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54 **Panel**

57 The present invention relates to a panel, in particular a floor panel, comprising a at least one first coupling part and at least one second coupling part connected respectively to opposite edges of the core, which first coupling part comprises an upward tongue, at least one upward flank lying at a distance from the upward tongue and an upward groove, which second coupling part comprises a downward tongue, at least one downward flank lying at a distance from the downward tongue, and a downward groove, wherein the upward tongue is provided with a first locking element; wherein the downward flank is provided with a second locking element, wherein the downward tongue is provided with a third locking element, wherein the upward flank is provided with a fourth locking element.

Panel

The invention relates to a panel, in particular a floor panel. The invention also relates to a covering, in particular a floor covering, comprising a plurality of
5 interconnected panels according to the invention.

Interconnectable panels, such as interconnectable floor panels, are generally joined mechanically at edges of the panels by using complementary coupling profiles at opposite edges. Traditionally, rectangular floor panels are connected at the long
10 edges by means of a traditional angling method. On the short side, the different coupling mechanisms can be applied, wherein a short edge coupling mechanism may, for example, be based upon vertical folding, also referred to as a drop down, wherein a downward tongue located at a short edge of a panel to be coupled is moved in downward direction, such that said downward tongue is inserted into an
15 upward groove located at a short edge of a panel already installed. An example of such a panel is disclosed in US7896571, wherein a short edge coupling mechanism is shown being configured to vertically lock mutually coupled short edges of adjacent panels. Although this aimed vertical locking effect at the short edges is intended to stabilize the coupling between floor panels at the short edges,
20 in practice often breakages, due to coupling edges being put under tension both during assembly and during practical use, occur at the coupling edges, which affects the reliability and durability of this type of drop down coupling.

An objection of the invention is to provide an improved panel which can be coupled
25 in improved manner to an adjacent panel as well as to improve the coupling of the coupled panels.

The present invention thereto provides a panel, in particular a floor panel, comprising a, preferably centrally located, core provided with an upper side and a
30 lower side, which core defines a plane; at least one first coupling part and at least one second coupling part connected respectively to opposite edges of the core, which first coupling part comprises an upward tongue, at least one upward flank lying at a distance from the upward tongue and an upward groove formed in
between the upward tongue and the upward flank wherein the upward groove is
35 adapted to receive at least a part of a downward tongue of a second coupling part

of an adjacent panel, which second coupling part comprises a downward tongue, at least one downward flank lying at a distance from the downward tongue, and a downward groove formed in between the downward tongue and the downward flank, wherein the downward groove is adapted to receive at least a part of an upward tongue of a first coupling part of an adjacent panel, wherein at least a part of a side of the upward tongue facing away from the upward flank is provided with at least one first locking element, for instance in the form of an outward bulge and/or a recess, adapted for co-action with a second locking element, for instance in the form of a recess or an outward bulge, of an adjacent floor panel; wherein at least a part of a side of the downward flank is provided with at least one second locking element, for instance in the form of a recess and/or an outward bulge, adapted for co-action with the first locking element, for instance in the form of an outward bulge or a recess, of an adjacent floor panel; wherein at least a part of a side of the downward tongue facing away from the downward flank is provided with at least one third locking element, for instance in the form of an outward bulge and/or a recess, adapted for co-action with a fourth locking element, for instance in the form of a recess or an outward bulge, of an adjacent floor panel; and wherein at least a part of the upward flank is provided with at least one fourth locking element, for instance in the form of a recess and/or an outward bulge, adapted for co-action with the third locking element, for instance in the form of an outward bulge or a recess, of an adjacent floor panel.

The panel is provided with hook-like coupling means wherein the upward tongue and the downward groove, as well as the upward groove and the downward tongue, cooperate and hook behind each other. In this way, these elements provide a (horizontal) locking of two coupled panels in horizontal direction, at least when placed on a horizontal floor. The locking elements, the first, second, third and fourth, provide a vertical locking of two coupled panels in vertical direction, at least when placed on a horizontal floor. In this regard, the horizontal direction may be considered to be the direction in the plane of the panel, whereas the vertical direction may be considered to be a direction perpendicular to the horizontal direction.

The locking in vertical direction may be achieved by the co-action of the first and second locking element, as well as by the co-action of the third and fourth locking

element. In an embodiment, the first and third locking elements are embodied as outward bulges, and the second and fourth locking elements are embodied as (inward) recesses. In a coupled condition, the bulges cooperate with the corresponding recesses and fit into each other. The surfaces of the bulges and recesses which are in contact with each other in coupled condition may have at least a horizontal component, thus providing a vertical locking. It may well be that the first and third locking elements are embodied as (inward) recesses, and the second and fourth locking elements are embodied as outward bulges. Other combinations/alterations are also possible, wherein for instance the first and fourth locking elements are embodied as outward bulges, or the second and third.

By providing the first and second locking elements on one side of the coupling parts (for instance the side of the downward flank), and the third and fourth locking elements on another side of the coupling parts (for instance the side of the upward flank), the vertical locking elements are distributed over the area of the coupling parts. This distribution may result in a horizontal and vertical separation of locking elements. Such separation is beneficial since, for instance upon coupling by a vertical motion, the locking elements which co-act together to provide locking, are coupled in turn, one after the other. This may reduce deformation and material stresses in these locking elements. Additionally the reduction in these forces increases the strength of the locking elements. Also, the invention allows that panels may be coupled using an angling motion, as well as that coupled panels can be uncoupled in an angling motion.

It is also possible to provide either the first and second locking elements, or the third and second locking elements, in the panel, thus effectively leaving out one of the pairs of locking elements.

At least a part of a side of the upward tongue facing toward the upward flank may be inclined with respect to a vertical direction and may be angled towards the upward flank; and at least a part of a side of the downward tongue facing toward the downward flank may be inclined with respect to a vertical direction. The part of the side of the downward tongue being inclined with respect to the vertical direction may be angled towards the downward flank. This angling and inclination creates a so-called "closed groove" system, in which the inclined parts facilitate the vertical

locking of coupled panels. In order to couple two panels with such “closed groove”, at least one of the coupling parts may deform at least partially and temporarily. A “closed groove” may thus increase the vertical locking of coupled panels, and may increase the difficulty to couple panels. The angle enclosed by the direction in which the part is inclined and the vertical may for instance lie between 0 and 45 degrees, in particular between 0 and 10 degrees. The angle may exclude 0 degrees, since this would result in a vertical direction and not a direction which can be considered angled. In the “closed groove” systems, vertical locking is typically improved by increasing the angle enclosed, but the greater the angle, the more difficult it is to couple adjacent panels.

At least a part of a side of the upward tongue facing toward the upward flank may be inclined with respect to a vertical direction and may be angled away from the upward flank; and wherein at least a part of a side of the downward tongue facing toward the downward flank may be inclined with respect to a vertical direction. The part of the side of the downward tongue being inclined with respect to the vertical direction may be angled away from the downward flank. This angling and inclination creates a so-called “open groove” system, which is relatively easy to couple, as well as uncouple, and does not require deformation of the coupling parts (or at least not as much as in a “closed groove”). The angle enclosed by the direction in which the part is inclined and the vertical may for instance lie between 0 and 45 degrees, in particular between 0 and 10 degrees. The angle may exclude 0 degrees, since this would result in a vertical direction and not a direction which can be considered angled.

The part of the side of the downward tongue facing away from the downward flank and/or at least a part of the upward flank may be at least partially curved or inclined, wherein the third and/or fourth locking element may be located on the at least partially curved or inclined part. Such curved or inclined part may for instance be for an aligning edge, facilitating mutual alignment of panels to be coupled. The first and second coupling parts may for instance comprise a bridge part, connecting the upward and downward tongues to the respective flanks. The curve or inclination of the part of the side of the downward tongue facing away from the downward flank and/or at least a part of the upward flank may be towards the bridge part of the coupling part.

An upper part of the upward flank and/or an upper part of the side of the downward tongue facing away from the downward flank may be provided with a bevel. The upper parts are for instance in contact at a lower zone of the upper parts, and are moving away from each other in a higher zone of the upper parts, forming the bevel. Such bevel provides both a space for movement around the upper parts, as well as an aesthetic effect simulating wooden flooring panels. When such bevels are provided on the upper parts of the coupling parts, in a coupled state the bevels form a V-shape (of removed material). The third and fourth locking elements are then, preferably, located at a level lower than, or beneath, the lowest part of the bevels. In this way, the third and fourth locking elements are not visible from above, when the panels are coupled.

The third locking element may be located inward compared to an upper part of the side of the downward tongue facing away from the downward flank. The upper part of the side of the downward tongue may thus form an extremity, or furthest part, of the locking element, and the other elements of the second coupling element may be arranged between the core of the panel and said upper part, resulting in a relative compact design. Such compact design has further benefits in that the elements thereof are protected and not as vulnerable to damage compared to protruding elements.

The third locking element may be an outward bulge, and the fourth locking element may be a recess, wherein in particular the outward bulge may be at least partially circular in cross section. It may also be that the third locking element is a recess, and the fourth locking element is an outward bulge. The recess may be shaped such to be substantially complementary to the bulge, which also holds for the first and second locking elements as well. A bulge/recess combination is relatively easy to manufacture, and thus relatively easy to produce.

Between the downward tongue and the core of the panel a bridge part may be present, connecting the downward tongue to the core, wherein, in particular, the bridge part may have a variable thickness between the core and the downward tongue. Such variable thickness of the bridge part results in a bridge part having a section with a minimum thickness, or a section wherein the thickness of the bridge

part is minimal. It is that section where the least amount of material is present in the bridge, such that said section forms a weakest zone of the bridge part. Especially in so-called "closed groove" locking systems, where (at least temporary) deformation of the coupling parts occurs, the formation or characterization of such weakest zone defines the location where deformation of the coupling parts, and the bridge thereof in particular, is most likely to occur. The second coupling part may thus be configured to deform at least temporarily during coupling, in particular the bridge part of the second coupling part.

10 The minimal thickness of the second coupling part, in particular the bridge thereof, may be less than half the total thickness of the panel. By having such minimal thickness of the second coupling part, a relative thin zone is created in the second coupling part. This thin zone is especially useful in the "closed groove" systems, where (at least temporary) deformation of the coupling parts occurs, the formation or characterization of such thin zone defines the location where deformation of the coupling parts, and the bridge thereof in particular, is most likely to occur. The second coupling part may thus be configured to deform at least temporarily during coupling, in particular the bridge part of the second coupling part.

20 At least one third locking element and at least one fourth locking element may be arranged at a higher level compared to the level of the first and second locking elements. Also, at least one third locking element and at least one fourth locking element may be arranged at a lower level compared to the highest point of the upward tongue. Also, the third and fourth locking elements may be arranged, at least in vertical direction, between the highest point of the upward tongue and the level of the first and second locking elements. This distribution may result in a vertical separation of locking elements. Such separation is beneficial since, for instance upon coupling by a vertical motion, the locking elements which co-act together to provide locking, are coupled in turn, one after the other. This may reduce deformation and material stresses in these locking elements. Additionally the reduction in these forces increases the strength of the locking elements.

In a coupled condition, a gap may be present between the upper side of the upward tongue and the lower part of the downward groove, wherein the gap preferably widens from the side of the upward tongue facing towards the upward

flank to the downward flank. The presence of a gap between the upper side of the upward tongue and the lower part of the downward groove results in that the upward tongue and the downward groove are, as such, not in direct contact. Instead, the inside and outside of the tongues are on contact. The gap allows
5 foreign material to collect, without hindering the coupling of panels. The gap also allows panel material to collect when such material is for instance shaved of the coupling parts during coupling. Such may occur when, due to for instance production tolerances, one of the coupling parts is slightly over dimensioned compared to the available space.

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Beneath the first coupling element, in particular beneath the upward tongue thereof, a space may be present, such that, when placed on the floor, a gap exists between the upward tongue and the floor the panel is placed on. This space may for instance increase in height in a direction from the core towards the outside of the
15 upward tongue, or the side of the upward tongue facing away from the upward flank. A space underneath the first coupling element may allow the first coupling element to deform, or bend, slightly downward during coupling, facilitating coupling of two panels. This facilitation of coupling further allows larger tolerances and deviations from the exact dimensions of the coupling parts to be coupled.

20

In a coupled condition, a plurality of gaps may be present between the coupling parts of the coupled panels. For instance, a first gap may be present between the upper parts of the coupling parts and the third and fourth locking elements. A second gap may be present between the third and second locking elements and
25 the inner sides of the tongues (or the side of the upward tongue facing towards the upward flank and the side of the downward tongue facing towards the downward flank). A third gap may be present between the inner sides of the tongues (or the side of the upward tongue facing towards the upward flank and the side of the downward tongue facing towards the downward flank) and the first and second
30 locking elements. The presence of these gaps between the upper side of the upward tongue and the lower part of the downward groove results in that the upward tongue and the downward groove are, as such, not in direct contact. Instead, the inside and outside of the tongues are on contact. The gap allows foreign material to collect, without hindering the coupling of panels. The gap also
35 allows panel material to collect when such material is for instance shaved of the

coupling parts during coupling. Such may occur when, due to for instance production tolerances, one of the coupling parts is slightly over dimensioned compared to the available space.

- 5 The panel according to the invention is typically used to provide a floor covering, but can also be applied to form an alternative covering, for example a wall covering, ceiling covering, column covering, beam covering, or furniture covering. The panel may have a thickness between 2.5 and 10 mm thick. At least a part of the core may be made of any material, such as MDF, HDF, particle board, plastic, such as PVC,
10 PE, PP, PET, PU, (wood) plastic composites, mineral board, magnesium oxide board, gypsum, glass, sand, wood, or mixtures (or combinations) thereof. The panel may further be provided with one or more reinforcement layers, such as a glass fibre layer or polyester layer, to strengthen the panel. The panel may for instance be elongated, and have a width between 10 and 100 cm, and a length of
15 50 to 250 cm.

At least a part of the core of the panels is preferably made of a – relative environmentally friendly – material comprising plastic material, such as polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET) or
20 polyurethane (PU), polylactic acid (PLA), polybutylene succinate (PBS), polyester, preferably a compostable polyester, or combinations thereof. The core may include filling materials, such as mineral fillers, such as particles, dust, and/or fibres. The panel, in particular the core, may further comprise plasticizer to make the panel as such more flexible. The core of the panel may at least partially be made of a wood
25 fibre core, for instance a recycled wood fibre core.

On top of the core, the panels may comprise a decorative layer, for instance a decorative print layer, preferably made of plastic and/or paper, or a decorative print printed directly on the core. On top of the decorative layer, a protective layer may
30 be present, to protect the decorative layer. On the bottom of the core a balancing or (sound) dampening layer may be present.

The decorative layer may include, for example, paper. The paper may be a printed melamine impregnated paper, for example, a decor sheet composed of melamine
35 resin impregnated cellulose fibres. The paper may be placed directly on the carrier,

for example, an HDF board. The paper may be placed on a scattering of decorative powder mix. For example, the decorative powder may include wood fibres and a binder, and optionally, a pigment and/or wear resistant particles. The wood fibres of the decorative power may be processed wood fibres or unprocessed wood fibres, such as recycled wood fibres.

The decorative layer may include, for example, a scattering of decorative powder mix. For example, the decorative powder may include wood fibres and a binder, and optionally, a pigment and/or wear resistant particles. The wood fibres of the decorative power may be processed wood fibres or unprocessed wood fibres, such as recycled wood fibres. The decorative layer may include, for example, multiple layers of scattered decorative powder mix.

The decorative layer may include, for example, a wood veneer. The wood veneer may be placed directly on the carrier, for example, an HDF board. The wood veneer may be placed on a scattering of decorative powder mix. For example, the decorative powder may include wood fibres and a binder, and optionally, a pigment and/or wear resistant particles. The wood fibres of the decorative power may be processed wood fibres or unprocessed wood fibres, such as recycled wood fibres.

The decorative layer may include, for example, cork. The cork may be placed directly on the carrier, for example, an HDF board. The cork may be placed on a scattering of decorative powder mix. For example, the decorative powder may include wood fibres and a binder, and optionally, a pigment and/or wear resistant particles. The wood fibres of the decorative power may be processed wood fibres or unprocessed wood fibres, such as recycled wood fibres.

The transitions between the bridge parts and the tongues of the coupling parts may for instance be rounded or smooth (at least not sharp). Such transitions provide a graduate transition between the different elements, and prevents formation of cracks or material weaknesses at the transitions when loads or forces are applied to the coupling parts. The transitions between the bridge parts and the flanks of the coupling parts may also be rounded or smooth for the same reasons.

The panels may for instance be configured to be coupled with a vertical motion. The panels according to the present invention may for instance be provided with first and second coupling parts on two opposite sides of the panel. For instance, the panel may be elongated or rectangular, and the first coupling part on a short edge thereof. The second coupling part may then be located on the opposite short edge. The other sides, such as the long sides, may be provided with first and second coupling parts as well. Alternatively, the other sides may be provided with angling down profiles, which are coupled by a turning or rotational movement. Such angling down profiles for instance have a sideward groove on one of the sides, and a sideward tongue on the opposite side. The first and second coupling parts are typically suitable to be coupled during this angling motion of the other sides, wherein the first and second coupling parts zip into place in a rotational downward motion, also referred to as "zip-lock". Additionally, the panels according to the invention may be uncoupled using an angling motion.

15

The invention also related to a covering, in particular a floor covering or wall covering, comprising a plurality of panels according to the present invention.

The invention will be elucidated on the basis of non-limitative exemplary embodiments shown in the following figures. Herein:

20

- Figure 1 schematically shows a panel according to the present invention, and shows the first coupling part of the panel;
- Figure 2 schematically shows a panel according to the present invention, and shows the second coupling part of the panel;
- 25 - Figure 3 schematically shows the first and second coupling parts of figures 1 and 2 in coupled condition;
- Figure 4 schematically shows a panel according to the present invention, and shows the first coupling part of the panel;
- Figure 5 schematically shows a panel according to the present invention, and shows the second coupling part of the panel;
- 30 - Figure 6 schematically shows the first and second coupling parts of figures 4 and 5 in coupled condition;
- Figure 7 schematically shows different levels of the embodiment shown in figures 1-3;

- Figure 8 schematically shows different levels of the embodiment shown in figures 4-6;
- Figure 9 schematically shows the coupling of two panels as shown in figures 1-3 and 7;
- 5 - Figure 10 schematically shows the uncoupling of two panels as shown in figures 1-3 and 7;
- Figures 11A-J schematically show various alternative coupling parts;
- Figure 12 schematically shows a panel according to the present invention, and shows the first coupling part of the panel; and
- 10 - Figure 13 schematically shows a panel according to the present invention, and shows the second coupling part of the panel.

Figure 1 schematically shows a floor panel (1) according to the present invention, and shows the first coupling part (2) of the panel (1). The panel (1) comprises a centrally located core (3) provided with an upper side (3a) and a lower side (3b).
 15 The first coupling part (2) comprises an upward tongue (4), an upward flank (5), lying at a distance from the upward tongue (4) and an upward groove (6) formed in between the upward tongue (4) and the upward flank (6). The upward groove (6) is adapted to receive at least a part of a downward tongue of a second coupling part
 20 of an adjacent panel.

A part of a side (7) of the upward tongue (4) facing away from the upward flank (5) is provided with a first locking element (8), in the form of an outward bulge (8), adapted for co-action with a second locking element of an adjacent floor panel.

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A part of the upward flank (5) is provided with a fourth locking element (9), in the form of a recess (9), adapted for co-action with the third locking element of an adjacent floor panel. A part of a side (17) of the upward tongue (4) facing toward the upward flank (5) is inclined with respect to a vertical direction (V) and is angled
 30 away from the upward flank (5), indicated with an arrow (A1). A part (19) of the upward flank (5) is curved (19a) or inclined (19b), wherein the fourth locking element (9) is located on the curved (19a) or inclined (19b) part. An upper part (20) of the upward flank (5) is provided with a bevel (21).

Figure 2 schematically shows a floor panel (1) according to the present invention, and shows the second coupling part (10) of the panel (1). The panel (1) comprises a centrally located core (3) provided with an upper side (3a) and a lower side (3b). The second coupling part (10) comprises a downward tongue (11), a downward flank (12) lying at a distance from the downward tongue (11), and a downward groove (13) formed in between the downward tongue (11) and the downward flank (12) wherein the downward groove (11) is adapted to receive at least a part of an upward tongue of a first coupling part of an adjacent panel.

10 A part of a side of the downward flank (12) is provided with a second locking element (14), in the form of a recess (14), adapted for co-action with the first locking element of an adjacent floor panel. A part of a side (15) of the downward tongue (11) facing away from the downward flank (12) is provided with a third locking element (16), in the form of an outward bulge (16), adapted for co-action
15 with a fourth locking element of an adjacent floor panel.

A part of a side (18) of the downward tongue (11) facing toward the downward flank (12) is inclined with respect to a vertical direction (V) and is angled away from the downward flank (12), indicated with an arrow (A2). A part of the side (15) of the downward tongue (11) facing away from the downward flank (12) is curved (22a) or inclined (22b), wherein the third locking element (16) is located on the curved (22a) or inclined (22b) part. An upper part (23) of the side (15) of the downward tongue (11) facing away from the downward flank (12) is provided with a bevel (24).
20 The third locking element (16) is located inward compared to the upper part (23) of the side (15) of the downward tongue (11) facing away from the downward flank (12).
25

Figure 2 shows that between the downward tongue (11) and the core (3) of the panel (1) a bridge part (25) is present, connecting the downward tongue (11) to the core (3), wherein the bridge part (25) has a variable thickness. The thickness of the bridge part (25) has a minimum thickness, indicated with (D1), wherein the bridge part (25), where thickness is minimum, has a thinnest, or weakest, area (26), where possible deformation of the second coupling part (10) is most likely to occur.
30

Figure 3 shows the first and second coupling parts of figures 1 and 2 in a coupled condition. In this coupled condition, a gap (27) is present between the upper side (28) of the upward tongue (4) and the lower part (29) of the downward groove (13), wherein the gap (27) widens from the side (17) of the upward tongue (4) facing
5 towards the upward flank (5) to the downward flank (12).

Figures 4-6 show a variant to the panel shown in figures 1-3. Figure 4 shows the first coupling part, figure 5 the second coupling part and figure 6 a coupled
10 condition.

Features corresponding between figures 1-3 and 4-6 are provided with the same numerals. The main difference is that where figures 1-3 show an "open groove" system, figures 4-6 show a "closed groove" locking system. This is indicated by the arrows (A3 and A4), which show that the sides (17, 18) of the tongues (4, 11) are
15 directed towards the flanks (5, 12), rather than away from the flanks (5, 12).

Beneath the upward tongue (4), a space (30) is present, such that, when placed on the floor, a space (30) exists between the upward tongue (4) and the floor the panel is placed on. Although the "closed groove" embodiment is shown, the same, or at least similar, profile can be used in an "open groove" embodiment as well.
20

Figures 7 and 8 show, in a coupled condition, the levels of the first and second locking elements (L1), the third and fourth locking elements (L3) and the highest point of the upward tongue (LH). The level of the third and fourth locking elements (L3) lies between the level of the highest point of the upward tongue (LH) and the
25 level of the first and second locking elements (L1). Figure 7 also indicates the level of the lowest part of the bevel as (LB). Between that level (LB) and the level of the third and fourth locking elements (L3) a distance exists, such that the third and fourth locking elements are not visible through the bevel.

Figure 9 schematically shows the coupling of two panels as shown in figures 1-3 and 7. Figure 10 schematically shows the uncoupling of two panels as shown in figures 1-3 and 7. Figure 9 shows coupling by a vertical movement (indicated with the vertical arrow). In step A the panels are moved towards each other. In step B, the first and second locking elements are engaging. In step C, a deformation of the
35 bridge part of the second coupling part occurs, indicated with the curved arrow. In

step D, the first and second locking elements are sliding in place, and the third and fourth locking elements are engaging. In step E the coupling is complete. Figure 10 shows the coupled condition in step E. In step F uncoupling is initiated by a rotation (large arrow), causing a deformation of the bridge part of the second coupling part (small arrow). In step G the coupling is undone, wherein in step H both panels are free from each other, corresponding to step A of figure 9.

Figures 11A-11J schematically show various alternative embodiments for coupling parts. The coupling parts as described in the previous figures are especially suitable for short sides of elongated panels. These coupling parts are typically on two opposite sides, or two opposite short sides, of such panels. On the other sides, for instance on two opposite long sides of such panels, angling down profiles could be present. Figures 11A-11J show various coupling parts which are suitable for using on these opposite sides of the panel. Each of these embodiments can be angled in place, by turning or rotating the sideward tongues (101) into sideward grooves (102). In each of these embodiments also gaps (103) are present in coupled conditions, which can be used to accumulate foreign material such as dust.

The sideward grooves (102) are typically bordered by an upper lip (104) and a lower lip (105) extending beyond the upper lip (104), wherein the upper lip (104) is provided with an upward shoulder (106), which cooperates with a groove typically underneath the sideward tongue (101). In some embodiments the entrance to the groove (102) is angled or chamfered (107). In coupled condition, an intermediate space (108) may be present between the coupling elements, between the outside of the upward shoulder (106) and the core of the panel.

The embodiments as shown in figures 11A, C, D and E have a rounded bottom (109) of the sideward tongue, and a corresponding rounded recess in the sideward groove, which rounding facilitates the angling of such panels. The embodiments of figures 11B, F, H and J rely on a relative flat bottom (110) and corresponding recess, which is easy to produce and increases vertical locking. The embodiments of figures 11A, F and J show the use of a bevel (111) on such angling down profiles. The embodiment of figure 11G shows an embodiment of an angling down profile wherein the sideward groove has a specific shape allowing it to force the sideward tongue into the sideward groove in a coupled condition. The embodiment

of figure 11f shows a double structure, or a sandwich structure of both the sideward tongue and the sideward groove.

5 Figures 12 and 13 show a variation on the panels with coupling parts of figures 1 and 2. Corresponding features have been given the same reference numbers. In figures 1 and 2, the third locking element (16) is provided on the outside of the downward tongue (11), in the form of a bulge (16), and the fourth locking element (9) is provided on the upward flank (5), in the form of a recess (9). In figures 12 and 13 a different interpretation is given, in which the upward flank (5) is provided with a
10 third locking element (16) in the form of the bulge (16), and the side of the downward tongue (11) facing away from the downward flank (12) is provided with a fourth locking element (9), in the form of a recess (9).

15 It will be apparent that the invention is not limited to the working examples shown and described herein, but that numerous variants are possible within the scope of the attached claims that will be obvious to a person skilled in the art.

The above-described inventive concepts are illustrated by several illustrative embodiments. It is conceivable that individual inventive concepts may be applied
20 without, in so doing, also applying other details of the described example. It is not necessary to elaborate on examples of all conceivable combinations of the above-described inventive concepts, as a person skilled in the art will understand numerous inventive concepts can be (re)combined in order to arrive at a specific application.

25

The verb "comprise" and conjugations thereof used in this patent publication are understood to mean not only "comprise", but are also understood to mean the phrases "contain", "substantially consist of", "formed by" and conjugations thereof.

Conclusies

1. Paneel, in het bijzonder een vloerpaneel of wandpaneel, omvattende:
 - een centraal geplaatste kern voorzien van een bovenzijde en een
 - 5 onderzijde, welke kern een vlak definieert;
 - ten minste één eerste koppelingsgedeelte en ten minste één tweede koppelingsgedeelte die respectievelijk verbonden zijn met tegenover elkaar gelegen randen van de kern,
 - o welk eerste koppelingsgedeelte een opwaartse tong omvat, ten minste één
 - 10 opwaartse flank die op een afstand van de opwaartse tong gelegen is, en een opwaartse groef gevormd tussen de opwaartse tong en de opwaartse flank, waarbij de opwaartse groef aangepast is om ten minste een gedeelte van een neerwaartse tong van een tweede koppelingsgedeelte van een aangrenzend paneel te ontvangen:
 - 15 o welk tweede koppelingsgedeelte een neerwaartse tong omvat, ten minste één neerwaartse flank die op een afstand van de neerwaartse tong gelegen is, en een neerwaartse groef gevormd tussen de neerwaartse tong en de neerwaartse flank, waarbij de neerwaartse groef aangepast is om ten minste een gedeelte van een opwaartse tong van een eerste koppelingsgedeelte van een aangrenzend
 - 20 paneel te ontvangen;
 - waarbij ten minste een gedeelte van een zijde van de opwaartse tong die van de opwaartse flank weg is gericht, is voorzien van een eerste vergrendelingselement, bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, aangepast voor samenwerking met een tweede
 - 25 vergrendelingselement, bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, van een aangrenzend vloerpaneel;
 - waarbij ten minste een gedeelte van een zijde van de neerwaartse flank is voorzien van een tweede vergrendelingselement, bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, aangepast voor
 - 30 samenwerking met het eerste vergrendelingselement, bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, van een aangrenzend vloerpaneel;
 - waarbij ten minste een gedeelte van een zijde van de neerwaartse tong die van de neerwaartse flank weg is gericht, is voorzien van een derde
 - 35 vergrendelingselement, bijvoorbeeld in de vorm van een naar buiten toe gerichte

uitstulping of een uitsparing, aangepast voor samenwerking met een vierde vergrendelingselement, bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, van een aangrenzend vloerpaneel; en

- waarbij ten minste een gedeelte van de opwaartse flank is voorzien van een vierde vergrendelingselement, bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, aangepast voor samenwerking met het derde vergrendelingselement, bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, van een aangrenzend vloerpaneel.

10 2. Paneel volgens conclusie 1, waarbij ten minste een gedeelte van een zijde van de opwaartse tong die naar de opwaartse flank is gericht, schuin staat ten opzichte van een verticale richting en onder een hoek staat naar de opwaartse flank toe; en waarbij ten minste een gedeelte van een zijde van de neerwaartse tong die naar de neerwaartse flank is gericht, schuin staat ten opzichte van een
15 verticale richting.

3. Paneel volgens conclusie 1 of 2, waarbij ten minste een gedeelte van een zijde van de opwaartse tong die naar de opwaartse flank is gericht, schuin staat ten opzichte van een verticale richting en onder een hoek staat weg van de opwaartse
20 flank; en waarbij ten minste een gedeelte van een zijde van de neerwaartse tong die naar de neerwaartse flank is gericht, schuin staat ten opzichte van een verticale richting.

4. Paneel volgens een der voorgaande conclusies, waarbij het gedeelte van de zijde van de neerwaartse tong die van de neerwaartse flank weg is gericht, en/of
25 ten minste een gedeelte van de opwaartse flank ten minste gedeeltelijk gebogen of hellend is, waarbij het derde en/of vierde vergrendelingselement zich op het ten minste gedeeltelijk gebogen of hellende gedeelte bevindt.

30 5. Paneel volgens een der voorgaande conclusies, waarbij een bovenste gedeelte van de opwaartse flank en/of een bovenste gedeelte van de zijde van de neerwaartse tong die van de neerwaartse flank weg is gericht, is voorzien van een afschuining, waarbij, bij voorkeur, de derde en vierde vergrendelingselementen zich op een afstand van het laagste deel van de afschuining bevinden.

6. Paneel volgens een der voorgaande conclusies, waarbij het derde vergrendelingselement zich naar binnen toe bevindt ten opzichte van een bovenste gedeelte van de zijde van de neerwaartse tong die van de neerwaartse flank weg is gericht.

5

7. Paneel volgens een der voorgaande conclusies, waarbij het derde vergrendelingselement een naar buiten toe gerichte uitstulping is, en het vierde vergrendelingselement een uitsparing is, waarbij in het bijzonder de naar buiten toe gerichte uitstulping ten minste gedeeltelijk cirkelvormig is in dwarsdoorsnede.

10

8. Paneel volgens een der voorgaande conclusies, waarbij er zich tussen de neerwaartse tong en de kern van het paneel een bruggedeelte bevindt dat de neerwaartse tong met de kern verbindt, waarbij, in het bijzonder, het bruggedeelte een variabele dikte heeft tussen de kern en de neerwaartse tong.

15

9. Paneel volgens een der voorgaande conclusies, waarbij de derde en vierde vergrendelingselementen zijn ingericht op een hoger niveau ten opzichte van het niveau van de eerste en tweede vergrendelingselementen.

20

10. Paneel volgens een der voorgaande conclusies, waarbij de derde en vierde vergrendelingselementen zijn ingericht op een lager niveau ten opzichte van het hoogste punt van de opwaartse tong.

25

11. Paneel volgens een der voorgaande conclusies, waarbij de derde en vierde vergrendelingselementen zijn ingericht, ten minste in verticale richting, tussen het hoogste punt van de opwaartse tong en het niveau van de eerste en tweede vergrendelingselementen.

30

12. Paneel volgens een der voorgaande conclusies, waarbij de derde en vierde vergrendelingselementen zijn aangepast om samen te werken om een verticale vergrendeling te verschaffen en/of waarbij de eerste en tweede vergrendelingselementen zijn aangepast om samen te werken om een verticale vergrendeling te verschaffen.

13. Paneel volgens een der voorgaande conclusies, waarbij het tweede koppelingsgedeelte geconfigureerd is om ten minste tijdelijk te vervormen tijdens de koppeling, in het bijzonder het bruggedeelte van het tweede koppelingsgedeelte.

5

14. Paneel volgens een der voorgaande conclusies, waarbij er, in een gekoppelde toestand, een tussenruimte aanwezig is tussen de bovenzijde van de opwaartse tong en de onderzijde van de neerwaartse groef, waarbij de tussenruimte bij voorkeur breder wordt vanaf de naar de opwaartse flank gerichte zijde van de opwaartse tong naar de neerwaartse flank toe.

10

15. Paneel volgens een der voorgaande conclusies, waarbij de minimale dikte van het tweede koppelingsgedeelte, in het bijzonder de brug ervan, kleiner is dan de helft van de totale dikte van het paneel.

15

16. Paneel volgens een der voorgaande conclusies, waarbij er, onder het eerste koppelingselement, in het bijzonder onder de opwaartse tong ervan, een ruimte aanwezig is, zodanig dat, wanneer op de vloer geplaatst, er een tussenruimte bestaat tussen de opwaartse tong en de vloer waarop het paneel wordt geplaatst.

20

17. Bedekking, in het bijzonder een vloerbedekking of wandbedekking, omvattende een veelheid onderling verbonden panelen volgens een der voorgaande conclusies.

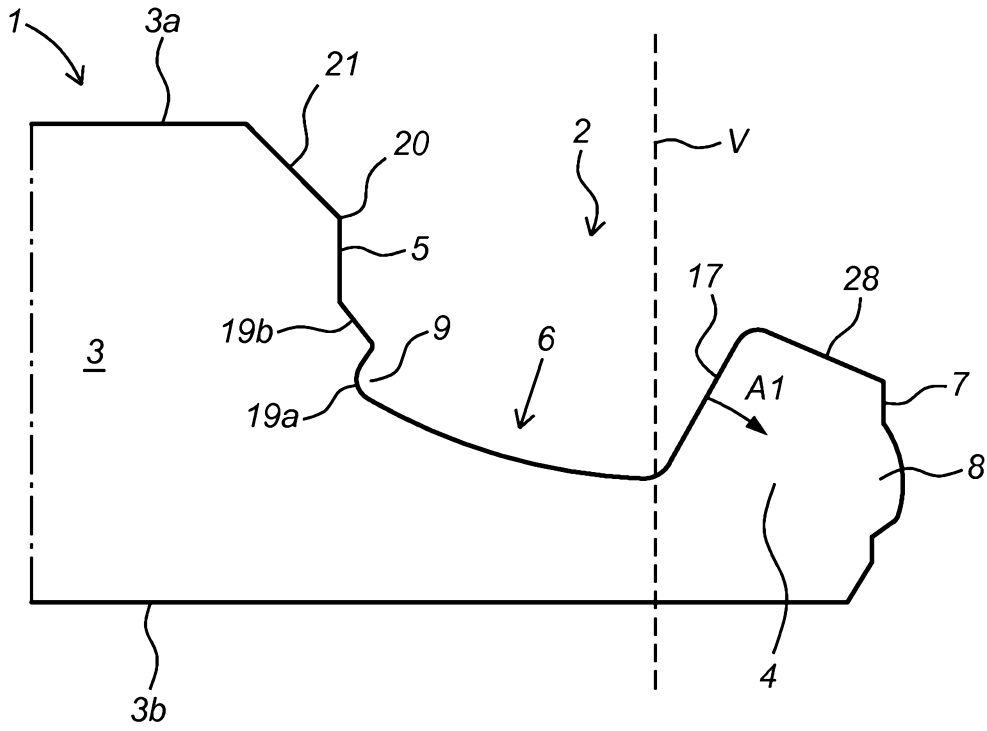


Fig. 1

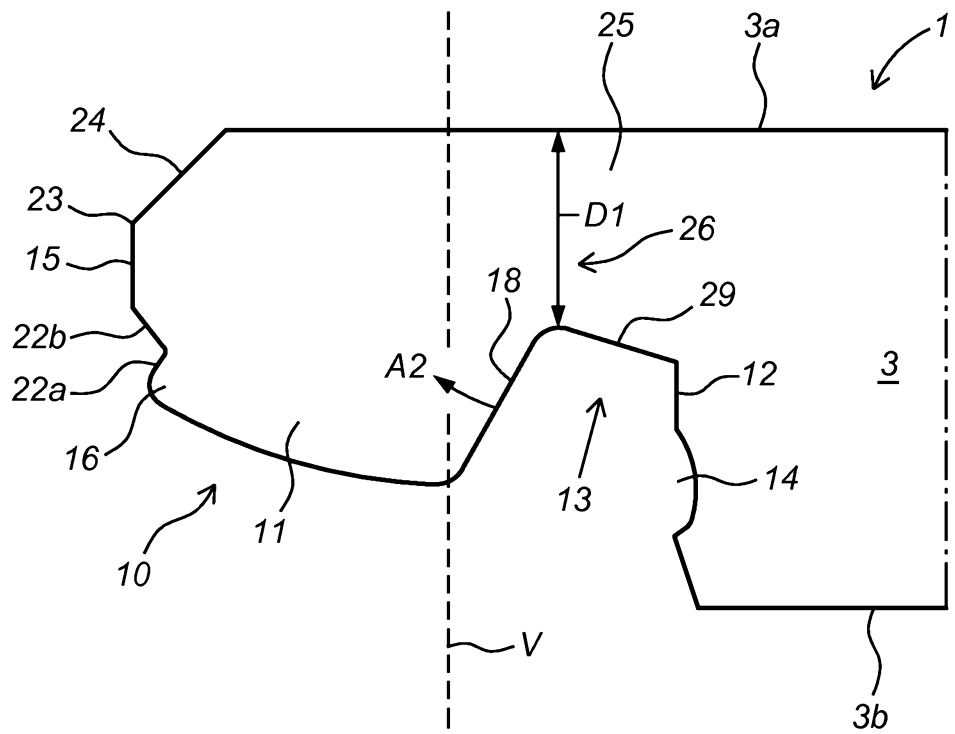


Fig. 2

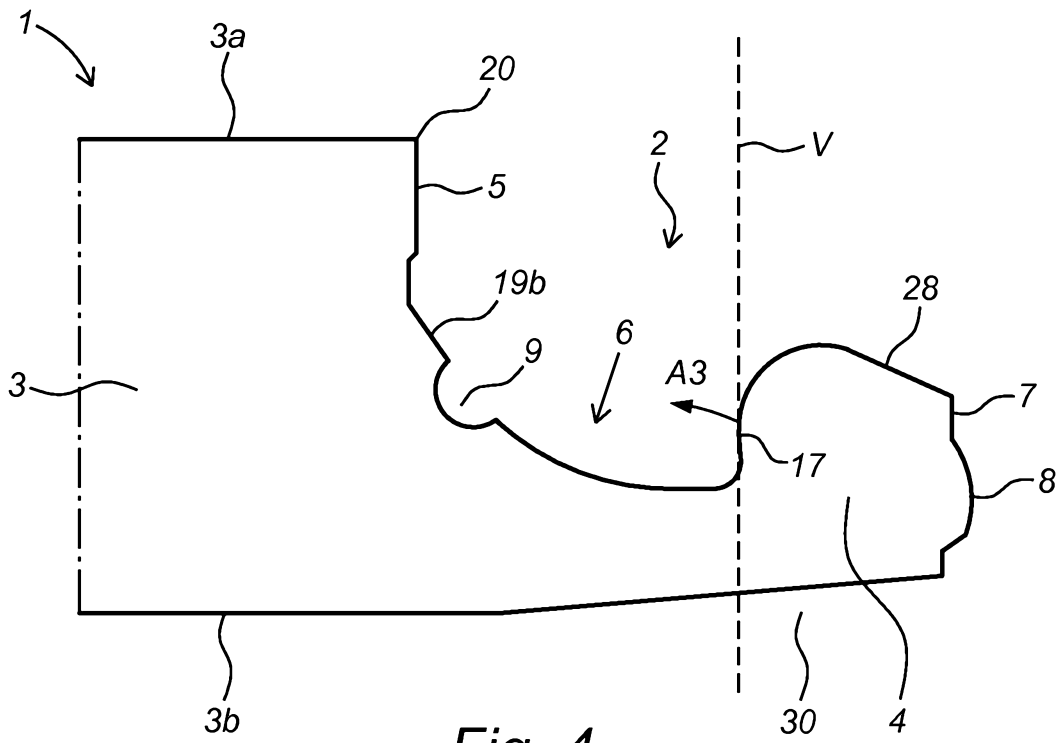


Fig. 4

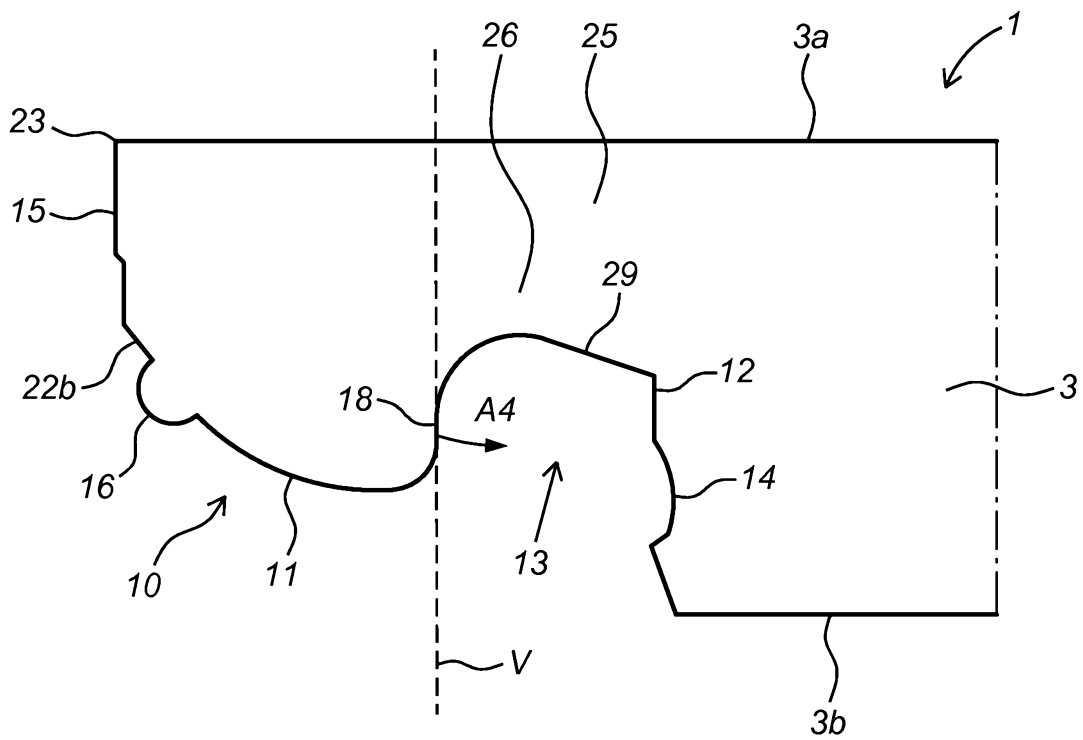


Fig. 5

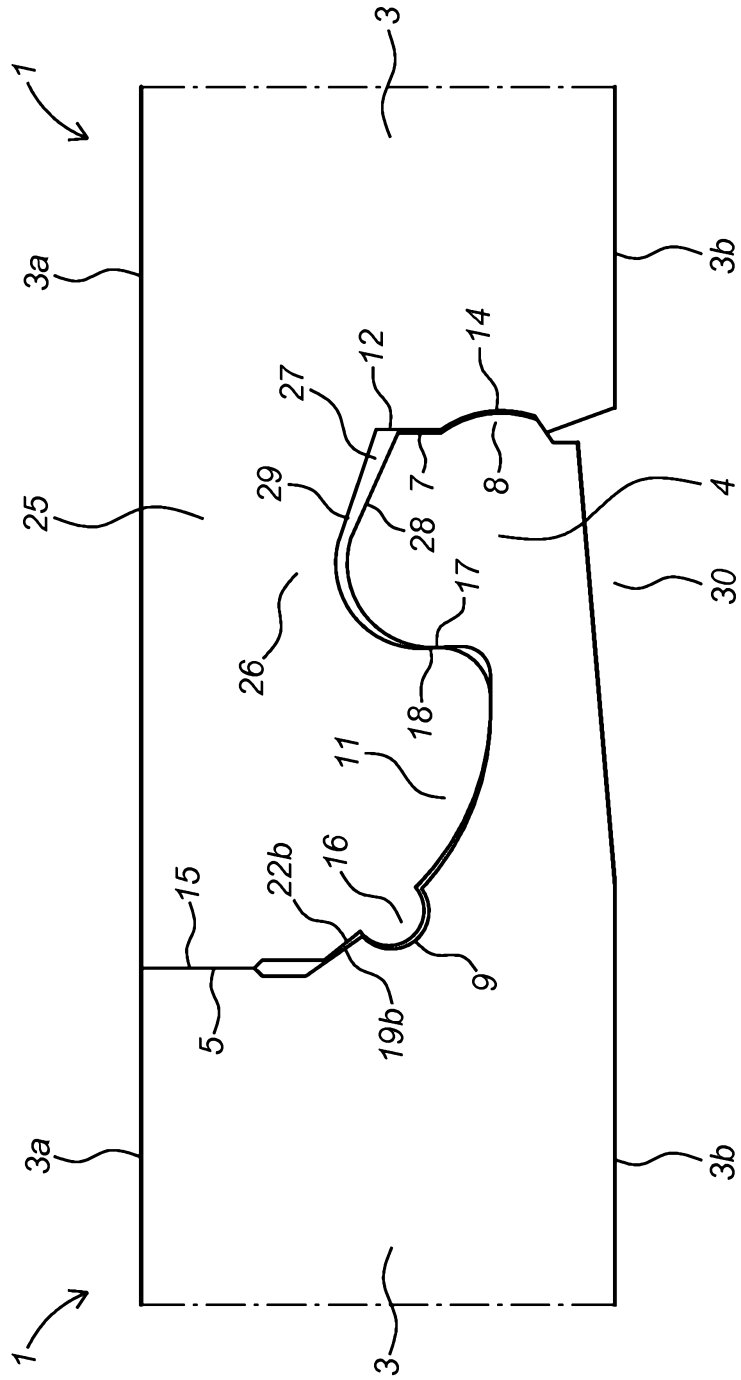


Fig. 6

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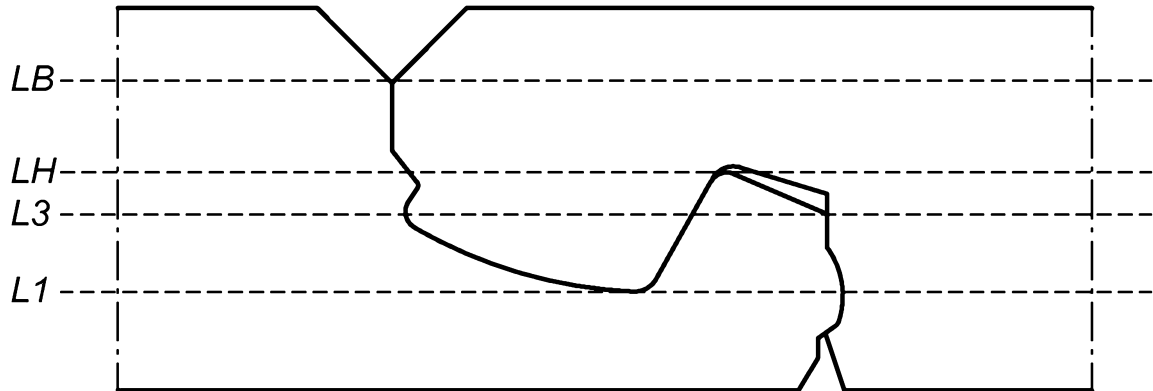


Fig. 7

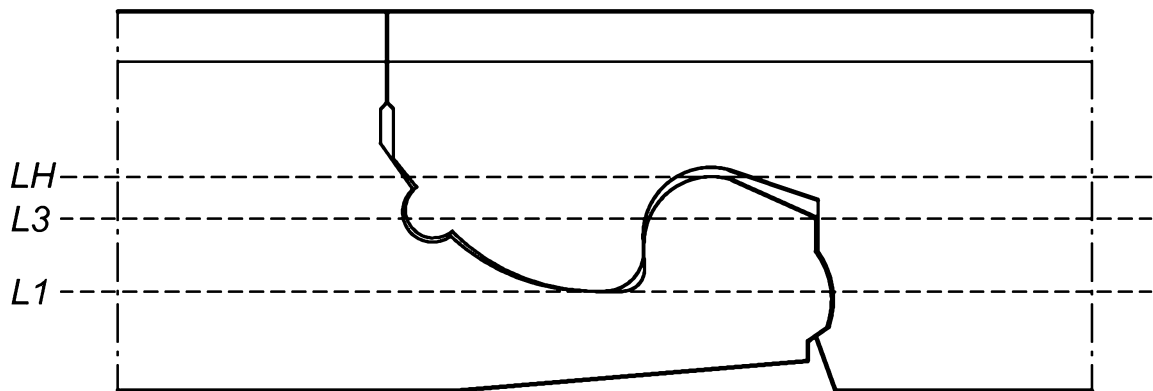


Fig. 8

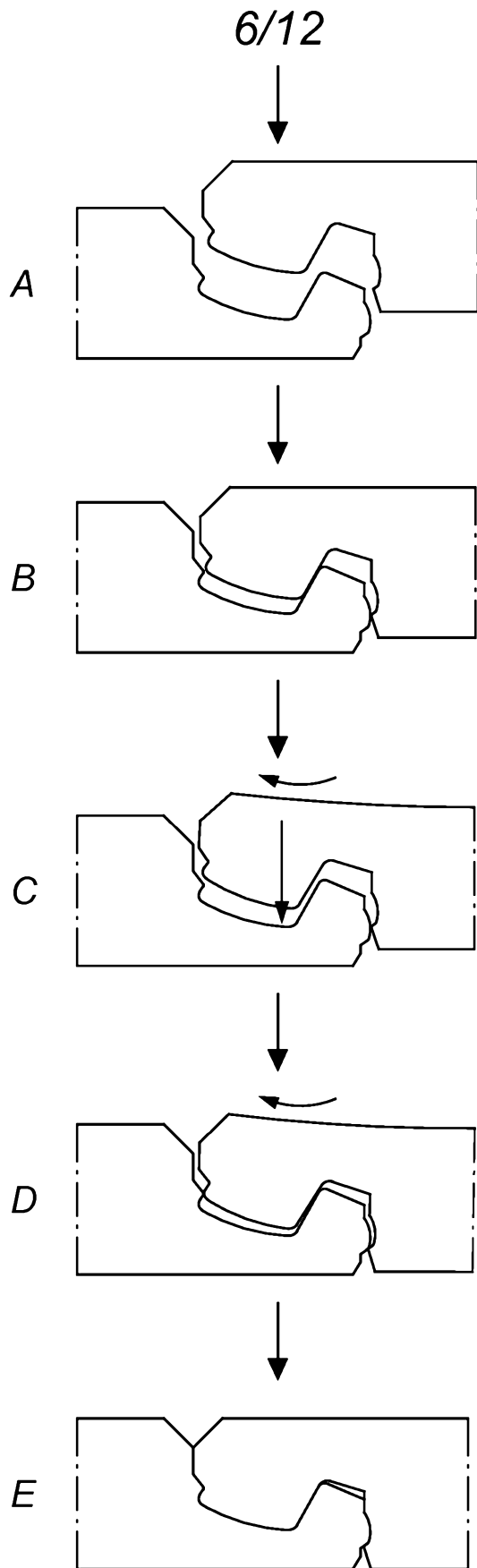


Fig. 9

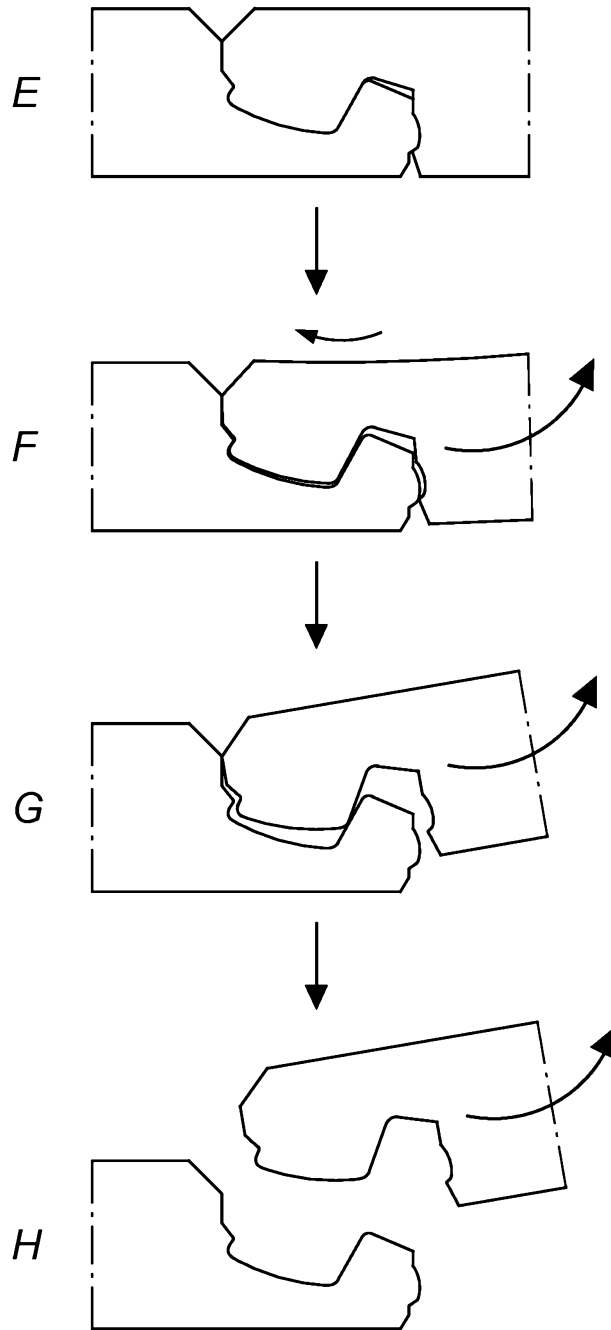


Fig. 10

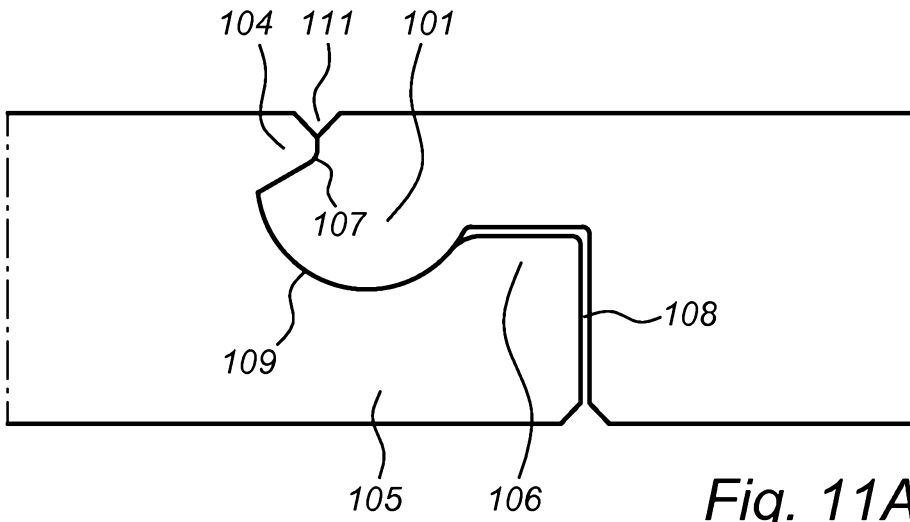


Fig. 11A

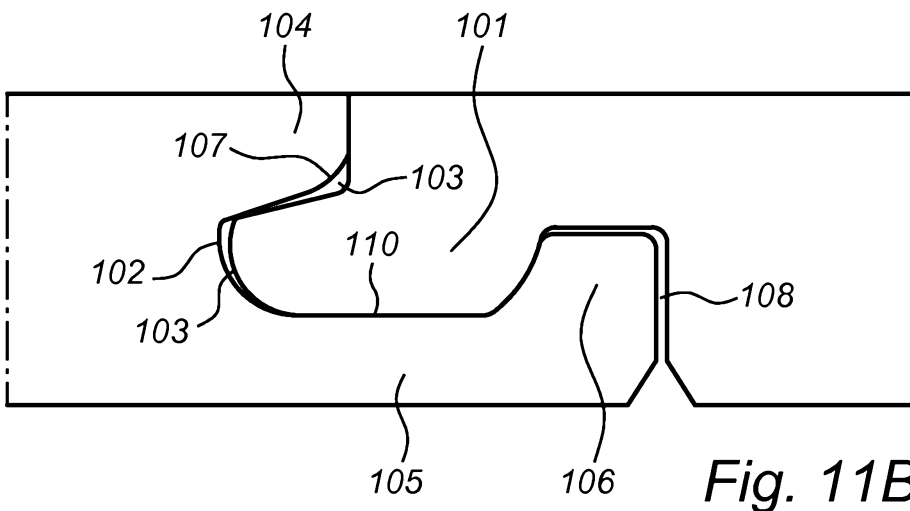


Fig. 11B

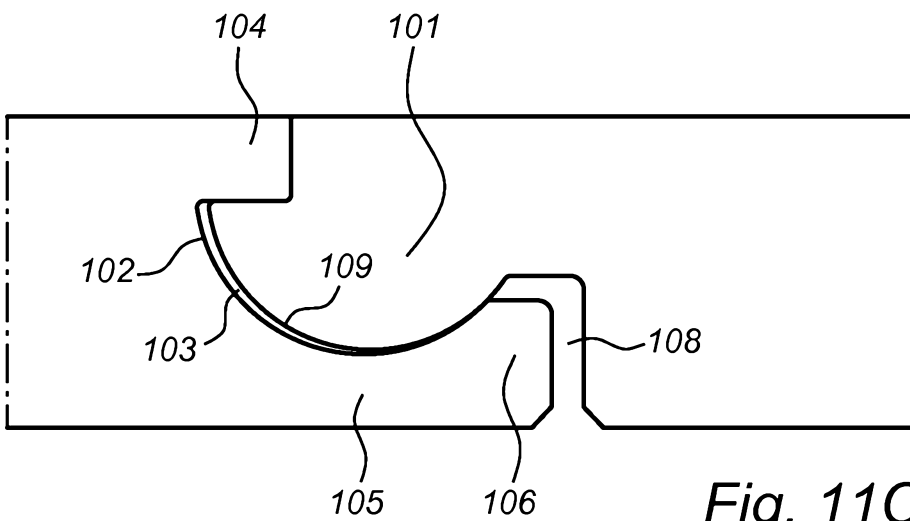


Fig. 11C

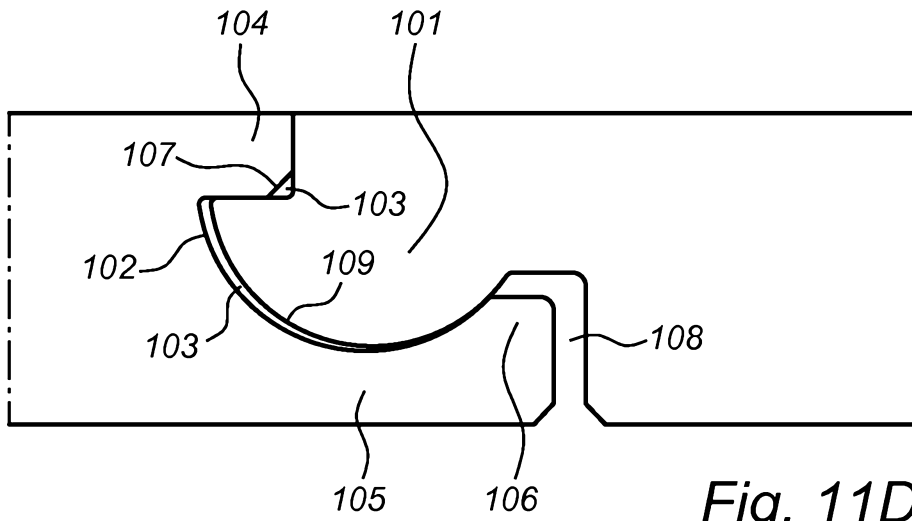


Fig. 11D

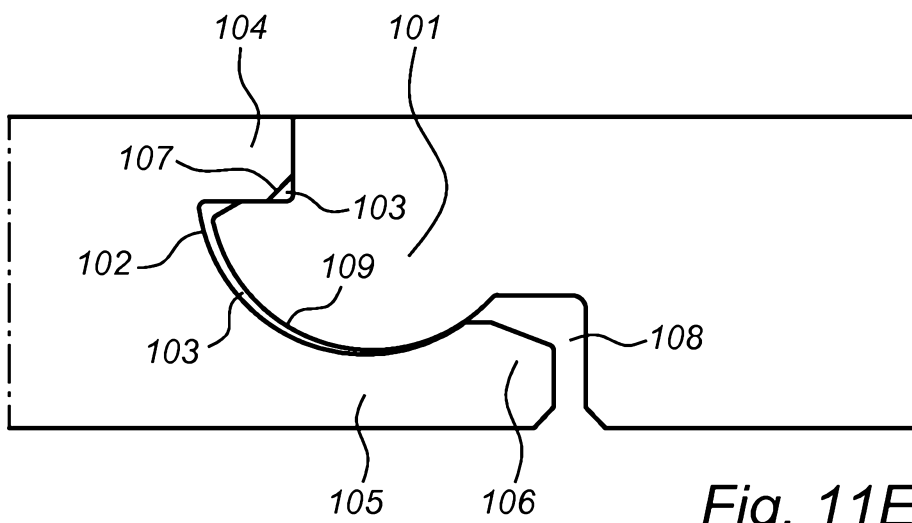


Fig. 11E

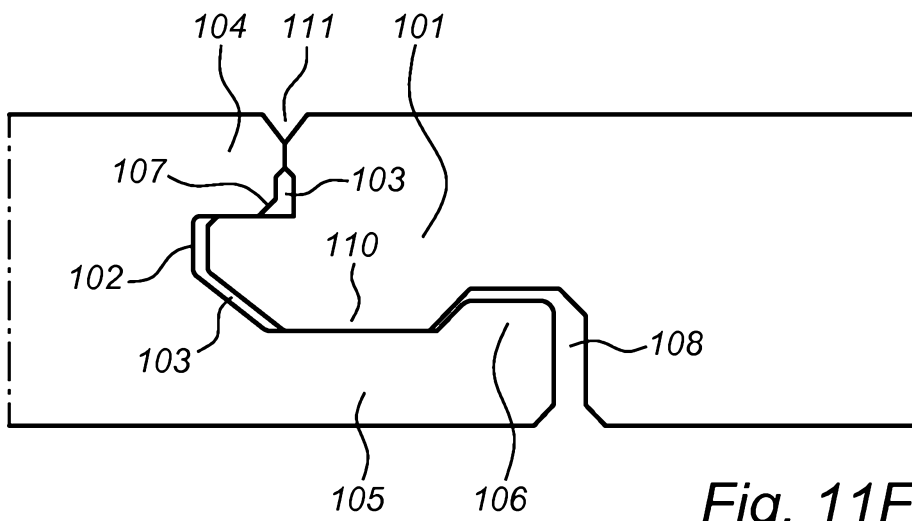


Fig. 11F

10/12

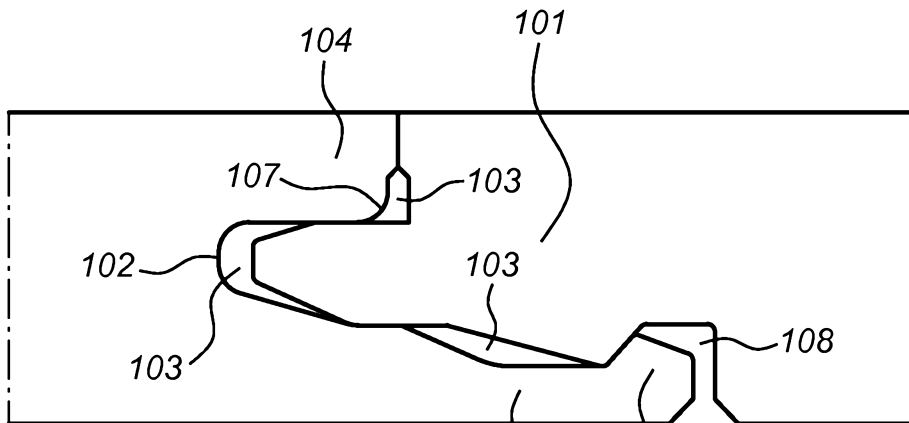


Fig. 11G

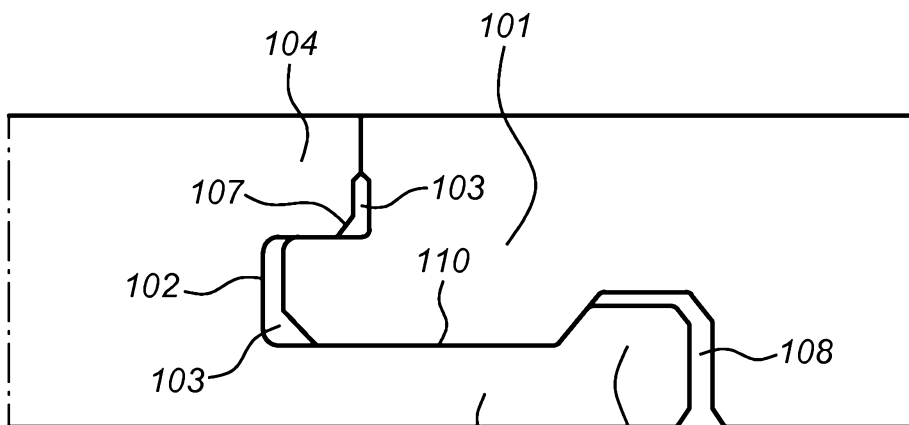


Fig. 11H

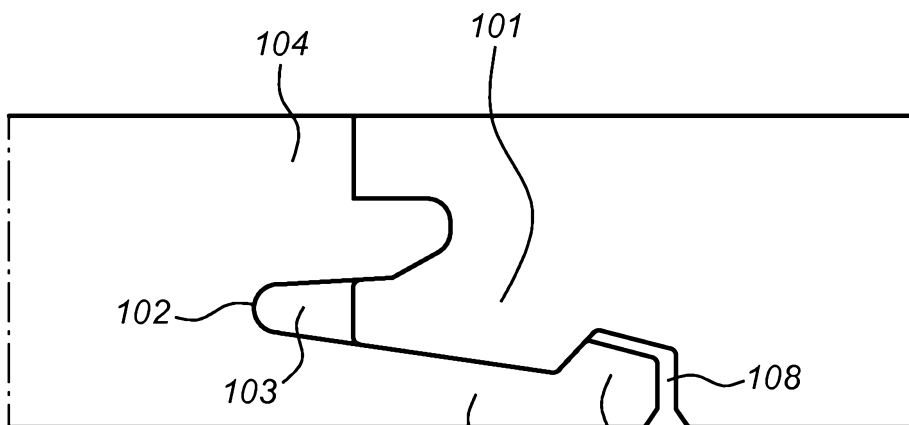


Fig. 11I

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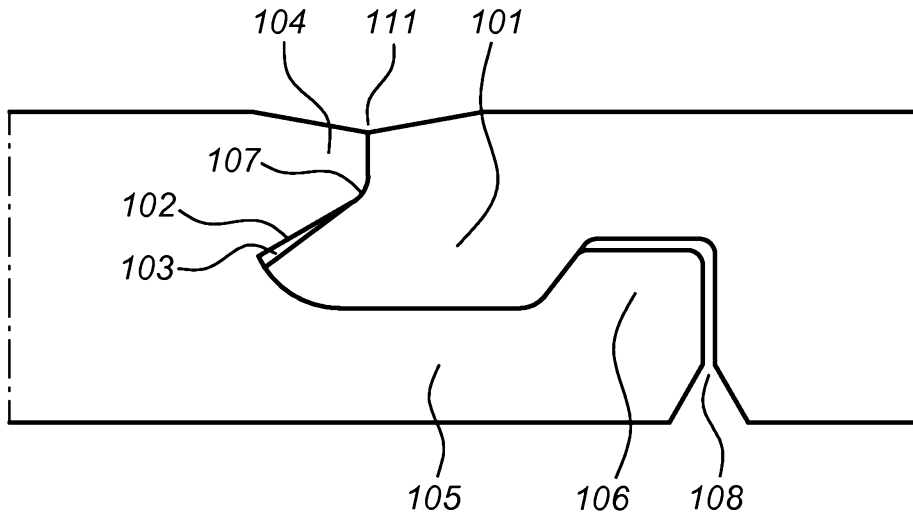


Fig. 11J

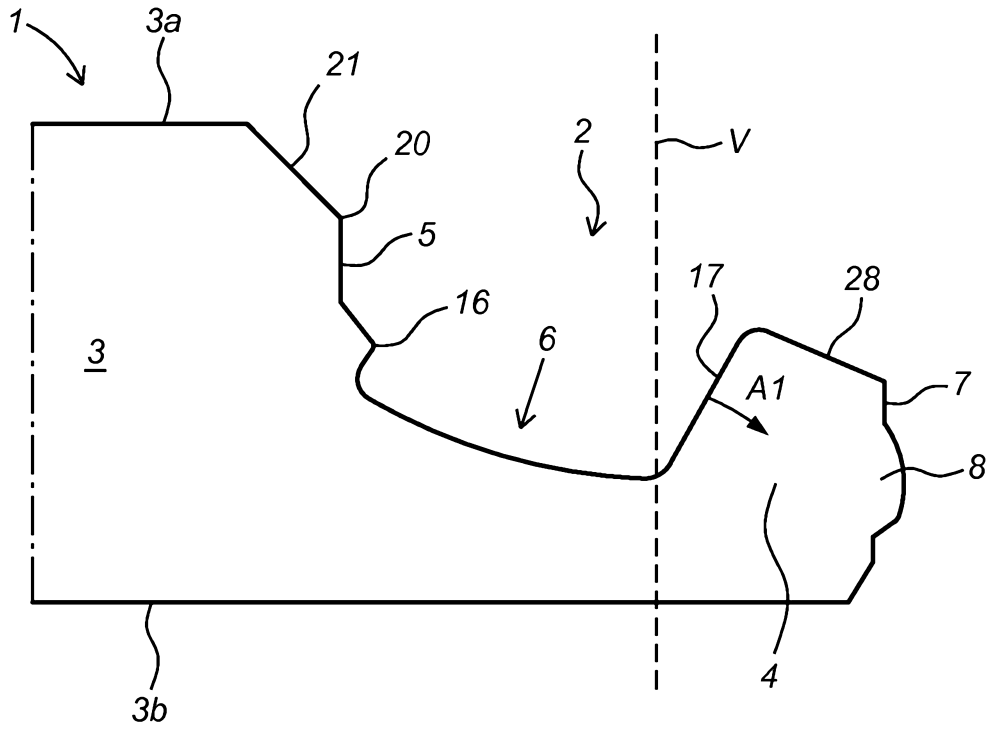


Fig. 12

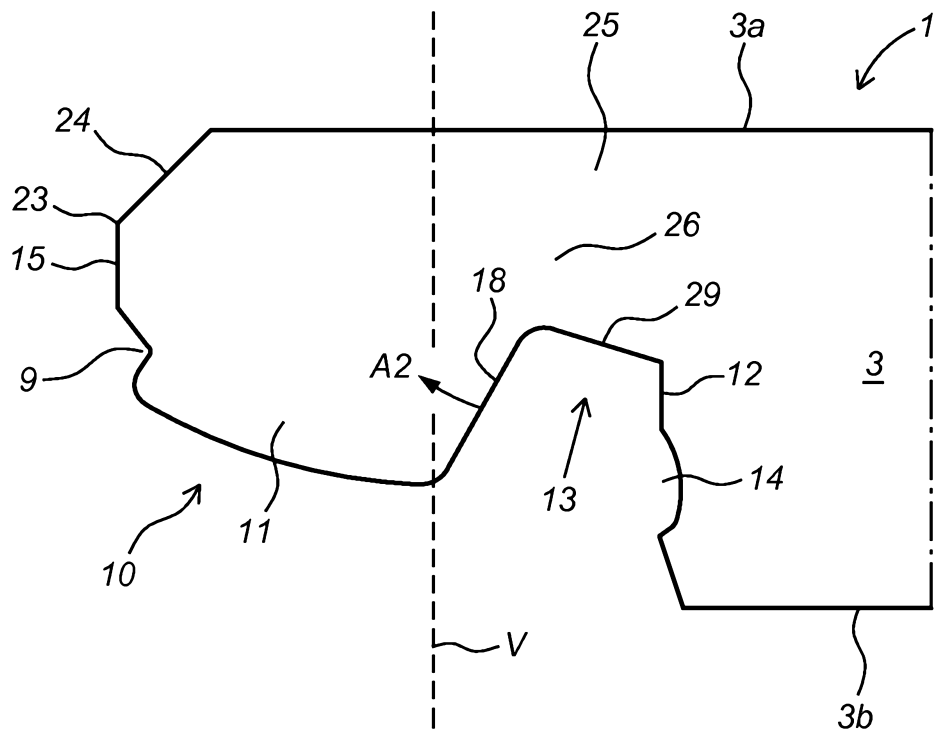


Fig. 13

Abstract

The present invention relates to a panel, in particular a floor panel, comprising a at least one first coupling part and at least one second coupling part connected
5 respectively to opposite edges of the core, which first coupling part comprises an upward tongue, at least one upward flank lying at a distance from the upward tongue and an upward groove, which second coupling part comprises a downward tongue, at least one downward flank lying at a distance from the downward tongue,
10 and a downward groove, wherein the upward tongue is provided with a first locking element; wherein the downward flank is provided with a second locking element, wherein the downward tongue is provided with a third locking element, wherein the upward flank is provided with a fourth locking element.

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	1.133.112 NL
Nederlands aanvraag nr.	Indieningsdatum
2020256	09-01-2018
	Ingeroepen voorrangdatum
Aanvrager (Naam)	
INNOVATIONS4FLOORING HOLDING N.V.	
Datum van het verzoek voor een onderzoek van internationaal type	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr.
24-03-2018	SN70943
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC)	
E04F15/02	
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
IPC	E04F
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III.	<input type="checkbox"/> GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV.	<input type="checkbox"/> 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 2020256

<p>A. CLASSIFICATIE VAN HET ONDERWERP INV. E04F15/02 ADD.</p>		
<p>Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.</p>		
<p>B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK</p>		
<p>Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen) E04F</p>		
<p>Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen.</p>		
<p>Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden) EPO-internal, WPI Data</p>		
<p>C. VAN BELANG GEACHTE DOCUMENTEN</p>		
Categorie *	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	WO 2010/143962 A2 (4SIGHT INNOVATION BV [NL]; PERRA ANTONIO GIUSEPPE [NL]) 16 december 2010 (2010-12-16) * figuren 14-18 *	1,2,4, 6-13,15, 17
X	WO 2012/126046 A1 (INOTEC INTERNAT PTY LTD [AU]; KELL RICHARD WILLIAM [AU]) 27 september 2012 (2012-09-27) * figuren 20b,23b *	1-7,9, 12-17
<p><input type="checkbox"/> Verdere documenten worden vermeld in het vervolg van vak C. <input checked="" type="checkbox"/> Leden van dezelfde octrooifamilie zijn vermeld in een bijlage</p>		
<p>* Speciale categorieën van aangehaalde documenten</p> <p>"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft</p> <p>"D" in de octrooiaanvraag vermeld</p> <p>"E" eerdere octrooiaanvraag, gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven</p> <p>"L" om andere redenen vermelde literatuur</p> <p>"O" niet-schriftelijke stand van de techniek</p> <p>"P" tussen de voorrangdatum en de indieningsdatum gepubliceerde literatuur</p> <p>"T" na de indieningsdatum of de voorrangdatum gepubliceerde literatuur die niet bezwerend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding</p> <p>"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur</p> <p>"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</p> <p>"Z" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie</p>		
<p>Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid</p> <p>20 april 2018</p>		<p>Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type</p>
<p>Naam en adres van de instantie</p> <p>European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016</p>		<p>De bevoegde ambtenaar</p> <p>Topcuoglu, Sadik Cem</p>

**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 2020256

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie	
WO 2010143962	A2	16-12-2010	CA 2764957 A1	16-12-2010
			CA 2908083 A1	16-12-2010
			CA 2965644 A1	16-12-2010
			CN 102725463 A	10-10-2012
			CN 104831899 A	12-08-2015
			CY 1115579 T1	04-01-2017
			CY 1117665 T1	17-05-2017
			DE 202010018229 U1	13-11-2014
			DK 2440724 T3	30-06-2014
			DK 2719845 T3	04-07-2016
			EP 2440724 A2	18-04-2012
			EP 2719845 A2	16-04-2014
			EP 3070228 A1	21-09-2016
			EP 3176345 A1	07-06-2017
			EP 3231959 A1	18-10-2017
			ES 2474465 T3	09-07-2014
			ES 2578008 T3	20-07-2016
			HR P20140566 T1	15-08-2014
			HR P20160613 T1	23-09-2016
			HU E029427 T2	28-03-2017
			PL 2719845 T3	31-01-2017
			PT 2440724 E	25-06-2014
			PT 2719845 T	08-07-2016
			RU 2012100772 A	20-07-2013
			SI 2440724 T1	29-08-2014
			US 2012180416 A1	19-07-2012
			US 2014215951 A1	07-08-2014
			US 2015152647 A1	04-06-2015
			US 2016186443 A1	30-06-2016
			WO 2010143943 A1	16-12-2010
WO 2010143962 A2	16-12-2010			
WO 2012126046	A1	27-09-2012	BR 112013023790 A2	06-12-2016
			CA 2866109 A1	27-09-2012
			CN 103547749 A	29-01-2014
			EP 2686502 A1	22-01-2014
			JP 6254519 B2	27-12-2017
			JP 2014513757 A	05-06-2014
			KR 20140050596 A	29-04-2014
			RU 2013146212 A	27-04-2015
			SG 193535 A1	30-10-2013
			WO 2012126046 A1	27-09-2012

WRITTEN OPINION

File No. SN70943	Filing date (day/month/year) 09.01.2018	Priority date (day/month/year)	Application No. NL2020256
International Patent Classification (IPC) INV. E04F15.02			
Applicant INNOVATIONS4FLOORING HOLDING N.V.			

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 Topcuoglu, Sadik Cem

WRITTEN OPINION**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	
	No: Claims	1-17
Inventive step	Yes: Claims	
	No: Claims	1-17
Industrial applicability	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D1 WO 2010/143962 A2 (4SIGHT INNOVATION BV [NL]; PERRA ANTONIO GIUSEPPE [NL]) 16 december 2010 (2010-12-16)

D2 WO 2012/126046 A1 (INOTEC INTERNAT PTY LTD [AU]; KELL RICHARD WILLIAM [AU]) 27 september 2012 (2012-09-27)

2 The features of claims are not provided with reference signs placed in parentheses.

3 The present application does not meet the criteria of patentability, because the subject-matter of claim 1 is not new.

3.1 D1 discloses (see particularly Fig. 14 and Figures 15-18, references in parentheses apply to D1, Fig. 14):

"Paneel (52a, 52b), in het bijzonder een vloerpaneel of wandpaneel, omvattende:

- een centraal geplaatste kern voorzien van een bovenzijde en een onderzijde, welke kern een vlak definieert;

- ten minste één eerste koppelingsgedeelte en ten minste één tweede koppelingsgedeelte die respectievelijk verbonden zijn met tegenover elkaar gelegen randen van de kern,

+ welk eerste koppelingsgedeelte een opwaartse tong (55) omvat, ten minste één opwaartse flank (67) die op een afstand van de opwaartse tong (55) gelegen is, en een opwaartse groef gevormd tussen de opwaartse tong (55) en de opwaartse flank (67), waarbij de opwaartse groef aangepast is om ten minste een gedeelte van een neerwaartse tong (59) van een tweede koppelingsgedeelte van een aangrenzend paneel (52a) te ontvangen;

+ welk tweede koppelingsgedeelte een neerwaartse tong (59) omvat, ten minste één neerwaartse flank (57) die op een afstand van de neerwaartse tong (59) gelegen is, en een neerwaartse groef gevormd tussen de neerwaartse tong (59) en de neerwaartse flank (57), waarbij de neerwaartse groef aangepast is om ten minste een gedeelte van een opwaartse tong (55)

van een eerste koppelingsgedeelte van een aangrenzend paneel (52b) te ontvangen;

- waarbij ten minste een gedeelte van een zijde van de opwaartse tong (55) die van de opwaartse flank weg is gericht, is voorzien van een eerste vergrendelingselement (53), bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, aangepast voor samenwerking met een tweede vergrendelingselement (56), bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, van een aangrenzend vloerpaneel (52a);

- waarbij ten minste een gedeelte van een zijde van de neerwaartse flank (57) is voorzien van een tweede vergrendelingselement (56), bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, aangepast voor samenwerking met het eerste vergrendelingselement (53), bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, van een aangrenzend vloerpaneel (52b);

- waarbij ten minste een gedeelte van een zijde van de neerwaartse tong (59) die van de neerwaartse flank (57) weg is gericht, is voorzien van een derde vergrendelingselement (62), bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, aangepast voor samenwerking met een vierde vergrendelingselement (62), bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, van een aangrenzend vloerpaneel (52b); en

- waarbij ten minste een gedeelte van de opwaartse flank (67) is voorzien van een vierde vergrendelingselement (62), bijvoorbeeld in de vorm van een uitsparing of een naar buiten toe gerichte uitstulping, aangepast voor samenwerking met het derde vergrendelingselement (62), bijvoorbeeld in de vorm van een naar buiten toe gerichte uitstulping of een uitsparing, van een aangrenzend vloerpaneel (52a)''

3.2 D2 discloses also the subject matter of claim 1, see particularly Fig. 20b.

4 Dependent claims 2-17 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of novelty.

D1 discloses the additional features of claims 2, 4, 6-13, 15, 17, see Figures 14-18.

D2 discloses the additional features of claims 2-7, 9, 12-17, see Figures 20b and 23b.