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(54) WOOD SURFACE LAYER FOR A PARQUET AND METHOD FOR MANUFACTURING THE SAME

HOLZOBERFLÄCHENSCHICHT FÜR PARKETT UND VERFAHREN ZU DEREN ERZEUGUNG

COUCHE DE SURFACE EN BOIS POUR PARQUET ET PROCEDE DE FABRICATION

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CH-A- 643 177
DE-A- 3 045 077
SE-B- 219 067
CH-A- 521 863
DE-A- 1 492 562
SE-B- 218 610

- **DERWENT'S ABSTRACT No. 366 60 B/19, SU 612 944, publ. week 7919.**

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Description

The present invention relates to a wood surface layer for a parquet, wherein the wood grains extend perpendicularly or at an angle substantially deviating from zero relative to the plane of a parquet surface, and over substantially the entire thickness of a wood surface layer some of the cell-wall water of wood is replaced by a water-soluble polyalcohol, most preferably by polyethylene glycol having a molecular weight within the range of 600 - 1200.

The use of vertically grained wood as a parquet surface layer offers several benefits. Wear resistance, hardness and compression strength in the direction of wood grains are clearly superior to the same values in the direction perpendicular to wood grains.

However, the use of vertically grained wood as a parquet surface layer invloves several problems with no satisfactory solution thus far and, therefore, a commercial breakthrough is yet to be achieved as well. One problem is the formation of seasoning cracks and after-movements (dimensional fluctuation) as a result of moisture variations. Another problem is the porosity of a finished wood surface. If a porous surface is conventionally coated with parquet lacquer layers (e.g. UV-setting urethane lacquers), the thin film of lacquer would be rapidly ruptured when subjected to wear. The film develops dot-like ruptures with moisture penetrating therethrough in wood and the surface blackens. The traditional horizontally grained parquets employ a wood non-impregnating primer varnish which builds a film-like seal between wood and coating lacquer layers. The total consumption of expensive parquet lacquers remains relatively low, all in all appr. 30 - 40 g/m^2. However, this type of parquet varnishing technique, with a prime varnish seal being applied directly to a ground wood surface, would in the invention lead to an unfavourable and unstable surface structure.

It is known from SE, 218 610, SE 219 067, DE 1 492 562 and CH 643 177 to replace the cell-water and cell-wall water in wooden layered products with polyalcohols in order to achieve dimensional stability and to prevent seasoning cracks. DE 1 492 562 also mentions several different types of wood, e.g.: popular used for this impregnation.

From DE 3 045 077, CH, 521 863 and SU 612 944 parquet surface layers with a first resin layer and a second laquer layer are known.

An object of the invention is to provide a parquet structure and its manufacturing method, capable of avoiding the cracking of a wood surface layer upon drying or seasoning thereof and also capable of substantially eliminating the after-movements caused by moisture fluctions.

This object is achieved by means of a wood surface layer as set forth in the annexed claim 1 and by means of a method as set forth in claim 3 for manufacturing a wood surface layer.

A further object of the invention is yet to improve this parquet structure and its manufacturing method in a manner that even the otherwise good wear resistance and hardness of vertically grained wood can still be substantially increased while providing an effective extra shield to the penetration of moisture and an effective binding against the forces of remaining moisture-induced movements and, yet at the same time, the amount of expensive parquet lacquer can be conventional.

This further object is achieved by means of a wood surface layer as set forth in the annexed claim 2 and by means of a method as set forth in claim 3 for manufacturing the same.

A parquet surface layer of the invention and its manufacturing method will now be described in more detail with reference made to the accompanying drawings, in which

fig. 1 is a schematic plan view showing the various working sequences for wood slices or blocks used in the manufacture of a wood surface layer by applying a method of the invention.

Fig. 2 illustrates hexagonal wood slices or blocks which have been treated with a method of the invention for use in a parquet wood surface layer.

Fig. 3 is a perspective view of a cross-sectioned parquet element which has a structure of the invention.

Fig. 4 is a cross-section of a sandwich parquet structure, and

fig. 5 shows in a larger scale a vertical section of a parquet wood surface layer with the wood grains extending in vertical direction.

The manufacturing of a wood surface layer of the invention proceeds as follows. Slices or blocks of suitable thickness are cut from a fresh polygonal wood balk perpendicularly or at an acute angle to the wood grains. At this point, the slices or blocks may have a thickness of e.g. 14 mm. These wood slices or blocks, fig. 2 showing a hexagonal example, are impregnated with a water-soluble polyalcohol, for example polyethylene glycol (PEG). The purpose of this is that the water-soluble impregnant replaces a sufficient amount of the cell-wall water of wood cells. This prevents the formation of seasoning cracks in wood and after-movements (dimensional fluctuations) caused by moisture variations. As well known, the moisture-induced movements of wood are definitely caused by an amount of water contained in cell walls and by the swelling and shrinking of a cell wall resulting from fluctuations in said amount of water.

In order to impregnate a ployalcohol rapidly and continuously within wood, the invention proceeds as follows.

The slices or blocks cut off of fresh wood are carried onto a loading table 6 including a conveyor for carrying the slices or blocks into a microwave oven 7 for heating and also partially evaporating the internal water of wood. The temperature of wood slices or blocks 1' flowing out of oven 7 and that of the water, water vapour and air contained therein lies within the range of 40 - 90°C. Conveyors 8 and 10 downstream of oven 7 are at room temperature, resulting in the cooling of wood and water vapour and hot air contained therein. This results in the development of vacuum within the interior of wood, which facilitates and accelerates the impregnation of polyalcohol within wood. A nozzle 9 is used to drain non-diluted polyalcohol in the form of a suitably heated thin flowable film, which trickles through a gap 8a between the successive sections of track 8 into a receiving trough 9. Thus, the film spreads over wood slices or blocks advancing upon conveyor track 8, passing over gap 8a and beneath nozzle 9. Between tracks 8 and 10 said wood blocks are turned over and a nozzle 11 is used to apply a polyalcohol film to the opposite surfaces of the blocks. The water-soluble polyalcohol impregnates well within wood as a result of its moisture and vacuum. A preferred polyalcohol is polyethylene glycol having a molecular weight within the range of 600 - 1200. Naturally, it is also possible to employ other water-soluble wood processing polyalcohols capable of replacing cell-wall water in wood.

In the following operation, the wood slices or blocks are advanced or carried into a heat-treating storage 12, having a temperature of 50 - 80°C. In this heat-treating storage the wood slices or blocks are held 1 - 3 days, during which time the penetration (diffusion) of polyalcohol to a sufficient depth on either side of a wood block. The blocks thus impregnated with polyalcohol are removed from heat-treating storage and dried whereby, upon the removal of water, the polyalcohol concentrates. The block surfaces are ground and the contours are worked to precise dimensions. Thereafter, the blocks are glued to create board parquet blanks, i.e. the blocks are adhered between two basic layers 4. The adhesion to a basic parquet element layer 4 can be effected with a resin or a wood-based adhesive 5 (e.g. polyester resin or polyvinyl acetate adhesive). The base 4 can be preferably made of plywood having a thickness of e.g. 9 mm. The base 4 may also include one or more layers of reinforced plastics. The blank is sawn through in the middle of wood blocks 1 and the resulting boards are worked to form butments and the sawn-off surfaces are ground smooth. Following the sawing and grinding operation, the vertically grained surface layer 1 has a thickness of e.g. 3,0 - 3,5 mm.

The surface of a finished wood parquet element is coated with a filling resin or varnish, which is allowed to impregnate within and between the wood grains. The impregnation of filling resin is accelerated basically the same way as described above in connection with the impregnation of PEG. Thus, the boards are pre-heated whereby, upon cooling, they absorb the resin to a sufficient depth within and between the wood grains. One preferred filling resin or varnish is an inexpensive polyester resin, whereby the parquet manufacturing costs remain reasonable despite the fact that, due to the porosity of a surface, the required amount of resin will be 100 - 300 g/m^2, preferably 150 - 200 g/m^2. Thus, the filling resin or varnish adsorbs locally to the depth of up to 0,5 mm and over most of the surface area to the depth of more than 0,2 mm. Hence, the thickness of filling resin or varnish layer 2 impregnating in wood varies according to the porosity and absorbability of wood but is within the above range. The process preferably employs a UV-setting polyester resin but another possibility is a conventional, extra heat activated (accelerated) setting reaction. A layer consisting of filling resin or varnish 2 increases substantially the wear resistance and hardness of vertically grained wood. The surface filling layer also provides an additional protection against the penetration of moisture and, at the same time, reinforces the structure against the forces created by the remaining mosture-induced movements.

By virtue of filling layer 2, the consumption of expensive parquet lacquers, such as UV-setting polyurethane lacquers, remains on the same level or will be lower than in conventional board parquets. Its amount is 20 - 50 g/m^2. Thus, the amount of filling resin or varnish to be impregnated within wood is appr. 4 - 5 times that of a parquet lacquer. However, the price of e.g. polyester resin is only a fraction of that of the UV-setting urethane lacquer used as a parquet lacquer.

A method of the invention is also suitable for manufacturing a high-quality parquet from soft grades of wood. For example, alder has been used to manufacture for test purposes a vertically-grained wood parquet having an approximately double hardness and a multiple wear resistance as compared to normal oakwood parquet. Also aspen can be used to produce a parquet competitive with the available grade of parquet in terms of wear resistance and hardness. The same applies also to the relatives of aspen, e.g. poplar. Indeed, one discovery and benefit of the invention relates to the very use of soft grades of wood. Since the compression strength of soft grades of wood in the cross-grain direction is low, the cross-grain directed forces, which the grain texture is capable of transmitting, remain low as well and this is another reason why the moisture-induced movements of a parquet will also remain negligible.

A single parquet element can be made to be relatively wide (e.g. 278 cm), whereby it is possible to create a wide range of designs by varying the laying-down patterns of wood blocks which vay in terms of colour tones and sizes/designs. The possibility of using inexpensive wood materials such as alder and aspen renders a parquet structure of the invention competitive also in terms of price.

This method can be applied to the manufacture of finished parquet or board parquet but it is also applicable to genuine parquet to be laid directly on the floor to match a traditional floor parquet, wherein the blocks are glued

directly to the floor, ground and varnished with parquet lacquers.

Claims

1. A wood surface layer for a parquet, wherein the wood grains extend perpendicularly or at an angle substantially deviating from zero relative to the plane of a parquet surface, and over substantially the entire thickness of a wood surface layer (1) some of the cell-wall water of wood is replaced by a water-soluble polyalcohol, most preferably by polyethylene glycol having a molecular weight within the range of 600 - 1200, **characterized** in that between and within the vertical wood grains to the depth of 0,1 - 0,5 mm, the wood surface layer is impregnated with a filling resin or varnish (2), whose amount is 100 - 300 g/m^2, and upon this varnish is applied a parquet lacquer (1) in an amount of 20 - 50 g/m^2.

2. A wood surface layer for a parquet as set forth in claim 1, **characterized** by consisting of one or more of the following grades of wood: alder, aspen, poplar, and other related soft grades of wood.

3. A method for manufacturing a parquet surface layer (1), in which surface layer the wood grains extend perpendicularly or at an angle substantially deviating from zero relative to the plane of a parquet surface, wherein wood slices or blocks (1') used for the manufacture of said surface layer (1) are heated in a heating furnace or oven (7) and the hot surfaces of said slices or blocks are coated with a wood-impregnating water-soluble polyalcohol which replaces some of the cell-wall water of wood, **characterized** in that the water-soluble polyalcohol is applied to wood surface while it is in heated condition whereby, upon cooling of the wood, the vacuum developing therein absorbs the polyalcohol to the interior of wood, and that after said polyalcohol impregnation the wooden wear surface of a wood surface layer (1) adhered to a basic parquet (4) is coated with a filling resin or varnish (2) impregnating between and within the vertical wood grains to the depth of 0,1 - 0,5 mm, the amount of said resin or varnish being 100 - 300 g/m^2, preferably 150 - 300 g/m^2, and on top of this is applied a parquet lacquer in an amount of 20 - 50 g/m^2.

4. A method as set forth in claim 3, **characterized** in that the polyalcohol comprises heat polyethylene glycol in a non-diluted condition.

5. A method as set forth in claim 3 or 4, **characterized** in that the slices or blocks cut off of fresh wood in the cross-grain direction are carried through a microwave oven (7), wherein the wood and the water, water vapour and air contained therein are heated to a temperature range of 45 - 90°C, and that the heating cycle is maintained so short that there is no time for a substantial wood drying before the water-soluble polyalcohol is applied to wood surface.

6. A method as set forth in any of claims 3 - 5, **characterized** in that the polyalcohol is applied in the form of a film discharged from a nozzle (9, 11) onto the wood slices or blocks carried on a conveyor (8, 10).

7. A method as set forth in any of claims 3 - 6, **characterized** in that following the application of the polyalcohol impregnant said wood slices or blocks are maintained at a temperature of 50 - 80°C for 1 - 3 days before adhering to a basic parquet (4).

8. A method as set forth in claim 3, **characterized** in that said filling resin (2) comprises UV-setting polyester resins and said parquet lacquer (1) comprises a UV-setting urethane lacquer.

9. A method as set forth in claim 3, **characterized** in that said filling resin (2) is applied to the surface of a heat parquet element during its cooling cycle.

Patentansprüche

1. Holzoberflächenschicht für Parkett, wobei die Holzmaserung senkrecht oder in einem Winkel verläuft, der wesentlich von Null abweicht im Verhältnis zur Parkettoberfläche, und im wesentlichen über die gesamte Stärke einer Holzoberflächenschicht (1) wird einiges Zellwandwasser des Holzes vorzugsweise durch einen wasserlöslichen Polyalkohol ersetzt, am besten durch Polyethylenglykol mit einem Molekulargewicht zwischen 600 - 1200,
dadurch gekennzeichnet,
daß die Holzoberflächenschicht 0,1 - 0,5 mm tief zwischen und innerhalb der senkrechten Holzmaserung mit einem Füllharz oder Lack (2) imprägniert wird, der 100 - 300 g/m^2 beträgt, und über diese Lakkierung wird ein Parkettlack (1) aufgetragen, der 20 - 50 g/m^2 beträgt.

2. Holzoberflächenschicht für Parkett gemäß Anspruch 1,
dadurch gekennzeichnet,
daß die Holzoberflächenschicht aus einer oder mehreren der folgenden Holzarten besteht: Erlenholz, Espenholz, Pappelnholz sowie andere zugehörige weiche Holzarten.

3. Verfahren zur Herstellung einer Holzoberflächenschicht (1) für Parkett, bei deren Oberfläche die Holzmaserung senkrecht oder in einem Winkel verläuft, der wesentlich von Null abweicht im Verhältnis zur Parkettoberfläche, wobei Holzscheiben oder -blöcke (1'), die zur Herstellung der Oberflächenschicht (1) benutzt werden, in einem Heizkessel oder Ofen (7) erhitzt werden, und die heißen Ober-

flächen der Scheiben oder Blöcke werden mit einem holzimprägnierenden, wasserlöslichen Polyalkohol beschichtet, der einiges Zellwandwasser des Holzes ersetzt,
dadurch gekennzeichnet,
daß der wasserlösliche Polyalkohol auf die Holzoberfläche aufgetragen wird, während diese sich in erwärmten Zustand befindet, wobei nach Abkühlung des Holzes das sich darin entwickelnde Vakuum den Polyalkohol in das Innere des Holzes absorbiert, und nach der Polyalkoholimprägnierung wird die hölzerne Nutzoberfläche einer hölzernen Oberflächenschicht (1), die dem Grundparkett (4) anhaftet, mit einem Füllharz oder Lack (2) beschichtet, der zwischen und innerhalb der senkrechten Holzmaserung 0,1 - 0,5 mm tief imprägniert, wobei der Füllharz oder Lack 100 - 300 g/m^2, vorzugsweise 150 - 300 g/m^2 beträgt, und als oberste Schicht wird ein Parkettlack aufgetragen, der 20 - 50 g/m^2 beträgt.

4. Verfahren gemäß Anspruch 3,
dadurch gekennzeichnet,
daß der Polyalkohol nicht-verdünntes Wärmepolyethylenglykol beinhaltet.

5. Verfahren gemäß Anspruch 3 oder 4,
dadurch gekennzeichnet,
daß die Scheiben oder Blöcke, die von saftfrischem Holz quer zur Maserung abgeschnitten werden, durch einen Mikrowellenofen (7) transportiert werden, wobei das Holz und das Wasser, der Wasserdampf und die darin enthaltene Luft auf eine Temperatur von 45 - 90° C erhitzt werden, und daß der Erhitzungskreislauf für so kurze Zeit aufrechterhalten wird, daß keine wesentliche Holzaustrocknung vor dem Auftragen des wasserlöslichen Polyalkohols auf die Holzoberfläche zustandekommen kann.

6. Verfahren gemäß Anspruch 3 bis 5,
dadurch gekennzeichnet,
daß der Polyalkohol in Form eines einer Düse (9, 11) entnommenen Films auf die Holzscheiben oder -blöcke, die sich auf einer Transportanlage (8, 10) befinden, aufgetragen wird.

7. Verfahren gemäß Anspruch 3 bis 6,
dadurch gekennzeichnet,
daß nach dem Auftragen des Polyalkoholimprägnats die Holzscheiben oder -blöcke 1 bis 3 Tage lang einer Temperatur von 50 - 80° C ausgesetzt bleiben, bevor sie mit dem Grundparkett verbunden werden.

8. Verfahren gemäß Anspruch 3,
dadurch gekennzeichnet,
daß das Füllharz (2) UV-setzende Polyesterharze und der Parkettlack (1) UV-setzende Urethanlacke beinhaltet.

9. Verfahren gemäß Anspruch 3,
dadurch gekennzeichnet,
daß das Füllharz (2) auf die Oberfläche des Wärmeparkettelements während seines Kühlungskreislaufs aufgetragen wird.

Revendications

1. Couche de bois superficielle pour un parquet, dans laquelle le fil du bois est orienté à la perpendiculaire ou à un angle notablement différent de zéro par rapport au plan du parquet et dans laquelle une partie de l'eau intercellulaire du bois est remplacée sur pratiquement toute l'épaisseur de la couche de bois superficielle (1) par un poly-alcool soluble à l'eau, de préférence par du polyéthylène-glycol, possédant un poids moléculaire entre 600 et 1200, caractérisée en ce qu'à l'intérieur et entre les fibres de bois verticales et sur une profondeur de 0,1 à 0,5 mm, la couche de bois superficielle est imprégnée d'une résine ou d'un vernis de remplissage (2) à un taux entre 100 et 300 g/m^2, et en ce que par dessus cette couche de vernis est appliqué un vernis de parquet à un taux entre 20 et 50 g/m^2.

2. Couche de bois superficielle pour un parquet comme décrite dans la revendication 1, caractérisée en ce qu'elle se compose d'une des essences de bois suivantes: aulne, tremble, peuplier ou autres essences de bois tendre apparentées.

3. Méthode de fabrication d'une couche de bois superficielle (1) dont le fil du bois est orienté à la perpendiculaire ou à un angle notablement différent de zéro par rapport au plan du parquet, et dans laquelle les rondelles ou blocs de bois (1') utilisés pour fabriquer ladite couche superficielle (1) sont chauffés dans un four ou une étuve (7) et dans laquelle les surfaces desdits rondelles ou blocs de bois reçoivent ensuite une couche d'un poly-alcool soluble à l'eau pour imprégner le bois et pour remplacer partiellement l'eau intercellulaire du bois, caractérisée en ce que cette couche de poly-alcool soluble à l'eau est appliquée sur la surface du bois tant qu'il est encore chaud, de façon à ce qu'au refroidissement du bois, le vide s'y formant aspire ledit poly-alcool à l'intérieur du bois, et en ce qu'après ladite imprégnation de la surface d'usure de la couche de bois superficielle (1) collée sur un parquet de fond (4) ladite couche est revêtue d'une résine ou d'un vernis de remplissage (2) qui pénètre dans les fibres de bois verticales elles-mêmes et les interstices sur une profondeur de 0,1 à 0,5 mm, ledit revêtement étant appliqué à un taux entre 100 et 300 g/m^2, de préférence à un taux entre 150 et 300 g/m^2, et en ce que

par dessus ce revêtement est appliqué un vernis de parquet à un taux entre 20 et 50 g/m^2.

4. Méthode de fabrication comme décrite dans la revendication 3, caractérisée en ce que ledit poly-alcool comprend du polyéthylène de glycol chaud à l'état non-dilué.

5. Méthode de fabrication comme décrite dans les revendications 3 ou 4, caractérisée en ce que lesdits rondelles ou blocs de bois coupés dans du bois frais à travers le fil du bois passent par un four à micro-ondes (7) qui chauffe le bois, l'eau, la vapeur d'eau et l'air contenus dans ce bois à une température entre 45°C et 90°C, et en ce que le cycle de chauffage est suffisamment court pour éviter un séchage substantiel du bois avant que le poly-alcool soluble à l'eau ne soit appliquée sur sa surface.

6. Méthode de fabrication comme décrite dans l'une des revendications 3 à 5, caractérisée en ce que le poly-alcool est appliqué sur la surface des rondelles ou blocs de bois sous forme d'une pellicule apposée par les pulvérisateurs (9, 11) pendant que lesdits rondelles ou blocs sont transportés par un convoyeur (8, 10).

7. Méthode de fabrication comme décrite dans l'une des revendications 3 à 6, caractérisée en ce qu'après l'imprégnation desdits rondelles ou blocs de bois par du poly-alcool, ceux-ci sont maintenus à une température entre 50°C et 80°C pendant 1 à 3 jours avant d'être collés sur le parquet de fond (4).

8. Méthode de fabrication comme décrite dans la revendication 3, caractérisée en ce que ladite résine de remplissage (2) comprend des résines de polyester durcissables à la lumière ultraviolette et en ce que ledit vernis de parquet (1) comprend des vernis au polyuréthanne durcissables à la lumière ultraviolette.

9. Méthode de fabrication comme décrite dans la revendication 3, caractérisée en ce que ladite résine de remplissage (2) est appliquée sur la surface d'un élément de parquet chaud au cours de son cycle de refroidissement.

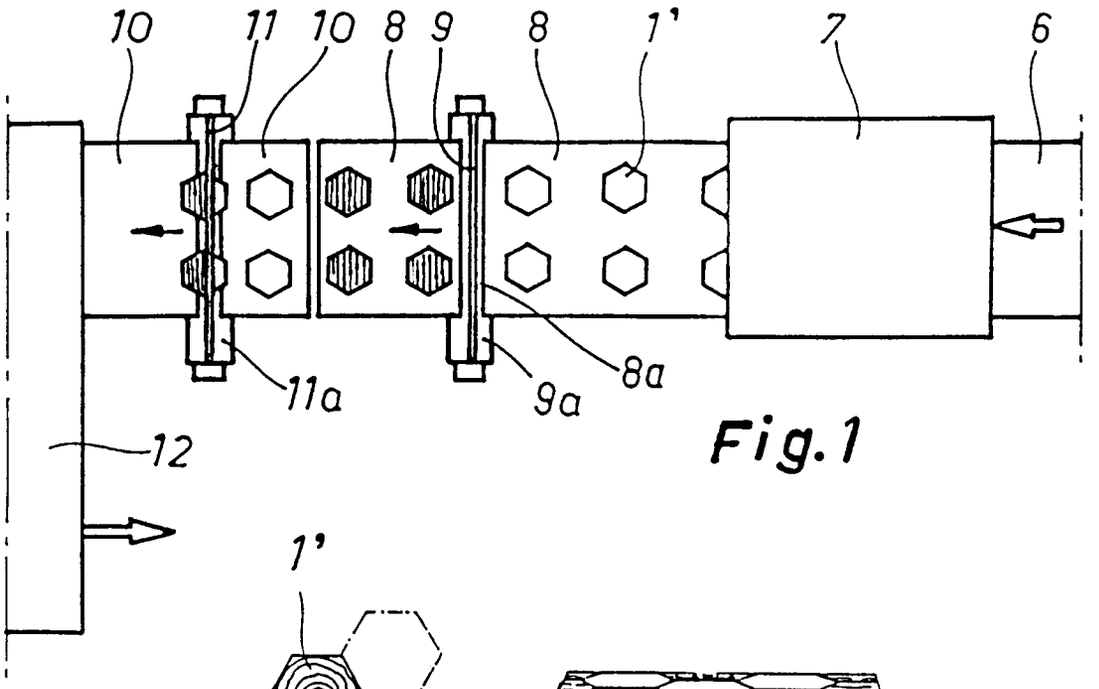


Fig. 1

Fig. 2

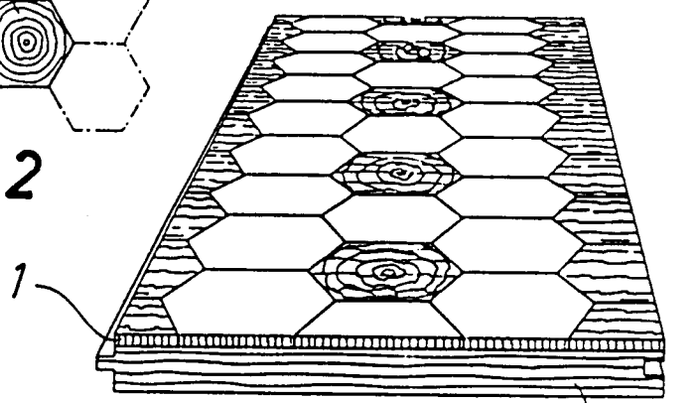


Fig. 3

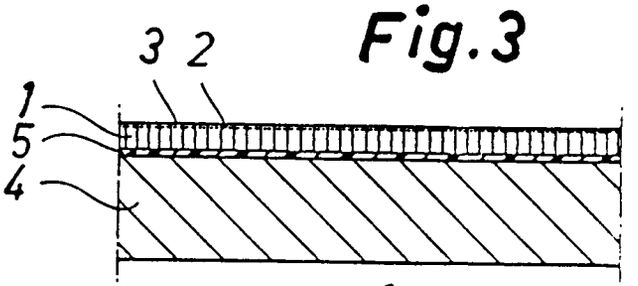


Fig. 4

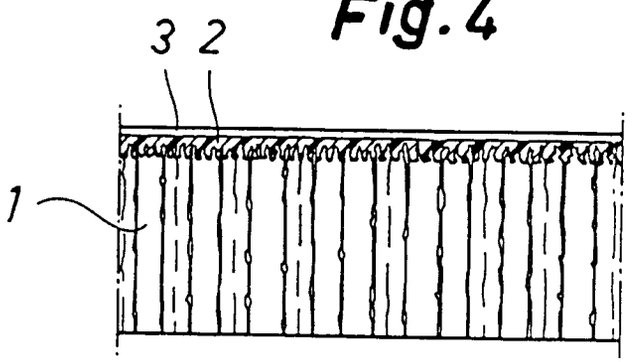


Fig. 5