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(54) Floor covering and method for manufacturing a floor covering

(57) Floor covering with at least a substrate layer (9A), a decor layer (7) and a transparent wear layer (6), wherein a relief is realized in said wear layer (6), wherein this relief comprises recesses (24), characterized in that said transparent wear layer (6) comprises at least two lacquer layers (25-26), namely a first lacquer layer (25) located at least on the bottom of at least one of said recesses (24), and a second lacquer layer which is interrupted at the location of the recess (24) concerned. The invention further also comprises a method for manufacturing such floor covering.

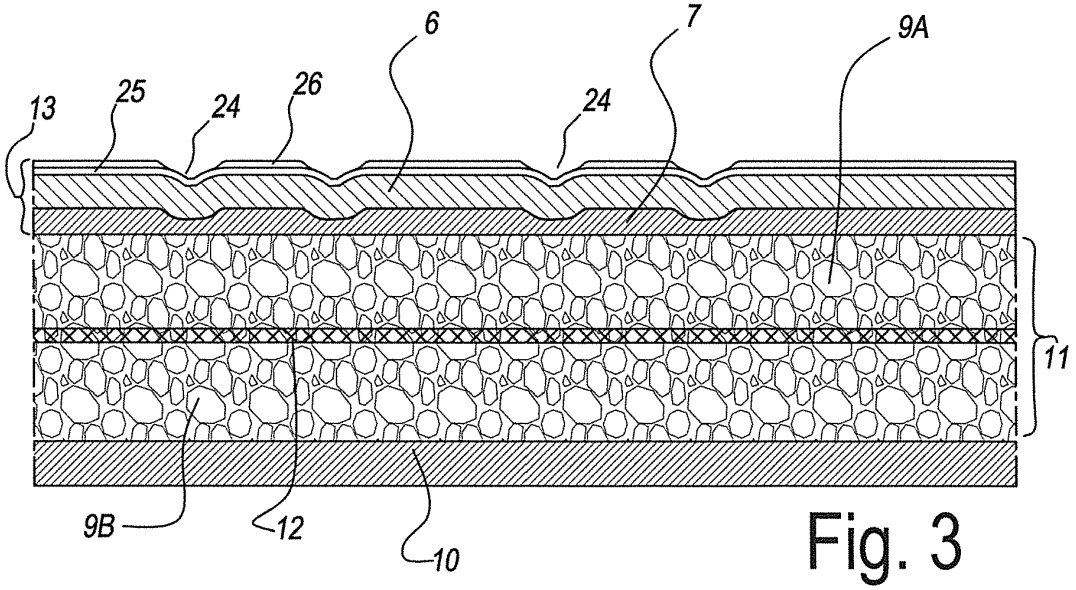

Fig. 3

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Description

[0001] This invention relates to a floor covering and a method for manufacturing a floor covering.

[0002] More particularly, the invention relates to a floor covering comprising at least a substrate layer, a decor layer and a translucent or transparent wear layer. The invention is particularly interesting for being applied with floor coverings wherein at least said substrate layer and said transparent wear layer comprise thermoplastic synthetic material.

[0003] Such floor coverings are already well-known as such. For example, this may relate to so-called vinyl tiles or so-called LVT (Luxury Vinyl Tiles), or to wall-to-wall coverings. In said cases, the thermoplastic material relates to so-called soft PVC (PolyVinyl Chloride), or PVC comprising a percentage of plasticizers, for example, of 5 to 20 percent by weight or even to 35 percent by weight or more. Herein, the decor layer relates to a print, the decor of which may form a representation of a wood or stone pattern or any other pattern, such as a fancy pattern. On the surface of the panel, namely in said wear layer, a relief or structure may be provided, such as a wood or stone structure, respectively. The thermoplastic nature of the transparent wear layer of such panels leads to problems when providing them with a structure, and without particular measures the sharpness obtainable up to now and the gloss degrees of the structure leave much to be desired. The lack of difference in gloss degree results in an artificially-looking appearance of the floor covering.

[0004] U.S. 2003/138,617 describes a method wherein a chemical technique is applied for providing a wall-to-wall floor covering with a structure. Herein, a selective foaming of thermoplastic material results in a relief at the surface of the floor covering. This technique may be combined with mechanical impressions realized by means of a structured roller. Relief realized by means of a chemical technique is uncontrolled and lacks sharpness; moreover, the technique does not offer a solution for realizing structured parts with mutually differing gloss.

[0005] From EP 1 938 963 A1, it is known to apply an UV-hardened lacquer layer on the surface of supple floor panels. From EP 2 154 184 A1, it is known to apply an

[0006] Excimer-hardened lacquer layer on the surface of such floor panels. By means of this last-mentioned procedure, matte finishing layers can be obtained. These techniques, too, however, do not offer a solution for realizing structured parts with mutually differing gloss.

[0007] From EP 2 123 476 A1, various techniques are known for realizing a wood structure with different gloss degrees in the surface of laminated floor panels. These techniques are not apt for other types of floor panels, such as for supple floor panels.

[0008] In the first place, the present invention relates to floor coverings of an alternative construction, such that new possibilities are created for the visual aspects of the surface, such as for the relief, and/or for the physical properties of the floor covering or panels.

[0009] To this end, the invention relates to a floor covering with at least a substrate layer, a decor layer and a transparent wear layer, wherein a relief is realized in said wear layer, wherein this relief comprises recesses, with the characteristic that said transparent wear layer comprises at least two lacquer layers, namely a first lacquer layer located at least on the bottom of one of said recesses, and a second lacquer layer which is interrupted at the location of the recess concerned. In this manner, the invention allows obtaining separate properties in the deeper-situated relief parts or recesses, where the first lacquer layer is present, and portions on the actual surface of the floor panel, where the second lacquer layer is present.

[0010] Preferably, said first lacquer layer extends continuously over substantially the entire floor surface and/or said second lacquer layer extends over the portions of the floor surface which are located between said recesses. It is clear that according to this preferred embodiment, both lacquer layers can be situated on top of each other over the major part of the floor surface, and that the first lacquer layer can come to the surface at the location of the recesses only.

[0011] Preferably, the floor covering of the invention shows a difference in gloss degree between the deeper-situated relief parts and the actual surface of the floor covering. According to the invention, such difference in gloss degree then is obtained in that the first and second lacquer layer are realized with a difference in gloss degree. Preferably, the difference in gloss degree relates at least to a difference of 6 or still better 10 points as measured according to DIN 67530. Preferably, the difference is such that the one lacquer layer is perceived as matte, whereas the other is perceived as glossy.

[0012] It is not excluded that by means of the invention other differences than a difference in gloss degree are obtained. For example, the actual surface can be made wear-resistant or scratchproof by a skillful choice of the material of the second lacquer layer or its additives, whereas the deeper-situated relief parts are less wear-resistant or scratchproof, for example, in that the same additives are not or less available in the first lacquer layer. An example of additives which can provide a certain scratchproofness are aluminum oxide particles.

[0013] The invention is of particular interest when it relates to supple floor coverings, preferably based on polyvinyl chloride. It is in such floor coverings that the artificial appearance can be minimized by means of the interaction of the lacquer layers.

[0014] Preferably, the transparent wear layer substantially consists of a thermoplastic layer on which at least the aforementioned two lacquer layers are provided. Preferably, said thermoplastic layer comprises soft polyvinyl chloride. In this type of thermoplastic layers, it is interesting to determine the gloss degree or gloss degrees by means of separate lacquer layers. To wit, the structured thermoplastic layer sometimes may show un-

desired gloss degrees, which then are neutralized in an effective manner by the lacquer layers of the invention.

[0015] The floor covering of the invention can be realized as a wall-to-wall covering or as a plurality of supple floor panels which have to be installed next to each other, for example, by adhering them to the underlying surface, or by installing them in a floating manner. On one or more pairs of opposite edges, they may be provided with coupling means which allow that two or more of such panels can be coupled to each other at the respective edges. This may relate, for example, to locking tongue and groove connections, such as described in WO 97/47834 or EP 1 938 963.

[0016] Preferably, the floor covering of the invention relates to a floor covering which imitates a wooden floor. In such case, said relief preferably relates to an imitation of wood pores. According to the invention, then a relief can be obtained in which the deeper-situated pores are made glossy, whereas the actual surface is made matte. The reverse is possible as well. As aforementioned, the gloss difference preferably is 6 points or more as measured according to DIN 67530. In the case of a floor covering consisting of a plurality of supple floor panels, each floor panel preferably relates to the imitation of a single wooden one-piece plank.

[0017] It is clear that the first and the second lacquer layer are made thinner than the possible remaining layers of the transparent wear layer. The overall thickness of the transparent wear layer preferably is at least 0.15 or 0.2 millimeters, whereas the thickness of the first lacquer layer as well as of the second lacquer layer is 0.05 millimeters or less, or still better 0.025 millimeters or less.

[0018] The invention further also relates to a method allowing, amongst others, manufacturing the floor covering of the invention. To this aim, the invention further also relates to a method for manufacturing a floor covering, wherein said method comprises the following steps:

- the step of preparing a semi-finished product with at least a substrate layer, a decor layer provided thereon and a transparent wear layer;
- the step of structuring the aforementioned wear layer and applying and hardening a first lacquer layer; wherein said structuring can be performed before, after or during applying and/or hardening the first lacquer layer;

with the characteristic that the method further also comprises the step of applying and hardening a second lacquer layer, wherein the first lacquer layer and second lacquer layer are hardened separately and by means of different techniques. Preferably, it relates to targeted techniques which each time harden substantially only one of both lacquer layers.

[0019] Preferably, the separate techniques relate to radiation techniques by means of different wavelengths, such that each time, in a targeted manner, only substantially one of both lacquer layers is hardened. It is evident that to this aim the lacquer layers may be provided with different photo-initiators, which become active at the respective wavelength. Preferably, one of said two lacquer layers is hardened by means of UV radiation, whereas the other of said two lacquer layers is hardened by means of Excimer radiation. The lacquer layer which is hardened by means of excimer radiation then can be made, for example, matte, whereas the other lacquer layer is made glossy. Obtaining a matte surface by means of an excimer-hardened lacquer layer is known as such from the document EP 2 154 184 A1 already mentioned above.

[0020] The second lacquer layer preferably is provided on the semi-finished product when the latter is already provided with the relevant relief and when the first lacquer layer is already situated on the semi-finished product. The first lacquer layer may already be hardened or not hardened by means of the relevant technique.

[0021] For obtaining a wood structure with a matte surface and glossy pores, specifically the following procedure may be followed:

- preparing a semi-finished product with at least a substrate layer, a decor layer provided thereon and a transparent wear layer;
- structuring the transparent wear layer;
- applying the first lacquer layer and hardening the first lacquer layer by means of UV radiation. The application technique and/or lacquer used is chosen such that the first lacquer layer is also present in the deeper structure parts. To this aim, a roller application with soft rollers and/or a lacquer layer with a relatively low viscosity can be chosen;
- applying the second lacquer layer and hardening the second lacquer layer by means of excimer radiation. The application technique and/or lacquer used is chosen such that the second lacquer layer is omitted in the deeper structure parts. To this aim, a roller application with hard rollers and/or a lacquer layer with a relatively higher viscosity can be chosen.

[0022] For obtaining a wood structure with a glossy surface and matte pores, specifically the following procedure may be followed:

- preparing a semi-finished product with at least a substrate layer, a decor layer provided thereon and a transparent wear layer;
- structuring the transparent wear layer;
- applying the first lacquer layer and hardening the first lacquer layer by means of excimer radiation. The application technique and/or lacquer used is chosen such that the second lacquer layer is omitted in the deeper structure parts. To this aim, a roller application with hard rollers and/or a lacquer layer with a relatively higher viscosity can be chosen;
- applying the second lacquer layer and hardening the second lacquer layer by means of UV radiation. The application technique and/or lacquer used is chosen

such that the second lacquer layer is also present in the deeper structure parts. To this aim, a roller application with soft rollers and/or a lacquer layer with a relatively low viscosity can be chosen.

[0023] It is clear that the method is of particular interest for realizing the above-mentioned floor covering.

[0024] According to the invention, said transparent wear layer preferably shows a relief corresponding to a printed decor, such that a so-called structure, and possibly gloss degree, in register with the printed decor is obtained. In the case of a printed decor which represents a wood pattern with wood nerves, this may relate to a structure of a plurality of impressions in the form of wood pores which follow the course of the wood nerves, and/or a line structure corresponding to the course of the wood nerves. According to another example, this may relate to a structure which imitates joints or chamfers between a plurality of panels and corresponds to a joint or border between panels represented in the printed decor.

[0025] Preferably, the floor covering also comprises at least one glass fiber layer, preferably a glass fiber fleece or a so-called "non-woven". Preferably, such glass fiber layer is embedded into the material of the substrate layer prior to the step of structuring.

[0026] Preferably, said printed decor is provided on a thermoplastic synthetic film which then forms the decor layer. This may relate, for example, to a hard or soft PVC film having a thickness of 0.03 to 0.15 millimeters. According to an alternative, the printed decor may be provided on said substrate layer by forming this decor, by means of any printing technique, directly on the substrate layer concerned. In such case, it is desirable to prepare the respective substrate layer by means of, for example, a plastisol of the respective thermoplastic material for forming a uniform background color for the printed decor. Preferably, such decor is printed by means of UV-based inks. According to another alternative, said decor is provided on said wear layer, more particularly on the side thereof which is intended for being directed towards the substrate layer. Herein, this relates to a so-called "reverse" print, wherein the usual color sequence of the inks is reversed. In such case, too, it is desirable to prepare the substrate layer with such plastisol or to provide a uniform background color for the printed decor in any other manner, for example, by providing a colored or white thermoplastic film underneath the printed wear layer. Here, too, such decor preferably is printed by means of UV-based inks.

[0027] It is noted that using a hard PVC film as a decor layer, namely a PVC film without plasticizers, or of a PVC film having a percentage of plasticizers which is lower than 5 percent by weight, is particularly advantageous for obtaining a good registering between the printed decor and the structure of the wear layer. Due to the low percentage of plasticizer, such PVC films are less subject to dimensional alteration.

[0028] Preferably, said thermoplastic material relates to polyvinyl chloride, and still better soft polyvinyl chloride, which contains, for example, a percentage of plasticizers of 5 to 20 percent by weight or even up to 35 percent by weight or more. DINP or DOP can be chosen as the plasticizer. It is clear that instead of PVC, also polypropylene (PP), polyethylene (PET) or polyurethane (PU) can be applied.

[0029] The wear layer preferably has a thickness of minimum 0.15 millimeters and still better minimum 0.3 millimeters, however, preferably less than 1 millimeter, wherein 0.2 to 0.4 millimeters is a good value. With this good value, by means of the thermoplastic material of the wear layer only, thus, without considering possible solid additives, already an effective wear resistance can be obtained for residential applications. So, for example, it is possible to achieve an IP value (Initial wear point) of 2000 or more in the Taber tests, as described in EN 13329, Annex E. The restricted thickness of the wear layer, namely between 0.2 and 0.4 millimeters, results in a better definition of the obtained structures, as in such case the springing back of the wear layer is restricted, too.

[0030] In particular, the present invention relates to panels of the type which, on two or more opposite edges, comprises coupling means or parts by which two of such floor panels can be coupled on the respective edges such that they are locked together in a horizontal direction perpendicular to the respective edge and in the plane of the floor panels, as well as in a vertical direction perpendicular to the plane of the floor panels. Such floor panels can be applied for composing a so-called floating floor covering, wherein the floor panels are connected to each other at their edges, however, rest freely on the underlying floor.

[0031] The floor panels of the invention preferably have a thickness of 2 to 6 millimeters and preferably have a high density, for example, a density of more than 1000 kilograms per cubic meter and preferably less than 1800 kilograms per cubic meter. In order to obtain this density, the substrate layers can be filled with particulate materials, such as chalk or sand.

[0032] Preferably, the substrate, which comprises one or more substrate layers, has a thickness of 1.3 to 5 millimeters. The entire floor panel preferably has a thickness situated between 2 and 6 millimeters. Preferably, the substrate forms at least half of the thickness of the floor panel.

[0033] Panels which are provided with coupling means preferably have at thickness of at least 2.5 millimeters and still better at least 3 millimeters. It is not excluded that the invention is applied for panels which are free from coupling means at their edges, wherein these panels then preferably are intended for being glued with their bottom side to the subfloor. Such panels preferably have a thickness of less than 4 millimeters, however, preferably of more than 1.5 millimeters.

[0034] The panels of the invention preferably have a width of 8 centimeters or more. Particularly preferred dimensions relate to a width situated between 18 and 22 centimeters and a length situated between 118 and 220

centimeters. It is clear that this relates to panel-shaped elements. However, it is not excluded that the invention may be applied to wall-to-wall floor coverings. The panel-shaped elements do not necessarily have to be rigid, but may be rollable. In particular, the invention relates to so-called LVT (Luxury Vinyl Tile) in plank format or in tile format.

[0035] On the underside of the substrate, a backing layer or sublayer, such as a vapor-tight layer, can be provided. Such backing layer or sublayer substantially consists of a thermoplastic synthetic material layer. The backing layer preferably acts as a balancing layer, such that a well-balanced sandwich structure can be obtained, namely without or only with a minimum cupping of the panels.

[0036] As aforementioned, said thermoplastic material of the substrate or the substrate layer preferably further comprises fillers, such as chalk or limestone.

[0037] It is clear that according to the invention by "substrate" an internal layer of the floor panel itself is meant, which as such can be made one- or more-layered, however, wherein the respective layer or layers preferably have an overall thickness which is larger than half of the thickness of the entire respective panel and/or wherein the respective layer or layers have an overall weight which preferably is larger than half of the weight of the entire respective panel. Preferably, the contour of the possible coupling parts is substantially or entirely realized in the substrate, for example, by milling it therein.

[0038] With the intention of better showing the characteristics of the invention, herein after, as an example without any limitative character, some preferred embodiments are described, with reference to the accompanying drawings, wherein:

Figure 1 represents a panel of a floor covering with the characteristics of the invention;
Figure 2, at a larger scale, represents a cross-section according to the line II-II indicated in figure 1;
Figure 3, at a still larger scale, represents a cross-section according to the line III-III indicated in figure 2, however, for a variant;
Figure 4 schematically represents some steps of a method according to the invention.

[0039] Figure 1 represents a rectangular and oblong floor panel 1 with a pair of long sides 2-3 and a pair of short sides 4-5.

[0040] Figure 2 represents that the floor panel 1 is composed of different layers 6-7-8-9A-9B-10.

[0041] The substrate 11 is formed by the substrate layers 9A and 9B of thermoplastic material, in this case soft PVC. Such substrate layers 9A-9B may consist substantially of strewn and pressed or sintered granulate. The substrate 11 further comprises an enclosed glass fiber layer, more particularly a glass fiber fleece 12. On top of the layers 9A-9B concerned, a top layer 13 is provided, which as such comprises a printed decor film 7 and a transparent wear layer 6 on the basis of thermoplastic material. In this example, the top layer 13 further also comprises a back layer 8 located underneath the decor film 7. In the example, the back layer 8, the decor film 7 as well as the wear layer 6 are made on the basis of polyvinyl chloride.

[0042] In the example, the decor film 7 is provided with a print with a wood pattern 14, wherein per panel 1 each time the image of a single wooden plank is provided. On the bottom side 15 of the substrate 11 a counter layer 10 is provided, which is also on the basis of soft PVC. According to the invention, it is also possible that one of the two aforementioned substrate layers 9A-9B, namely the lower substrate layer 9B, forms the bottom side of the panel 1.

[0043] Figure 2 represents that at least one of the substrate layers 9A-9B is at least present in the middle of the thickness T of the substrate 11. In this case, the respective layers 9A-9B and the enclosed glass fiber layer 12 form the entire substrate 11.

[0044] Figure 2 further also represents that the respective layers 9A-9B form at least 40 percent and here even more than half of the thickness T1 of the panel 1.

[0045] Further, the panel 1 of the example is provided with mechanical coupling means or coupling parts 16 on both opposite edges 2-3. Figure 2 shows that at least the mechanical coupling means 16 on the long pair of sides 2-3 allow that two of such floor panels 1 can be coupled to each other, such that a locking is created in a vertical direction V1 perpendicular to the plane of the coupled panels 1, as well as in a horizontal direction H1 perpendicular to the coupled edges 2-3 and in the plane of the panels 1. The depicted coupling means 16 show the feature that they are substantially realized as a tongue 17 and a groove 18 bordered by an upper lip 19 and a lower lip 20, wherein this tongue 17 and groove 18 substantially are accountable for the locking in said vertical direction V1, and wherein the tongue 17 and the groove 18 are provided with additional locking parts 21-22, substantially accountable for the locking in said horizontal direction H1. In this case, the locking parts comprise a protrusion 21 on the lower side of the tongue 17 and a cooperating therewith recess 22 in the lower lip 20.

[0046] The coupling means 16 represented here allow at least a coupling by means of a turning movement W along the edges 2-3 concerned.

[0047] The mechanical coupling means 16 substantially are realized in the substrate layers 9A-9B. In the example, they are applied by means of a milling operation, for example, with rotating tools.

[0048] It is also noted that it is particularly advantageous when the glass fiber layer 12 extends uninterruptedly from in the substrate 11 to beyond the recess 23 on the lower side of the tongue 17, namely to beyond the recess 23 which borders the locking part 22. In this manner, a particularly stable coupling part 16 is obtained, which, for example, is less susceptible to any curling of the edge 2, which might lead to undesired visual outlines

in the floor surface. Such curling has been noted by the inventors when a floor covering consisting of a plurality of floor panels 1 coupled to each other is exposed to direct sunlight, for example, at a window in a room. Preferably, this glass fiber layer 12 extends uninterruptedly into the protruding portion of the tongue 17 or even up to the distal end of the tongue 17.

[0049] It is clear that the position of a reinforcing layer or a glass fiber layer 12, as described herein above, is also of interest when no use is made of the particular lacquer layers of the invention mentioned in the introduction. Independently, the invention thus also relates to a floor covering consisting of floor panels 1 coupled to each other, wherein these floor panels 1 comprise at least a substrate 11 on the basis of thermoplastic material, a decor layer 7 and a transparent wear layer 6, wherein the floor panels 1, on at least two opposite edges 2-3, are provided with mechanical coupling means 16, substantially in the form of a tongue 17 and a groove 18 bordered by an upper lip 19 and a lower lip 20, wherein this tongue 17 and groove 18 substantially are accountable for a locking of the panels in a vertical direction V1 perpendicular to the plane of the coupled floor panels, and wherein the tongue 17 and the groove 18 are provided with additional locking parts 21-22, substantially accountable for a locking in a horizontal direction H1 in the plane of the coupled floor panels and perpendicular to the respective edge, wherein the locking parts comprise a protrusion 21 on the lower side of the tongue 17 and a cooperating therewith recess 22 in the lower lip 20, wherein said substrate further also comprises a reinforcing layer, such as a glass fiber layer 12, characterized in that this reinforcing layer 12 extends uninterruptedly from in the substrate 11 to beyond a recess 23 on the lower side of the tongue 17, namely to beyond the recess 23 which borders the locking part 22.

[0050] Figure 3 shows the essence of the invention referred to in the introduction. This consist in that a relief is realized in said wear layer 6, wherein this relief comprises recesses 24, and that said transparent wear layer 6 comprises at least two lacquer layers 25-26, namely a first lacquer layer 25, which is located at least on the bottom of at least one of said recesses 24, and a second lacquer layer 26, which is interrupted at the location of the respective recess 24.

[0051] In the example, said first lacquer layer 25 extends continuously over the entire floor surface, and said second lacquer layer 26 extends over those portions of the floor surface which are located between said recesses 24. In the present case, the first lacquer layer 25 and the second lacquer layer 26 are made with a difference in gloss degree.

[0052] It is also noted that, different from figure 2, the embodiment of figure 3 is a variant in which no back layer 8 is applied. It is clear that embodiments with as well as without a back layer are the object of the invention.

[0053] Figure 4 represents a method with the characteristics of the invention. In a first step S1, a semi-finished product 27 is prepared with at least a substrate layer 11, a decor layer 7 provided thereon and a transparent wear layer 6. In a subsequent step S2, the aforementioned wear layer 6 is structured. However, it is also possible that the step of structuring is performed simultaneously to the step S1 of preparing the semi-finished product 27. In the example, the structuring is performed by means of a mechanical press element 28. In this case, this relates to a structured press platen; however, this may also relate to a structured roller. In the step S3, a first lacquer layer 25, in this case by means of one or more rollers 29, is applied and hardened. The rollers 29 used comprise a rubber roller 30, such that the lacquer layer 25 can also be provided on the bottom of the recesses 24. Here, this relates to a UV-hardening lacquer layer 25, which is hardened by means of a battery of UV lamps 31. The hardened lacquer layer is glossy.

[0054] In the step S4, then a second lacquer layer 26 is applied and hardened. In this case, again rollers 29 are used, however, with hard rollers. Hereby, the second lacquer layer 26 does not get the chance to flow into the recesses 24. Here, this relates to a lacquer layer 26 which is hardened by means of excimer beam units 32, preferably under an inert atmosphere. The hardened lacquer layer is matte.

[0055] The obtained floor covering has a matte surface formed by said second lacquer layer 26 and has glossy recesses 24 formed by said first lacquer layer 25.

[0056] It is evident that the steps of the method of the invention may be performed on larger sheets or webs, from which in a subsequent step possibly panels can be formed by means of a dividing operation, as well as on panels having dimensions which approximately are the dimensions of the final panels.

[0057] From the above, it is clear that in the embodiment of figure the first lacquer layer 25 and the second lacquer layer 26 are hardened separately and by means of different techniques, namely, on the one hand by means of an UV radiation with UV lamps 31 and on the other hand by means of excimer radiation of the units 32.

[0058] The present invention is in no way limited to the herein above described embodiments; on the contrary, such floor coverings and methods may be realized according to various variants, without exceeding the scope of the present invention. Moreover, the coverings and panels may also be made as wall coverings or ceiling coverings instead of as a floor covering.

Claims

1. Floor covering with at least a substrate layer (9A-9B), a decor layer (7) and a transparent wear layer (6), wherein a relief is realized in said wear layer (6), wherein this relief comprises recesses (24), **characterized in that** said transparent wear layer (6) comprises at least two lacquer layers (25-26), namely a first lacquer layer (25) located at least on the bottom

of one of said recesses (24), and a second lacquer layer which is interrupted at the location of the recess (24) concerned.

2. Floor covering according to claim 1, **characterized in that** said first lacquer layer (25) extends continuously over substantially the entire floor surface and/or that said second lacquer layer (26) extends over the parts of the floor surface which are situated between said recesses (24).

3. Floor covering according to claim 1 or 2, **characterized in that** the first lacquer layer (25) and the second lacquer layer (26) are made with a difference in gloss degree.

4. Floor covering according to any of the preceding claims, **characterized in that** it relates to a supple floor covering, preferably based on polyvinyl chloride.

5. Floor covering according to any of the preceding claims, **characterized in that** the transparent wear layer (6) substantially consists of a thermoplastic layer on which at least said two lacquer layers (25-26) are provided.

6. Floor covering according to claim 5, **characterized in that** said thermoplastic layer (6) comprises soft polyvinyl chloride.

7. Floor covering according to any of the preceding claims, **characterized in that** said relief relates to an imitation of wood pores.

8. Floor covering according to any of the preceding claims, **characterized in that** it is made in the form of supple floor panels (1).

9. Method for manufacturing a floor covering, wherein this method comprises the following steps:

- the step (S1) of preparing a semi-finished product (27) with at least a substrate layer (9A-9B-11), a decor layer (7) provided thereon and a transparent wear layer (6);
- the steps (S2-S3) of structuring the aforementioned wear layer (6) and of applying and hardening a first lacquer layer (25);

characterized in that the method further also comprises the step (S4) of applying and hardening a second lacquer layer (26), wherein the first lacquer layer (25) and second lacquer layer (26) are hardened separately and by means of different techniques.

10. Method according to claim 9, **characterized in that** one of said two lacquer layers (25) is hardened by means of UV radiation, whereas the other of said two lacquer layers (26) is hardened by means of excimer radiation.

11. Method according to claim 9 or 10, **characterized in that** the method is applied for manufacturing a floor covering according to any of the claims 1 to 8.

12. Floor covering consisting of floor panels which are coupled to each other, wherein these floor panels (1) comprise at least a substrate (11) on the basis of thermoplastic material, a decor layer (7) and a transparent wear layer (6), wherein the floor panels (1), on at least two opposite edges (2-3), are provided with mechanical coupling means (16) substantially in the form of a tongue (17) and a groove (18) bordered by an upper lip (19) and a lower lip (20), wherein said tongue (17) and groove (18) substantially are accountable for a locking of the panels in a vertical direction (V1) perpendicular to the plane of the coupled floor panels (1), and wherein the tongue (17) and the groove (18) are provided with additional locking parts (21-22), substantially accountable for a locking in a horizontal direction (H1) in the plane of the coupled floor panels (1) and perpendicular to the respective edge (2-3), wherein the locking parts comprise a protrusion (21) on the lower side of the tongue (17) and a cooperating therewith recess (22) in the lower lip (20), wherein said substrate (11) further also comprises a reinforcing layer, such as a glass fiber layer (12), **characterized in that** said reinforcing layer (12) extends uninterruptedly from in the substrate (11) to beyond a recess (23) on the lower side of the tongue (17), namely to beyond the recess (23) which borders the locking part (22).

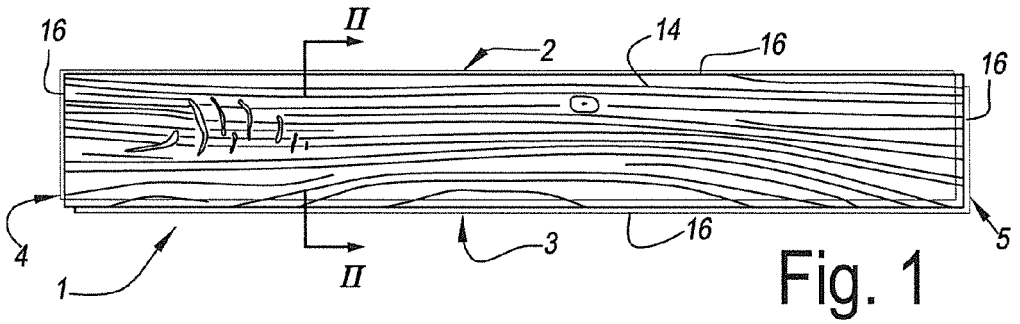

Fig. 1

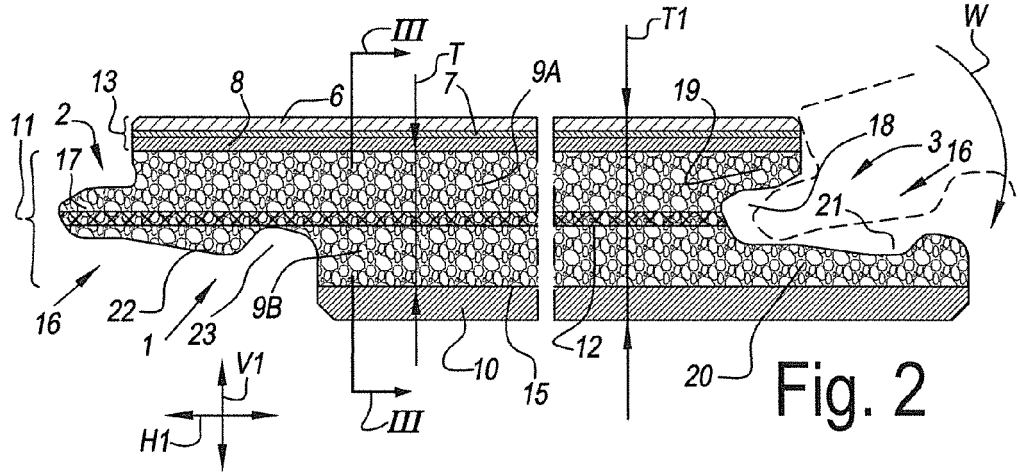

Fig. 2

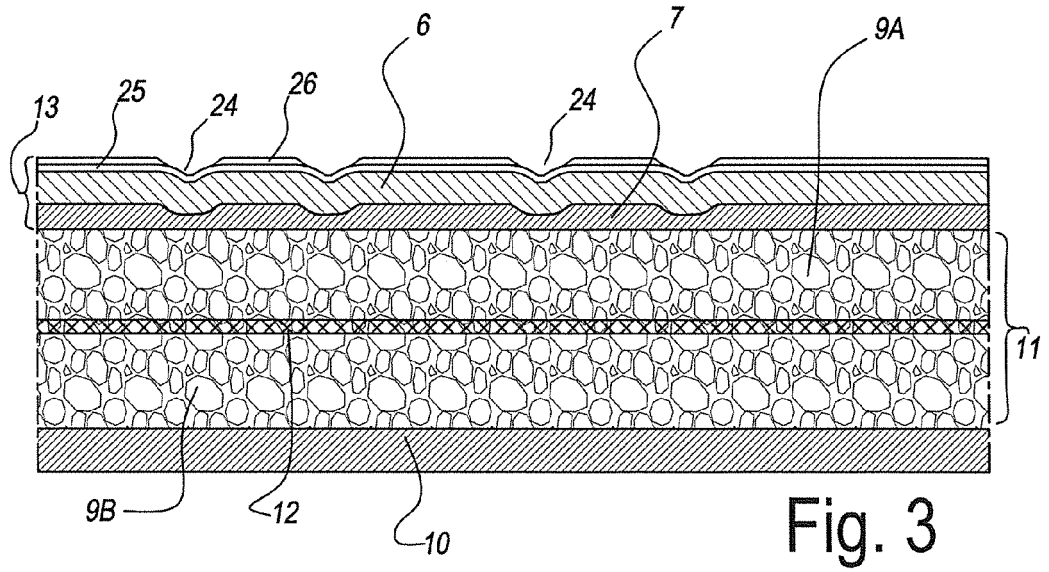

Fig. 3

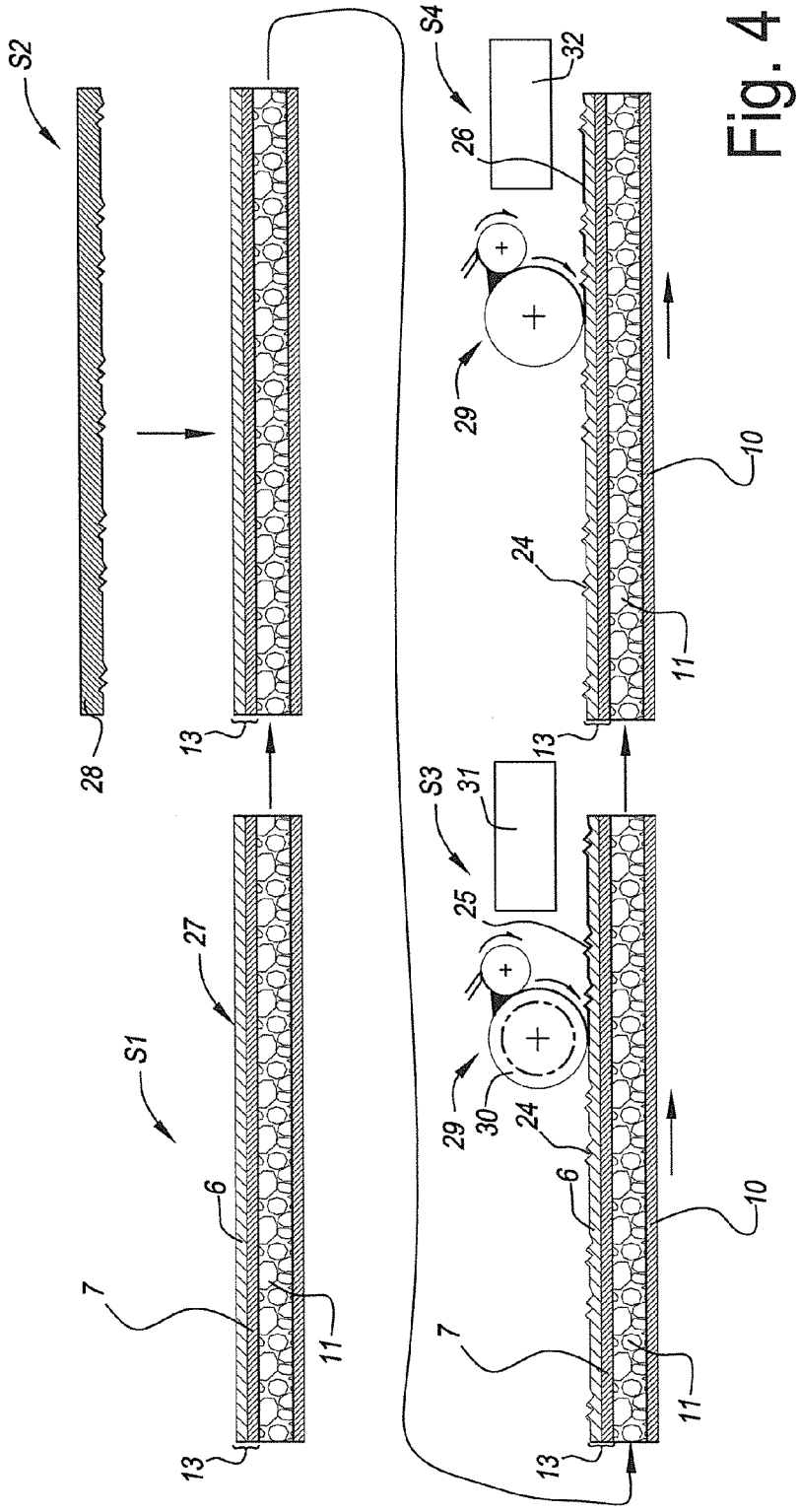

Fig. 4

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Place of search	Date of completion of the search	Examiner
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