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(71) Applicant: ISOPAN S.P.A. [IT/IT]; Via Righi, 7, 37135 Verona (IT).

(72) Inventor: GUERRINI, Luigi; c/o ISOPAN S.P.A., Via Righi, 7, 37135 Verona (IT).

(74) Agent: FELTRINELLI, Secondo Andrea; c/o APTA S.r.l., Via Ca' di Cozzi 41, 37124 Verona (IT).

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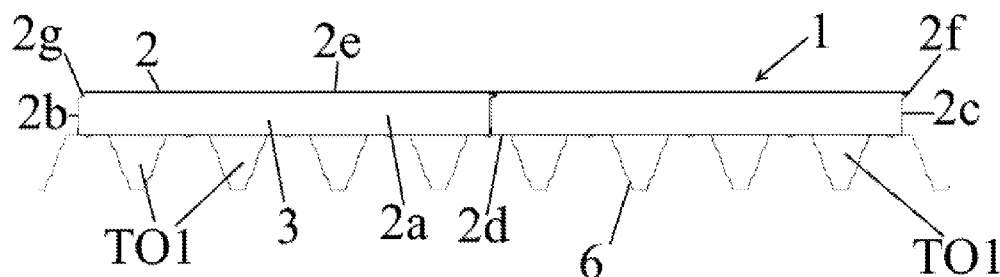


Fig. 1

(57) Abstract: The present invention regards a cladding or covering unit for roofs comprising at least one sandwich panel (2) and at least one fretted or corrugated metal sheet component (6).

“CLADDING OR COVERING UNIT FOR ROOFS”

TECHNICAL FIELD OF THE INVENTION

The present invention regards a cladding or covering unit for roofs as well
5 as a cladding or covering including a plurality of such units.

STATE OF THE PRIOR ART

Many claddings or coverings for roofs or the like have been proposed, as well as, naturally, many methods for the assembly thereof.

According to a known process, an insulating packet is created onsite by
10 directly applying a fretted sheet at the work site, then applying insulating material such as rock wool thereon and subsequently applying a waterproofing membrane.

The solution obtainable by means of such process is not satisfactory in terms of capacities, mounting times, laying times as well as costs.

The European patent application published with number EP3201409A1,
15 for example, teaches a panel for coverings which comprises a pair of opposite sheets with fretted profile, between which a layer of insulating material is interposed, for example mineral wool or polyurethane foam.

The solution taught in such patent application, if on one hand it involves reduced mounting and laying times, on the other hand does not ensure high
20 capacities.

OBJECTS OF THE INVENTION

One object of the present invention is to provide a new cladding or covering unit for roofs.

Another object of the present invention is to provide a unit as indicated
25 above which allows obtaining higher capacities than the solutions proposed up to now.

Another object of the present invention is to provide a cladding or covering unit for roofs which allows reducing the mounting and laying times as well as the costs with respect to the conventional solutions.

30 Another object of the present invention is to provide a cladding or

covering unit for roofs that can be easily transported.

In accordance with one aspect of the invention, a cladding or covering unit for roofs is provided for according to claim 1.

The dependent claims refer to preferred and advantageous embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Other characteristics and advantages of the invention will be more evident from the description of an embodiment of a unit, illustrated as a non-limiting example in the enclosed drawings, in which:

- figure 1 is a front view of a unit according to the present invention;
- figure 2 is an exploded front view of a panel of the unit of figure 1;
- figure 3 is a front view of a fretted or corrugated sheet component of the unit of figure 1;

- figures 4 and 5 are exploded views depicting the structure of other embodiments of panels for a unit according to the present invention;

- figures 6 to 8 illustrate other embodiments of usable fretted or corrugated sheet components of a unit according to the present invention;

- figure 9 is a front view of another unit according to the present invention;
and

- figure 10 is a side view of another unit in accordance with the present invention.

In the enclosed drawings, equivalent parts or components are marked by the same reference numbers.

EMBODIMENTS OF THE INVENTION

The terms “external”, “internal” in the present description refer to the distance or lack of distance with respect to the outside or inside of the roof on which a unit or covering according to the present invention is applied. Thus, for example, the external face of a component is the face of the latter leading to or closer to the outside of the respective roof.

With reference to the enclosed figures, a cladding or covering unit 1 for

roofs is illustrated, comprising at least one panel in particular a sandwich panel 2 including a first layer or main support or insulating block 3, if desired made of mineral wool, polyurethane foam, glass wool, as well as at least one first metal sheet 4, for example made of steel, if desired galvanized, pre-painted, stainless, or of pre-varnished or natural aluminum, copper, etcetera applied or adhered on at least one external, in use, face 3a of the first main support layer 3.

The first sheet 4 can be substantially flat, but it can also have slats, micro-ribs, or it can be undulated or have another shape.

With the term “flat surface” or “flat face” in the present description, it is intended not curved or in any case lacking hollow sections or sections in relief such to prevent the engagement via substantially uniform abutment against another surface or flat face or with flat sections of another face or surface.

In addition, the first main support layer 3 preferably has constant or variable thickness, e.g. with zones in relief alternated with hollow zones, as a function of the configuration of the first sheet 4.

The face that is external during use 3a of the first main support or insulating layer 3 is flat, undulated or has another shape.

The first metal sheet 4 is adhered, glued or constrained in another manner, for example by means of adhesive, to the external face 3a of the first main support layer 3.

In addition, in particular if the first layer 3 is made of mineral wool or glass wool, an internal face 4a of the first metal sheet 4 is preferably constrained, for example glued, for the entire extension thereof in a substantially uniform manner to the external face 3a of the first main support layer 3. If the first layer 3 is made of polyurethane foam or of another foamable component, then the constraint between the first layer 3 and the first sheet 4 could be obtained via adhesion following the foaming of the polyurethane very close to the first sheet 4, before the hardening or final solidification of the polyurethane or foamable component.

Additionally, the first metal sheet 4 preferably has constant thickness.

If desired, the panel 2 also comprises a second metal sheet 5, for example made of steel, if desired galvanized, pre-painted, stainless, or of pre-varnished or natural aluminum, copper etcetera applied or adhered on the face 3b that is internal during use of the first main layer 3. As an alternative or additionally, the panel 2 can comprise a felt component 50, such as an anti-condensation felt component, e.g. substantially flat, applied or adhered on the side 3b that is internal during use of the first main support layer 3.

Clearly, if both a second metal sheet 5 and an anti-condensation felt 50 (see in particular figure 5) are provided, then the first sheet 5 could be applied or adhered on the face 3b that is internal during use of the first main layer 3a, while the felt component 50 would be applied on the face that is internal during use of the first sheet 5.

The second sheet 5 can be substantially flat, but also undulated or have other shapes.

The panel 2 is a compact body or better yet is movable as a single body or body made of a single piece, such that it can be installed as a single component in a single step. This is in particular applied if the panel comprises a second metal sheet 5 and/or a felt component 50 which define, with the first metal sheet 4, the ends of the sandwich panel or better yet the internal and external layers of the same for containing or delimiting the zone for housing the first main layer 3.

The face 3b that is internal during use of the first main support or insulating layer 3 is flat, undulated or has another shape.

The second metal sheet 5, if provided, is adhered, glued or constrained in another manner, e.g. by means of adhesive, to the internal face 3b of the first main support layer 3.

In addition, in particular if the first layer 3 is made of mineral wool or glass wool, an external face 5a of the second metal sheet 5 is preferably glued or constrained in another manner, for the entire extension thereof, in a substantially uniform manner to the internal face 3b of the first main support layer 3. If the first layer 3 is made of polyurethane foam or of another foamable component, then the

constraint between the first layer 3 and the second sheet 5 could be obtained via adhesion following the foaming of the polyurethane very close to the second sheet 5, before the hardening or final solidification of the polyurethane or foamable component.

5 In addition, the second metal sheet 5 can have a constant thickness.

 Additionally, the panel 2 or better yet a respective first layer or main support or insulating block 3 can have four edge faces, one frontal 2a, one rear (not visible in the figures) and two lateral edge faces 2b, 2c.

 The panel 2 then includes a face 2d that is lower or internal during use and
10 a face 2e that is upper or external during use. The face 2d that is lower during use can for example correspond to the internal face of the second metal sheet 5 or of the first layer or main support or insulating block 3 or of the felt component 50. The face 2e that is external during use can instead correspond to the external face of the first metal sheet 4.

15 Two or more of the edge faces, in particular the lateral edge faces 2b, 2c can have means 2f, 2g for engaging or fitting with respective engaging or fitting means of adjacent panels.

 Thus, for example, starting from a lateral edge face 2c of a panel 2 or of a respective first layer or main support or insulating block 3, a projecting portion 2f
20 could be extended for the insertion to size or forced in a corresponding seat 2g delimited in a lateral edge face 2b of an adjacent panel.

 Clearly, each panel 2 or a respective first layer or main support or insulating block 3 could have a projecting portion 2f on a lateral edge face 2c, and a seat 2g as indicated above on the other lateral edge face 2b.

25 Naturally, different engaging or fitting means could also be provided.

 Preferably, apart from the engaging or fitting means, one, some or all the edge faces of the panel 2 can be flat.

 In addition, the lower face 2d and/or the upper face 2e can be flat as well as if desired substantially orthogonal to the edge faces of the panel 2.

30 The cladding unit 1 then comprises at least one fretted or corrugated sheet

component 6 having a plurality of connecting sections, if desired substantially flat 7 alternated with hollow sections 8, each defining a first concavity or concave zone C1 directed towards the panel 2.

Clearly, the fretted sheet component 6 would also define the second
5 concavities or concave zones C2 directed away from the panel 2 and alternated with the first concavities C1, and such second concavities C2 would be defined by the connecting sections 7 and by the lateral side of the hollow sections 8.

Naturally, the connecting sections 7 could also be slightly curved or have tilted sections (see figures 7 and 8). In addition, the connecting sections 7 could
10 also be very narrow, nearly up to forming a connecting edge between adjacent hollow sections 8. In each case, a fretted sheet component such to allow obtaining higher capacities is that illustrated in figure 3.

One or more of the hollow sections 8 could comprise a curved portion or two side portions 8a, each extended from a respective connecting section 7 as well
15 as a base portion 8b for bridge-like connection of the side portions 7a.

More particularly, the side portions 8a could be slightly curved or substantially tilted so as to be converging when approaching the base portion 8b, i.e. the distance between the side portions 8a of a same hollow section 8 decreases when approaching the respective base portion 8b.

Naturally, one or more of the hollow sections 8 could be delimited only by
20 a pair of side portions 8a, as well as, as indicated above, by a curved portion or by combinations or variations of such solutions.

Preferably, the hollow sections 8 of a same fretted sheet component 6 all have the same geometry and the same dimensions.

Advantageously, the base portions 8b or the ends that are lower during use
25 of a fretted or corrugated sheet component 6 are aligned or substantially aligned with each other (this if such portions 8b were not flat) in a same plane.

Preferably, the connecting sections 7 or the ends that are upper during use of a fretted or corrugated sheet component 6 are aligned or substantially aligned
30 with each other (this if the connecting sections 7 were not flat) in a same plane.

A fretted sheet component 6 has, at the respective sides or flanks, coupling means 6a, e.g. snap-coupling with approached and adjacent sheet components.

The panel 2 is applied on the fretted sheet component 6, in a manner such that between the surface or face 2d that is lower during use of the panel 2, for example the internal surface of the second sheet 5 or of the felt component 50, and the hollow sections 8 of the fretted or corrugated metal sheet component 6 - or better yet the external face of the components of the hollow sections 8 - a series of first through openings TO1 remain delimited.

More particularly, each first through opening TO1 is extended in the direction from the front face or surface 2a to the rear face or surface of the panel 2 or even in a direction oblique or perpendicular to the direction from the surface or front face 2a to the rear face or surface of the panel 2.

Advantageously, the first through openings TO1 facilitate the mounting speeds, since they allow, as will also be described hereinbelow, fixing and subsequently housing screws or pins at the same.

According to the non-limiting embodiment illustrated in the figures, each first through opening TO1 is delimited between the external face of the hollow sections 8, for example of respective side portions 8a and base portions 8b, on one side, and by a corresponding section of the internal face of the first layer or main support or insulating block 3 or, if provided, of the second metal sheet 5 or of the felt component 50.

In substance, each through opening TO1 is defined by a respective first concavity or first concave zone C1 of a fretted sheet component closed by the internal face of the first layer or main support or insulating block 3 or, if provided, of the second metal sheet 5 or of the felt component 50.

The first through openings TO1 can be extended for the entire extension of the hollow sections 8. Naturally, the panel 2, at the respective external face, could have portions in relief set for being partly inserted in the hollow sections 8, and in such case the first through openings TO1 would be extended for only part of the extension of the 8.

With regard to the connection of the panel 2 on the fretted sheet component 6, the panel 2 is abutted or set against respective parts of the fretted sheet component 6, e.g. on the external faces of the connecting sections 7.

In addition, the panel 2 could be glued or constrained by means of other suitable means, such as adhesive, screws, pins, on the fretted sheet component 6, for example in a substantially uniform manner on the respective connecting sections 7.

In addition, the fretted sheet component 6 comprises at least one rib 9, 10a, 10b at the connecting sections 7 and/or at the hollow sections 8.

On such matter, at least one rib 10a, 10b could be provided in each lateral portion 8a, if provided, and at least one rib 9 could be provided in the connecting sections 7.

In one, some or each lateral portion 8a, two or more ribs 10a, 10b could be provided, each constituted by a respective folded section.

With reference to such aspect, relative to the non-limiting embodiment illustrated in the figures, a first 10a and/or second 10b rib is/are defined between two parallel and offset segments of the lateral portion 8a connected by means of a connection segment that is tilted with respect thereto.

In one, some or each connecting section 7, a third rib 9 could for example be provided, constituted by a folded section, if desired V- or U-shaped. Such rib 9 can for example be provided at the center line of the respective connecting section 7.

In such case, the contact between each connecting section 7 and a respective internal or lower face 2d of the panel 2 preferably occurs in a uniform manner apart from the zone of the rib(s) 9.

By way of example, the height h of at least one hollow section 8, i.e. the distance of a respective base portion 8b from the connecting sections 7 is between about 140 mm and about 160 mm.

The base portions 8b can have an extension between 30 mm and 80 mm, e.g. 50-70 mm.

The connecting sections 7 can have an extension between about 120 mm and about 150 mm.

The fretted sheet component 6 can instead overall have an extension or width w between about 700 and 900 mm.

5 Preferably, the fretted sheet component 6 comprises three, four or five, six, seven or more hollow sections 8.

 In addition, the above description of the configuration of the fretted sheet component 6 regards a section or front or back thereof, but clearly this remains the same in the direction from the front or back of the unit 1 or even in the direction
10 that is tilted with respect to a front-back direction of the unit. On such matter, the hollow sections 8 of the fretted sheet component 6 define parallel longitudinal zones of the same.

 If desired, the panel 2 also comprises (see in particular figure 9) a membrane made of polymer material 11, e.g. of PVC or TPO, applied on the first
15 metal sheet 4 or better yet on a surface of the latter that is external or distal from the first main support layer 3.

 In addition, a part of the external face of the first metal sheet 4 is preferably constrained, e.g. glued, in a substantially uniform manner to the internal face of the membrane 11.

20 Such membrane 11 mainly carries out the function of waterproofing.

 The membrane 11 is pre-coupled to the panel 2 before laying the same or during the step of producing the panel 2 or to the first sheet 4 before producing the panel 2. In such case, the panel 2 with the membrane 11 forms a compact body or better yet is movable as a single body or body made of a single piece, such that
25 this can be installed as a single component in a single step.

 In accordance with the present invention, also a covering or cladding 12 for roofs is provided for, comprising a plurality of units 1 approached to each other at edges of the respective panels 2, and in such covering 12 the means 2f, 2g for engaging or fitting panels 2 of approached and adjacent units are engaged and
30 constrained with each other, and the same holds true for the means 6a for coupling

sheet components 6 of approached and adjacent units.

In such case, as taught by EP3201409A1, the covering 12 can comprise strips of waterproof material 13 arranged to cover the gaps G delimited between the edges of the panels 2 of adjacent units 1, and such strips 13 are set to ensure the waterproofing of the covering 12.

For the obtaining or better yet the installation of a covering or cladding 12 according to the present invention, one first proceeds by arranging or making a panel 2 or better yet a plurality of panels 2.

In order to produce one panel or each panel 2, if the first layer 3 is made of mineral wool or glass wool, the first layer 3, the first sheet 4 and, if desired, the second sheet 5 or the felt component 50 are made or obtained and the first layer 3 is constrained to the first sheet 4 and, if provided, to the second sheet 5 or to the felt component 50, such that the panel 2 forms a compact body or better yet is movable as a single body or body made of a single piece, such that this can be installed as a single component and in a single step.

Such step is attained by constraining, for example by means of glue or adhesive, the first metal sheet 4 or better yet the internal face thereof to the external face 3a of the first main support layer 3.

If a second metal sheet 5 or a felt component 50 is also provided for, then the latter is constrained, for example by means of glue or adhesive, to the internal face 3b of the first main support layer 3.

If instead the first layer 3 is made of polyurethane foam or of another foamable component, then, in accordance with processes according to the state of the art, the constraint is determined between the first layer 3 and the first sheet 4 and, if a second sheet 5 and/or a felt component 50 is provided for, between the first layer 3 and the second sheet 5 and/or the felt component 50 via adhesion following the foaming of the polyurethane very close to such components 4, 5, before the hardening or final solidification of the polyurethane or foamable component.

If desired, independent of the material for obtaining the first layer 3, also a

membrane 11 is made or obtained and the same is fixed on the external face of the first metal sheet 4, during the step of producing the panel 2 or even before producing the panel 2.

Naturally, such production processes are obtained in a plant which provides for suitable components or steps for obtaining and conveying components 3, 4, 5 of the panel 2.

One or a plurality of fretted sheet component(s) 6 is/are obtained with any suitable method.

Subsequently, preferably at the work site, by means of screws, pins or another suitable mode, the fretted sheet component 6 or better yet the fretted sheet components 6 is/are constrained to the already-installed sub-structure or main structure, e.g. made of concrete SO of the respective roof.

In order to obtain this, the hollow sections 8 are abutted or brought into abutment at the respective internal face, i.e. that outside the first concavity/concavities C1, against an external surface of the sub-structure or structure made of concrete and then screws or pins are for example inserted starting from the internal face of the hollow sections 8 up to inside the sub-structure or structure made of concrete. If the hollow sections 8 comprise respective base portions 8b, then these are brought into abutment against an external surface of the sub-structure and the pins or screws are inserted in the base portions 8b and in the underlying sub-structure or structure made of concrete SO.

At this point, one or more previously-obtained panels 2 are brought into abutment against or resting on the fretted sheet component(s) 6. On such matter, the panels 2 are brought with the internal face of the first layer 3 or, if provided, of the second sheet 5 or of the felt component 50 in abutment against external face sections of the fretted sheet components 6, for example against the external face of the connecting sections 7. Such step is obtained by moving the panel as a single body, so that the various elements thereof are not constrained to each other.

As indicated above, the panel 2 is applied on the fretted metal sheet component 6, in a manner such that between the surface 2d that is lower during

use of the panel 2, for example the internal surface of the second metal sheet 5 or of the felt component 50, and the hollow sections 8 of the fretted or corrugated sheet component 6 or better yet the external face of the components of the hollow sections 8, a series of first through openings TO1 remain delimited.

5 In such a manner, the first through openings TO1 are each defined at a respective first concavity C1.

Advantageously, second through openings TO2 are instead defined at the second concavities or concave zones C2, such openings delimited between the fretted sheet component(s) 6 and the sub-structure or structure made of concrete
10 SO. The first through openings TO1 are naturally alternated with the second through openings TO2.

The panel(s) 2 is/are constrained to the fretted sheet component(s) 6 by means of adhesive, glue, screws, pins, etcetera.

Clearly, during such steps, adjacent fretted sheet components 6 are
15 constrained to each other by means of respective coupling means 6a, and adjacent panels 2 are connected by means of respective engaging or fitting means 2f, 2g.

Naturally, depending on the dimensions (width and length), each panel 2 can be brought resting on into abutment and hence constrained to a respective fretted sheet component 6 or also to multiple fretted sheet components 6 or
20 multiple panels 2 can be brought resting or into abutment and hence constrained to the same fretted sheet component 6.

In addition, as further step, strips of waterproof material 13 could then be applied to cover the gaps G delimited between the edges of the panels 2 of approached units 1.

25 Clearly, due to a unit according to the present invention, it is possible to obtain high speeds of mounting onsite, since - the sandwich panel being pre-assembled - it is necessary only to constrain the fretted sheet components to the sub-structure or structure made of concrete and then the panels to the fretted sheet component, there being no intermediate steps, before then possibly applying strips
30 of waterproof material 13 to cover the gaps G delimited between the edges of the

panels 2 of approached units 1.

With the conventional solutions, however, first the fretted sheet components are installed and then the same are filled with insulating material, in order to then weld a sheath or install a sheet and then weld a sheath.

5 In addition, due to the configuration of units according to the present invention, in particular due to the configuration of the fretted sheet components and due to the constraint with the panels, it is possible to obtain greater capacities with respect to the solutions proposed up to now, in particular where fretted sheet components are used according to figure 3.

10 Modifications and variations of the invention are possible within the scope defined by the claims.

CLAIMS

1. Cladding or covering unit for roofs, comprising:
 - at least one sandwich panel (2) including a first main support or insulating layer or block (3) as well as at least one first metal sheet (4) applied or adhered to at least one external, in use, face (3a) of said first main support layer (3), and
 - at least one fretted or corrugated sheet component (6) having a plurality of connecting sections (7) alternating with hollow sections (8) each defining a first concavity or concave zone (C1) facing said at least one panel (2).
2. Unit according to claim 1, wherein said at least one panel (2) is applied on said at least one fretted sheet component (6), so that between the lower, in use, surface or face (2d) of said at least one panel (2) and said hollow sections (8) of said at least one fretted or corrugated sheet component (6) a series of first through openings (TO1) remain delimited.
3. Unit according to claim 1 or 2, wherein said at least one panel (2) comprises a second metal sheet (5) applied or adhered to an inner, in use, face (3b) of said first main support layer (3).
4. Unit according to claim 1, 2 or 3, wherein said panel comprises a felt component (50) applied or adhered to an inner, in use, face (3b) of said first main support layer (3).
5. Unit according to claim 1, 2, 3 or 4, wherein said at least one fretted sheet component (6) comprises at least one rib (9) at said connecting sections (7).
6. Unit according to any one of the preceding claims, wherein said at least one fretted sheet component (6) comprises at least one rib (10a, 10b) at said hollow sections (8).
7. Unit according to any one of the preceding claims, wherein said at least one hollow section (8) comprises two side portions (8a) each extending from a respective connecting section (7) as well as a base portion (8b) for bridging said side portions (8a).
8. Unit according to claims 6 and 7, wherein at least one rib (10) is provided

in each side portion (8a).

9. Unit according to claim 7 or 8, wherein the height of at least one hollow section (8), that is the distance of a respective base portion (8b) from the connecting sections (7), is equal to about 140-160 mm.

5 10. Unit according to any one of the preceding claims, wherein said at least one panel (2) comprises a polymeric material membrane (11) applied on said at least one first metal sheet (4).

11. Unit according to any one of the preceding claims, wherein said at least one panel (2) is a compact body or a better movable one as a single body or in one
10 piece, so that it can be installed as a single component and in a single step.

12. Covering or cladding for roofs comprising a plurality of units according to any one of the preceding claims, wherein said units are approached to each other at edges of the respective panels (2), engaging or fitting means (2f, 2g) of adjacent panels (2) being in engagement and constraint between each other and coupling
15 means (6a) of sheet components (6) of adjacent units being in engagement and constraint between each other.

13. Process for installing a covering according to claim 12, comprising the following steps:

- making said at least one fretted sheet component (6),
- 20 - providing at least one panel (2) constituting a compact body or one that can be better moved as a single body or in a single piece, so that this panel (2) can be installed as a single component and in a single phase,
- constraining said at least one corrugated sheet component (6) to the already installed substructure or main structure (SO) of a respective roof,
- 25 - bringing said at least one panel (2) to rest or abut against said at least one corrugated sheet component (6), this being obtained by bringing said at least one panel (2) with the inner face of said first layer (3) or, if provided, of a respective second sheet (5) or of a respective felt component (50) in abutment against outer face portions of said at least one fretted sheet component (6), this step being
30 obtained by moving said at least one panel (2) as a single body or in one piece,

- constraining said at least one panel (2) to said at least one fretted sheet component (6).

14. Process according to claim 13, wherein said at least one panel (2) is applied on said at least one fretted sheet component (6), so that between the lower, in use, surface (2d) of the panel (2) and the hollow sections (8) of said at least one fretted or corrugated sheet component (6) a series of first through openings (TO1) remain delimited.

15. Process according to claim 13 or 14, for the installation of a covering including at least one unit according to claim 7, wherein said at least one base portion (8b) is brought into abutment against an outer surface of the substructure or main structure (SO) and said step of constraining said at least one fretted sheet component (6) to the substructure (SO) is obtained by inserting at least one pin or screw in said at least one base portion (8b) and in the underlying substructure or main structure (SO).

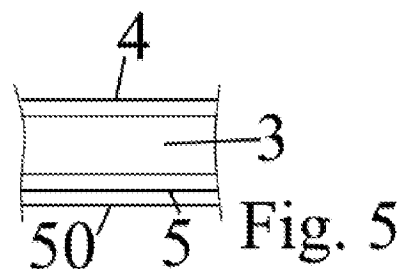
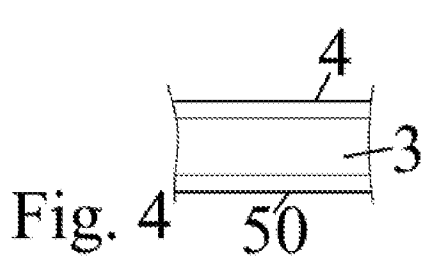
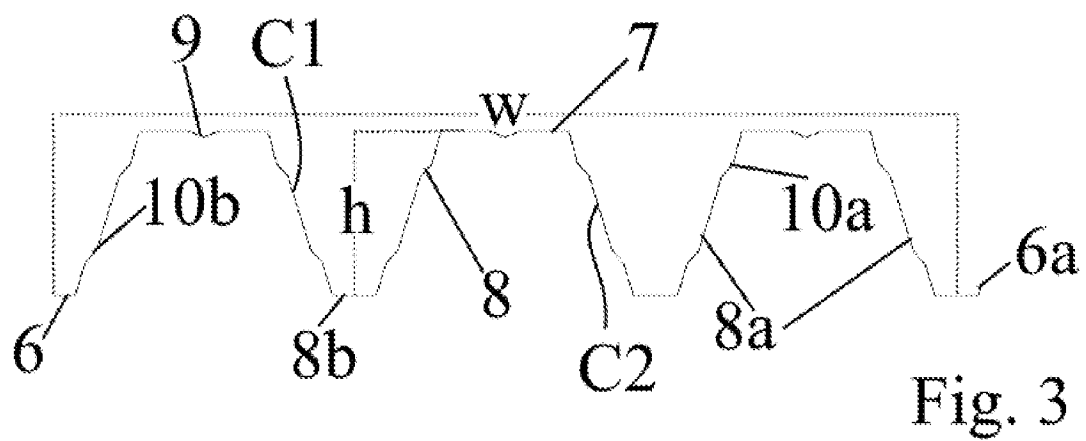
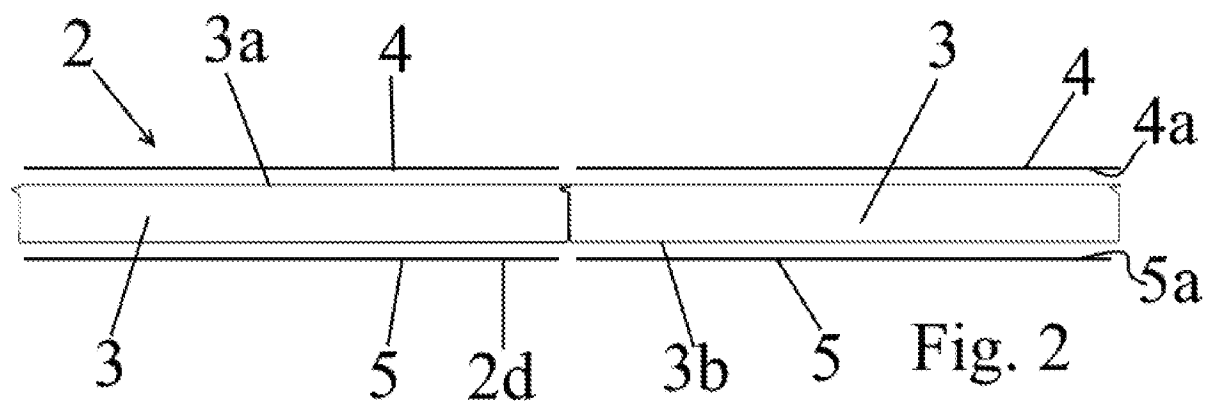
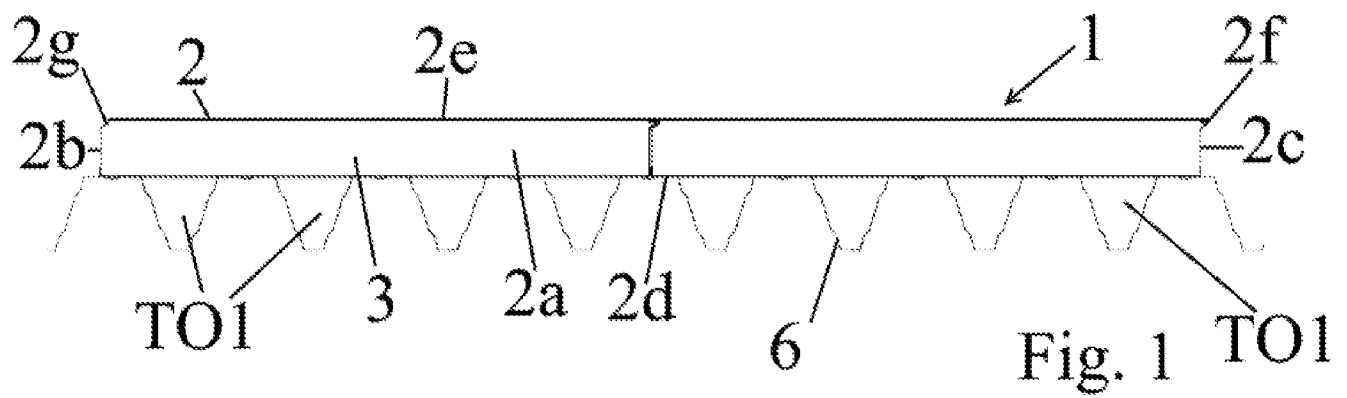
16. Process according to claim 13, 14 or 15, comprising the following steps:

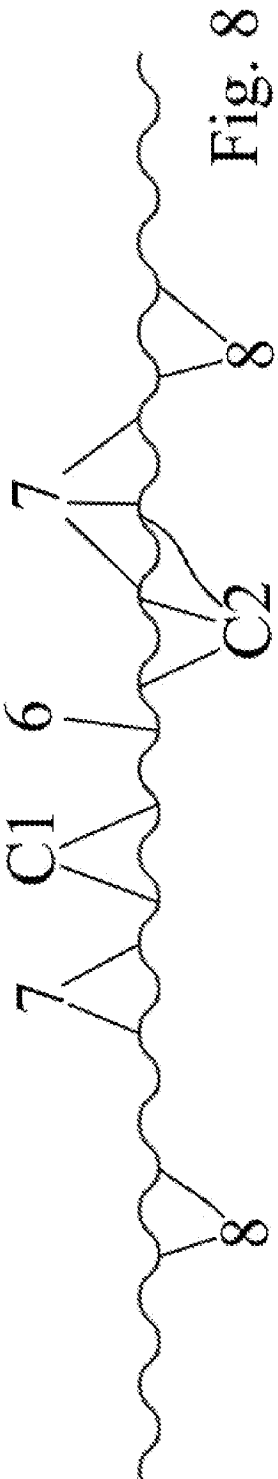
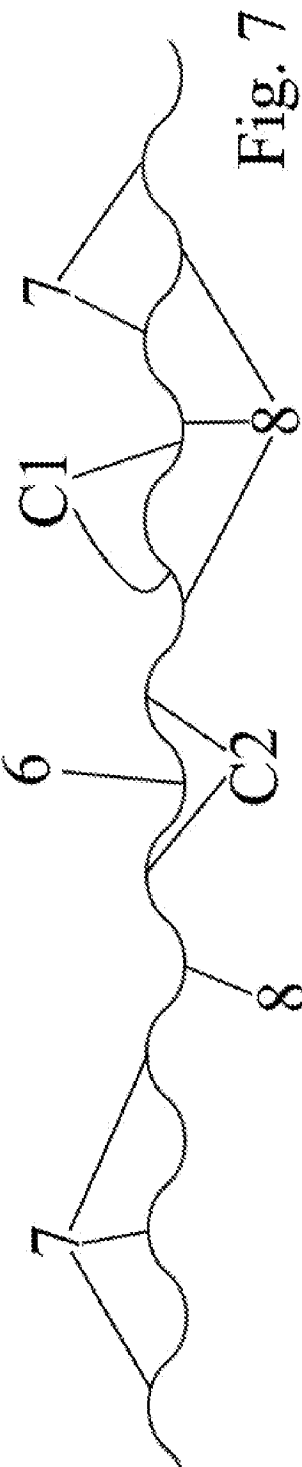
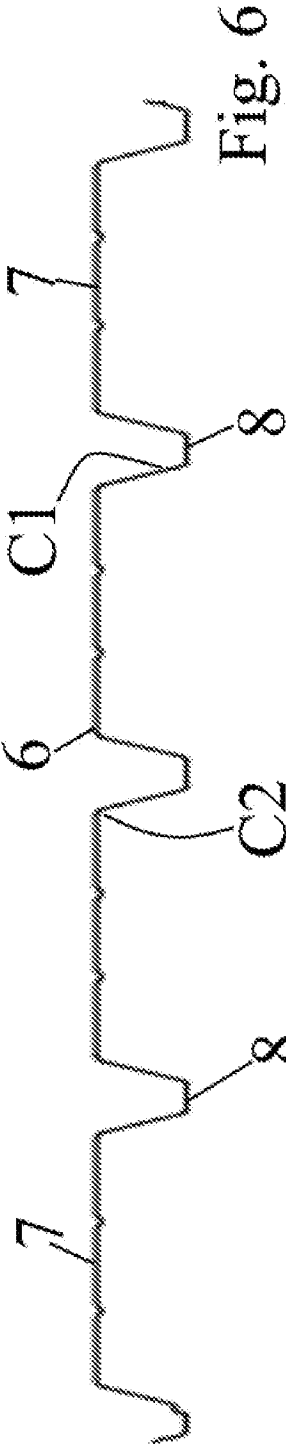
- making several units including a panel (2) connected to a respective fretted sheet component (6),

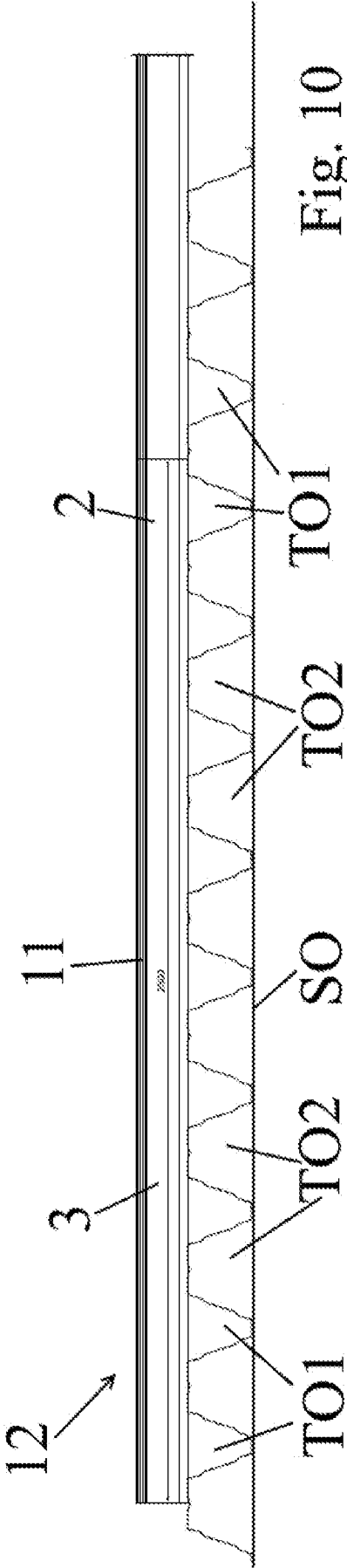
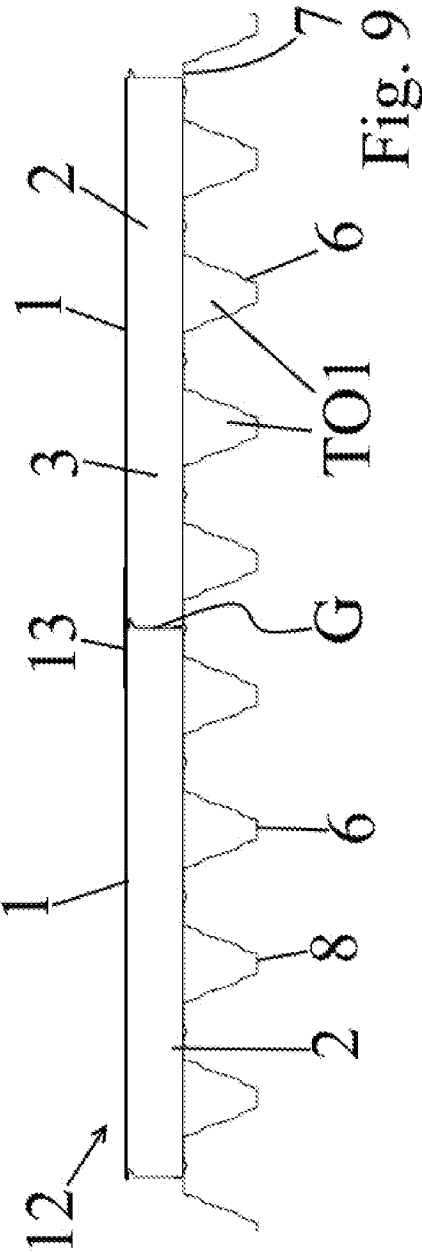
constraining to each other fretted sheet components (6) of approached and adjacent units and connecting to each other panels (2) of approached and adjacent units, and

if necessary, applying strips of waterproof material (13) to cover the gaps (G) delimited between the edges of the panels (2) of approached units.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2020/053402

A. CLASSIFICATION OF SUBJECT MATTER

INV. E04D3/35 E04D3/362 E04D13/16
ADD. E04D3/36

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04D E04C E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/141379 A1 (RAUTARUUKKI OYJ [FI]; MOISIO MARKO [FI]) 13 December 2007 (2007-12-13)	1-3,7,9, 11-14,16
Y	figure 1	4-6,8, 10,15
X	----- US 1 975 842 A (HARRY GILLET ET AL) 9 October 1934 (1934-10-09) page 1, column 2 - page 2, column 1; figures 1,3	1,2,7, 11,12
X	----- DE 93 00 104 U1 (ISOBOUW DÄMMTECHNIK GMBH) 12 August 1993 (1993-08-12) paragraphs [0018] - [0021]; figure 1 ----- -/--	1-3,7,11



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

29 May 2020

Date of mailing of the international search report

09/06/2020

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Leroux, Corentine

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2020/053402

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	DE 203 07 206 U1 (ZAHN HARALD GMBH [DE]) 17 July 2003 (2003-07-17) page 7; figure 2 -----	4-6,8
Y	FR 2 221 606 A1 (IND PROFILATI SOMAGLIA SPA [IT]) 11 October 1974 (1974-10-11) figures 1-3 -----	5
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Y	WO 2005/059265 A1 (KINGSPAN HOLDINGS IRL LTD [IE]; STEVENS MARK VICTOR [GB]) 30 June 2005 (2005-06-30) page 10, line 1 - page 11, line 5; figure 1 -----	10
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X	WO 2005/024152 A1 (HUBNER WOLFGANG [AT]) 17 March 2005 (2005-03-17) figure 21 -----	1
A	EP 3 201 409 A1 (ISOPAN S P A [IT]) 9 August 2017 (2017-08-09) cited in the application figure 4 -----	1-16

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Information on patent family members

International application No

PCT/IB2020/053402

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