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(54) **Covering panel for buildings**

(57) A covering panel for buildings comprising an upper sheet (2) in metal material, defining a plurality of longitudinal ribs (5) which are in relief and substantially parallel. The first sheet (2) also has a first and a second raised transverse ribs (10, 11), respectively at a first and a second longitudinal end region of the panel (1). The first and the second transverse ribs (10, 11) are configured such that the first transverse rib (10) of the first sheet (2) of a first panel can be coupled with the second transverse rib (11) of the first sheet (2) of another similar panel (1).

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Description

[0001] The present invention relates to covering panels for buildings, of the type which comprise at least one sheet in metal material, preferably defining a plurality of substantially parallel longitudinal ribs, which rise from a general plane of a respective face of the panel. The present invention has been developed with particular reference being paid to covering panels of the type described above, comprising furthermore a second sheet in rigid or semi-rigid material, in particular in metal material, and a layer of insulating material between the first sheet and the second sheet. This type of panel also performs a thermal insulation function, in addition to the aforementioned covering function.

[0002] Panels of the type indicated are typically used for making roofs of buildings.

[0003] In order to be able to be used for covering or for making external surfaces of buildings, the aforementioned panels must exhibit excellent properties of resistance to water penetration and of mechanical strength. The structure of the panels must also enable a high degree of modularity, in the sense of the possibility of coupling several panels together to obtain a substantially continuous cladding surface.

[0004] To this end the panels are usually of rectangular shape and configured for being coupled adjacent to each other. The corresponding structure must also allows the possibility of manufacturing panels of very different dimensions from each other, without this causing significant alterations to the production cycle, which preferably is a cycle is a substantially continuous production cycle.

[0005] In panels of the type indicated the upper sheet has respective longitudinal ribs, having similar cross-section, also in proximity to its side edges. The longitudinal rib of a first edge extends laterally beyond the insulating material, while the longitudinal rib of the second edge extends above the insulating material, with the latter filling the rib itself. In this embodiment, during installation, the longitudinal rib of the first edge of a panel is overlapped with the longitudinal rib of the second edge of the adjacent panel; the two panels are then secured to each other by means of fixing members, comprising bolts or rivets which pass through the corresponding upper metal sheets at the overlapping ribs of the two panels (see, purely for reference, figure 1 of US-B- 3,290,845).

[0006] When installing the known panels of the types described above, it is common practice to use gaskets and similar, located along the joining edges of the various panels, in order to ensure that the covering structure resulting from assembling the panels has a good seal against water penetration from the outside.

[0007] Gasket elements are typically arranged between the facing longitudinal sides of two laterally adjacent panels. Gasket elements, or more often a sealing material, typically of silicone type, can also be provided between the front end and the rear end of two panels being aligned in a longitudinal direction.

[0008] In order to perform their functions effectively, these sealing means require a precise and stable coupling between the panels. However, in normal practice and in normal use of the panels, it is not always possible to guarantee a sufficiently solid and precise coupling.

[0009] First of all, cases can occur where the covering panels are not positioned correctly by the fitters, so that the gasket or sealing elements do not become completely effective in performing their sealing action. Furthermore, in their operative condition, the panels can be subject to considerable mechanical stresses exercised by atmospheric agents, such as for example the wind, which can generate vibrations in the panels which tend to disarrange their mutual coupling. The panels can also be subject to a high degree of thermal expansion, caused by the considerable jumps in temperature which occur in the environment to which the panels are exposed. This thermal expansion is capable of altering the geometry of the panels to a far from negligible degree, so as to compromise the precision of their coupling and their capacity to seal against water penetration. This problem is experienced particularly as regards the seal at the junction points between the front and rear ends of the panels, more so than at the coupling zones between the lateral extremities.

[0010] For the above reasons, furthermore, covering panels according to the prior art do not generally prove suitable for installation on planes inclined with respect to the horizontal where the pitch is less than 6%, because in this configuration an adequate seal against water penetration cannot be guaranteed in the joint and/or overlap areas of the panels, irrespective of how correct is the coupling configuration between the parts.

[0011] The present invention proposes essentially to solve the above-mentioned disadvantages and drawbacks of the prior art.

[0012] Within this general framework, the main aim of the invention is to realize covering panels which, when assembled for the purpose of forming a covering or roof, ensure a good seal against water penetration at their longitudinal ends.

[0013] Another aim of the invention is to realize covering panels which, when assembled for the purpose of forming a covering or roof, also ensure a good seal against water penetration at their side ends.

[0014] These and other aims, which will become clear hereinafter, are achieved according to the present invention by covering panels having the features indicated in the appended claims, which constitute an integral part of the technical teaching provided here in relation to the invention itself.

[0015] The covering panels according to the present invention allow a mutual coupling to be made which remains stable and ensures a good seal against water penetration, even following likely variations in the configuration of the connection between respective joint portions of the panels, caused, for example, by thermal expansion. Furthermore, the covering structure formed by pan-

els according to the present invention ensures a good seal against water penetration, even in applications on surfaces with a very low inclination with respect to the horizontal, particularly with pitches lower than 6%.

[0016] Further features and advantages of the invention will become clear from the detailed description which follows, provided purely by way of non-limiting example, wherein:

- figure 1 represents a perspective schematic view of a portion of a covering structure formed from panels according to the present invention;
- figure 2 represents a schematic perspective view of a covering panel according to the present invention;
- figure 3 represents a schematic section along line III-III of the panel shown in figure 2;
- figure 4 represents a schematic view in longitudinal section of a detail of the coupling in a transverse direction between two covering panels according to the present invention;
- figure 5 represents a detail of figure 2, on a larger scale;
- figures 6 to 8 are schematic representations of steps for the execution of a type of coupling between two panels according to the present invention;
- figure 9 represents a schematic lateral view of the panel of figure 2;
- figure 10 represents a schematic lateral view of a detail of the coupling in a longitudinal direction between two covering panels according to the present invention;
- figure 11 represents a schematic perspective view of a covering panel according to a possible variant of the present invention.

[0017] Figure 1 shows an application example of panels according to the present invention, to create a covering structure of a generic building. In the example illustrated in figure 1, the panels, some of which are indicated by 1, 1', 1", are used for forming a roof and for this purpose are arranged on and anchored to an underlying structure, represented schematically with dotted lines and indicated by S. The structure S, and therefore the panels 1, 1', 1", lie generally in a plane which is inclined to the horizontal. Note that the panels mentioned are of identical construction, and that the indication by the reference numbers 1, 1' and 1" is aimed solely at clarifying the various methods of coupling in a lateral and a longitudinal direction between two panels, as will appear below.

[0018] Purely by way of indication, the width of the panels can be about one metre, while their length can be 10-15 metres. It should be noticed that panels of the type considered herein are typically manufactured by a continuous process, and for this reason they could even be produced in lengths much greater than those indicated: however, given that the panels are installed in a different place from their place of manufacture, their maximum length is substantially dictated by the requirements of road transport by lorry and the like.

[0019] With reference to figure 2, a covering panel 1 according to the present invention has an upper sheet 2 made of metal material and a lower sheet 3 made of a rigid or semi-rigid material, preferably but not necessarily metal material. Between sheets 2 and 3 a layer or mass of insulating or lagging material 4 is interposed. Layer 4 may be made, for example, of self-extinguishing polyurethane resin or polyisocyanurate foam, or foam with flame-retardant additives; the adhesive capacity itself of the foam material 4 used can advantageously be exploited to fix the above-mentioned components 2-4 of panel 1 together, in order to obtain a substantially monolithic structure and thus avoid welded or mechanical connections.

[0020] The upper sheet 2 has one or more intermediate longitudinal ribs 5, substantially parallel, these ribs being in relief, i.e., rising from the general plane defined by sheet 2. In the example, the longitudinal ribs 5 have a substantially trapezoidal form in cross-section (i.e., with an upper side and two opposite diverging sides) and extend for the entire length of sheet 2.

[0021] Still with reference to figure 2, panel 1 has a predominantly parallelepiped conformation, having parallel longitudinal sides, indicated by 1a and 1b, as well as a front part 1c and a rear part 1d, which extend transversely with respect to sides 1a and 1b.

[0022] As mentioned, a plurality of panels 1 is used for the purpose of making the covering structure shown in figure 1, according to a configuration in which the panels themselves are coupled to each other both at their longitudinal sides 1a, 1b, and at their front and rear parts 1c, 1d. As said, the panels 1 are arranged on the structure S in such a way that the longitudinal sides of the panels 1 are inclined with respect to the horizontal.

[0023] The coupling between the covering panels according to the present invention is made at the longitudinal sides 1a, 1b and at the front and rear parts 1c, 1d, according to two different methods, as will be described in detail below.

[0024] With reference to figure 3, the upper sheet 2 terminates at a first lateral edge 2a, which rises substantially perpendicularly from the general plane of the sheet itself; in the example, this edge 2a has an end part 6, substantially horizontal, formed by a perpendicular fold in edge 2a. The opposite edge 2b also rises perpendicularly from the general plane of sheet 2, but the corresponding end part 7 has two perpendicular folds, so as to substantially take the form of an inverted U.

[0025] Again from figure 3 (and from figure 4) it will be noted that the lower sheet 3, at the lateral edge thereof corresponding to edge 2a of the upper sheet 2, is shaped so as to form a substantially horizontal projection 3a. This projection 3a is formed from a portion of sheet 3 folded back on itself, protruding outwards, beyond edge 2a. The opposite edge of the lower sheet 3 on the other hand is shaped so as to form a raised step part, indicated by 3b.

[0026] Figure 4 represents schematically the method

of coupling between the longitudinal sides of two adjacent panels.

[0027] In particular, figure 4 represents a first and a second covering panel 1 and 1', facing one another at the respective sides previously indicated by 1a and 1b (figure 2), with a retaining member R interposed, which is rigidly fixed to the underlying structure S (see figure 1 or 2).

[0028] As may also be seen in figure 5, retaining member R comprises a bracket 8, having a base portion 8' which extends substantially according to the longitudinal direction of the panels, having a small step which cooperates with projection 3a of the lower sheet 3 of panel 1'. Holes 8a are provided in the base portion 8', which are used for anchoring bracket 8, and member R as a whole, to the underlying structure S.

[0029] Bracket 8 continues with a substantially vertical portion 8", designed to be interposed between the two sides of the panels 1, 1' which face each other, as may be seen in figure 4. Bracket 8 has a slot 8b, substantially at the intersection between the above-mentioned portions 8', 8". Slot 8b is longitudinally extended in the longitudinal direction of the panels 1, 1'.

[0030] It can be inferred from figure 4 that the edges 3a, 3b of the lower sheet 3 have the function of constituting couplable portions in a substantially complementary manner to the horizontal portion 8' of bracket 8. In particular, the raised portion 3b of panel 1 covers the top of the horizontal portion 8' of bracket 8, while projection 3a of panel 1' is arranged below the step of the same horizontal portion 8' of bracket 8.

[0031] The upper sheets 2 of panels 1 and 1' in figure 4 are permanently coupled to each other, without any fixing means (for example bolts) passing through the sheets themselves.

[0032] In particular, figure 4 represents a first step in the execution of the coupling between the upper sheets 2 of the two panels 1 and 1'. The edges 2b and 2a, respectively of panels 1 and 1', are substantially parallel, with the end portion 7 of panel 1 which is arranged so as to overhang end portion 6 of panel 1'. A connecting plate 9 is arranged between the facing sides of panels 1 and 1'. This plate has an upper portion which is interposed between edge 2b, 7 of panel 1 and edge 2a, 6 of panel 1'; the end 9a of this upper portion of plate 9 is preferably distinguished by an inner profile adapted to receive part 6 of edge 2a, and by an outer profile adapted to be received within part 7 of edge 2b of the panels. The lower region of plate 9, on the other hand, has a curved or hooked portion, engaged in slot 8b of bracket 8 (see also figure 2).

[0033] The configuration just described above, between portions 7 and 6 of upper sheets 2 of the panels, edge portions 3b, 3a of lower sheets 3 of the panels, bracket 8 and plate 9, is also illustrated schematically in figure 6. Figures 7 and 8 represent the subsequent steps of the execution of the permanent coupling between the respective upper sheets 2 of panels 1 and 1', wherein the pack formed by the edges of the upper sheets 2 and of the upper portion of the connecting plate 9 is folded over, in such a way that the end portions 6, 7, 9a are turned over integrally with each other through 180°, by means of a seaming operation. In this way the open or free side of the starting pack is closed over on itself, as shown schematically in figure 8. The seaming process is performed directly on site, after the panels have been assembled on the structure S, using suitable equipment known in the filed (seaming equipment of this type is used for example in the formation of covering structures made up of metal sheets only).

[0034] The coupling described for upper sheets 2 of panels 1 and 1' brings about a permanent constraint between the two panels 1 and 1', at their respective longitudinal sides. This type of coupling allows to ensure a good seal against water penetration, due to the edges of the upper sheets 2 being tightly packed together; in this way, also, in the region of coupling of sheets 2 a substantially labyrinthine path is obtained, which cannot be travelled by rainwater. As already mentioned, the type of coupling described above avoids the use of bolts passing through metal sheets 2, which traditionally give rise to weak points in the panels according to the prior art, as regards possible water penetration.

[0035] It should be noted in any event that, if desired, at the time of installation, gasket elements according to the prior art can be provided anyway between the facing longitudinal sides of the panels.

[0036] With the coupling described above the upper sheets of the panels result in being constrained in a relatively rigid way. Notwithstanding this, any possible expansions of the metal material of the sheets due to sudden changes of temperature, are compensated through the use of the retaining members R. Provision of plate 9 coupled in a movable fashion to bracket 8 (due to slot 8b, whose width is greater than that of plate 9) in fact allows the assembled structure of the panels to move and settle as necessary.

[0037] The number of members R used for anchoring each panel clearly varies depending on the length of the panel, as well as on the type of structure S underlying the covering.

[0038] A description will now be given of the method of coupling the panels 1 at the respective front and rear portions, indicated by 1c and 1d respectively in figure 2.

[0039] As may be seen in figure 2, the upper sheet 2 has a first and a second transverse rib 10, 11, respectively at the opposite longitudinal ends. Also the ribs 10 and 11 are in relief, i.e., they rise from the general plane defined by sheet 2 and extend in a direction substantially perpendicular to ribs 5, also crossing the latter. The height of ribs 10 and 11 is markedly lower than that of ribs 5.

[0040] In the case illustrated, ribs 10 and 11 almost completely cross sheet 2, terminating at the perpendicular edges 2a, 2b; note that, into practice, these ribs 10, 11 can also extend over at least part of the vertical stretch

of edges 2a, 2b of upper sheet 2.

[0041] In the example, the transverse ribs 10 and 11 have respective median profiles having cross-sections differing from each other, particularly in terms of dimensions. In the example illustrated here, the section of rib 10 is approximately semicircular, whereas the section of rib 11 is substantially trapezoidal (i.e., with an upper side and two opposite diverging sides), wherein the profile of rib 11 subtends, with respect to the general plane of sheet 2, a substantially larger area, adapted to contain the area subtended by the profile of rib 10, again with respect to the general plane of sheet 2. Thus, in more immediate terms, in the non-limiting example illustrated, the rib 11 of one panel is able to completely house the rib 10 of another panel, leaving at least one volume of air between the corresponding upper sheets 2, for the purposes described below. Note that the two ribs 10 and 11 could have similar shapes in section, provided always that it is possible for rib 10 to be received within rib 11. Such a case is for example visible in figure 11, wherein the opposite ends of ribs 10 and 11 are slightly tapering and terminate at a certain distance from edges 2a and 2b of sheet 2.

[0042] Furthermore, with reference to figures 2 and 9, in the front part 1c of panel 1, the longitudinal end zone of sheet 2 where the transverse rib 11 is provided, is substantially a cantilever zone, i.e, projecting with respect to the corresponding longitudinal end zones of intermediate layer 4 and lower sheet 3.

[0043] As has already been mentioned, panels 1 are preferably produced by a substantially continuous process. In panels obtained by such a process, the area subtended by sheets 2 and 3 and by layer 4 is substantially the same. However, in the course of the production process, the individual panel is prearranged so as to facilitate the subsequent removal of part of the material 4 and, preferably, also of a corresponding part of sheet 3, these parts to be removed being indicated by dotted lines in figure 9.

[0044] To this end, for example, before the insulating material 4 (e.g., a foam material) is arranged between sheets 2 and 3, a film - for example paper or synthetic - is applied to the lower face of sheet 2, this film having plan dimensions substantially corresponding to those of the portion of material 4 which is to be removed to obtain the configuration illustrated in figure 2. This film is represented schematically in figure 9, where it is indicated by P. In this way, when the insulating material 4 is applied between sheets 2 and 3, the film P prevents the material itself adhering directly to the lower face of sheet 2. In addition, a transverse incision or partial cut is made in the lower sheet 3, so as to facilitate the subsequent removal of a corresponding portion of sheet 3 (the part represented by dotted lines in figure 9).

[0045] At the end of the production process, preferably at the time of installation on site, the panels are processed to give them the form represented in figure 2. For this purpose, in practice, the lower sheet 3 is folded at the above-mentioned incision (or the above-mentioned partial cut is completed with an ordinary tool suitable for the purpose) so as to detach the portion of sheet 3 represented by dotted lines in figure 9; the portion of material 4 represented by dotted lines in figure 9 is then also removed (thanks to the presence of film P, it does not adhere and is not attached directly to sheet 2).

[0046] In any case, there is nothing in principle to prevent the manufacture of panels 1 by a discontinuous process, i.e., by first forming sheets 2 and 3 already with the configuration illustrated in figure 2, and then interposing and securing the insulating material, made of rock wool for example, between them.

[0047] The first and second ribs 10 and 11 are prearranged for creating a watertight coupling between the front part 1c and the rear part 1d of the covering panels 1.

[0048] In particular, with reference to figure 10, two covering panels 1 and 1" according to the present invention face each other in a longitudinal direction, with the cantilever end zone of sheet 2 of panel 1 arranged such that it covers at the top a respective portion of sheet 2 of panel 1": the arrangement is such that rib 11 of panel 1 encloses rib 10 of panel 1" at least in part and preferably completely.

[0049] As said, in the example, rib 11 of panel 1 is shaped so as to substantially contain within it the whole of rib 10 of panel 1", giving rise - between the inner face of rib 11 and the outer face of rib 10 - to at least one hollow volume or airspace 12, substantially closed to the outside with respect to the longitudinal direction of panels 1 and 1". Rib 11 is formed in an intermediate position of the cantilever zone of face 2 of panel 1; as a result, as may be seen in figure 10, the frontmost edge of the cantilever zone of panel 1, which is substantially horizontal, is also leaning on sheet 2 of panel 1".

[0050] In the example, the dimensions are such that the upper end of rib 11 does not lean on the substantially horizontal upper side of rib 10, but this arrangement must not be considered as a limiting one.

[0051] The hollow volume 12 contributes to creating an obstacle to possible water penetration by capillarity between the two overlapping panels 1, 1": this is in virtue of the fact that air presents inside volume 12 opposes a possible flow of water capable of being directed by capillarity into the inside of the volume itself. Also in this instance the coupling described further defines a sort of labyrinth path, which opposes the passage of water.

[0052] Given its great efficiency in forming a seal against water penetration, the coupling by means of transverse ribs 10 and 11 is adopted for preference for connecting together covering panels which are subject to being laid at a low pitch with respect to the horizontal (6% or less) and which, therefore, are in theory more exposed to heavy flows or backwater of rainwater along the covering surface.

[0053] The method of coupling by means of transverse ribs also allows the panels forming the covering to make the necessary settling movements due, for example, to

any thermal expansion or other stresses induced by atmospheric agents, without this compromising the efficacy of its protective and sealing action. It will in fact be appreciated that the joining parts constituted by the coupling between ribs 10 and 11 of the two panels are not rigidly connected together.

[0054] The configuration of the joining sides of the panels, as described and illustrated in the drawings, wherein the longitudinal and transverse sides are provided respectively with the two different coupling methods described above, is demonstrably excellent for the purpose of constructing roofs distinguished by great compactness and solidity and by great efficiency in sealing against water penetration from the outside.

[0055] At the longitudinal edges 1a and 1b of panels 1 is in fact provided the coupling method by means of seaming, which ensures solidity and a good seal; the resulting covering structure can in any case make the necessary settlement and movement due to stresses of various kinds, thanks to anchorage by means of the retaining members R. On the other hand, at the longitudinal ends of the panels, the coupling method provided is based on a partial overlapping and transverse ribs, which ensures the maximum seal against water penetration.

[0056] Thanks to the characteristics described above, covering panels according to the present invention are suitable for the formation of roofs and covering structures capable of being laid with inclinations with respect to the vertical substantially between 84° and 90° (i.e., with pitches with respect to the horizontal of between 6 and zero degrees).

[0057] It should also be noted that in the longitudinal end areas, there will be partial overlapping of the lateral edges of four panels, specifically of two edges 2a, 6 and two edges 2b, 7. In this regard, it should be borne in mind that the thickness of upper sheet 2 of the panels, which forms the above-mentioned edges, is relatively small (indicatively 0.5 - 0.6 mm), and therefore easily deformable/adaptable for the purpose of allowing the local overlapping of four lateral edges; for the same reason, the subsequent seaming step is anyway quick and easy also at the overlap areas of the above-mentioned four edges.

[0058] In any case, in a possible variant embodiment, at the rear part of each panel, the longitudinal end zone of sheet 2 can have respective portions of edges 2a and 2b removed, for example by using ordinary cutting tools, either at the production stage or during installation. Such a variant is shown in figure 11, in which the same reference numbers are used as in the previous figures; this figure also represents a possible different configuration of the end regions of edges 2a, 2b, both being folded back so as to have a configuration substantially of an inverted U, the end of edge 2a having a radius of curvature smaller than that of the end of edge 2b.

[0059] As regards the production process, sheets 2 and 3 can be obtained starting by rolling metal sheet, with a predefined width, for example in stainless or galvanised steel, or aluminium or copper, possibly painted and given other surface treatments. The longitudinal ribs 5 and the edges 2a, 2b of sheet 2, as well as the shaped edge portions 3a and 3b of sheet 3, can be obtained directly in the course of the respective rolling operations. Later, sheet 3 is deformed mechanically, for example by being subjected to drawing by means of a press, in order to form the transverse ribs 10 and 11. Layer 4 of insulating or lagging material is then interposed between sheets 2 and 3. As said, layer 4 can be made of resin, foam, rock wool or mineral wool, according to known art. As explained above, the panels are advantageously configured at the production stage for the purposes of the subsequent removal of the parts represented by dotted lines in figure 9.

[0060] As explained above, in fact, to enable the final installation on site, part of layer 4 is removed from the panels, underneath the region of sheet 2 which includes rib 11; possibly, as said, respective portions of edges 2a and 2b of sheet 2 are cut from the rear end zone of the panel.

[0061] Clearly the construction details and embodiments can vary widely with respect to what has been described and illustrated, without for this reason departing from the scope of the present invention, as defined in the claims which follow.

[0062] For example, in a possible variant embodiment, the lateral coupling among panels can be made by conventional means, i.e., by shaping the upper sheet of a panel so that it has a respective rib at each of the two opposite lateral ends, with the rib at the lateral end of one panel being designed to be superimposed on the rib at the lateral end of the adjacent panel.

[0063] The upper sheet 2 of panels 1 can possibly even have two or more transverse ribs 10 and two or more transverse ribs 11 in the respective longitudinal end regions, or again two ribs 10 close to each other, capable of being accommodated into one and the same rib 11.

[0064] Ribs 10 and 11 could possibly have similar shapes and dimensions, in which case -at the time of installation of the panels - sealing or waterproofing means, such as a layer of silicone or similar, or a gasket element, could be fitted between the front end of the cantilever part of the upper sheet of one panel and the underlying upper sheet of the next panel.

Claims

1. Covering panel for buildings, particularly for forming roofs, comprising at least one first sheet (2) in metal material defining a plurality of substantially parallel longitudinal ribs (5), **characterised in that** the first sheet (2) has a first and a second transverse rib (10, 11), respectively at a first and a second longitudinal end region of the panel (1, 1") being opposite to each other, the first and second transverse ribs (10, 11) rising from a general plane of the first sheet (2) and extending in a direction substantially perpendicular

to the longitudinal ribs (5), the first transverse rib (10) of the first sheet (2) of a first said panel (1) being designed to be received within the second transverse rib (11) of the first sheet (2) of a second said panel (1").

2. Covering panel according to claim 1, comprising a second sheet (3) in rigid or semi-rigid material, in particular a metal material, and a layer of insulating or lagging material (4) between the first and second sheets (2, 3), and wherein, in an operative configuration of the panel, the region of the first sheet (2) in which one (11) of said transverse ribs (10, 11) is formed is a projecting or cantilever region with respect to the layer of insulating material (4), such a rib being in particular formed in an intermediate position of said projecting or cantilever region.

3. Panel according to claim 1 or 2, wherein the first transverse rib (10) of the first sheet (2) of said first panel (1) is designed to be inserted at least partially within the second transverse rib (11) of the first sheet (2) of said second panel (1") such that said ribs (10, 11) delimit between them at least one hollow volume (12).

4. Covering panel according to claim 3, wherein the first and second transverse ribs (10, 11) have shapes and/or dimensions of different section, presenting in particular respective median profiles of different section from each other, wherein said median profiles define, with respect to said general plane, respective internal areas of different size, such that the median profile of section of the second transverse rib (11) is adapted to contain substantially the entire median profile of section of the first transverse rib (10).

5. Panel according to claim 1 or 2, wherein the first sheet (2) has a first and a second longitudinal edge (2a, 2b), the first longitudinal edge (2a) of the first sheet (2) of a first said panel (1') being designed and/or configured for being coupled by seaming with the second longitudinal edge (2b) of the first sheet (2) of a second said panel (1).

6. Panel according to claim 1 or 2 or 5, wherein the first and the second longitudinal edges (2a, 2b) each have a respective folded portion (6, 7), the first and the second edges (2a, 2b) rising in particular from said general plane and having end portions with profile and/or dimensions different from each other.

7. Panel according to claim 6, wherein the folded portion (6, 7) is present in a prevailing part of the respective longitudinal edge (2a, 2b).

8. Panel according to at least one of the preceding claims, wherein the lower sheet (3) is shaped so as to present, at it's a lateral edge thereof, a projecting projection (3a), being substantially horizontal, and at its opposite lateral edge a raised step part (3b).

9. Covering for buildings, particularly a roof, comprising a plurality of panels (1, 1', 1") arranged side by side in a lateral direction and/or one following the other in a longitudinal direction, wherein said panels (1, 1', 1") are made according to one or more of claims 1 to 8, where in particular:

- the first transverse rib (10) of the first sheet (2) of a first said panel (1") is overhung by the second transverse rib (11) of the first sheet (2) of a second said panel (1), and/or
- the said projecting or cantilever region of the first sheet (2) of one said first panel (1) has a flat front edge, which overhangs a respective flat portion of the first sheet (2) of one second said panel (1").

10. Covering according to claim 9, comprising retaining members (R) for anchoring a respective said panel (1, 1', 1") to an underlying structure (S) of a building, one said retaining member (R) comprising a first component (8) designed to be fixed to said structure (S) and a second element (9) designed to be fixed to said respective panel (1, 1', 1"), the second element (9) being operatively coupled to the first element (8) with the possibility of movement with respect to it.

11. Covering according to claim 10, wherein the first element comprises a bracket (8) provided with a slot (8b) and the second element comprises a plate (9) having a respective portion designed to be seamed between the said first longitudinal edge (2a) of the first sheet (2) of a first said panel (1) and the said second longitudinal edge of the first sheet (2) of a second said panel (1').

12. Covering according to claim 9, wherein the first longitudinal edge (2a) of the first sheet (2) of a first said panel (1') is seamed to the second longitudinal edge (2b) of the first sheet (2) of a second said panel (1).

13. Covering according to claims 10 and 12 or 11 and 12, wherein the first longitudinal edge (2a) of the first sheet (2) of the first said panel (1') and the second longitudinal edge (2b) of the first sheet (2) of the said second panel (1) are seamed together with a portion of the said second element (9) of a respective retaining member (R) interposed between them.

14. Method for obtaining a panel according to one or more of claims 1 to 8, comprising the operations of:

i) providing the first sheet (2) of the panel (1, 1',

1");
ii) providing the second sheet (3) of the panel (1, 1', 1");
iii) interposing a layer or mass of insulating or lagging material (4) between the first and the second sheet,

wherein during operation i) the longitudinal ribs (5) and the transverse ribs (10, 11) are formed in the first sheet (2).

15. Method according to claim 14, further comprising at least one of the operation of

- prearranging the panel (1, 1', 1") for the purposes of subsequent removal from the panel of a part of the layer or mass of insulating material (4):
- removing a part of the layer or mass of insulating material (4) previously arranged between the first and second sheets (2, 3), such that one said longitudinal end region of the first sheet (2) results in a substantially cantilever region with respect to a remaining part of the layer or mass of insulating material (4);
- removing one or more portions of at least one of the first and the second sheet (2, 3) after the layer or mass of insulating or lagging material (4) has been arranged between them.

FIG. 1

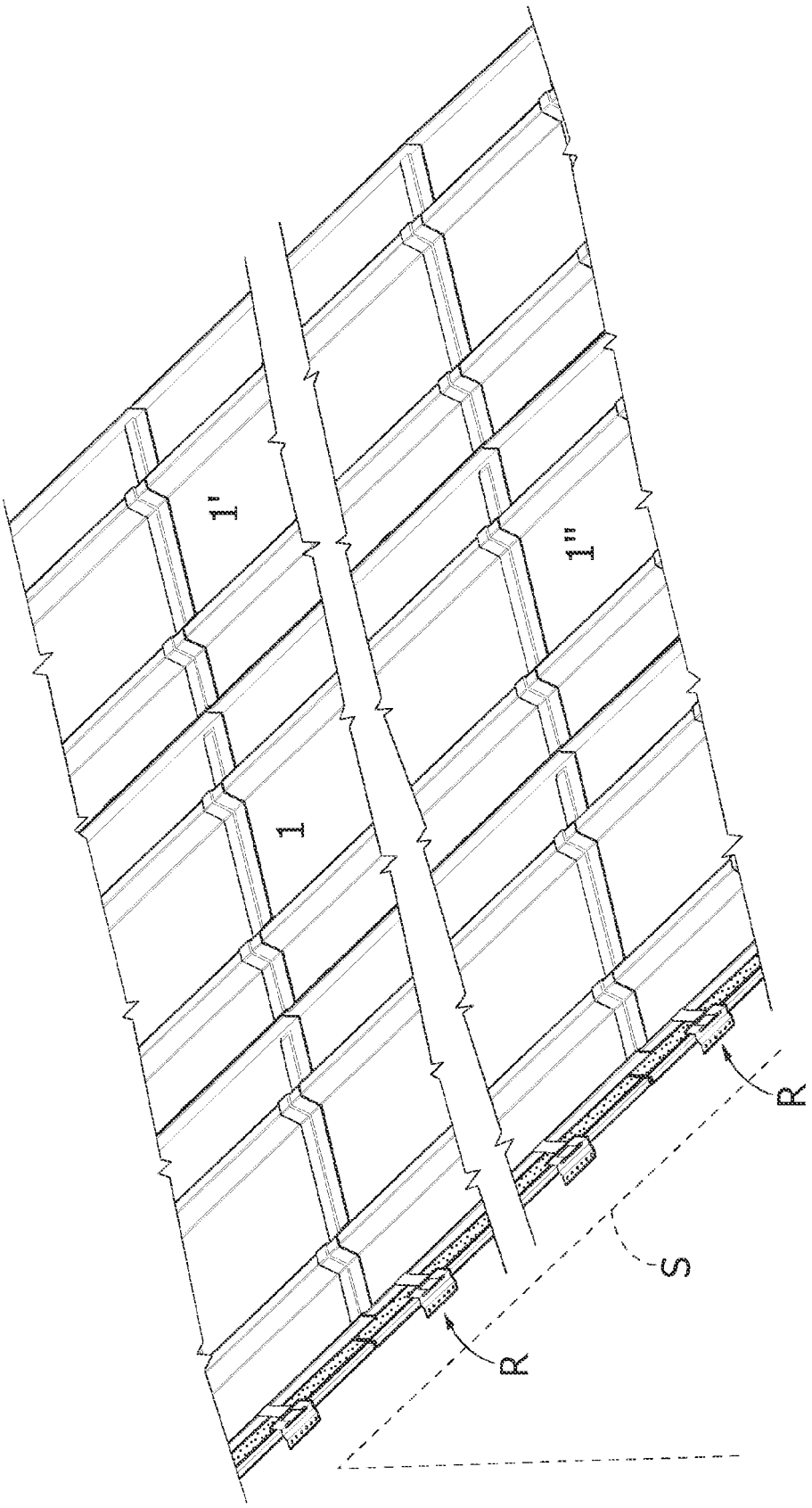


FIG. 2

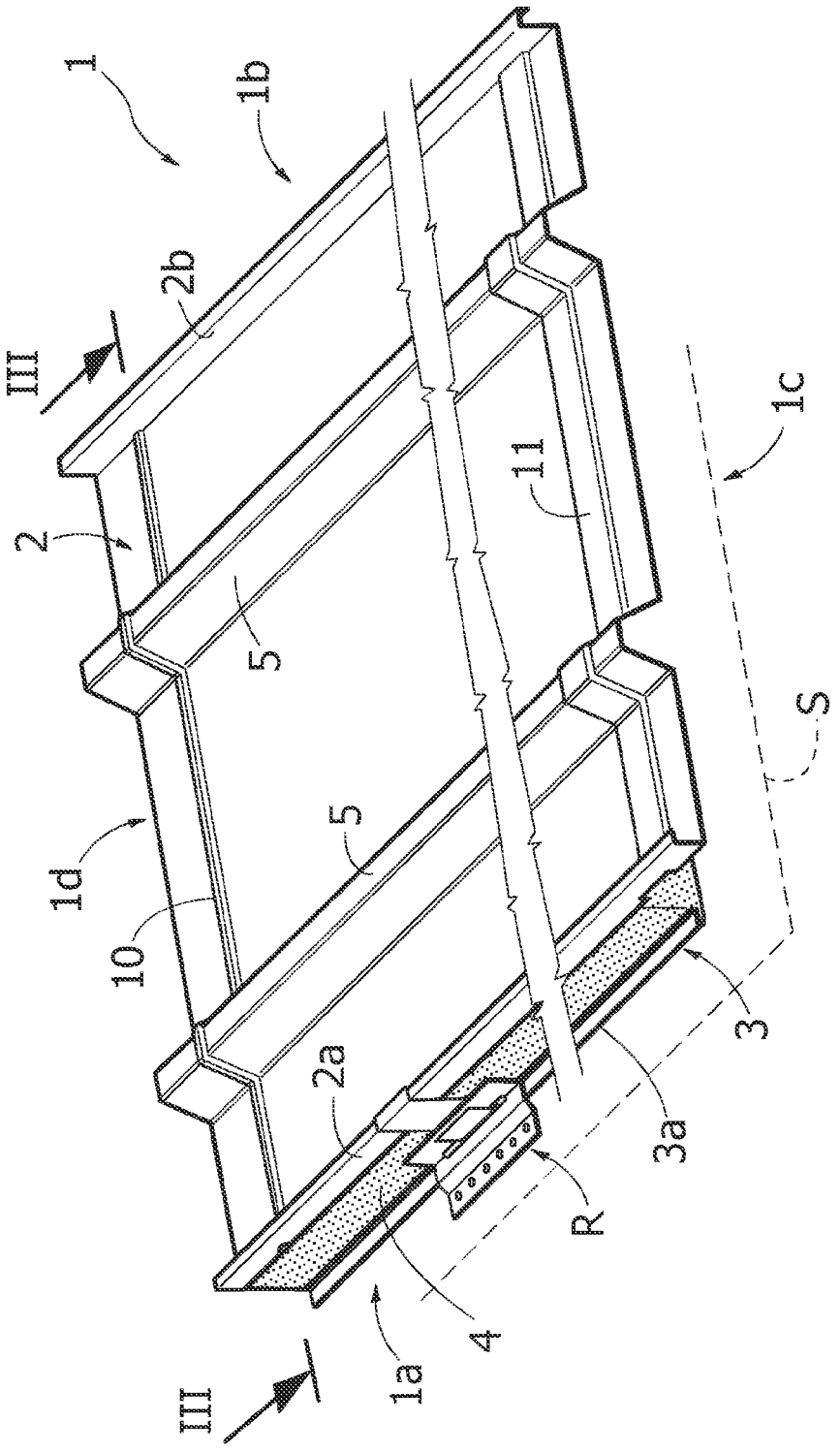


FIG. 3

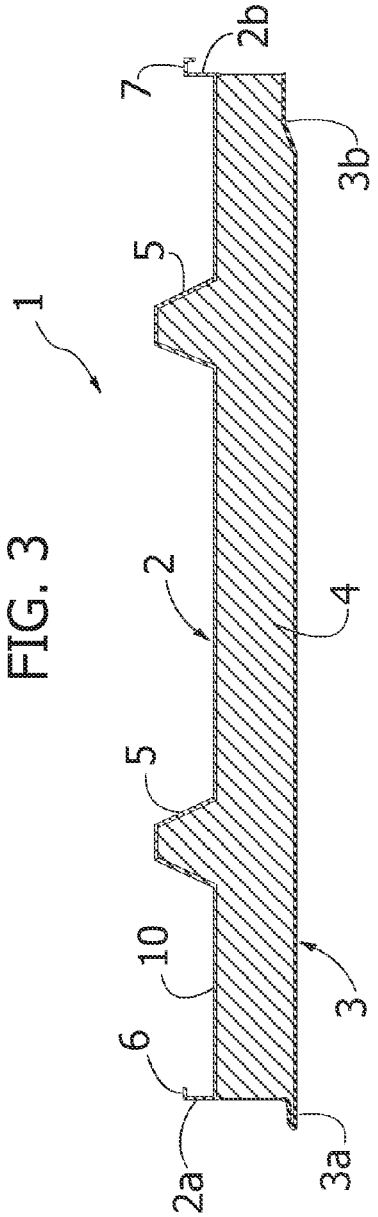


FIG. 5

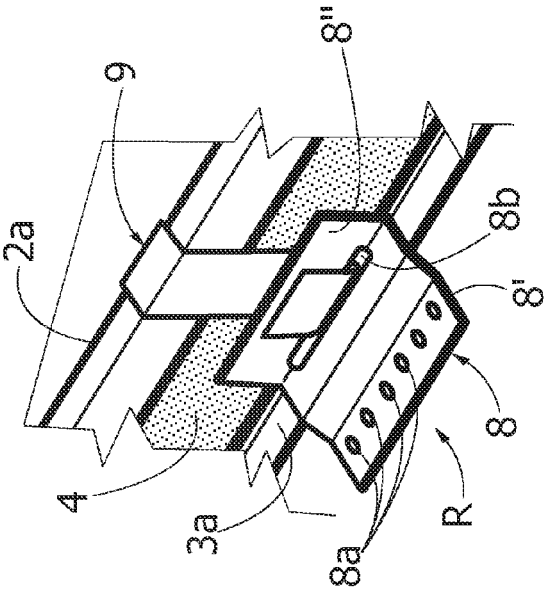


FIG. 4

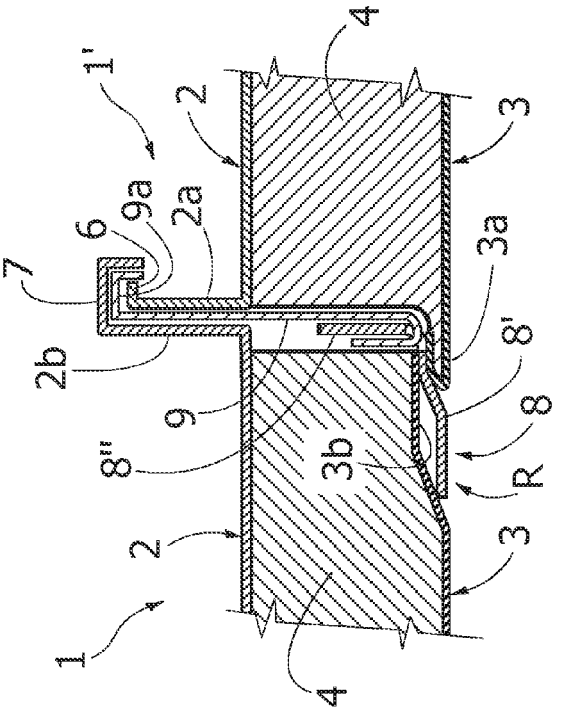


FIG. 8

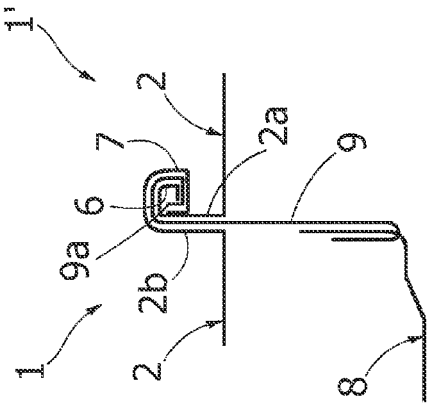


FIG. 7

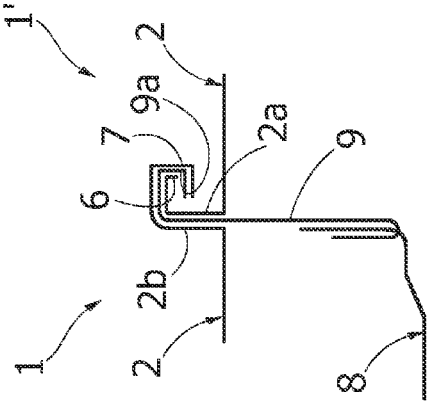


FIG. 6

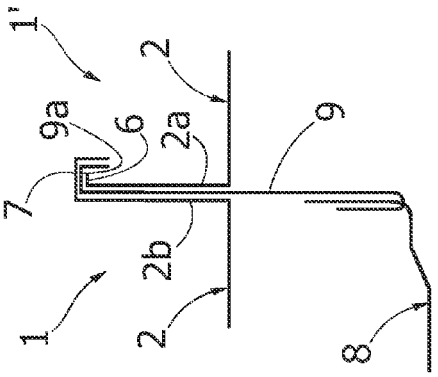


FIG. 11

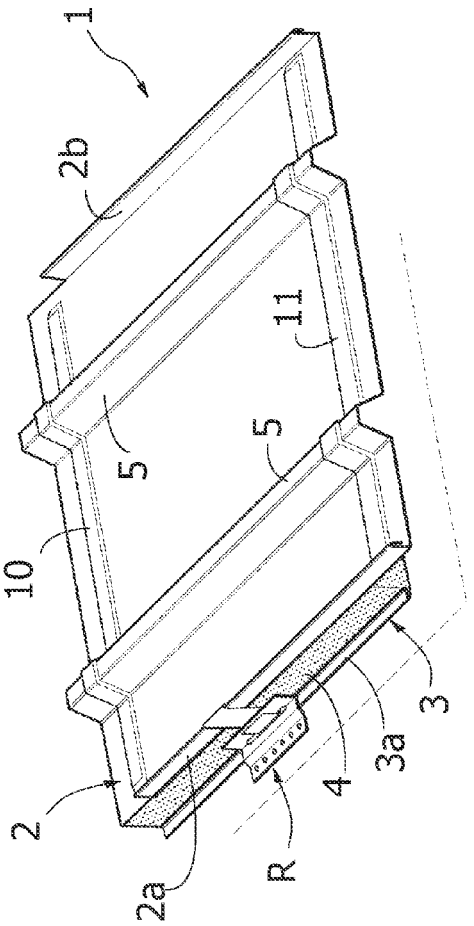


FIG. 9

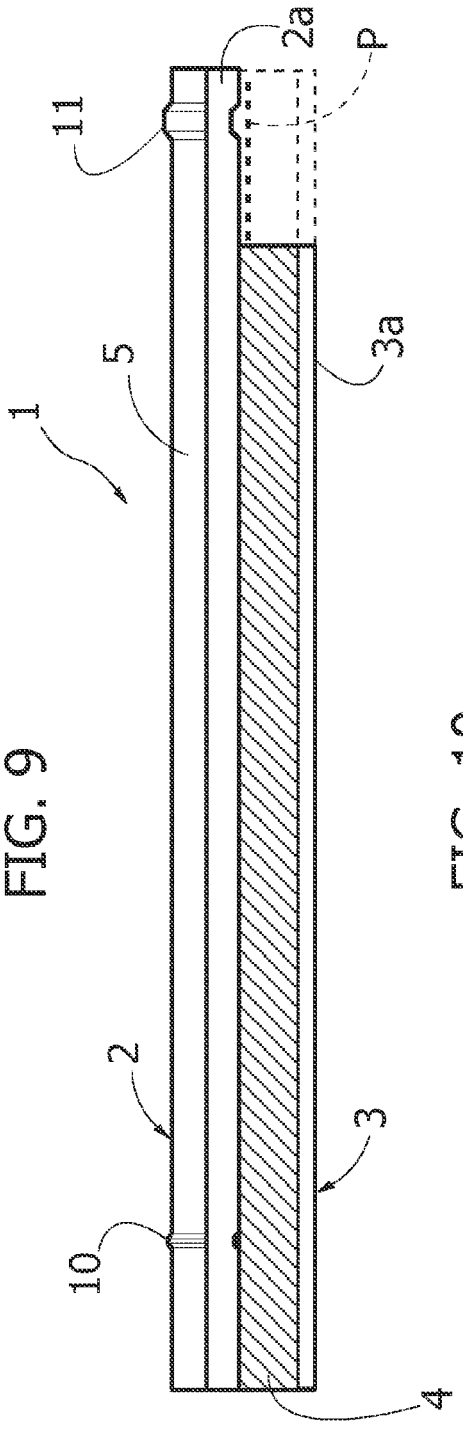
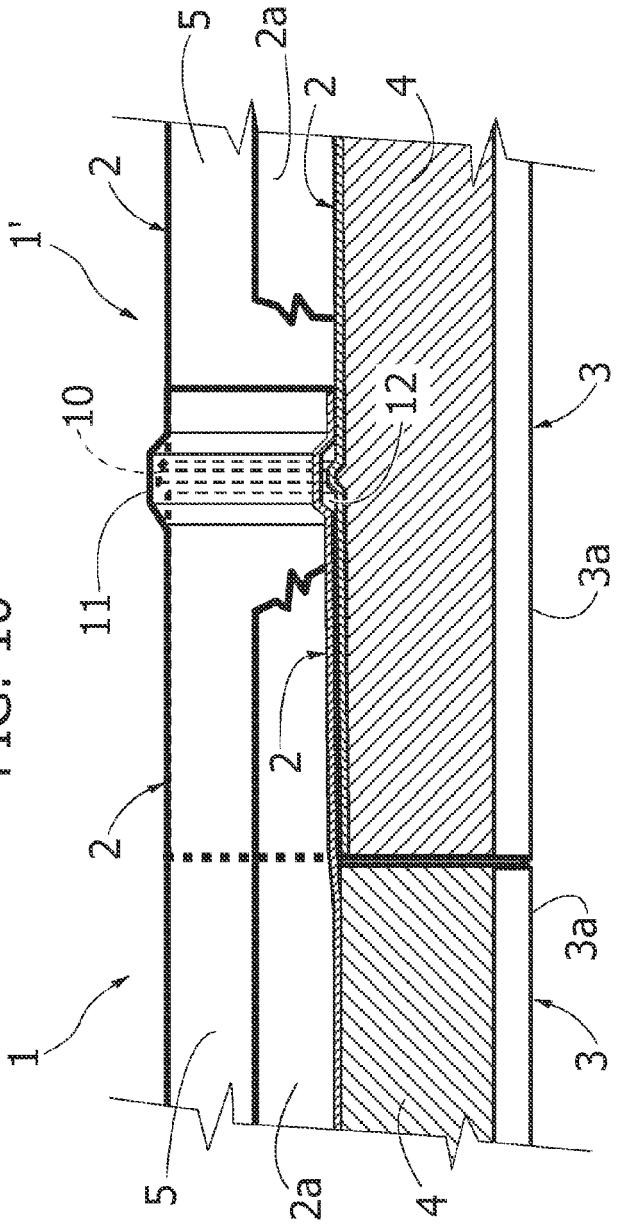


FIG. 10



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Patent documents cited in the description

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