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(54) **Tile panel, surface covering of a multitude of such tile panels for a floor, ceiling or wall surface.**

(57) The present invention relates to a decorative tile panel for covering a floor, ceiling, or wall. Furthermore, the invention relates to a surface covering for a floor, ceiling or wall surface which is constructed by a multitude of neighbouring tile panels according to the invention, wherein the plurality of tile panels are preferably interconnected.

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Tile panel, surface covering of a multitude of such tile panels for a floor, ceiling or wall surface.

The present invention relates to a decorative tile panel. Furthermore, the invention relates to a surface covering for a floor, ceiling or wall surface which is constructed by a multitude of neighbouring tile panels according to the invention.

It has been common for centuries, to apply a surface covering of neighbouring tiles in a traditional way by applying a cement layer onto the surface, and subsequently position and fix the tiles onto the cement layer in a surface covering pattern. In this traditional method, grout is furthermore applied between adjacent side edges of neighbouring tile panels to fill up an interspatial gap between adjacent side edge, which filled gaps are commonly referred to as 'grout lines'. These grout lines are visible as slightly recessed joint lines of grout which are present between adjacent top surfaces of neighbouring tiles.

As an alternative to the traditional way of applying a tile covering, it has been proposed in the art to develop a tile panel which has a top surface made from a synthetic material having similar properties as a traditional tile material such as ceramic material. When such tile panels are positioned adjacent to each other and adhered onto a surface, a covering of neighbouring tiles can be achieved in a different, and practical way in which no cement or grout is necessary. Typically, the adjacent side edges of these neighbouring tile panels are laid in abutting contact with each other, and may include interconnecting coupling profiles. In this way, one can dispense with the application of grout in the form of grout lines.

However, in order to mimic an overall appearance of a traditional tile covering, it has recently been proposed to provide the side edges of a tile panel with an imitation grout line by milling a rectangular groove in the top surface of the tile panel which recess extends along a side edge of the tile panel.

A drawback of the imitation grout line known from the above prior art, is that the visual appearance of the imitation grout line is compromised in certain respects. First, the recess has an upwardly facing groove surface composed of flat surfaces that are in an angled configuration to each other which lead to a recess which provides the imitation grout line an artificial look and feel in comparison to a traditionally formed grout line. Second, at the interface of coupled adjacent side

edges of neighbouring tile panels a seam is visible which splits the imitation grout line into two halves, and as such impedes the overall appearance of the imitation grout line which ideally should look like one uninterrupted body of grout that fills the gap between two neighbouring panels.

It is an objective of the present invention to reduce or eliminate the drawbacks known from the prior art, by developing a new tile panel having improved properties, in particular in view of the imitation grout line.

In a first aspect of the invention, the above objective is achieved by the provision of a decorative tile panel suitable for covering a floor, ceiling or wall surface, which tile panel comprises:

- at least one core layer, and
- at least one decorative top section, directly or indirectly affixed to said core layer or integrated with said core layer, wherein the top section defines a top surface of the tile panel,
- a plurality of side edges at least partially defined by said core layer and/or by side top section,

wherein the tile panel is provided with at least one imitation grout line along at least one side edge of the tile panel, which is formed by a channel-shaped recess connecting to the top surface of the tile panel, which recess extends along a side edge of the tile panel, and has a substantially constant width which is delimited by the respective side edge of the tile panel,

wherein the recess has an upwardly facing recess surface, wherein said recess surface is at least partially concavely curved across the width direction of the recess. The upwardly facing recess surface is preferably at least partially formed by a separate grout covering layer.

As such, the tile panel contains an imitation grout line having an at least partially and preferably substantially completely rounded (curved) recess surface which resembles more accurately a surface that is inherent to a traditionally formed grout line.

It is noted in this context that the top section defines a highest top surface of the tile panel, which may either be flat or textured (e.g. embossed, preferably embossed in

register with a decorative layer making part of said top section). This top surface, defined by the top section, is connected to the at least one recess, wherein said top surface and the upwardly facing recess surface together form the total top surface of the tile panel. Even in case the top surface of the top section is provided with a texture, such as an embossing with indentations, the maximum depth of the recess is typically larger than the maximum depth of said indentations.

The recess is for instance formed by designing, milling, cutting, printing, or any abrasive technique that is suitable for the purpose. Typically the recess is created by cutting away, so removing, material during the production process. However, it is imaginable that the recessed is created by design during the production process without having to remove material.

The separate grout covering layer does not make integral part of the core layer or the top section and is applied as separate layer, typically during or after the production process. The separate grout layer is used to provide the imitation grout line of suitable appearance, such as a grey appearance to imitate mortar and/or a darker appearance that than the top section in order to create a visual depth effect. Moreover, the separate grout layer typically has a protective function in order to protect the vulnerable underlying side edge part of the tile panel. Here, the separate grout layer may e.g. have a greater scratch resistance (abrasion resistance) than the underlying layer and/or may have better waterproof properties than the underlying side edge part. The separate grout layer could cover only a part of the recess, in particular a part of a curved part of the recess (surface). However, it is typically more preferred for the aforementioned reasons that the substantially complete curved recess surface is formed by the separate grout covering layer, and more preferred that the substantially complete recess surface is formed by the separate grout covering layer. Optionally, the separate grout covering layer is omitted. In this latter case the upwardly facing recess surface is typically formed by either at least a part of the top section and/or by the core layer.

The separate grout layer is typically at least partially made of at least one material chosen from the group consisting of:

- a metal, such as aluminium, which could be applied as metal layer and/or as metallic particles,

- at least one thermoplastic material, like polyvinyl chloride (PVC), polyethylene terephthalate (PET), polyester or polyethylene (PE), and/or
- at least one thermoset material, such as polyurethane,
- at least one at least partially cured resin, in particular an at least partially cured ink and/or at least partially cured paint.

The separate grout layer could be a monolithic layer (single layer) or could consist of a laminate of a plurality of sublayers.

Preferably, the separate grout covering layer is formed by a coating. Typically, the coating is applied in liquid state by a roller or brush, wherein the paint is cured (dried) afterwards, typically by means of air and/or radiation, such as infrared radiation.

It is also imaginable and possibly also preferable, that the grout layer is provided by means of a transfer printing technique by means of a transfer film. Preferably, this transfer film (transfer foil) is initially provided with a transferable digital print. This digital print is transferred into and onto the recess during transfer printing, and will form at least a part of the recess surface. Forming the separate grout layer by a transferred print can be realized in a rather economic manner even with small production quantities.

It is also thinkable that the separate grout covering layer is formed by printed layer, in particular a digitally printed layer. In this manner a two-dimensional or even three-dimensional structure can be printed to form at least a part of the recess surface, and optionally also to provide the recess its shape, its texture, and/or its thickness. By means of digital printing an elevated (3D) structure can be created, also referred to as positive embossing. It is also imaginable that an etching liquid is printed onto an already printed liquid base layer which results in position selected indentations, also referred to as negative embossing. A combination of this positive embossing step and (preferably successive) negative embossing step is also imaginable in order to form the peripheral portion(s) of the covering structure. This printing process could thus be considered as a printing process where an embossed structure is created which eventually forms the recess.

The separate grout covering layer preferably has a substantially constant thickness. However, it is also imaginable that the separate grout covering layer has a varying thickness across the width direction of the recess. In this latter case, the grout covering layer is (more predominantly) responsible for providing the final shape of the recess as such, as well as of the upwardly facing recess surface.

Typically, the separate grout covering layer is connecting to the top surface of the tile panel. Typically, the separate grout covering layer is connecting to the side edge of the tile panel. The separate grout covering may have a smooth upper surface, which typically improves the cleanability of the grout. It is also imaginable that the separate grout covering layer has a (fine or coarse) textured upper surface. This textured surface provides the imitation grout line a more realistic look and feel compared to traditional filled grout lines.

The separate grout covering layer is typically glued and/or fused to an underlying part of the tile panel.

It is imaginable that wherein at least a part, for example one layer, of the top section extends to a side edge where a channel-shaped recess is formed. This results in the situation that the separate grout layer is applied onto the top section (part) situated in or underneath the recess. Although the complete top section could extend to the side edge, it is often preferred that the top section terminates at a distance from the side edge or that only a part of the top section, having a reduced thickness compared to the thickness of the top section, extends to the side edge. In this latter embodiment, typically one or two layers of the top section, such as a polymer layer (PVC layer) and optionally a decorative layer, extend(s) to the side edge. A typical wear layer of the top section of kept at a distance from said side edge. This provides space to efficiently create the recess. In case the entire top section terminates at a distance from the side edge, then it is typically preferred that the separate grout layer is directly applied onto an underlying core part (which connects to the side edge).

Preferably, the upwardly facing recess surface is at least partially gradually concavely curved across the width direction of the recess. This means that the curvature is a continuous curvature. This prevents the presence of sharp ridges

(discontinuities) on the surface recess, which improves the appearance of the curved recess surface. Preferably, the upwardly facing recess surface is substantially completely concavely curved across the width direction of the recess.

The deepest point of at least one recess, defining the maximum depth of the recess (with respect to the (highest) top surface of the top section), could be situated at the side edge or at a distance from the side edge. In this latter case a more or less parabolically shaped recess surface is present. It is imaginable that at least one recess has a deepest point at a distance from the respect side edge, wherein said deepest point is located closer to the side edge than to the top surface of the tile panel.

The curvature of at least one concavely shaped part of the recess surface may have a constant radius. It is however also conceivable that the curvature of at least one concavely shaped part of the recess surface may have a radius which varies across the width direction. Preferably, the radius of at least one concavely shaped part of the recess surface increases in the direction towards the side edge. This results in the situation that the recess surface has the greatest curvature adjacent to the top surface of the top section and obtains less curvature in the direction towards the side edge. Here, it is e.g. imaginable that a recess surface part connecting to the side edge has a low or no curvature, which results in a substantially flat recess surface part at the side edge. Preferably, (at least a part of) at least one concavely shaped part of the recess surface has at least one radius of 3-7 millimetre, preferably 4-5 millimetre. Preferably, at least one concavely shaped part of the recess surface has a radius (in millimetres) exceeding the width (in millimetres) of the recess. Preferably, the width of the recess is smaller than 4.5 millimetre.

The recess is provided with a chamfered edge (inclined edge) positioned in between the top surface of the top section and a concavely curved part of the recess surface. This is also called a (micro)bevel. This chamfered edge is typically flat and thus uncurved. The chamfer edge preferably encloses an angle with a plane defined by the tile panel which is situated in between 5 and 50 degrees, preferably in between 5 and 45 degrees. Typically, these (micro)bevel(s) are applied in order to create a smooth transition between the top surface and the

curved part of the recess, and often also to compensate small height differences between the panels and to prevent the presence of unwanted sharp edges as much as possible, in order to improve look and feel of a tile panel covering consisting of a plurality of tile panels according to the invention. The width of this chamfered edge is typically situated in between 0.05 and 2 mm, and is preferably approximately 1 mm.

It is imaginable that at least one side edge is free of a channel-shaped recess. This recess-free side edge may be provided with a chamfered edge connecting to the top surface. In case a recessed side edge of a first tile panel is positioned against a recess-free side edge of a second tile panel, a (micro)bevelled curved grout line is created with an eccentrically positioned seam, which is less visible to the human eye and therefore attractive from an aesthetic point of view. In this manner, the imitation grout line appears as an uninterrupted body to the human eye.

Preferably, the tile panel is provided with at least two imitation grout lines along at least two connecting side edge of the tile panel, wherein each grout line is formed by a channel-shaped recess connecting to the top surface of the tile panel, which recess extends along a side edge of the tile panel, and has a substantially constant width which is delimited by the respective side edge of the tile panel, wherein the recess has an upwardly facing recess surface, which is at least partially formed by a separate grout covering layer, wherein said recess surface is at least partially concavely curved across the width direction of the recess. The shape and/or dimensioning of connecting grout lines may be identical or may be distinctive.

Preferably, said grout covering layer comprises a wear sublayer and a decorative sublayer, wherein said wear layer is connecting to the said top surface of the tile panel and comprising a substantially transparent material, such that said decorative sublayer is visually observable through said wear layer. The decorative layer may be formed by a digitally printed decorative layer. This decorative layer may be printed, either directly or indirectly (e.g. by using an intermediate primer layer), to the core layer. The decorative layer may also be formed by a film or foil bearing a decorative pattern. The decorative print or pattern may be of various nature and may e.g. be formed by imitation marble, imitation stone, imitation stone, imitation ceramic, or imitation wood, or may be any other possibly fantasy based pattern or

design. Typically, the top section also comprises at least one intermediate layer, such as a polymer layer (e.g. a PVC layer) and/or a reinforcing layer, such as a glass fibre layer (woven or non-woven).

Preferably, said top section comprises a wear layer and a decorative layer, wherein said wear is made of substantially transparent material, such that said decorative layer is visually observable through said wear layer. It is also imaginable that the top section comprises or is entirely formed by at least one tile. This tile may be made of sliceable natural stone, marble, concrete, limestone, granite, slate, glass, ceramics, wood, or a composite material. Particular preferred are ceramic materials of a type selected from the group consisting of Monocuttura ceramic, Monoporosa ceramic, porcelain ceramic, or multi-casted ceramic.

In a preferred embodiment, the tile panel according to the invention is substantially made from one or more plastic composites, such as wood plastic composite and/or stone plastic composite. These materials have proven a highly suitable and feasible alternative to a traditional tile material such as marble, stone, ceramic or wood.

Preferably in the tile panel according to the invention, the recess surface has an upper texture which resembles the upper texture of a natural grout line, preferably having a coarse (rough) upper texture. The texture of the recess surface may be a roughened texture. This roughened texture may for instance be created by means of a roughening technique, for example mechanically brushing, which is performed after or during the formation of the recess itself. A rough upper texture of the recess surface effectively achieves that the imitation grout line appears to the human eye as if it were a natural grout line.

The separate grout covering layer may be made from a material that has wear resistant and/or water repellent properties which further improve the durability of the imitation grout line. The coating layer is for instance a thin film which is applied on the structure by transfer printing. The grout covering layer typically has a thickness of 0.010 mm up to 0.10 mm, but deviations from this range are also possible. By choosing an appropriate colour of the coating layer, the imitation grout line appears to the human eye as if it were a natural grout line.

The core layer may be rigid, flexible, or semi-rigid. The core layer may be solid or at least partially foamed. The core may comprise at least one virgin and/or recycled polymer selected from the group consisting of: ethylene vinyl acetate (EVA), polyurethane (PU), polyethylene (PE), polypropylene (PP), polystyrene (PS), polyvinylchloride (PVC), polyethylene terephthalate (PET), Polyisocyanurate (PIR), or mixtures thereof. The core layer may comprise at least one wood-based material. The core may comprise at least one composite material of at least one polymeric material and at least one non-polymeric material. The at least one non-polymeric material is preferably selected from the group consisting of: talc, chalk, wood, calcium carbonate, and a mineral filler. The core may comprise magnesium oxide and/or magnesium hydroxide. The upper side of the core is preferably substantially flat.

The tile panel according to the invention, has a preferred thickness in the range from 4.0 mm up to 12.0 mm. When the tile panel comprises a core layer and a top section, the top section may have a thickness in the range of 0.30 up to 1.20 mm, while the core layer may have a thickness in the range of 3.50 mm up to 11.0 mm. In case the top section is formed by one or more tiles, the overall thickness of the top section and of the tile panel as such will typically be larger.

Preferably, the maximum depth of the recess is in 0.2 – 1.5 millimetre, and more preferably the maximum depth of the recess is preferably 0.2 - 0.8 millimetre. In order to acquire a satisfactory visual effect of the imitation grout, the maximum vertical depth is chosen from this range. It is noted that in a tile panel which comprises both a top section and a core layer, the recessed curved grout line may be extending vertically into both the top section and the core layer.

In the tile panel according to the invention, the gradual curve of the recess surface preferably includes at least a tangent line under an angle of 45 degrees to a vertical vector of the tile panel, and further preferably also a tangent line under an angle of 20 degrees and 70 degrees to the vertical vector, and most preferably also a tangent line under an angle of 90 degrees to the vertical vector. The vertical vector of the tile panel is herein defined as a vector perpendicular to the top surface of the tile panel. The gradual curve that includes the above featured tangent lines, could be characterized as a part of a crescent shaped curve.

It is preferred in the tile panel according to the invention, that the side edges comprise at least one pair, and preferably two pairs, of opposed side edges, wherein a first side edge of a pair is provided with an imitation grout line while the second side edge of the pair is not provided with an imitation grout line. When constructing a surface covering composed of neighbouring tile panels, the tile panels may be laid in a pattern wherein a first side edge of one tile panel abuts to a second side edge of another tile panel. In this situation, the imitation grout line between the two abutting tile panels is formed by the first side edge which contains the imitation grout line, while the second edge merely delimits the imitation grout line of the first side edge. When provided with two pairs of opposed side edges, it is possible to obtain a surface covering wherein each tile panel is visually bordered by two pairs of imitation grout lines. It is especially preferred that in the tile panel according to the invention, the first and second side edges of a pair are parallel to each other, preferably the tile panel having a rectangular or hexagonal format.

With regard to a pair of first and second side edges of a tile panel according to the invention, it is preferred that these are provided with mutually interacting coupling profiles, so that the first side edge of a first tile panel can be coupled to the second side edge of a second panel by a first, respectively second, coupling profile.

In a (more) preferred embodiment, a first panel edge comprises a first coupling profile, and a second panel edge, preferably opposite to the first panel edge, comprising a second coupling profile being designed to engage interlockingly with said first coupling profile of an adjacent surface covering element, both in horizontal direction and in vertical direction, wherein the first coupling profile and the second coupling profile are preferably configured such that two of such surface covering elements can be coupled to each other by means of a lowering movement (fold-down movement). In case the surface covering element is rectangular, then the first panel edge and second panel edge are typically situated at opposite short edges of the surface covering element. The surface covering element preferably also comprises at least one third coupling profile and at least one fourth coupling profile located respectively at a third panel edge and a fourth panel edge, wherein the third coupling profile comprises: a sideward tongue extending in a direction substantially parallel to the upper side of the core, at least one second downward flank lying at a

distance from the sideward tongue, and a second downward groove formed between the sideward tongue and the second downward flank, wherein the fourth coupling profile comprises: a third groove configured for accommodating at least a part of the sideward tongue of the third coupling profile of an adjacent surface covering element, said third groove being defined by an upper lip and a lower lip, wherein said lower lip is provided with an upward locking element, wherein the third coupling profile and the fourth coupling profile are configured such that two of such surface covering elements can be coupled to each other by means of a turning movement (angling down movement), wherein, in coupled condition: at least a part of the sideward tongue of a first surface covering element is inserted into the third groove of an adjacent, second surface covering element, and wherein at least a part of the upward locking element of said second surface covering element is inserted into the second downward groove of said first surface covering element. Preferably, complementary coupling profiles are configured to mutually lock coupled tile panels in a direction parallel to a plane defined by the tile panels, and/or in a direction perpendicular to said plane defined by the tile panels.

The top section and the core layer of the tile panel may be integrated with each other, which may lead to a monolithic (single layer) tile panel, wherein merely one or more separate grout covering layers are applied as additional layers to complete the tile panel.

According to a second aspect of the invention, a surface covering, such as a floor covering, wall covering or ceiling covering, is provided, which is constructed by a multitude of, preferably interconnected, neighbouring tile panels according to one of the preceding claims. Such a surface covering from a tile panels achieves a visually satisfactory result, wherein the surface covering appears to the human eye as a traditionally laid tile covering.

The invention will be further elucidated by several examples and with reference to the appended figures, wherein:

- Figure 1 is a top view of a tile panel according to a preferred embodiment of the invention;
- Figure 2 is a cross-sectional view of the tile panel of fig. 1;

- Figure 3 is a cross-sectional view of another preferred embodiment of the tile panel according to the invention;
- Figure 4 is a cross-sectional view of a detail of the side edges of two neighbouring panels that are interlinked to each other by a preferred type of coupling profiles;
- Figure 5 is a cross-sectional view of two neighbouring panels that are interlinked to each other by another preferred type of coupling profiles.

Fig. 1 shows a tile panel 1 of a substantially flat format having a top surface 3, a bottom surface (not visible) and a plurality of side edges 7a-d.

The tile panel 1 is provided with two imitation grout lines 9 and 9', along the two side edges 7b and 7c, which is formed by a recess in the top surface 3 and has a substantially constant width which is delimited by the respective side edges 7b and 7c.

Dotted line A-A' indicates a cross-section of the panel which is depicted in fig. 2.

Fig. 2 shows a cross-section of the same tile panel 1 as in fig. 1, along line A-A' in fig. 1. Identical parts in both figures have the same reference numerals as in fig. 1.

The tile panel has a bottom surface 5, and is composed of a substantially flat core layer 20 of a resilient material, and a substantially flat top layer 22 that is connected to the top side of the core layer 20. The top layer 22 has properties that resemble natural material such as marble, stone, ceramic or wood, and is made from a wood plastic composite and/or stone plastic composite. The core layer 20 is made of a thermoplastic, for instance PVC.

The imitation grout line 9 is formed by a recess having an upwards facing recess surface 11, which recess surface comprises a gradual curve of a concave type over the width direction of the recess 9.

Fig. 3 shows two abutting side edges 7a and 7b of two neighbouring tile panels 1 and 1', which are interlinked by a coupling profile comprising a tongue 30 and groove 32 which are provided at the respective side edges 7a and 7b.

The imitation grout line 9 is formed by a crescent shaped recess which comprises a grout covering layer 10 the top side of which forms the upwards facing recess surface. The grout covering layer 10 has a rough upper texture and

preferably a grey colour. The recess 9 has a maximum vertical depth as indicated by the arrow dm. The vertical vector V is perpendicular oriented to the top surface of the tile panel 1, and indicates the vertical direction of the tile panel.

The form of the gradual curve of the recess surface is characterized by tangent lines T1, T2, T3, wherein T1 has an angle of 15 degrees to vertical vector V, T2 an angle of 40 degrees to the vertical vector V, and T3 has an angle of 80 degrees to vertical vector V.

Fig. 4 shows two side edges of two neighbouring tile panels 1 and 1', which are interlinked by a coupling profile 5 and 6 which contain a tongue 51 and a groove 61. The coupling profiles 5 and 6 are configured such that an angling or turning movement (depicted by arrow T) allows for coupling the two profiles together, which results in an interlocked coupling in the horizontal plane.

Fig. 5 shows two side edges of two neighbouring tile panels 1 and 1', which are interlinked by a coupling profile 7 and 8 which contain a respective tongue 71 and groove 73, and a respective tongue 81 and groove 83. The coupling profiles 7 and 8 are configured such that a drop down movement of panel 1' (depicted by the arrow) allows for coupling of the two profiles together, which results in an interlocked coupling in the horizontal plane.

Conclusies

1. Decoratief tegelpaneel geschikt voor het bedekken van een vloer-, plafond- of wandoppervlak, welk tegelpaneel omvat:

- ten minste één kernlaag, en
- ten minste één decoratieve topsectie, direct of indirect bevestigd aan de kernlaag, waarbij de topsectie een topoppervlak van het tegelpaneel definieert,
- een veelheid aan zijranden die tenminste ten dele worden gedefinieerd door de kernlaag en/of de topsectie,

waarbij het tegelpaneel is voorzien van ten minste één imitatievoeglijn langs tenminste één zijrand van het tegelpaneel, welke is gevormd door kanaalvormige verdieping die verbonden is aan het topoppervlak van het tegelpaneel, welke verdieping zich uitstrekt langs een zijrand van het tegelpaneel en een hoofdzakelijk constante breedte heeft die is begrensd door de respectievelijke zijrand van het tegelpaneel,

waarbij de verdieping een opwaarts gericht verdiepingsoppervlak heeft, welke tenminste gedeeltelijk is gevormd door een afzonderlijke voegbedekkingslaag, waarbij het verdiepingsoppervlak tenminste gedeeltelijk concaaf is gekromd over de breedterichting van de verdieping.

2. Tegelpaneel volgens conclusie 1, waarbij het hoofdzakelijk gehele verdiepingsoppervlak is gevormd door de afzonderlijke voegbedekkingslaag.

3. Tegelpaneel volgens conclusie 1 of 2, waarbij de afzonderlijke voegbedekkingslaag is gevormd door een bekledingslaag.

4. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag is gevormd door een overgedragen laag afkomstig van een overdrachtsfolie of –film, door middel van overdrachtsprinten.

5. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag is gevormd door een geprinte laag.

6. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag een hoofdzakelijk constante dikte heeft.

7. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag een variërende dikte heeft over de breedterichting van de verdieping.

8. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag verbonden is met het topoppervlak van het tegelpaneel.

9. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag verbonden is met de respectievelijke zijrand van het tegelpaneel.

10. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag en het topoppervlak van het tegelpaneel verschillen in visuele verschijningsvorm.

11. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag donkerder is dan het topoppervlak van het tegelpaneel.

12. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag een glad bovenoppervlak heeft.

13. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag een bovenoppervlak heeft dat is voorzien van reliëf.

14. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de afzonderlijke voegbedekkingslaag is verlijmd en/of versmolten met een onderliggend deel van het tegelpaneel.

15. Tegelpaneel volgens een van de voorgaande conclusies, waarbij tenminste een deel van de topsectie zich uitstrekt tot een zijrand waar een kanaalvormige verdieping is gevormd.

16. Tegelpaneel volgens een van de voorgaande conclusies, waarbij het opwaarts gerichte verdiepingsoppervlak tenminste gedeeltelijk concaaf is gekromd over de breedterichting van de verdieping.

17. Tegelpaneel volgens een van de voorgaande conclusies, waarbij het opwaarts gerichte verdiepingsoppervlak vrijwel geheel concaaf is gekromd over de breedterichting van de verdieping.

18. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één verdieping een diepste punt heeft op een afstand van de respectievelijke zijrand.

19. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één verdieping een diepste punt heeft op een afstand van de respectievelijke zijrand, waarbij het diepste punt dichter bij de zijrand aanwezig is dan bij het topoppervlak van het tegelpaneel.

20. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één verdieping een diepste punt heeft op een afstand van de respectievelijke zijrand.

21. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één concaaf gevormd deel van het verdiepingsoppervlak een constante straal heeft.

22. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één concaaf gevormd deel van het verdiepingsoppervlak tenminste een straal heeft van 3-7 mm, bij voorkeur 4-5 mm.

23. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één concaaf gevormd deel van het verdiepingsoppervlak een straal heeft die groter is dan de breedte van de verdieping.

24. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de breedte van de verdieping kleiner is dan 4,5 mm.

25. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de maximale diepte van de verdieping 0,2 – 1,5 mm is, bij voorkeur 0,2 – 0,8 mm.

26. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de verdieping is voorzien van een afgeschuinde rand die gepositioneerd is tussen het topoppervlak van het tegelpaneel en een concaaf gekromd deel van het verdiepingsoppervlak.

27. Tegelpaneel volgens een van de voorgaande conclusies, waarbij ten minste één rand vrij is van een kanaalvormige verdieping, waarbij deze rand is voorzien van een afgeschuinde rand die verbonden is met het topoppervlak.

28. Tegelpaneel volgens een van de voorgaande conclusies, waarbij het tegelpaneel is voorzien van ten minste twee imitatievoeglijnen langs ten minste twee verbindende zijranden van het tegelpaneel, waarbij elke voeglijn is gevormd door een kanaalvormige verdieping die verbonden is met het topoppervlak van het tegelpaneel, welke verdieping zich uitstrekt langs een zijrand van het tegelpaneel en een vrijwel constante breedte heeft die wordt begrensd door de respectievelijke zijrand van het tegelpaneel, waarbij de verdieping een opwaarts gericht verdiepingsoppervlak heeft dat tenminste gedeeltelijk is gevormd door een afzonderlijke voegbedekkingslaag, waarbij het verdiepingsoppervlak tenminste gedeeltelijk concaaf is gekromd over de breedterichting van de verdieping.

29. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de voegbedekkingslaag een slijtagesublaag en een decoratieve sublaag omvat, waarbij de slijtagelaag verbonden is met het topoppervlak van het tegelpaneel en een hoofdzakelijk transparant materiaal omvat, zodat de decoratieve sublaag visueel waarneembaar is door de slijtagelaag.

30. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de topsectie een slijtagelaag en een decoratieve laag omvat, waarbij de slijtagelaag samenvalt met het topoppervlak van het tegelpaneel en een hoofdzakelijk transparant materiaal omvat, zodat de decoratieve laag visueel waarneembaar is door de slijtagelaag.

31. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de kernlaag van het tegelpaneel tenminste gedeeltelijk is gemaakt van een of meer plastic composieten, zoals een hout-plastic composiet en/of een steen-plastic composiet en/of een mineraal-plastic composiet.

32. Tegelpaneel volgens een van de voorgaande conclusies, waarbij het tegelpaneel een dikte heeft in het gebied van 4,0 mm tot 12,0 mm.

33. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de geleidelijke kromming van het verdiepingsoppervlak tenminste een raaklijn omvat onder een hoek van 45 graden met een verticale vector van het tegelpaneel, en bij voorkeur tevens een raaklijn onder een hoek van 20 tot 70 graden met de verticale vector, en meest bij voorkeur tevens een raaklijn onder een hoek van 90 graden met de verticale vector.

34. Tegelpaneel volgens een van de voorgaande conclusies, waarbij de zijranden tenminste één paar, en bij voorkeur twee paren van tegenoverliggende zijranden omvatten, waarbij een eerste zijrand van een paar is voorzien van een imitatievoeglijn terwijl de tweede zijrand van het paar niet is voorzien van een imitatievoeglijn.

35. Tegelpaneel volgens conclusie 34, waarbij de eerste en tweede zijranden van een paar parallel zijn aan elkaar, en bij voorkeur het tegelpaneel een rechthoekig of zeshoekig formaat heeft.

36. Tegelpaneel volgens conclusie 34 of 35, waarbij de eerste en/of tweede zijranden van een paar zijn voorzien van onderling interacterende koppelprofielen, zodat de eerste zijrand van een eerste tegelpaneel kan worden gekoppeld aan de tweede zijrand van een tweede paneel.

37. Tegelpaneel volgens conclusie 36, waarbij de koppelprofielen zijn ingericht om gekoppelde tegelpanelen met elkaar te vergrendelen in een richting parallel aan het vlak dat door de tegelpanelen wordt opgetrokken, en/of in een richting loodrecht om het vlak dat door de tegelpanelen wordt opgetrokken

38. Oppervlakbedekking, in het bijzonder voor een vloer-, plafond- of wandoppervlak, welke is opgebouwd uit een veelheid naburige tegelpanelen volgens een van de voorgaande conclusies.

39. Oppervlakbedekking volgens conclusie 38, welke is opgebouwd uit een veelheid naburige en onderling verbonden tegelpanelen volgens een van de conclusies 36 of 37.

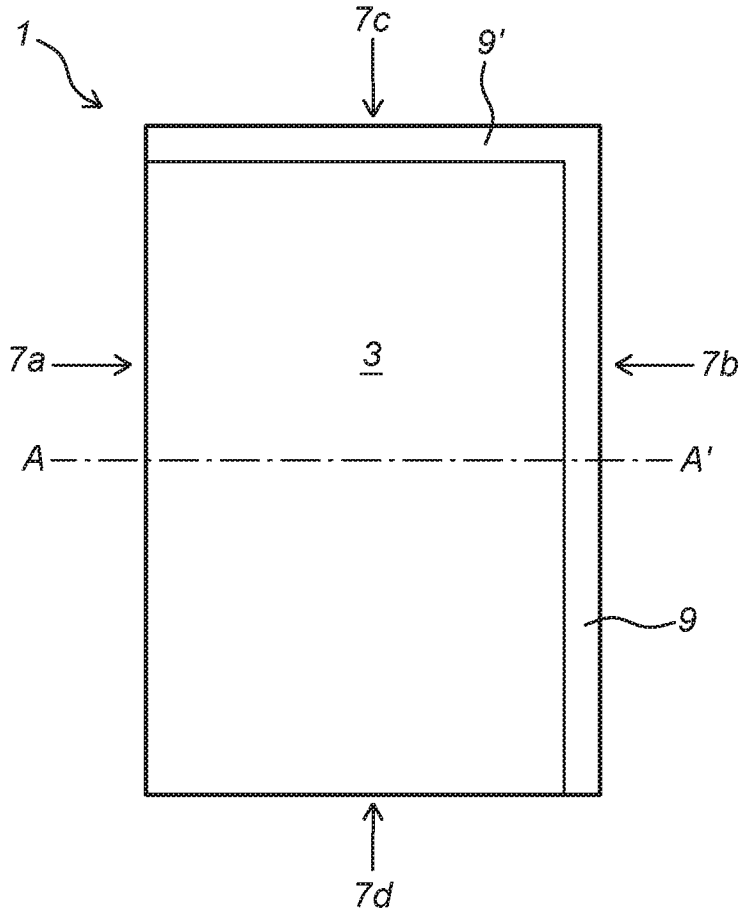

Fig. 1

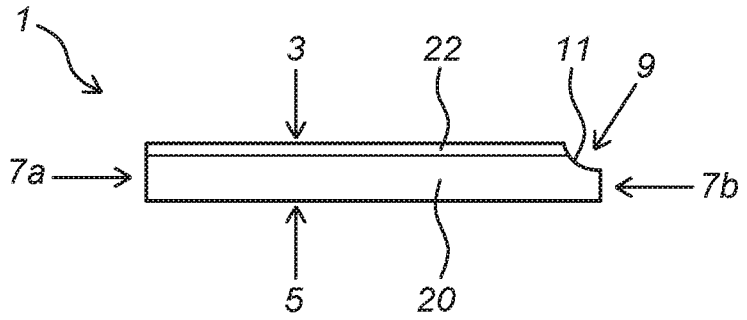

Fig. 2

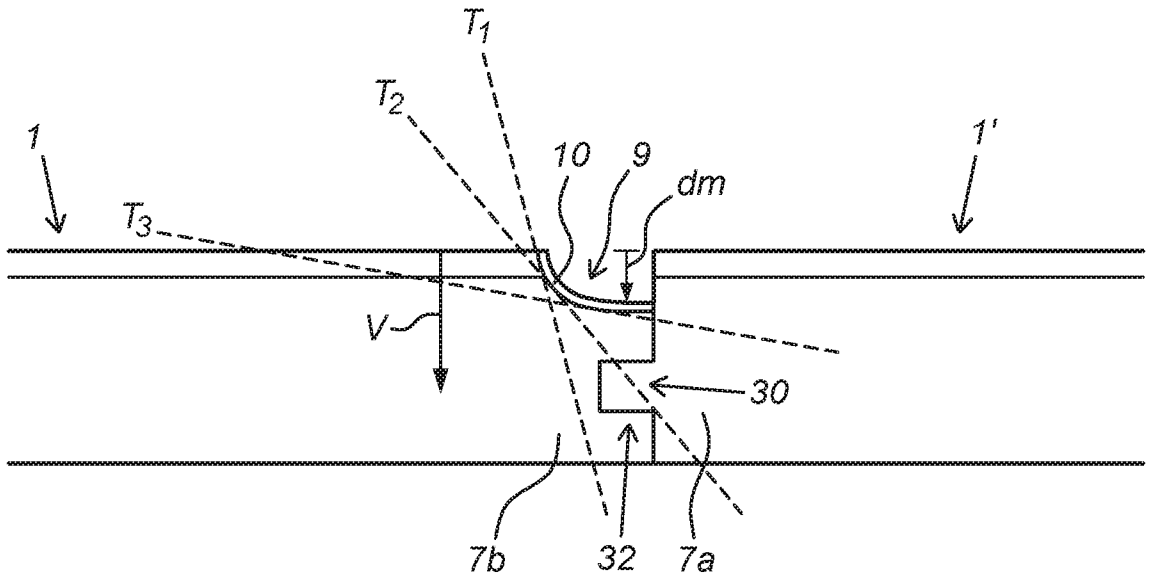

Fig. 3

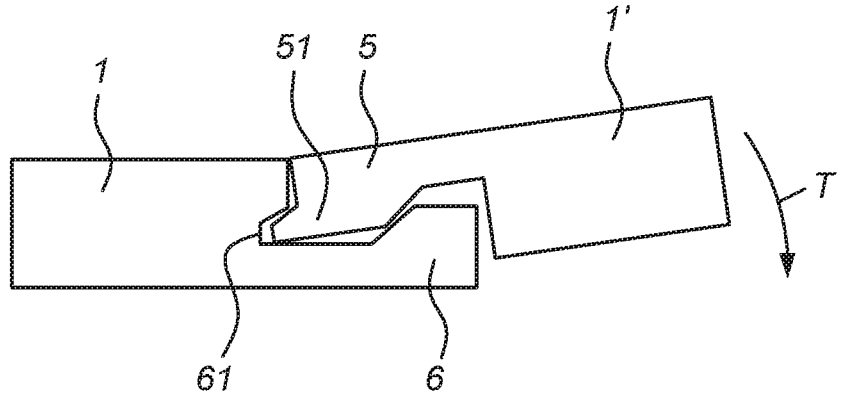

Fig. 4

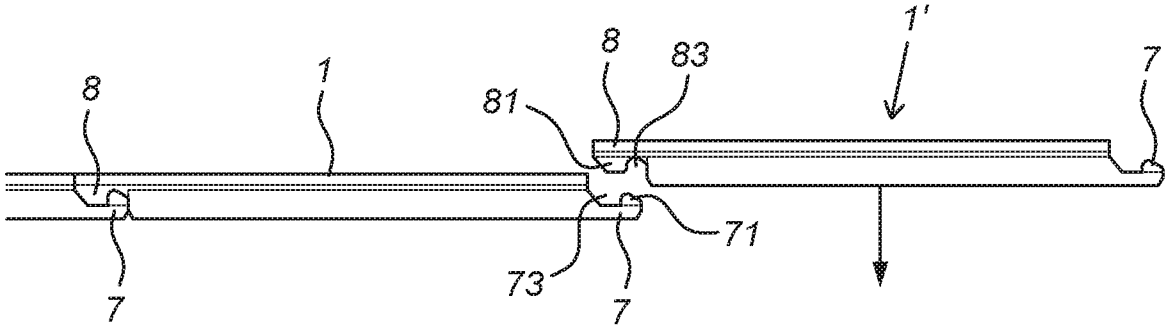

Fig. 5

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
Nederlands aanvraag nr. **2025283**	Indieningsdatum **06-04-2020**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **I4F LICENSING NV**	
Datum van het verzoek voor een onderzoek van internationaal type **27-06-2020**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN76430**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

Zie onderzoeksrapport

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**Zie onderzoeksrapport**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III.	☐	**GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES**	(opmerkingen op aanvullingsblad)
IV.	☐	**GEBREK AAN EENHEID VAN UITVINDING**	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2025283

A. CLASSIFICATIE VAN HET ONDERWERP
INV. E04F15/02 E04F15/10
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
E04F

Onderzochte andere documentatie dan de mimimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	US 2016/046144 A1 (THIERS BERNARD [BE]) 18 februari 2016 (2016-02-18)	1-17,21, 22, 24-33,38
Y	* alineas [0070], [0071], [0075], [0077], [0101], [0102], [0111], [0114]; figuren 1, 2, 18, 19, 24 *	18-20, 23, 34-37,39
Y	EP 1 971 735 A1 (VAELINGE INNOVATION AB [SE]) 24 september 2008 (2008-09-24) * figuren 3a-b, 4a-c *	18-20, 34-37,39
Y	WO 2020/025129 A1 (XYLO TECH AG [CH]) 6 februari 2020 (2020-02-06) * figuren 12a-c *	23

☐ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
18 januari 2021	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Fournier, Thomas

Formulier PCT/ISA/201 (tweede blad) (Januari 2004)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2025283

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 2016046144	A1 18-02-2016	BE 1016846 A3	07-08-2007
		BE 1017311 A6	03-06-2008
		CA 2626218 A1	18-05-2007
		CN 101300142 A	05-11-2008
		CN 104742637 A	01-07-2015
		EP 1960215 A2	27-08-2008
		US 2009139170 A1	04-06-2009
		US 2013305649 A1	21-11-2013
		US 2016046144 A1	18-02-2016
		WO 2007054812 A2	18-05-2007
EP 1971735	A1 24-09-2008	CN 101365852 A	11-02-2009
		EP 1971735 A1	24-09-2008
		WO 2007081260 A1	19-07-2007
WO 2020025129	A1 06-02-2020	GEEN	

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN76430	06.04.2020		NL2025283

International Patent Classification (IPC)
INV. E04F15/02 E04F15/10

Applicant
I4F LICENSING NV

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☒ Box No. VIII Certain observations on the application

	Examiner
	Fournier, Thomas

Application number

WRITTEN OPINION

NL2025283

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	18-20, 22, 23, 27, 31, 32, 34-37, 39
	No:	Claims	1-17, 21, 24-26, 28-30, 33, 38
Inventive step	Yes:	Claims	
	No:	Claims	1-39
Industrial applicability	Yes:	Claims	1-39
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VII Certain defects in the application

see separate sheet

Box No. VIII Certain observations on the application

see separate sheet

Re Item VIII

Clarity

1 Claims 18, 20 are not clear.

Claims 18 and 20 are identical in wording. One of these should be deleted.

Re Item V

Novelty and Inventive Step

2 Reference is made to the following documents:

D1 US 2016/046144 A1 (THIERS BERNARD [BE]) 18 februari 2016 (2016-02-18)

D2 EP 1 971 735 A1 (VAELINGE INNOVATION AB [SE]) 24 september 2008 (2008-09-24)

D3 WO 2020/025129 A1 (XYLO TECH AG [CH]) 6 februari 2020 (2020-02-06)

3 **Furthermore, the above-mentioned lack of clarity notwithstanding,** the subject-matter of **claims 1-17, 21, 24-26, 28-30, 33, 38 is not new** and the subject-matter of **claims 18-20, 22, 23, 27, 31, 32, 34-37, 39 does not involve an inventive step**.

3.1 The subject-matter of **claims 1-17, 21, 24-26, 28-30, 33, 38 is not new** in view of **D1, figure 1, 2, 18, 19**, disclosing

a decorative tile panel 2 suitable for covering a floor, ceiling or wall surface, which tile panel comprises:

- at least one core layer 14, and

- at least one decorative top section 12, 13, directly or indirectly affixed to said core layer 14 or integrated with said core layer, wherein the top section 12, 13 defines a top surface of the tile panel,

- a plurality of side edges 4, 5 at least partially defined by said core layer 14 and/or by side top section 12, 13,

wherein the tile panel 2 is provided with at least one imitation grout line along at least one side edge of the tile panel, which is formed by a **channel-shaped recess 8** connecting to the top surface 29 of the tile panel, which recess 8 extends along a side edge of the tile panel, and has a substantially constant width which is delimited by the respective side edge of the tile panel,

the upwardly facing recess surface 10 being at least partially formed by a **separate grout covering layer 11**,

wherein the recess 8 has an upwardly facing recess surface 10, **wherein said recess surface 10 is at least partially concavely curved** across the width direction of the recess.

D1 further discloses that:

2. the substantially entire surface of the recess 8 is formed by a separate grout covering layer 11.

3. the separate grout covering layer 11 is formed by a coating layer.

4. the separate grout covering layer 11 is formed by a transferred layer from a transfer film or film, by means of transfer prints. (par. 0114)

5. the separate grout covering layer 11 is formed by a printed layer. (par. 0075)

6. the separate grout covering layer 11 has a substantially constant thickness. (e.g. transfer print without relief)

7. the separate grout covering layer 11 has a varying thickness over the width direction of the recess. (e.g. transfer print with relief, par. 0111)

8. the separate grout covering layer 11 is connected to the top surface of the tile panel. (see Fig. 19)

9. the separate grout covering layer 11 is connected to the respective side edge of the tile panel. (see Fig. 19)

10. the separate grout covering layer 11 and the top surface of the tile panel differ in visual appearance.

11. the separate grout covering layer is darker than the top surface of the tile panel. *(layer 11 can likewise imitate the top surface decor or not, and an be monochrome or multicolored)*

12. the separate grout covering layer has a smooth top surface.

13. the separate grout covering layer has an upper surface that is embossed. (e.g. transfer print with relief, par. 0111)

14. the separate grout covering layer is glued and/or fused with an underlying part of the tile panel. (e.g. transfer print)

15. at least a portion of the top section extends to a side edge where a channel-shaped recess is formed. (see Fig. 19)

16. the upwardly facing surface is at least partially concave curved over the width direction of the recess. (continuous curvature; see Fig. 19)

17. the upwardly facing surface of the recess is substantially completely concave across the width direction of the recess. (continuous curvature; see Fig. 19)

21. at least one concave formed part of the recessed surface has a constant radius. (see Fig. 19)

24. the width of the recess is less than 4.5 mm. (par. 0077 discloses a width of 3 mm or less)

25. the maximum depth of recess is 0.2 - 1.5 mm, preferably 0.2 - 0.8 mm. (par. 0070 discloses the width being "considerably smaller than 2 mm.")

26. the recess is provided with a beveled edge positioned between the top surface of the tile panel and a concave curved portion of the recess surface. (Fig. 24)

28. the tile panel is provided with at least two imitation joint lines along at least two connecting side edges of the tile panel. (see Fig. 2)

29. the joint cover layer comprises a wear substrate and a decorative sublayer, the wear layer being connected to the top surface of the tile panel and comprises a substantially transparent material, so that the decorative sublayer is visually detectable by the wear layer. (par. 101, 102)

30. the top section comprises a wear layer and a decorative layer, wherein the wear layer coincides with the top surface of the tile panel and comprises a substantially transparent material, so that the decorative layer is visually detectable by the wear layer. (par. 071)

33. the gradual curvature of the recessed surface comprises at least one tangent at an angle of 45 degrees with a vertical vector of the tile panel, and preferably also a tangent at an angle of 20 to 70 degrees with the vertical vector, and most preferably also a tangent at a 90 degree angle to the vertical vector. (see Fig. 19)

D1 further discloses a surface covering in accordance with claim 38.

3.2 **D2** and **D3** disclose similar panels. In D2, Fig. 3a-b, 4a-4c, no covering layer is disclosed for the channel, and in D3, Fig. 12a-c the covering layer of the channel in one piece with the top layer, and not a separate covering layer.

The subject matter of **claims 18-20, 22, 23, 27, 31, 32, 34-37, 39 doesn't seem to involve an inventive step** starting from **D1** as closest prior art, the additional features defined in these claims being either known from **D2, Fig. 3a-b, 4a-c (for claims 18-20, 34-37, 39)** or **D3 (for claim 23)**, or which are slight changes in the panel known from D1 which are obvious to the skilled person to solve the respective problem **(for claims 22, 27, 31, 32)**.

Re Item VII

Certain defects

4 The following defects have been observed

4.1 The relevant **background art disclosed in D1-D3 is not mentioned in the description**, nor are these documents identified therein.

4.2 Following rule applies: if the application contains drawings, and the comprehension of the claims would be improved by establishing the connection between the features mentioned in the claims and the corresponding reference signs in the drawings, then **appropriate reference signs should be placed in parentheses after the features mentioned in the claims**. Reference signs should not however be seen as limiting the extent of the matter protected by the claims; their sole function is to make claims easier to understand. If text is added to reference signs in parentheses in the claims, lack of clarity can arise.