(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 538 475 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
16.04.2025 Bulletin 2025/16

(21) Application number: **23819303.1**

(22) Date of filing: **26.05.2023**

(51) International Patent Classification (IPC):
E04B 2/74 *(2006.01)* ***E04F 13/00*** *(2006.01)*
E04F 13/24 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E04B 2/74; E04F 13/00; E04F 13/24

(86) International application number:
PCT/ES2023/070346

(87) International publication number:
WO 2023/237792 (14.12.2023 Gazette 2023/50)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **09.06.2022 ES 202230504**

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(54) **HIDDEN FASTENING SYSTEM FOR MODULAR PANELS AND MODULAR STRUCTURE OBTAINED**

(57) The present invention relates to a hidden fastening system comprising pairs of fittings (2) formed by bases (2a) and notched structures (2b), the fittings being fastened to the panels (1, T) by means of the bases (2a) of said fittings (2), and the notched structures (2b) being located on planes parallel to opposing faces of the panels (1, T). Each hidden fastening system is characterised in that, between each pair of adjacent panels (1, T), at least one of the two notched structures (2b) of one of the two adjacent panels (1, T) is press-fitted in a channel (5,5') defined between the other similar notched structure (2b) and a front surface of the other similar panel (1, T). The edges of the two adjacent assembled panels (1, T) are in contact with each other when connected.

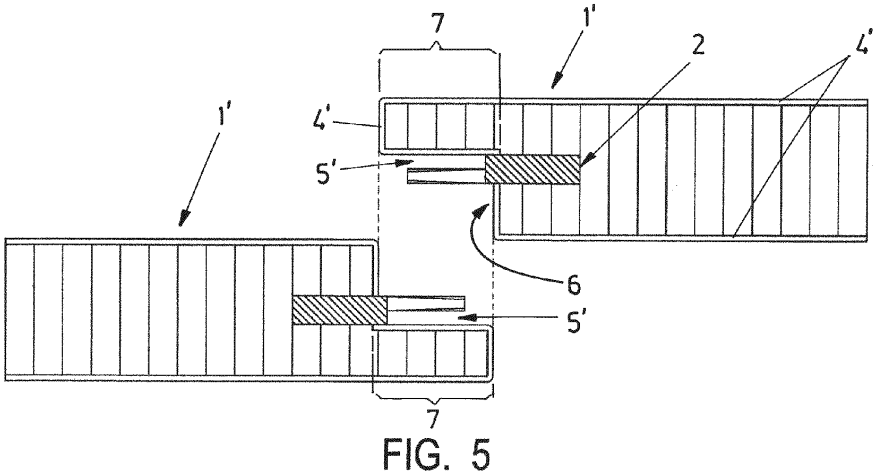

FIG. 5

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Description

Object of the invention

[0001] The present invention relates to a hidden fastening system for panels and to the modular structure obtained, the object of which refers to a modular system for cladding and partitioning (including sectoring) spaces, both for application in industrial and civil constructions and for application in ship construction, and the modular structure of which is configured by the modular panels which are attached by means of the hidden fastening system; with said modular panels preferably being made of an aluminium material and including a configuration with a honeycomb core.

[0002] The weight of claddings and partitioning elements in construction, the speed of assembly, and delivery times without losing final finish quality, as well as maximising the ease of maintenance in the case of malfunctions, deterioration, and even replacement or substitution of said claddings, are of great concern today. The present invention seeks to solve all these issues in a satisfactory manner.

Technical field

[0003] The field of the art in which the present invention is comprised belongs to industrial and civil constructions, as well as to ship construction, with said constructions being carried out by means of the modular panel structure.

Technical problem to be solved and background of the invention

[0004] Modular cladding and partitioning systems, even with a structure formed by panels with a honeycomb core, are already known in the market, but they are not designed for application in ship construction, and their attachment profiles are fully visible when it is required to be able to disassemble them, which means that a projection or ribbing can be seen from the outside along the entire length of each attachment joint between each pair of panels, which negatively affects the visual finish of the formed structure as a whole.

[0005] Similarly, in ship construction, there are modular cladding systems, but they do not comprise a honeycomb configuration, and generally the panels are heavy and difficult to disassemble, particularly when the attachment profiles are intended to be hidden, requiring the disassembly of a whole line of panels to replace only one of them, with the arduous work and time that this entails.

[0006] Therefore, even though there are modular systems similar to those described in the present invention, they do not meet all the requirements necessary to achieve the advantages described above and the application of which can be extended to both the industrial and naval markets.

Description of the invention

[0007] In order to achieve the objectives and prevent the drawbacks in the preceding sections, the invention proposes a hidden fastening system for panels and a modular structure obtained, the hidden fastening system being located along pairs of parallel opposite areas of the panels which include a first front face and a second rear face opposite the front face and edges which define the contour of said panels.

[0008] The hidden fastening system comprises pairs of fittings formed by bases and notched structures, with the fittings being fastened to the panels by means of the bases and the notched structures being located on planes parallel to the opposite faces of the panels.

[0009] The fittings are located in the pairs of parallel opposite areas of the panels in a location selected from a location close to the edges of the panels and a location in correspondence with the respective edges of the panels.

[0010] The notched structures of the fittings are located in a position selected from a first position in which the notched structures project from at least one part of the edges of the panels and a second position in which the notched structures do not project from at least the part of the edges of the panels, wherein taking into consideration this second position there is a channel defined between the notched structure and a front surface of the panels which is parallel to the opposite faces of said panels.

[0011] In each hidden fastening system, between each pair of adjacent panels, at least one of the two notched structures of one of the two adjacent panels is press-fitted in a channel defined between the other similar notched structure and a front surface of the other similar panel, with the edges of the two adjacent assembled panels being in contact with each other when connected.

[0012] The teeth of the notched structures have slightly smaller dimensions than the gaps defined between said teeth, such that during the assembly of two adjacent panels to carry out their fastening, in a first phase, the teeth of one of the fittings are aligned frontally with the gaps of the other similar fitting to enable fitting at least one of the notched structures in the channel of the respective panel in a second phase.

[0013] In an embodiment of the invention, the fastening system between each pair of adjacent panels for a vertical cladding comprises a first fitting fastened on the rear face of one of the two panels with its notched structure projecting from the edge of said panel, and a second fitting fastened on the rear face of the other similar panel with its notched structure arranged parallel to an area of the rear face of the panel, with the channel being defined between the notched structure of the second fitting and said area of the rear face of the panel constituting the front surface.

[0014] In a second embodiment of the invention, the

fastening system between each pair of adjacent panels for a horizontal cladding comprises a first fitting fastened in correspondence with an edge having a stepped configuration of one of the two panels, and a second fitting fastened in correspondence with an edge having a stepped configuration of the other similar panel, with there being configured, between the structures of the two fittings and the front surfaces of the two panels, two channels in which the opposing structures of said panels are press-fitted, and with the edges having a stepped configuration being in contact with each other by means of a tongued and grooved coupling.

[0015] The edges having a stepped configuration comprise angular recesses and end portions, with the notched structures of the fittings being arranged parallel to the front surfaces of the end portions of the panels, and with the end portions being fitted in the angular recesses of the panels in the tongued and grooved coupling between adjacent panels.

[0016] One panel model comprises a simple structure with a honeycomb core, with the first front faces and edges thereof being covered by laminar bodies.

[0017] A second panel model comprises a composite structure with a honeycomb core, with the first front faces, second rear faces, and edges thereof being covered by laminar bodies.

[0018] The modular structure obtained with the panels attached by means of the hidden fastening system comprises facings selected from vertical facings and horizontal facings of a ceiling, which are formed by a succession of panels fastened to each other by means of pairs of fittings of pairs of adjacent panels 1, 1'.

[0019] In an embodiment of the invention, the modular structure comprises a vertical facing of a wall which further includes a frame of a door which is fastened parallel to pairs of opposing panels with a simple structure by means of the fittings, with the frame including two parallel branches which are a continuation of the pairs of simple panels, and with fittings that are complemented with other similar fittings fastened on the pairs of panels with a simple structure being fastened on inner faces of the two parallel branches of the frame.

[0020] In another embodiment of the invention, the modular structure comprises a first vertical facing of a wall and two second vertical facings of collateral walls attached in a perpendicular manner to the first vertical facing, with the attachment between each collateral wall and the adjacent wall comprising pairs of panels with a simple structure with a right angle configuration formed by two flanges, with angular reinforcement profiles being assembled in the junction of the two flanges of said panels.

[0021] In an embodiment of the invention, the vertical facings of collateral walls comprise a composition of panels with a simple structure and panels with a composite structure.

[0022] In the embodiment of the invention of the horizontal facings of a ceiling, the modular structure includes perimeter angular profiles and an intermediate beam which supports two groups of panels with a composite structure, with the different panels of the modular horizontal structure being supported on these elements. The intermediate beam has an inverted T-shaped configuration, with the panels being supported on its horizontal cross member, while its vertical branch constitutes the element which separates the two groups of panels.

[0023] In line with what was described in the preceding paragraph, the panels with a composite structure are supported, on one of their opposite faces, on the horizontal cross member of the intermediate beam and on a flange of the perimeter angular profiles.

[0024] In another embodiment of the invention, the panels with a composite structure are supported on the perimeter angular profiles through the end portions located in opposite areas of said panels in correspondence with one of the branches of the angular recesses of the opposite edges of the panels.

[0025] In another embodiment of the invention, the two opposing end portions of two panels with a composite structure converging at a central area, are supported on the horizontal cross member of the intermediate beam, while one of the two panels further includes an additional extension which covers a gap of the same width as said horizontal cross member and as the sum of the two opposing end portions of the two panels.

[0026] The hidden fastening system of the invention is applicable to claddings and partitions for spaces and is essentially designed with aluminium panels with a honeycomb core. The main elements mentioned above, such as vertical panels for cladding vertical partitions, horizontal ceiling panels (slats) for cladding horizontal partitions, and doors with special frames designed to be fitted in the vertical cladding itself, are included as described above.

[0027] The aluminium structure with a honeycomb core of the panels makes them much lighter compared to other materials such as steel, mortars, or plaster, all this without reducing the rigidity necessary to enable the use thereof as cladding or partitioning element, even providing them with greater structural capacities and offering the possibility of increasing the size of the panels, thereby reducing the number of joints and thus favouring better cleaning.

[0028] In the panels, the hidden fastening system as means for attaching said panels is of the plug-and-play type. To that end, the fastening system comprises the structure-format hidden fittings located on the rear face of each panel with a simple structure.

[0029] Each vertical panel is easily assembled in two movements, a first forward movement to the front in order to place it vertically in its position, and another downward movement so that the respective structure is fastened in the corresponding channel.

[0030] The particularity of the fittings having the described configuration is that each panel can be disassembled again individually by simply performing the

same movements as for the assembly, but in reverse, that is, lifting the panel and pulling it frontally backwards and towards itself.

[0031] The other particularity of these fittings being designed to be hidden is that they allow attachment without additional profiles, and therefore the exterior visual finish is smooth and projection-free, with a single line of attachment in correspondence with the contact of their edges, which also allows the subsequent lining of these partitions with other textures or materials, such as wood, PVC, laminates, etc.

[0032] In the case of the application of the invention to ceilings, the tongued and grooved coupling of the edges of adjacent panels is a stepped Z-shaped coupling, with one panel (slat) being supported on another adjacent panel, which allows them to be easily disassembled. When fastening against partitions, the panel is designed to be supported on the respective contour profile, the latter being hidden by the inside of the ceiling panel. This design of the attachment to the support profiles also allows each panel (slat) to be disassembled individually without having to disassemble the adjoining panels.

[0033] The material used for manufacturing the elements complies with the "SOLAS" fire regulations for use in ship construction as class "C" partitions. In other words, the elements of the invention are manufactured with non-combustible materials and their use is also valid for naval applications.

[0034] To help better understand this specification, and as an integral part thereof, a series of figures is attached, in which the object of the invention is depicted in an illustrative and non-limiting manner.

Brief description of the figures

[0035]

Figure 1 shows an elevational view of the hidden fastening system for modular panels, object of the invention, with the hidden fastening system being in a disengaged position.

Figure 2 depicts a view similar to that shown in Figure 1, with the hidden fastening system being in an engaged position.

Figure 3 shows a view of the section of what is depicted in Figure 1, applicable to simple panels formed by a configuration with a honeycomb core with a single aluminium plate located on one of the two opposite faces of the panels.

Figure 4 shows a view of the section of what is depicted in Figure 2, applicable to simple panels.

Figure 5 shows a view of the section of what is depicted in Figure 1, applicable to composite panels formed by a configuration with a honeycomb core with two aluminium plates located on both opposite faces of the panels.

Figure 6 shows a view of the section of what is depicted in Figure 2, applicable to composite panels.

Figure 7 shows an elevational view of a panel incorporating the hidden fastening system on two opposing sides of the simple panel.

Figure 8 shows another elevational view of a panel incorporating the hidden fastening system on two opposite sides of the composite panel.

Figure 9 shows a view of the section of what is depicted in Figure 7.

Figure 10 shows a view of the section of what is depicted in Figure 8.

Figures 11 to 14 show views of the sections of composite panels applicable to a horizontal roof structure.

Figure 15 shows an elevational view of a wall portion with a door, said wall including the modular structure of the invention with the hidden fastening system.

Figure 16 shows another view of the section of what is depicted in Figure 15.

Figure 17 depicts an elevational view of three vertical panels, with the central panel in the process of being assembled/disassembled.

Figure 18 shows a plan view of what is depicted in Figure 17.

Description of an exemplary embodiment of the invention

[0036] Considering the numbering used in the figures, the modular structure comprises panels 1, 1' which are configured for engagement with each other by means of the hidden fastening system located along pairs of parallel opposite areas of said panels 1, 1' in correspondence with pairs of opposite edges of the panels 1, 1', with the panels 1, 1' comprising a honeycomb core in the embodiment shown in the figures. Each panel 1, 1' includes two opposite faces: a visible front face and a rear face opposite the front face and both faces converge at the side edges or borders of the panel 1, 1'.

[0037] The hidden fastening system comprises pairs of fittings 2, each of which comprises an elongated profile including a base 2a which is fastened to the panels 1, 1' by means of fastening elements 3, and a notched structure 2b. Said fastening elements 3 can be rivets as shown in the figures, screws, by means of an adhesive, or any other fastening means.

[0038] The modular structure is applicable for assembling first claddings arranged on vertical planes (vertical partitions) such as, for example, the one shown in Figures 15, 16, 17, and 18, and second claddings arranged on horizontal planes or inclined planes for roof coverings (horizontal partitions) as shown in Figures 11 to 14.

[0039] In an embodiment of the invention, the panels 1 comprise a first simple structure having a smaller thickness (Figures 3, 4, 9, and 16), and in another embodiment of the invention, the panels 1' comprise a second composite structure 1' having a greater thickness (Figures 5, 6, 10, 11, 12, 13, 14, and 16).

[0040] In simple panels 1, their visible front faces and

edges (side borders) are covered by laminar bodies 4, while in composite panels 2, their opposite (front and rear) faces and edges are covered by other laminar bodies 4'.

[0041] In each panel 1 with a simple structure, the pair of fittings 2 is fastened on their rear face that will be hidden, with the notched rack 2b in one of the two fittings 2 projecting from the edge of the panel 1, while the other similar fitting 2 being tucked inwards, taking as a reference the other similar edge of the panel 1. Said notched structures 2b are arranged parallel to the opposite faces of the panel 1 with a simple structure.

[0042] With this described arrangement, to couple and engage two panels 1 with a simple structure to each other along their two adjacent edges or borders (Figures 1, 2, 3, and 4), first both panels 1 are placed on parallel planes, moving them forward to the front and closer together so that the notched structures 2b of both fittings 2 can engage with each other, with the teeth of one of the fittings 2 being arranged facing the gaps between the teeth of the other similar fitting 2 in this operation, and vice versa, such that at the end of the forward movement to the front, one structure 2b surpasses the other and vice versa until the structure 2b of the fitting 2 projecting from the edge of one of the panels 1 abuts against an area of the rear face of the other similar panel 1.

[0043] In this situation, the notched structure 2b of the fitting 2 projecting from one of the two panels 1 occupies a channel 5 defined between the other similar notched structure 2b and the rear face of the other similar panel. In this situation, both panels 1 are then moved relatively to each other so that the teeth of both notched structures 2b are in contact with each other with a certain tightness, thereby ensuring engagement. Obviously, the assembled panels are in contact with each other at their adjacent edges, while being flush with each other on their respective opposite faces: front and rear opposite faces.

[0044] The panel 1 which is moved is usually the one assembled on the previously assembled panel 1 or group of previously assembled panels 1.

[0045] In contrast, in each panel 1' with a composite structure, the pair of fittings 2 is fastened on the two opposite edges of the panel 1', such that the bases 2a of the fittings 2 are hidden in the actual structure of the panel 1'.

[0046] In said composite structure of the panel 1', each of its two opposing edges where the fittings 2 are fastened, comprises a stepped configuration formed by an angular recess 6 and a complementary end portion 7, with the notched structure 2b of the fitting 2 being arranged parallel to the end portion 7 of the panel 1'. Also in this case, the notched structures 2b are arranged parallel to the opposite faces of the panel 1' with a composite structure, and at the same time also arranged parallel to and in proximity to the end portions 7 of said composite panel 1'.

[0047] In this embodiment of the composite structure of the panels 1', between the notched structures 2b of the fittings 2 and the end portions 7 of both opposite edges of the panels 1', there are channels 5' configured for fitting therein the notched structures 2b of said panels 1' in a conjugated manner.

[0048] In line with what was described in the preceding paragraph, the end portion 7 of one panel 1' is coupled by way of tongued and grooved in the angular recess 6 of another adjacent panel 1' following the same methodology or procedure as for the simple panels 1 described above, such that once the notched structures 2b are located in the channels 5', the panels 1' are then moved relatively to each other so that the teeth of both notched structures 2b are in contact with each other with a certain tightness, thereby ensuring engagement. Obviously, the assembled panels 1' with a composite structure are in contact with each other at their adjacent edges with a stepped configuration, while said panels 1' being flush with each other on their respective opposite faces: front and rear opposite faces.

[0049] Like in the case of the simple panels 1, the panel 1' with a composite structure which is moved is usually the one assembled on the previously assembled panel 1' or group of previously assembled panels 1.

[0050] When the hidden fastening system is applicable to a modular horizontal roof structure such as that shown in Figures 11 to 14, said modular horizontal structure further includes perimeter angular profiles 8 and an intermediate beam 9 separating and supporting two groups of panels 1' with a composite structure, with the different panels 1' (slats) of the modular horizontal structure being supported on these elements 8 and 9. The intermediate beam 9 has an inverted T-shaped configuration, with the panels 1' being supported on its horizontal cross member 9a, while its vertical branch 9b constitutes the element which separates the two groups of panels 1'.

[0051] In an embodiment of the invention such as that shown in Figures 11 and 12, the panels 1' with a composite structure are supported on the horizontal cross member 9a of the intermediate beam 9 and on a flange of the perimeter angular profiles 8.

[0052] In another embodiment of the invention such as that shown in Figures 13 and 14, the panels 1' with a composite structure are supported on the perimeter angular profiles 8 through the end portions 7 located in opposite areas of said panels 1' in correspondence with one of the branches of the angular recesses 6 of the opposite edges of the panels 1'.

[0053] Furthermore, in the embodiment of the invention which is shown in Figure 13, two opposing end portions 7 of two panels 1' with a composite structure converging at a central area, are supported on the horizontal cross member 9a of the intermediate beam 9, while one of the two panels 1' further includes an additional extension 10 that covers a gap of the same width as said horizontal cross member 9a and as the sum of the two opposing end portions 7 of the two panels 1'.

[0054] As shown in Figure 16, the hidden system of the invention is also applicable to the installation of frames 11

of doors 12. The frame 11 has a C-shaped section, with its cross member 11a defining the gap where the door 12 is located, while its two opposite and parallel branches 11b are a continuation of end segments of pairs of parallel panels 1 with a simple structure constituting a wall 13 (vertical cladding) in which the door 12 is installed along with its frame 11.

[0055] In this case, there are fastened in the segments of the two branches 11b of the frame 11 the fittings 2, which are complemented with other similar fittings 2 of the panels 1 with a simple structure, such that said frame 11 is attached to the simple panels 1 by means of the engagement of said fittings 2 in the same way as how the panels 1 are attached to each other, as has been described above.

[0056] Said Figure 16 also shows two collateral vertical walls 14 (vertical claddings) which are attached to the wall 13 in which the door 12 is installed, such that pairs of panels 1 with a simple structure with a right-angle configuration are used in the attachment between each collateral wall 14 and the wall 13 of the door 12, such that angular reinforcement profiles 15 are assembled in the junction of the two branches of said panels.

[0057] Moreover, the collateral walls 14 comprise a combination of panels 1 with a simple structure and panels 1' made of composite panels.

[0058] The way for fastening the notched structures 2b of the fittings 2 is by means of press coupling when one of the notched structures 2b slides over the other along the channel 5, 5'. Figure 1 depicts the fittings 2 before being fastened and Figure 2 depicts the fittings 2 once they have slide vertically and are fastened to each other in a complementary manner. Figures 3 to 6 show the sections of what is depicted in Figures 1 and 2 but using different panel thicknesses: smaller thickness (panels 1 with a simple structure) with the structure on the rear face of the panel and greater panel thickness (panels 1' with a composite structure) with the notched structure 2b on the inside in correspondence with the edges having a stepped configuration of the panels 1'.

[0059] Figures 7, 8, 9, and 10 show the hidden fastening fastened in the panel 1, 1'. In the narrower panel 1, fastening is performed on the hidden rear face thereof (Figures 7 and 8); while in the thicker panel 1' (Figures 9 and 10), the fastening is fastened on the inside in correspondence with its opposite edges having a stepped configuration.

[0060] Figures 11 to 14 fundamentally show two applications of the invention on ceilings for horizontal claddings, formed by the honeycomb core and with hidden fastening design compatible with the overall system, with the panels 1' (slats) being supported on profiles described above such as the perimeter angular profiles 8 and the intermediate beams 9, such that they are hidden or flush with each other on the entire outer surface of the panels 1'.

[0061] Figures 17 and 18 show an example of assembling a cladding of modular panel 1 with the hidden fastening system. It can be seen how the panel 1 can be fastened and disassembled with ease in two movements. The fastening with a hidden structure allows keeping the panels 1 fastened to each other without requiring additional profiles, conferring a smoother and cleaner finish. Being structural, it allows disassembling each panel 1 individually without having to disassemble the entire line of panels 1.

[0062] Likewise, the hidden fastening system is also applicable to the frames 11 of doors 12, with the design of the frame 11 being adapted to allow the also modular fastening thereof, which allows the ability to completely replace a door 12 at any time, also including the frame 11 itself, without affecting the rest of the claddings or partitions.

[0063] As a whole, the invention is designed to cover, partition, or sector a space in its entirety, as can be seen in the figures, with the individual disassembly of each panel 1, 1' being possible and minimising the profiles and corners on the visible front face, without losing the preceding advantages in any case.

Claims

1. **A hidden fastening system for modular panels,** the hidden fastening system being located along pairs of parallel opposite areas of the panels (1, 1') which include a first front face and a second rear face opposite the front face, and edges which define the contour of said panels (1, 1'); **characterised in that**:

   - it comprises pairs of fittings (2) formed by bases (2a) and notched structures (2b); the fittings (2) being fastened to the panels (1, 1') by means of the bases (2a) of said fittings (2), and the notched structures (2b) being located on planes parallel to the opposite faces of the panels (1, 1');
   - the fittings (2) are located in the pairs of parallel opposite areas of the panels (1, 1') in a location selected from a location close to the edges of the panels (1, 1') and a location in correspondence with the respective edges of the panels (1,1');
   - the notched structures (2b) of the fittings (2) are located in a position selected from a first position in which the notched structures (2b) project from at least one part of the edges of the panels (1, 1') and a second position in which the notched structures (2b) do not project from at least the part of the edges of the panels (1, 1'); where taking into consideration this second position there is a channel (5, 5') defined between the notched structure (2b) and a front surface of the panels (1, 1') which is parallel to the opposite faces of said panels (1, 1');
   - in each hidden fastening system, between each pair of adjacent panels (1, 1'), at least one of the two notched structures (2b) of one

of the two adjacent panels (1, 1') is press-fitted in the channel (5, 5') defined between the other similar notched structure (2b) and the front surface of the other similar panel (1, 1'), wherein the edges of the two adjacent assembled panels (1, 1') are in contact with each other when connected;

wherein the teeth of the notched structures (2b) having dimensions smaller than gaps defined between said teeth.

2. **The hidden fastening system for modular panels** according to claim 1, **characterised in that** the fastening system between each pair of adjacent panels (1) for vertical facings comprises a first fitting (2) fastened on the rear face of one of the two panels (1) with its notched structure (2b) projecting from the edge of said panel (1), and a second fitting (2) fastened on the rear face of the other similar panel (1) with its notched structure (2b) arranged parallel to an area of the rear face of the panel (1); wherein the channel (5) being defined between the notched structure (2b) of the second fitting (2) and said area of the rear face of the panel (1) constituting the front surface.

3. **The hidden fastening system for modular panels** according to claim 1, **characterised in that** the fastening system between each pair of adjacent panels (1') for horizontal facings comprises a first fitting (2) fastened in correspondence with an edge having a stepped configuration of one of the two panels (1'), and a second fitting (2) fastened in correspondence with an edge having a stepped configuration of the other similar panel (1'), wherein two channels (5') are configured between the notched structures (2b) of the two fittings (2) and the front surfaces of the two panels (1'), in which the opposing notched structures (2b) of said panels (1') are press-fitted, and with the edges having a stepped configuration are in contact with each other by means of a tongued and grooved coupling.

4. **The hidden fastening system for modular panels** according to claim 3, **characterised in that** the edges having a stepped configuration comprise angular recesses (6) and end portions (7), wherein the notched structures (2b) of the fittings (2) are arranged parallel to the front surfaces of the end portions (7) of the panels (1'); and wherein the end portions (7) fit in the angular recesses of the panels (1') in the tongued and grooved coupling between adjacent panels (1').

5. **The hidden fastening system for modular panels** according to claim 2, **characterised in that** the panels (1) comprise a simple structure with a honeycomb core, with the first front faces and edges thereof being covered by laminar bodies (4).

6. **The hidden fastening system for modular panels** according to any one of the preceding claims 3 or 4, **characterised in that** the panels (1') comprise a composite structure with a honeycomb core, with the first front faces, second rear faces, and edges thereof being covered by laminar bodies (4').

7. **A modular structure** obtained by means of the hidden fastening system for panels described in any one of the preceding claims, **characterised in that** it comprises facings selected from vertical facings and horizontal facings of a ceiling, which are formed by a succession of panels (1, 1') fastened to each other by means of pairs of fittings of pairs of adjacent panels (1, 1').

8. **The modular structure** according to claim 7, **characterised in that** it comprises a vertical wall of a facing (13) which further includes a frame (11) of a door (12) which is fastened parallel to pairs of opposing panels (1) with a simple structure by means of the fittings (2), with the frame (11) including two parallel branches (11b) which are a continuation of the pairs of simple panels (1), and wherein the fittings (2) that are complemented with other similar fittings (2) fastened on the pairs of panels (1) with a simple structure are fastened on inner faces of the two parallel branches (11b) of the frame (11).

9. **The modular structure** according to claim 7, **characterised in that** it comprises a first vertical facing of a wall (13) and two second vertical facings of collateral walls (14) attached in a perpendicular manner to the first vertical facing, with the attachment between each collateral wall (14) and the adjacent wall (13) comprising pairs of panels (1) with a simple structure with a right angle configuration formed by two flanges, wherein angular reinforcement profiles (15) are assembled in the junction of the two flanges of said panels (1).

10. **The modular structure** according to claim 9, **characterised in that** the vertical facings of collateral walls comprise a composition of panels (1) with a simple structure and panels (1') with a composite structure.

11. **The modular structure** according to claim 7, **characterised in that** it comprises a modular horizontal roof structure including perimeter angular profiles (8) and an inverted T-shaped intermediate beam (9) separating and supporting two groups of panels (1') with a composite structure, wherein the different panels (1') of the modular horizontal structure being supported on these elements (8, 9), and wherein the

panels (1) being supported on a horizontal cross member (9a) of the inverted T-shaped intermediate beam (9), while the vertical branch (9b) thereof separates the two groups of panels (1').

12. **The modular structure** according to claim 11, **characterised in that** the panels (1') with a composite structure are supported, on one of their opposite faces, on the horizontal cross member (9a) of the inverted T-shaped intermediate beam (9) and on a flange of the perimeter angular profiles (8).

13. **The modular structure** according to claim 11, **characterised in that** the panels (1') with a composite structure are supported on the perimeter angular profiles (8) through the end portions (7) located in opposite areas of said panels (1') in correspondence with one of the branches of the angular recesses 6 of the opposite edges of the panels (1').

14. **The modular structure** according to claim 13, **characterised in that** the two opposing end portions (7) of two panels (1') with a composite structure converging at a central area, are supported on the horizontal cross member (9a) of the intermediate beam (9), while one of the two panels (1') further includes an additional extension (10) which covers a gap of the same width as said horizontal cross member (9a) and as the sum of the two opposing end portions (7) of the two panels (1').

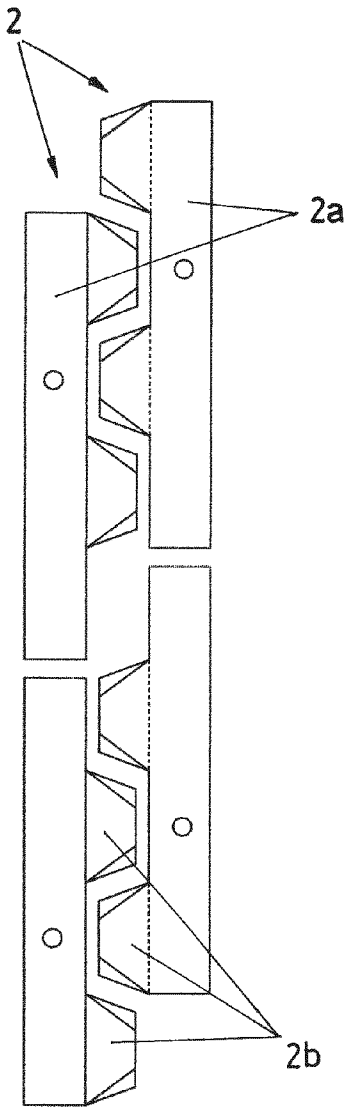

FIG. 1

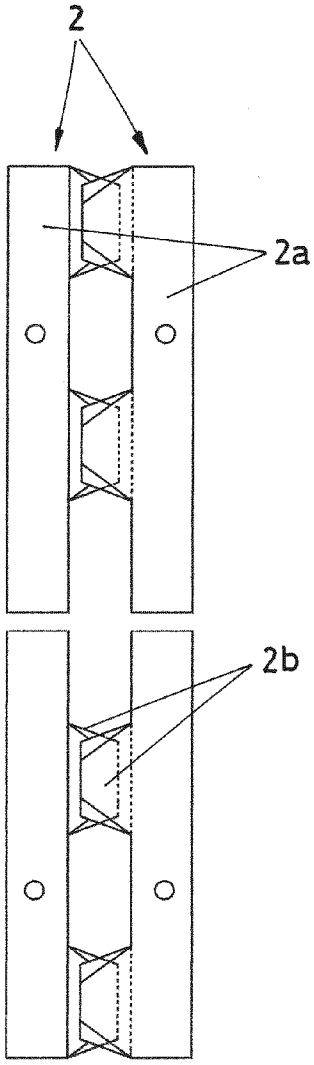

FIG. 2

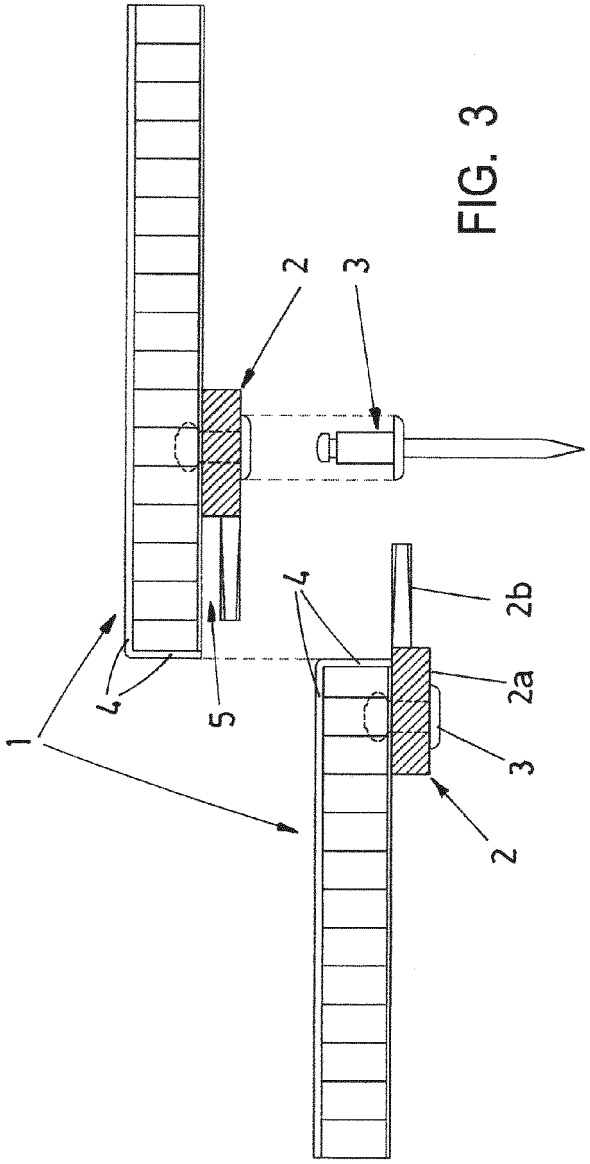

FIG. 3

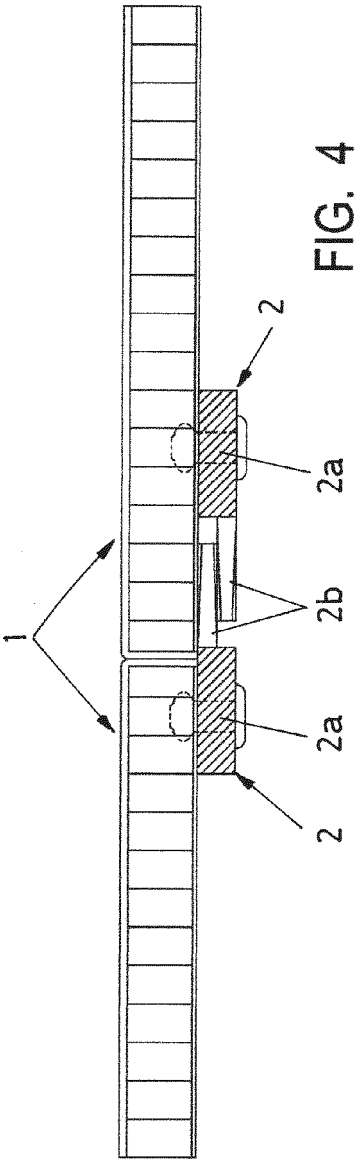

FIG. 4

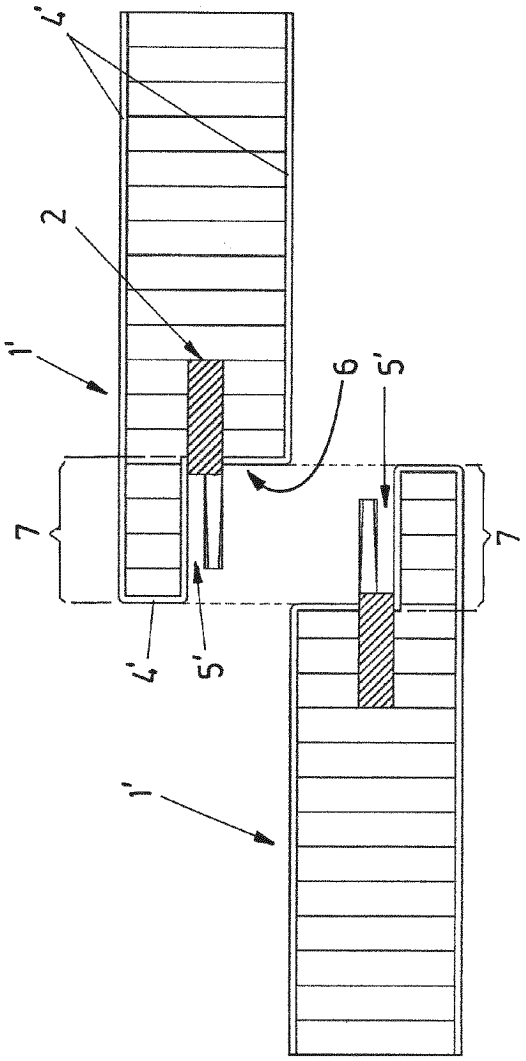

FIG. 5

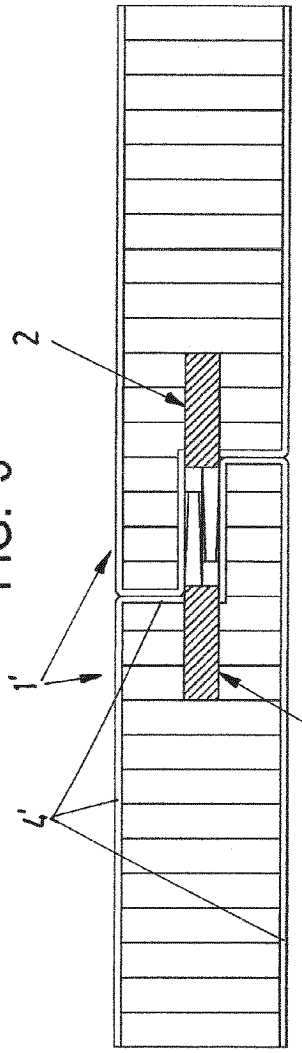

FIG. 6

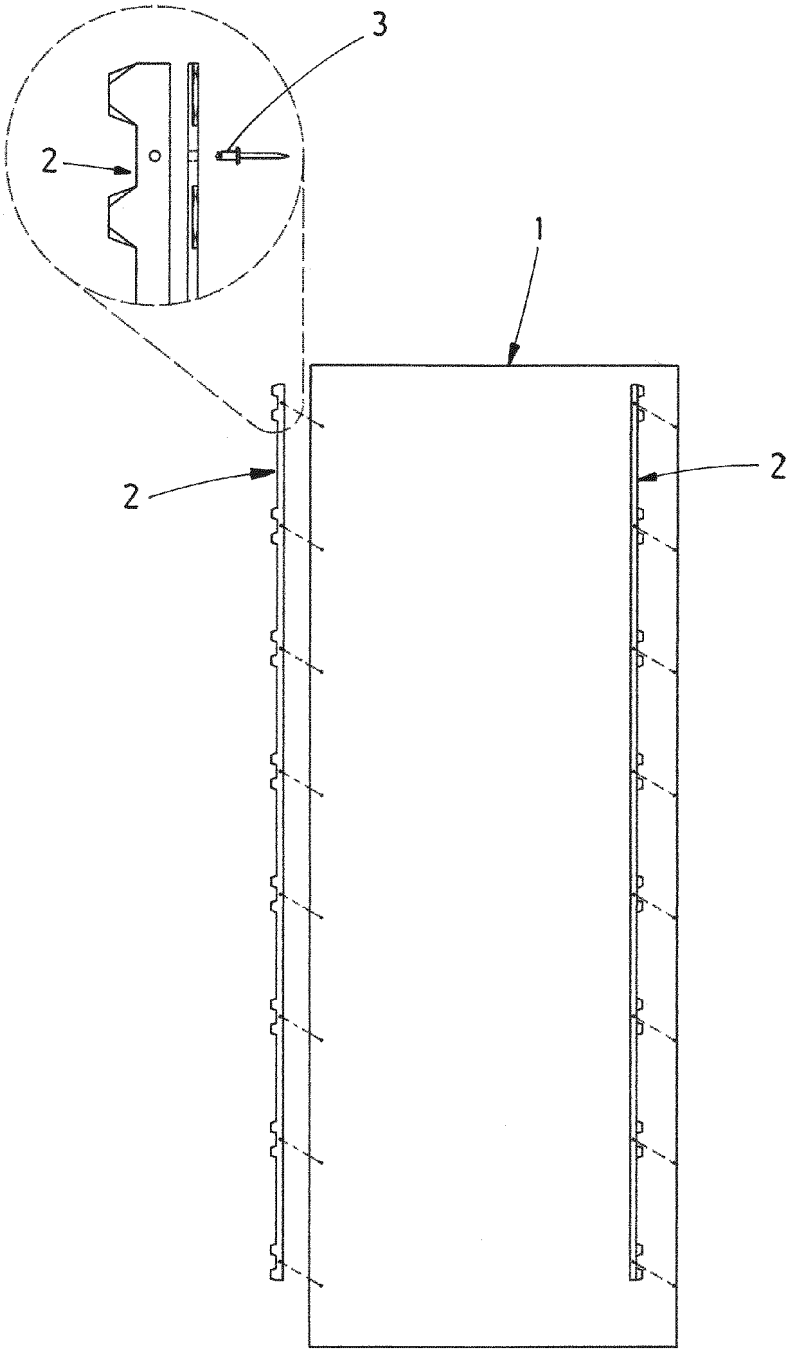

FIG. 7

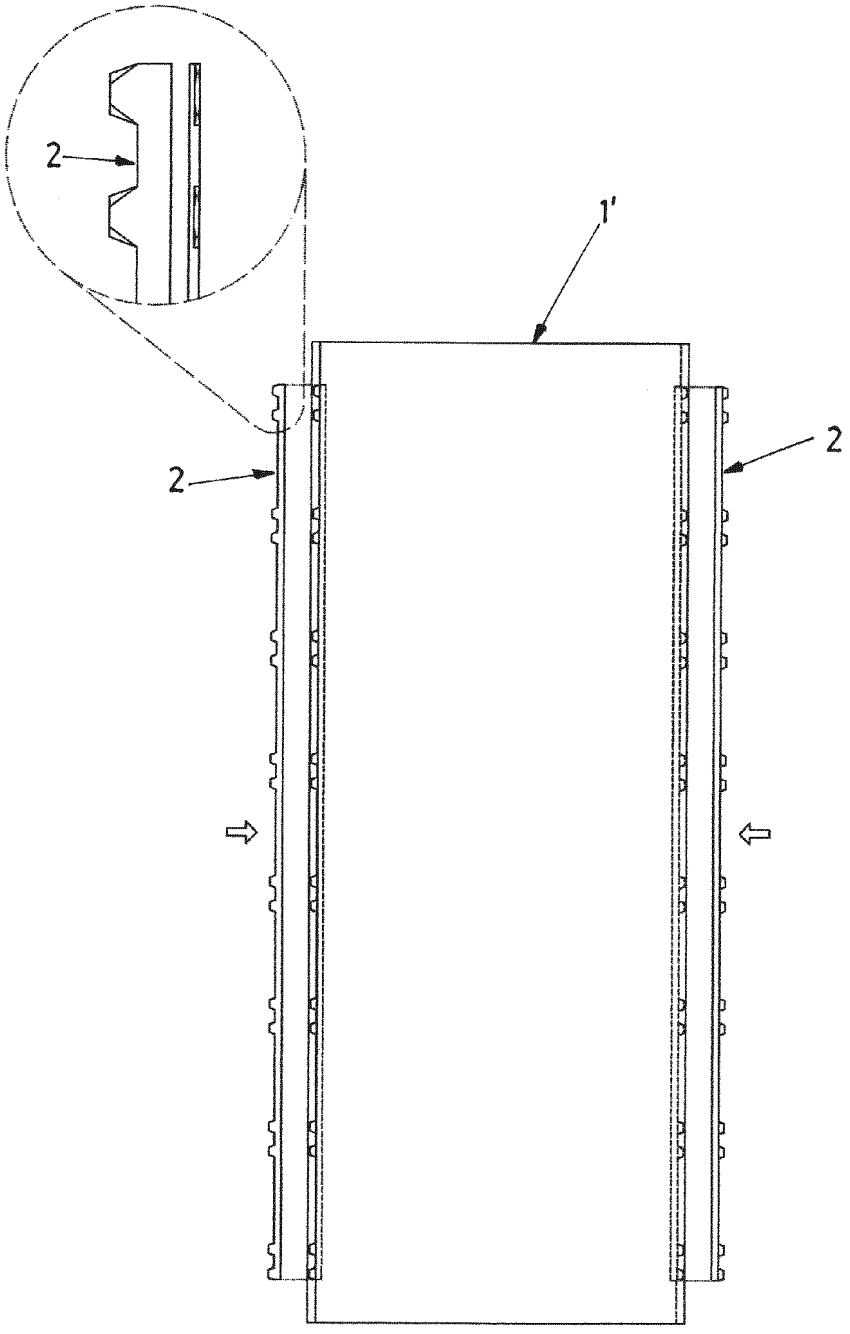

FIG. 8

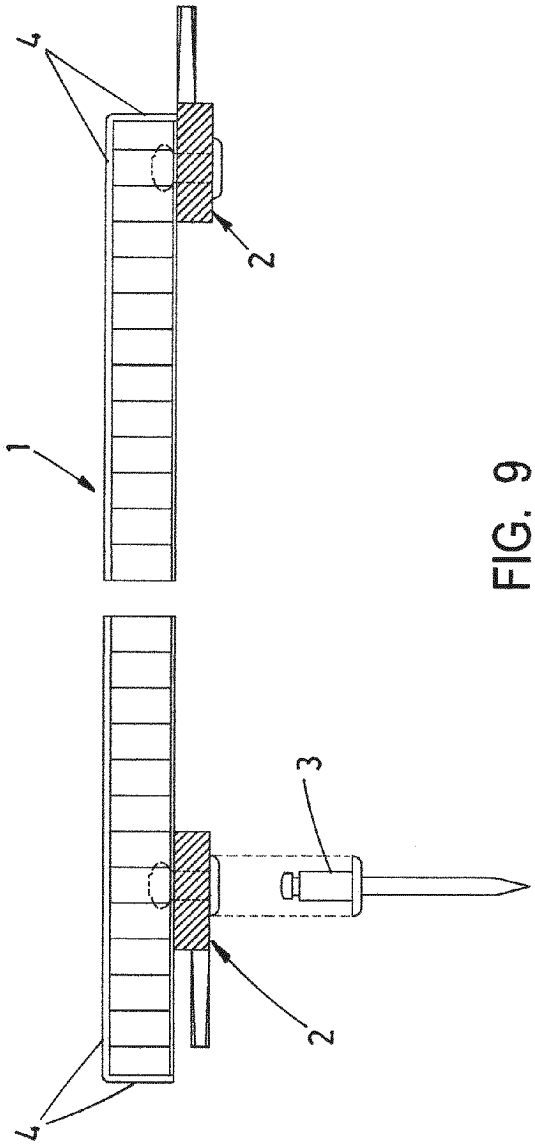

FIG. 9

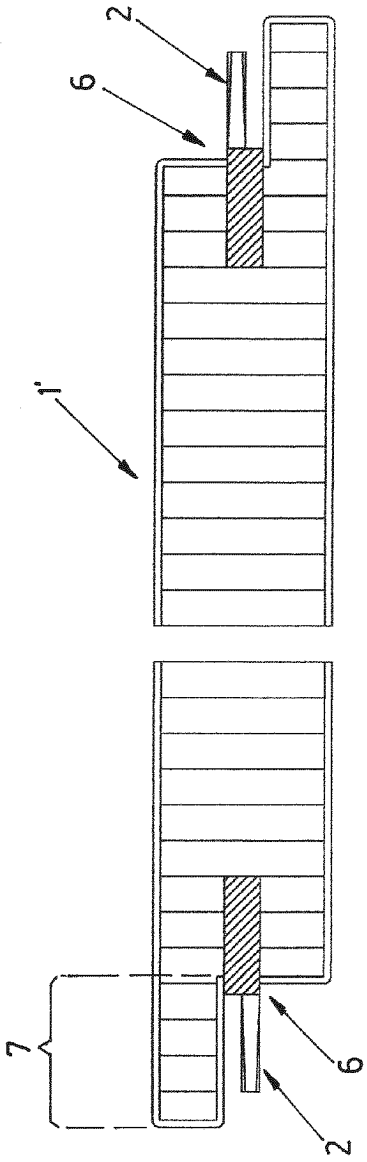

FIG. 10

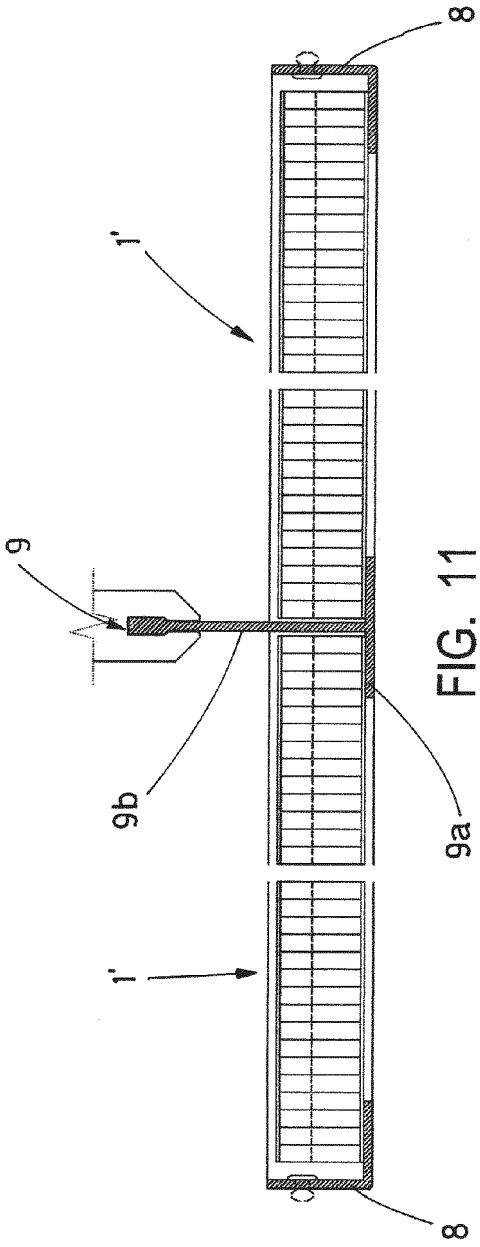

FIG. 11

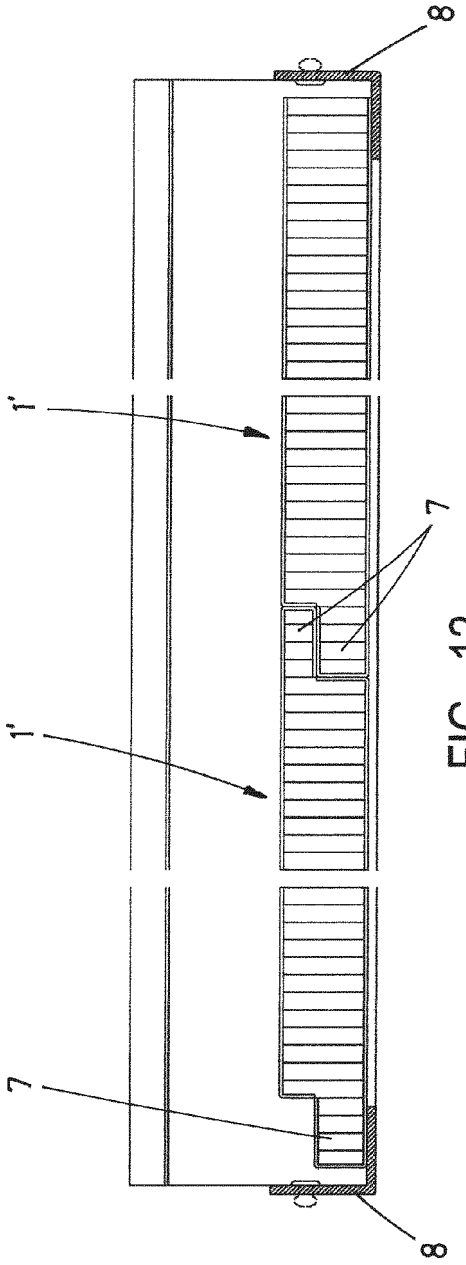

FIG. 12

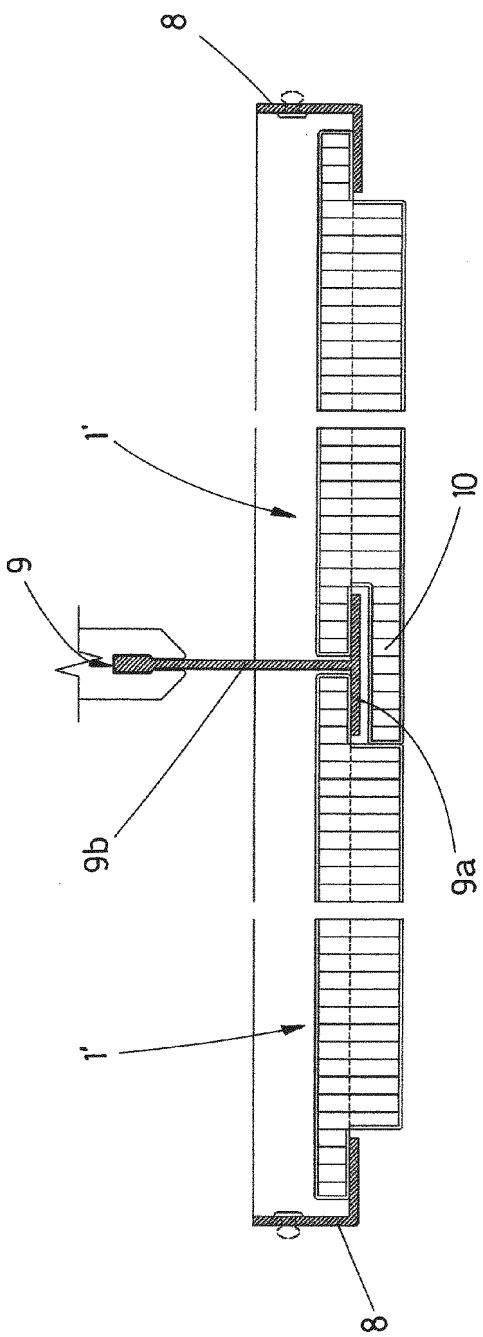

FIG. 13

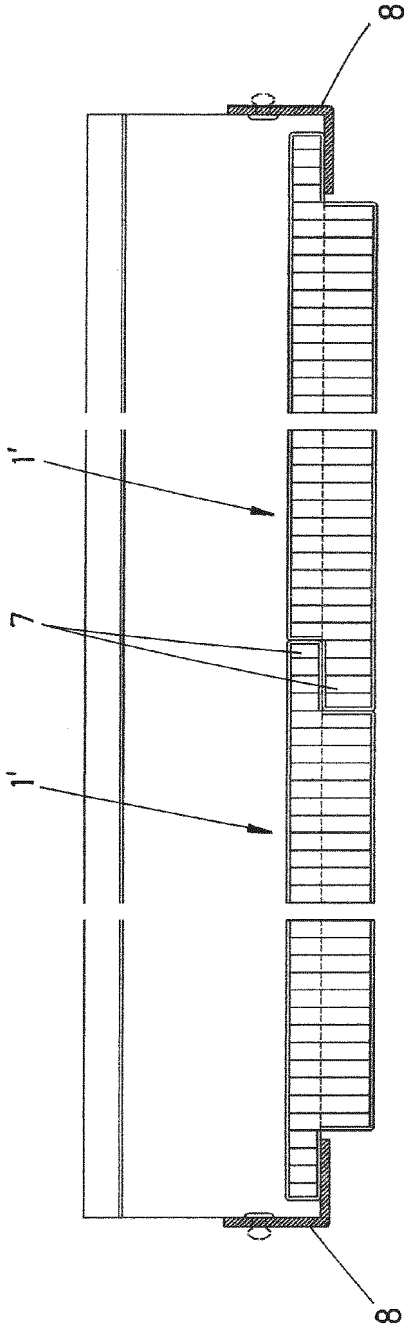

FIG. 14

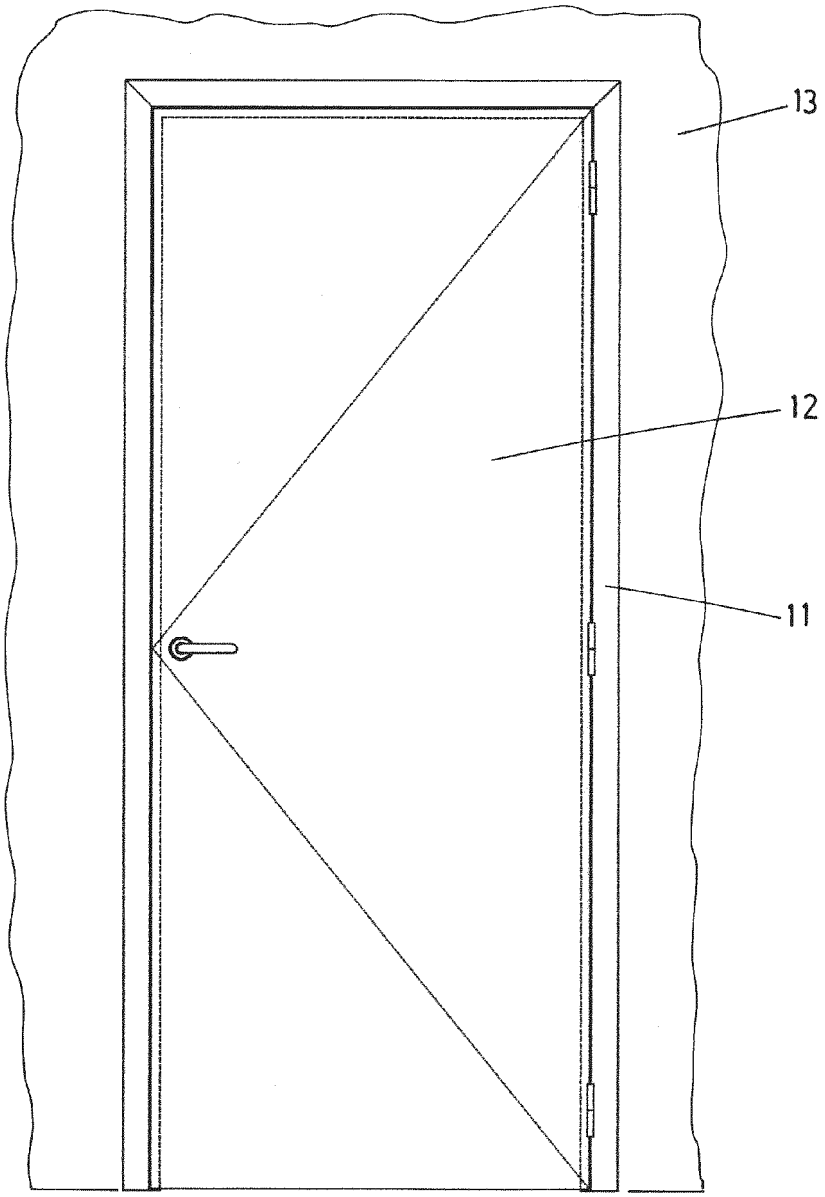

FIG. 15

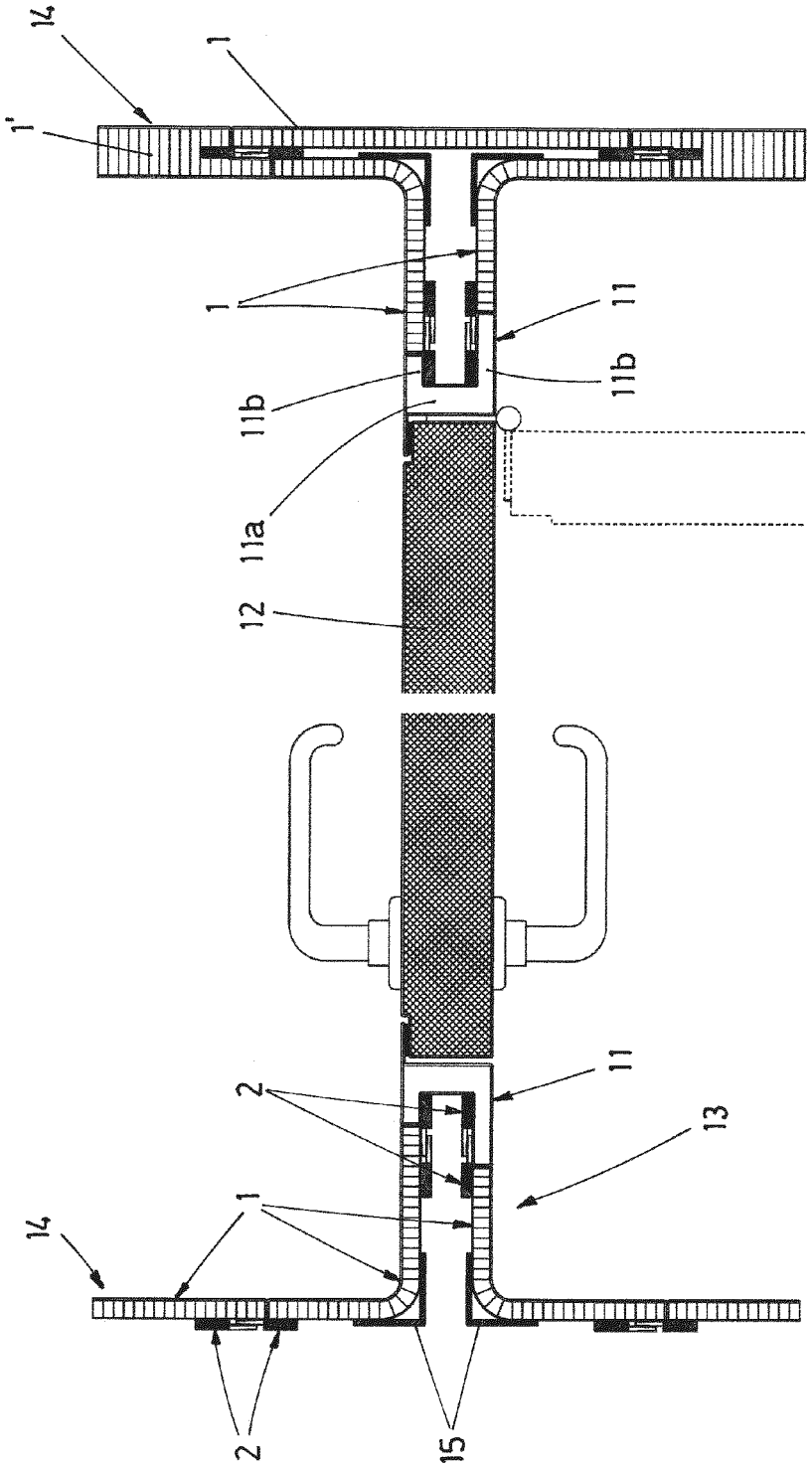

FIG. 16

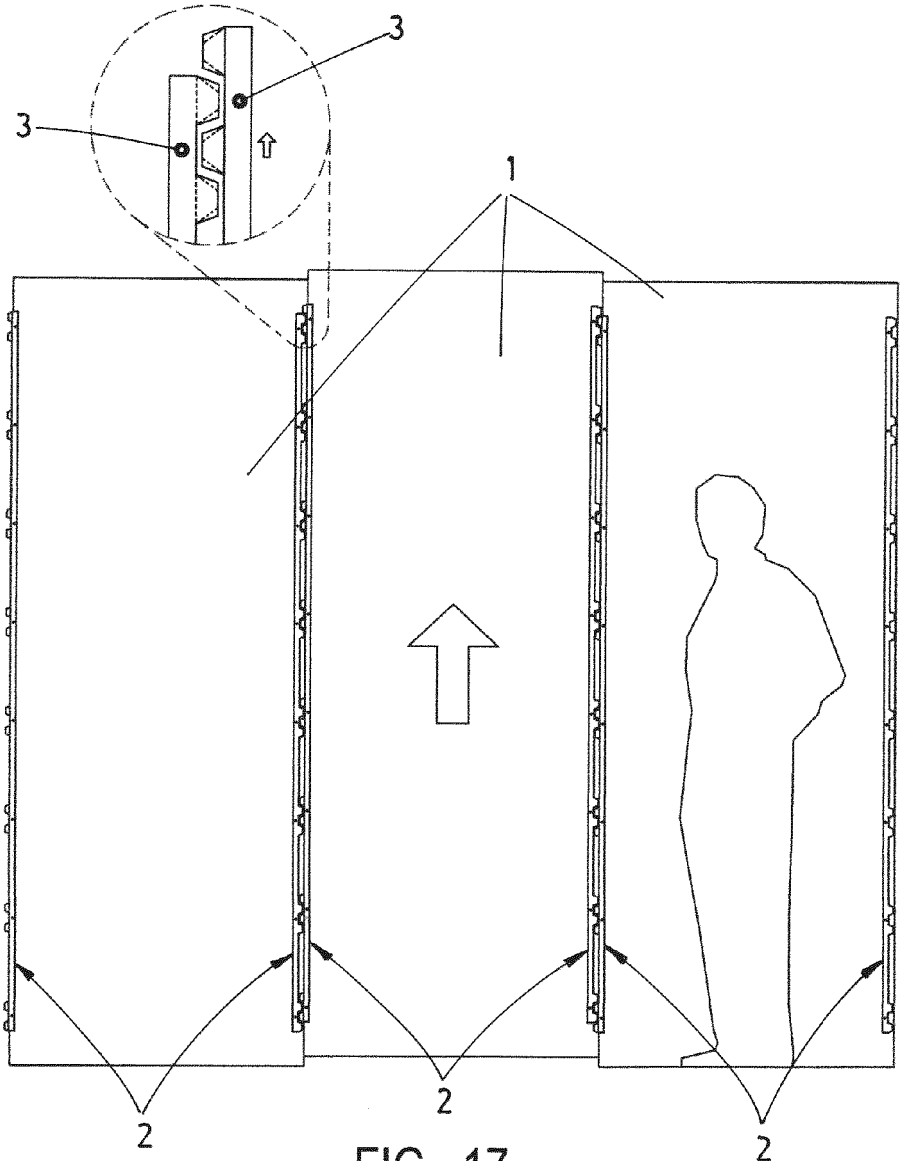

FIG. 17

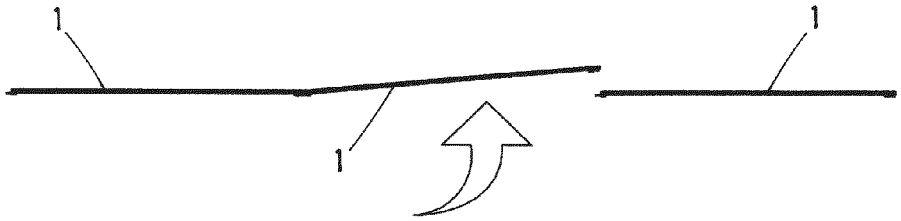

FIG. 18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2023/070346

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)
E04B, 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)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2446061 A (SMITH MARTIN ANDREW) 30/07/2008, page 1, paragraph [1] - page 13, paragraph [4]; figures 1, 4 - 10.	1-14
A	KR 102164970B B1 (KANG JUN GI) 13/10/2020, paragraph [0014], [0028 - 0033]; figures 6 -8.	1, 3, 7
A	CN 214617328U U (ZHEJIANG YASHA DECORATION CO LTD) 05/11/2021, description; figures.	1, 3-7
A	GB 2221273 A (HUNTING ENG LTD) 31/01/1990, page 1, line 4, page 3, line 28; page 4, line 27; figures 2 - 4.	1-3, 7
A	US 2014115985 A1 (HAYASHI TOSHIHIRO) 01/05/2014, paragraphs [0001], [0014], [0035], [0042]; figures1 - 3, 5a- 6e.	1, 3, 7

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14/07/2023	**(14/07/2023)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer M. Pérez Quintana Telephone No. 913495428

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2023/070346

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2015027075 A1 (WILKENS JAN ET AL.) 29/01/2015, description; figures.	1, 7, 11-13
A	US 3488908 A (JAHN MARTIN D) 13/01/1970, description; figures 4 - 5.	1, 7, 14

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2023/070346

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
GB2446061 A	30.07.2008	NONE	
KR102164970B B1	13.10.2020	NONE	
CN214617328U U	05.11.2021	NONE	
GB2221273 A	31.01.1990	NONE	
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US2015027075 A1	29.01.2015	ZA201406859 B DK2631380T T3 WO2013124396 A1 EP2631380 A1 EP2631380 B1	25.05.2016 15.06.2015 29.08.2013 28.08.2013 18.03.2015
US3488908 A	13.01.1970	NONE	

Form PCT/ISA/210 (patent family annex) (July 2022)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2023/070346

CLASSIFICATION OF SUBJECT MATTER

E04B2/74 (2006.01)
E04F13/00 (2006.01)
E04F13/24 (2006.01)

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