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(54) Benævnelse: **GULV-, VÆG- ELLER LOFTSPANEL OG FREMGANGSMÅDE TIL FREMSTILLING AF DETTE**

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FLOOR, WALL, OR CEILING PANEL AND METHOD FOR PRODUCING SAME

The invention relates to a floor, wall or ceiling panel, which has a carrier plate and an upper-side veneer, and to a method for producing such a floor, wall or ceiling panel.

Panels with a wear layer or top layer made of real wood are used in particular as real wood floors or parquet floors. Such floors impart a natural living environment. They are pleasantly warm underfoot and equalize moisture fluctuations in the room air, thereby contributing to a healthy indoor climate. Such veneer or wooden panels are also very popular as wall or ceiling cladding.

A method for producing parquet or veneer floorboards with a top layer made of real wood is described in DE 102 45 914 A1. In said document, a top layer made of real wood is subjected to impregnation with thermosetting synthetic resins. After the impregnation, the top layer is glued onto the carrier plate. Furthermore, the top layer is printed.

Floor panels with a three-layer structure and profiled joining surfaces on the side edges to form connecting means in the form of a tongue and groove or a so-called click system are common. The connecting means enable a mechanical coupling of the individual panels to one another within a floor covering or a wall or ceiling cladding. The carrier plate usually consists of a wood material, in particular a high-density fiberboard (HDF). The upper-side top layer made of real wood can have a different strength. If the top layer made of wood has a thickness of more than 2.5 mm, reference is made to a parquet floor. According to a customary terminological classification in the art, veneers for top layers of floor panels start at approximately 0.4 mm. In principle, floor panels with wood top layers of less than 2.5 mm are referred to as real wood or veneer floors.

After the veneer has been glued on, defects in the surface, for example, knots, gaps or cracks, are filled. Usually, an excess of filler is used, which is then removed again later. This is usually done by polishing or brushing. This runs the risk, especially in the case of thin veneer layers, of the layer being damaged by the subsequent mechanical processing. For this reason, thicker veneer is thus frequently used from the outset, or veneers with defects are rejected from the

outset. However, this is uneconomical and also means that the variety in terms of the optical appearance of the natural wood floors is restricted.

A so-called real wood laminate is also known. In this case, an overlay, for example in the form of a melamine paper or film, is applied to the top layer made of veneer. This sandwich is subsequently pressed. A disadvantage of this is that the defects that are naturally present in the veneer in this product, such as gaps, cracks, knots or pores, often have a milky appearance. The reason for this is the lack of or inadequate pressing pressure during the pressing process because there is no counterpressure in the region of the defects. If, on the other hand, a higher pressing pressure is used, the structure of the press plate dominates the wood surface and the natural wood structure or appearance suffers.

Within the scope of US 2006/070325 A1, a floor panel is disclosed, comprising a first layer made of, for example, high or medium-density wood fiber material and a second layer made of a hardwood veneer. An adhesive, which penetrates into the upper layer, is applied to the first layer. The adhesive used is a urea formaldehyde. To produce the floor panel, the layers are pressed together under pressure and elevated temperature.

The prior art includes US 2005/136234 A1, which discloses a bonded panel made of a high or medium-density carrier plate with a hard wood layer. A polyurethane adhesive is used to bond the layers. Here too, the layers are pressed at elevated pressure and elevated temperature.

The technological background further includes WO 2009/015682 A1, which discloses a floor panel made of a carrier plate and a layer made of a resin-impregnated layer, preferably paper. Urea resins are used here. The layers are joined by means of pressure and/or heat pressing.

Furthermore, DE 10 2006 058 244 A1 describes a veneered plate, a method for producing a veneered plate and the use of scrap papers in this method. The veneered plate has a x is bonded to a veneer on at least one of its surfaces. The bonding is effected by means of a paper impregnated with resin.

Planar components and the production thereof are also disclosed in DE 103 00 247 A1 or EP 1 657 055 A1.

Proceeding from the prior art, the invention is based on the object of creating a floor, wall or ceiling panel which is of high quality and has an improved natural appearance while being cost-effective to manufacture, and finding a method for producing such a floor, wall or ceiling panel.

The subject-matter part of the object is achieved by a floor, wall or ceiling panel according to claim 1. The method part of the object is achieved in claim 7.

Advantageous embodiments, developments and aspects of the invention form the subject matter of dependent claims 2 to 6 and 8 to 14.

The present invention relates in particular to real wood or veneer floor panels with a veneer made of wood and a thickness of the veneer of less than 2.5 mm, in particular with a thickness between 0.6 mm and 1.2 mm. The veneer can also be a cork veneer, in particular a cork oak veneer.

The carrier plate is a plate material made of a wood material, such as, for example, solid wood, chipboard, wood fiber material, MDF (medium-density fiberboard) or HDF (high-density fiberboard). Preferably, a carrier plate made of HDF is used within the scope of the invention. The starting product in the manufacture of floor, wall or ceiling panels according to the invention is a carrier plate having a large area, in the present case referred to as base carrier plate. Such a carrier plate or base carrier plate having a large area or large format is rectangular and has a size of 2000 mm to 5600 mm in length and 1200 mm to 2100 mm in width. The carrier plate or the base carrier plate usually has a thickness of 5 mm to 12 mm. Also conceivable are water-resistant materials, for example based on mineral materials, such as fiber cement, sand binding mixtures or wood-plastic composite materials (wood-plastic composites WPC), and also wood-fiber-polymer composite materials or also the use of magnesite plates. One aspect here aims to use natural-fiber-reinforced plastic as a material for the carrier plate or the base carrier plate. In addition to wood fibers, other plant fibers, such as jute or flax, can also be used here, in particular in a wood fiber or wood flour fraction of 50 % to 90 % and a plastic matrix made of polypropylene (PP).

Furthermore, a wood-plastic composite material based on thermoplastically workable thermosets, such as modified melamine resin with a natural fiber or natural flour fraction, can be used. In this connection, bamboo plastic composites (BPC) also offer interesting practical approaches. In this material, bamboo fibers or bamboo flour are used as natural material.

As already mentioned, plates based on cement-containing binders or fiber cement plates can also be used as the carrier plate. Just like magnesite plates. Magnesite plates consist of a mixture of magnesium oxide, calcium carbonate, silicates and fibers, in particular wood and/or glass fibers. An advantage of magnesite plates is the low weight and the low thermal conductivity, as well as their fire resistance. Magnesite plates are classified as non-flammable.

The essence of the invention is that a resin layer is provided between the carrier plate and the veneer, and the carrier plate, the resin layer and the veneer are pressed together and joined to one another. The veneer is penetrated or infiltrated by the resin of the resin layer. The pressing takes place in hot conditions, at a temperature which is substantially dependent on the resin material.

Preferably, the pressing takes place at a temperature of more than 100°C, preferably at a temperature between 100°C and 140°C. The pressing temperature relates to the temperature on the press plate of the press. This temperature also prevails at the contact surfaces of the press plate with the upper side of the veneer or the underside of the carrier plate. Higher temperatures are required for thermosetting resins or reactive resins. In particular, the pressing takes place at a temperature between 180°C and 210°C.

In the case of resins in the form of urea-formaldehyde condensation products, the press temperatures are lower, in particular in a range between 100°C and 140°C. With these resin materials, even press temperatures of 80°C and higher can be sufficient.

The resin layer consists of resin. This is in particular a polyvinyl acetate (abbreviated to PVAc), i.e. a thermoplastic material. Particularly preferably, the resin layer is a polymer resin, in particular a urea-formaldehyde condensation product, as is marketed by BASF under the trade name and registered trademark

"KAURIT". Preferably, a pulverulent ready-made urea-formaldehyde condensation product is used. Further, the resin of the resin layer can be a thermosetting synthetic resin. Colored or transparent resins or colored urea resins, colored urea melamines or colored melamine-polyurethane resin mixtures or colored polymer resins can be used. One aspect of the invention aims to use resins which cure or react under heat. In this connection, it is possible to use aminoplastic, thermosetting or reactive resins, such as polyurethane (PUR) or thermoplastic polyurethane. The resin or the resin layer is preferably present or formed as a resin film.

An essential aspect of the invention is seen in the use of Kaurit resins, in particular Kaurit glues. Particularly suitable are Kaurit powdered glues, which are mixed with water and curing agent. This leads to a particularly effective penetration of the pores in the veneer. The resin ensures good penetration into the veneer layer. In this connection, coloring of the Kaurit glue, for example with black or brown dyes, is advantageous in order to allow the otherwise colorless Kaurit glue to become visible as a contrast. For optimization, fillers are added to the resin mixture, for example in the form of wood fibers, wood chips, cellulose fibers, cork flours, rock flours and other or similar natural fillers.

The resin layer can be applied as a powder or as a liquid, in particular highly pasty, film. An aqueous resin solution is produced for application to the base carrier plate. An advantageous mixing ratio consists of two parts by weight of resin powder and one part by weight of water.

The resin layer is preferably colored, in particular black or brown. This takes place in particular by adding dyes or coloring agents, for example pigments, to the resin powder.

Further optimization of resin powder mixtures or resin mixtures is carried out by adding fillers, in particular wood fibers, wood chips, cellulose fibers, cork flour or rock flours and the like, in particular natural additives.

To produce a floor, wall or ceiling panel according to the invention, a base carrier plate having a large area or large format as well as a veneer are provided as sheet goods in the required size. In this case, the veneers are applied as strips or as

composite (bonded or sewn) veneer or as a wide, peeled veneer matched to the format of the base carrier plate. A multi-layered body, comprising the base carrier plate and the veneer, is formed. A resin layer is incorporated between the base plate and the veneer. A compensation layer is arranged on the underside of the carrier plate. The multi-layered body formed in this way is subsequently pressed in a press so that base carrier plate, resin layer, veneer and compensation layer are joined. The multi-layered body is pressed in a press, specifically at a pressing pressure appropriate for the product.

When a resin layer made of aminoplastic, thermosetting or reactive resins, such as polyurethane (PUR) or thermoplastic polyurethane, is used, a pressing pressure of greater than or equal to (≥) 1000 kilopascals (kPa) is considered to be suitable. The pressing pressure is preferably above 3500 kilopascals (kPa). The pressing temperature here is greater than or equal to (≥) 120°C. Preferably, the pressing temperature is between 180°C and 210°C. If the resin layer consists of a polymer resin, in particular a urea-formaldehyde condensation product, the pressing is carried out at a pressing pressure of greater than or equal to (≥) 100 kilopascals (kPa). The pressing in this case takes place at a pressing temperature which is preferably between 100°C and 140°C.

The pressing temperature relates to the temperature on the press plate of the press. Within the scope of the method according to the invention, the pressing time during which the multi-layered body is subjected to pressure in the press is between 10 seconds and 60 seconds. In the case of resin layers based on polymer resins, the pressing time is preferably between 20 seconds and 25 seconds.

During the pressing process, the surface of the veneers can obtain a structure, a pattern or decoration by means of a structuring plate or a structuring element. The structure can vary in gloss level in portions. Furthermore, various structure depths are possible. The structure depth can be up to 0.6 mm. Based on the veneer thickness, the structure can have a structure depth of 2/3 of the veneer thickness.

After the pressing process, the pressed multi-layered body is divided into individual panels. The individual panels are profiled on their side edges in a

subsequent working step. The profiling takes place only after cooling of the carrier plate to room temperature. The profiling serves in particular to form connecting means on the long and narrow sides of the panels.

The pressed multi-layered body is usually divided after cooling. For this purpose, the multi-layered body can be guided over a cooling section or temporarily stored for cooling.

The press used is in particular a short-cycle press or also a continuous press. During the hot pressing process or pressing process under the influence of temperature, the resin layer is plasticized and penetrates into the veneer. A substantial aspect of the invention is that the resin of the resin layer penetrates the veneer as far as the upper side of the wood veneer. In this case, pores, cracks, gaps and/or other defects present in the veneer are filled with resin during the pressing process. The resin of the resin layer forms an unreleasable connection between the veneer and the carrier plate. A particular advantage of the invention is therefore that two manufacturing steps, namely adhesive bonding and filling of the veneer, are carried out together in one working process.

In particular, the pressing of the multi-layered body is carried out such that the veneer is saturated with resin, and resin becomes visible on the surface of the veneer after the pressing. In this connection, in particular resins color-matched to the color of the veneer are used. A black resin is considered to be universal and advantageous in product terms. The pressing is expediently carried out such that the surface of the veneer and thus of the panel is only subject to very little resin or even no resin. Pores, cracks, gaps or other defects are visibly filled. However, no or at least only very little excess resin escapes at the surface. The pressed product then only needs to be structure-brushed and, if appropriate, is given surface oiling or varnishing.

An alternative provides for the resin layer to be formed by a resin film applied to the upper side of the carrier plate. In this case, resin is applied to the carrier plate in liquid form. It can then be dried or pre-condensed. The resin film adheres to the carrier plate as a gel-like or waxy layer.

Furthermore, the resin layer can also be formed on the underside of the veneer in the form of a resin film. Here too, resin is applied in liquid form to one side of the veneer. As a result, the veneer is impregnated with resin. The resin applied in liquid form is dried and pre-condensed. The veneer thus impregnated and provided with the resin layer is fed to further use after the production of the resin layer. Before the multi-layered body is formed, the veneer is rotated so that the resin layer is on the underside of the veneer and comes into contact with the upper side of the base carrier plate.

A resin film can also be formed by applying resin in powder form onto the surface of the carrier plate or onto the veneer. The pulverulent resin is then set under the influence of temperature so that the resin film forms.

In general, the resin can also be pasty, i.e., in the form of a paste, and processed.

The amount of resin is metered such that it infiltrates or penetrates the veneer but cannot escape to the surface of the veneer by the press being closed. Pores, defects, cracks or gaps in the veneer are pressed and filled with resin. The natural wood surface or cork surface and structure remains intact. The resin can be thickened with a filler. In this way, more mass is present to fill pores, cracks, gaps and/or defects. Organic or inorganic materials, in particular mineral pigments, rock flour or chalk, as well as wood powder or wood flour, can be used as filler.

The compensation layer compensates stresses in the multi-layered body. The compensation layer can be a veneer, a paper, a foil or also a film, in particular a synthetic resin film. A compensation veneer or a compensation paper is expediently also coated or impregnated with synthetic resin. During the production of the floor, wall or ceiling panel according to the invention, the compensation layer is pressed together with the base carrier plate, the veneer and the resin layer and joined on the underside to the base carrier plate.

The panels are profiled on their side edges and are provided with connecting means. Connecting means can be designed as tongues and grooves. Preferably, the side edges are provided with a click connection. Furthermore, the panels can be provided with a chamfer around their upper edges. In the case of a panel with a

chamfer, the intermediate resin layer has a very positive effect with respect to the moisture seal in the laid product.

A colored design of the panels is also possible if the resin remains visible at the side edges. In particular, this is done by a colored resin, which is color-matched to the veneer. In this case, individual or all side edges can be formed with an optically visible border strip made of resin. Variety in the optical design of a panel results when a resin is used which is color-contrasted to the color of the veneer. As a result, for example, a visual join effect can be produced in a targeted manner. The interaction of resin and veneer enables an optical accentuation of the surface of a floor, wall or ceiling panel according to the invention. For this purpose, effect materials such as pigments and other fillers, for example mica, can also be used in the resin.

One aspect further consists in forming the chamfer as a decorative, optically delimiting edge. Furthermore, the veneer can be printed with a decoration. The printing preferably takes place by means of digital printing. In this case, a system of printing inks matched to the resins used is used. It is possible to apply a seal to the veneer. The term seal means the application of a paint, a stain, an oil or also a varnish or varnish systems.

After pressing, the panel or the surface of the veneer is subjected to mechanical surface treatment. In the context of surface treatment, polishing or brushing of the surface is carried out in particular. As a result, the natural appearance of the surface can be accentuated. An aged structure or appearance, a so-called vintage look, can be achieved by irregular surface treatment. The surface of the panel can thus have, for example, a rough-hewn surface or can have chatter marks or polishing marks or the like.

A further aspect of the invention provides for a structure to be embossed into the veneer, in particular into the surface of the veneer, during pressing. This also contributes to a particularly elegant and decorative surface. Furthermore, the embossing process advantageously helps the resin material penetrate into the veneer.

A floor, wall or ceiling panel according to the invention is cost-effective to manufacture and has a high quality. The panels have a strikingly natural wood appearance or cork appearance with a rustic character as a result of the visible, filled cracks, gaps and/or knots. Since the veneer, i.e., the upper-side wear layer or top layer of the panel, is saturated or impregnated with resin, the resistance, in particular the sag resistance and the rubbing resistance, is additionally increased. As a result of the high resistance, mechanical processing of the veneer, such as by polishing or brushing, is possible, specifically with a reduced risk that the appearance is destroyed by the mechanical processing operations. The panel is significantly more resistant. The invention advantageously also enables the use of softer wood species or veneers from softer woods, such as larch. Due to the resin impregnation or saturation, a veneer made of a soft wood is increased in hardness and more resistant.

Within the scope of the invention, steamed or smoked veneers can also advantageously be used. Also particularly suitable are veneers made of coarse-pore woods, such as oak, ash, larch or spruce. These are improved in quality and optically accentuated by the resin infiltration according to the invention.

PATENTKRAV

1. Gulv-, væg- eller loftspanel, der indeholder en bærepladе og et finerlag på oversiden, hvor der mellem bærepladen og finerlaget er tilvejebragt et harpikslag, og bærepladen, harpikslaget og finerlaget er presset sammen med hinanden, **kendetegnet ved, at** harpikslaget er dannet på basis af harpikspulver og harpikspulveret er iblandet farvestoffer og/eller bindemidler og/eller hærdere og/eller fyldstoffer, særligt træbaserede fyldstoffer, og harpiksen i harpikslaget penetrerer finerlaget, idet harpiksen i harpikslaget gennemtrænger finerlaget indtil oversiden af finerlaget, og porer, revner og spalter i finerlaget i den forbindelse fyldes med harpiks.

2. Gulv-, væg- eller loftspanel ifølge krav 1, **kendetegnet ved, at** harpikslaget er dannet af en harpiksfilm, der er påført på oversiden af bærepladen.

3. Gulv-, væg- eller loftspanel ifølge krav 1, **kendetegnet ved, at** harpikslaget er dannet af en harpiksfilm, der er påført på undersiden af finerlaget.

4. Gulv-, væg- eller loftspanel ifølge i det mindste et af kravene 1 til 3, **kendetegnet ved, at** der på undersiden af bærepladen er tilvejebragt et stabiliseringslag.

5. Gulv-, væg- eller loftspanel ifølge i det mindste et af kravene 1 til 4, **kendetegnet ved, at** finerlagets overside er slebet, børstet og/eller forseglet.

6. Gulv-, væg- eller loftspanel ifølge i det mindste et af kravene 1 til 5, **kendetegnet ved, at** der er indpræget en struktur i finerlagets overside.

7. Fremgangsmåde til fremstilling af et gulv-, væg- eller loftspanel,

der indeholder en bærepladе og et finerlag på oversiden, kendetegnet ved følgende trin:

- tilvejebringelse af en basisbærepladе med en stor overflade;
- tilvejebringelse af et finerlag;

- dannelse af et flerlagslegeme, der består af basisbærepladen, finerlaget og et harpikslag, der er indarbejdet mellem basisbærepladen og finerlaget, såvel som et stabiliseringslag, der er placeret på undersiden af basisbærepladen;

- forbindelse af basisbærepladen, harpikslaget og finerlaget samt stabiliseringslaget ved presning af flerlagslegemet i en presse, hvor pressetrykket, pressetemperaturen og pressetiden er tilpasset på en sådan måde, at porer, revner og spalter i finerlaget fyldes med harpiks, når flerlagslegemet presses, idet pressetrykket er over 3500 kPa, pressetemperaturen ligger mellem 180 °C og 210 °C og pressetiden er på mellem 10 sekunder og 60 sekunder;

- det pressede flerlagslegeme efterfølgende opdeles i enkelte paneler, og

- panelerne profileres og forsynes med forbindelsesmidler ved deres sidekanter,

hvor presningen af flerlagslegemet udføres på en sådan måde, at finerlaget gennemvædes med harpiks, og harpiks bliver synlig på finerlagets overflade efter presningen, og

hvor harpikslaget påføres i pulverform, idet hærdere og/eller bindemidler og/eller et farvestof og/eller fyldstoffer er iblandet pulveret.

8. Fremgangsmåde ifølge krav 7, **kendetegnet ved, at** harpikslaget dannes af en polymerharpiks eller et urea-formaldehyd-kondensationsprodukt.

9. Fremgangsmåde ifølge krav 7 eller 8, **kendetegnet ved, at** harpikslaget dannes af en harpiksfilm, der påføres på oversiden af basisbærepladen.

10. Fremgangsmåde ifølge krav 7 eller 8, **kendetegnet ved, at** harpikslaget dannes af en harpiksfilm, der påføres på undersiden af finerlaget.

11. Fremgangsmåde ifølge i det mindste et af kravene 7 til 10, **kendetegnet ved, at** finerlaget påtrykkes med en dekoration.

12. Fremgangsmåde ifølge i det mindste et af kravene 7 til 11, **kendetegnet ved, at** der påføres en forsegling på finerlaget.

13. Fremgangsmåde ifølge i det mindste et af kravene 7 til 12, **kendetegnet ved, at** finerlaget efter presningen underkastes en mekanisk overfladebehandling, særligt en slibeproces og/eller en børsteproces.

14. Fremgangsmåde ifølge i det mindste et af kravene 7 til 13, **kendetegnet ved, at** en struktur præges ind i finerlaget i forbindelse med presningen.