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(54) LAMINATE PANEL WITH OIL FOR SEALING

(57) The present disclosure relates to a laminate panel, in particular wall, ceiling, furniture or floor panel, wherein the laminate panel comprises: a carrier plate, wherein the carrier plate is a medium density wood fibre (MDF) or high density wood fibre (HDF) plate, comprising coupling elements on at least one side surface of the carrier plate for connecting to another correspondingly shaped laminate panel; wherein the surfaces of the coupling elements are at least partially provided with oil.

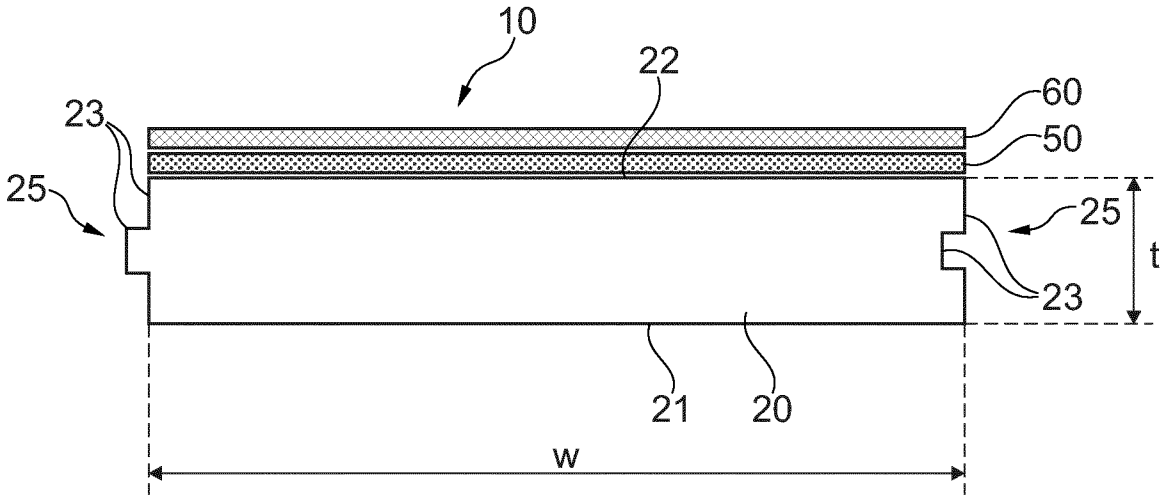

Fig. 1

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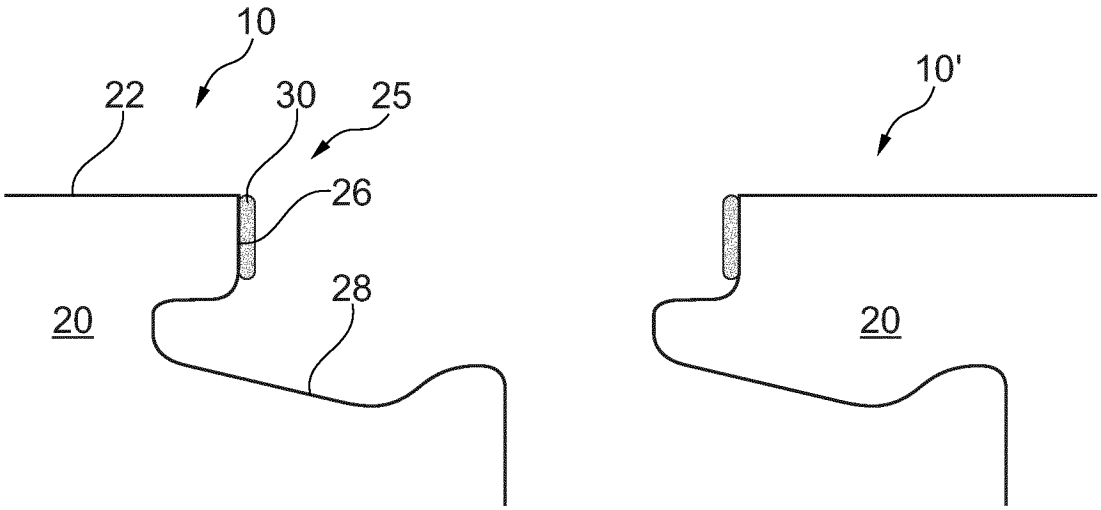

Fig. 2

Description

1. Technical Field

[0001] The present invention relates to a laminate panel, in particular wall, ceiling, furniture or floor panel, and to a method for producing a laminate panel.

2. State of the Art

[0002] A large number of panels and laminates for wall, ceiling or floor coverings are currently known in the state of the art. In recent years, in particular laminate panels have experienced widespread use. Laminate panels are relatively inexpensive and can be processed well. They are usually based on a carrier plate (carrier layer) made of MDF or HDF material.

[0003] Laminate panels need to be protected against the ingress of water. In particular, this relates to the profile region of laminate panels, i.e. the contact surface of adjacent laminate panels. These profile regions usually constitute a weak point for water resistance.

[0004] In the state of the art, the profile regions are usually finely milled in order to produce a substantially dense profile, as a result of which ingress of water is substantially prevented. Furthermore, a sealing can be provided, as a result of which the carrier material of the carrier plate can be rendered hydrophobic. As a further consequence, the liquid is thus prevented from ingress into the profile.

[0005] For sealing, the state of the art proposes lacquering the profile regions or providing lacquer-based sealing means.

[0006] The proposals made in the state of the art for rendering laminate panels hydrophobic in recent years have already shown considerable progress. However, there is still a need for improvement.

[0007] The invention is therefore based on the object of improving the previously known state of the art. In particular, a laminate panel of the type described at the beginning should be provided which has a high resistance to ingress of water and which is at the same time inexpensive.

3. Summary of the Invention

[0008] The above objects and further objects which emerge from the following description are achieved by the subject matter of the independent claims. Preferred embodiments are the subject matter of the dependent claims, and the person skilled in the art finds indications of other suitable embodiments of the present invention in the disclosure of the present application.

[0009] A laminate panel according to the invention, in particular wall, ceiling, furniture or floor panel, comprises: a carrier plate, wherein the carrier plate is a medium density wood fibre (MDF) or high density wood fibre (HDF) plate, comprising coupling elements on at least one side surface of the carrier plate for connecting to another correspondingly shaped laminate panel; wherein the surfaces of the coupling elements are at least partially provided with oil.

[0010] The laminate panel according to the invention offers the advantage that the ingress of liquids, such as water, can be counteracted in an improved manner. Consequently, the laminate panel is better protected. In particular, the oil makes it possible for the carrier plate to be rendered hydrophobic. This can also be understood as a sealing. The coupling elements of laminate panels are usually the weak points with regard to the ingress of water. According to the invention, this weak point can be substantially eliminated. The quality of the carrier plate and of the laminate panel can then be substantially improved. The carrier plate swells substantially less. This increases the durability of the carrier plate and of the laminate panel and thus leads to saving in terms of costs.

[0011] The carrier plate (also referred to herein for the sake of brevity as a plate) can be a plate which is produced from a wood-based material, such as a medium density fibre plate or a high density fibre plate, a particle plate, an oriented strand board (OSB) or the like. However, it can also be produced from a plastic material, such as luxury vinyl tile (LVT), a rigid polymer core, PCV, or an expanded polymer core, as well as mixed constructions which are widely used in the flooring industry. The fibre plates allow good recyclability.

[0012] The plate typically has a longitudinal extent (length) in a longitudinal direction and a width, substantially perpendicularly to the longitudinal direction. The width of the plate is typically small compared to the length. The at least one side surface of the plate, for example, is oriented substantially perpendicularly to the main surface of the plate. For example, the side surface of the plate extends along the longitudinal direction of the carrier plate.

[0013] The carrier plate comprises coupling elements. In one example, an element, for example a groove or a tongue, can already be understood as a plurality of coupling elements due to two mutually engaging surfaces. Thus, for example, an upper side constitutes a first coupling element, and a lower side constitutes a second coupling element. The coupling elements can also be understood as a connecting structure.

[0014] The coupling elements make it possible for the plate to be connected to another plate. This can be effected e.g. by (partial) form-fitting, for example by a tongue- and-groove connection. The coupling elements make it possible for the side surface to be configured to be brought into engagement with a side surface of another plate.

[0015] The other correspondingly shaped laminate panel can have a substantially congruent (or else substantially precisely fitting) coupling element. The other correspondingly shaped laminate panel could also have other shapes and/or surface properties.

[0016] The surfaces of the coupling elements are at

least partially provided with oil. This can be understood as the oil being at least partially applied to the surfaces of the coupling elements. The oil, for example, is arranged substantially at the surfaces of the coupling elements. The oil may have penetrated at least partially (in one example completely), into the surfaces of the coupling elements.

[0017] The oil can furthermore be naturally colored or colored in a different manner and can then be applied. As described herein, the oil can also be applied in combination with a lacquer, for example a chamfer lacquer, in the form of a mixture of lacquer and oil. The oil can furthermore be dissolved in a carrier medium, for example a solvent or water, and can be applied in this state.

[0018] The oil is preferably provided in an amount sufficient to achieve a water tightness of the laminate panel according to NALFA test of ISO 4760 of at least 3, preferably at least 2, most preferably at least 1.

[0019] The oil is thus advantageously provided or applied to the surfaces of the coupling elements in an amount such that the properties described herein are valid.

[0020] The NALFA test is a standardized test method of the North American Laminate Flooring Association (NALFA). In this test, it is measured how a laminate panel behaves when its surface is exposed to standing water for about 24 hours. Before and after this time, the surface is measured at different measurement positions and the visual and tactile changes of the plate are recorded and evaluated. In particular, the swelling of the laminate material at the measurement positions is determined. Usually, in order to determine the swelling, a measurement position in the middle of an area on the laminate, for example on a cross-head, is selected as a reference. Furthermore, 3 measurement positions a few centimeters next to one another are selected. If the average of the swelling of the 3 measurement positions a few centimeters next to the reference measurement position is less than 0.3 mm, a value of less than 3 can be assigned according to ISO 4760. The visual and/or tactile evaluation usually takes place according to the school grade system.

[0021] Preferably, the oil applied to the surfaces of the coupling elements is part of a mixture of lacquer and oil applied to the surfaces of the coupling elements.

[0022] The mixture of lacquer and oil combines the advantageous hydrophobizing properties of the oil with the advantageous properties of the lacquer. The lacquer, for example, allows easier application and/or coloring of the mixture. The mixture thus offers an advantage over the use of pure oil. The oil per se in turn constitutes an improved hydrophobizing of the carrier plate than the use of pure lacquer.

[0023] The lacquer of the mixture of lacquer and oil can provide sufficient elasticity to compensate for deformation of the plate. It can also be that the lacquer of the mixture of lacquer and oil is based on a harder, i.e. less elastic, material. A higher resistance to impacts, scratches and/or chemicals can thereby be achieved. Suitable lacquers of the mixture of lacquer and oil which can be used herein comprise, in a non-exhaustive list, corundum particles, acrylate, polymers, oligomers, additives and/or the like. So-called polyurethane lacquers (PUR lacquers) can also be used. The lacquer of the mixture of lacquer and oil can in particular comprise a colored liquid plastic. PUR lacquers have the advantage that they are durable and scratch-resistant.

[0024] The mixture of lacquer and oil can be applied, for example, via spray nozzles, contact nozzles, vacumat coating, a transfer wheel and/or by means of similar means and/or methods. Preferably, the mixture of lacquer and oil is applied by vacumat coating.

[0025] The mixture of lacquer and oil consists substantially exclusively of lacquer and oil. However, it may be that further constituents are present in the mixture of lacquer and oil. These further constituents can be, for example, small amounts of solvents or agents having a comparable effect. These further constituents usually play a subordinate role and/or are present only in very small amounts in the mixture of lacquer and oil. Furthermore, smaller impurities can be present in the mixture of lacquer and oil.

[0026] A preferred embodiment relates to the laminate panel as described herein, wherein the weight ratio of oil to lacquer of the mixture of lacquer and oil is at least 5%, preferably at least 6%, preferably at least 7%, preferably at least 8%, preferably at least 9%, preferably at least 10%, preferably at least 11%, most preferably at least 12%.

[0027] This has the advantage that the favorable properties of the oil of the mixture of lacquer and oil improve the laminate panel. Consequently, an increased water resistance and hydrophobic effect can be achieved. This contributes to an improved sealing of the laminate panel, in particular of the coupling elements of the side surface of the carrier plate of the laminate panel.

[0028] The embodiment described above also has advantages with respect to production. In particular, the weight ratio of oil to lacquer of the mixture of lacquer and oil can be adjusted, for example before application. This adjusted weight ratio can then be used for the desired number of laminate panels (for example of particular types which have particular coupling elements, geometries and/or the like). These laminate panels then have substantially the same product quality. The weight ratio can be adapted as desired for further types of laminate panels or in accordance with particular requirements. The weight ratio can be stored permanently on a computer-readable storage medium and can then be easily retrieved when the need arise.

[0029] A preferred embodiment relates to the laminate panel as described herein, wherein the weight ratio of oil to lacquer of the mixture of lacquer and oil is at most 50%, preferably at most 45%, preferably at most 40%, preferably at most 35%, preferably at most 30%, preferably at most 25%, preferably at most 20%, preferably at most

19%, preferably at most 18%, preferably at most 17%, preferably at most 16%, most preferably at most 15%.

[0030] The oil should not have an excessively high proportion in the mixture of lacquer and oil. In particular, only so much oil should be applied that the desired effect of hydrophobizing the surfaces of the coupling elements of the at least one side surface of the carrier plate is achieved. An excessively high proportion of oil could have a disadvantageous effect on the costs.

[0031] The applicant has succeeded in achieving an optimal compromise from these opposing requirements with a weight ratio of oil to lacquer of the mixture of lacquer and oil of approximately 10% to 15%.

[0032] A preferred embodiment relates to the laminate panel as described herein, wherein the oil comprises tung oil and/or linseed oil, wherein the oil preferably consists of tung oil and/or linseed oil.

[0033] The oil according to this embodiment has the advantage that it is relatively easy to procure. Furthermore, high hydrophobic effects can be achieved with even small amounts of oil, as a result of which the costs can be reduced.

[0034] Tung oil and linseed oil have the advantage that they are natural oils and consequently represent a gentle variant for laminate panels. These natural oils contain substantially no additives at all. Furthermore, these oils offer the advantage that a healthy room climate can be promoted. This is particularly noticeable if the laminate panels are installed and / or used in an interior area.

[0035] A preferred embodiment relates to the laminate panel as described herein, wherein the lacquer of the mixture of lacquer and oil comprises or consists of one or more of the following: corundum particles, acrylate, polymers, oligomers, additives, wherein the lacquer preferably consists of acrylate. For example, the lacquer can consist of acrylate-based lacquer.

[0036] These materials for the lacquer have proven to be advantageous since they are readily available and can be processed well. The lacquer can be cured, for example, by UV radiation or electron radiation. It can also be the case that the lacquer of the mixture of lacquer and oil consists substantially of one of the materials described herein. For example, the lacquer can be an acrylate lacquer.

[0037] However, the person skilled in the art understands that small amounts of other constituents can be present (for example impurities or similar constituents).

[0038] A preferred embodiment relates to the laminate panel as described herein, wherein the mixture of lacquer and oil is applied by point nozzles, contact nozzles, vacumat coating and/or a transfer wheel, preferably by vacumat coating.

[0039] Thus, the mixture can be applied quickly and efficiently to the surfaces of the coupling elements.

[0040] A preferred embodiment relates to the laminate panel as described herein, wherein the applied oil per meter of coupling elements in the longitudinal direction of the laminate panel is at least 0.1 grams, preferably at least 1 grams, more preferably at least 2 grams, more preferably at least 4 grams, more preferably at least 5 grams, more preferably at least 6 grams, more preferably at least 7 grams, more preferably at least 8 grams, more preferably at least 10 grams, more preferably at least 15 grams, more preferably at least 20 grams, most preferably at least 25 grams.

[0041] As described herein, a minimum amount of oil should be used to render the side surface sufficiently hydrophobic, i.e. to make it substantially water-resistant. A higher amount of oil usually leads to an improvement in the water resistance. However, this trend of increased amount of oil and improvement in the water resistance is not linearly increasing and a saturation can be observed which resembles an asymptotic profile.

[0042] A preferred embodiment relates to the laminate panel as described herein, wherein the applied oil per meter of coupling elements in the longitudinal direction of the laminate panel is at most 100 grams, preferably at most 60 grams, more preferably at most 50 grams, more preferably at most 45 grams, more preferably at most 40 grams, more preferably at most 35 grams, more preferably at most 30 grams, most preferably at most 25 grams.

[0043] As described herein, the oil should not be applied in unnecessarily high amounts to the coupling elements of the side surface, since the oil may be expensive and would thus make the laminate panel unnecessarily cost-intensive.

[0044] With a specification of a minimum amount and a maximum amount of the oil, an optimal compromise of these opposing requirements can be achieved.

[0045] A preferred embodiment relates to the laminate panel as described herein, wherein the oil is applied to a surface of the coupling elements oriented perpendicular to the main surface of the laminate panel, preferably exclusively to the surface of the coupling elements oriented perpendicular to the main surface of the laminate panel, wherein the surface of the coupling elements forms an abutting edge with another correspondingly shaped laminate panel.

[0046] The surface of the coupling elements forming an abutting edge is usually arranged in the immediate vicinity of the main surface of the carrier plate. A part of this abutting edge can be visible from above (e.g., from a top view) in the case of two laminate panels connected via the coupling elements. This surface usually constitutes a critical surface with respect to water resistance since the water first passes through this surface during ingress between two laminate panels. Consequently, it is advantageous if this surface is provided with oil. It can also be advantageous that exclusively this surface is provided with oil in order to reduce the costs for the laminate panel.

[0047] A preferred embodiment relates to the laminate panel as described herein, wherein the abutting edge has a thickness in the depth direction of the laminate panel of 0.2 mm to 10 mm, preferably 0.5 mm to 9 mm, more preferably 1 mm to 8 mm, more preferably 2 mm to 7 mm,

more preferably 3 mm to 6 mm, most preferably 4 mm to 5 mm.

[0048] For example, the abutting edge can have a thickness in the depth direction of the laminate panel of at least 0.2 mm, preferably at least 0.5 mm, more preferably at least 1 mm, more preferably at least 2 mm, more preferably at least 3 mm, more preferably at least 4 mm, more preferably at least 5 mm, more preferably at least 6 mm.

[0049] Furthermore, the abutting edge can have a thickness in the depth direction of the laminate panel of at most 10 mm, preferably at most 9 mm, more preferably at most 8 mm, more preferably at most 7 mm, more preferably at most 6 mm, more preferably at most 5 mm, more preferably at most 4 mm, more preferably at most 3 mm.

[0050] This thickness range of the abutting edge has proven to be advantageous in order to provide a substantially flush abutment between two laminate panels. As described herein, it can be advantageous if only this abutting edge is provided with oil.

[0051] In a further embodiment, the side surface comprises a chamfer forming the transition between the abutting edge and the main surface of the laminate panel. The chamfer can be substantially straight or rounded. Preferably, the chamfer is substantially straight. The chamfer can form an acute angle of at least 5 degrees, preferably at least 10 degrees, more preferably at least 15 degrees, more preferably at least 20 degrees, more preferably at least 25 degrees, more preferably at least 30 degrees with the main surface of the carrier plate. The chamfer can form an acute angle of at most 80 degrees, preferably at most 70 degrees, more preferably at most 60 degrees, more preferably at most 50 degrees, more preferably at most 40 degrees, more preferably at most 35 degrees with the main surface of the carrier plate.

[0052] In one example, the oil can be applied exclusively to the chamfer or to the chamfer and to the abutting edge. In a further example, the oil can be applied to the entire profile of the coupling elements.

[0053] A preferred embodiment relates to the laminate panel as described herein, wherein the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel have a profile length of 5 mm to 50 mm, wherein of the profile length at least 5% is provided with oil, preferably at least 10% is provided with oil, more preferably at least 15% is provided with oil, more preferably at least 20% is provided with oil, more preferably at least 25% is provided with oil, most preferably at least 30% is provided with oil.

[0054] As described herein, the oil contributes to increasing the water resistance. Consequently, it is advantageous that the oil is provided in a minimum amount on the profile length for the purpose of an improved sealing.

[0055] The profile length provided with oil can be a continuous length or can be composed of individual length sections, which in turn can be different or equal in length. However, it is advantageous if the profile length provided with oil represents a continuous length. This offers the advantage that no intermediate region without oil is formed, which could promote the ingress of water. Preferably, the profile length provided with oil is arranged substantially close to a first end of the profile length, wherein the first end represents the end adjoining the main surface of the carrier plate. In a non-limiting example, a profile length of 10 mm provided with 20% oil represents a length of 2 mm provided with oil.

[0056] A preferred embodiment relates to the laminate panel as described herein, wherein the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel have a profile length of 5 mm to 50 mm, wherein of the profile length at most 100% is provided with oil, preferably at most 90% is provided with oil, more preferably at most 80% is provided with oil, more preferably at most 70% is provided with oil, more preferably at most 60% is provided with oil, more preferably at most 50% is provided with oil, more preferably at most 40% is provided with oil, most preferably at most 35% is provided with oil.

[0057] As described herein, the oil should not be applied in unnecessarily high amounts, since the oil may be expensive and would thus make the laminate panel unnecessarily cost-intensive. The applicant has succeeded in achieving an optimal compromise from these opposing requirements with a minimum amount and a maximum amount of the profile length which is provided with oil.

[0058] Furthermore, with respect to the profile length, which is provided with oil, the same applies as already described above.

[0059] In a preferred embodiment of the laminate panel, the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel have a profile length, wherein of the profile length at least 1 mm is provided with oil, preferably at least 2 mm is provided with oil, more preferably at least 3 mm is provided with oil, more preferably at least 4 mm is provided with oil, more preferably at least 5 mm is provided with oil, more preferably at least 6 mm is provided with oil, more preferably at least 8 mm is provided with oil, more preferably at least 10 mm is provided with oil, more preferably at least 12 mm is provided with oil, more preferably at least 15 mm is provided with oil, more preferably at least 20 mm is provided with oil, more preferably at least 25 mm is provided with oil, more preferably at least 30 mm is provided with oil, more preferably at least 35 mm is provided with oil, most preferably at least 40 mm is provided with oil.

[0060] In a preferred embodiment of the laminate panel, the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel have a profile length, wherein of the profile length at most 50 mm is provided with oil, preferably at most 45 mm is provided with oil, more preferably at most 40 mm is provided with oil, more preferably at most 35 mm is provided with oil, more preferably at most 30 mm is provided with oil, more preferably at most 25 mm is

provided with oil, more preferably at most 20 mm is provided with oil, more preferably at most 15 mm is provided with oil, more preferably at most 10 mm is provided with oil, more preferably at most 8 mm is provided with oil, more preferably at most 6 mm is provided with oil, most preferably at most 4 mm is provided with oil.

[0061] Corresponding advantages with respect to the profile length which is at least and/or at most provided with oil are described in the preceding embodiments and are likewise applicable here.

[0062] The objects are furthermore achieved by a method for producing a laminate panel, in particular wall, ceiling, furniture or floor panel, according to any one of the embodiments described herein.

[0063] It goes without saying that the technical properties shown or described for the laminate panel, the advantages and the improvements over the state of the art are likewise applicable to the method for producing a laminate panel.

[0064] In a preferred embodiment of the method, the application of the mixture of oil and lacquer takes place by point nozzles, contact nozzles, vacumat coating and/or a transfer wheel, preferably by vacumat coating.

[0065] In a preferred embodiment, the method comprises a step of profiling to provide coupling elements, wherein the step of profiling comprises milling, wherein the milling comprises providing an abutting edge (also to be understood as a joining edge) and optionally a chamfer.

[0066] In a preferred embodiment of the laminate panel, the carrier plate has a thickness of at least 1 mm, preferably at least 2 mm, more preferably at least 3 mm, more preferably at least 4 mm, more preferably at least 5 mm, more preferably at least 6 mm, more preferably at least 7 mm, most preferably at least 8 mm.

[0067] In a further preferred embodiment of the laminate panel, the carrier plate has a thickness of at most 40 mm, preferably at most 35 mm, more preferably at most 30 mm, more preferably at most 25 mm, more preferably at most 20 mm, more preferably at most 18 mm, more preferably at most 14 mm, most preferably at most 10 mm.

[0068] These thicknesses have on the one hand proven to be advantageous in order to provide sufficient rigidity and/or to offer high wear resistance, while on the other hand the use of material is kept at a moderate level.

4. Brief Description of the Figures

[0069] In the following, preferred embodiments are described only by way of example. Reference is made to the following accompanying figures:

FIG.1 shows a schematic cross section of a carrier plate of a laminate panel according to an embodiment of the present disclosure;

FIG. 2 shows a detailed view of a schematic cross section of two laminate panels close to a side surface according to an embodiment of the present disclosure;

FIG.3 shows a detailed view of a schematic cross section of two laminate panels close to a side surface according to a further embodiment of the present disclosure;

FIG.4 shows a detailed view of a schematic cross section of two laminate panels close to a side surface according to a further embodiment of the present disclosure;

FIG.5 shows a structure of a NALFA test according to an embodiment of the present disclosure;

FIG. 6 shows a flow chart of a method for producing a laminate panel according to an embodiment of the present disclosure.

5. Detailed Description of the Figures

[0070] In the following, only some possible embodiments of the invention are described in detail. However, the present invention is not limited to these, and a large number of other embodiments can be applied without departing from the scope of the disclosure. The embodiments presented can be modified in many ways and combined with each other whenever they are compatible, and certain features can be omitted insofar as they appear to be unnecessary. In particular, the disclosed embodiments can be modified by combining certain features of one embodiment with one or more features of another embodiment.

[0071] In the entire present figures and the description, the same reference numerals refer to the same elements. The figures may not be drawn to scale, and the relative size, proportions, and illustration of elements in the figures may be exaggerated for clarity, illustration, and / or convenience.

[0072] For clarity, not all reference numerals are illustrated in all figures. However, the person skilled in the art understands, at least from the overall view of all figures, which features are shown in the figures, even if they are not separately identified with reference numerals.

[0073] **FIG. 1** shows a schematic cross section of a laminate panel 10 according to an embodiment of the present disclosure.

[0074] The laminate panel 10 is in particular a wall, ceiling, furniture or floor panel. The laminate panel 10 comprises a carrier plate 20, which is a medium density wood fibre (MDF) or high density wood fibre (HDF) plate.

[0075] The carrier plate 20 comprises coupling elements 23 on at least one side surface 25 of the carrier plate 10 for connecting to another correspondingly shaped laminate panel (as can be seen e.g. in FIGS. 2

to 4). The connection can be effected without adhesives. Two side surfaces 25 (right and left) are illustrated in FIG. 1, wherein each of the two side surfaces 25 comprises coupling elements 23. The coupling elements 23 can, for example, comprise one or more of a groove and a tongue.

[0076] The surfaces of the coupling elements 22 are at least partially provided with oil 30 (identified in FIGS. 2 to 4).

[0077] Furthermore, the width w of the laminate panel 10 in a width direction and the thickness t of the laminate panel 10 in a depth direction are illustrated in FIG. 1**.** The width and depth directions of the laminate panel 10 are each oriented substantially perpendicular to a longitudinal direction of the laminate panel 10, wherein the longitudinal direction is oriented perpendicular to the image plane of FIG. 1.

[0078] The carrier plate 20 has a main surface 22 and a rear side 21. The rear side 21 typically faces a floor, a wall, a ceiling or the like. The person skilled in the art understands that this depends on the field of application of the laminate panel 10. The main surface 22 is usually visible and opposite the rear side 21.

[0079] As illustrated in FIG. 1, the laminate panel 10 can furthermore comprise further layers 50, 60. The further layers 50, 60 can, for example, comprise a primer layer which is applied to the carrier plate 20 directly below a decorative printing layer, as seen from the carrier plate 20. Furthermore, the laminate panel can comprise, as a further layer 50, 60, a lacquer layer which is applied directly above a decorative printing layer, as seen from the carrier plate 20. Furthermore, a wear layer can be provided which is preferably applied directly above the lacquer layer, as seen from the carrier plate 20.

[0080] The decorative printing layer (for example one of the layers 50, 60) can be configured such that this layer and a decorative pattern provided thereon can be viewed from above (for example in FIG. 1 in a vertical direction from top to bottom). The decorative printing layer and the decorative pattern can usually be viewed by a user when the laminate panel 10 is in a typical position, for example on a floor or the like.

[0081] The laminate panel 10 can have phenolic resin-containing cellulose webs in the carrier plate 20. The further layers 50, 60 can comprise papers impregnated with melamine resin. A surface structure can be configured on the laminate panel 10 which reproduces surface unevenness and/or crack formations. For example, a wood grain can thus be reproduced. Furthermore, the surface structure can have a regular or irregular pattern which can advantageously contribute to the reproduction of the unevenness. The configuration of the surface structure can be adapted in accordance with the optical and mechanical requirements to the laminate panel 10.

[0082] **FIG. 2** shows an enlarged detail of a schematic cross section perpendicular to the longitudinal direction of the laminate panel 10 of two laminate panels 10, 10' close to a respective side surface 25 according to an embodiment of the present disclosure. FIG. 3 shows an enlarged detail of a schematic cross section perpendicular to the longitudinal direction of the laminate panel 10 of two laminate panels 10, 10' close to a respective side surface 25 according to a further embodiment of the present disclosure. FIG. 4 shows an enlarged detail of a schematic cross section perpendicular to the longitudinal direction of the laminate panel 10 of two laminate panels 10, 10' close to a respective side surface 25 according to yet a further embodiment of the present disclosure. In FIGS. 2 to 4, the laminate panel 10 and another correspondingly shaped laminate panel 10' are respectively depicted spaced apart in the width direction (running horizontally in the figures) for illustration purposes. It goes without saying that the laminate panel 10 and the other correspondingly shaped laminate panel 10' are arranged substantially flush with one another during ordinary is and /or in the connected state. FIGS. 2 to 4 show that the coupling elements 22 can comprise a groove in which a corresponding tongue of the other correspondingly shaped laminate panel 10' engages.

[0083] It is common to the embodiments that the surfaces of the coupling elements 22 (not illustrated in FIGS. 2 to 4 for clarity but they are indicated in FIG. 1) are at least partially provided with oil 30. The oil 30 is provided in an amount such that a water tightness of the laminate panel 10 according to NALFA test according to ISO 4760 of at least 3, preferably at least 2, most preferably at least 1 can be achieved. The oil applied to the surfaces of the coupling elements 22 can be part of a mixture 30 of lacquer and oil. Preferably, the weight ratio of oil 30 to lacquer of the mixture 30 of lacquer and oil is at least 5%, and at most 50%, most preferably at least 10% and at most 15%. An advantageous sealing of the side surfaces 25 can thus be achieved.

[0084] The mixture 30 of lacquer and oil is usually applied by point nozzles, contact nozzles, vacumat coating and/or a transfer wheel. If only oil 30 is applied and thus no mixture 30 of lacquer and oil is applied, the application can take place by means of nozzles which do not spray on the oil 30, but rather supply it. For this purpose, the carrier plate 20 can, for example, move past one or more nozzles at a small distance (for example in the range of tenths of a millimeter). The oil 30 can then be transferred to the carrier plate 20, in particular to the surfaces of the coupling elements 22.

[0085] The applied oil 30 can be at least 0.1 grams and at most 100 grams (or at most 50 grams) per meter of path length of the coupling elements 22 in the longitudinal direction of the laminate panel (perpendicular to the image plane in FIGS. 2 to 4).

[0086] FIG. 2 shows a surface 26 of the coupling elements 22 oriented perpendicular to the main surface 22 of the laminate panel 10. This surface 26 of the coupling elements 22 forms an abutting edge 26 with another correspondingly shaped laminate panel 10'. The oil 30 or the mixture 30 of lacquer and oil is applied exclusively to the abutting edge 26 in FIG. 2. The abutting edge 26 usually provides a flush termination between the lami-

nate panel 10 and the other correspondingly shaped laminate panel 10'. However, the oil 30 or the mixture 30 of lacquer and oil can also be applied over a larger range of the profile length of the profile 28 of the coupling elements 22 of the side surface 25.

[0087] **FIG. 3** shows a similar embodiment as in FIG. 2, but the side surface 25 further comprises a chamfer 27 forming a transition between the abutting edge 26 and the main surface 22 of the laminate panel 10. The oil 30 or the mixture 30 of lacquer and oil is applied exclusively to the chamfer 27 and the abutting edge 26 in FIG. 3. In one example, the oil 30 or the mixture 30 of lacquer and oil can be applied only to the chamfer 27 or to the abutting edge 26. In a further example, the oil 30 or the mixture 30 of lacquer and oil can be applied over a larger range of the profile length of the profile 28 of the coupling elements 22 of the side surface 25.

[0088] **FIG. 4** shows a similar embodiment as in FIG. 3, but in FIG. 4 substantially the entire profile length of the profile 28 of the coupling elements 22 of the side surface 25 is provided with the oil 30 or the mixture 30 of lacquer and oil.

[0089] The profile length described herein can be understood as the length of the profile 28 of the side surface 25 in the cross-section perpendicular to the longitudinal direction of the laminate panel 10, wherein the length is measured from the main surface 22 to the rear side 21.

[0090] The profile length described herein can also assume values within the range described herein. For example, the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel can have a profile length of at least 8 mm, preferably at least 10 mm, more preferably at least 15 mm, more preferably at least 20 mm, more preferably at least 25 mm, more preferably at least 30 mm, more preferably at least 35 mm, more preferably at least 40 mm.

[0091] Furthermore, the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel can have a profile length of at most 50 mm, preferably at most 45 mm, more preferably at most 40 mm, more preferably at most 35 mm, more preferably at most 30 mm, more preferably at most 25 mm, more preferably at most 20 mm, more preferably at most 15 mm.

[0092] **FIG. 5** shows a structure of a NALFA test according to an embodiment of the present disclosure.

[0093] The surface of the laminate panel 10 is measured e.g. at four different measurement positions P1, P2, P3, P4 and the visual and tactile changes of the laminate panel 10 are recorded and evaluated. In particular, the swelling of the laminate panel 10 at the measurement positions P1, P2, P3, P4 is determined. In order to determine the swelling, a measurement position P1 in the middle of the surface on the laminate panel 10 is used as a reference and the remaining measurement positions P2, P3, and P4 are used to determine the swelling.

[0094] **FIG. 6** shows a flow chart of a method 100 for producing a laminate panel 10 according to an embodiment of the present disclosure.

[0095] The method 100 can comprise the step of providing 110 a carrier plate 20.

[0096] The method 100 can furthermore comprise the step of profiling 120 to provide coupling elements 23, wherein the profiling 120 comprises milling, wherein the milling comprises providing an abutting edge 26 and optionally a chamfer 27.

[0097] The method 100 can furthermore comprise the step of applying 130 an oil 30 or a mixture 30 of oil and lacquer by point nozzles, contact nozzles, vacumat coating and/or a transfer wheel, preferably by vacumat coating.

[0098] The scope of protection is determined by the claims and is not limited by the embodiments.

6. List of Reference Numerals

[0099]

10, 10'	Laminate panel
20	Carrier plate
21	rear side
22	main surface
23	coupling elements
25	side surface
26	abutting edge
27	chamfer
28	profile
30	oil or mixture of lacquer and oil
50, 60	further layers
w	width in width direction
t	thickness in depth direction
P_1, P_2, P_3, P_4	measurement positions

100	method
110	providing
120	profiling
130	applying

Claims

1. Laminate panel, in particular wall, ceiling, furniture or floor panel, wherein the laminate panel comprises:

   a carrier plate, wherein the carrier plate is a medium density wood fibre (MDF) or high density wood fibre (HDF) plate, comprising coupling elements on at least one side surface of the carrier plate for connecting to another correspondingly shaped laminate panel;
   wherein the surfaces of the coupling elements are at least partially provided with oil.

2. The laminate panel according to the preceding claim, wherein the oil is provided in an amount sufficient to achieve a water tightness of the laminate panel according to NALFA test according to ISO 4760 of

at least 3, preferably at least 2, most preferably at least 1.

3. The laminate panel according to any one of the preceding claims, wherein the oil applied to the surfaces of the coupling elements is part of a mixture of lacquer and oil applied to the surfaces of the coupling elements.

4. The laminate panel according to the preceding claim, wherein the weight ratio of oil to lacquer of the mixture of lacquer and oil is at least 5%, preferably at least 8%, preferably at least 9%, preferably at least 10%, preferably at least 11%, most preferably at least 12%.

5. The laminate panel according to any one of claims 3 or 4, wherein the weight ratio of oil to lacquer of the mixture of lacquer and oil is at most 50%, preferably at most 45%, preferably at most 40%, preferably at most 35%, preferably at most 30%, preferably at most 25%, preferably at most 20%, preferably at most 18%, most preferably at most 15%.

6. The laminate panel according to any one of claims 3 to 5, wherein the oil comprises tung oil and/or linseed oil, wherein the oil preferably consists of tung oil and/or linseed oil.

7. The laminate panel according to any one of claims 3 to 6, wherein the lacquer of the mixture of lacquer and oil comprises one or more of the following: acrylic-based lacquer, polyurethane-based lacquer, wherein the lacquer preferably consists of acrylic-based lacquer.

8. The laminate panel according to any one of claims 3 to 7, wherein the mixture of lacquer and oil is applied by point nozzles, contact nozzles, by vacumat and/or a transfer wheel, preferably by vacumat.

9. The laminate panel according to any one of the preceding claims, wherein the applied oil per meter of coupling elements in the longitudinal direction of the laminate panel is at least 0.1 grams, preferably at least 1 grams, more preferably at least 2 grams, more preferably at least 5 grams, more preferably at least 8 grams, more preferably at least 10 grams, more preferably at least 15 grams, more preferably at least 20 grams, most preferably at least 25 grams.

10. The laminate panel according to any one of the preceding claims, wherein the applied oil per meter of coupling elements in the longitudinal direction of the laminate panel is at most 100 grams, preferably at most 60 grams, more preferably at most 50 grams, more preferably at most 45 grams, more preferably at most 40 grams, more preferably at most 35 grams, more preferably at most 30 grams, most preferably at most 25 grams.

11. The laminate panel according to any one of the preceding claims, wherein the oil is applied to a surface of the coupling elements oriented perpendicular to the main surface of the laminate panel, preferably exclusively to the surface of the coupling elements oriented perpendicular to the main surface of the laminate panel, wherein the surface of the coupling elements forms an abutting edge with another correspondingly shaped laminate panel.

12. The laminate panel according to the preceding claim, wherein the abutting edge has a thickness in the depth direction of the laminate panel of 0.2 mm to 10 mm, preferably 0.5 mm to 9 mm, more preferably 1 mm to 8 mm, more preferably 2 mm to 7 mm, more preferably 3 mm to 6 mm, most preferably 4 mm to 5 mm.

13. The laminate panel according to any one of the preceding claims, wherein the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel have a profile length of 5 mm to 50 mm,
wherein of the profile length at least 5% is provided with oil, preferably at least 10% is provided with oil, more preferably at least 15% is provided with oil, more preferably at least 20% is provided with oil, more preferably at least 25% is provided with oil, most preferably at least 30% is provided with oil.

14. The laminate panel according to any one of the preceding claims, wherein the coupling elements in the cross-section perpendicular to the longitudinal direction of the laminate panel have a profile length of 5 mm to 50 mm,
wherein of the profile length at most 100% is provided with oil, preferably at most 90% is provided with oil, more preferably at most 80% is provided with oil, more preferably at most 70% is provided with oil, more preferably at most 60% is provided with oil, more preferably at most 50% is provided with oil, more preferably at most 40% is provided with oil, most preferably at most 35% is provided with oil.

15. Method for producing a laminate panel, in particular wall, ceiling, furniture or floor panel, according to any one of the preceding claims.

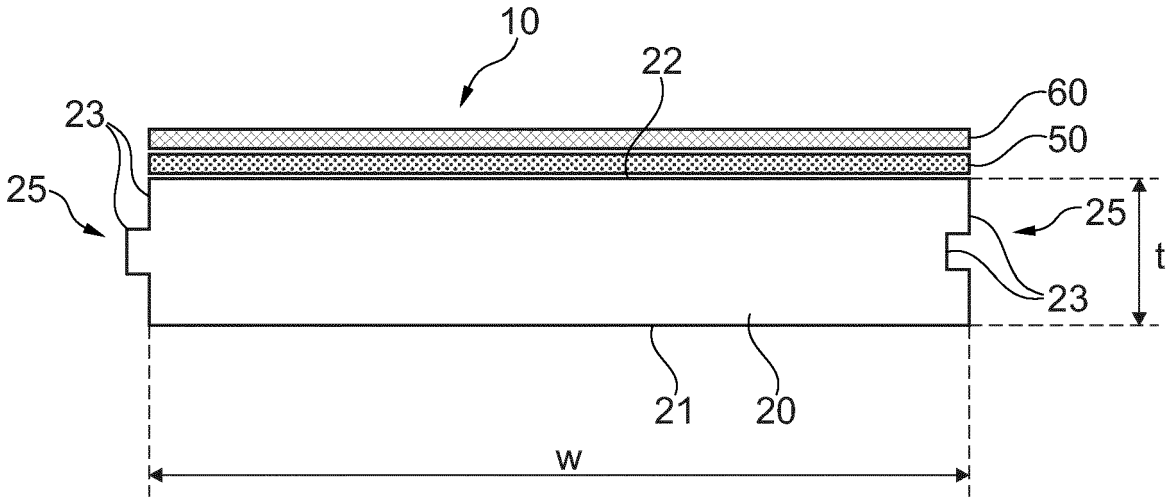

Fig. 1

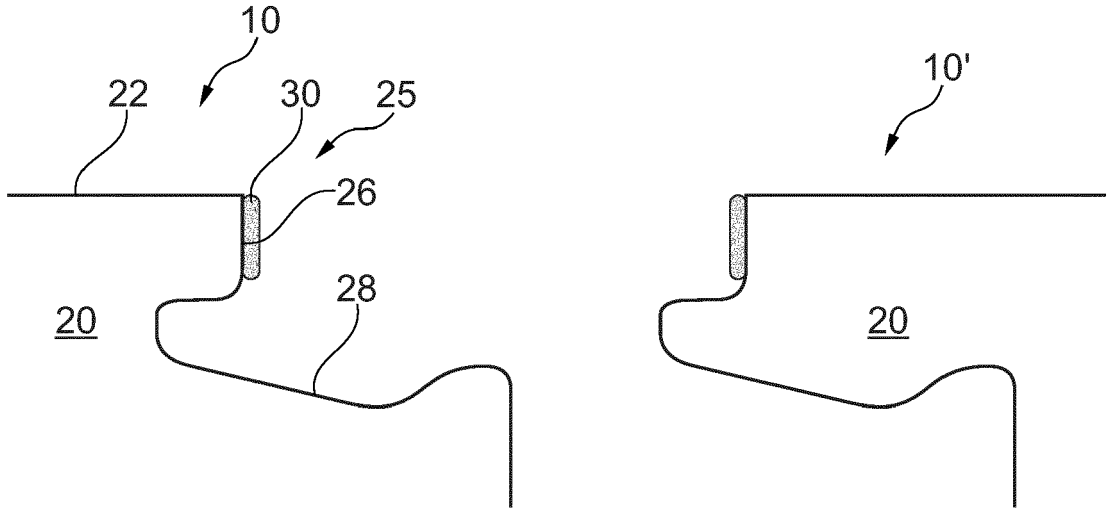

Fig. 2

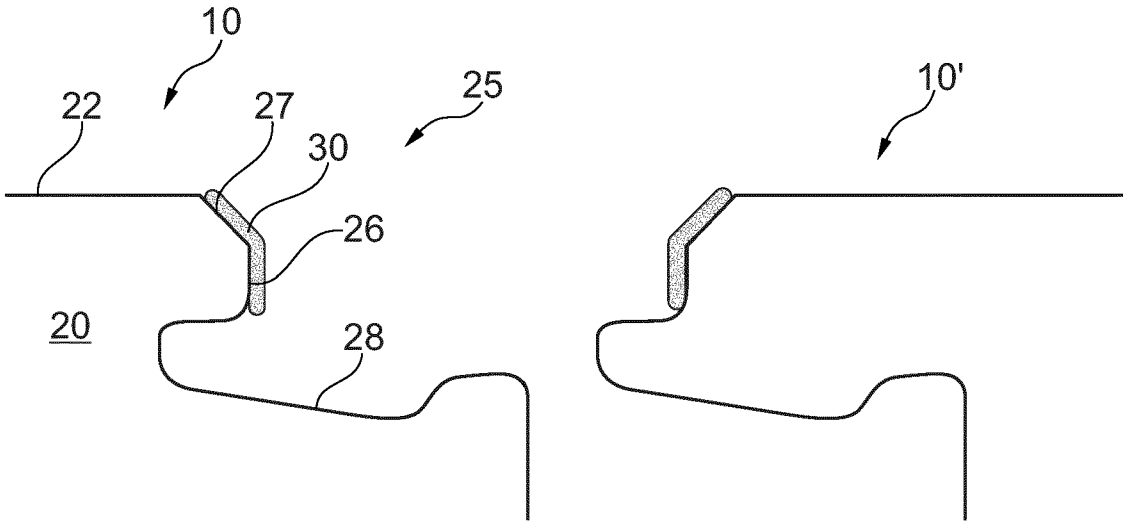

Fig. 3

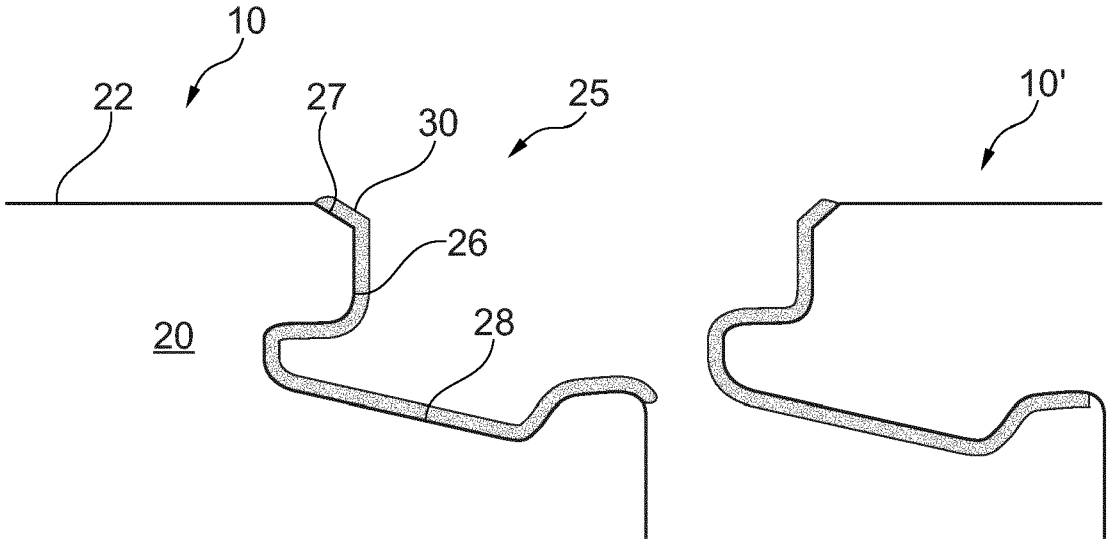

Fig. 4

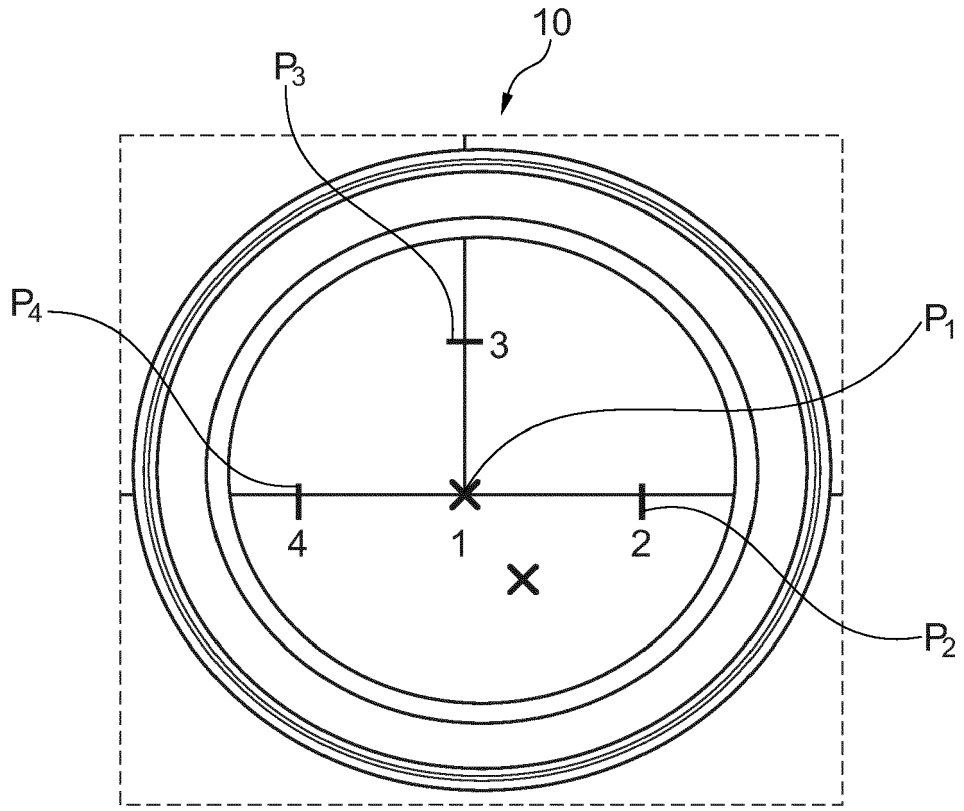

Fig. 5

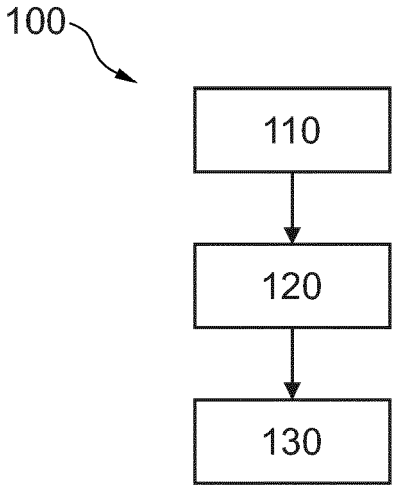

Fig. 6

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Application Number
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E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 November 2023	Estorgues, Marlène

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