(12) STANDARD PATENT (11) Application No. **AU 2017258368 B2**
(19) AUSTRALIAN PATENT OFFICE

(54) Title
A veneered element and method of producing such a veneered element

(51) International Patent Classification(s)
B32B 21/14 (2006.01) ***B44C 5/04*** (2006.01)
B27D 1/00 (2006.01) *B27D 1/06* (2006.01)
B32B 7/14 (2006.01) *B27M 3/04* (2006.01)
B32B 21/04 (2006.01) *E04F 15/02* (2006.01)
B32B 37/12 (2006.01)

(21) Application No: **2017258368** (22) Date of Filing: **2017.04.25**

(87) WIPO No: **WO17/188883**

(30) Priority Data

(31) Number	(32) Date	(33) Country
1650551-3	**2016.04.25**	**SE**

(43) Publication Date: **2017.11.02**
(44) Accepted Journal Date: **2021.08.12**

(71) Applicant(s)
Välinge Innovation AB

(72) Inventor(s)
Bergelin, Marcus;Ziegler, Göran

(74) Agent / Attorney
Phillips Ormonde Fitzpatrick, PO Box 323, COLLINS STREET WEST, VIC, 8007, AU

(56) Related Art
EP 2353861 A1
WO 2015174909 A1
WO 2015105455 A1

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
02 November 2017 (02.11.2017)

WIPO | PCT

(10) International Publication Number
WO 2017/188883 A1

(51) International Patent Classification:
B32B 21/14 (2006.01) *B44C 5/04* (2006.01)
B27D 1/00 (2006.01) *B27D 1/06* (2006.01)
B32B 7/14 (2006.01) *B27M 3/04* (2006.01)
B32B 21/04 (2006.01) *E04F 15/02* (2006.01)
B32B 37/12 (2006.01)

(21) International Application Number:
PCT/SE2017/050407

(22) International Filing Date:
25 April 2017 (25.04.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1650551-3 25 April 2016 (25.04.2016) SE

(71) Applicant: **VÄLINGE INNOVATION AB** [SE/SE]; Prästavägen 513, SE-263 65 Viken (SE).

(72) Inventors: **BERGELIN, Marcus**; Lerbergets Byaväg 78, SE-263 52 Lerberget (SE). **ZIEGLER, Göran**; Hästhovsvägen 11, SE-263 62 Viken (SE).

(74) Agent: **WESTEMAN, Maria**; Välinge Innovation AB, Prästavägen 513, SE-263 65 Viken (SE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:
— *with international search report (Art. 21(3))*

(54) Title: A VENEERED ELEMENT AND METHOD OF PRODUCING SUCH A VENEERED ELEMENT

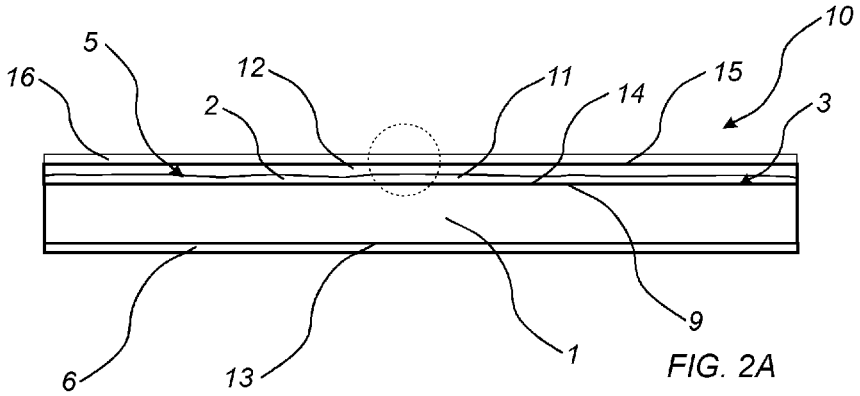

FIG. 2A

(57) Abstract: The present disclosure relates to aveneered element (10), comprising a substrate (1), a wood veneer layer (5) having a first surface (14) and a second surface (15), the first surface (14) being opposite to the second surface (15), an adhesive layer (3) adapted to adhere the first surface (14) of the wood veneer layer(5)to a surface of the substrate(1), wherein adhesive (2) from the adhesive layer (3) is present in a first portion (11) of the wood veneer layer (5), extending from the first surface (14) of the wood veneer layer (5) into the wood veneer layer (5), and where in the second surface (15) of the wood veneer layer (5) is substantially free from adhesive (2) from the adhesive layer (3).The disclosure also relates to a method of producing such a veneered element (10).

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A VENEERED ELEMENT AND METHOD OF PRODUCING SUCH A VENEERED ELEMENT

Field of the invention

The present invention relates to a veneered element and a method of producing such a veneered element comprising a wood veneer layer.

Technical background

The discussion of the background to the invention that follows is intended to facilitate an understanding of the invention. However, it should be appreciated that the discussion is not an acknowledgement or admission that any aspect of the discussion was part of the common general knowledge as at the priority date of the application.

Veneer layers may be used as a construction material, for example in the form of plywood. Plywood is formed of several veneer layers being glued together, for example with urea formaldehyde or phenol formaldehyde. The veneer layers are glued to each other in low pressure method at a temperature of about 140 °C and at a pressure about 10 bar. After pressing, the glue is present as a thin layer between the veneer layers. The veneer layers retain their original properties, including swelling and temperature expansion.

Veneer layers may also be used as a surface covering in panels. WO 2015/105455 discloses a building panel having a surface layer comprising a wood veneer and a sub-layer comprising wood fibres and a binder arranged between the surface layer and a wood fibre based core. In the surface layer, material from the sub-layer extends into the wood veneer.

WO 2015/105456 discloses a method of producing a veneered element, wherein a sub-layer permeates through a veneer layer and a design of the veneer layer is controlled by the permeation.

Summary

It is desirable to provide an improvement over the above described techniques and known art.

It is further desirable to provide a veneered element having a wood veneer layer with increased surface hardness compared to a convention wood veneer.

It is further desirable to provide a veneered element having a wood veneer layer with increased wear resistance compared to a convention wood veneer.

It is further desirable to provide a veneered element having a wood veneer layer with increased water resistance compared to a convention wood veneer.

It is further desirable to provide a veneered element having a wood veneer layer that may be lacquered.

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According to one form of the invention there is provided a method of producing a veneered element, comprising providing a substrate and a wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface, arranging an adhesive layer on the substrate and/or on the first surface of the wood veneer layer, arranging the wood veneer layer on the substrate, pressing the wood veneer layer to the substrate, wherein, after pressing, adhesive from the adhesive layer is present in a first portion of the wood veneer layer extending from the first surface of the wood veneer layer and into at least 10% of the thickness of the wood veneer layer, wherein, after pressing, the second surface of the wood veneer layer is substantially free from adhesive from the adhesive layer, and wherein, after pressing, the wood veneer layer is compressed to a thickness being less than or equal to 80% of its thickness prior to pressing, wherein, after pressing, a second portion of the wood veneer layer extending from the second surface of the wood veneer layer and into the wood veneer layer is substantially free from adhesive from the adhesive layer, and wherein the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 70% of the thickness of the wood veneer layer.

According to another form of the invention there is provided a veneered element, comprising a substrate, a wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface, an adhesive layer adapted to adhere the first surface of the wood veneer layer to a surface of the substrate, wherein adhesive from the adhesive layer is present in a first portion of the wood veneer layer, extending from the first surface of the wood veneer layer and into at least 10% of the thickness of the wood veneer layer, wherein the second surface of the wood veneer layer is substantially free from adhesive from the adhesive layer, and wherein the wood veneer layer is compressed to a thickness being less than or equal to 80% of its original thickness, wherein, a second portion of the wood veneer layer extending from the second surface of the wood veneer layer and into the wood veneer layer is substantially free from adhesive from the adhesive layer, and wherein the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 70% of the thickness of the wood veneer layer.

At least some of these and other desirable features and advantages that will be apparent from the description have been achieved by a veneered element according to a first aspect of the invention. The veneered element comprises a substrate, a wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface, an adhesive layer adapted to adhere the first surface of the wood veneer layer to a surface of the substrate, wherein adhesive from the adhesive layer is present in a first portion of the wood veneer layer, extending from the first surface of the wood veneer layer into the

wood veneer layer, and wherein the second surface of the wood veneer layer is substantially free from adhesive from the adhesive layer.

The veneered element may be a panel.

By the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is meant that 70%, preferably at least 80%, such as at least 90%, of the surface of the second surface of the wood veneer layer is free from adhesive from the adhesive layer.

A minor part, such as less than 20%, such as less than 10% such as less than 5%, depending of wood specie, veneer production method, etc., of the surface of the second surface of the wood veneer layer is formed by pores or tracheids of the wood veneer layer. Since only a minor part of the second surface is formed by pores or tracheids, a second surface that is substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids extending into the second surface of the wood veneer layer filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer. Preferably, less than 30% of the pores or tracheids extending into the second surface of the wood veneer layer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer, and more preferably less than 20% of the pores or tracheids extending into the second surface of the wood veneer layer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids.

By pores are meant pores formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. By tracheids are meant elongated cells in the xylem of gymnosperms such as softwood. Larger structures such as cracks and/or holes in the veneer are not included in the term *pores* or *tracheids*. Cracks and/or holes in the veneer may be at least partly filled with adhesive from the adhesive layer.

An advantage of at least embodiments of the first aspect is that properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer. The Brinell hardness of the wood veneer layer, as measured in accordance with EN 1534, after pressing is preferably higher than the Brinell hardness as measured on the wood veneer layer prior to pressing.

An advantage of having the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is that adherence to further layers such as putty and/or coating or lacquer layers is improved. The surface may be substantially free from adhesive that may impair adherence to further layers. Wood putty may be applied to fill any holes and/or cracks of the wood veneer.

In one embodiment, a second portion of the wood veneer layer, the second portion extending from the second surface of the wood veneer layer and into the wood veneer layer, may be substantially free from adhesive from the adhesive layer. Thereby, adherence to further layers such as putty and/or coating or lacquer layers is further improved, as the second portion is substantially free from adhesive that may impair adherence to further layers.

Since only a minor part, such as less than 20%, such as less than 10%, such as less than 5%, depending of wood species, veneer production method, etc., of the wood in the wood veneer layer is formed by pores or tracheids, substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids of the wood veneer layer in the second portion at least partly filled with adhesive from the adhesive layer. Preferably, less than 30% of the pores or tracheids of the wood veneer layer in the second portion are at least partly filled with adhesive from the adhesive layer, and more preferably less than 20% of the pores or tracheids of the wood veneer in the second portion are at least partly filled with adhesive from the adhesive layer.

Preferably, the pores or tracheids at the second portion of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids. On at least 60%, preferably at least 70% such as at least 80% of the surface of the second surface of the wood veneer layer, wood fibres of the wood veneer layer may be free from adhesive from the adhesive layer.

In one embodiment, the wood veneer layer may be compressed to a thickness being less than or equal to 80% of its original thickness. By the wood veneer layer being compressed, the hardness of the wood veneer is increased. Further, by obtaining a denser wood veneer layer, impact, such as from footsteps, may result in a more dull sound and improved sound absorbance.

In one embodiment, the first portion may extend into at least 10 % of the thickness of the wood veneer layer. A corresponding second portion of the wood veneer layer, which is substantially free of adhesive, may extend into 90% or less of the thickness of the wood veneer layer. By the first portion comprising adhesive from the adhesive layer extending further into the wood veneer layer, the wood veneer layer is reinforced by the adhesive. Properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer.

In one embodiment, the second portion of the wood veneer layer may extend from the second surface of the wood veneer layer and into at least 70% of the thickness of the wood veneer layer, preferably into at least 80% of the thickness of the wood veneer layer, and more preferably into at least 90% of the thickness of the wood veneer layer. By the second portion being at least substantially free from adhesive extending into at least 70% of the thickness of the wood veneer layer, a major portion of the wood veneer layer remain unaffected by adhesive and in a flexible, compressed state. The second portion is not locked in a compressed state by the adhesive from the adhesive layer as in the first portion, but remains more flexible and allows, for example, the wood veneer layer to be more readily embossed. Further, the wood feeling of the wood veneer may be maintained by the second portion of the wood veneer layer being substantially free from adhesive. Additionally, adherence to further layers such as putty and/or coating or lacquer layers is further improved.

In one embodiment, the second portion of the wood veneer layer may extend from the second surface of the wood veneer layer and into at least 5% of the thickness of the wood veneer layer, preferably into at least 10 % of the thickness of the wood veneer layer, and more preferably into at least 20 % of the thickness of the wood veneer layer. By increasing the thickness of the second portion of the wood veneer layer, more wood is substantially free from adhesive from the adhesive layer, thereby improving adherence to further layers.

The second surface of the wood veneer layer may be abrasively machined, such as sanded. Thereby, the thickness of the second portion of the wood veneer may be diminished, such that the second portion may extend from the second surface of the wood veneer layer and into at least 0.5% of the thickness of the wood veneer layer, preferably into at least 2 % of the thickness of the wood veneer layer, and more preferably into at least 5% such as at least 10% of the thickness of the wood veneer layer.

At least 60%, preferably at least 70%, such as at least 80%, of the surface of the second surface of the wood veneer layer, wood fibres of the wood veneer layer may be free from adhesive from adhesive layer after abrasive machining, such as sanding.

The first portion may extend into at least 20 % of the thickness of the wood veneer layer, preferably into at least 30%, and more preferably into at least 40% of the thickness of the wood veneer layer, such as at least 50% of the thickness of the wood veneer layer. By increasing the thickness of the portion of the wood veneer layer including adhesive from the adhesive layer, the hardness, wear resistance, and/or water resistance of wood veneer layer may be improved.

In one embodiment, the second portion may extend into at least 0.5% of the thickness of the wood veneer layer and the first portion may extend no more than 99.5% of the thickness of the wood veneer layer. The second portion may extend into at least 2% of the thickness of the wood veneer layer and the first portion may extend no more than 98% of the thickness of the wood veneer layer. The second portion may extend into at least 5% of the thickness of the wood veneer layer and the first portion may extend no more than 95% of the thickness of the wood veneer layer.

In one embodiment, the second portion may extend into at least 70% of the thickness of the wood veneer, and the first portion may extend no more than 30% into the thickness of the wood veneer. The second portion may extend into at least 80% of the thickness of the wood veneer, and the first portion may extend no more than 20% into the thickness of the wood veneer.

The density of the wood veneer may be at least 1000 kg/m^3. The wood veneer layer may be formed of compressed wood veneer. By the wood veneer having a density of at least 1000 kg/m^3, or being compressed to a density of at least1000 kg/m^3, the hardness of the wood veneer is increased. Further, by a more dense wood veneer layer, impact such as footsteps result in a more dull sound and improves sound absorbance.

The substrate may comprise at least one wood veneer layer. The substrate may comprise several wood veneer layers such as being plywood. Preferably, the veneered element includes uneven number of wood veneer layers. Preferably, the wood veneer layers are arranged crosswise. Preferably, in each of the wood veneer layers, the adhesive is present in a first portion of each wood veneer layer, extending from a first surface of each wood veneer layer and into at least 10%, preferably 20%, more preferably 30% such as 40%, of the thickness of each wood veneer layer. A plywood having improved hardness is thereby provided.

The substrate may comprise a wood-based panel. The wood-based panel may be selected from the group consisting of HDF, MDF, OSB, lamella core, and solid wood. The substrate may be a thermoplastic board. The substrate may comprise a thermoplastic material.

The substrate may comprise a sheet such as a paper sheet or sheet of non-woven.

The adhesive layer may comprise a resin impregnated paper. The resin impregnated paper may be impregnated with urea formaldehyde, phenol formaldehyde, melamine formaldehyde, or combination thereof. The paper may be impregnated with polyurethane. Resin from the resin impregnated paper has the function of adhesive and bonds the wood veneer layer to the substrate by means of the resin impregnated paper, and is present in the first portion of the wood veneer layer.

The adhesive layer may comprise a thermosetting binder. The thermosetting binder may be urea formaldehyde, phenol formaldehyde, melamine formaldehyde, polyurethane, polyester, emulsion polymer isocyanate (EPI), or combination thereof.

The adhesive layer may comprise a thermoplastic binder. The thermoplastic binder may be polyvinyl chloride (PVC), polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinyl alcohol (PVOH), polyvinyl butyral (PVB), and/or polyvinyl acetate (PVAc), or a combination thereof. The adhesive layer may comprise a hot melt or pressure sensitive adhesive.

Material from a primer, foil or sheet arranged on the second surface of the wood veneer layer may be present in pores or tracheids of the second surface. Material from a primer, foil or sheet arranged on the second surface of the wood veneer layer may be present in pores or tracheids of the second portion of the wood veneer layer. The material may be from a primer such as a print primer, a primer for preparing the wood veneer layer for lacquering, etc. The material may be a thermosetting resin from the foil or sheet, such as an overlay.

According to a second aspect of the present invention, a method of producing a veneered element is provided. The method comprises:

providing a substrate and a wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface,

arranging an adhesive layer on the substrate and/or on a first surface of the wood veneer layer,

pressing the wood veneer layer to the substrate,

wherein, after pressing, adhesive from the adhesive layer is present in a first portion of the wood veneer layer extending from the first surface of the wood veneer layer into the wood veneer layer, and

wherein, after pressing, the second surface of the wood veneer layer is substantially free from adhesive from the adhesive layer.

The veneered element may be a panel.

By the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is meant that 70%, preferably at least 80% such as at least

90% of the surface of the second surface of the wood veneer layer is free from adhesive from the adhesive layer.

A minor part, such as less than 20%, such as less than 10% such as less than 5%, depending of wood specie, veneer production method, etc., of the surface of the second surface of the wood veneer layer is formed by pores or tracheids of the wood veneer. Since only a minor part of the second surface is formed by pores or tracheids, a second surface that is substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids extending into the second surface of the wood veneer layer filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer. Preferably, less than 30% of the pores or tracheids extending into the second surface of the wood veneer layer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer, and more preferably less than 20% of the pores or tracheids extending into the second surface of the wood veneer layer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids.

By pores are meant pores formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. By tracheids are meant elongated cells in the xylem of gymnosperms such as softwood. Larger structures such as cracks and/or holes in the veneer are not included in the term *pores* or *tracheids*. Cracks and/or holes in the veneer may be at least partly filled with adhesive from the adhesive layer.

An advantage of at least embodiments of the second aspect is that properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer. The Brinell hardness of the wood veneer layer, as measured in accordance with EN 1534, after pressing is preferably higher than the Brinell hardness as measured on the wood veneer layer prior to pressing. The adhesive in the first portion fixes the wood veneer in its compressed state even after pressing, such that the wood veneer remains compressed in thickness.

An advantage of having the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is that adherence to further layers such as putty and/or coating or lacquer layers is improved. The surface may be substantially free from adhesive that may impair adherence to further layers. Wood putty may be applied to fill any holes and/or cracks of the wood veneer.

After pressing, a second portion of the wood veneer layer, the second portion extending from the second surface of the wood veneer layer and into the wood veneer layer, may be substantially free from adhesive from the adhesive layer. Thereby, adherence to further layers such as putty and/or coating or lacquer layers is further improved, as the second portion is substantially free form adhesive that may impair adherence to further layers.

Since only a minor part, such at less than 20%, such as less than 10% such as less than 5%, depending on the wood specie, veneer production method etc., of the wood in the wood veneer layer is formed by pores or tracheids, substantially free from adhesive from the adhesive layer may have that less than 40% of the pores or tracheids of the wood veneer in the second portion are at least partly filled with adhesive from the adhesive layer. Preferably, less than 30% of the pores or tracheids of the wood veneer in the second portion are at least partly filled with adhesive from the adhesive layer, and more preferably less than 20% of the pores or tracheids of the wood veneer in the second portion are at least partly filled with adhesive from the adhesive layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids, after pressing.

On at least 60%, preferably at least 70% such as at least 80% of the surface of the second surface of the wood veneer layer, wood fibres of the wood veneer layer may be free from adhesive from the adhesive layer.

In one embodiment, after pressing, the wood veneer layer may be compressed to a thickness being less than or equal to 80% of its thickness prior pressing. By the wood veneer layer being compressed, the hardness of the wood veneer is increased. Further, by obtaining a denser wood veneer layer, impact, such as from footsteps, may result in a more dull sound and improved sound absorbance.

In one embodiment, the first portion may extend into at least 10 % of the thickness of the wood veneer layer after pressing. A corresponding second portion of the wood veneer layer, which is substantially free of adhesive, may extend into 90% of the thickness of the wood veneer layer. By the first portion comprising adhesive from the adhesive layer extending further into the wood veneer layer, the wood veneer layer is reinforced by the adhesive. Properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer.

In one embodiment, the second portion of the wood veneer layer may extend from the second surface of the wood veneer layer and into at least 70% of the thickness of the wood veneer layer, preferably into at least 80% of the thickness of the wood veneer layer,

and more preferably into at least 90% of the thickness of the wood veneer layer after pressing. By the second portion being at least substantially free from adhesive extending into at least 70% of the thickness of the wood veneer layer, a major portion of the wood veneer layer remain unaffected by adhesive and in a flexible, compressed state. The second portion is not locked in a compressed state by the adhesive from the adhesive layer as in the first portion, but remains more flexible and allows, for example, the wood veneer layer to be readily embossed. Further, the wood feeling of the wood veneer may be maintained by the second portion of the wood veneer layer being substantially free from any adhesive. Additionally, adherence to further layers such as putty and/or coating or lacquer layers is further improved.

In one embodiment, the second portion of the wood veneer layer may extend from the second surface of the wood veneer layer and into at least 2% of the thickness of the wood veneer layer, preferably into at least 5% of the thickness of the wood veneer layer, and more preferably into at least 10% of the thickness of the wood veneer layer. By increasing the thickness of the second portion of the wood veneer layer, more wood is substantially free from adhesive from the adhesive layer, thereby improving adherence to further layers.

The method may further comprise abrasively machining the second surface of the wood veneer layer. The second surface of the wood veneer may be sanded. Thereby, the thickness of the second portion of the wood veneer may be diminished, such that the second portion may extend from the second surface of the wood veneer layer and into at least 0.5% of the thickness of the wood veneer layer, preferably into at least 2% of the thickness of the wood veneer layer, and more preferably into at least 5% of the thickness of the wood veneer layer.

On at least 60%, preferably at least 70% such as at least 80% of the surface of the second surface of the wood veneer layer, wood fibres of the wood veneer layer may be free from adhesive from adhesive layer after abrasive machining such as sanding.

The first portion may extend into at least 20 % of the thickness of the wood veneer layer, preferably into at least 30%, and more preferably into at least 40% of the thickness of the wood veneer layer such at least 50% or the thickness of the wood veneer layer. By increasing the thickness of the portion of the wood veneer layer including adhesive from the adhesive layer, the hardness, wear resistance, and/or water resistance of wood veneer layer may be improved.

The second portion may extend into at least 0.5% of the thickness of the wood veneer layer and the first portion may extend no more than 99.5% of the thickness of the wood veneer layer. The second portion may extend into at least 2% of the thickness of the wood veneer layer and the first portion may extend no more than 98% of the thickness of

the wood veneer layer. The second portion may extend into at least 5% of the thickness of the wood veneer layer and the first portion may extend no more than 95% of the thickness of the wood veneer layer.

In one embodiment, the second portion may extend into at least 70% of the thickness of the wood veneer, and the first portion may extend no more than 30% into the thickness of the wood veneer. The second portion may extend into at least 80% of the thickness of the wood veneer, and the first portion may extend no more than 20% into the thickness of the wood veneer.

In one embodiment, the wood veneer layer may be compressed to a thickness being less than or equal to 70 % of its thickness prior to pressing, preferably to a thickness of less than or equal to 50% of its thickness prior to pressing. The wood veneer layer is compressed during pressing and the compressed state is substantially maintained after pressing. The adhesive in the adhesive layer fixes the wood veneer layer in the compressed state. Thereby, the hardness of the wood veneer layer is improved.

The wood veneer layer may have a density after pressing of at least 1000 kg/m^3.

Pressing the wood veneer layer to the substrate may comprise applying heat and pressure.

The pressure applied may be at least 15 bar. By applying pressure exceeding 15 bar, adhesive from the adhesive layer is pressed into the wood veneer, thereby reinforcing the wood veneer. The pressure may be applied during at least during 15 s, preferably during at least 30 s, more preferably during at least 45 s. The temperature may be at least 150°C, such as 150-200°C.

The substrate may comprise at least one wood veneer layer. The substrate may comprise several wood veneer layers such as being plywood. Preferably, the veneered element includes an uneven number of wood veneer layers. Preferably, the wood veneer layers are arranged crosswise. Preferably, in each of the wood veneer layers, the adhesive is present in a first portion of each wood veneer layer, extending from a first surface of each wood veneer layer and into at least 10%, preferably into at least 20%, more preferably into at least 30% such as into at least 40% such as into at least 50% of the thickness of each wood veneer layer. A plywood having improved hardness is thereby provided.

The substrate may comprise a wood-based panel. The wood-based panel may be selected from the group consisting of HDF, MDF, OSB, lamella core, and solid wood. The substrate may be a thermoplastic board. The substrate may comprise a thermoplastic material.

The substrate may comprise a sheet such as a paper sheet or non-woven.

The adhesive layer may comprise a resin impregnated paper. The resin impregnated paper may be impregnated with urea formaldehyde, phenol formaldehyde, melamine

formaldehyde, or combination thereof. The paper may be impregnated with polyurethane. Resin from the resin impregnated paper has the function of adhesive and bonds the wood veneer layer to the substrate by means of the resin impregnated paper, and is present in the first portion of the wood veneer layer.

The adhesive layer may comprise a thermoplastic binder. The thermoplastic binder may be polyvinyl chloride (PVC), polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinyl alcohol (PVOH), polyvinyl butyral (PVB), and/or polyvinyl acetate (PVAc), or a combination thereof. The adhesive layer may comprise a hot melt or pressure sensitive adhesive.

The adhesive layer may comprise a thermosetting binder. The thermosetting binder may be urea formaldehyde, phenol formaldehyde, melamine formaldehyde, polyurethane, polyester, emulsion polymer isocyanate (EPI), or combination thereof.

The adhesive may be applied in powder form. The thermosetting binder in powder form may be applied either on the substrate and/or on the first surface of the wood veneer layer.

The adhesive may be applied in liquid form. The thermosetting binder in liquid form may be applied either on the substrate and/or on the first surface of the wood veneer layer.

A primer, foil or sheet may be applied on the second surface of the wood veneer layer prior to pressing. The primer may be a print primer, a primer for preparing the wood veneer layer for lacquering, etc. The foil or sheet, such as an overlay, may be impregnated with a B staged thermosetting resin. During pressing, material from the primer, foil or sheet may be pressed into pores or tracheids of the second surface of the wood veneer layer. Thereby, a counteracting force is obtained, preventing adhesive from the adhesive layer from impregnating into the second surface of the wood veneer layer. The counteracting force may prevent adhesive from the adhesive layer from impregnating into the second portion of the wood veneer layer and will allow an increased amount of adhesive in the adhesive layer and/or allow for increased pressure to be applied such that the wood veneer layer is more thoroughly impregnated with adhesive from the adhesive layer without resulting in increased amount of adhesive from the adhesive layer being present at the second surface of the wood veneer layer.

According to a third aspect of the invention, a method of producing a veneered element is provided. The veneered element comprises an uppermost wood veneer layer, at least one intermediate wood veneer layer, and a lowermost wood veneer layer, wherein the uppermost wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface, an adhesive layer adapted to adhere the first surface of the uppermost wood veneer layer to a surface of said at least one intermediate wood veneer layer, wherein adhesive from the adhesive layer is present in a first portion of the

uppermost wood veneer layer, extending from the first surface of the uppermost wood veneer layer into the uppermost wood veneer layer, and wherein the second surface of the uppermost wood veneer layer is substantially free from adhesive from the adhesive layer.

The veneered element may be a panel.

By the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is meant that 70%, preferably at least 80% such as at least 90% of the surface of the second surface of the wood veneer layer is free from adhesive from the adhesive layer.

A minor part, such as less than 20%, such as less than 10% such as less than 5%, of the surface, of the second surface of the wood veneer layer is formed by pores or tracheids of the wood veneer layer. Since only a minor part of the second surface is formed by pores or tracheids, a second surface that is substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids extending into the second surface of the wood veneer layer filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer. Preferably, less than 30% of the pores or tracheids extending into the second surface of the wood veneer layer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer, and more preferably less than 20% of the pores or tracheids at the second surface of the wood veneer layer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60 % of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids.

By pores are meant pores formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. By tracheids are meant elongated cells in the xylem of gymnosperms such as softwood. Larger structures such as cracks and/or holes in the veneer are not included in the term *pores* or *tracheids*. Cracks and/or holes in the veneer may be at least partly filled with adhesive from the adhesive layer.

An advantage of at least embodiments of the first third aspect is that properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer. The Brinell hardness of the wood veneer, as measured in accordance with EN 1534, layer after pressing is preferably higher than the Brinell hardness as measured on the wood veneer layer prior to pressing.

An advantage of having the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is that adherence to further layers such as putty and/or coating or lacquer layers is improved. The surface may be substantially

free from adhesive that may impair adherence to further layers. Wood putty may be applied to fill any holes and/or cracks of the wood veneer.

In one embodiment, a second portion of the wood veneer layer, the second portion of the wood veneer layer extending from the second surface of the wood veneer layer and into the wood veneer layer, may be substantially free from adhesive from the adhesive layer. Thereby, adherence to further layers such as putty and/or coating or lacquer layers is further improved, as the second portion is substantially free from adhesive that may impair adherence to further layers.

Since only a minor part, such at less than 20%, such as less than 10% such as less than 5%, depending on wood specie, veneer production method, etc., of the wood in the wood veneer layer is formed by pores or tracheids, substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids of the wood veneer in the second portion at least partly filled with adhesive from the adhesive layer. Preferably, less than 30% of the pores or tracheids of the wood veneer in the second portion are at least partly filled with adhesive from the adhesive layer, and more preferably less than 20% of the pores or tracheids of the wood veneer in the second portion are at least partly filled with adhesive from the adhesive layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably 70%, more preferably at least 80% such as at least 90% of the pores or tracheids. On at least 60%, preferably at least 70% such as at least 80% of the surface of the second surface of the wood veneer layer, wood fibres of the wood veneer layer may be free from adhesive from the adhesive layer.

In one embodiment, the uppermost wood veneer layer may be compressed to a thickness being less than or equal to 80% of its original thickness. By the wood veneer layer being compressed, the hardness of the wood veneer is increased. Further, by obtaining a denser wood veneer layer, impact, such as from footsteps, may result in a more dull sound and improved sound absorbance.

In one embodiment, the first portion may extend into at least 10 % of the thickness of the uppermost wood veneer layer. A corresponding second portion of the wood veneer layer, which is substantially free of adhesive, may extend into 90% of less of the thickness of the wood veneer layer. By the first portion comprising adhesive from the adhesive layer extending further into the wood veneer layer, the wood veneer layer is reinforced by the adhesive. Properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer.

In one embodiment, the second portion of the uppermost wood veneer layer may extend from the second surface of the uppermost wood veneer layer and into at least 70%

of the thickness of the uppermost wood veneer layer, preferably into at least 80% of the thickness of the uppermost wood veneer layer, and more preferably into at least 90% of the thickness of the uppermost wood veneer layer after pressing. By the second portion being at least substantially free from adhesive extending into at least 70% of the thickness of the wood veneer layer, a major portion of the wood veneer layer remain unaffected by adhesive and in a flexible, compressed state. The second portion is not locked in a compressed state by the adhesive from the adhesive layer as in the first portion, but remains more flexible and allows, for example, the wood veneer layer to be more readily embossed. Further, the wood feeling of the wood veneer may be maintained by the portion of the wood veneer layer being substantially free from adhesive. Additionally, adherence to further layers such as putty and/or coating or lacquer layers is further improved.

According to a fourth aspect of the invention, a method of producing a veneered element is provided. The method comprises

providing an uppermost wood veneer layer, at least one intermediate wood veneer layer, and a lowermost wood veneer layer, wherein the uppermost wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface,

arranging an adhesive layer at least on said at least one intermediate wood veneer layer and/or on the first surface of the uppermost wood veneer layer,

pressing the uppermost wood veneer layer, said at least one intermediate wood veneer layer, and the lowermost wood veneer layer together,

wherein, after pressing, adhesive from the adhesive layer is present in a first portion of the uppermost wood veneer layer extending from the first surface of the wood veneer layer into the wood veneer layer, and

wherein, after pressing, the second surface of the uppermost wood veneer layer is substantially free from adhesive from the adhesive layer.

The veneered element may be a panel.

By the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is meant that 70%, preferably at least 80% such as at least 90% of the surface of the second surface of the wood veneer layer is free from adhesive from the adhesive layer.

A minor part, such as less than 20%, such as less than 10% such as less than 5%, depending on wood specie, veneer production method, etc., of the surface of the second surface of the wood veneer layer is formed by pores or tracheids of the wood veneer. Since only a minor part of the second surface is formed by pores or tracheids, a second surface that is substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids extending into the second surface of the wood veneer layer filled

with adhesive from the adhesive layer up to the second surface of the wood veneer layer. Preferably, less than 30% of the pores or tracheids extending into the second surface of the wood veneer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer, and more preferably less than 20% of the pores or tracheids extending into the second surface of the wood veneer are filled with adhesive from the adhesive layer up to the second surface of the wood veneer layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids.

By pores are meant pores formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. By tracheids are meant elongated cells in the xylem of gymnosperms such as softwood. Larger structures such as cracks and/or holes in the veneer are not included in the term *pores* or *tracheids*. Cracks and/or holes in the veneer may be at least partly filled with adhesive from the adhesive layer.

An advantage of at least embodiments of the fourth aspect is that properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer. The Brinell hardness of the wood veneer layer, as measured in accordance with EN 1534, after pressing is preferably higher than the Brinell hardness as measured on the wood veneer layer prior to pressing.

An advantage of having the second surface of the wood veneer layer being substantially free from adhesive from the adhesive layer is that adherence to further layers such as putty and/or coating or lacquer layers is improved. The surface may be substantially free from adhesive that may impair adherence to further layers. Wood putty may be applied to fill any holes and/or cracks of the wood veneer.

In one embodiment, a second portion of the wood veneer layer, the second portion extending from the second surface of the wood veneer layer and into the wood veneer layer, may be substantially free from adhesive from the adhesive layer. Thereby, adherence to further layers such as putty and/or coating or lacquer layers is further improved, as the second portion is substantially free from adhesive that may impair adherence to further layers.

Since only a minor part, such at less than 20%, such as less than 10% such as less than 5%, of the wood in the wood veneer layer is formed by pores or tracheids, substantially free from adhesive from the adhesive layer may have less than 40% of the pores or tracheids of the wood veneer in the second portion at least partially filled with adhesive from the adhesive layer. Preferably, less than 30% of the pores or tracheids of the wood

veneer in the second portion are at least partially filled with adhesive from the adhesive layer, and more preferably less than 20% of the pores or tracheids of the wood veneer in the second portion are at least partially filled with adhesive from the adhesive layer.

Preferably, the pores or tracheids at the second surface of the wood veneer layer are substantially free from any adhesive, such as at least 60% of the pores or tracheids are free from adhesive, preferably at least 70%, more preferably at least 80% such as at least 90% of the pores or tracheids. On at least 60%, preferably at least 70% such as at least 80% of the surface of the second surface of the wood veneer layer, wood fibres of the wood veneer layer may be free from adhesive from the adhesive layer.

In one embodiment, after pressing, the uppermost wood veneer layer may be compressed to a thickness being less than or equal to 80% of its thickness prior to pressing. By the wood veneer layer being compressed, the hardness of the wood veneer is increased. Further, by obtaining a denser wood veneer layer, impact, such as from footsteps, may result in a more dull sound and improves sound absorbance.

In one embodiment, the first portion may extend into at least 10 % of the thickness of the uppermost wood veneer layer after pressing. A corresponding second portion of the wood veneer, which is substantially free from adhesive, may extend into 90% or less of the thickness of the wood veneer layer. By the first portion comprising adhesive from the adhesive layer extending further into the wood veneer layer, the wood veneer layer is reinforced by the adhesive. Properties such as hardness, wear resistance, and/or water resistance are improved by the adhesive from the adhesive reinforcing the wood veneer.

In one embodiment, after pressing the second portion of the uppermost wood veneer layer may extend from the second surface of the uppermost wood veneer layer and into at least 70% of the thickness of the uppermost wood veneer layer, preferably into at least 80% of the thickness of the uppermost wood veneer layer, and more preferably into at least 90% of the thickness of the uppermost wood veneer layer after pressing. By the second portion being at least substantially free from adhesive extending into at least 70% of the thickness of the wood veneer layer, a major portion of the wood veneer layer remain unaffected by adhesive and in a flexible, compressed state. The second portion is not locked in a compressed state by the adhesive from the adhesive layer as in the first portion, but remains more flexible and allows, for example, the wood veneer layer to be readily embossed. Further, the wood feeling of the wood veneer may be maintained by the second portion of the wood veneer layer being substantially free from adhesive. Additionally, adherence to further layers such as putty and/or coating or lacquer layers is further improved.

According to a fifth aspect of the invention, a method of producing a veneered element is provided. The method comprises

providing an uppermost wood veneer layer, at least one intermediate wood veneer layer, and a lowermost wood veneer layer,

arranging an adhesive layer on the uppermost wood veneer layer and/or on said at least one intermediate wood veneer layer, and on said at least one intermediate wood veneer layer and/or on the lowermost wood veneer layer, respectively,

pressing the wood veneer layers together,

wherein, after pressing, adhesive from the adhesive layers is present in portions of said at least one intermediate wood veneer layer, wherein a thickness of each of said portions is at least 5% of the thickness of each of said at least one intermediate wood veneer layer, preferably at least 10% of the thickness of each of said at least one intermediate wood veneer layer, more preferably at least 15% of the thickness of each of said at least one intermediate wood veneer layer.

The total combined thickness of said portions may be at least 20%, preferably at least 40%, and more preferably at least 60% of the thickness of each of said at least one intermediate wood veneer layer.

Thereby, a high strength veneered element is obtained, with improved bending stiffness, hardness, wear resistance and/or water resistance.

By adhesive from the adhesive layer being present in portions of said at least one intermediate wood veneer layer is meant that pores or tracheids of the wood veneer layer are filled with adhesive from the adhesive layer. By pores are meant pores formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. By tracheids are meant elongated cells in the xylem of gymnosperms such as softwood.

Adhesive from the adhesive layers may be present in a first portion of said at least one intermediate wood veneer layer, facing the uppermost wood veneer layer, and in a second portion of said at least one intermediate wood veneer layer, facing the lowermost wood veneer layer. The total thickness of the first and second portion may be at least 20%, preferably at least 40%, and more preferably at least 60% of the thickness of each of said at least one intermediate wood veneer layer.

The veneered element may be a plywood panel.

Said at least one intermediate layer may be compressed to a thickness of less or equal to 80% of its thickness prior to pressing, preferably less or equal to 70% of its thickness prior to pressing, and more preferably less or equal to 50% of its thickness prior to pressing. The uppermost and/or the lowermost wood veneer layer may be compressed to a thickness of less or equal to 80% of its thickness prior to pressing, preferably less or equal to 70% of its thickness prior to pressing, and more preferably less or equal to 50% of its thickness prior to pressing.

Adhesive may be present the uppermost and/or the lowermost wood veneer layer. Adhesive may be present at a surface of the uppermost and/or lowermost wood veneer layer, facing away from said at least one intermediate wood veneer layer. The surface of the uppermost and/or lowermost wood veneer layer, facing away from said at least one intermediate wood veneer layer, may be substantially free from adhesive from the adhesive layer.

According to a sixth aspect of the invention, a veneered element is provided. The veneered element comprises an uppermost wood veneer layer, at least one intermediate wood veneer layer, and a lowermost wood veneer layer, wherein and an adhesive layer is arranged between the uppermost wood veneer layer and said at least one intermediate wood veneer layer, and between said at least one intermediate wood veneer layer and the lowermost wood veneer layer, respectively, and wherein adhesive from the adhesive layers is present in portions of said at least one intermediate wood veneer layer, wherein a thickness of each of said portions is at least 5% of the thickness of each of said at least one intermediate wood veneer layer, preferably at least 10% of the thickness of each of said at least one intermediate wood veneer layer, more preferably at least 15% of the thickness of each of said at least one intermediate wood veneer layer.

The total combined thickness of said portions may be at least 20%, preferably at least 40%, and more preferably at least 60% of the thickness of each of said at least one intermediate wood veneer layer.

By adhesive from the adhesive layer being present in portions of said at least one intermediate wood veneer layer is meant that pores or tracheids of the wood veneer layer are filled with adhesive from the adhesive layer. By pores are meant pores formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. By tracheids are meant elongated cells in the xylem of gymnosperms such as softwood.

Adhesive from the adhesive layers may be present in a first portion of said at least one intermediate wood veneer layer, facing the uppermost wood veneer layer, and in a second portion of said at least one intermediate wood veneer layer, facing the lowermost wood veneer layer. The total combined thickness of the first and second portion may be at least 20%, preferably at least 40%, and more preferably at least 60% of the thickness of each of said at least one intermediate wood veneer layer.

The density of said at least one intermediate wood veneer layer may be at least 1000 kg/m^3. The density of the lowermost and/or the uppermost wood veneer layer may be at least 1000 kg/m^3.

The veneered element may be a plywood panel.

2017258368 28 Jun 2021

Adhesive may be present the uppermost and/or the lowermost wood veneer layer. Adhesive may be present at a surface of the uppermost and/or lowermost wood veneer layer, facing away from said at least one intermediate wood veneer layer. The surface of the uppermost and/or lowermost wood veneer layer, facing away from said at least one intermediate wood veneer layer, may be substantially free from adhesive from the adhesive layer.

The distribution of the amount of adhesive may be applied symmetrically in a thickness direction of the wood veneer layers. In order to improve impact and water resistance properties, more adhesive may be applied in the adhesive layer adjacent the uppermost and the lowermost wood veneer layer compared to the amount of adhesive applied for the adhesive layer/layers between intermediate wood veneer layers. In order to improve obtain impregnation of the adhesive in the intermediate wood veneer layers and to improve adherence to further layer such as lacquer layer, more adhesive may be applied in the adhesive layer/layers between intermediate wood veneer layers compared to the amount of adhesive applied in the adhesive layer adjacent the uppermost and the lowermost wood veneer layer.

Where any or all of the terms "comprise", "comprises", "comprised" or "comprising" are used in this specification (including the claims) they are to be interpreted as specifying the presence of the stated features, integers, steps or components, but not precluding the presence of one or more other features, integers, steps or components.

Brief description of the drawings

The present invention will by way of example be described in more detail with reference to the appended schematic drawings, which show embodiments of the present invention.

Fig. 1 shows a method of producing a veneered element.

Fig. 2A shows a veneered element produced according to the method shown in fig. 1.

Fig. 2B shows an enlarged portion of the veneered element shown in fig. 2A.

Fig. 3 shows a method of producing a veneered element.

Fig. 4A shows a veneered element produced according to the method shown in fig. 3.

Fig. 4B shows an enlarged portion of the veneered element shown in fig. 4A.

Detailed description

Fig. 1 shows a method of producing a veneered element 10. The veneered element may be a panel. The veneered element or panel 10 may be, or form part of, a furniture component, a building panel such as a floor panel, a ceiling panel, a wall panel, a door panel, a worktop, skirting boards, mouldings, edging profiles, etc. The method includes providing a substrate 1. The substrate 1 is preferably a pre-fabricated substrate, produced prior to the method of producing the panel 10. The substrate 1 may be a panel, for example, a wood-

based panel. The wood-based panel may be a wood fibre based panel such as MDF, HDF, particleboard, etc., or plywood. The substrate 1 may be a sheet of paper or non-woven. In other embodiments, the substrate 1 may be a Wood Plastic Composite (WPC). The substrate 1 may be a plastic board such as a thermoplastic board. The substrate 1 may be a mineral composite board. The substrate 1 may be a fibre cement board. The substrate 1 may be magnesium containing cement board. The substrate 1 may be a ceramic board.

As show fig. 1, an adhesive 2 is applied on a first surface 9 of the substrate 1 such that an adhesive layer 3 is formed on the substrate 1. The adhesive 2 may be a thermosetting binder, a thermoplastic binder, or a combination of a thermosetting and thermoplastic binder. The thermosetting binder may be urea formaldehyde, phenol formaldehyde, melamine formaldehyde, polyurethane, polyester, emulsion polymer isocyanate (EPI), or combination thereof. The thermoplastic binder may be polyvinyl chloride (PVC), polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinyl alcohol (PVOH), polyvinyl butyral (PVB), and/or polyvinyl acetate (PVAc), or a combination thereof.

The adhesive 2 may be any type of glue. The adhesive 2 may be a hot melt. The adhesive 2 may be a pressure sensitive adhesive.

The adhesive 2 may be applied in liquid form or as a paste. The adhesive 2 may be applied by a roller, as shown fig. 1. The adhesive 2 may be applied by spraying, roller coating, curtain coating, hot melt coating, etc.

The adhesive 2 may be applied in powder form, preferably in dry powder form. The adhesive 2 may be applied by scattering.

The adhesive 2 may be applied on the substrate 1 in form of a sheet or foil. The sheet may be impregnated with a binder as adhesive. The sheet may be paper sheet. The sheet may be a non-woven. The sheet may be coloured, and/or the binder solution used to impregnate the sheet may be coloured, such that sheet becomes coloured during impregnation.

The adhesive 2 may include fillers. The fillers may be particles or fibres, for example wood fibres or particles, or mineral particles or fibres. The wood particles may be lignocellulosic particles and/or cellulosic particles. The wood particles may be at least partially bleached. The fillers may be rice, straw, corn, jute, linen, flax, cotton, hemp, bamboo, bagasse or sisal particles or fibres.

The fillers may be fillers having sound-absorbing properties such as cork particles and/or barium sulphate ($BaSO_4$). Alternatively, a sound-absorbing layer (not shown), for example a cork layer or cork veneer layer, may be arranged as an intermediate layer. The adhesive 2 may be applied on the sound-absorbing layer. The sound-absorbing layer may be arranged on the substrate 1, or on a sub-layer arranged on the substrate 1.

The adhesive 2 may further include pigments, wear resistant particles, and additives. The additives may be wetting agents, anti-static agents such as carbon black, and heat-conducting additives such as aluminium. Other possible additives are magnetic substances. Additives such as blowing agents may be included in the sub-layer. The blowing agents may be physical foaming agents such as EXPANCEL(RTM) and/or chemical blowing agents such as AIBN (azoisobutyronitrile) or ADC (azodicarbonamide). The wear and/or scratch resistant particles may be aluminium oxide particles and/or silica particles. In embodiments, fillers, pigments, wear resistant particles, additives etc. may be applied separately from the adhesive 2 and not be included in the adhesive 2.

The adhesive 2 may be applied in an amount corresponding to a dry resin content of 10-200 g/m^2, preferably in an amount of 10-150 g/m^2 such as 25-75 g/m^2.

On the adhesive layer 3, a wood veneer layer 5 is applied. The wood veneer layer 5 may have a porous structure. Pores are formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. Tracheids are formed by elongated cells in the xylem of gymnosperms such as softwood. The wood veneer layer 5 may also comprise holes and cracks. The wood veneer layer 5 may have a thickness of about 0.2 to 4 mm, such as about 0.2 to 1 mm. The wood veneer layer 5 may be continuous or non-continuous. The wood veneer layer 5 may be formed of several veneer pieces, i.e. being non-continuous. The veneer pieces may be over-lapping or non-overlapping.

In a similar manner as described above, the adhesive 2 described above may be applied on a surface of the wood veneer layer 5 facing the substrate. The adhesive 2 may be applied both on the substrate 1 and on the wood veneer layer 5.

A balancing layer or counteracting layer 6 may be applied to a second surface 13 of the substrate 1, opposite the first surface 9. The balancing layer or counteracting layer 6 may be applied with an adhesive 2 as described above with reference to the wood veneer layer 5. The balancing layer or counteracting layer 6 may be a wood veneer layer. In the embodiment wherein the balancing layer or counteracting layer 6 is a wood veneer layer, and is adhered to the substrate with an adhesive as described above with reference to the wood veneer layer 5, the description and properties of the wood veneer layer 5 also applies to the balancing or counteracting layer 6. The balancing layer or counteracting layer 6 may be a powder based balancing layer being applied as a powder. The powder based balancing layer may comprise wood particles such as lignocellulosic and/or cellulosic particles and a binder, preferably a thermosetting binder such as an amino resin. The balancing layer or counteracting layer 6 may be a resin impregnated paper, preferably impregnated with a thermosetting binder.

When the wood veneer layer 5 is arranged on the adhesive layer 3 on the substrate 1, pressure is applied to the wood veneer layer 5 and/or the substrate 1. Preferably, heat is

applied together with applying pressure. The pressure may be applied by continuous press 8 or in a discontinuous press (not shown). Pressure applied may be at least 15 bar. The pressure may be applied during at least 15 s, preferably during at least 30 s, more preferably during at least 45 s. The temperature may be at least 150°C, such as 150-200°C.

When applying pressure, the wood veneer layer 5 is adhered to the substrate 1 by the adhesive 2 such that a veneered element 10 in form of a panel is formed. The veneered element 10 or panel will be described in more detail below with reference to figs. 2A-B.

The adhesive 2 impregnates a first portion 11 of the wood veneer layer 5, facing the adhesive layer 3, during pressing. The impregnation of the adhesive 2 into the wood veneer layer 5 will be described in more detail below with reference to figs. 2A-B.

When pressing, the wood veneer layer 5 may be compressed. The wood veneer layer 5 may be compressed to a thickness being less or equal to 80 % of its thickness prior to pressing, such as less or equal to 70%, such as less or equal to 50%, of its thickness prior to pressing. The density of the wood veneer layer may be at least 1000 kg/m^3 after pressing. Due to the binder in the adhesive 2 impregnating into the first portion 11 of the wood veneer layer 5, the compression of wood veneer layer 5 is maintained, or substantially maintained after pressing to a thickness being less than 80 % of the thickness of the wood veneer layer 5 prior to pressing. The binder in the adhesive 2, which impregnates into the first portion 11 of the wood veneer layer 5 during pressing, fixes the first portion 11 of the wood veneer layer 5 into its compressed state after pressing, when the binder in the adhesive layer 3 has harden or cured. By thickness of the wood veneer layer 5 is meant in this application the distance between the first and second surface 14, 15 of the wood veneer layer 5.

The veneered element 10 or panel formed by the method described in fig. 1 will now be described in more detail with reference to figs. 2A-B. After pressing, the adhesive 2 has impregnated a first portion 11 of the wood veneer layer 5. The first portion 11 is extending from a first surface 14 of the wood veneer layer 5, facing the substrate 1, and into the wood veneer layer 5. The first portion 11 may extend from the first surface 14 into at least 10% of the thickness of the wood veneer layer 5. Preferably, the first portion 11 may extend from the first surface 14 into at least 20% of the thickness of the wood veneer layer 5, more preferably into at least 30%, most preferably at least 40%, of the thickness of the wood veneer layer 5. The adhesive 2 from the adhesive layer 3 has flowed through pores or tracheids of the wood veneer. The thickness of the wood veneer layer 5 referred to is measured after pressing.

The second surface 15 of the wood veneer layer 5 may be substantially free from adhesive 2 from the adhesive layer 3. The second surface 15 of the wood veneer layer 5 may be free from any adhesive or resin from the adhesive layer 3.

In one embodiment, a second portion 12 extending from a second surface 15 of the wood veneer layer 5, opposite the first surface 14, and into the wood veneer layer 5 may be substantially free from adhesive 2 from the adhesive layer 3. The second portion 12 of the wood veneer layer 5 may be free from any adhesive or resin from the adhesive layer 3.

By substantially free from adhesive 2 from the adhesive layer 3 is meant that less than 40% of the pores or tracheids of the wood veneer are at least partially filled with adhesive 2. Preferably, less than 30% of the pores or tracheids of the wood veneer are at least partially filled with adhesive 2, and more preferably less than 20% of the pores or tracheids of the wood veneer are at least partially filled with adhesive 2. Pores and tracheids only form a minor part, such as less than 20% such that less than 10% such that less than 5%, depending on wood specie, veneer production method, etc., of the material of the wood veneer. Larger openings than pores or tracheids in the wood veneer, such as cracks and holes, may be contain adhesive 2 from the adhesive layer 3, and may be at least be partially filled with adhesive 2. Cracks and holes are not considered as pores or tracheids.

The second portion 12 of the wood veneer layer 5, being substantially free from adhesive, preferably extends from the second surface 15 of the wood veneer layer 5 and into at least 5% of the thickness of the wood veneer layer 5. Preferably the second portion 12 is extending from the second surface 15 of the wood veneer layer 5 and into at least 10% of the thickness of the wood veneer layer 5, more preferably into at least 20% of the thickness of the wood veneer layer 5, and most preferably into at least 30% of the wood veneer layer 5. In one embodiment, the second portion 12 of the wood veneer layer 5 extends into at least 70% of the thickness of the wood veneer layer 5, such as at least 80% such as at least 90% of the thickness of the wood veneer layer 5. The thickness of the wood veneer layer 5 referred to is measured after pressing and prior to post-treatment, such as abrasive machining, such as sanding.

Consequently, the second surface 15 of the wood veneer layer 5 is substantially free from adhesive 2. Thereby, surface treatment of the second surface, such as coating and/or lacquering, is facilitated, since substantially no adhesive that may make adherence to the second surface of the wood veneer layer more difficult is present at the second surface.

It is contemplated that the balancing or counteracting layer 6 formed of a wood veneer layer may have a surface, or second surface portion, facing away from the substrate 1, being substantially free from adhesive 2 from the adhesive layer 3, and a first layer facing the substrate 1 containing adhesive 2 from the adhesive layer 3, in a similar manner as described above with reference to the wood veneer layer 5.

The second surface 15 of the wood veneer layer 5 may be treated prior to applying a protective layer. The second surface 15 may be abrasively machined. The second surface 15 may be sanded. Sanding is often performed prior to lacquering. If measured after abrasive

machining such as sanding, the second surface 15 is substantially free from adhesive 2 from the adhesive layer 3. In one embodiment, if measured after abrasive machining such as sanding, the second portion 12 may extend from the second surface 15 of the wood veneer layer 5 and into at least 0.5% of the thickness of the wood veneer layer 5, preferably into at least 2% of the thickness of the wood veneer layer 5, and more preferably into at least 5% of the thickness of the wood veneer layer 5.

The second surface 15 of the wood veneer layer 5 may be provided with a protective layer. The second surface 15 of the wood veneer layer 5 may be coated with a coating 16, such as lacquered with one or more lacquer layers. The coating or lacquer 16 may be an acrylate or methacrylate coating such as polyurethane coating. The coating or lacquer 16 may comprise wear and/or scratch resistant particles. The protective layer may be an overlay paper comprising wear resistant particles (not shown). The protective layer may be a powder overlay, as described in WO2011/129755, comprising processed wood fibres, a binder and wear resistant particles applied as mix on the wood veneer layer (not shown). If the protective layer comprises or is an overlay paper or a powder overlay, the protective layer is preferably applied before applying pressure. Thereby, the protective layer is cured and attached to the wood veneer layer 5 in the same step as adhering the wood veneer layer 5 to the substrate 1.

The wood veneer layer 5 may further be treated in different ways, for example brushed, oiled, waxed, etc. A protective coating (not shown) may also be applied to the wood veneer layer 5 prior to pressing. In one embodiment, a wax powder is applied, for example, scattered, on the second surface 15 of the wood veneer layer 5, prior to pressing. During pressing, the wax powder forms a protective coating of the wood veneer layer 5.

In one embodiment, a primer, foil or sheet (not shown) is applied on the second surface 15 of the wood veneer layer 5, prior or after pressing. The primer may be a print primer, a primer for preparing the wood veneer layer 5 for lacquering, etc. The foil or sheet may be impregnated with a B staged thermosetting resin. If applied prior to pressing, material from the primer, foil or sheet may be pressed into pores or tracheids of the second surface 15 of the wood veneer layer 5 during pressing. Thereby, a counteracting force is obtained, preventing adhesive 2 from the adhesive layer 3 from impregnating into the second surface 15 of the wood veneer layer 5. The counteracting force may prevent adhesive 2 from the adhesive layer 3 from impregnating into the second portion 12 of the wood veneer layer 5.

A protective foil may also be applied on the second surface 15 of the wood veneer layer 5 prior or after pressing. The protective foil may be thermoplastic foil such as PU (polyurethane) or PVC (polyvinyl chloride) foil.

As described above, the wood veneer layer 5 is maintained compressed compared to its original thickness after pressing. The thickness of the wood veneer layer 5 after pressing may be less or equal to 80% of the thickness of the wood veneer layer 5 prior to pressing, and preferably less or equal to 70% of the thickness of the wood veneer layer 5 prior to pressing, and more preferably less or equal to 50% of the thickness of the wood veneer layer 5 prior to pressing.

The panel may be provided with a mechanical locking system for joining with an adjacent panel.

In one embodiment, for example when the wood veneer layer 5 is adhered to a substrate in form of a sheet such as paper sheet or non-woven, the veneered element 10 may be adhered, for example by an adhesive, to a panel or board in a separate step after pressing the wood veneer layer to the substrate. The board or panel may be a wood-based panel such as MDF, HDF, particleboard etc., or plywood. The substrate may be thermoplastic board.

A method of producing a veneered element 20 in form of a panel will now be described with reference to fig. 3. In the embodiment described with reference to figs. 3-4, the substrate 1 comprises at least one intermediate wood veneer layer 22, 23, 24. Thereby, the veneered element 20 forms a plywood panel comprising an uppermost wood veneer layer 21, three intermediate wood veneer layers 22, 23, 24, and a lowermost wood veneer layer 25. The plywood panel may be, or form part of, a furniture component, a building panel such as a floor panel, a ceiling panel, a wall panel, a door panel, a worktop, skirting boards, mouldings, edging profiles, etc.

In fig. 3 an uneven number of wood veneer layers or plies 21, 22, 23, 24, 25 are provided. Each wood veneer layer 21, 22, 23, 24, 25 may have a thickness of 0.2-4 mm such as about 0.2-1 mm. In the embodiment shown in fig. 3, five wood veneer layers 21, 22, 23, 24, 25 are provided. The number of wood veneer layers 21, 22, 23, 24, 25 may be any uneven number exceeding three. The wood veneer layers 21, 22, 23, 24, 25 with their fibre direction are arranged in a crosswise manner. The wood veneer layers 21, 22, 23, 24, 25 may be arranged such that the fibre directions of the different layers are arranged perpendicularly. Depending on the number of layers, the layers may be arranged such that their fibre directions are arranged in steps of 45°.

For the uppermost wood veneer layer 21, and preferably also for the lowermost wood veneer layer 25, a high quality veneer may be used. For the intermediate wood veneer layers 22, 23, 24, a lower quality veneer may be used, i.e. a veneer quality containing more defects such as knots, discoloration, plugs, etc. The lowermost wood veneer layer 25 functions as a balancing layer or counteracting layer for the uppermost wood veneer layer 21 in order to balance the panel 20.

The wood veneer layers 21, 22, 23, 24, 25 may have a porous structure. Pores are formed by vessel elements of angiosperms such as hardwood being cut such that hollow channels are formed. Tracheids are formed by elongated cells in the xylem of gymnosperms such as softwood. An adhesive 2 is applied on a surface of the wood veneer layers 22, 23, 24, 25 adapted to face another surface of wood veneer layers, such that an adhesive layer 3 is formed between the wood veneer layers 22, 23, 24, 25. An adhesive 2 may be applied on both surfaces of the wood veneer layers, 22, 23, 24, adapted to face each other.

The adhesive 2 may be a thermosetting binder, a thermoplastic binder, or a combination of a thermosetting and thermoplastic binder. The thermosetting binder may be urea formaldehyde, phenol formaldehyde, melamine formaldehyde, polyurethane, polyester, emulsion polymer isocyanate (EPI), or combination thereof. The thermoplastic binder may be polyvinyl chloride (PVC), polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinyl alcohol (PVOH), polyvinyl butyral (PVB), and/or polyvinyl acetate (PVAc), or a combination thereof.

The adhesive 2 may be any type of glue. The adhesive 2 may be a hot melt. The adhesive 2 may be a pressure sensitive adhesive.

The adhesive 2 may be applied in liquid form or as a paste. The adhesive may be applied by a roller. The adhesive 2 may be applied by spraying, roller coating, curtain coating, hot melt coating, etc.

The adhesive 2 may be applied in powder form, preferably in dry powder form. The adhesive may be applied by scattering.

The adhesive 2 may also comprise additives such as ant-fungal additives, additives that improve water resistance properties, pigments, etc.

The adhesive 2 may be applied in form of a sheet or foil. The sheet may be impregnated with a binder as adhesive. The sheet may be paper sheet. The sheet may be a non-woven.

The adhesive 2 may be applied in an amount corresponding to a dry resin content of 10-200 g/m^2, preferably in an amount of 10-150 g/m^2, such as 25-75 g/m^2.

The amount of adhesive 2 applied may be different between the different wood veneer layers 22, 23, 24, 25. A larger amount of adhesive 2 may be applied for adhering the uppermost wood veneer layer 21 to an underlying wood veneer 22, compared to the amount of adhesive applied for adhering intermediate wood veneer layers 22, 23, 24 together. A larger amount of adhesive 2 may also be applied for adhering a lowermost wood veneer layer 25 to an overlying wood veneer layer 24, compared to the amount of adhesive 2 applied for adhering the intermediate wood veneer layers 22, 23, 24 together. In one embodiment, a larger amount of adhesive 2 is applied between the intermediate wood veneer layers 22, 23, 24.

When the wood veneer layers 21, 22, 23, 24, 25 are arranged in a stack of wood veneer layers, with adhesive layers 3 formed by the adhesive 2 between each wood veneer layer 21, 22, 23, 24, 25, pressure is applied to the wood veneer layers 21, 22, 23, 24, 25. Preferably, heat is applied together with applying pressure. The pressure may be applied by continuous press (not shown) or in a discontinuous press 30. Pressure applied may be at least 15 bar. The pressure may be applied during at least 15 s, preferably during at least 30s, more preferably during at least 45 s. The temperature may be at least 150°C, such as 150-200°C.

When applying pressure, the wood veneer layers 21, 22, 23, 24, 25 are adhered to each other by the adhesive 2 such that a plywood panel 20 is formed. The plywood panel 20 will be described in more detail below with reference to figs. 4A-B.

The adhesive 2 impregnates the wood veneer layers 21, 22, 23, 24, 25 during pressing. The impregnation of the adhesive 2 into the wood veneer layers 21, 22, 23, 24, 25 will be described in more detail below with reference to figs. 4A-B.

When pressing, the wood veneer layers 21, 22, 23, 24, 25 are compressed. The wood veneer layers 21, 22, 23, 24, 25 may be compressed to a thickness being less or equal to 80 % of their thickness prior to pressing such as less or equal to 70% such as less than or equal to 50% of their thickness prior to pressing. Preferably, at least the uppermost wood veneer layer 21 is compressed to a thickness being less or equal to 80% of its thickness prior to pressing such as less or equal to 70% such as less or equal to 50% of its thickness prior to pressing. The lowermost wood veneer layer 25 may be compressed to a thickness being less or equal to 80% of its thickness prior to pressing such as less or equal to 70% such as less or equal to 50% of its thickness prior to pressing. In one embodiment, each wood veneer layer 21, 22, 23, 24, 25 are compressed to a thickness being less or equal to 80% of each wood veneer layer thickness prior to pressing such as less or equal to 70% such as less or equal to 50% of their thickness prior to pressing. The density of the wood veneer layers 21, 22, 23, 24, 25 may be at least 1000 kg/m^3 after pressing. Preferably, at least the uppermost wood veneer layer 21 and/or the lowermost wood veneer layer 25 has a density of at least 1000 kg/m^3 after pressing. Thereby, by obtaining a remaining compression and high density of at least one of the wood veneer layers 21, 22, 23, 24, 25, a plywood panel 20 having high strength is formed.

Due to the binder in the adhesive 2 impregnating a portion of the wood veneer layer or layers 21, 22, 23, 24, 25, the compression of wood veneer layer or layers is maintained, or substantially maintained after pressing to a thickness being less or equal to 80 % of the thickness of the wood veneer layer or layers prior to pressing, such as less or equal to 70% such as less or equal to 50% of the thickness of the wood veneer layer or layers prior to pressing. The binder in the adhesive 2, which impregnates the portion of the wood veneer

layer or layers during pressing, fixes the portion of the wood veneer layer or layers into its compressed state after pressing, when the binder in the adhesive layer 3 has harden or cured. By thickness of the wood veneer layer 21, 22, 23, 24, 25 is meant in this application the distance between a first and second surface of the wood veneer layer 21, 22, 23, 24, 25.

The plywood panel 20 formed by the method described in fig. 3 will now be described in more detail with reference to figs. 4A-B, to which reference now is made. After pressing, the adhesive 2 has impregnated a first portion 31 of the uppermost wood veneer layer 21. The first portion 31 is extending from a first surface 35 of the uppermost wood veneer layer 21, facing the adjacent wood veneer layer 22, and into the uppermost wood veneer layer 21. The first portion 31 may extend from the first surface 35 into at least 10% of the thickness of the uppermost wood veneer layer 21. Preferably, the first portion 31 may extend from the first surface 35 into at least 20% of the thickness of the uppermost wood veneer layer 21, more preferably into at least 30%, most preferably at least 40%, of the thickness of the uppermost wood veneer layer 21. The adhesive 2 from the adhesive layer 3 has flowed through pores or tracheids of the wood veneer. The thickness of the uppermost wood veneer layer 25 referred to is measured after pressing.

Preferably, the adhesive 2 has impregnated a first portion 33 of the lowermost wood veneer layer 25. The first portion 33 is extending from a first surface 37 of the lowermost wood veneer layer 25, facing the adjacent wood veneer layer 24, and into the lowermost wood veneer layer 25. The first portion 33 may extend from the first surface 37 into at least 10% of the thickness of the lowermost wood veneer layer 25, preferably into at least 20%, more preferably into at least 30% and most preferably into at least 40% of the thickness of the lowermost wood veneer layer 25.

In order to form a high strength plywood panel 20, the adhesive 2 may impregnate a first portion of each wood veneer layer 21, 22, 23, 24, 25. The first portion is extending from a surface of the wood veneer layers 21, 22, 23, 24, 25 facing an adjacent wood veneer layer. In one embodiment, each wood veneer layer 21, 22, 23, 24, 25, the first portion 31, 33 is extending into at least 10% of the thickness of each wood veneer layer 21, 22, 23, 24, 25. Preferably, the first portion 31, 33 is extending into at least 20%, more preferably into at least 30%, and most preferably into at least 40% of the thickness of each wood veneer layer 21, 22, 23, 24, 25.

In one embodiment, the adhesive 2 has impregnated into portions of each of said intermediate wood veneer layer 22, 23, 24. The total thickness of impregnated portions is at least 20%, preferably at least 40%, and more preferably at least 60%. Adhesive may have impregnated a first portion of each of said intermediate wood veneer layer 22, 23, 24, facing the uppermost wood veneer layer, and in a second portion of each of said intermediate wood veneer layer 22, 23, 24, facing the lowermost wood veneer layer. The total thickness

of the first and second portion may be at least 20%, preferably at least 40%, and more preferably at least 60% of the thickness of each intermediate wood veneer layer 22, 23, 24. A second surface 36 of the uppermost wood veneer layer 21, opposite the first surface 35, may be substantially free from adhesive 2 from the adhesive layer 3. The second surface 36 of the uppermost wood veneer layer 21 may be free from any adhesive or resin. Preferably, also a second surface of the lowermost wood veneer layer 25 is substantially free from adhesive 2 from the adhesive layer 3. The second surface of the lowermost wood veneer layer 25 may be free from any adhesive or resin.

A second portion 32 extending from the second surface 36 of the uppermost wood veneer layer 21, opposite the first surface 35, and into the uppermost wood veneer layer 21 may be substantially free from adhesive 2 from the adhesive layer 3. The second surface 36 of the uppermost wood veneer layer 21 is an upper surface of the uppermost wood veneer 21, not being adhered to any other wood veneer layer. Preferably, the second portion 32 of the uppermost wood veneer layer 21 is free from any adhesive or resin. By substantially free from adhesive 2 from the adhesive layer 3 is meant that less than 40% of the pores or tracheids of the second portion 32 of the uppermost wood veneer layer 21 are filled with adhesive 2. Preferably, less than 30% of the pores or tracheids of the second portion 32 of the uppermost wood veneer layer 21 are filled with, and more preferably less than 20% of the pores or tracheids of the second portion 32 of the uppermost wood veneer layer 21 are filled with adhesive. Pores and tracheids only form a minor part, such as less than x%, of the material of the wood veneer. Larger openings than pores or tracheids in the uppermost wood veneer, such as cracks and holes, may be contain adhesive from the adhesive layer, and may be at least be partially filled with adhesive. Cracks and holes are not considered as pores or tracheids.

By substantially free from adhesive 2 from the adhesive layer 3 is meant that less than 40% of the pores or tracheids of the wood veneer are filled with adhesive 2. Preferably, less than 30% of the pores or tracheids of the wood veneer are filled with, and more preferably less than 20% of the pores or tracheids of the wood veneer are filled with adhesive 2. Larger openings than pores or tracheids in the wood veneer, such as cracks and holes, may be contain adhesive 2 from the adhesive layer 3, and may be at least be partially filled with adhesive 2. Cracks and holes are not considered as pores or tracheids.

The second portion 32 of the uppermost wood veneer layer 21 being substantially free from adhesive 2 is preferably extending from the second surface 36 of the uppermost wood veneer layer 21 and into at least 5% of the thickness of the uppermost wood veneer layer 21. Preferably, the second portion 32 is extending from the second surface 36 of the uppermost wood veneer layer 21 and into at least 10% of the thickness of the uppermost wood veneer layer 21, more preferably into at least 20% of the thickness of the uppermost

wood veneer layer 21, and most preferably into at least 30% of the uppermost wood veneer layer 21. In one embodiment, the second portion 32 of the uppermost wood veneer layer 21 extends into at least 70% of the thickness of the uppermost wood veneer layer 21, such as at least 80% such as at least 90% of the thickness of the uppermost wood veneer layer 21. The thickness of the uppermost wood veneer layer 21 referred to is measured after pressing and prior to post-treatment, such as abrasive machining such as sanding.

Similarly, a second portion 34 of the lowermost wood veneer layer 25 may be substantially free from adhesive 2 from the adhesive layer 3. The definition of substantially free from adhesive 2 above is applicable also for the second portion 34 of the lowermost wood veneer layer 25. The second portion 34 of the lowermost wood veneer layer 25 may extend from a second surface 38 of the lowermost wood veneer layer 25, opposite the first surface 37, and into at least 5% of the thickness of the uppermost wood veneer layer 25. The second surface 38 of the lowermost wood veneer layer 25 is a lower surface of the lowermost wood veneer layer 25, not being adhered to any other wood veneer layer. Preferably, the second portion 34 is extending from the second surface 38 of the lowermost wood veneer layer 25 and into at least 10% of the thickness of the lowermost wood veneer layer 25, more preferably into at least 20% of the thickness of the lowermost wood veneer layer 25, and most preferably into at least 30% of the lowermost wood veneer layer 25. In one embodiment, the second portion 34 of the lowermost wood veneer layer 25 extends into at least 70% of the thickness of the lowermost wood veneer layer 25, such as at least 80% such as at least 90% of the thickness of the lowermost wood veneer layer 25. The thickness of the lowermost wood veneer layer 25 referred to is measured after pressing.

The second surface 36 of the uppermost wood veneer layer 21 is substantially free from adhesive 2. Thereby, surface treatment of the second surface 36, such as coating and/or lacquering, is facilitated, since substantially no adhesive 2 that may make adherence to the second surface 36 of the uppermost wood veneer layer 21 more difficult is present at the second surface 36.

The second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 may be treated prior to applying a protective layer. The second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 may be abrasively machined. The second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 may be sanded. Sanding is often performed prior to lacquering. If measured after abrasive machining such as sanding, the second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 is substantially free from adhesive 2 from the adhesive layer 3. In one embodiment, if measured after abrasive machining such as sanding, the second portion of

the uppermost wood veneer layer 21 and/or of the lowermost wood veneer layer 25 may extend from the second surface of the uppermost wood veneer layer 21 and/or of the lowermost wood veneer layer 25 and into at least 0.5% of the thickness of the wood veneer layer 21, 25, preferably into at least 2% of the thickness of the wood veneer layer 21, 25, and more preferably into at least 5% of the thickness of the wood veneer layer 21, 25.

The second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 may be provided with a protective layer (not shown). The second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25may be coated with a coating, such as lacquered with one or more lacquer layers. The coating or lacquer may be an acrylate or methacrylate coating such as polyurethane coating. The coating or lacquer may comprise wear and/or scratch resistant particles. The protective layer may be an overlay paper comprising wear resistant particles. The protective layer may be a powder overlay, as described in WO2011/129755, comprising processed wood fibres, a binder and wear resistant particles applied as mix on the veneer surface. If the protective layer comprises or is an overlay paper or a powder overlay, the protective layer is preferably applied before applying pressure. Thereby, the protective layer is cured and attached to the uppermost wood veneer layer in the same step as adhering the wood veneer layers to each other.

The uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 may further be treated in different ways, for example brushed, oiled, waxed, etc. A protective coating (not shown) may also be applied to the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 prior to pressing. In one embodiment, a wax powder is applied, for example, scattered, on the second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25, prior to pressing. During pressing, the wax powder forms a protective coating of the uppermost wood veneer layer 21 of the uppermost wood veneer layer 25 and/or the second surface of the lowermost wood veneer layer 25.

In one embodiment, a primer, foil or sheet (not shown) is applied on the second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25, prior or after pressing. The primer may be a print primer, a primer for preparing the wood veneer layer for lacquering, etc. The foil or sheet may be impregnated with a B staged thermosetting resin. If applied prior to pressing, material from the primer, foil or sheet may be pressed into pores or tracheids of the second surface of the uppermost wood veneer layer 21 and/or of the lowermost wood veneer layer 25 during pressing. Thereby, a counteracting force is obtained, preventing adhesive 2 from the adhesive layer 3 from impregnating into the second surface of the uppermost wood veneer layer 21 and/or of the lowermost wood veneer layer 25. The counteracting force may

prevent adhesive 2 from the adhesive layer 3 from impregnating into the second portion of the uppermost wood veneer layer 21 and/or of the lowermost wood veneer layer 25.

A protective foil may also be applied on the second surface 36 of the uppermost wood veneer layer 21 and/or the second surface of the lowermost wood veneer layer 25 prior or after pressing. The protective foil may be thermoplastic foil such as PU (polyurethane) or PVC (polyvinyl chloride) foil.

As described above, the wood veneer layers 21, 22, 23, 24, 25 are maintained compressed compared to its original thickness after pressing. The thickness of the wood veneer layers 21, 22, 23, 24, 25 after pressing may be less than 80% of the thickness of the wood veneer layers 21, 22, 23, 24, 25 prior to pressing, and preferably less than 70% of the thickness of the wood veneer layers 21, 22, 23, 24, 25 prior to pressing.

The plywood panel shown in figs. 4A-B may be provided with a mechanical locking system for joining with an adjacent panel.

It is contemplated that there are numerous modifications of the embodiments described herein, which are still within the scope of the invention as defined by the appended claims.

EXAMPLES

Example 1:

An oak veneer layer having a thickness of 0.6 mm is arranged on a HDF core having a thickness of 9.8 mm. An adhesive layer comprising 42.5 g/m^2 melamine formaldehyde resin, as measured as dry resin content, is arranged between the oak veneer layer and the HDF core. The oak veneer layer is pressed to the HDF core with a pressure of 40 bar during 35 seconds at 180°C. After pressing, melamine formaldehyde resin is present in a lower portion of the oak wood veneer layer facing the HDF core. Pores of an upper surface and an upper portion of the oak veneer layer are substantially free from melamine formaldehyde resin from the adhesive layer after pressing.

Example 2:

5 oak veneer layers, each having a thickness of 0.6 mm, are arranged crosswise on top of each other. Between each wood veneer layer, 150 g/m^2 of melamine formaldehyde resin, as measured as dry resin content, is applied as adhesive layers. In total, four adhesive layers are applied. The wood veneer layers are pressed together with a pressure of 10 bar at a temperature of 170°C during 75 seconds to form a plywood. After pressing, melamine formaldehyde resin is present in a lower portion of the uppermost wood veneer layer facing an adjacent wood veneer layer. Pores of an upper surface and an upper portion of the

uppermost wood veneer layer are substantially free from melamine formaldehyde resin from the adhesive layer after pressing.

2017258368 28 Jun 2021

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of producing a veneered element, comprising:

providing a substrate and a wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface,

arranging an adhesive layer on the substrate and/or on the first surface of the wood veneer layer,

arranging the wood veneer layer on the substrate,

pressing the wood veneer layer to the substrate,

wherein, after pressing, adhesive from the adhesive layer is present in a first portion of the wood veneer layer extending from the first surface of the wood veneer layer and into at least 10% of the thickness of the wood veneer layer,

wherein, after pressing, the second surface of the wood veneer layer is substantially free from adhesive from the adhesive layer, and

wherein, after pressing, the wood veneer layer is compressed to a thickness being less than or equal to 80% of its thickness prior to pressing,

wherein, after pressing, a second portion of the wood veneer layer extending from the second surface of the wood veneer layer and into the wood veneer layer is substantially free from adhesive from the adhesive layer, and

wherein the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 70% of the thickness of the wood veneer layer.

2. The method according to claim 1, wherein, after pressing, less than 40% of pores or tracheids of the wood veneer layer extending into the second surface of the wood veneer layer are filled with the adhesive from the adhesive layer up to the second surface of the wood veneer layer.

3. The method according to claim 2, wherein, less than 30% of the pores or tracheids are filled with the adhesive from the adhesive layer up to the second surface of the wood veneer layer.

4. The method according to claim 2 or 3, wherein, less than 20% of the pores or tracheids are filled with the adhesive from the adhesive layer up to the second surface of the wood veneer layer.

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5. The method according to claim 1, wherein, after pressing, less than 40% of pores or tracheids of the wood veneer layer are filled with the adhesive from the adhesive layer in the second portion of the wood veneer layer.

6. The method according to claim 5, wherein less than 30% of pores or tracheids are filled with the adhesive from the adhesive layer in the second portion of the wood veneer layer.

7. The method according to claim 5 or 6, wherein less than 20% of p pores or tracheids are filled with the adhesive from the adhesive layer in the second portion of the wood veneer layer.

8. The method according to any one of claims 1, or 5 to 7, wherein, after pressing, the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 80% of the thickness of the wood veneer layer.

9. The method according to any one of claims 8, wherein, after pressing, the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 90% of the thickness of the wood veneer layer.

10. The method according to any one of claims 1 to 9, wherein the substrate comprises at least one wood veneer layer.

11. The method according to any one of claims 1 to 9, wherein the substrate comprises a wood-based board.

12. The method according to any one of claims 1 to 9, wherein the substrate comprises a sheet such as a paper sheet or sheet of non-woven.

13. The method according to any one of claims 1 to 12, wherein the adhesive layer comprises a resin impregnated paper.

14. The method according to any one of claims 1 to 12, wherein the adhesive layer comprises a thermoplastic binder, such as a hot melt or pressure sensitive adhesive.

15. The method according to any one of claims 1 to 12, wherein the adhesive layer comprises a thermosetting binder.

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16. A veneered element, comprising:

a substrate,

a wood veneer layer having a first surface and a second surface, the first surface being opposite to the second surface,

an adhesive layer adapted to adhere the first surface of the wood veneer layer to a surface of the substrate,

wherein adhesive from the adhesive layer is present in a first portion of the wood veneer layer, extending from the first surface of the wood veneer layer and into at least 10% of the thickness of the wood veneer layer,

wherein the second surface of the wood veneer layer is substantially free from adhesive from the adhesive layer, and

wherein the wood veneer layer is compressed to a thickness being less than or equal to 80% of its original thickness,

wherein, a second portion of the wood veneer layer extending from the second surface of the wood veneer layer and into the wood veneer layer is substantially free from adhesive from the adhesive layer, and.

wherein the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 70% of the thickness of the wood veneer layer.

17. The veneered element according to claim 16, wherein the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 80% of the thickness of the wood veneer layer.

18. The veneered element according to claim 17, wherein the second portion of the wood veneer layer is extending from the second surface of the wood veneer layer and into at least 90% of the thickness of the wood veneer layer

19. The veneered element according to any one of claims 16 to 18, wherein the wood veneer layer has a density of at least 1000 kg/m^3.

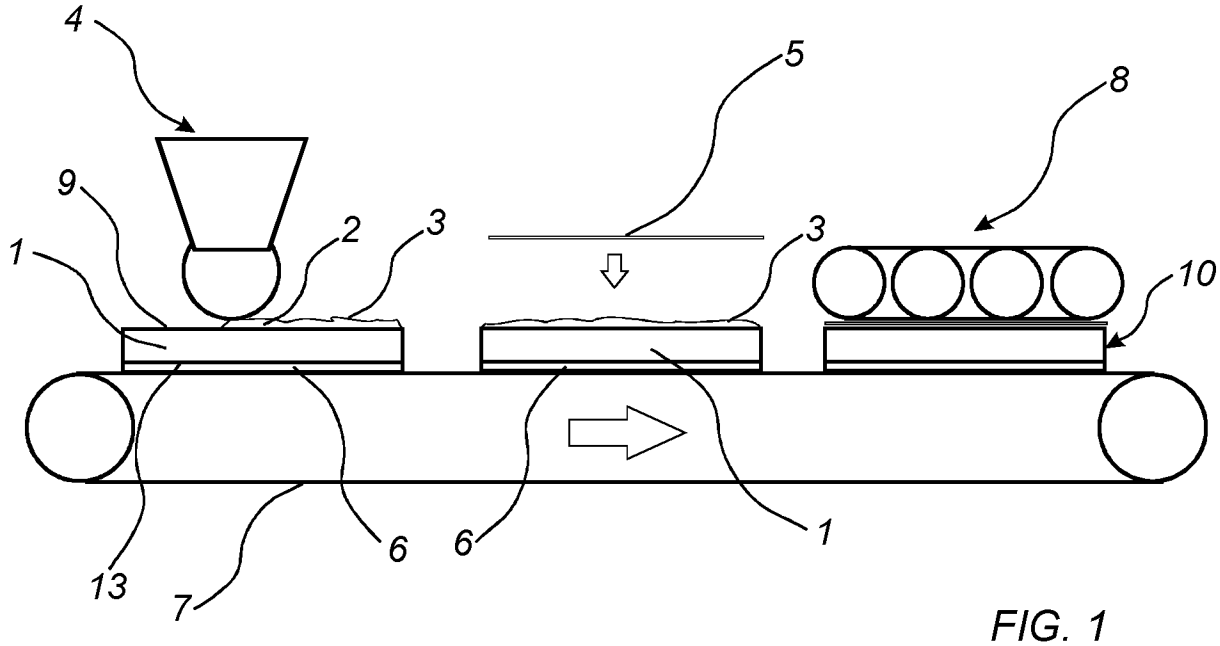

FIG. 1

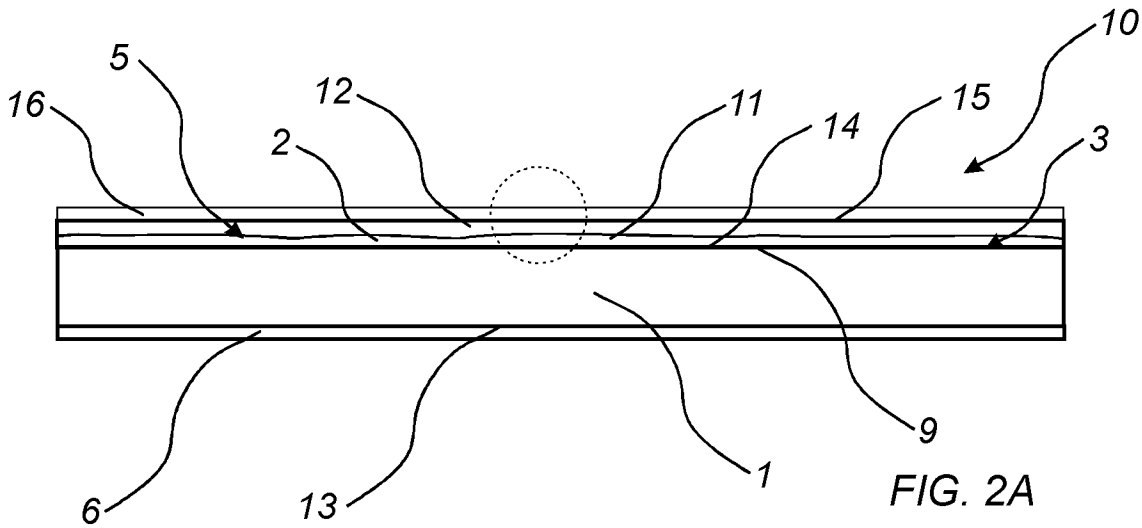

FIG. 2A

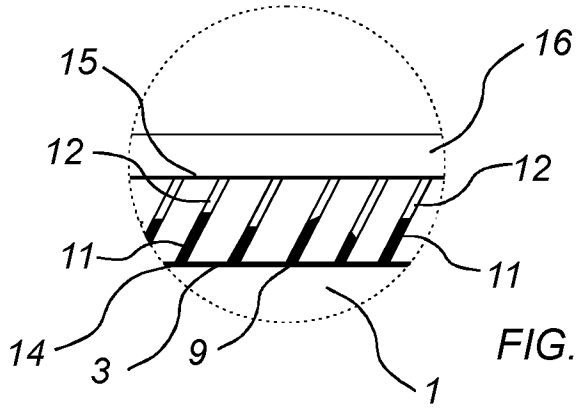

FIG. 2B

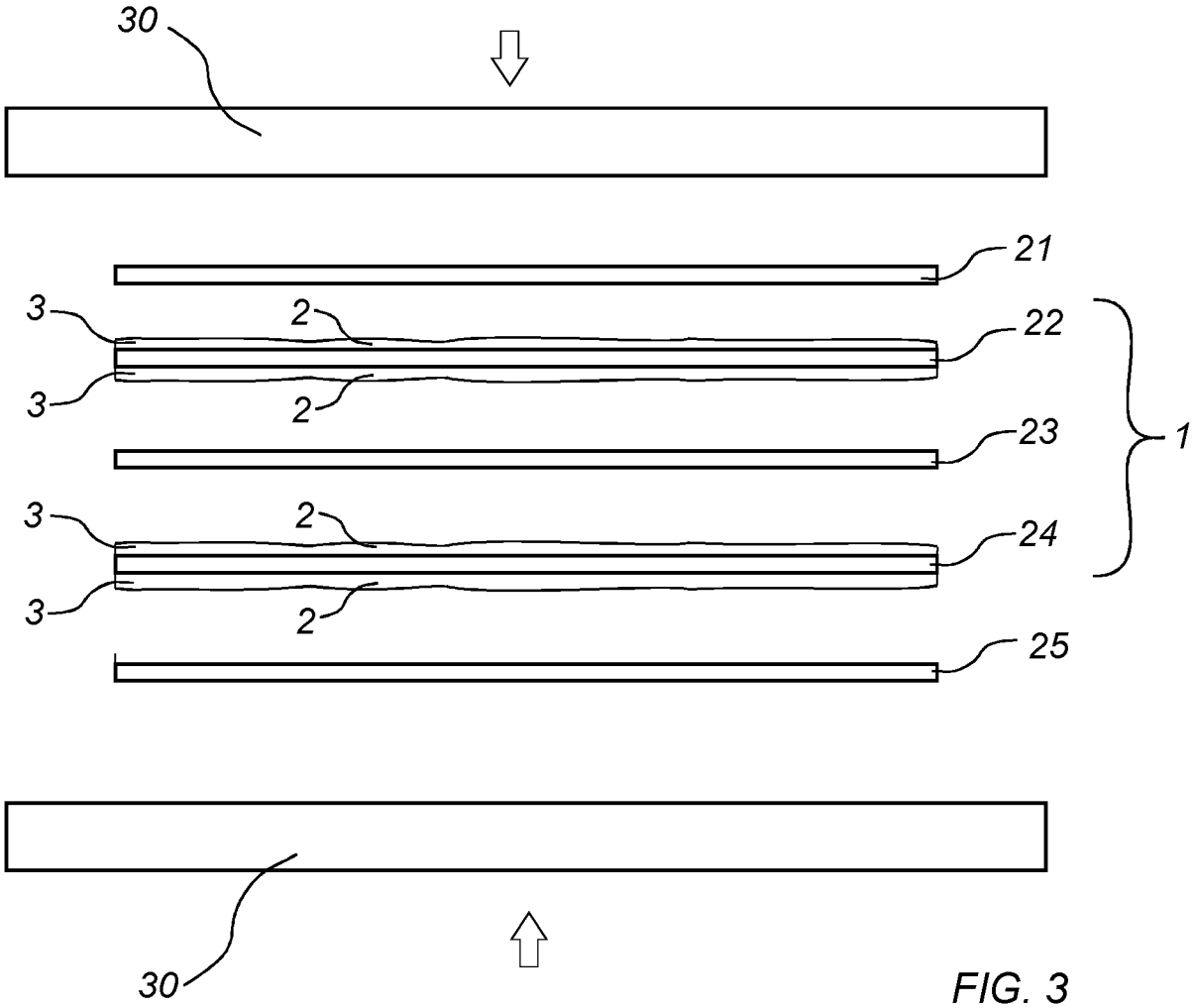

FIG. 3

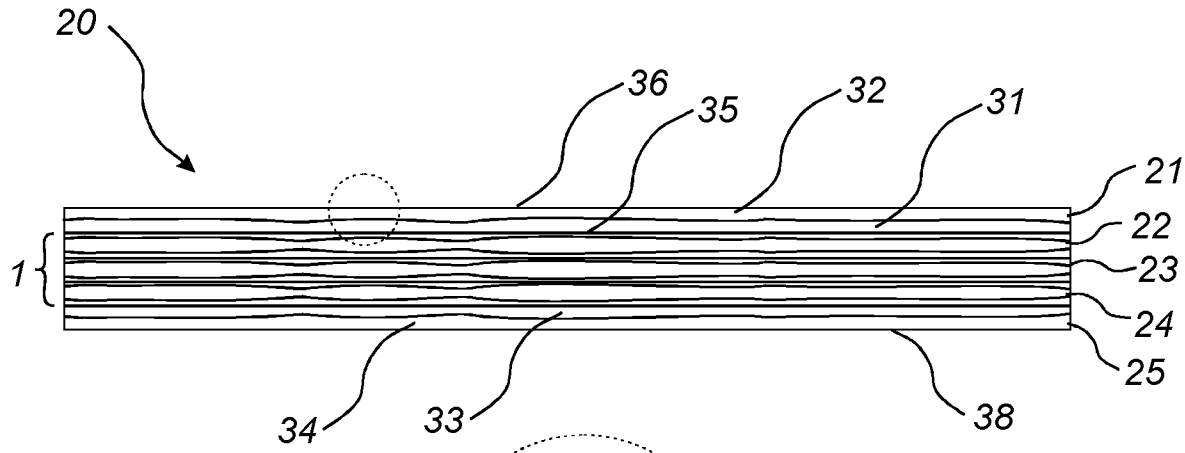

FIG. 4A

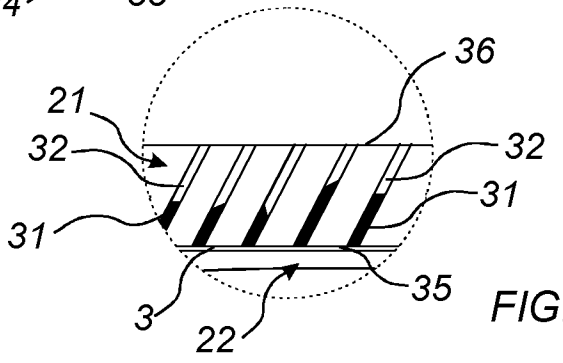

FIG. 4B