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(54) **FLOOR PANEL AND FLOOR PANEL ASSEMBLY PROCESS**

(57) The invention relates to a floor panel (1) used in a flooring installation system. The floor panel (1) is configured in the form of a rectangular board having at least two joints provided on opposite sides in the form of a receiving element (2) on one side and a connecting element (3) on the opposite side, wherein, when the floor panels (1) are being assembled, the connecting element (3) fits into the receiving element (2) in a form-locking

manner, thus ensuring a tight joint between two adjacent panels (1). The floor panel (1) is provided on its bottom face with equidistantly spaced floor grooves (4) in longitudinal and transverse directions. On the sides intended for a receiving element (2), the floor panel (1) is provided with vertical grooves (5) extending from the bottom surface of the floor panel (1) through the receiving element (2). The vertical grooves (5) are preferably equidistantly

spaced, wherein each vertical groove (5) continuously continues into the corresponding floor groove (4). The vertical groove (5) is formed in its upper portion in the form of a slot (5a), while it is formed in its bottom portion in the form of an extension (5b) that continuously continues into the floor groove (4).

## Description

**[0001]** The invention relates to the field of construction, more particularly to the field of floor structures.

**[0002]** The subject of the invention is a prefabricated floor panel used in a flooring installation system. Said floor panel, by virtue of its structure, allows for an easy and considerably more rapid flooring assembly - installation. In addition, the structure of the floor panel provided with additional vertical and floor grooves allows air to remain trapped in the grooves after the installation of the flooring and not to circulate, thereby improving the thermal insulation properties of the flooring. In addition, the floor grooves allow for easy subsequent laying of various installations, e.g. electrical cables.

### Prior art

**[0003]** Patent documents such as EP Patent No. 1261785, EP Patent No. 1585867 and EP Patent No. 2718516 are known from prior art and describe different panel configurations that allow the panels to be joined without the use of force or adhesive. These documents relate to different configurations of receiving and connecting elements, wherein the structure of the panels does not allow air to remain trapped in the grooves after installation of the flooring, which does not circulate, which would improve the thermal insulation properties of the flooring. The structure of the described panels does not allow for easy subsequent laying of different installations.

**[0004]** Said technical problem is solved by a floor panel of the invention and an assembly process described hereinbelow and illustrated on the figures which show:

Figure 1 shows a floor panel of the invention

Figure 2 shows a joint of two adjacent floor panels

Figure 3 shows a joint of two adjacent floor panels from the other direction

Figure 4 shows a vertical groove

Figure 5 shows part of the flooring with connected floor panels on the side abutting the ground.

**[0005]** A floor panel 1 is configured in the form of a rectangular board having at least two joints provided on opposite sides in the form of a receiving element 2 on one side and a connecting element 3 on the opposite side, the connecting element 3 and the receiving element 2 being configured such that, when a flooring is being installed, that is to say, when the floor panels 1 are being assembled, the connecting element 3 fits into the receiving element 2 in a form-locking manner, thus ensuring a tight joint between two adjacent floor panels 1.

**[0006]** In the preferred embodiment, the receiving element 2 is configured as a recess 2a and the connecting

element 3 is configured as a tongue 3a which fits into the recess 2a in a form-locking manner.

**[0007]** To further stiffen the tight joint against unintentional disassembly of the joint, the receiving element 2 is provided with an additional protrusion 2b and the connecting element 3 is provided with an indentation 3b, wherein upon the installation of the flooring, i.e. assembly of floor panels 1, the protrusion 2b fits into the indentation 3b. Said configuration of the receiving element 2 and the connecting element 3 also allows the joint to be easily opened if necessary, for example in the case where a single floor panel 1 needs to be replaced.

**[0008]** The floor panel 1 is provided on its bottom face, that is the face which abuts the floor during installation, with at least one floor groove 4 in respective longitudinal and transverse directions.

**[0009]** On each of the sides intended for a receiving element 2, the floor panel 1 is provided with at least one vertical groove 5 extending from the bottom surface of the floor panel 1 through the receiving element 2.

**[0010]** The vertical groove 5 is formed in its upper portion, i.e. on the side facing the room when installed, in the form of a slot 5a, while it is formed in its bottom portion, i.e. on the side facing the ground when installed, in the form of an extension 5b, the transition from the slot 5a to the extension 5b being continuous. The continuous transition can be implemented in different ways, for example with straight lines or a curve or a combination of both.

**[0011]** The ratio between the width  $W_1$  of the slot 5a and the width  $W_2$  of the extension 5b is between 1:1.1 and 1:10. The ratio between the height  $H_1$  of the slot 5a and the height  $H_2$  of the extension 5b is between 1:1 and 1:50.

**[0012]** Preferably, the width  $W_1$  and the height  $H_1$  of the slot 5a should be at least such to easily receive a cutting element of a tool for cutting the floor panel 1 and to allow adequate positioning of the tool for cutting the floor panel 1. This allows the floor panel 1 to be cut straight and square in both the horizontal and vertical directions, so that the individual floor panels 1 can be quickly and easily adjusted in length and width depending on the floor plan surface.

**[0013]** The vertical groove 5 is preferably formed axially symmetrically with respect to the vertical axis.

**[0014]** Preferably, the floor panel 1 has a plurality of floor grooves 4 in the longitudinal and transverse directions, the floor grooves 4 preferably being equidistantly spaced.

**[0015]** Preferably, the floor panel 1 is provided with a plurality of vertical grooves 5, preferably arranged so that the extension 5b of each vertical groove 5 continues continuously into the corresponding floor groove 4.

**[0016]** Preferably, the width of the floor groove 4 is substantially identical to the width  $W_2$  of the extension 5b.

**[0017]** Floor panels 1 are preferably made of polymeric materials having a compressive strength in the range from 50 kPa to 800 kPa, which allow prefabrication by

appropriate polymer processing techniques.

**[0018]** The flooring assembly process includes laying the floor panels 1 on the floor and joining them by means of receiving elements 2 and connecting elements 3, so that a tight joint is made between the floor panels 1. The assembly process - installation method starts in a corner of a room, wherein the floor panels 1 are laid in rows, a first row being laid from one wall to the opposite wall, followed by a second row, and so on until the flooring is laid. As the vertical grooves 5 are visible during the installation of the floor panels 1, it is also possible to precisely offset individual floor panels 1, if this is necessary due to the flooring layout. As the vertical grooves 5 continue continuously into the corresponding floor grooves 4, a continuous arrangement of the floor grooves 4 across the bottom surface of the flooring is also ensured.

**[0019]** The floor assembly process comprises the following steps:

- placing a first floor panel 1 in a corner of a room on the floor, wherein the first floor panel 1 is placed on the floor so that the two sides provided with a connecting element 3 face the corresponding walls of the room and the two sides provided with a receiving element 2 and vertical grooves 5 face the room;
- placing each subsequent floor panel 1 so that the floor grooves 4 of the subsequent panel 1 are as closely aligned as possible with the floor grooves 4 of the preceding panel 1, and joining each subsequent floor panel 1 through joining points, wherein the joining element 3 of a subsequent floor panel 1 fits into the receiving element 2 of the preceding floor panel 1 in a form-locking manner, thereby ensuring a tight joint between the two adjacent floor panels 1 and a continuous arrangement of floor grooves 4 over the entire bottom surface of the flooring, a first row of floor panels 1 being laid first from one wall to the opposite wall, followed by a second row, and so on until the flooring installation is completed.

**[0020]** If an individual floor panel 1 is to be adjusted in length and width to the floor plan of the room, the floor panel 1 is adequately trimmed before the installation and laid in accordance with the installation procedure described above.

**[0021]** Said structure of the floor panel 1 and the installation method have the following advantages:

- the floor grooves 4 allow impurities, such as pebbles, which remain on the surface of the substrate (floor) on which the floor panels 1 are laid, to be withdrawn into the floor grooves 4, thus ensuring the stability and suitable flatness of the laid flooring;
- the vertical grooves 5 allow any debris and particles that may be generated during installation to be pushed into the vertical grooves 5, thus ensuring a tight joint between the two floor panels;
- the shape of the vertical groove 5 with the narrower

slot 5a in the upper part allows precise positioning of the tool for cutting the floor panels 1 and thus a straight and perpendicular cut of the floor panel 1 in both the horizontal and vertical directions, thus allowing a high precision of the lengths of the cut panels 1 to be achieved in a quick and easy way;

- the shape of the vertical groove 5 with the extension 5b in the lower portion allows the chips generated at cutting to fall more easily due to the extension and to move away from the cutting area;
- the shape of the vertical groove 5 prevents the cutting tool from tearing the floor panel 1 at the end and/or at the beginning of the cutting process, making the cutting of the floor panels 1 precise and fast;
- the vertical 5 and floor grooves 4 allow air to remain trapped in the grooves 4, 5 after the installation of the flooring and not to circulate, thereby improving the thermal insulation properties of the flooring;
- the floor grooves 4 allow the installation of cables (since the grooves 4 are continuous), such as power cables, data cables, etc., from one side of the room to the other, in a way that is concealed; in this case, the grooves 4 act as an installation canal, which, if the function of the room is changed, allows the room to be re-purposed without major interventions in the room;
- the configuration of the floor 4 and vertical grooves 5, namely the vertical grooves 5 continue continuously into the floor grooves 4, a grid of grooves 4, 5 is defined, thus allowing precise measuring of the length of each floor panel 1 and cutting the same;
- since the vertical grooves 5 are visible during the installation of the flooring (when laying the floor panels 1) by the defined installation method or system, it is also possible to precisely offset individual floor panels 1, if this is necessary due to the layout of the surface on which the floor panels are being installed, while ensuring a continuous arrangement of the canals, i.e. the floor grooves 4.

## Claims

1. A floor panel (1) used in a flooring installation system, wherein the floor panel (1) is configured in the form of a rectangular board having at least two joints provided on opposite sides in the form of a receiving element (2) on one side and a connecting element (3) on the opposite side, the connecting element (3) and the receiving element (2) being configured such that, when a flooring is being installed, the connecting element (3) fits into the receiving element (2) in a form-locking manner, **characterized in that** the floor panel (1) is provided on its bottom face, that is the face which abuts the floor during installation, with at least one floor groove (4) in respective longitudinal and transverse directions, on each of the sides intended for a receiving element (2), the floor panel

- (1) is provided with at least one vertical groove (5) extending from the bottom surface of the floor panel (1) through the receiving element (2), wherein the vertical groove (5) is formed in its upper portion, i.e. on the side facing the room when installed, in the form of a slot (5a), while it is formed in its bottom portion, i.e. on the side facing the ground when installed, in the form of an extension (5b). 5
2. The floor panel (1) according to claim 1, **characterized in that** the transition from the slot (5a) to the extension (5b) is implemented in a continuous way with straight lines or a curve or a combination of both. 10
3. The floor panel (1) according to claims 1 and 2, **characterized in that** the ratio between the width ( $W_1$ ) of the slot (5a) and the width ( $W_2$ ) of the extension (5b) is between 1:1.1 and 1:10. 15
4. The floor panel (1) according to any of the preceding claims, **characterized in that** the ratio between the height ( $H_1$ ) of the slot (5a) and the height ( $H_2$ ) of the extension (5b) is between 1:1 and 1:50. 20
5. The floor panel (1) according to any of the preceding claims, **characterized in that** the vertical groove (5) is preferably formed axially symmetrically with respect to the vertical axis. 25
6. The floor panel (1) according to any of the preceding claims, **characterized by** being provided with a plurality of floor grooves (4) in the longitudinal and transverse directions, the floor grooves (4) preferably being equidistantly spaced. 30
7. The floor panel (1) according to any of the preceding claims, **characterized by** being provided with a plurality of vertical grooves (5) and said vertical grooves (5) being preferably arranged so that the extension (5b) of each vertical groove (5) continues continuously into the corresponding floor groove (4). 35 40
8. The floor panel (1) according to any of the preceding claims, **characterized in that** the width of the floor groove (4) is preferably identical to the width ( $W_2$ ) of the extension (5b). 45
9. The floor panel (1) according to any of the preceding claims, **characterized by** being made of polymeric materials having a compressive strength in the range from 50 kPa to 800 kPa. 50
10. A floor panel installation method comprising the following steps: 55
- placing a first floor panel (1) in a corner of a room on the floor, wherein the first floor panel (1) is placed on the floor so that the two sides

provided with a connecting element (3) face the corresponding walls of the room and the two sides provided with a receiving element (2) and vertical grooves (5) face the room;

- placing each subsequent floor panel (1) so that the floor grooves (4) of the subsequent floor panel (1) are as closely aligned as possible with the floor grooves (4) of the preceding floor panel (1), and joining each subsequent floor panel (1) through joining points, wherein the joining element (3) of a subsequent floor panel (1) fits into the receiving element (2) of the preceding floor panel (1) in a form-locking manner, thereby ensuring a tight joint between the two adjacent floor panels (1) and a continuous arrangement of floor grooves (4) over the entire bottom surface of the flooring, a first row of floor panels (1) being laid first from one wall to the opposite wall, followed by a second row, and so on until the flooring installation is completed.

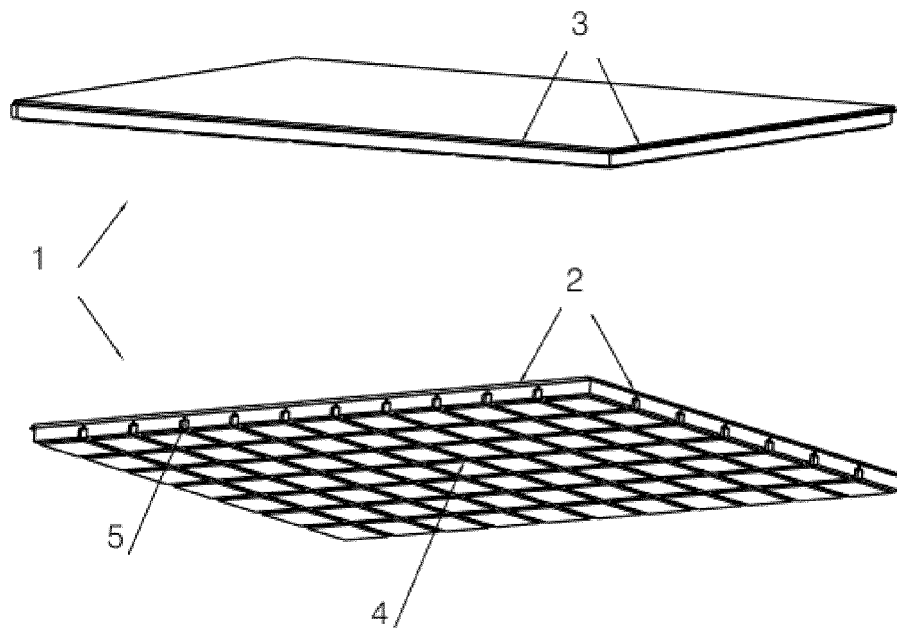


Figure 1

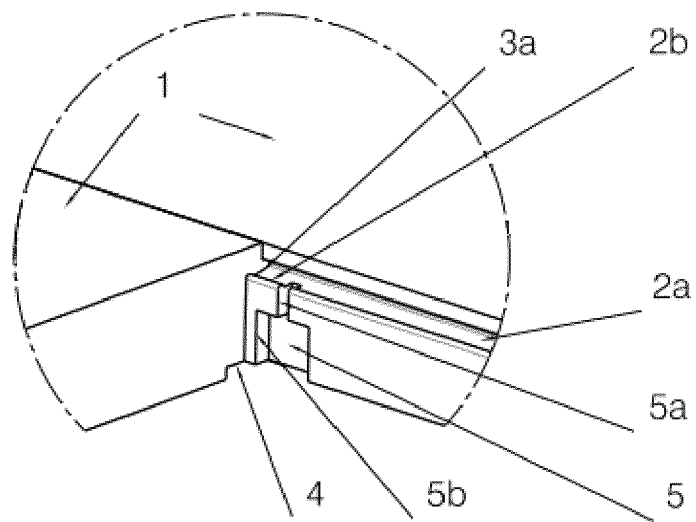


Figure 2

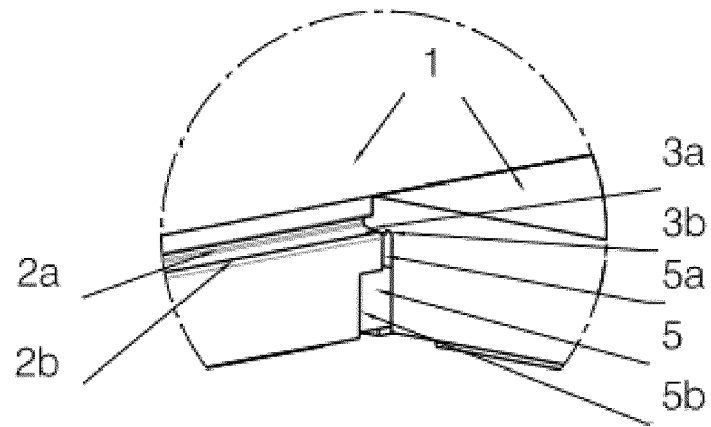


Figure 3

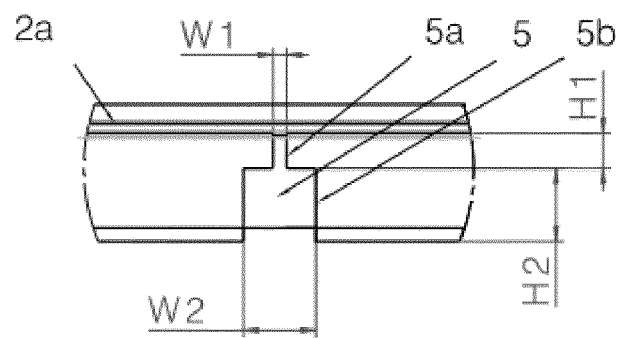


Figure 4

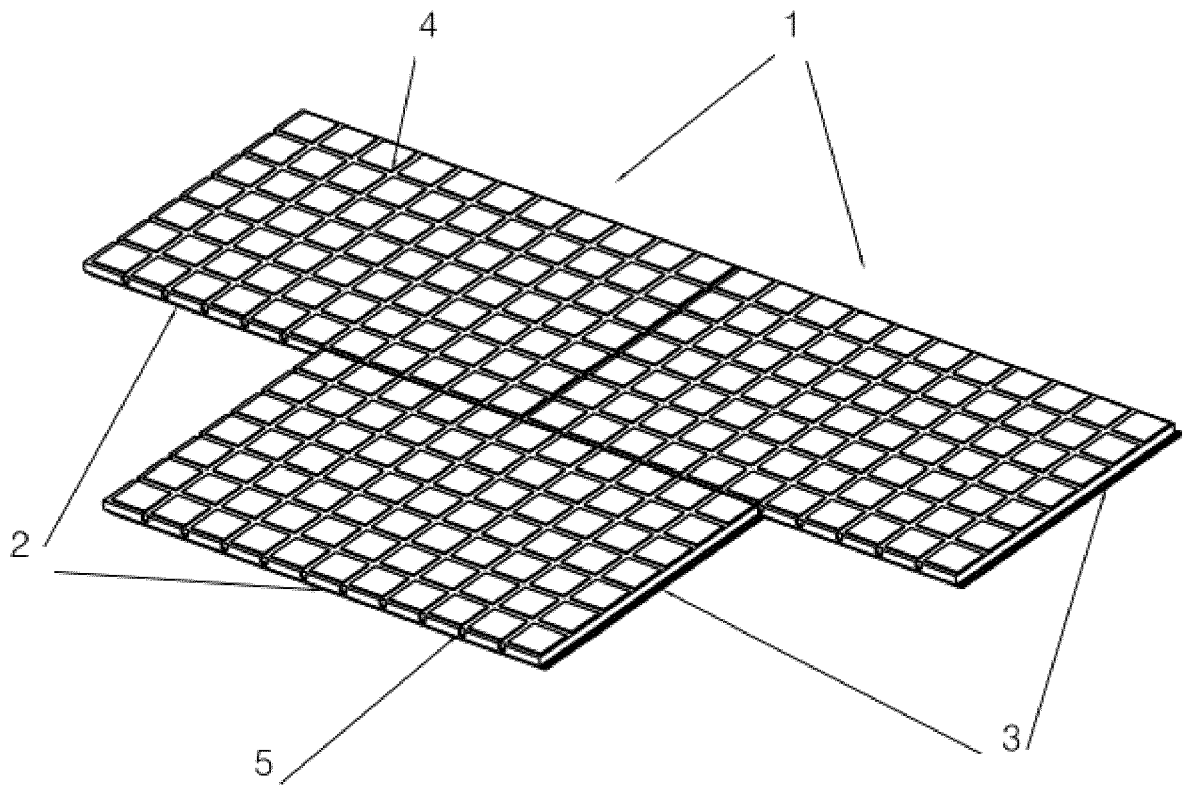


Figure 5



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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- EP 1585867 A [0003]
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