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(54) **MANUFACTURING METHOD OF A FLOOR PANEL**

(57) The invention relates to a method for manufacturing a floor panel, wherein the method comprises the steps of:
- providing at least two elongated wooden elements, extending in a longitudinal direction, and having a parallelogram-shaped cross-section, wherein the elongated elements each have a first side and a second side located opposite the first side in a stacking direction transverse to the longitudinal direction;
- gluing the at least two elongated elements together, wherein each time the first side of one of the elongated elements is glued to the second side of another of the elongated elements for forming a composite intermediate product; and
- sawing a plate-shaped element from the composite intermediate product along a cutting plane spanned by the longitudinal direction and the stacking direction, wherein the plate-shaped element forms at least a part of the floor panel.

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a method for manufacturing a floor panel, in particular a wooden floor panel. The invention further relates to a floor panel obtained using the method according to the invention. The invention further relates to the use of a floor panel according to the invention as floor covering for a floor.

[0002] US 5,050,653 discloses a method for making a laminated wood product. The method comprises the sawing or sanding of opposing surfaces of strips of waste offcut wood in order to prepare these surfaces for being glued together in a quarter-sawn orientation. The strips are subsequently glued together end-to-end and side-by-side in order to form a laminated plank with the strips in a quarter-sawn orientation. Optionally, the plank can be sawn parallel to its top and bottom surface in order to create two or more planks out of one plank.

[0003] US 2007/0193656 A1 discloses a method for manufacturing wooden floors wherein multiple first boards and multiple second boards are provided and are connected side-by-side to each other by means of glue in order to form a plank. An outer end of each first board is provided with a tenon and an outer end of each second board is provided with a groove for receiving a tenon of a corresponding first board. Once the glue has dried and the first boards and second boards are stably connected to one another, the plank is divided into several thin plates to be spread out on the floor. The tenon and groove connection between the first and second boards is essential for stably connecting the first and second boards and for counteracting the warping of the wood due to the influence of moisture.

SUMMARY OF THE INVENTION

[0004] A drawback of the known method according to US 5,050,653 is that a dimensionally stable product can only be obtained in case of gluing together in a quarter-sawn orientation. In other words, if the strips are glued together in another orientation, a dimensionally stable product cannot be obtained. For instance, it is not possible to obtain a dimensionally stable product if the strips are glued together in plain-sawn orientation. A product in which the strips are glued together in plain-sawn orientation, may be aesthetically attractive because of the so-called flame pattern at the surface of the planks. Moreover, as residual wood is worked with, only a few planks can be sawn from one laminated plank.

[0005] A drawback of US 2007/0193656 A1 is that a tenon and groove construction has to be arranged in the boards in order to prevent the thin plates from starting to bend. The tenon and groove construction is an additional machining treatment of the boards, resulting in loss of material as well as additional labour.

[0006] It is an object of the present invention to provide a method for manufacturing a floor panel, the floor panel, and the use of the floor panel, wherein the floor panel can be dimensionally stable without the above-mentioned limitations from the state of the art.

[0007] According to a first aspect, the invention provides a method for manufacturing a floor panel, wherein the method comprises the steps of:

- providing at least two elongated wooden elements, wherein the elongated elements extend in a longitudinal direction and have a parallelogram-shaped or substantially parallelogram-shaped cross-section, wherein the elongated elements each have a first side and a second side, respectively, which extend in the longitudinal direction, wherein the second side is located opposite the first side in a stacking direction transverse to the longitudinal direction, wherein the elongated elements have a width of at least ten centimetres in a direction perpendicular to the longitudinal direction and the stacking direction;
- drying the elongated elements at a temperature of twenty-eight to forty-five degrees Celsius for a duration of at least five months;
- gluing the at least two elongated elements together, wherein each time the first side of one of the at least two elongated elements is glued to the second side of another of the at least two elongated elements for forming a composite intermediate product; and
- sawing a plate-shaped element from the composite intermediate product along a cutting plane spanned by the longitudinal direction and the stacking direction, wherein the plate-shaped element has a thickness of between one and six millimetres, wherein the plate-shaped element forms at least a part of the floor panel.

[0008] Due to the relatively slow drying process, the elongated elements are dimensionally more stable than elongated elements that have been dried to a same moisture percentage more quickly, meaning at a higher temperature. In particular, the elongated elements are less affected by changes in the atmospheric humidity. Due to the combination of drying the elongated elements and gluing the elongated elements to one another, a dimensionally stable floor panel can be manufactured. In other words, the floor panel cannot warp as much. Due to the slow drying process, the floor panel will also be less prone to splitting or the formation of cracks. Because of the combination of the relatively large width of the elongated elements and the relatively small thickness of plate-shaped elements, several plate-shaped elements can be sawn from one composite intermediate product. As a result, the efficiency of the sawing process can be increased. Due to the thickness of between one and six millimetres, a wear-proof top layer of the floor panel can moreover be obtained. Due to the indicated thickness, the plate-shaped element can furthermore be suitable for use in a floor in combination with underfloor heating.

The thickness of the plates as compared to thicker plates furthermore makes economising on material possible, as less wood is required for covering a same floor surface area.

[0009] In one embodiment thereof, the elongated elements have a rectangular or substantially rectangular cross-section in the longitudinal direction. Elongated elements having a rectangular cross-section, such as for instance beams or planks, can be glued together into a steady composite intermediate product. In addition, the elongated elements can be produced easily and at a low price.

[0010] In a further embodiment, the elongated elements are dried at a temperature of thirty-five to forty degrees Celsius for a duration of six to eight months; and/or

the elongated elements are dried to a moisture content of six to twelve percent, preferably to a moisture content of eight to ten percent, prior to the step of gluing together. Due to the longer drying time, a more stable final product can be obtained. That means that the elongated elements will be less sensitive to changes in the atmospheric humidity.

[0011] In a further embodiment, prior to the step of sawing, the method comprises the step of levelling the composite intermediate product along a top surface spanned by the stacking direction and the longitudinal direction. Due to levelling, a high-quality top layer of the plate-shaped element can be obtained.

[0012] In a further advantageous embodiment the plate-shaped element has a thickness of between one and a half and five millimetres, preferably of between two millimetres and four and a half millimetres.

[0013] In a further embodiment the plate-shaped element is the floor panel. The plate-shaped element can therefore be used directly as floor covering. The plate-shaped element can for instance be directly glued to the foundation. Further treatment steps can thus be saved on and consequently this may be cheaper than conventional methods for providing a floor.

[0014] In an alternative embodiment thereof, the plate-shaped element is a top layer for the floor panel, wherein the floor panel further comprises a base layer, and wherein the method furthermore comprises the step of gluing the plate-shaped element to the base layer for forming the floor panel. The base layer is capable of providing stability to the floor panel. The base layer can be made of material that is of less high-quality than the base layer. The costs of material can thus be economised on and a floor can be obtained at a lower price.

[0015] In one embodiment thereof, the base layer is provided with a tongue and groove or a snap connection. Two adjacent floor panels can thus easily be connected to one another.

[0016] In a further embodiment, the base layer is made of compressed wood. Compressed wood can be a cheap raw material for a stable base layer. The floor panels can therefore be produced at a lower price.

[0017] In a further embodiment, the elongated elements are plain-sawn. In an alternative embodiment thereof, the elongated elements are quarter-sawn. Plain-sawn elongated elements may substantially warp in the stacking direction of the wood and therefore in the plane of the plate-shaped elements. In these manners of sawing, the individual slats of the plate-shaped elements have a dense grain pattern at the top side. Quarter-sawn elongated elements may substantially warp in the thickness direction. The plate-shaped elements expanding in the plane thereof can therefore be reduced. In quarter-sawn elongated elements, the individual slats of the plate-shaped elements acquire a flame pattern at their top sides.

[0018] In a further embodiment, the elongated elements have a thickness of between sixty to one hundred millimetres, in the stacking direction, preferably of between seventy and ninety millimetres. This thickness corresponds to the usual width of parquet planks. As a result, the floor panels may look like a genuine parquet floor, that means like a parquet floor made according to one of the known methods for manufacturing a floor.

[0019] In a further advantageous embodiment, the elongated elements have a length of between one hundred and three hundred centimetres, in the longitudinal direction, preferably of between one hundred and twenty-five and two hundred and fifty centimetres.

[0020] In a further advantageous embodiment, the elongated elements have a width of between ten and twenty centimetres, in a direction perpendicular to the longitudinal direction and the stacking direction. In other words, the width of the elongated elements exceeds the thickness. Due to the relatively large width of the elongated elements, several plate-shaped elements can be sawn from the composite intermediate product, depending on the thickness of the plate-shaped elements.

[0021] According to a second aspect, the invention provides a floor panel manufactured according to the method according to the invention. The floor panel according to the invention can be manufactured at a relatively low price as compared to genuine parquet. The floor panel may look like genuine parquet.

[0022] According to a third aspect, the invention provides the use of one or more floor panels according to the invention as floor covering for a floor. The floor panels according to the invention can be laid easily. The floor panels can be laid in relatively large surface areas at the same time. As a result, laying the floor can take place more efficiently than is the case according to the known methods. The floor can therefore be provided at a lower price.

[0023] In one embodiment thereof, the use comprises gluing the one or the several floor panels to the floor. The gluing of the floor panels to the floor can give a dimensionally stable final result.

[0024] In a further embodiment, wherein the floor panel further comprises a base layer provided with a tongue and groove or a snap connection, the use comprises con-

necting two floor panels to one another by means of the tongue and groove or the snap connection. The tongue and groove or the snap connection can facilitate the connection of two adjacent floor panels to one another. Consequently, the floor can be laid more efficiently and at a lower price. Moreover, gluing the floor panels to the floor can in some cases be dispensed with.

[0025] The aspects and measures described in this description and the claims of the application and/or shown in the drawings of this application may where possible also be used individually. Said individual aspects and other aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The invention will be elucidated on the basis of an exemplary embodiment shown in the attached drawings, in which:

figure 1 shows a view in perspective of an elongated element to be used in the method for manufacturing a floor panel according to the present invention;
figure 2 shows a view in perspective of a composite intermediate product of several elongated elements according to figure 1;
figure 3 shows the composite intermediate product according to figure 2 during sawing a plate-shaped element therefrom;
figure 4 shows the use of the floor panel according to the invention;
figure 5 shows a top view of an alternative composite intermediate product according to an alternative embodiment of the present invention;
figure 6 shows a top view of a further, alternative composite intermediate product according to a further, alternative embodiment of the present invention; and
figure 7 shows a cross-section of a floor panel according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0027] Figures 1 - 3 show various steps of a method for manufacturing a floor panel 1, in particular a wooden floor panel 1, according to an exemplary embodiment of the present invention. The method comprises gluing elongated wooden elements 10 together into a composite intermediate product 60. Plate-shaped elements 80 are sawn from the composite intermediate product 60, which elements form at least a part of the floor panel 1.

[0028] Figure 1 shows an elongated wooden element 10, such as for instance a plank, a slat or beam, for manufacturing the floor panel 1. The elongated element 10 extends in a longitudinal direction Y. The elongated element 10 has a parallelogram-shaped or substantially parallelogram-shaped cross-section. In particular, the elongated element 10 has a rectangular or substantially rectangular cross-section in the longitudinal direction Y. The elongated element has a first side 11 and a second side 12. The first side 11 and the second side 12 extend in the longitudinal direction Y. The second side 12 is located opposite the first side 11 in a stacking direction Z transverse to the longitudinal direction Y.

[0029] The elongated element 10 is plain-sawn. That means that the graining of the wood extends transverse to the stacking direction Z. Alternatively, the elongated element can also be quarter-sawn or rift-sawn. Quarter-sawn means that the graining extends in or substantially in the stacking direction Z.

[0030] For a high stability of the plate-shaped elements 80, the elongated element 10 is dried prior to gluing. Drying preferably first comprises a step of wind drying and subsequently a step of drying in a drying chamber (not shown). During wind drying, the elongated elements are dried in the outside air. Preferably, the step of wind drying takes at least four months. After wind drying, the elongated element 10 preferably has a moisture percentage of twenty to thirty percent.

[0031] In the step of drying in the drying chamber, the elongated element 10 is dried at a temperature of twenty-eight to forty-five degrees Celsius. Preferably, the elongated elements 10 are dried in the drying chamber at a temperature of between thirty-five and forty degrees Celsius. The elongated element 10 is dried in the drying chamber for the duration of at least five months. Preferably, the elongated element 10 is dried in the drying chamber for the duration of five to ten months, more preferably for the duration of six to eight months. At a higher drying temperature, a shorter drying time can suffice. The elongated element may for instance be dried in the drying chamber for the duration of five months at a temperature of between forty and forty-five degrees Celsius. In another example the elongated element 10 can be dried for the duration of nine months at a temperature of between thirty and thirty-five degrees Celsius.

[0032] The elongated element 10 is preferably dried in the drying chamber to a moisture percentage of six to twelve percent. More preferably, the elongated element 10 is dried to a moisture percentage of eight to ten percent.

[0033] Figure 2 shows a composite intermediate product 60 according to an embodiment of the present invention. The composite intermediate product 60 comprises three elongated elements 10. However, it is also possible to form a composite intermediate product 60 using two elongated elements 10 or more than three elongated elements 10. The composite intermediate product 60 is formed by each time gluing the first side 11 of one of the elongated elements 10 to the second side 12 of an adjacent elongated element 10. In other words, the elongated elements 10 are arranged next to one another in the stacking direction Z.

[0034] The composite intermediate product 60, as

shown in figure 2, comprises three elongated elements 10 having the same or substantially the same dimensions. The composite intermediate product 60 may however also be built up using elongated elements 10 that have shapes and/or dimensions that are not the same. The elongated elements 10 have a length L in the longitudinal direction Y, a thickness B in the stacking direction Z and a width W in a transverse direction X perpendicular to the longitudinal direction Y and stacking direction Z. The length L preferably is of between one and three metres. More preferably, the length L is of between one hundred and twenty-five and two hundred and fifty centimetres. The thickness B preferably is of between sixty and one hundred millimetres. Preferably the thickness B is of between seventy and ninety millimetres.

[0035] The elongated elements 10 are glued together in a pattern corresponding to a desired pattern for a floor covering. The pattern as shown in figures 3 and 4 is for instance suitable for covering a floor with a herringbone pattern. The elongated elements 10 can however be arranged in any desired pattern.

[0036] As shown in figure 3, the elongated elements are aligned in the transverse direction X, so that the composite intermediate product 60 has a level or substantially level top surface 61. The top surface 61 is spanned by the longitudinal direction Y and the stacking direction Z. Optionally the top surface 61 can be levelled. Levelling may for instance take place by means of sanding and/or planing.

[0037] Figure 3 shows the composite intermediate product 60. The top surface 61 has been evened out. The next step in the method is sawing a first plate-shaped element 80 from the composite intermediate product 60. The composite intermediate product 60 is sawn along a first cutting plane 71 for forming the plate-shaped element 80. The first cutting plane 71 is spanned by the longitudinal direction Y and the stacking direction Z. In other words, the first cutting plane 71 is parallel to the top surface 61. The distance between the top surface 61 and the first cutting plane 71 defines a thickness T of the first plate-shaped element 80. The thickness T preferably is of between one and six millimetres. More preferably, the thickness T is of between one and a half and five millimetres. More preferably, the thickness T is of between two and four and a half millimetres. The plate-shaped element 80 may for instance have a thickness of two and a half millimetres or of four millimetres.

[0038] As further shown in figure 3, the composite intermediate product 60 has also been sawn along a second cutting plane 72 parallel to the first cutting plane 71 for forming a second plate-shaped element 80. The distance between the first cutting plane 71 and the second cutting plane 72 preferably equals the distance between the top surface 61 and the first cutting plane. Sawing along the second cutting plane 72, preferably takes place once the first plate-shaped element 80 has been removed. Optionally, the composite intermediate product 60 is evened out along the first cutting plane 71 prior to sawing along the second cutting plane 72.

[0039] Figure 4 shows a use of two floor panels 1 according to the invention. The floor panels 1 are used for covering a floor 3. In the exemplary embodiment as shown in figure 4, the plate-shaped elements 80 form the floor panels 1. The plate-shaped elements 80 are glued to the floor 3 in a desired pattern. Optionally, an intermediate layer or underlay can be disposed between the plate-shaped elements 80 and the floor 3.

[0040] Figure 7 shows an alternative floor panel 101 according to the invention. The floor panel 101 comprises a base layer 90 and the plate-shaped element 80. The plate-shaped element 80 forms the top layer of the floor panel 101. The plate-shaped element 80 is glued to the base layer 90. The base layer 90 is provided with a tongue 91 and a groove 92. Alternatively, it is also possible to provide the base layer 90 with a snap connection. The base layer 90 preferably comprises a cheap wood type or compressed wood. When used as floor covering, the floor panels 101 are connected to each other by means of the tongue 91 and groove 92 or by means of the snap connection.

[0041] Figure 5 shows a top view of an alternative composite intermediate product 160 according to an alternative embodiment of the present invention. The composite intermediate product 160 comprises alternative elongated elements 110. The elongated elements 110 are bevelled at their outer ends. Preferably the elements end in a forty-five to sixty-degree angle. The elongated elements as shown are particularly suitable for laying a floor in a Chevron pattern.

[0042] Figure 6 shows a top view of a further alternative composite intermediate product 260 according to a further alternative embodiment of the present invention. The composite intermediate product 260 comprises first elongated elements 210 and second elongated elements 220. The first elongated elements 210 and the second elongated elements 220 have different dimensions. The elongated elements 210, 220 are laid in a staggered bond to represent a desired floor pattern in strips.

[0043] The above description is included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation, many variations that fall within the scope of the present invention will be evident to an expert.

Claims

1. Method for manufacturing a floor panel (1, 101), wherein the method comprises the steps of:

   - providing at least two elongated wooden elements (10, 110, 210, 220), wherein the elongated elements (10, 110, 210, 220) extend in a longitudinal direction (Y) and have a parallelogram-shaped or substantially parallelogram-shaped

cross-section, wherein the elongated elements (10, 110, 210, 220) each have a first side (11) and a second side (12) which respectively extend in the longitudinal direction (Y), wherein the second side (12) is located opposite the first side (11) in a stacking direction (Z) transverse to the longitudinal direction (Y), wherein the elongated elements (10, 110, 210, 220) have a width (W) of at least ten centimetres in a direction perpendicular to the longitudinal direction (Y) and the stacking direction (Z);
- drying the elongated elements (10, 110, 210, 220) at a temperature of twenty-eight to forty-five degrees Celsius for a duration of at least five months;
- gluing the at least two elongated elements (10, 110, 210, 220) together, wherein each time the first side (11) of one of the at least two elongated elements (10, 110, 210, 220) is glued to the second side (12) of another of the at least two elongated elements (10, 110, 210, 220) for forming a composite intermediate product (60, 160, 260); and
- sawing a plate-shaped element (80) from the composite intermediate product (60, 160, 260) along a cutting plane (71, 72) spanned by the longitudinal direction (Y) and the stacking direction (Z), wherein the plate-shaped element (80) has a thickness (T) of between one and six millimetres, wherein the plate-shaped element (80) forms at least a part of the floor panel (1, 101).

2. Method according to claim 1, wherein the elongated elements (10, 110, 210, 220) have a rectangular or substantially rectangular cross-section in the longitudinal direction (Y).

3. Method according to claim 1 or 2, wherein the elongated elements are dried at a temperature of thirty-five to forty degrees Celsius for a duration of six to eight months; and/or
wherein the elongated elements (10, 110, 210, 220) are dried to a moisture content of six to twelve percent, preferably to a moisture content of eight to ten percent, prior to the step of gluing together.

4. Method according to claim 1, 2 or 3, wherein prior to the step of sawing, the method comprises the step of levelling the composite intermediate product (60, 160, 260) along a top surface (61) spanned by the stacking direction (Z) and the longitudinal direction (Y).

5. Method according to any one of the preceding claims, wherein the plate-shaped element (80) has a thickness (T) of between one and a half and five millimetres, preferably of between two millimetres and four and a half millimetres.

6. Method according to any one of the preceding claims, wherein the plate-shaped element (80) is the floor panel (1).

7. Method according to any one of the claims 1 - 5, wherein the plate-shaped element (80) is a top layer for the floor panel (101), wherein the floor panel (101) further comprises a base layer (90), and wherein the method further comprises the step of gluing the plate-shaped element (80) to the base layer (90) for forming the floor panel (101).

8. Method according to claim 7, wherein the base layer (90) is provided with a tongue (91) and groove (92) or a snap connection.

9. Method according to claim 7 or 8, wherein the base layer (90) is made of compressed wood.

10. Method according to any one of the preceding claims, wherein the elongated elements (10, 110, 210, 220) are plain-sawn, or wherein the elongated elements (10, 110, 210, 220) are quarter-sawn.

11. Method according to any one of the preceding claims, wherein in the stacking direction (Z), the elongated elements (10, 110, 210, 220) have a thickness (B) of between sixty to one hundred millimetres, preferably of between seventy and ninety millimetres; and/or
wherein in the longitudinal direction (Y), the elongated elements (10, 110, 210, 220) have a length (L) of between one hundred and three hundred centimetres, preferably of between one hundred and twenty-five and two hundred and fifty centimetres; and/or
wherein in a direction perpendicular to the longitudinal direction (Y) and the stacking direction (Z), the elongated elements (10, 110, 210, 220) have a width (W) of between ten and twenty centimetres.

12. Floor panel (1, 101) manufactured according to the method according to any one of the preceding claims.

13. Use of one or several floor panels (1, 101) according to claim 12 as floor covering for a floor (3).

14. Use of one or several floor panels (1, 101) according to claim 13, wherein the use comprises gluing the one or the several floor panels (1, 101) to the floor (3).

15. Use of two or more floor panels (101) according to claim 13 or 14 when dependent on claim 8, wherein the use comprises connecting two floor panels (101) to one another by means of the tongue (91) and groove (92) or the snap connection.

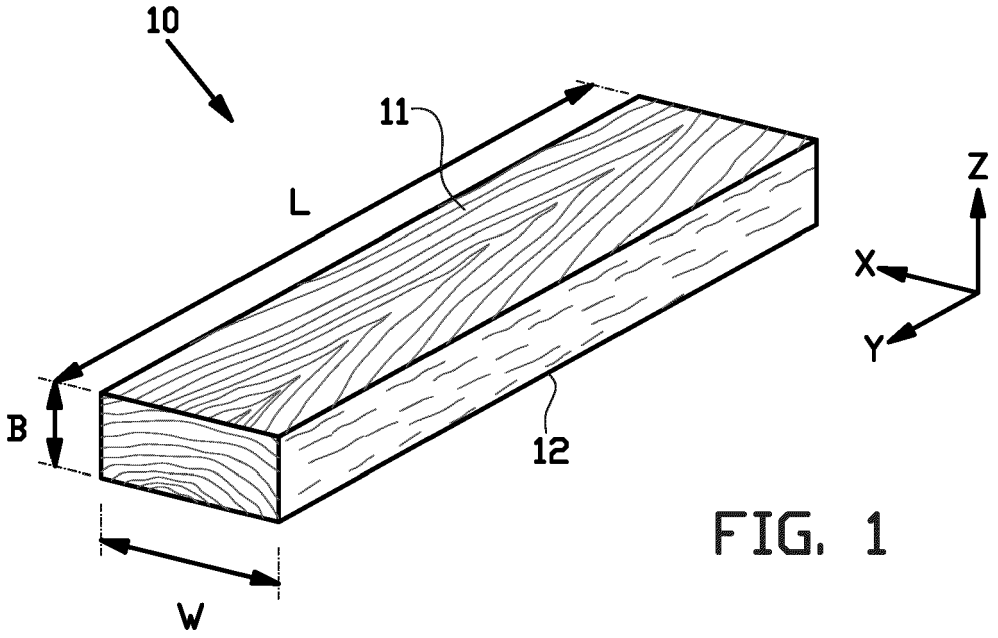

FIG. 1

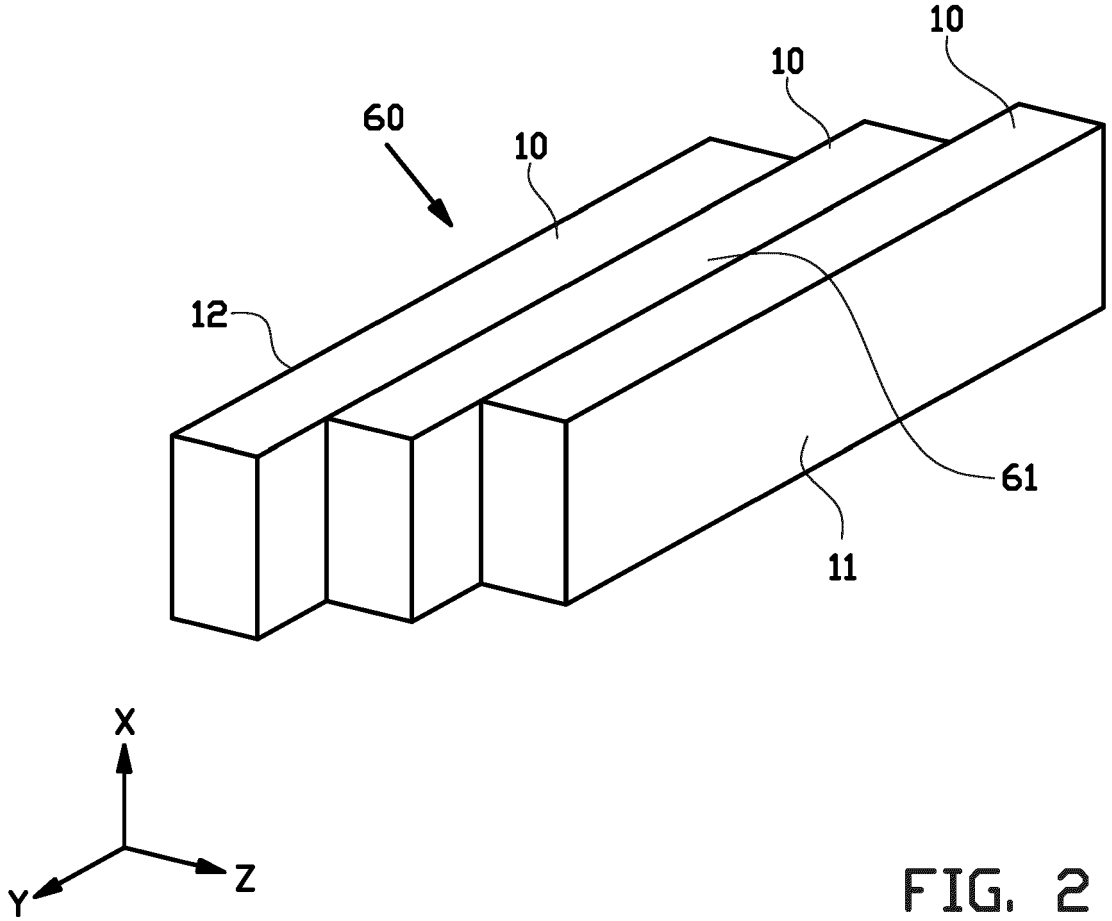

FIG. 2

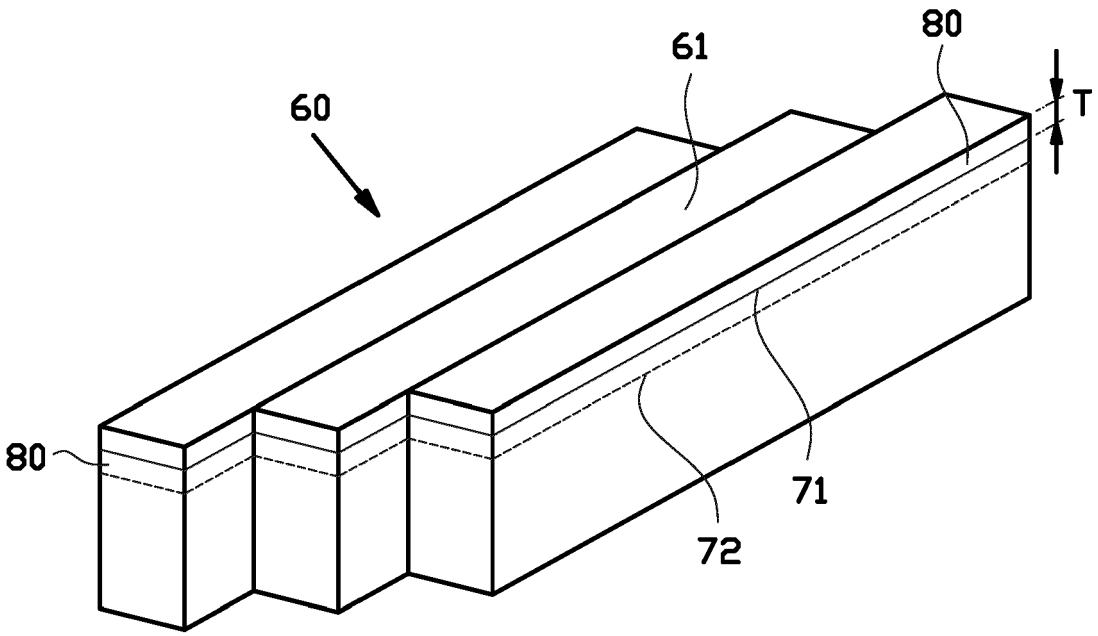

FIG. 3

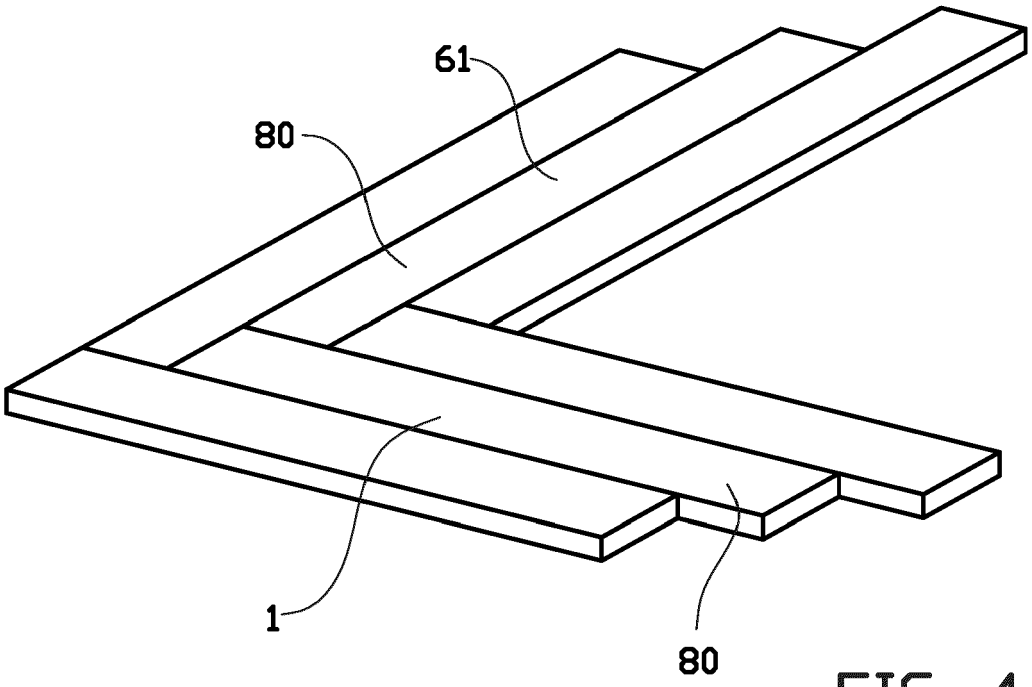

FIG. 4

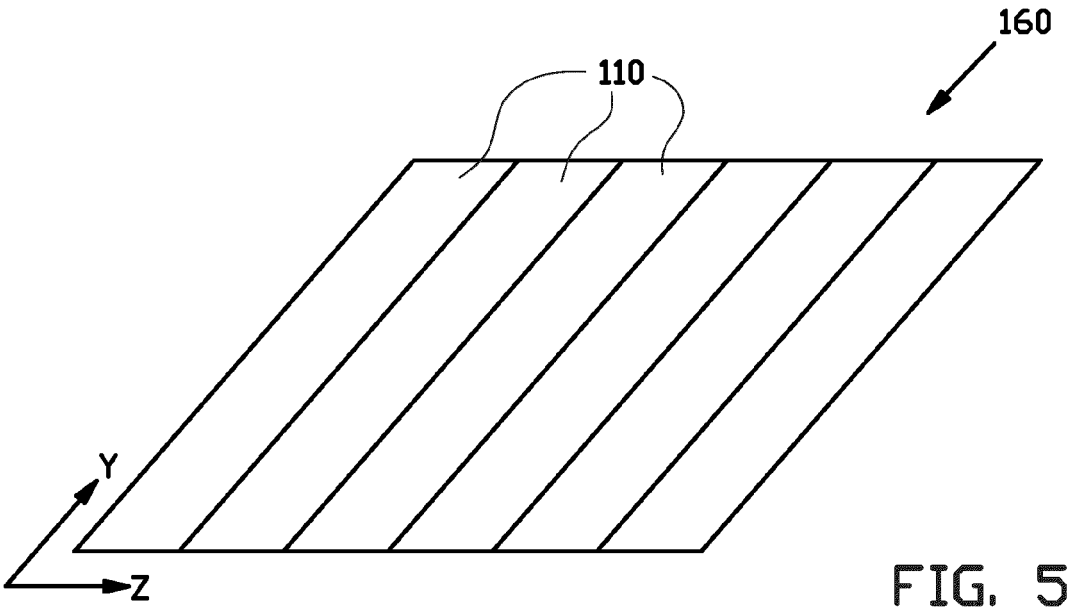

FIG. 5

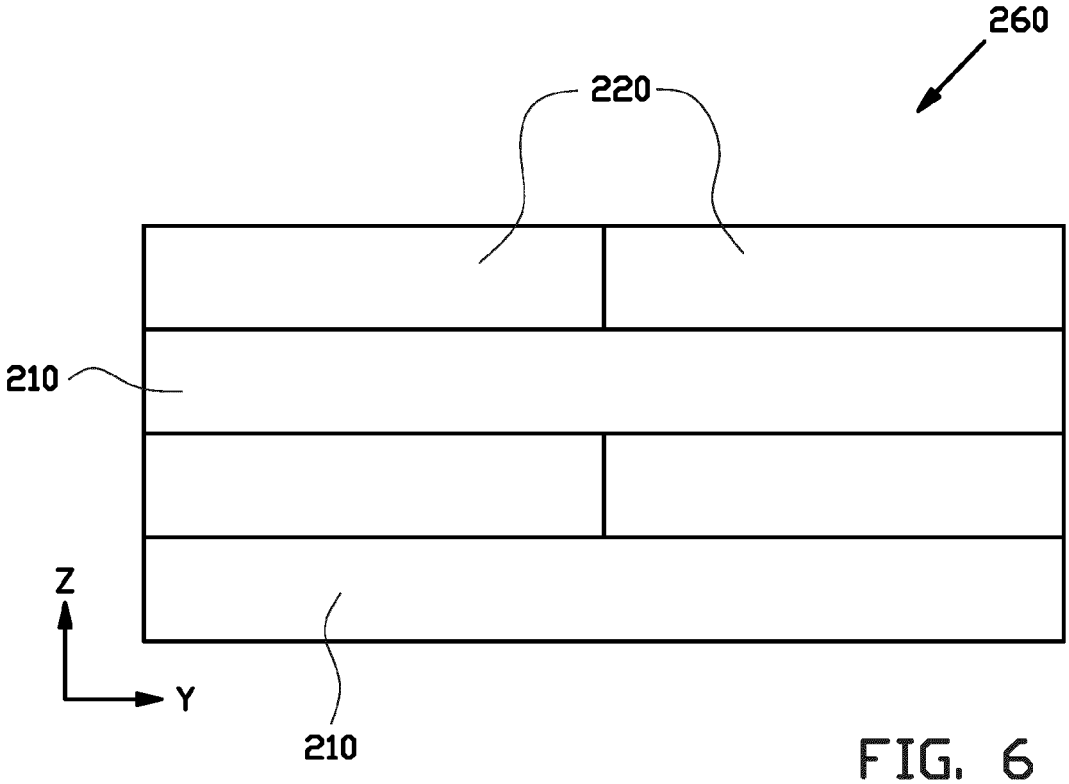

FIG. 6

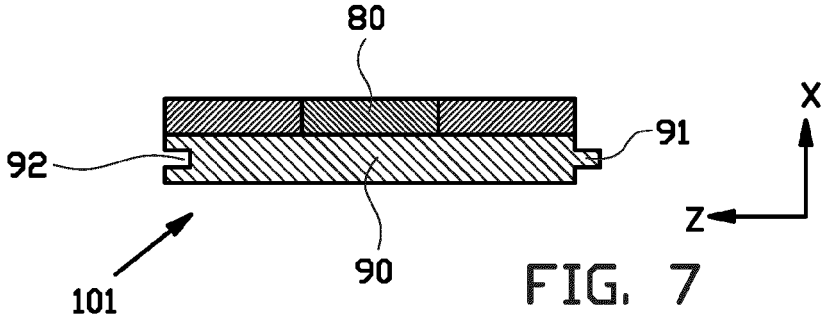

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 20 19 5242

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2015/059927 A1 (BRÄNNSTRÖM HANS [SE] ET AL) 5 March 2015 (2015-03-05) * abstract * * paragraphs [0004], [0083], [0099] * * figures *	1-15	INV. B27M3/04 B27M3/00
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TECHNICAL FIELDS SEARCHED (IPC)

B27M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 January 2021	Hamel, Pascal

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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