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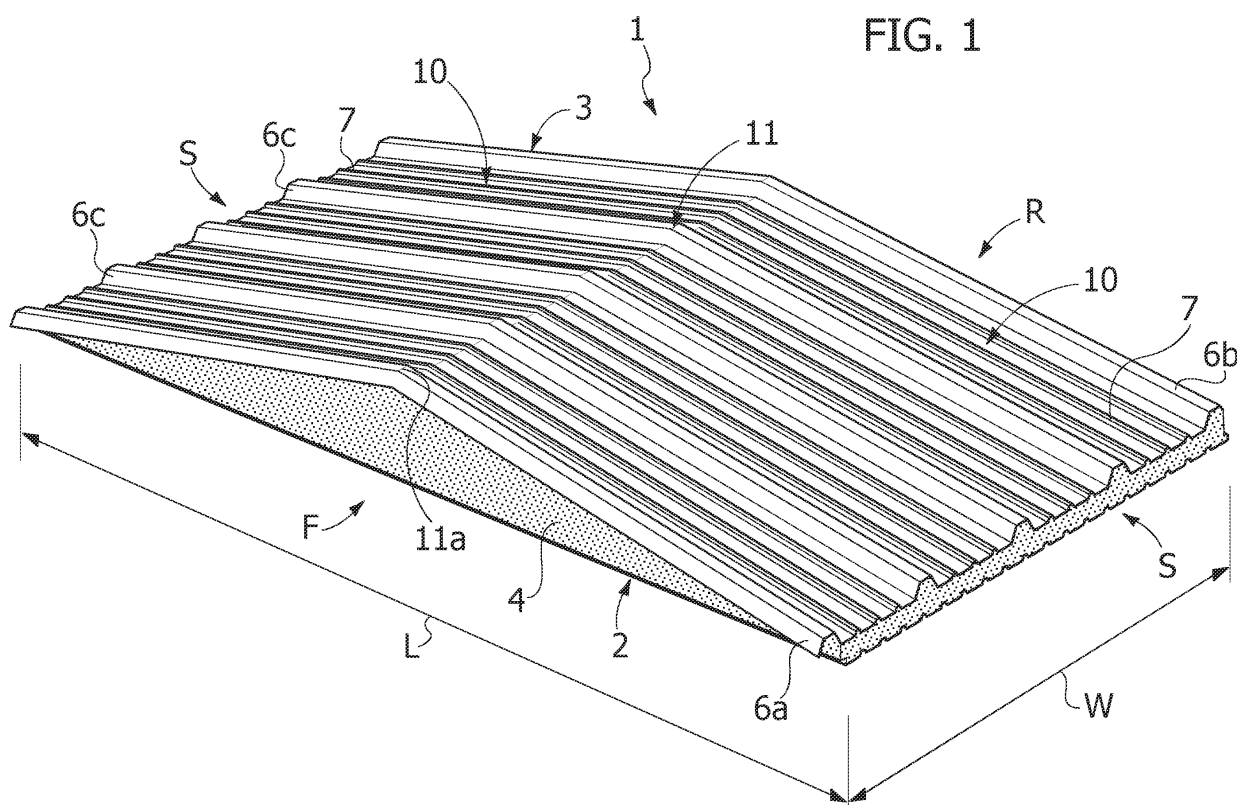
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(54) **Prefabricated insulating panel for roofing of buildings**

(57) A prefabricated insulating panel for roofing of buildings comprises a lower sheet (2) made of rigid or semirigid material, an upper sheet (3) made of rigid material, and a layer (4) of thermally insulating material between the lower and upper sheets (2,3). The upper sheet

(3) is shaped so as to define two inclined surfaces (10), opposite with respect to a ridge region (11) of the panel, which form two opposite pitches of the panel (1), the ridge region (11) being defined in an intermediate area or area of transition between the two inclined surfaces (10).



Description

[0001] The present invention regards a prefabricated insulating panel for roofing of buildings, comprising:

- a lower sheet made of rigid or semirigid material;
- an upper sheet made of rigid material, in particular a metal material; and
- a layer of thermally insulating material between the upper and lower sheets,

wherein the panel has two opposite longitudinal ends, defining between them a dimension of length of the panel, and a first edge and a second edge opposite to one another, which define between them a dimension of width of the panel, in which the side edges are shaped in such a way that the first side edge of a said panel can be coupled to the second side edge of a further said panel, the upper sheet being corrugated so as to define a plurality of ribbings that extend between the two longitudinal ends and that are substantially parallel to one another and with respect to the two side edges.

[0002] The structure of the panels of the type referred to, made up of the aforesaid layer of insulating material fixedly set between the two mutually parallel rigid or semirigid sheets, is substantially monolithic, and this guarantees good characteristics of water-tightness to any infiltration, of thermal insulation, and of mechanical resistance. For said reason, the panels of the type referred to above are widely used for the construction of roofs of buildings.

[0003] For reasons of standardization of production, the panels are generally produced in some versions, which are differentiated from one another as regards thickness of the upper sheet, of the lower sheet, and of the layer of insulating mass. The length of the panels can be varied, in the production stage, according to the final installation.

[0004] In the majority of cases, the panels have a straight or rectilinear configuration and are used to form individual pitches of a roof. Consequently, for the construction of roofs with two pitches, each pitch is formed by a respective plurality of juxtaposed panels. The sealed junction between the two opposite inclined pitches, each formed by a respective plurality of panels, is obtained by installation of an additional ridge element, which defines the ridge line of the roof. Rectilinear panels of this type require relatively complex or extensive substructures, designed to support the panels that provide each pitch in an inclined position.

[0005] Also known are prefabricated insulating panels designed for covering individual bays of buildings, where by "bay" is understood the span or space comprised between two load-bearing rests or elements of the structure of a building, such as for example prefabricated parallel beams made of reinforced concrete of an industrial building.

[0006] In order to guarantee off-flow of water, these

panels have a curved shape so as to present a ridge region. Also the monolithic structure of these panels comprises an upper sheet and a lower sheet, curved according to one and the same radius and set parallel to one another, provided between which is the layer of insulating material.

[0007] With this configuration, the two parallel longitudinal ends of the panels can be supported by means of the two load-bearing rests or elements defining the span of the bay, without the need for complex or extensive supporting substructures. The aforesaid load-bearing rests or elements are set at an inter-axis that is generally comprised between 5 and 7 m, and the curved panels are mounted perpendicular to them. The free span to be covered is generally comprised approximately between 2 m and 4 m.

[0008] For these applications, the length of the curved panels - understood as distance between the two longitudinal ends - is generally comprised approximately between 2.5 m and 5 m, whilst the width (or pitch) - understood as distance between the two side edges of the panel - is generally approximately 1 m. Also these curved panels are modular, with the possibility of coupling together the front and back of different panels, in the direction of length of the bay.

[0009] If on the one hand curved prefabricated panels do not require complex or extensive supporting substructures, on the other they present some drawbacks of a practical nature.

[0010] On account of production, dimensional, or installation constraints - including the need to guarantee an adequate loading capacity - curved panels for the applications referred to above are in general made with relatively small radiuses of curvature, for example of approximately 3.5-4 m. Consequently, the top surface of these panels presents a steep slope, even higher than 50%, and practically cannot be walked on, if not with a high risk of slipping.

[0011] This circumstance complicates any possible interventions that are to be carried out on the roof of the bay, for example, when it is necessary to carry out cleaning of gutters or flashing that are located along the sides of the coupled panels. Given that the panels cannot be walked on, the person responsible for carrying out cleaning operations has to climb on the roof and clean a gutter or flashing at a longitudinal end of the panels, climb down from the roof, and then climb up again to clean the second gutter or flashing, at the opposite longitudinal end of the panels. Similar drawbacks arise when cleaning is carried out with the aid of purposely equipped lorries or movable scaffolding.

[0012] Traditional curved panels for the applications referred to above can also be obtained with radiuses of curvature greater than those indicated above, but the consequence of this is that the maximum admissible load for the panels themselves is considerably reduced.

[0013] A drawback of curved panels of the type referred to, linked to the previous drawbacks, regards the

difficulty of mounting thereon additional units, such as, for example, photovoltaic modules. The installation of an additional unit on the curved surface of the panel is evidently inconvenient for the persons responsible for installation, on account of the aforesaid steep slope. On the other hand, it has been seen how panels with wide radius of curvature have comparatively reduced structural characteristics: the installation of an additional module evidently reduces the possibility of the panel supporting further loads thereon, such as for example snow, or the weight of persons responsible for carrying out repair/maintenance of the module.

[0014] In addition to this, the installation of an additional unit having a planar or rectilinear configuration, such as for example a photovoltaic module, imposes prior mounting on the curved panel of a relatively complex structure for supporting and fixing the unit.

[0015] The object of the present invention is basically to overcome one or more of the aforesaid drawbacks of curved panels of the type referred to in a simple and inexpensive way. Said object is achieved, according to the invention, by a prefabricated insulating panel having the characteristics specified in the annexed claims, which form an integral part of the technical teaching provided herein in relation to the invention.

[0016] The characteristics and advantages of the invention will emerge from the ensuing description with reference to the annexed drawings, which are provided purely by way of non-limiting example and in which:

- Figure 1 is a perspective view of an insulating panel according to the invention;
- Figure 2 is a partial and schematic cross section of a plurality of panels according to the invention, coupled together or juxtaposed;
- Figure 3 is a partial perspective view of two panels according to the invention, in a step of coupling or juxtaposition;
- Figure 4 is a schematic perspective view of a plurality of panels according to the invention coupled together or juxtaposed;
- Figure 5 is a partial and schematic cross section according to the line V - V of Figure 4;
- Figure 6 is a partial and schematic view in front elevation according to the arrow VI of Figure 4;
- Figure 7 is a simplified view, in front elevation, of a portion of a generic building with a number of bays, provided with a roofing obtained with a plurality of insulating panels according to the invention;
- Figures 8, 9, and 10 are schematic sections of further embodiments of the panel according to the invention; and
- Figure 11 is a simplified view, in front elevation, of a portion of a generic building with a number of bays, provided with roofing formed by a plurality of insulating panels according to the embodiment of Figure 10.

[0017] Figure 1 represents a prefabricated insulating panel provided according to one embodiment of the invention for the roofing of individual bays of buildings. The panel, designated as a whole by 1, has a monolithic structure that comprises a lower sheet 2, preferably but not necessarily made of metal material, and an upper sheet 3 made of metal material. Set between the sheets 2 and 3 is a layer or mass of thermally insulating material 4. The layer 4 can be provided with a foamed material, such as, for example, a self-extinguishing polyurethane resin or a polyisocyanurate foam or a foam containing flame-retardants. The very gluing capacity of the foamed material used can be advantageously exploited for fixing the aforesaid components 2-4 of the panel 1 to one another in order to obtain the aforesaid monolithic structure and thus prevent the need for welded or mechanical connections.

[0018] In the panel 1 two longitudinal ends may be identified, designated by S, and two side edges, designated by F and R, hereinafter defined as front and back, respectively, only by way of reference of the modalities of coupling between a number of panels. The panel 1 has a length L, understood as distance between the ends S, and a width or pitch W, understood as distance between the front F and the back R.

[0019] At least the upper sheet 3, and preferably also the lower sheet 2 are fretted or corrugated; i.e., they have parallel ribbings, which extend substantially throughout the length of the sheets themselves, between the ends S. In this perspective, the sheets 2 and 3 can be obtained via rolling from sheet metal, for example stainless-steel or galvanized sheet, or sheet of aluminium or copper, possibly painted or subjected to other surface treatment. In the course of the step of forming of the lower sheet 2, there can be defined in the latter parallel ribbings that are the same as one another, some of which are designated by 5 in Figure 3. Likewise, in the course of forming of the upper sheet 3, defined in the latter are longitudinal ribbings projecting upwards, in such a way that the top surface of the panel 1 presents a recurrent pattern.

[0020] In the case exemplified (see Figure 2), the upper sheet 3 envisages a plurality of deep (high) ribbings, some of which are designated by 6a, 6b, 6c, and a plurality of shallow (low) ribbings, some of which are designated by 7. Preferably extending, in the same longitudinal direction, between two deep ribbings are a plurality of shallow ribbings.

[0021] The presence of these deep and shallow ribbings enables strengthening of the structure of the upper sheet 3, and hence of the entire panel 1. Once again in order to strengthen the monolithic structure of the panel 1, as has been said, also the lower sheet 2 can present a plurality of ribbings 5 substantially parallel to one another and with respect to the front F and to the back R of the panel.

[0022] The front F and the back R are shaped so as to enable watertight juxtaposition of a number of similar panels 1. In particular, in the embodiment exemplified

herein, the front F (or the back R) of one panel 1 can be coupled via overlapping to the back R (or to the front F) of another panel 1. In the embodiment exemplified, in a region corresponding to the front F of the panel 1, the upper sheet 3 is shaped to provide part of a deep ribbing 6a, which is external to the space of containment of the insulating mass 4 (it should be noted that said external ribbing 6a could be formed also by shaping appropriately the lower sheet 2, in the case where said sheet 2 is intended to be used for "closing" laterally the space for containing the insulating mass 4). On the other side, at the back R of the panel 1, the upper sheet 3 is shaped for defining a deep ribbing 6b, designed for shape fit with the ribbing 6a of another panel 1.

[0023] The concept is, for example, visible also in Figure 3, which is a schematic illustration of the step of superposition of the ribbing 6a of one panel 1 on the ribbing 6b of a different panel 1. Likewise, Figures 2 and 4 are, respectively, a schematic cross section and a perspective view of a number of panels 1 coupled in the way described. Final fixing between the panels 1 juxtaposed in the aforesaid way can be obtained with modalities and means in themselves known in the sector, for example, screws and U-bolts.

[0024] It should be noted that the coupling of the panels 1 via overlapping must be deemed preferred, but is not indispensable. In embodiments alternative to the one represented, the front F and back R of two panels can be just set alongside and coupled in a water-tight way by means of a butt strap, according to a technique in itself known in the sector.

[0025] As may be clearly seen also in Figure 3, in the case exemplified, the shape fit between the front F and the back R of two different panels 1 also includes a longitudinal appendage 8 (comprising, for example, a shaped portion of the rear edge of the lower sheet 2) of a panel 1, designed to fit into a longitudinal recess 9 defined in the face of the insulating mass 4 corresponding to the front F of another panel 1.

[0026] As in the case of curved panels, the panel 1 has a ridge region that extends between the front F and the back R. However, according to the main characteristic of the invention, the upper sheet 3 defines, in opposite parts with respect to the ridge region, two opposite rectilinear pitches of the panel 1. In particular, as may be seen in Figure 1, the sheet 3 is shaped so as to define two inclined surfaces, designated by 10, which form the two aforesaid pitches, with the ridge region of the panel 1, designated by 11, that is defined in the intermediate area or area of transition between the two inclined surfaces 10.

[0027] In this way, the panel 1 according to the invention has a configuration substantially with rectilinear double pitch, and said shape, in addition to guaranteeing the necessary running off of water, enables the problems typical of curved panels of the type described previously to be overcome, in particular so that it will be possible to walk on them and/or in order to guarantee a sturdiness

and resistance thereof to loads and/or facilitate mounting thereon of additional units, such as rectilinear photovoltaic modules. Obviously, the fact that the two rectilinear pitches constituted by the inclined surfaces 10 are obtained via deformation of one and the same sheet of material prevents the need to envisage an additional ridge element.

[0028] The slope of at least one of the inclined surfaces 10, preferably of each inclined surface 10, is less than 25%. In the embodiment currently deemed preferential, said slope is comprised between approximately 3% and approximately 8%, preferably approximately 5-6%. Said reduced slope constitutes a considerable advantage in that it means that the panel 1 can be walked on by a person carrying out maintenance operations without any risk of him slipping. The configuration of the sheet 3 with opposed inclined surfaces 10 facilitates, when necessary, also installation of additional elements on the panels 1, such as, for example, the photovoltaic modules.

[0029] The two inclined surfaces or pitches 10 can have one and the same slope and length, with respect to the ridge of the panel 1, as in the case of Figure 1. In other embodiments, however (see, for example, Figure 9), there may be envisaged different slopes and/or lengths for the two rectilinear pitches 10.

[0030] According to a preferred characteristic of the invention, and unlike panels of a known type, the two sheets 2 and 3 are not parallel to one another; namely, the general development of the sheet 2 in a longitudinal direction (i.e., between the two ends S) is different from the general development of the sheet 3 in a longitudinal direction.

[0031] In the case of the embodiment of Figures 1 and 4, the lower sheet 2 has a longitudinal general development that is substantially rectilinear, i.e., it lies substantially in a plane. The upper sheet 3 has, instead, a longitudinal general development that defines the two inclined surfaces 10 having opposite slopes. Hence, in this embodiment, the panel 1 has, in cross section, a shape that is at least approximately triangular, approximately the shape of an isosceles triangle (in actual fact, in the example shown, the cross section is substantially shaped like an irregular pentagon, but as may be seen, the geometrical shape recalled visually is at least approximately triangular).

[0032] With this configuration the thickness of the layer of insulating material 4 is variable starting from each end S up to the area corresponding to the ridge region 11. In particular, in the case exemplified, the thickness increases from a minimum, in an area corresponding to the ends S, to a maximum, in an area corresponding to the ridge region 11. With this type of configuration, the overall structure of the panel 1 is very sturdy and distinguished by an increased load-bearing capacity. As compared to curved panels with parallel sheets, the panel 1 according to the invention consequently has also an insulating mass of increased thickness. The configuration of the base constituted by the sheet 2 presents the further advantage

- in the condition where the panels are installed - of reducing the internal space of the building that must be heated in the cold seasons as compared to a roofing obtained via the curved panels described previously. It should be noted that the panels 1 can be exploited to provide directly also a substantially plane false ceiling, in which case the respective lower sheets 2 will be preferably painted or subjected to a surface treatment.

[0033] It will be appreciated that the same advantages highlighted above can be achieved also with a sheet 2 that is not exactly rectilinear. In said perspective, the sheet 2 could even be undulated (albeit arranged according to a respective substantially rectilinear general plane), or again it could be a slightly arched sheet 2, with concavity facing upwards or downwards.

[0034] In the embodiment exemplified, the two inclined surfaces 10 defined by the upper sheet 3 intersect at the ridge region 11 to define a ridge line 11a of the panel 1 (Figure 1). With this type of embodiment, the shaping of the sheet 3, after the latter has possibly undergone rolling, is relatively simple in so far as it requires a simple operation of folding of the sheet itself. By way of example, in an embodiment of the type referred to in Figure 1, the angle formed between the two inclined surfaces 10 can be comprised between 169° and 177° , preferably between approximately 172° and approximately 174° .

[0035] It should in any case be noted that, in other embodiments, not represented, the ridge region defined by the upper sheet 3 may not be "sharp": in other words, the sheet 3 can be bent during the production stage to define - for example between the two inclined surfaces 10 - an intermediate area or area of transition that is horizontal or has some other form.

[0036] In a particularly advantageous embodiment:

- the distance (ribs excluded) between the lower sheet 2 and the ridge 11a of the upper sheet 3 (i.e., the distance measured in a region corresponding to the planes between the ribbings 5 and 6-7 - see height D in Figure 5) - is between approximately 6 cm and approximately 25 cm, preferably between approximately 11 cm and approximately 13 cm, and/or
- the distance (ribs excluded) between the upper sheet 3 and the lower sheet 2 at the ends S of the panel 1 (see height E in Figure 6), is between approximately 2.5 cm and approximately 12 cm, preferably from approximately 4 to approximately 7 cm.

[0037] These sizings guarantee excellent characteristics of sturdiness and thermal insulation. The distances D and E indicated correspond evidently to different thicknesses of the insulating mass 4 that fills the gap between the two sheets 2 and 3.

[0038] Once again with reference to a preferential embodiment, the length L of the panel 1 is between 2 m and 5 m, preferably between approximately 2.5 m and approximately 4 m. On the other hand, the preferred pitch or width W of the panel 1 is not greater than 1.5 m; pref-

erably, the useful width W is approximately 1 m.

[0039] The prefabricated insulating panels 1 according to the invention can be used for top roofing of individual bays, i.e., of the span or space comprised between two parallel load-bearing rests or elements of a building, with each panel 1 arranged perpendicular to the aforesaid rests, i.e., with the ends S of the panels 1 that are supported by them.

[0040] Figure 7 is a partial and schematic illustration, merely by way of example, of an application of the above sort. In particular, Figure 7 shows the structure with bays of a generic building, which is assumed as being a shed for industrial use, said structure being provided via elements made of pre-compressed reinforced concrete. The width or span of each bay is basically represented by the distance between the two parallel load-bearing elements designated by 20, which here are assumed as being beams made of reinforced concrete, supported via columnar elements 21, which are also made of concrete.

[0041] As may be noted from Figure 7, the prefabricated insulating panels 1 according to the invention are used for roofing the individual bays. A number of panels 1 are coupled one after another - in the way described previously with reference to Figures 2-4 - in the direction of length of the bays themselves (said direction is perpendicular to the plane of the sheet of Figure 7), i.e., according to the direction of width W of the panels. Anchorage of the panels 1 with respect to the beams 20 can be provided with methodologies and means in themselves known in the sector.

[0042] The roofing of each bay can be completed at the two ends S of the panels via suitable accessories according to the known art, not represented, such as, for example, flashing, gutters, drip edges, or edge trims, designed to enable collection and/or running-off of water and/or prevent the risk of infiltration of water into the building.

[0043] Figures 8, 9 and 10 illustrate some possible variant embodiments of the panel 1 according to the invention.

[0044] The panel 1 of Figure 8 presents a construction and use that are generally similar to the ones described previously with reference to the Figures 1-7. As may be seen, in this case, the upper sheet 3 is shaped so as to present, in the regions of the ends, stretches S' that are at an angle with respect to the corresponding inclined surfaces 10, are preferably generally plane or rectilinear, and are substantially parallel to the lower sheet 2. Hence, in the example of Figure 8, the longitudinal-end regions of the panel are defined by parallel stretches of the sheets 2 and 3, but in other embodiment not illustrated herein the stretches S' can project in a cantilever way towards the outside, beyond the insulating mass 4 and/or the lower sheet. The stretches S' may indicatively have a length of approximately 10 cm. The provision of these rectilinear stretches S' in the two longitudinal-end areas is particularly advantageous during production of the panel in so far as it facilitates the operations of cutting of the sheet 3.

[0045] The embodiment of Figure 9 is conceptually similar to those already described above, with the difference that in this case the two inclined surfaces 10 have different lengths and slopes. Panels having a configuration of this type can be used, for example, for providing roofing of a "shed" type. It may be noted that, also in the case of the panel 1 of Figure 9, the presence of the stretches S' of the sheet 3 substantially parallel to the sheet 2 are to be deemed preferred, but not strictly indispensable.

[0046] From the foregoing description the characteristics and the advantages of the present invention emerge clearly. The panel described is a roofing panel that can be numbered amongst monolithic prefabricated modular components. The structure of the panel described is simple and guarantees the necessary modularity. Said structure moreover enables panels of dimensions also different from one another to be obtained, without this causing substantial variations in the production cycle. As has been explained previously, moreover, the panels according to the invention enable considerable advantages to be obtained as compared to the known curved panels envisaged for similar applications.

[0047] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary widely with respect to what is described and illustrated.

[0048] Figure 10 regards a possible alternative embodiment of a panel according to the invention. This embodiment differs from the previous ones substantially in that the longitudinal general development of the sheet 2 is similar to that of the sheet 3. Hence, as may be noted, also the sheet 2 is shaped so as to define two opposed inclined surfaces, here designated by 10'. In the example illustrated the two sheets 2 and 3 are substantially parallel to one another so that the thickness (ribs excluded) of the insulating mass 4 is substantially constant. Preferably, both of the sheets 2 and 3 of a panel of this sort have respective end stretches S', for the reasons already explained previously. In this way, then, also in the panel 1 of Figure 10 the two longitudinal-end regions lie in one and the same general plane, and this facilitates positioning of the panels on plane surfaces, such as for example the top surfaces of the corresponding load-bearing elements 20, as may be clearly seen in Figure 11.

[0049] The embodiment of Figures 10 and 11 is less advantageous than the previous ones as regards overall sturdiness of the panel, thermal insulation, and possibility of obtaining a plane false ceiling. Possibly, the angle formed between the two inclined surfaces 10' of the lower sheet 2 could be different from the angle formed between the two inclined surfaces 10 of the upper sheet 3, so as to have in any case a thickness of the insulating material 4 that is variable between the ends S and the ridge region 11. In any case, as compared to the known curved panels for similar applications, the panel 1 of the embodiment of Figures 10 and 11 renders walking on the panel safe, thanks to the modest slope of the inclined surfaces 10,

and enormously facilitates installation of additional units, such as plane photovoltaic modules, as explained previously.

[0050] According to an embodiment not represented, the upper sheet 3 of the panel 1 according to any one of the embodiments described and/or illustrated above has shaped ribbings for resting and/or supporting opposite edges of an auxiliary panel unit, i.e., a unit having a configuration structurally or functionally similar to those described in the Italian patent No. 1.346.172 and/or in the Italian patent application No. TO2007A000633, filed in the name of the present applicant. In this way, the aforesaid ribbings can be exploited for providing in themselves a supporting structure for an auxiliary unit, such as, for example, a rectilinear or plane photovoltaic panel.

[0051] In an application of the above sort, these supporting ribbings extend in height above the plane of lie of the auxiliary unit, as described in TO2007A000633, and are shaped so as to define each both a resting surface for the corresponding edge of the auxiliary unit and a surface of delimitation of a seat for the auxiliary unit, orthogonal to the aforesaid resting surface.

[0052] Between the lower sheet and the upper sheet of the panel there may be advantageously provided at least one channel for the passage of cables and/or pipes, for example cables for electrical connection of a photovoltaic unit.

[0053] The thermally insulating mass 4 can be made of any material suitable for the purpose, even other than a layer of foamed material, for example a layer of mineral fibre, or else it could comprise a number of layers, such as a foamed layer and a fibre layer. The lower sheet 2 can be made of a rigid or semirigid non-metal material, for example asphaltic felt paper, glass-reinforced resin, or glass fibre.

[0054] In the examples of embodiment illustrated above the panels forming the subject of the invention are used for providing a roofing for a building of an industrial type with a number of bays. It is, however, evident that the panels according to the invention can be used also for providing roofs of other types of buildings with single bays, such as for example roofs for garages, whether prefabricated or not, even with metal load-bearing structure.

Claims

1. A prefabricated insulating panel for roofing of buildings, comprising:

- a lower sheet (2) made of rigid or semirigid material;
- an upper sheet (3) made of rigid material, in particular a metal material; and
- a layer (4) of thermally insulating material between the lower and upper sheets (2, 3), the panel (1) having two opposite longitudinal

- ends (S), defining between them a dimension of length (L) of the panel, and a first edge (F) and a second edge (R) opposite to one another, defining between them a dimension of width (W) of the panel, the side edges (F, R) being shaped in such a way that the first side edge (F) of a said panel (1) can be coupled to the second side edge (R) of a further said panel (1), the upper sheet (2) being corrugated so as to define a plurality of ribbings (6, 7) that extend between the two longitudinal ends (S) substantially parallel to one another and with respect to the two side edges (F, R), and wherein the panel (1) has a ridge region (11) that extends between the two side edges (F, R), said panel being **characterized in that** the upper sheet (3) is shaped so as to define two inclined surfaces (10) opposite with respect to the ridge region (11) so as to form two opposite pitches of the panel (1), the ridge region (11) being defined in an intermediate area or area of transition between the two inclined surfaces (10).
2. The panel according to Claim 1, wherein at least one of said inclined surfaces (10), preferably both of said inclined surfaces (10), has/have a slope of less than 25%.
 3. The panel according to Claim 2, wherein the slope of at least one of said inclined surfaces, preferably of both of said inclined surfaces (10), is substantially between approximately 3% and approximately 8%, preferably between approximately 5% and approximately 6%.
 4. The prefabricated insulating panel according to Claim 1, wherein
 - the distance (D) between the lower sheet (2) and a ridge (11a) of the upper sheet (3), measured between respective areas without ribbings (5; 6,7), is comprised between approximately 6 cm and approximately 25 cm, preferably between approximately 11 cm and approximately 13 cm; and/or
 - the distance (E) between the lower sheet (2) and the upper sheet (3), measured between respective areas without ribbings (5; 6, 7) and at said longitudinal ends (S), is comprised between approximately 2.5 cm and approximately 12 cm, preferably between approximately 4 and approximately 7 cm.
 5. The panel according to one of the preceding claims, wherein the thickness of the layer of insulating material (4) varies from each longitudinal end (S) to the ridge region (11), the thickness in particular increasing from a minimum, at the longitudinal ends (S), to a maximum, at the ridge region (11).
 6. The panel according to Claim 5, wherein the lower sheet (2) and the upper sheet (3) are not parallel to one another, and/or the lower sheet (2) has a longitudinal general development that differs from the longitudinal general development of the upper sheet (3).
 7. The panel according to one of the preceding claims, wherein the lower sheet (2) is substantially rectilinear or in any case is arranged according to a respective substantially rectilinear general plane, or else is slightly arched.
 8. The panel according to any one of the preceding claims, wherein the ribbings (6, 7) of the upper sheet (3) comprise first ribbings (6) and second ribbings (7) projecting upwards, the first ribbings (6) being of a greater height than the second ribbings (7), between two first ribbings (6) there being set at least one second ribbing (7).
 9. The panel according to a of Claims 1 to 4, wherein the lower sheet (2) and the upper sheet (3) are substantially parallel to one another, and/or the lower sheet (2) has a longitudinal general development similar to the longitudinal general development of the upper sheet (3).
 10. The panel according to any one of the preceding claims, having at least one longitudinal-end region including a stretch (S') of the upper sheet (3) that is at an angle with respect to a corresponding said inclined surface (10), is preferably generally plane or rectilinear, and is substantially parallel to the lower sheet (2).
 11. The panel according to any one of the preceding claims, wherein the two inclined surfaces (10) have lengths and/or slopes different from one another.
 12. The panel according to any one of the preceding claims, wherein the upper sheet (3) has ribbings shaped for resting and/or supporting opposite edges of an auxiliary unit, such as a photovoltaic panel.
 13. The panel according to Claim 12, wherein said ribbings extend in height above the plane of lie of the auxiliary panel unit and are shaped so as to define each both a surface for resting the corresponding edge of the auxiliary panel unit and a surface of delimitation of a seat for the auxiliary panel unit, that is orthogonal to said resting surface.
 14. The panel according to Claim 12 or Claim 13, wherein said auxiliary panel unit is a photovoltaic unit and provided between the lower sheet (2) and the upper sheet (3) is at least one channel for passage of ca-

bles for electrical connection of said unit.

15. A roofing system, comprising a plurality of prefabricated insulating panels (1) according to one or more of the preceding claims, wherein the panels (1) are coupled to one another to provide the top roofing of a bay of a building, i.e., of the space comprised between two parallel load-bearing rests or elements (20) of the building, the bay having a width and a length, the coupled panels (1) of said plurality being supported at the respective longitudinal ends (S) by said load-bearing elements (20), and the panels (1) being coupled in the direction of the length of the bay.

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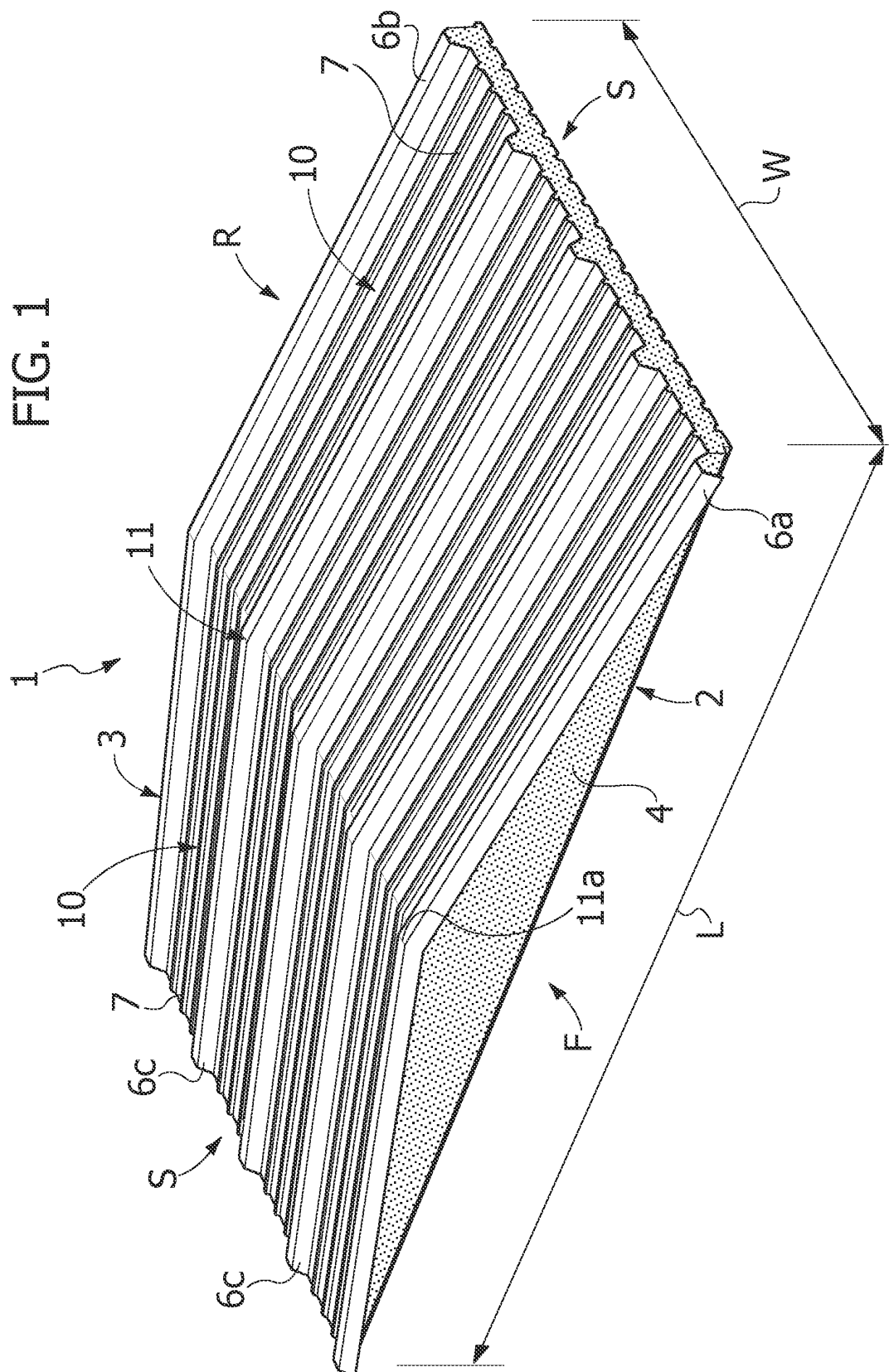
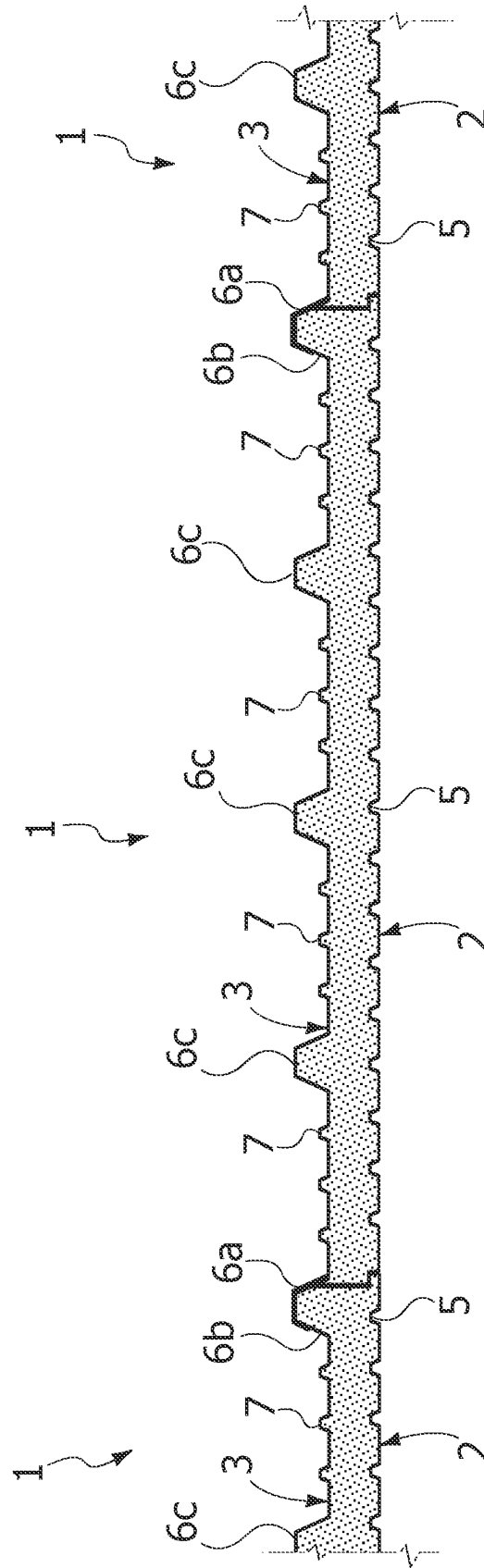


FIG. 2



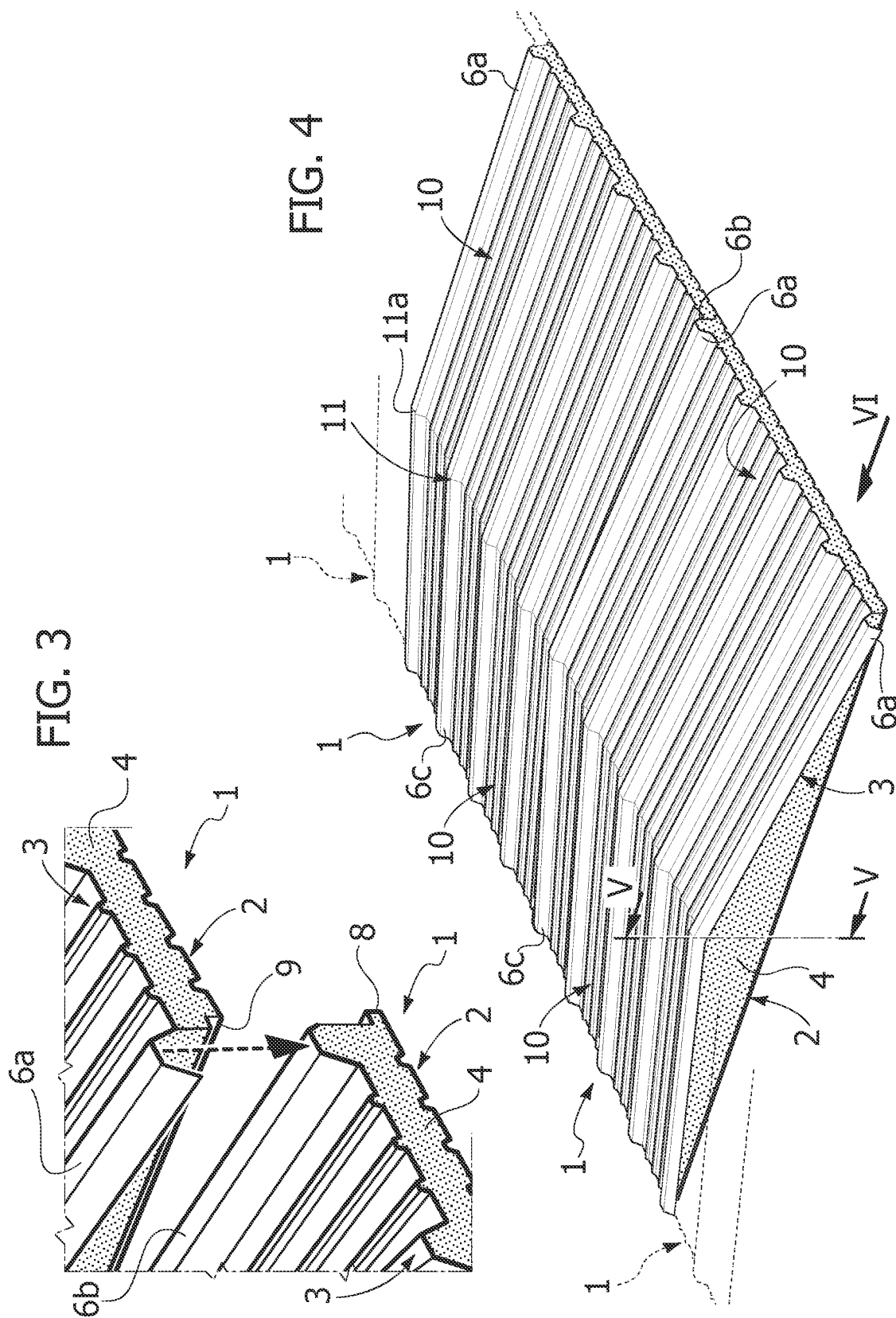


FIG. 6

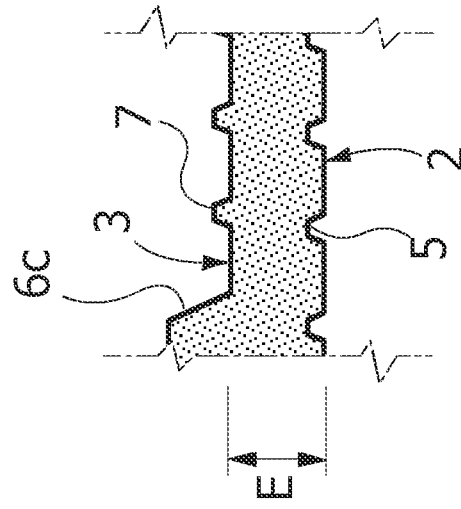


FIG. 5

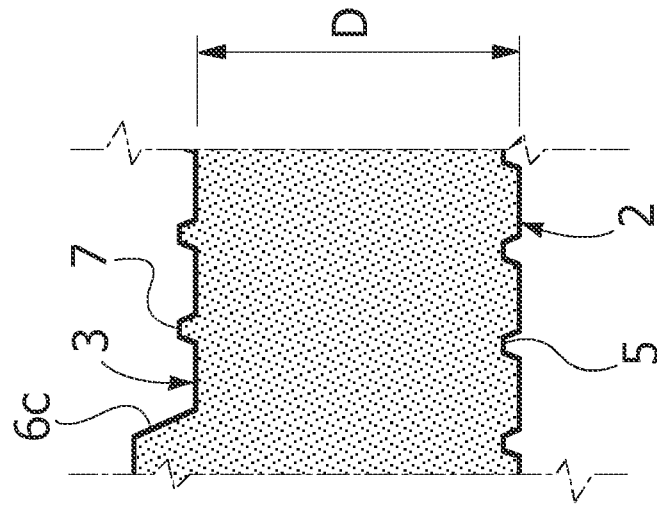


FIG. 7

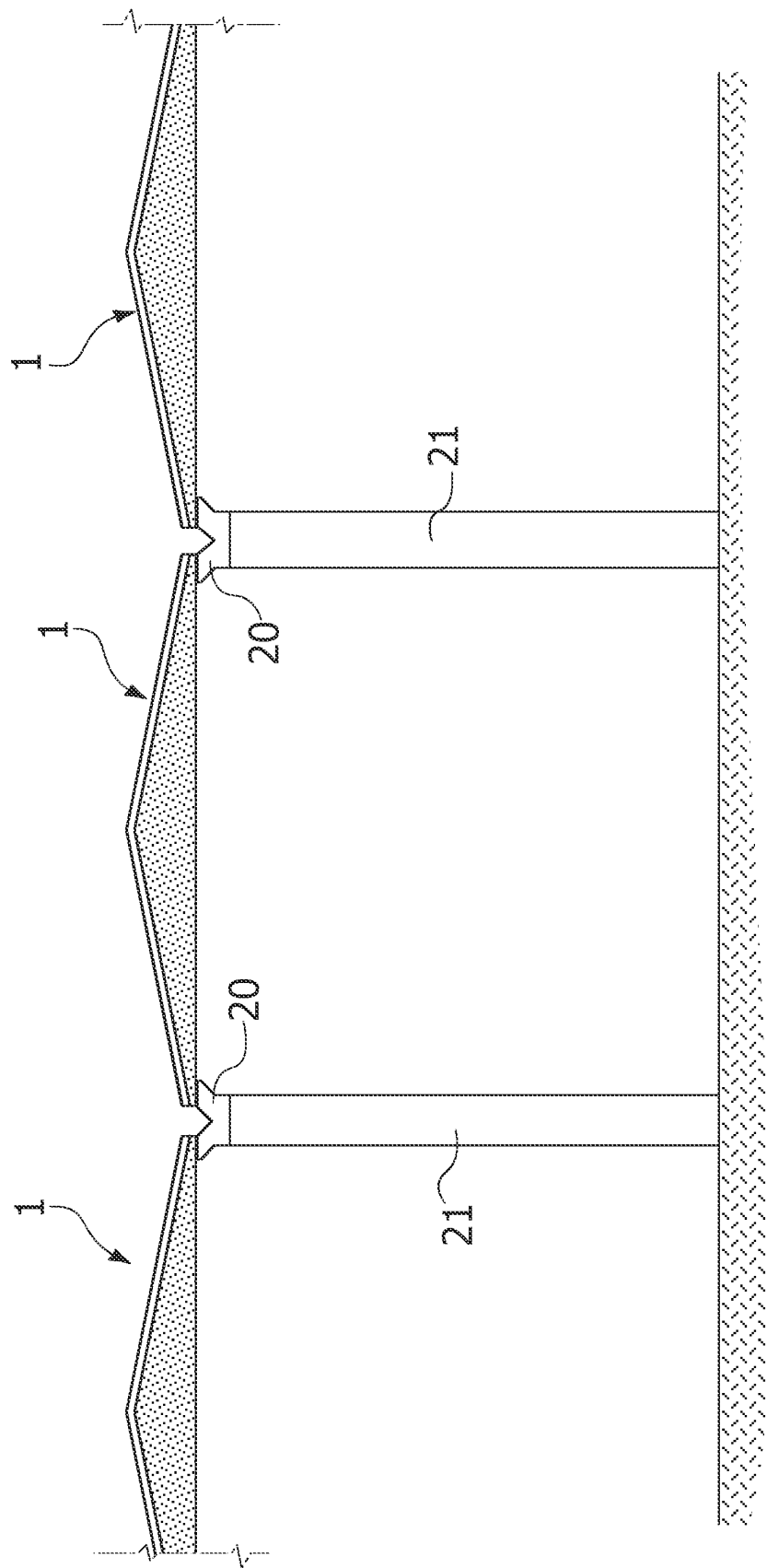


FIG. 9

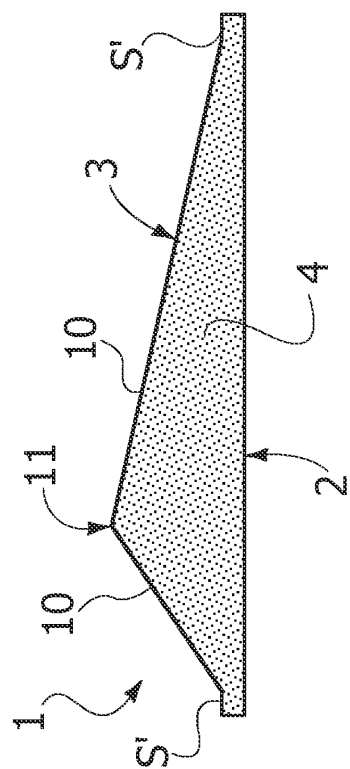


FIG. 8

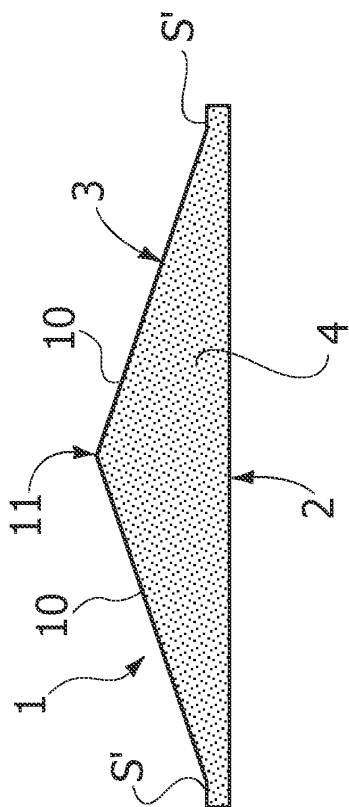


FIG. 10

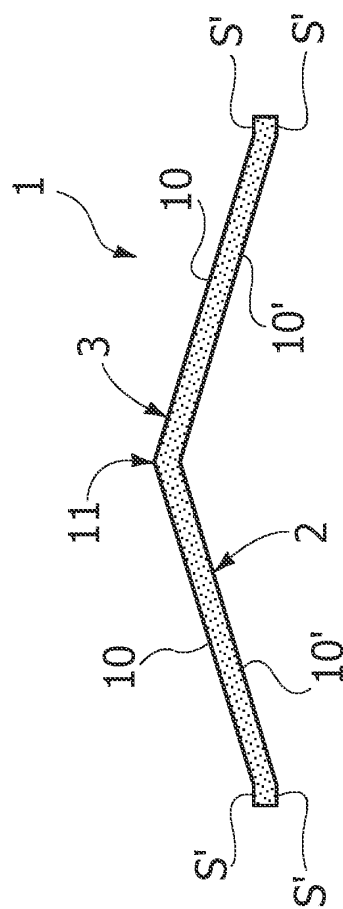
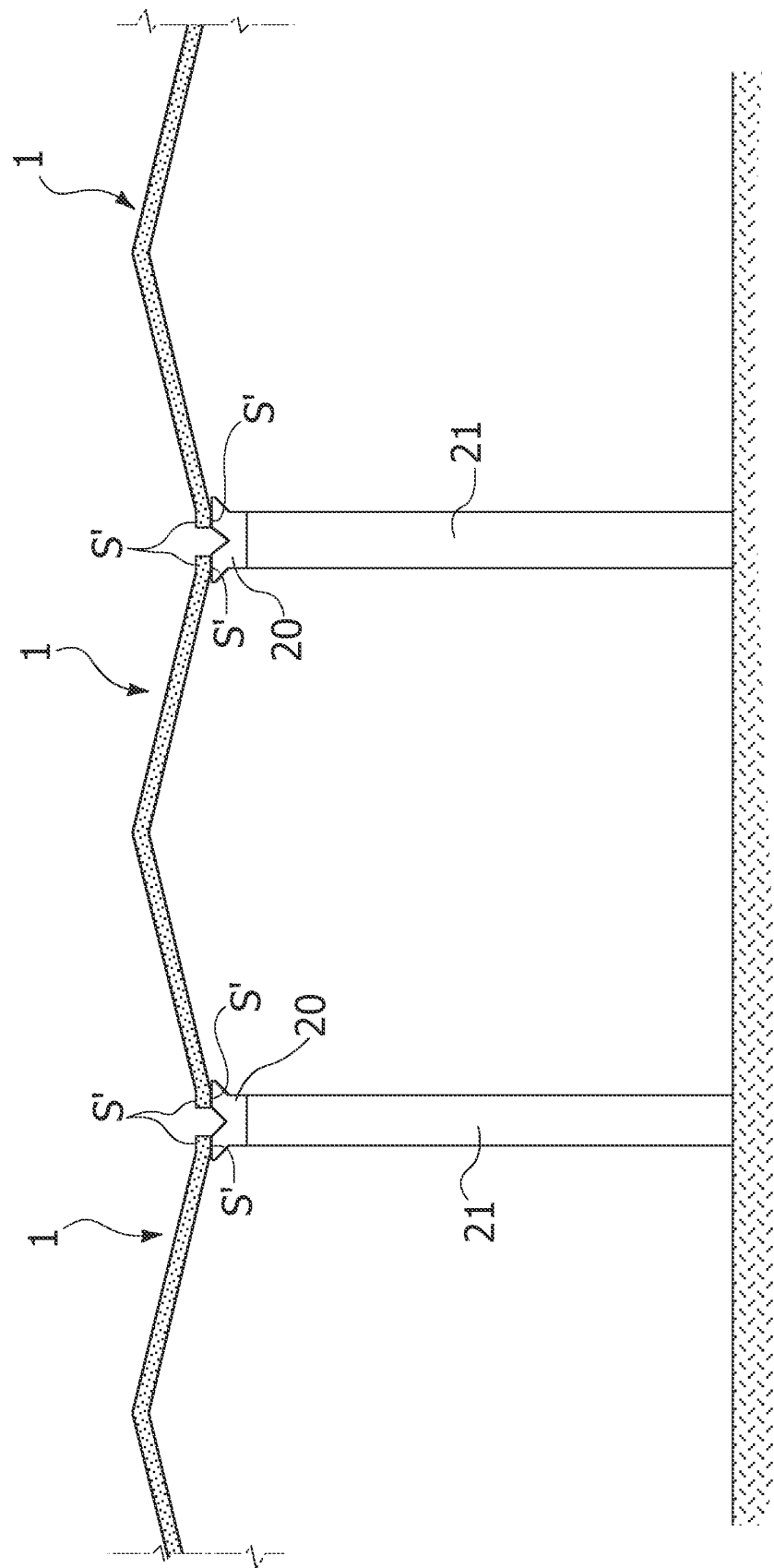


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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