (142c).
10. Earthquake-resistant roofing system (100) according to any of the preceding claims, wherein the roofing elements (141) arranged in a region inner to the fourth-order columns and third-order rows of the roofing cover are without anchoring elements (142).
11. Earthquake-proof roofing system (100) according to any one of the preceding claims, wherein one or more of said perimeter roofing elements (141) of the pitch (100) is formed with a first part comprising a first whole tile and with an additional part comprising a portion of a second tile cut to size and glued to an outer sidewall of the first part by means of a monocomponent polyurethane adhesive, and wherein the associated anchoring element (142) is attached to the first part of the perimeter roofing element.
12. Earthquake-resistant roofing system (100) according to any one of the preceding claims, further comprising one or more lateral battens arranged at respective one or more lateral perimeter sides of the pitch (100) and attached to the load-bearing structure.
13. Earthquake-resistant roofing system (100) according to any one of the preceding claims further com-

prising a ridge assembly arranged along an upper longitudinal perimeter side of a pitch (100), a ridge support batten supporting a series of ridge tiles (3) arranged in a row in the longitudinal direction, wherein each of the ridge tiles (3) is fixed to the ridge-support batten by a respective ridge-fixing hook and the end ridge tiles (3) of the ridge row are further fixed to the ridge-support batten by means of fixing screws.

- 14.** Earthquake-resistant method of covering an upper external area (2) of a load-bearing structure (1), wherein, a roof pitch (100) is formed on the upper external area to be covered, extending in length parallel to a longitudinal direction (X-X) and in width parallel to a transverse direction (Y-Y), by means the following steps:

forming an insulation layer (110), comprising one or more panels of insulating material and a plurality of transverse battens (112), each rigidly joined to one of the panels (111), wherein the one or more panels (111) are fixed to the load-bearing structure by means of first fastening elements (113) which fix said transverse battens to the load-bearing structure (1);
forming ventilation layer (120) by arranging a plurality of transverse battens (121) ventilation each superimposed superimposing in a vertical direction on one of said insulation battens (112) and securing each transverse batten (121) to the underlying insulation batten (112);
arranging a plurality of longitudinal anchoring battens (130) orthogonally ventilation over the ventilation battens (121) at predefined intervals in the transverse direction, and securing the anchor battens (130) to the transverse ventilation battens (121) by means of fasteners (131), with at least one fastener (131) arranged at each intersection between a transverse ventilation (121) and a longitudinal anchor batten (130);
arranging a plurality of roofing elements (141) in longitudinal rows and transverse columns on top of the anchoring battens so as to form a roofing cover (140) of the pitch and define an outer lateral perimeter of the roofing cover (140) of the pitch (100);
anchoring a subset of selected roofing elements (141) to the longitudinal anchoring battens (130) by means of respective anchoring elements (142), so as to anchor the roofing cover (140) to the underlying layer of anchoring battens (130);
wherein said subset includes at least all the perimetral elements (141) arranged along the lateral perimeter (144,145) of the roofing cover of the pitch, which are anchored to an underlying anchoring batten (130) by means of a respective

anchoring element (142); and in which from the second order inward rows and columns of the roofing cover (140), the density of anchoring elements (142) is lower than that along the lateral perimeter (144,145) of the roofing cover (140).

- 15.** Earthquake-resistant method according to claim 14, wherein the roofing system is formed in accordance with any one of claims 2-13.

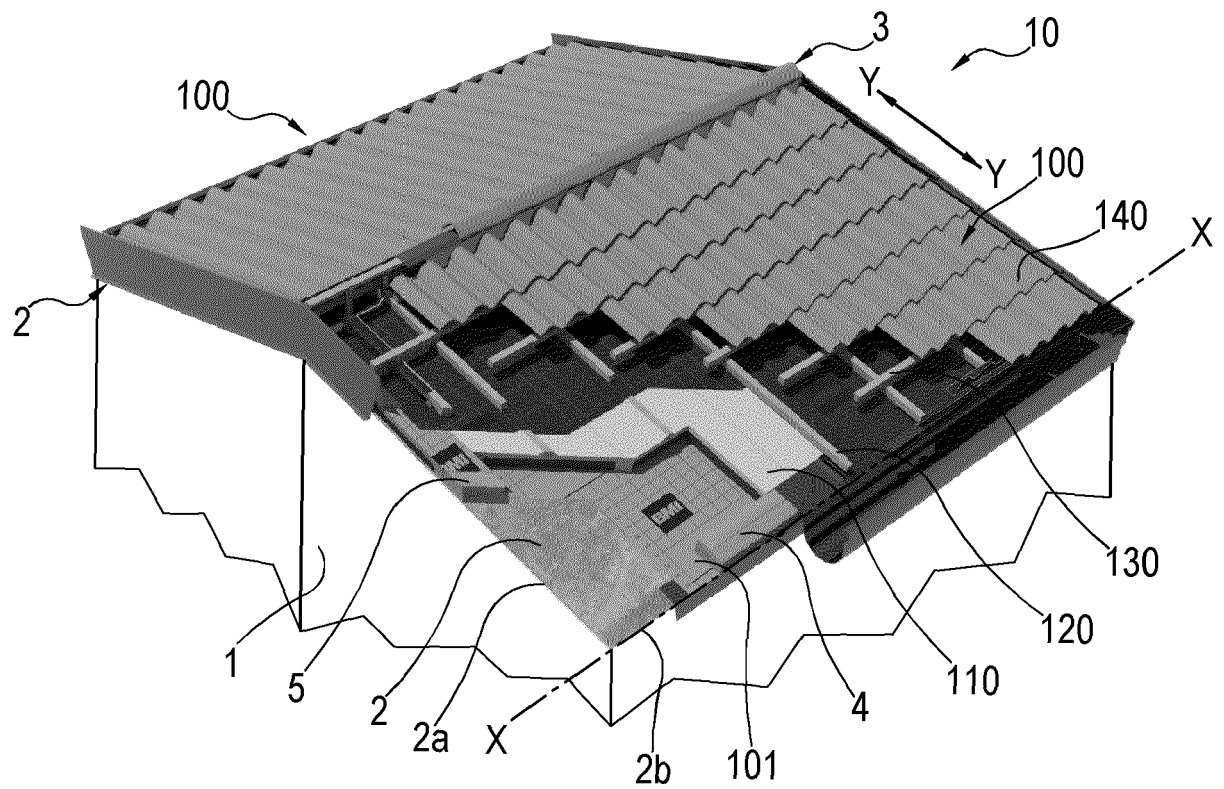


Fig.1

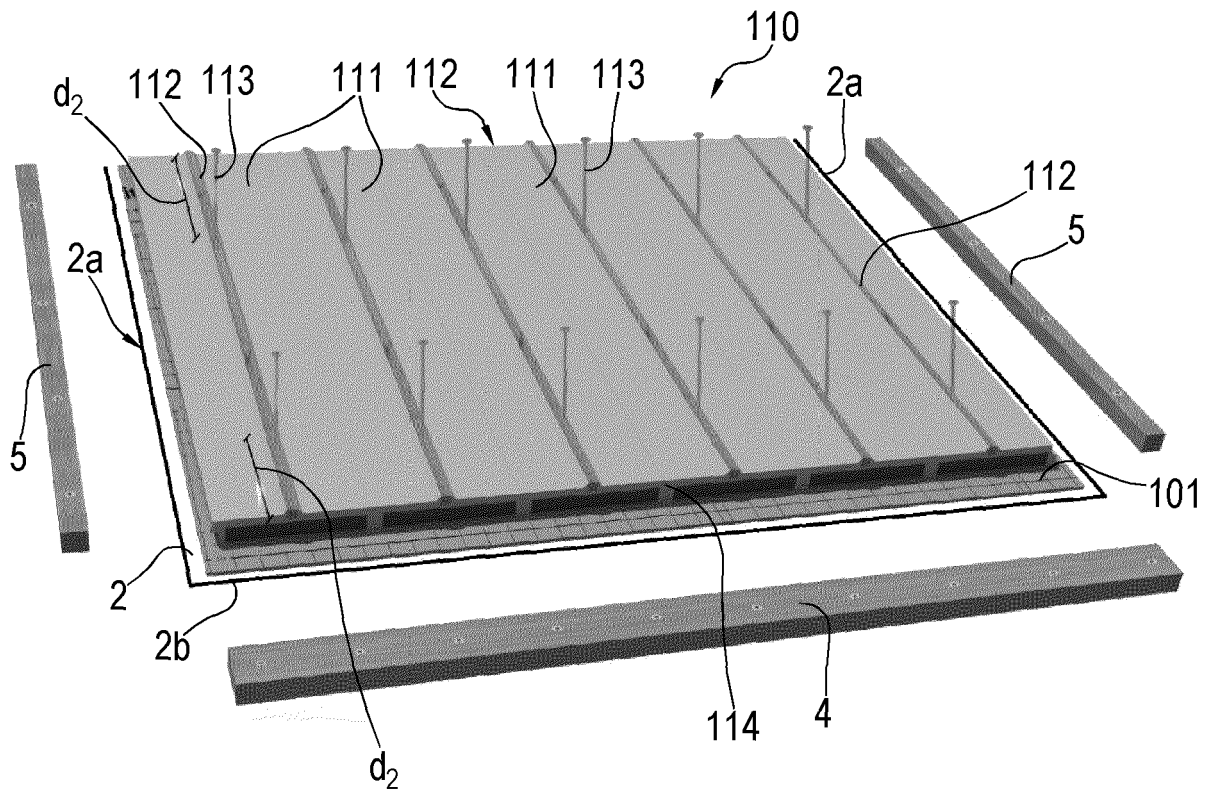


Fig.2

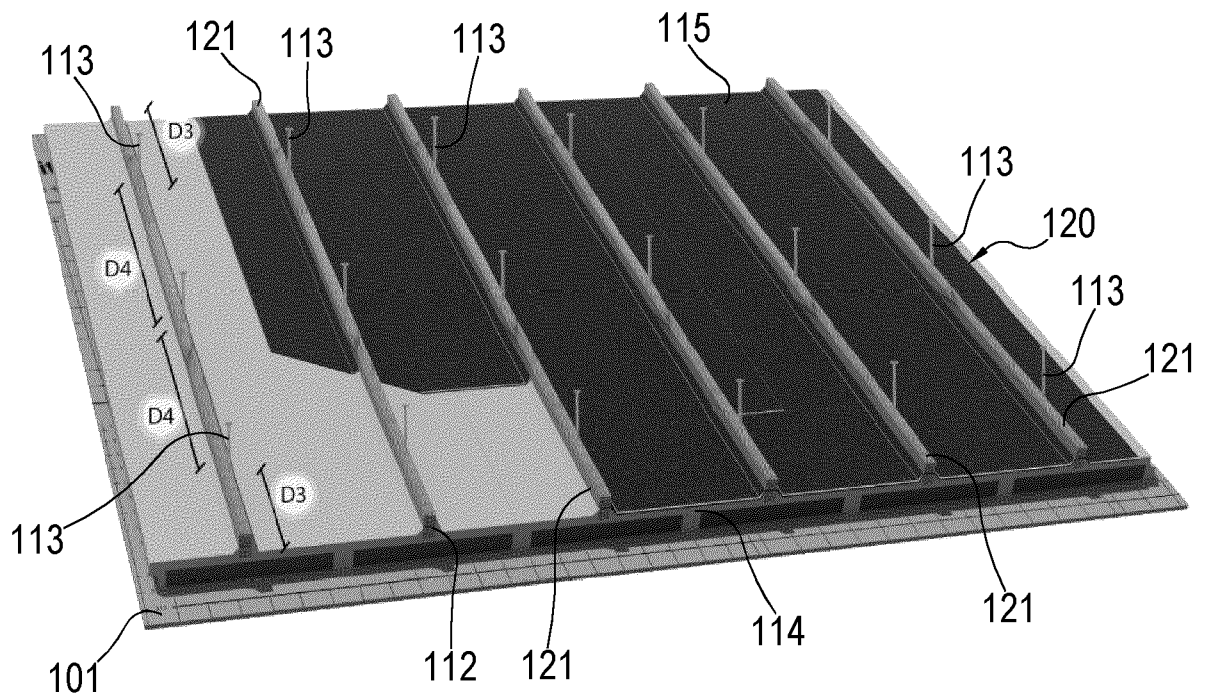


Fig.3

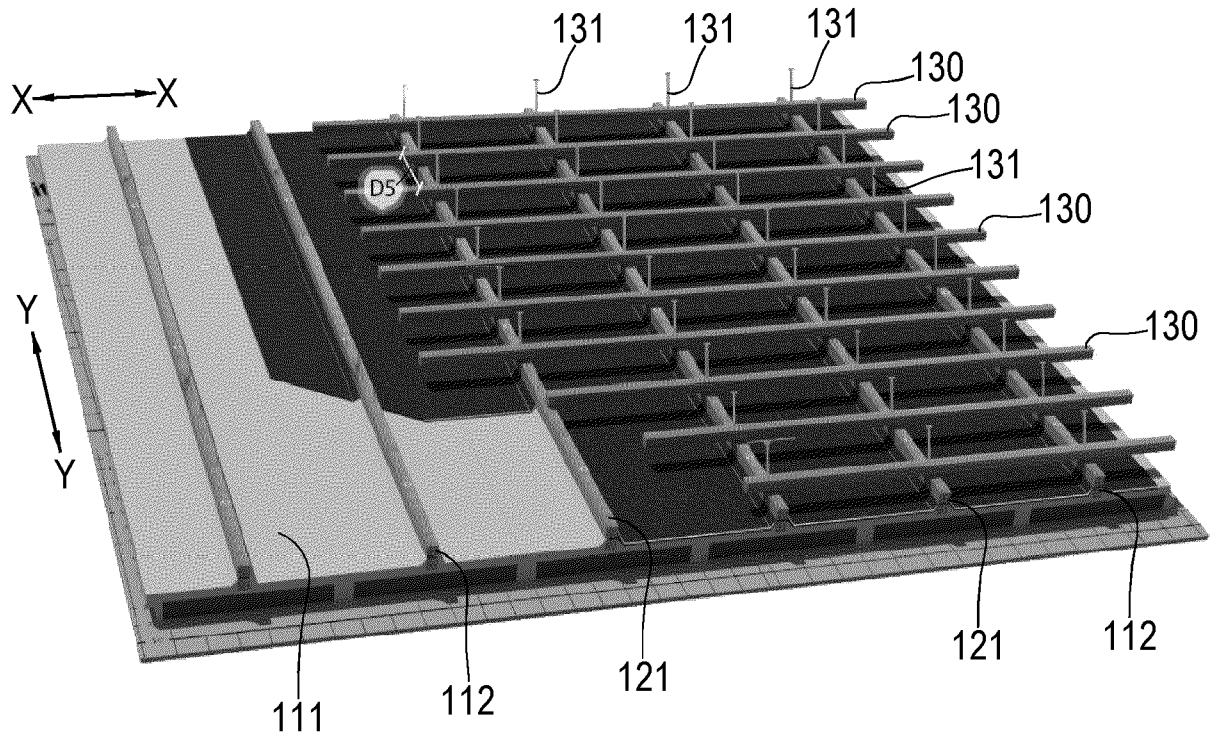


Fig.4

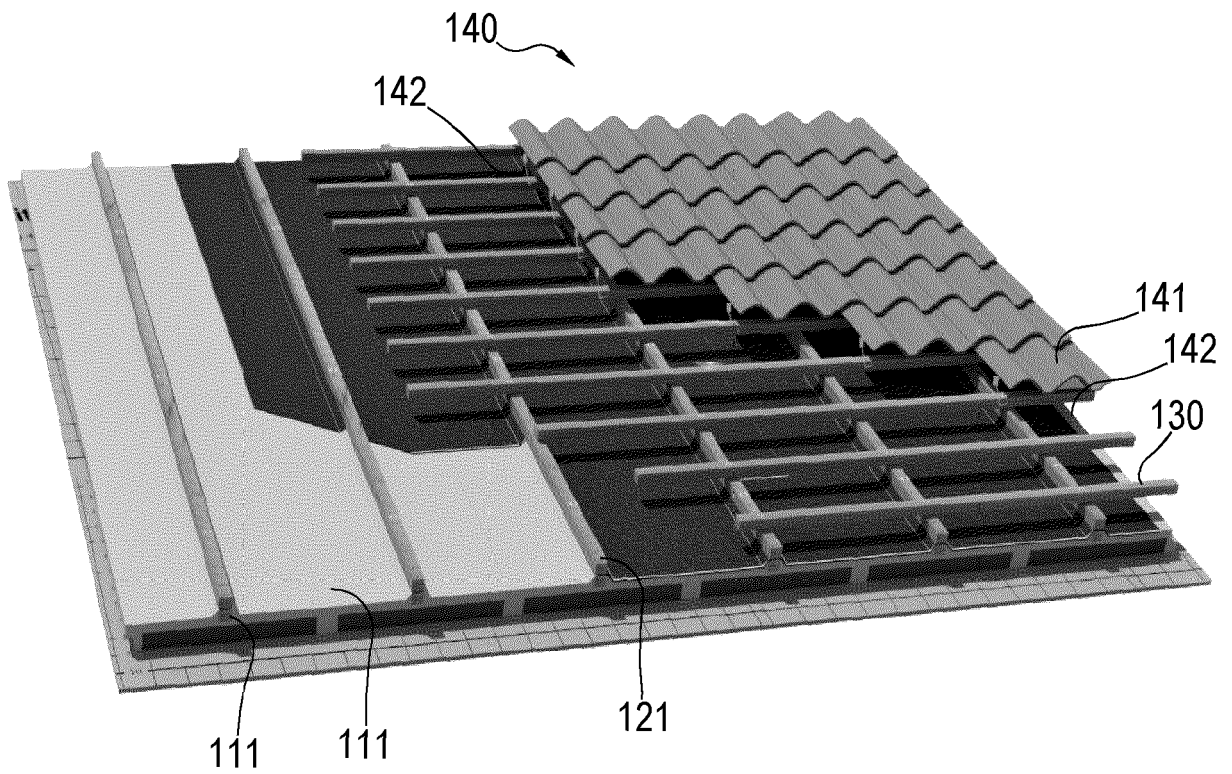


Fig.5

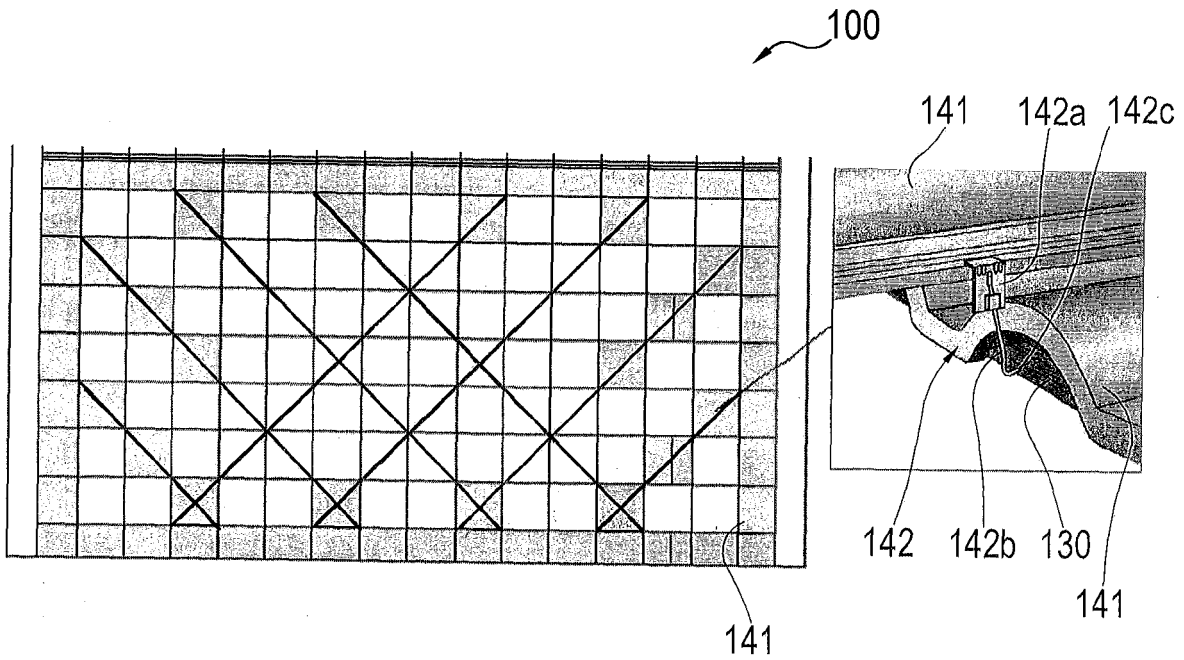


Fig.6



EUROPEAN SEARCH REPORT

Application Number

EP 24 20 6981

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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