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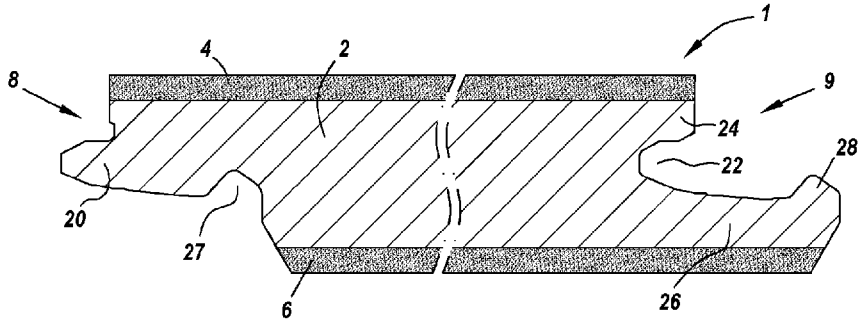

Fig. 1

(57) Abstract: The lacquer comprises a binder and a filler. The binder comprises or consists of an acrylic binder, a polyurethane binder, a polyester binder or an epoxy binder; or combinations thereof. The filler comprises lignocellulosic flour or cellulosic flour, or combinations thereof. The invention further relates to methods for applying such lacquer and decorative panels comprising such lacquer layer.

WO 2024/256908 A1

LACQUER COMPRISING CELLULOSIC FILLERS

The invention relates to lacquers, to panels comprising a layer provided with such lacquer, to surfaces covered with such lacquer layer, and to methods for applying such lacquers to provide a decorative surface.

Lacquers are known that comprise inorganic fillers to modify their rheology.

It is an objective of the invention to provide lacquers and products comprising lacquer layers provided with such lacquers that contribute to reduced emissions of carbon dioxide.

The first aspect of the invention is a lacquer comprising a binder and a filler. The binder comprises or consists of an acrylic binder, a polyurethane binder, – e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) -, a polyester binder or an epoxy binder; or combinations thereof. The lacquer is characterized in that the filler comprises lignocellulosic flour or cellulosic flour, or combinations thereof.

The lacquer of the invention has the benefit that the fillers are plant based and ensure carbon capture during a long time, thereby contributing to the reduction of carbon dioxide emissions.

The lignocellulosic flour or the cellulosic flour provides a surface texture to a lacquer layer established with the lacquer of the first aspect of the invention, thereby providing a decorative effect.

The lignocellulosic flour also provides a coloration to a lacquer layer established with the lacquer of the first aspect of the invention, thereby providing a decorative aspect.

It is a further benefit that lignocellulosic flour and cellulosic flour have hydroxyl groups that can bind with the binder of the inventive lacquer, or to a top lacquer layer provided

onto a lacquer layer made from lacquers from the first aspect of the invention. Therefore, the lacquer of the first aspect of the invention provides decorative lacquer layers with improved mechanical properties.

The lacquer preferably is a lacquer for providing a lacquer layer to a floor covering.

The lacquer can have varying viscosity. The lacquer also encompasses pastes that can be applied by means of casting.

Preferably, the lignocellulosic flour or the cellulosic flour have D50 particle size between 1 micrometer and 100 micrometer; and more preferably below 20 micrometer. The D50 particle size is, as determined via the cumulative particle size distribution according to volume measured by means of laser diffraction, the particle size of which 50% of the particles are smaller.

It is a benefit of such particles sizes that a nice texture, showing a distinct attractive roughness, is obtained in surface where the lacquer is used for obtaining a decorative surface.

A preferred lacquer is characterized in that the lacquer comprises between 2 and 25 parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

Such embodiments provide optimized performance of lacquer layers formed with such lacquers.

More preferably, the lacquer comprises more than 5 – and more preferably more than 10 - parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

The filler can comprise wood flour. It is a benefit that waste products, e.g. from wood saving mills can be used.

The filler can comprise plant based flour, e.g. plant straw flour. Examples of plant based flour that can be used in the invention are straw flour, hemp flour, flax flour, miscanthus flour or ricehusk flour.

It is an advantage of the use of plant based flour in lacquers according to the invention that waste streams can be valorized.

A preferred lacquer is characterized in that the filler comprises chemically treated wood flour, chemically treated plant based flour or chemically treated plant straw flour. This way, the properties of lacquer layers made with such lacquers are improved.

Examples of chemically treated wood flour or chemically treated plant based flour or chemically treated plant straw are acetylated wood flour, acetylated plant based flour or acetylated plant straw flour. It is a benefit of such embodiments that lacquer layers can be obtained that have improved water resistance.

The lacquer can comprise additives, such as pigments, dyes, abrasion resistant particles (such as e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond), mineral based fillers (such as e.g. cement, gypsum, magnesium oxide); or combinations thereof.

It is a benefit of mineral based fillers that they can modify and optimize the rheology of the lacquer.

A preferred lacquer is characterized in that the lacquer is a water-based lacquer. Such lacquers are environmentally friendly, as no solvent needs to evaporate when applying the lacquer.

A preferred lacquer is characterized in that the binder is a polyurethane– e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) -, wherein at least part of the polyol of the polyurethane is a biobased polyol. Such embodiments synergistically contribute to renewable carbon capture in the lacquer.

A preferred lacquer is characterized in that the binder is a polyurethane binder– e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) -, preferably present in the lacquer as a dispersion. Such embodiments provide lacquers that can be easily applied and that provide excellent mechanical properties of the lacquer.

A preferred lacquer is characterized in that the binder is a two-component polyurethane binder, preferably wherein the first component is a polyol and the second component is a di-isocyanate. Such embodiments provide lacquers that can be easily applied and that provide excellent mechanical properties of the lacquer.

A preferred lacquer is characterized in that the binder is an acrylic binder, preferably present in the lacquer as a dispersion or as an emulsion. Such embodiments provide lacquers that can be easily applied and that provide excellent mechanical properties of the lacquer.

A preferred lacquer is characterized in that film formation of the lacquer occurs at room temperature. Such lacquers have the benefit that they can be applied on a basis and that the temperature does not need to be increased for film formation. The lacquer can e.g. be applied on a cement basis in order to provide a floor covering in which the lignocellulosic flour or cellulosic flour can provide a texture to the floor covering.

A preferred lacquer is characterized in that film formation of the lacquer requires temperature higher than 60°C. Such embodiments provide lacquers that have better shelf life and that can be applied e.g. to floor panels during production of floor panels to provide floor panels with good mechanical properties, e.g. wear resistant and/or scratch resistance properties.

A preferred lacquer is characterized in that curing of the binder of the lacquer requires UV-radiation. Such embodiments provide lacquers to – after UV-curing – provide excellent wear resistance and scratch resistance.

A preferred lacquer is characterized in that curing of the binder of the lacquer occurs a room temperature. Such lacquers have the benefit that they can be applied on a floor to provide the decorative surface of a floor. The lacquer can e.g. be applied by casting onto a floor, e.g. a cement based or concrete based floor.

A preferred lacquer is characterized in that the glass transition temperature of the binder is less than 60°C, and preferably less than 40°C, more preferably less than 25°C. Such embodiments provide lacquers ideally suited for floors as the lacquer is well suited to withstand varying temperature conditions.

The glass transition temperature in the context of this invention is measured according to DIN 53765: 1994.

The second aspect of the invention relates to a decorative panel, e.g. a floor, wall or ceiling panel. The decorative panel comprises a lacquer layer; wherein the lacquer layer comprises a binder and a filler. The binder comprises an acrylic binder, a polyurethane binder; – e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) – a polyester binder or an epoxy binder; or combinations thereof. The filler comprises lignocellulosic flour or cellulosic flour or both.

The lacquer layer has the benefit that the fillers are plant based and ensure carbon capture during a long time, thereby contributing to the reduction of carbon dioxide emissions.

The lignocellulosic flour or the cellulosic flour provides a surface texture to a lacquer layer, thereby providing a decorative effect.

It is a further benefit that lignocellulosic flour and cellulosic flour have hydroxyl groups that bind with the binder of the lacquer, or to a top lacquer layer provided onto the lacquer layer. Therefore, invention provides decorative panels having improved mechanical properties.

As the lacquer layer has a certain thickness, the decorative effect is maintained when wear occurs to the decorative panel.

The lacquer layer of the decorative panel of the second aspect of the invention can be obtained by applying a lacquer according to any embodiment of the first aspect of the invention.

Preferably, the lignocellulosic flour or the cellulosic flour of the lacquer layer have D50 particle size between 1 micrometer and 100 micrometer, more preferably below 20 micrometer. The D50 particle size is, as determined via the cumulative particle size distribution according to volume measured by means of laser diffraction, the particle size of which 50% of the particles are smaller.

A preferred decorative panel is characterized in that the lacquer layer comprises between 2 and 25 parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

Such embodiments provide optimized performance of decorative panels.

More preferably, the lacquer comprises more than 5 – and more preferably more than 10 - parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

Such embodiments provide optimized performance of the decorative panel.

The filler can comprise wood flour. It is a benefit that waste products, e.g. from wood saving mills can be used.

The filler can comprise plant based flour, e.g. plant straw flour. Examples of plant based flour that can be used in the invention are straw flour, hemp flour, flax flour, miscanthus flour or ricehusk flour.

It is an advantage of the use of plant based flour in lacquer layers according to the invention that waste streams can be valorized.

A preferred lacquer layer is characterized in that the filler comprises chemically treated wood flour, chemically treated plant based flour or chemically treated plant straw flour. This way, the properties of the lacquer layer are improved.

Examples of chemically treated wood flour or chemically treated plant based flour or chemically treated plant straw for use in lacquer layers according to the invention are acetylated wood flour, acetylated plant based flour or acetylated plant straw flour. It is a benefit of such embodiments that lacquer layers are obtained that have improved water resistance.

The lacquer layer can comprise additives, such as pigments, dyes, abrasion resistant particles (such as e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond), mineral based fillers (such as e.g. cement, gypsum, magnesium oxide); or combinations thereof. Such additives allow to optimize the properties of the lacquer layer.

A preferred decorative panel is characterized in that the lacquer layer provides the surface layer of the decorative panel.

It is a benefit of such embodiment that the filler will provide a surface texture to the decorative panel.

A preferred decorative panel is characterized in that at least one top lacquer layer is applied onto the lacquer layer, preferably wherein the at least one top lacquer layer is transparent. Such embodiments allow to improve the wear resistance and/or the scratch resistance of the decorative panel.

The lignocellulosic flour or the cellulosic flour, or combinations thereof, of the lacquer layer have hydroxyl groups that can bind to the top lacquer layer resulting in improved mechanical properties of the surface of the decorative panel.

The top lacquer layer can be free from lignocellulosic and cellulosic particles. It is a benefit of such embodiments that the binder content of the top lacquer layer is higher, resulting in better wear resistance and better scratch resistance.

To further improve the wear resistance and the scratch resistance, the top lacquer layer can comprise abrasion resistant particles, e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond.

The optional at least one top lacquer layer can be selected from a polyurethane lacquer layer (e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU)) or an acrylic lacquer layer. Such top lacquer layers have the benefit that they provide good durability, e.g. good wear resistance and good scratch resistance.

An optional polyurethane top lacquer layer can be a one component polyurethane lacquer layer, e.g. applied as water based polyurethane dispersion.

An optional polyurethane top lacquer layer can be a two component polyurethane lacquer layer. It is a benefit of such top lacquer layers that improved wear resistance of the decorative panel is obtained. Preferred two component polyurethane lacquer layers are obtained from a polyol and an isocyanate.

A preferred top lacquer layer is a cross-linked top lacquer layer. Such embodiments provide improved durability of the decorative panel.

A preferred decorative panel comprises a the top lacquer layer which is less than 100 micrometer thick, and more preferably less than 50 micrometer thick. It is a benefit of such embodiments that a texture pressed into the decorative panel before applying the top lacquer layer is preserved.

A preferred decorative panel is characterized in that the panel surface opposite to the panel surface comprising the lacquer layer comprises a second lacquer layer provided by a lacquer as in any embodiment of the first aspect of the invention.

It is a benefit that both sides of the decorative panel comprise a lacquer layer comprising a filler comprising lignocellulosic flour or cellulosic flour, or combinations thereof. The decorative panel can used at both sides. When the side is worn, the decorative panel can be turned over and used again with the second side as decorative surface.

A preferred decorative panel is characterized in that the decorative panel comprises a substrate, preferably wherein the substrate comprises or consists of a board selected from the list consisting of a wood board, a wood-based panel, a wood-fiber board, a wood particle board, an inorganic board (e.g. a cement based board or a magnesium oxide board), a polymer matrix board (e.g. a polyvinyl chloride board, a polypropylene board or a polyester board), a board comprising lignocellulosic fibers (e.g. miscanthus fibers) bonded together by a binder, or combinations thereof.

A preferred decorative panel is characterized in that the decorative panel comprises at least at two opposite parallel side edges coupling parts for coupling the decorative panel with a second decorative panel at their respective side edges; wherein in coupled condition a locking is provided in the direction perpendicular to the surface of the coupled decorative panels; as well as a locking is provided in the direction perpendicular to the coupled side edges and parallel to the surface of the coupled panels. The coupling parts comprise at one of said two opposite side edges a male coupling part. The coupling parts comprise at the other one of said two opposite side edges a female coupling part.

Such embodiments have the benefit that installation of the decorative panels, e.g. to form a floor covering, is facilitated and does not require adhesives, contributing to the environmental friendliness of the decorative panels.

In a preferred embodiment, the lacquer layer has a uniform thickness over the surface of the decorative panel.

A preferred decorative panel is characterized in that the glass transition temperature of the binder is less than 60°C, and preferably less than 40°C, more preferably less than 25°C. Such embodiments provide decorative panels ideally suited as the lacquer is well suited to withstand varying temperature conditions.

A preferred decorative panel is characterized in that the thickness of the lacquer layer is more than 0.5 mm, preferably more than 1 mm, and preferably less than 3 mm, more preferably less than 2.5 mm. Such embodiments provide decorative panels with decorative effects that maintain their visuals even if some wear occurs to the panel.

The third aspect of the invention relates to a method for producing a decorative panel – optionally a decorative panel as in any embodiment of the second aspect of the invention. The method comprises the steps of providing a substrate; and applying a lacquer on the substrate thereby providing a lacquer layer on the substrate. The lacquer is a lacquer as in any embodiment of the first aspect of the invention.

A preferred method is characterized in that the method comprises the step of applying at least one top lacquer layer on the lacquer layer, more preferably wherein the at least one top lacquer layer is transparent.

The lignocellulosic flour or the cellulosic flour, or combinations thereof, of the lacquer layer have hydroxyl groups that can bind to the top lacquer layer resulting in improved mechanical properties of the surface of the decorative panel.

The optional at least one top lacquer layer can be selected from a polyurethane lacquer layer (e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU)) or an acrylic lacquer layer. Such top lacquer layers have the benefit that they provide good durability, e.g. good wear resistance and good scratch resistance.

An optional polyurethane top lacquer layer can be a one component polyurethane lacquer layer, e.g. applied as water based polyurethane dispersion.

An optional polyurethane top lacquer layer can be a two component polyurethane lacquer layer. It is a benefit of such top lacquer layers that improved wear resistance of the decorative panel is obtained. Preferred two component polyurethane lacquer layers are obtained from a polyol and an isocyanate.

Preferably, the top lacquer layer is a cross-linked top lacquer layer. Such embodiments provide improved durability of the decorative panel.

A preferred method is characterized in that the method comprises the step of cross-linking and/or polymerizing the at least one top layer lacquer, preferably by means of increased temperature or by means of UV-radiation or both. Such embodiments provide a top lacquer layer having improved wear resistance.

In a preferred method, the lacquer providing the top lacquer layer comprises a cross linking agent, e.g. an isocyanate. Such embodiments provide optimum cross-linking of the top lacquer layer and therefore optimized wear resistance of this top lacquer layer.

A preferred method is characterized in that the decorative panel comprises a substrate, wherein the substrate comprises or consists of a board, preferably selected from the list consisting of a wood board, a wood-based panel, a wood-fiber board, a wood particle board, an inorganic board (e.g. a cement based board or a magnesium oxide board), a polymer matrix board (e.g. a polyvinyl chloride board, a polypropylene board or a polyester board), a board comprising lignocellulosic fibers (e.g. miscanthus fibers) bonded together by a binder, or combinations thereof.

A preferred method is characterized in that the lacquer is uniformly applied on the substrate.

A preferred method is characterized in that applying the lacquer on the substrate is performed via a casting operation. As the lacquer comprises the lignocellulosic flour

and/or the cellulosic flour, it can have a relatively high viscosity. Casting can be the optimum way of applying the lacquer.

The fourth aspect of the invention relates to a floor. The floor comprises a basis, preferably an inorganic basis – e.g. a cement based basis -, and a lacquer layer applied onto the basis. The lacquer layer comprises a binder and a filler. The binder comprises an acrylic binder, a polyurethane binder– e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) -, a polyester binder, or an epoxy binder; or combinations thereof. The filler comprises lignocellulosic flour or cellulosic flour or both.

The lacquer layer has the benefit that the fillers are plant based and ensure carbon capture during a long time, thereby contributing to the reduction of carbon dioxide emissions.

The lignocellulosic flour or the cellulosic flour provides a surface texture to a lacquer layer, thereby providing a decorative effect to the floor of the invention.

It is a further benefit that lignocellulosic flour and cellulosic flour have hydroxyl groups that bind with the binder of the lacquer, or to a top lacquer layer provided onto the lacquer layer. Therefore, the invention provides floors having improved mechanical properties.

The lacquer layer of the floor of the fourth aspect of the invention can be obtained by applying a lacquer according to any embodiment of the first aspect of the invention.

The lacquer can e.g. be applied to the basis by a casting operation.

Preferably, the lignocellulosic flour or the cellulosic flour of the lacquer layer have D50 particle size between 1 micrometer and 100 micrometer, more preferably below 20 micrometer. The D50 particle size is, as determined via the cumulative particle size distribution according to volume measured by means of laser diffraction, the particle size of which 50% of the particles are smaller.

A preferred floor is characterized in that the lacquer layer comprises between 2 and 25 parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

Such embodiments provide optimized performance of floors.

More preferably, the lacquer comprises more than 5 – and more preferably more than 10 - parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

Such embodiments provide optimized performance of the lacquer layer.

The filler can comprise wood flour. It is a benefit that waste products, e.g. from wood saving mills can be used.

The filler can comprise plant based flour, e.g. plant straw flour. Examples of plant based flour that can be used in the invention are straw flour, hemp flour, flax flour, miscanthus flour or ricehusk flour.

It is an advantage of the use of plant based flour in lacquer layers according to the invention that waste streams can be valorized.

A preferred floor is characterized in that the filler comprises chemically treated wood flour, chemically treated plant based flour or chemically treated plant straw flour. This way, the properties of the lacquer layer are improved.

Examples of chemically treated wood flour or chemically treated plant based flour or chemically treated plant straw for use in lacquer layers according to the invention are acetylated wood flour, acetylated plant based flour or acetylated plant straw flour. It is a benefit of such embodiments that lacquer layers are obtained that have improved water resistance.

A preferred floor is characterized in that the filler comprises thermally treated wood flour, thermally treated plant based flour or thermally treated plant straw flour. This way, the properties of the lacquer layer are improved.

The lacquer layer can comprise additives, such as pigments, dyes, abrasion resistant particles (such as e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond), mineral based fillers (such as e.g. cement, gypsum, magnesium oxide); or combinations thereof. Such additives allow to optimize the properties of the lacquer layer.

A preferred floor is characterized in that the lacquer layer provides the surface layer of the floor.

It is a benefit of such embodiment that the filler will provide a surface texture to the floor.

A preferred floor is characterized in that at least one top lacquer layer is applied onto the lacquer layer, preferably wherein the at least one top lacquer layer is transparent. Such embodiments allow to improve the wear resistance and/or the scratch resistance of the floor.

The lignocellulosic flour or the cellulosic flour, or combinations thereof, of the lacquer layer have hydroxyl groups that can bind to the top lacquer layer resulting in improved mechanical properties of the surface of the floor.

The top lacquer layer can be free from lignocellulosic and cellulosic particles. It is a benefit of such embodiments that the binder content of the top lacquer layer is higher, resulting in better wear resistance and better scratch resistance of the floor.

To further improve the wear resistance and the scratch resistance of the floor, the top lacquer layer can comprise abrasion resistant particles, e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond.

The optional at least one top lacquer layer of the floor can be selected from a polyurethane lacquer layer (e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU)) or an acrylic lacquer layer. Such top lacquer layers have the benefit that they provide good durability, e.g. good wear resistance and good scratch resistance, to the floor.

An optional polyurethane top lacquer layer of the floor can be a one component polyurethane lacquer layer, e.g. applied as water based polyurethane dispersion.

An optional polyurethane top lacquer layer of the floor can be a two component polyurethane lacquer layer. It is a benefit of such top lacquer layers that improved wear resistance of the decorative panel is obtained. Preferred two component polyurethane lacquer layers are obtained from a polyol and an isocyanate.

A preferred top lacquer layer of the floor is a cross-linked top lacquer layer. Such embodiments provide improved durability of the decorative panel.

A preferred floor comprises a the top lacquer layer which is less than 100 micrometer thick, and more preferably less than 50 micrometer thick. It is a benefit of such embodiments that a texture pressed into the floor before applying the top lacquer layer is preserved .

In a preferred embodiment, the lacquer layer of the floor has a uniform thickness over the surface of the floor.

A preferred floor is characterized in that the thickness of the lacquer layer is more than 0.5 mm, preferably more than 1 mm, and preferably less than 3 mm, more preferably less than 2.5 mm. Such embodiments provide a floor with decorative effects that maintain their visuals even if some wear occurs to the panel.

The fifth aspect of the invention relates to a method for providing a decorative layer to a floor, optionally for providing a floor as in any embodiment of the fourth aspect of the

invention. The method comprises the steps of applying a lacquer on a basis, thereby providing a lacquer layer on the basis. The lacquer is a lacquer as in any embodiment of the first aspect of the invention.

It is a benefit of the method of the fifth aspects of the invention that large floor surfaces can be provided with a uniformly applied decorative surface layer in a way that ensures long capture of renewable carbon, thereby limiting carbon dioxide emissions.

The basis preferably is an inorganic basis, e.g. a cement based basis.

A preferred method for providing a decorative layer to a floor is characterized in that the method comprises the step of applying at least one top lacquer layer on the lacquer layer. The at least one top lacquer layer preferably is transparent.

The lignocellulosic flour or the cellulosic flour, or combinations thereof, of the lacquer layer have hydroxyl groups that can bind to the top lacquer layer resulting in improved mechanical properties of the surface of the floor.

The optional at least one top lacquer layer can be selected from a polyurethane lacquer layer (e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU)) or an acrylic lacquer layer. Such top lacquer layers have the benefit that they provide good durability, e.g. good wear resistance and good scratch resistance.

An optional polyurethane top lacquer layer can be a one component polyurethane lacquer layer, e.g. applied as water based polyurethane dispersion.

An optional polyurethane top lacquer layer can be a two component polyurethane lacquer layer. It is a benefit of such top lacquer layers that improved wear resistance of the floor is obtained. Preferred two component polyurethane lacquer layers are obtained from a polyol and an isocyanate.

Preferably, the top lacquer layer is a cross-linked top lacquer layer. Such embodiments provide improved durability of the decorative panel.

A preferred method for providing a decorative layer to a floor is characterized in that the method comprises the step of curing the top lacquer layer at room temperature. It is a benefit that no special treatment needs to be performed to cure the top lacquer layer to obtain a floor covering with excellent durability.

In a preferred method for providing a decorative layer to a floor, the lacquer providing the top lacquer layer comprises a cross linking agent, e.g. an isocyanate. Such embodiments provide optimum cross-linking of the top lacquer layer and therefore optimized wear resistance of the floor.

A preferred method according to the fifth aspect of the invention is characterized in that the lacquer is uniformly applied on the basis.

A preferred method according to the fifth aspect of the invention is characterized in that applying the lacquer on the substrate is performed via a casting operation. As the lacquer comprises the lignocellulosic flour and/or the cellulosic flour, it can have a relatively high viscosity. Casting can be the optimum way of applying the lacquer onto the basis.

With the intention of better showing the characteristics of the invention, hereafter, as an example without any limitative character, several preferred embodiments are described, with reference to the accompanying drawings, wherein:

figure 1 shows an example of a decorative panel according to the invention;
figure 2 shows another example of a decorative panel according to the invention; and
figure 3 shows a floor according to an aspect of the invention.

Figure 1 shows an example of a decorative panel 1 according to the invention. The decorative panel comprises a substrate 2. The substrate can e.g. consist of a wood-fiber board, e.g. High Density Fiberboard, or a wood particle board.

The decorative panel 1 comprises a lacquer layer 4 according to the invention. The lacquer layer 4 can e.g. be a lacquer according to the following example. The lacquer of the example has been prepared as follows. Wood flour has been added to an aqueous emulsion of a self-cross linking acrylic polymer with 50% by weight of solids. The glass transition temperature of the acrylic polymer is 1°C. Film formation of the acrylic polymer occurs below 1°C. For each 100 parts by weight of solids of the acrylic polymer, 20 parts by weight of wood flour has been added. The obtained combination has been stirred.

The lacquer has been casted on the substrate 2 to a uniform layer thickness. The lacquer has cured at room temperature to form a uniform lacquer layer 4 of thickness 1.5 mm.

The presence of the lacquer layer 4 provides a decorative surface to the panel 1. The wood flour provides a surface texture, as it creates a certain roughness. The wood flour also provides a coloration to the panel surface.

After curing of the lacquer layer 4, a second lacquer layer 6 has been uniformly applied in the same way on the panel surface opposite to the panel surface comprising the lacquer layer 4. This way, the decorative panel 1 of the example of figure 1 can be used at both sides. When one side is worn, the panel can be turned over.

The decorative panel 1 comprises at least at two opposite parallel side edges 8, 9 coupling parts for coupling the decorative panel with a second decorative panel at their respective side edges. The coupling parts are configured such that in coupled condition a locking is provided in the direction perpendicular to the surface of the coupled decorative panels; as well as a locking is provided in the direction perpendicular to the coupled side edges and parallel to the surface of the coupled panels.

The coupling parts comprise a male coupling part at one 8 of the two opposite parallel side edges and a female coupling parts at the other one 9 of the two opposite parallel side. The male coupling part is substantially provided by a tongue 20. The female coupling part is substantially provided by a groove 22 delimited by a front lip 24 and a rear lip 26. The tongue 20 and the groove 22 substantially provided in coupled condition for the locking in the direction perpendicular to the surface of the coupled decorative panels. The tongue 20 and the female coupling part comprise locking parts 27, 28. The locking parts 27, 28 substantially provide in coupled condition for the locking provided in the direction perpendicular to the coupled side edges and parallel to the surface of the coupled panels. The locking parts 27, 28 are provided by a protrusion 28 at the rear lip 26 and a corresponding recess 27 at the rear side of the tongue 20.

Figure 2 shows another example of a decorative panel according to the invention. The decorative panel 1 of figure 1 is similar in composition as the decorative panel of figure 1, except that on both sides of the panel a transparent top lacquer layer 30, 32 has been applied on the lacquer layer 4 and the second lacquer layer 6 respectively for improved durability of the decorative panel surfaces. The top lacquer can e.g. be a polyurethane lacquer, applied as an aqueous polyurethane dispersion.

Figure 3 shows an example of a floor 50 according to the invention. The floor 50 comprises a cement based basis 40 and a lacquer layer 4 applied onto the basis. The lacquer layer 4 can be produced with the lacquer used for the floor panel of figure 1. The lacquer layer 4 has uniform thickness and can be applied by means of casting.

The present invention is in no way limited to the embodiments described as an example and represented in the figures, on the contrary it can be realized in various forms and dimensions, without leaving the scope of the invention.

Claims

1.- Lacquer, preferably for providing a lacquer layer to a floor covering, wherein the lacquer comprises a binder and a filler, wherein the binder comprises an acrylic binder, a polyurethane binder – e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) -, a polyester binder or an epoxy binder; or combinations thereof, characterized in that the filler comprises lignocellulosic flour or cellulosic flour or both.

2.- Lacquer as in claim 1, characterized in that the lacquer comprises between 2 and 25 parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

3.- Lacquer as in any of the preceding claims, characterized in that the filler comprises wood flour, plant based flour or plant straw flour; e.g. straw flour, hemp flour, flax flour, miscanthus flour or ricehusk flour.

4.- Lacquer as in any of the preceding claims, characterized in that the filler comprises chemically treated wood flour, chemically treated plant based flour or chemically treated plant straw flour, for example acetylated wood flour, acetylated plant based flour or acetylated plant straw flour.

5.- Lacquer as in any of the preceding claims, characterized in that the lacquer comprises pigments, dyes, abrasion resistant particles (such as e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond), mineral based fillers (such as e.g. cement, gypsum, magnesium oxide); or combinations thereof.

6.- Lacquer as in any of the preceding claims, characterized in that the lacquer is a water-based lacquer.

7.- Lacquer as in any of the preceding claims 1- 6, characterized in that the binder is a polyurethane, wherein at least part of the polyol of the polyurethane is a biobased polyol.

8.- Lacquer as in any of the preceding claims 1 – 7, characterized in that the binder is a polyurethane binder, preferably present in the lacquer as a dispersion.

9.- Lacquer as in any of the preceding claims 1 – 8, characterized in that the binder is a two-component polyurethane binder, preferably wherein the first component is a polyol and the second component is a di-isocyanate.

10.- Lacquer as in any of the preceding claims 1 – 6, characterized in that the binder is an acrylic binder, preferably present in the lacquer as a dispersion or as an emulsion.

11.- Lacquer as in any of the preceding claims 1 – 10, characterized in that film formation of the lacquer occurs at room temperature.

12.- Lacquer as in any of the preceding claims 1 – 10, characterized in that film formation of the lacquer requires temperature higher than 60°C.

13.- Lacquer as in any of the preceding claims 1 - 12, characterized in that curing of the binder of the lacquer requires UV-radiation.

14.- Lacquer as in any of the preceding claims 1 – 12, characterized in that curing of the binder of the lacquer occurs a room temperature.

15.- Lacquer as in any of the preceding claims, characterized in that the glass transition temperature of the binder is less than 60°C, and preferably less than 40°C, more preferably less than 25°C.

16.- Decorative panel – e.g. a floor, wall or ceiling panel -, characterized in that the decorative panel comprises a lacquer layer; wherein the lacquer layer comprises a binder

and a filler, wherein the binder comprises an acrylic binder, a polyurethane binder – e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU) -, a polyester binder or an epoxy binder; or combinations thereof; wherein the filler comprises lignocellulosic flour or cellulosic flour or both.

17.- Decorative panel as in claim 16, characterized in that the lacquer layer comprises between 2 and 25 parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

18.- Decorative panel as in any of the preceding claims 16 - 17, characterized in that the filler comprises wood flour, plant based flour or plant straw flour; e.g. straw flour, hemp flour, flax flour, miscanthus flour or ricehusk flour.

19.- Decorative panel as in any of the preceding claims 16 - 18, characterized in that the filler comprises chemically treated wood flour, chemically treated plant based flour or chemically treated plant straw flour, for example acetylated wood flour, acetylated plant based flour or acetylated plant straw flour.

20.- Decorative panel as in any of the preceding claims 16 - 19, characterized in that the lacquer comprises pigments, dyes, abrasion resistant particles (such as e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond), mineral based fillers (such as e.g. cement, gypsum, magnesium oxide); or combinations thereof.

21.- Decorative panel as in any of the preceding claims 16 - 20, characterized in that the lacquer layer provides the surface layer of the decorative panel.

22.- Decorative panel as in any of the preceding claims 16 - 20, characterized in that at least one top lacquer layer is applied onto the lacquer layer, preferably wherein the at least one top lacquer layer is transparent.

23.- Decorative panel as in claim 22, characterized in that the at least one top lacquer layer is selected from a polyurethane lacquer layer (preferably a one component

polyurethane lacquer layer – e.g. a water-based polyurethane dispersion - or a two component polyurethane lacquer layer) or an acrylic lacquer layer.

24.- Decorative panel as in any of the preceding claims 22 - 23, characterized in that the top lacquer layer is a cross-linked top lacquer layer.

25.- Decorative panel as in any of the preceding claims 22 - 22, characterized in that the top lacquer layer is less than 100 micrometer thick, and preferably less than 50 micrometer thick.

26.- Decorative panel as in any of the preceding claims 22 - 24, characterized in that the panel surface opposite to the panel surface comprising the lacquer layer comprises a second lacquer layer provided by a lacquer as in any of the preceding claims 1 – 15.

27.- Decorative panel as in any of the preceding claims 16 – 26, characterized in that the decorative panel comprises a substrate, wherein the substrate comprises or consists of a board, preferably selected from the list consisting of a wood board, a wood-based panel, a wood-fiber board, a wood particle board, an inorganic board (e.g. a cement based board or a magnesium oxide board), a polymer matrix board (e.g. a polyvinyl chloride board, a polypropylene board or a polyester board), a board comprising lignocellulosic fibers (e.g. miscanthus fibers) bonded together by a binder, or combinations thereof.

28.- Decorative panel as in any of the preceding claim 16 - 27, characterized in that the decorative panel comprises at least at two opposite parallel side edges coupling parts for coupling the decorative panel with a second decorative panel at their respective side edges; wherein in coupled condition a locking is provided in the direction perpendicular to the surface of the coupled decorative panels; as well as a locking is provided in the direction perpendicular to the coupled side edges and parallel to the surface of the coupled panels; wherein the coupling parts comprise at one of said two opposite side edges a male coupling part; wherein the coupling parts comprise at the other one of said two opposite side edges a female coupling part.

29.- Decorative panel as in any of the preceding claims 16 – 28, characterized in that the glass transition temperature of the binder is less than 60°C, and preferably less than 40°C, more preferably less than 25°C.

30.- Decorative panel as in any of the preceding claims 16 – 29, characterized in that the thickness of the lacquer layer is more than 0.5 mm, preferably more than 1 mm, and preferably less than 3 mm, more preferably less than 2.5 mm.

31.- Method for producing a decorative panel – optionally a decorative panel as in any of the preceding claims 16 - 30, wherein the method comprises the steps of
- providing a substrate; and
- applying a lacquer on the substrate thereby providing a lacquer layer on the substrate;
characterized in that the lacquer is a lacquer as in any of the preceding claims 1 – 15.

32.- Method as in claim 31, characterized in that the method comprises the step of applying at least one top lacquer layer on the lacquer layer, preferably wherein the at least one top lacquer layer is transparent.

33.- Method as in claim 32, characterized in that the lacquer providing the at least one top lacquer layer is selected from a polyurethane lacquer layer (preferably a one component polyurethane lacquer layer – e.g. a water-based polyurethane dispersion - or a two component polyurethane lacquer layer) or an acrylic lacquer layer.

34.- Method as in any of the preceding claims 31 - 33, characterized in that the method comprises the step of cross-linking and/or polymerizing the at least one top layer lacquer, preferably by means of increased temperature or by means of UV-radiation or both.

35.- Method as in claim 32 - 34, characterized in that the lacquer providing the top lacquer layer comprises a cross linking agent, e.g. an isocyanate.

36.- Method as in any of the preceding claims 31 - 35, characterized in that the decorative panel comprises a substrate, wherein the substrate comprises or consists of a

board, preferably selected from the list consisting of a wood board, a wood-based panel, a wood-fiber board, a wood particle board, an inorganic board (e.g. a cement based board or a magnesium oxide board), a polymer matrix board (e.g. a polyvinyl chloride board, a polypropylene board or a polyester board), a board comprising lignocellulosic fibers (e.g. miscanthus fibers) bonded together by a binder, or combinations thereof.

37.- Method as in any of the preceding claims 31 - 36, characterized in that the lacquer is uniformly applied on the substrate.

38.- Method as in any of the preceding claims 31 - 37, characterized in that applying the lacquer on the substrate is performed via a casting operation.

39.- Floor, characterized in that the floor comprises a basis, preferably an inorganic basis – e.g. a cement based basis -, and a lacquer layer applied onto the basis; wherein the lacquer layer comprises a binder and a filler, wherein the binder comprises an acrylic binder, a polyurethane binder – e.g. an isocyanate based polyurethane or a non-isocyanate polyurethane (NIPU), – a polyester binder or an epoxy binder; or combinations thereof; wherein the filler comprises lignocellulosic flour or cellulosic flour or both.

40.- Floor as in claim 39, characterized in that the lacquer layer comprises between 2 and 25 parts by weight of the combination of lignocellulosic flour and cellulosic flour for each 100 parts by weight of the solids content of the binder.

41.- Floor as in any of the preceding claims 39 - 40, characterized in that the filler comprises wood flour, plant based flour or plant straw flour; e.g. straw flour, hemp flour, flax flour, miscanthus flour or ricehusk flour.

42.- Floor as in any of the preceding claims 39 - 41, characterized in that the filler comprises chemically treated wood flour, chemically treated plant based flour or chemically treated plant straw flour, for example acetylated wood flour, acetylated plant based flour or acetylated plant straw flour.

43.- Floor as in any of the preceding claims 39 - 42, characterized in that the lacquer comprises pigments, dyes, abrasion resistant particles (such as e.g. aluminium oxide, silicon carbide, silicon dioxide, diamond), mineral based fillers (such as e.g. cement, gypsum, magnesium oxide); or combinations thereof.

44.- Floor as in any of the preceding claims 39 - 43, characterized in that the lacquer layer provides the surface layer of the floor.

45.- Floor as in any of the preceding claims 39 - 43, characterized in that at least one top lacquer layer is applied onto the lacquer layer, preferably wherein the at least one top lacquer layer is transparent.

46.- Floor as in claim 45, characterized in that the at least one top lacquer layer is selected from a polyurethane lacquer layer (preferably a one component polyurethane lacquer layer – e.g. a water-based polyurethane dispersion - or a two component polyurethane lacquer layer) or an acrylic lacquer layer.

47.- Floor as in any of the preceding claims 45 - 46, characterized in that the top lacquer layer is a cross-linked top lacquer layer.

48.- Floor as in any of the preceding claims 45 - 47, characterized in that the top lacquer layer is less than 100 micrometer thick, and preferably less than 50 micrometer thick.

49.- Floor as in any of the preceding claims 39 - 48, characterized in that the thickness of the lacquer layer is more than 0.5 mm, preferably more than 1 mm, and preferably less than 3 mm, more preferably less than 2.5 mm.

50.- Method for providing a decorative layer to a floor– optionally for providing a floor as in any of the preceding claims 39 - 49, wherein the method comprises the steps of

- applying a lacquer on a basis, preferably an inorganic basis – e.g. a cement based basis -, thereby providing a lacquer layer on the basis;
characterized in that the lacquer is a lacquer as in any of the preceding claims 1 – 15.

51.- Method as in claim 50, characterized in that the method comprises the step of applying at least one top lacquer layer on the lacquer layer, preferably wherein the at least one top lacquer layer is transparent.

52.- Method as in claim 51, characterized in that the lacquer providing the at least one top lacquer layer is selected from a polyurethane lacquer layer (preferably a one component polyurethane lacquer layer – e.g. a water-based polyurethane dispersion - or a two component polyurethane lacquer layer) or an acrylic lacquer layer.

53.- Method as in any of the preceding claims 50 - 52, characterized in that the method comprises the step of curing the top lacquer layer at room temperature.

54.- Method as in claim 50 - 53, characterized in that the lacquer providing the top lacquer layer comprises a cross linking agent, e.g. an isocyanate.

55.- Method as in any of the preceding claims 50 - 54, characterized in that the lacquer is uniformly applied on the substrate.

56.- Method as in any of the preceding claims 50 - 55, characterized in that applying the lacquer on the substrate is performed via a casting operation.

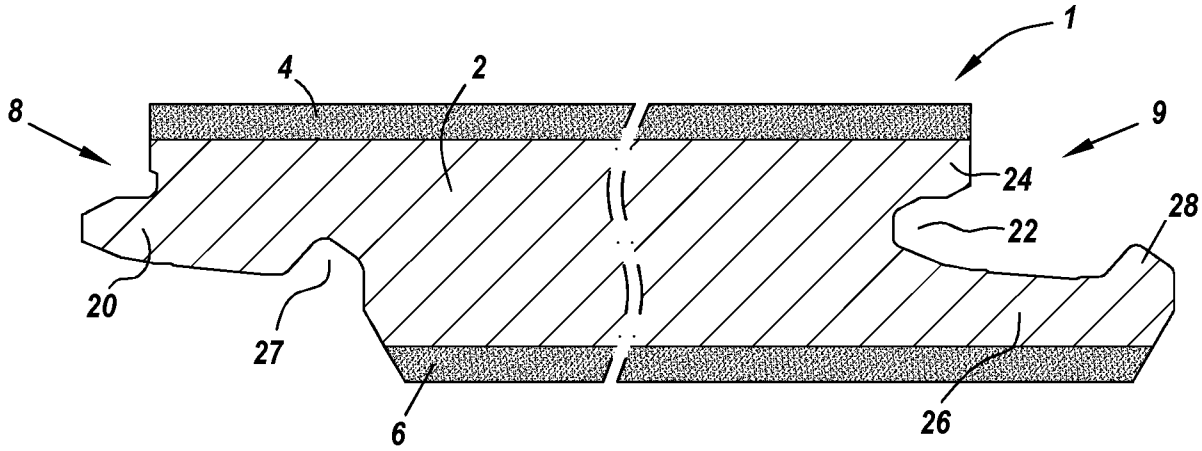

Fig. 1

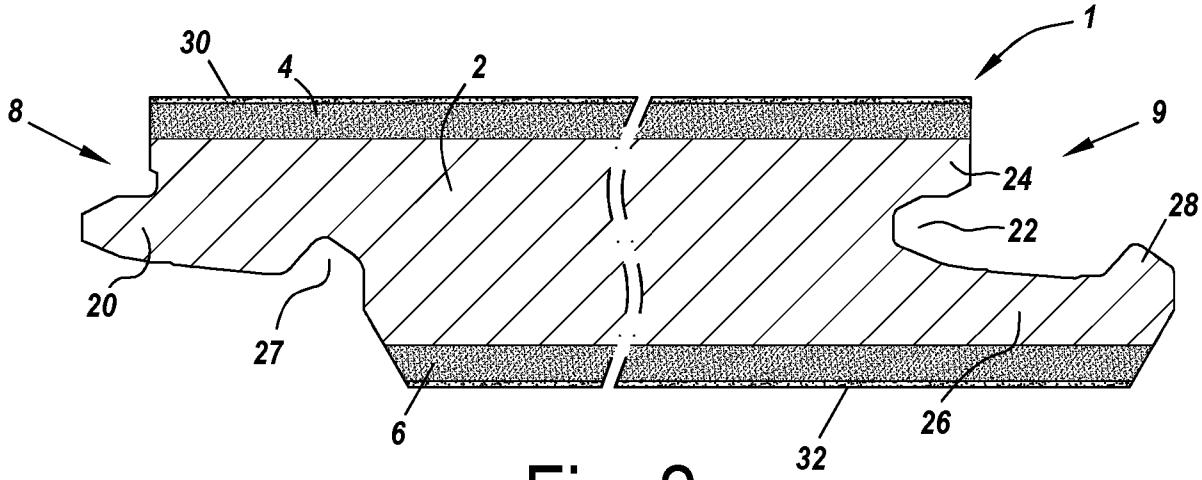

Fig. 2

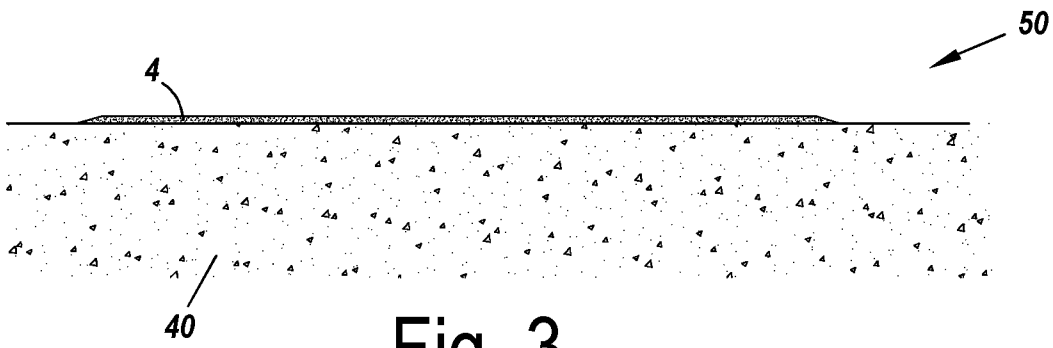

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2024/055393

A. CLASSIFICATION OF SUBJECT MATTER
INV. C09D5/00 C09D7/65 C09D101/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C09D C09J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 010 730 A1 (VALENTI IMPERO [IT]) 21 June 2000 (2000-06-21) paragraphs [0001,0004,0012,0013,0019]; claims 1-19, in particular claim 5	1-56
X	US 6 964 989 B1 (FANG JIAFU [US] ET AL) 15 November 2005 (2005-11-15) column 5 lines 1-7; column 5 lines 20-35; claims 3-12	1-56
X	JP 2007 224688 A (DAINIPPON PRINTING CO LTD) 6 September 2007 (2007-09-06) paragraphs [0028, 00037, 0054, 0057]; claims 1-9	1-56

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[x] Further documents are listed in the continuation of Box C.

[x] See patent family annex.

* Special categories of cited documents :

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"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
12 November 2024	21/11/2024

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Kositza, Matthias

3

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2024/055393

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2007 247386 A (DAINIPPON PRINTING CO LTD) 27 September 2007 (2007-09-27) paragraphs [0024, 0026]; examples in paragraphs [0057-0071]; claims 1-9	1-56
X	JP 2009 209237 A (OTANI TORYO KK) 17 September 2009 (2009-09-17) paragraphs [0011, 0012, 0018,0019]; examples 1-7; claims 1-2	1-56

3

INTERNATIONAL SEARCH REPORT

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		JP 2009209237 A	17-09-2009