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- (73) Patenthaver: **GKT Gummi- und Kunststofftechnik Fürstenwalde GmbH, Tränkeweg 3, 15517 Fürstenwalde, Tyskland**
- (72) Opfinder: **Fiedler, Sven, Am Kanal 6A, 15864 Wendisch-Rietz, Tyskland**
Bloßé, Robert, Richard-Tauber-Straße 6, 15517 Fürstenwalde, Tyskland
- (74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**
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Description

The invention pertains to a floorboard system with floorboards of dimensionally stable material, which have an upper side, an underside, as well as faces that encompass this upper side and underside, namely longitudinal faces and end faces, with a connecting system comprising interengaging projections and recesses for connecting floorboards bordering on one another, wherein the connecting system comprises a connector of a flexible material, which has a supporting surface that in the installed state of the floorboard system protrudes over the underside of the floorboards and serves for flexibly supporting the floorboard system on a substructure,

Floorboards are also referred to as floor plates, floor panels, etc. and installed in the form of a walking and stepping surface on a substructure, which may consist of a more or less smooth or rough surface such as a floor screed or another substructure, e.g., of beams. In the following descriptions, the terms horizontal, vertical, top, bottom, etc. refer to an installed position, i.e. to a floorboard that flatly lies on the floor.

DE 10 2009 014 603 A1 discloses a floor covering, in which four square floor plates are respectively connected by means of a connecting element that has the shape of a cross, wherein knobs protrude upward from the arms of said cross and engage into holes on the underside of the floor plates. The cross is supported on the substructure with its underside. The system does not secure one floor plate from lifting relative to another floor plate.

Similar connecting elements are described in DE 10 2011 012 023 A1, DE 4222 936 A1 and DE 10 2010 014 131 A1. These publications describe strip-shaped or plate-shaped connecting elements, from which the knobs protrude upward. The knobs have a partially ribbed profile in order to be retained in the holes of the floor plates. An upwardly protruding center web serves for spacing apart the plates and for thereby producing a clearance gap between the plates. DE 202 01 654 U1 describes a design of this type in the form of a spoke wheel for the floor plates of an exhibition booth. DE 3902 419 A1 describes plates that are compressed from scrap tires, wherein knobs are formed in depressions of said plates and rings can be pushed on said knobs in order to connect the plates.

Floor coverings such as engineered wooden floors or laminate floors, the connection of which is produced in accordance with the tongue-and-groove system, are widely available on the market. Projections on one plate face engage into depressions on the other plate face of the adjacent plate and are connected to one another in a tension-proof manner by either being snapped or pivoted into position. An example of a snap-in connection is described in DE 60213161 T2 and an example for a pivoted connection is described in DE 10 2005 034 094 A1.

There ultimately also exists a double T-connector that engages into a respective groove in the lateral face and on the underside of the plates. In order to produce the connection, both plates have to be joined at an offset in the direction of the gap and then horizontally displaced into the correct position in the direction of the gap.

OBJECTIVE AND SOLUTION

The invention is based on the objective of developing a floorboard system, in which a connection between floorboards that border on one another is produced in all directions, i.e. transverse to and along the gap in the horizontal direction, as well as in the vertical direction, wherein the connecting system comprises a connector, which in addition to its function of connecting the floorboards allows a flexible support on the substructure that also compensates unevenness.

According to the invention, this objective is attained with a floorboard system of the initially cited type in that recesses are provided at least in the longitudinal faces and projections engage into said recesses in order to positively secure the vertical position of the floorboards bordering on one another, and in that the flexible connector comprises at least one gripping element for securing the horizontal position in the transverse direction of the floorboards bordering on one another, wherein said gripping element engages on at least one of the floorboards when a floorboard is attached to another floorboard at an insertion angle and pivoted into an aligned position of the floorboard.

The invention proposes a connecting system with a flexible connector that has a double function, namely on the one hand the function of positively securing the floorboards on one another in all relevant degrees of freedom and on the other

hand the function of forming supports that can be supported on the substructure, compensate unevenness of the substructure and ensure that the dimensionally stable floorboards have a ground clearance between the connectors. The floorboards may be self-supporting between these connectors. The system therefore puts little demands on the substructure and nevertheless is flexible and can be easily installed.

According to the invention, different projections are respectively arranged on both longitudinal faces of the floorboards, e.g. receptacle projections designed for receiving the connector on one longitudinal face and engagement projections for engaging into the recesses on the opposite face. The connectors can be attached to the receptacle projections and inserted into a recess of the receptacle projection with a projection either during the installation or already at the factory. In this context, different designs for fastening the connector on the floorboard are also conceivable, e.g. an undercut profile for the insertion similar to a dovetail or a cavity on the connector, into which the receptacle projection engages like into a flexible shoe and is secured therein. Other characteristics in this respect are defined in the dependent claims.

In order to selectively allow an installation of the floorboards without clearance from one another (zero gap) or with a clearance gap, it is either possible to use differently dimensioned connectors or alternative securing positions, which define the two (or more) gap clearances, may already provided on the floorboards and/or the connectors, e.g. gripping webs that are arranged on the underside of the engagement projections and can selectively engage into spaced-apart recesses on the connector.

An advantageous embodiment, which does not belong to the claimed invention, comprises a connector that has a flexible body with a supporting surface on its underside, lateral gripping elements that are directed upward and designed for engaging on the longitudinal faces of the floorboards, as well as engagement projections that laterally protrude from a center web and are designed for engaging into the laterally open recesses of the floorboards to be connected. They are advantageously capable for ensuring the engagement of the engagement projections into the recesses, as well as the positive engagement of the gripping elements for securing the connection of the floorboards, when they are pivoted into their aligned in position due to rounding or beveling, as

well as due to their flexibility, e.g. in the form of lateral webs that engage on the interior of the longitudinal faces from below.

The dimensions of the recesses in the longitudinal faces in the longitudinal direction of the gap and the corresponding dimensions of the connector are adapted to one another in such a way that a positive connection is also produced in this direction. In the above-described embodiment, it is advantageous that the connector has a uniform profile in the longitudinal direction of the gap such that it can also be manufactured in the form of a section of an extruded profile.

During the assembly of the floorboards, a connection produced by pivoting the respectively following floorboard into position is not possible on all sides, e.g. between the end faces if the pivoted connection is produced between longitudinal faces or when producing a connection between an end face and a longitudinal face of floorboards that are installed angular to one another. In this case, it is advantageous to supplement and complete the floorboard system with a connector that can be pressed into the gap between the adjacent faces of two floorboards from below or is to be engaged by a vertical displacement parallel to the gap. It comprises engagement projections that act in a barb-like manner. These engagement projections may comprise elements on the center web of the connector, which snap into the recesses on the faces in a pawl-like manner. This connector can be attached to one face of a floorboard from below and the other floorboard can subsequently be attached from above and pressed down, wherein the connector pushes back the elastic pawl-like engagement projection until it snaps into the recess on this floorboard. However, it is also possible to provide this connector in addition to the pivoted connectors or to connect the floorboards entirely with this type of connector, e.g. by pressing in the connector from below.

All these connections provide significant advantages. The floorboards do not lie on the substructure over their entire length and width, but rather only on precisely defined locations, namely the supporting surfaces of the connectors. These connectors may also be structured or ribbed if an elastic support and an even better adaptation to the substructure are desired. A manufacture with different elasticities between the gripping region and the supporting region would also be possible, e.g. by means of multi-component injection molding or

extrusion. In all embodiments, the connection between the floorboards is reinforced by a load, i.e. by walking on the floorboards, although a secure connection in all relevant degrees of freedom is also produced without this load. Unevenness of the substructure is less disruptive for a flat installation of the floorboard system because a gap, which also serves for dissipating admitted moisture or for the installation of cables, etc., exists between the underside and the substructure.

The floorboards are particularly manufactured by means of injection molding, e.g. from plastic that is reinforced and/or filled with natural fibers, i.e. a natural fiber composite (NFC), on the basis of polyolefin, epoxy, polyester, phenol amide or polyamide. They are ribbed in the longitudinal direction and in the lateral direction in order to achieve their rigidity, as well as to create channels underneath their surface that is preferably provided with a non-skid structure. Consequently, they are so dimensionally stable that they can also withstand the desired loads without significant deformation if they are only supported at their end points. They are furthermore weather resistant and easy to clean and therefore also suitable, in particular, for patios and balconies. The floorboards can be installed in different patterns and it is also possible to adapt the floor covering to the structural circumstances by shortening the floorboards because numerous connecting options (recesses and/or projections) are provided on all faces within relatively short distances from one another.

BRIEF DESCRIPTION OF THE DRAWINGS

An exemplary embodiment of the invention is schematically illustrated in a few of the drawings and described in greater detail below. In these drawings:

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| Figure 1 | shows a top view of an inventive floorboard, |
| Figure 2 | shows a bottom view of the floorboard, |
| Figure 3 | shows an oblique bottom view of the floorboard, |
| Figure 4 | shows a perspective of an inventive connector, |

- Figure 5 shows a top view of details of two floorboards prior to their connection,
- Figure 6a shows a section along the line VI-VI in Figure 5 during the oblique attachment of a floorboard to be connected to a floorboard lying on the substructure,
- Figure 6b likewise shows a section along the line VI-VI in Figure 5 after the connection has been produced,
- Figures 7a and 7b show illustrations corresponding to Figures 6a and 6b, however, along the line of section VII-VII in Figure 5,
- Figures 8 to 10 show top views of different floorboard installation patterns,
- Figure 11 shows a perspective of a detail of a connection between a receptacle projection and a connector,
- Figure 12 shows a perspective of a connector for a different connection between receptacle projection/connector,
- Figure 13 shows an illustration similar to Figure 11 with the connector according to Figure 12,
- Figure 14 shows a section along the line XIV-XIV,
- Figure 15 shows a perspective bottom view of a detail of the floorboard with an alternative engagement projection,
- Figure 16 shows a perspective of a connector for the alternative according to Figure 15,
- Figure 17 shows a detail of a connector according to Figure 16 that is attached to a receptacle projection of the floorboard,

- Figure 18 shows a cross section through a connector according to an advantageous embodiment that does not belong to the claimed invention,
- Figure 19 shows a section through two floorboards and the connector according to Figure 18 during the connecting process,
- Figure 20 shows a section corresponding to Figure 19 after the connection has been produced,
- Figure 21 shows a sectioned oblique view of a detail of the underside of two floorboards connected in accordance with Figure 20,
- Figure 22 shows a perspective view of a connector for a gapless connection, wherein said connector does not belong to the claimed invention,
- Figure 23 shows a perspective top view of a floorboard of the type illustrated in Figures 19 to 21,
- Figure 24 shows a section through two floorboards that are connected by means of a connector according to Figure 22,
- Figure 25 shows an illustration corresponding to Figure 21 of a connection according to Figure 24,
- Figure 26 shows a bottom view of an installation pattern produced by using connectors according to Figure 22 and 27 or 32,
- Figure 27 shows a front view of a snap-in connector for a "zero gap" connection,

- Figure 28 shows a perspective view of the connector according to Figure 27,
- Figure 29 shows a perspective of a detail of the connector according to Figure 27 and 28 after the preparatory attachment on a floorboard,
- Figure 30 shows a sectional view of two floorboards and a snap-in connector during the connecting process,
- Figure 31 shows the connection according to Figure 30 after its completion,
- Figure 32 shows a front view of a connector for producing a connection with defined clearance gap, wherein said connector does not belong to the claimed invention,
- Figure 33 shows a perspective view of the connector according to Figure 32,
- Figure 34 shows an illustration corresponding to Figure 29 with the connector according to Figures 32 and 33,
- Figure 35 shows a detail of a connection between two floorboards with the connector according to Figures 32 and 33,
- Figure 36 shows a connector for interacting with an engagement projection according to Figure 15,
- Figure 37 shows a cross section through the connection produced with a connector according to Figure 36 along the line XXXVII-XXXVII in Figure 38, and
- Figure 38 shows a bottom view of two floorboards connected with the connector according to Figure 36.

DESCRIPTION OF PREFERRED EXEMPLARY EMBODIMENTS

Figure 1 shows a floorboard 11 that is manufactured from a natural fiber composite (NFC) in an injection molding process. Plastics such as polyolefins, epoxy, polyester, phenol amide or polyamide, which are filled with natural fibers and thereby also reinforced, are particularly suitable for this purpose. The floorboard has an upper side 12 that is provided with a non-skid structure such as structured longitudinal ribs 13. It is bounded by faces or sidewalls, namely longitudinal faces 14, 15 and end faces 16, which encompass the floorboard 11 as illustrated in Figure 3. The floorboard therefore has a flat, box-shaped design, the interior of which, i.e. its underside, has continuous longitudinal ribs 17, 18, wherein the longitudinal ribs 17 extend to the same level as the faces 14 to 16 whereas lower longitudinal ribs 18 respectively extend in between. Transverse ribs are provided on their level and also reinforce the floorboard in the lateral direction. Channels 19 are formed between the ribs 17, 18 and cables, lines, etc. may extend in said channels. In connection with the relatively hard material, this results in a dimensionally stable floorboard that is resistant to bending and fracture, but nevertheless can be inexpensively manufactured of ecologically advantageous material.

In the exemplary embodiments illustrated in Figures 1 to 14, the faces 14, 15, 16 have recesses 20 that are realized in the form of cutouts in this case and open toward the lower edge 21 of the faces. Receptacle projections 22 horizontally protrude from the longitudinal face 14 and are realized in the form of flat tabs, the upper side of which lies on the level of the upper edges of the cutouts. They have a central recess 24 in the form of a continuous hole with a countersink 24 on the upper side. Two matching, complementary engagement projections 25 are respectively provided on the opposite longitudinal face 15, wherein the upper side of said engagement projections likewise lies on the level of the upper edges of the cutouts whereas their underside lies on the level of the lower edges 21 of the faces. The receptacle projections 22 and the engagement projections 22 are respectively flanked by two recesses 20 of the longitudinal faces. The engagement projections 25 are narrower than the receptacle projections 22. The engagement projections 25 are except for the regions near the end faces 16 respectively arranged in pairs in such a way that they lie opposite of the receptacle projections 22, i.e. such that they can engage adjacent to the receptacle projections on both faces during the assembly of two

floorboards. Viewed in the longitudinal direction of the floorboard, multiple groups of one respective pair of engagement projections 25 with opposite receptacle projections are provided in a spaced-apart manner, wherein two groups with smaller clearance from one another are provided in the center.

This constellation is realized in such a way that a connection with a gap that theoretically has a width of zero and is referred to as "zero gap" below would result when two floorboards are respectively connected with a longitudinal face 14 bordering on a longitudinal face 15, wherein the floorboards would lie on the substructure over their entire length in this type of connection. In this case, the previous floorboard could be screwed to the substructure by means of the recesses 23 in the receptacle projections 22 prior to the attachment of the adjacent floorboard. This would result in a positioning that is horizontally secured in the longitudinal direction and vertically secured against lifting, but only secured by the screw connection in the lateral direction. In addition, the substructure should in such instances be very flat because even a slight elevation, e.g. in the center of a floorboard, would lead to an unstable position.

The following embodiments make it possible to avoid these limitations. To this end, Figure 4 shows a connector 30 of a flexible material, namely an injection-molded plastic material with rubber-like properties, in the form of a plate-shaped body with an underside 31 that forms a supporting surface 31, an upwardly protruding knob that forms a projection 32 for engaging into the recess 23 in the receptacle projection, a likewise upwardly protruding supporting web 33 on one longitudinal side 28 and upwardly protruding securing projections 34 in the region of the corners on the opposite longitudinal side 37, wherein said securing projections serve as securing elements that are described in greater detail below. A clearance 35 is formed between these projections 34. The supporting web 33 has on its inner side 39 a central projection 40, which fits into a recess on the base of the receptacle projection during the assembly of the connector and the receptacle projection 22 and secures the connector against being pulled off in the lateral direction in addition to the projection 32 (knob). Oblique insertion depressions 38 are formed in the plate-shaped body of the connector 30 adjacent to the two lateral sides 36. We expressly refer to the drawings with respect to details of the design and dimensions of the connectors 30 and other elements of the floorboard system.

Figure 5 shows a top view of a detail of two floorboards 11 prior to their connection into the floorboard system 10. The connector 30 according to Figure 4 is attached to the receptacle projection 22 protruding from the longitudinal face 14 of the left floorboard 11 from the underside, wherein its projection 34 or knob engages into the recess 23 and fixes the connector 30 on the receptacle projection 22 due to its flexibility. To this end, the head of the knob may be slightly thickened and/or beveled in a barb-like manner and fitted into the countersink 24. The supporting web engages behind the sidewall 14 in this case. The attachment of the connectors 30 to the receptacle projections 22 may already take place at the factory, wherein other fastening options such as bonding, welding, 2-component injection or the like are also possible. However, the connectors 30 may also be attached immediately prior to the assembly of the floorboards, wherein the user can equip all or a few of the receptacle projections with connectors depending on the requirements or the condition of the substructure. The user can furthermore choose if he wants to use connectors for an installation with a gap 46 with a defined clearance between the faces of the floorboards, which is referred to as clearance gap below, or connectors for an installation with a "zero gap". This increases the flexibility and reduces the types to be kept in stock.

The sections according to Figures 6a, b and 7a, b along the lines of section VI and VII in Figure 5 show two phases of the assembly of two floorboards. The receptacle projection 22 of the left floorboard in Figure 5 is provided with the connector 30 in the above-described manner, wherein these figures show that the projection 32 (knob) has a thickened and somewhat barb-like head 39 that is fitted into the countersink 34 and thereby secures the connector 30 on the receptacle projection 22. The right floorboard is attached at an insertion angle α in such a way that, according to Figure 7a, the engagement projection 25 penetrates into the space 58 formed between the recess 20 and the insertion depression 38 when the right floorboard is pushed onto or into the left floorboard in the inserting direction (arrow). In the process, the underside of the engagement projection 25 slides over the securing projections 34 with the assistance of the insertion bevel 42 (see Figure 4). The size of the insertion angle α depends on the dimensions of the floorboards and particularly of the connector 30, primarily the height of the securing projections 34, and lies between 10° and 30°. In the present example, this angle lies at approximately 20°. Once the engagement projection 25 has penetrated into the insertion

depression 38 up to its end, the inner edge 43 of the engagement projection 25, which is provided with a center projection 44, is released from the upper side of the securing projection 34 and can snap in in front thereof (Figure 7b). The center projection 44 engages into the depression 45 that centrally interrupts the insertion bevel 42 of the securing projections (see also Figure 4). It also secures the connection in the direction parallel to the gap 50 formed between the two floorboards 11. This gap is with respect to its existence and size defined by the dimensions of the connectors 30, primarily by the position of the projection 32. Figures 6a to 7b show dimensions of the connector 30 that form a clearance gap, e.g., of 5 mm, wherein a "zero gap" would be formed with an offset of the projection 32 and corresponding dimensions of the supporting web 33.

The figures show that this connecting system fulfills multiple functions. It elastically supports the floorboards on the substructure 47 at a clearance 48 by means of the supporting surface 31 of the flexible connector 30 and secures the connection between the floorboards 11 in the lateral direction and in the longitudinal direction of the gap, as well as in the vertical direction, i.e. against lifting. The connection in the lateral direction is produced in that, according to Figures 6a and 6b, the supporting web 33 and its projection 40 engage behind the inner edge 49 of the sidewall 14 of the left floorboard 11 whereas the securing projections 34 engage behind the inner edge 43 of the sidewall 15 of the right floorboard 11. The connector 30 therefore forms a flexible clamp that takes hold of both floorboards from below and is additionally secured by an operating load from above. The connection is also elastic in the vertical direction because the engagement projection 25 lies on the inner surface 51 of the flexible connector 30.

Figures 8 to 10 show different installation patterns of floorboards 11, namely adjacent to one another without offset (Figure 8), offset by about one third (Figure 9) and angular to one another (Figure 10). The arrangement of the receptacle and engagement projections 22, 25 allows these installation variations, as well as a large number of other installation variations. The connection between the longitudinal faces and the end faces cannot be produced in the described manner by pivoting the floorboards into position if a connection between longitudinal faces is simultaneously produced. However, connecting systems that make it possible to produce this type of connection are described further below.

Figure 11 shows a variation of the connection between the receptacle projection 22 and the connector 30, in which the receptacle projections 22 are divided into two parts and on the inside beveled toward one another in such a way that the dovetail-shaped projection 32 on the connector 30 forms a dovetail connection with the receptacle projections.

Figures 12 to 14 show a variation of the connector 30, in which the connector has a shoe 52 for receiving the receptacle projection 22, wherein said receptacle projection does not have to be provided with a hole 23 in this case. The shoe is realized in the form of a flat, rectangular compartment and has on its upper side a stop ledge that serves as a spacer 53 between the two longitudinal faces 14, 15 in order to define the clearance gap 46, i.e. the gap width. Figure 12 shows the connector in the form of an oblique view and Figure 13 shows the connector after its attachment to a floorboard 11. According to the section along the line XIV-XIV illustrated in Figure 14, the receptacle projection 22 can due to the flexibility of the connector 30 be inserted into the shoe 52 like a foot, wherein the supporting web 33 in a manner of speaking snaps in behind the heel of the receptacle projection and thereby fixes the connector 30 on the floorboard 11 like in the dovetail variation. The lateral projections 54 on the connector 30 to both sides of the shoe 52 serve for laterally guiding the connector on the floorboard like in the dovetail variation. The connection with the adjacent floorboard 11 particularly is produced as illustrated in Figures 6 and 7, wherein the insertion depressions 38 are not shown in these figures in order to simplify the illustration or may also be omitted due to the flexibility of the connector.

Figures 15 to 17 show a variation that makes it possible to realize an installation with a zero gap and an installation with a clearance gap. In this variation, the connector 30 is attached to the receptacle projection 22 as described above with reference to Figures 4 to 7. The connector 30 illustrated in the form of an oblique view in Figure 16 also resembles the connector according to Figure 4, but three grooves or incisions 55 are provided on its base in the region of the insertion depressions 38. Strip-shaped gripping webs 56, which protrude downward from the underside of the engagement projections 25, fit into these grooves or incisions. Once the connector 30 has been fastened on the receptacle projection, which resembles the receptacle projection according to

Figures 1 to 7, by snapping the knob 32 with its head 39 into the hole 23 and the countersink 24 as shown in Figure 17, the engagement projection 25 or two not-shown paired, adjacent engagement projections can be pivoted into the space 58. Depending on the desired installation with a zero gap or a clearance gap, the gripping webs 56 engage into the two front or rear grooves and thereby define the clearance between the two floorboards. In this case, the rear securing projection 34 is not engaged in the "zero gap" variation. Different installation principles therefore can be realized with one variation of the connector 30.

Figures 18 to 25 show a preferred embodiment of the connecting system that does not belong to the claimed invention.

Figure 22 shows an oblique view and Figure 18 shows a section through a connector 30 for a "zero gap" installation and an installation with a clearance gap. The connector of flexible material has a constant profile over its length extending in the direction of the gap such that it can also be manufactured from an extruded profile, wherein said connector has a plate-shaped body 59 with an upper inner surface 51 and a lower supporting surface 31. In Figure 22, this supporting surface is ribbed in order to increase the flexibility and adaptability to an even substructure at this location, as well as to improve the position of the floorboards 30 on the substructure. The flexibility in the region of the supporting surface 31 without rendering the remaining body excessively soft could also be achieved with different material properties in the injection molding or extrusion process, e.g. by means of 2-component injection molding.

Securing projections 34 laterally protrude upward from the body 59, wherein the function of said securing projections corresponds to that of the supporting web 33 and the securing projections 34 in the variation according to Figure 4. A center web 60 is provided with gripping elements 9 in the form of engagement projections 25a, which laterally protrude from the center web and have a rounding 62 on their underside. In Figure 22, the upper side of the engagement projections 25a is flat such that the central part of the connector 30 is T-shaped. In the connector 30 according to Figure 18, a spacer 53 in the form of a strip-shaped projection protrudes upward from the center of the two laterally extending engagement projections 25a, but said strip-shaped projection is significantly narrower than the center web 60.

Figure 23 shows an oblique view of a floorboard 11. According to this figure, the floorboards intended for the variations according to Figure 4 and for the variations according to Figures 18 to 22 do not comprise any gripping elements in the form of receptacle and engagement projections, but rather merely recesses 20 that are uniformly distributed over the longitudinal faces 14, 15 and end faces 16. This not only represents a significant advantage with respect to the manufacture, but also with respect to the storage and assembly because the floorboards do not have to be aligned in a certain way during the installation. The recesses 20 (see particularly Figure 19) are provided in the faces 14, 15, 16 and consist of horizontally aligned incisions or openings (see also Figure 21). These recesses are slightly set back between their location and the lower edge 21 of the faces such that a space 61 for the center web 60 is formed.

Figure 19 shows the assembly of two floorboards 11. Although it would also be possible and sensible the other way around, the connector 30 was in this case arranged on the right floorboard 11 to be attached prior to the connecting process. An engagement projection 25a engages into the recess 20 on the right floorboard 11 and the securing projection 34 on this face engages behind the sidewall 15. The connector 30 is thereby connected to the right floorboard 11 and can now be pushed into the recess 20 of the left floorboard 11 with its engagement projection 25a due to the rounding 62. The strip-shaped securing projection 34 on the left side of the connector, which during the insertion forms the front side of the connector, slides forward underneath the lower edge 21 of the sidewall 14 of the left floorboard until it engages behind the inner edge of the sidewall 14 during the downward pivoting motion into the aligned position (Figure 20). A rounding 62 on the inner edge of the securing projections 34 also assist in this process.

Figures 20 and 21 show a section through the completed connection with a clearance gap. According to these figures, the engagement projections 25a secure the floorboards 11 on one another against vertical displacements whereas the securing projections 34 hold the floorboards 11 together like a clamp and secure the floorboards against being pulled apart. The spacer 53 on the upper side of the cross-shaped center part of the connector 30 ensures a uniform size of the clearance gap 46. According to Figure 21, the connectors could be inserted into each of the numerous recesses 20, but this is not

necessary. These figures show that a load on the floorboard system also additionally reinforces and secures the connection in this case and furthermore ensures a certain flexibility in that the body 59 of the connector 30 acts in a compensating and slightly flexible manner between the floorboards and the substructure 47 and therefore is also sound-absorbing.

Figures 24 into 25 show illustrations corresponding to Figures 20 and 21 for the "zero gap" variation. The angular arrangement of Figure 26 is also illustrated with connectors 30 at all potential connecting points, i.e. recesses 20 of the floorboards 11, but this is certainly only necessary or practical in exceptional situations. As already mentioned above with reference to Figure 10, such connections across corners can only be produced by means of a pivoting motion if it takes place about one pivoting axis.

Figures 27 to 35 show a connecting system that does not belong to the claimed invention, wherein the two floorboards 11 to be connected can be securely coupled on one another by means of the connector 30 without a pivoting motion. Figure 27 shows a cross section and Figure 28 shows an oblique view of the connector for a "zero gap" connection, wherein said connector comprises a plate-shaped body 59 with a supporting surface 31 on its underside. Securing projections 34 protrude upward on both sides of the body and are provided with a fillet 63 on their inner edge. The connector 30 is likewise made of a flexible material and has a constant profile over its length extending in the direction of the gap such that it can also be manufactured from an extruded profile. A center web 60 protrudes upward from the inner surface 51 of the body 59. A narrower web region 71 is connected to this center web, wherein engagement projections 25b are connected to the tip of the narrower web region and provide the upper part of the center web with an arrow-like shape. The engagement projections are elastic pawls that are directed obliquely downward in a barb-like manner and can adjoin or at least approach the center web in the narrower web region 71, which forms depressions 70 at these locations, under pressure from above.

Figure 29 shows the attachment of the connector 30 to a floorboard 11 of the type illustrated in Figure 23, i.e. a floorboard with recesses 20 in the faces, wherein said recesses are realized in the form of slots in the sidewall, which have a longitudinal dimension that matches the length of the connector and a section 73 that is set back in order to create space for the center web 60. A

connector 30 is inserted into such a recess, wherein the securing projection 34 engages behind the inner edge 49 of the sidewall 15 as it is also illustrated in Figure 30 and one of the engagement projections 25b lies on the lower surface 74 of the recess 20 with its front end, i.e. its lower end. The left floorboard 11 in Figure 30 may be prepared in this way (Figure 29). This preparation can be easily carried out by the installer and therefore does not require any measures during the manufacture and distribution.

Figure 30 shows the connecting process. The right floorboard 11 is pushed down with the same alignment as the left floorboard 11, which is already supported on the substructure 47 by means of the connector 30 and its supporting surface 31, i.e. horizontally from above in the direction of the arrow 75. In the process, the lower outer edge of the sidewall, which is provided with a rounding 65, penetrates into the gap 67 between the securing projection 34 and the engagement projection 25b and pushes this engagement projection back into the depression 70. Since the securing projection 34 already engages behind the inner edge 49 of the sidewall, the right floorboard is held in its lateral position and cannot be pushed toward the right due to the lateral pressure exerted by the engagement projection 25b. It is therefore important that the securing projections 34 protrude upward to such an extent that the section 76 of the floorboard 11 lying underneath the recess has already penetrated into the gap 67 before the section 76 reaches the engagement projection 25b. Once the section 76 lying underneath the recess has passed the outer end of the engagement projection 25 with its upper edge, namely the lower surface 74 of the recess 20, the engagement projection once again snaps back due to its flexibility and lies on the surface 74. In the previously described not-shown alternative variation with engagement projections that are realized in the form of massive triangles, the entire unit of both engagement projections is elastically bent slightly toward the left and the securing projection 34 potentially is slightly bent toward the right in addition to an elastic compression of the engagement projections such that the section 76 of the sidewall lying underneath the recess 20 penetrates into the space formed between the inner surface 51, the securing projection 34, the center web 60 and the engagement projection 25b and remains secured therein as it is also the case in the variation illustrated in Figure 30. This insertion process is identical to that carried out previously during the attachment of the connectors 30 to the left floorboard, in this case by

pressing the connector 30 into the gap 67 from below. The finished connection, which in this case has a "zero gap," is illustrated in Figure 31.

According to these figures, this connecting system simply produces a secure connection between floorboards 11, which are merely provided with slot-shaped recesses in the faces, by means of flexible connectors 30 that can be pressed into the gap from below. The connector comprises a clamp that engages behind both sidewalls and a shaft that can be pushed into the gap between the floorboards from below, wherein said shaft is provided with the engagement projections that penetrate into the recesses on the sidewalls of the floorboards and retain themselves therein.

Figures 32 to 35 show a variation for producing a defined clearance gap 46. Apart from the same design and function, the center web 60 or shaft is not only provided with the engagement projections 25b that protrude in an arrow-like or barb-like manner, but also with an upper extension that serves as a spacer 53, wherein the thickness of said extension defines the gap width. In other respects, the individual characteristics and connecting functions are identical to those described above with reference to Figures 27 to 31.

Figures 36 to 38 show a simplified variation of the exemplary embodiment according to Figures 15 to 17. Figure 36 shows that the connector 30 does not have a body that is obliquely recessed toward the insertion depressions, but rather an essentially flat body 58, in the flat inner surface 51 of which three grooves 55 are provided. The supporting web 33 and the securing projections 34 are realized in the form of continuous webs. Figures 37 and 38 respectively show a cross section and a bottom view of a connection between two floorboards that is produced with the connector 30 according to Figure 36. The floorboards have a receptacle projection 22 of the type illustrated in Figure 17 and an engagement projection 25 with two gripping webs 56 of the type illustrated in Figure 15. Figure 37 shows a connection with a "zero gap" in the form of a section along the line XXXVII in Figure 38. In this case, the gripping webs 56 engage into the grooves 51 that are located closer to the supporting web 33. However, they could also be inserted into the two grooves that are spaced apart farther from the supporting web in order to thereby produce a connection with a clearance gap. In addition to a zero gap, different gap widths of clearance gaps could be achieved by providing additional grooves or omitting

one of the gripping webs. The insertion of the engagement projection 25 is achieved due to the flexibility of the connector 30.

Figure 38 shows the connector 30 in the form of a transparent view. According to this figure, only one engagement projection 25 is used in this case such that the flexibility of the system arrangement is additionally increased.

REFERENCE LIST

Insertion angle	α
Underside	8
Gripping elements	9
Floorboard system	10
Floorboard	11
Upper side	12
Longitudinal ribs	13
Longitudinal faces	14, 15
End faces	16
Longitudinal ribs	17, 18
Transverse ribs	18a
Channels	19
Recesses	20
Lower edge	21
Receptacle projection	22
Recess (hole)	23
Countersink	24
Engagement projections	25, 25a, 25b
Longitudinal side	28
Connector	30
Supporting surface	31
Projection (knob)	32
Supporting web	33
Securing projections	34
Clearance	35
Lateral sides	36
Longitudinal side	37
Insertion depressions	38
Head of 32	39
Insertion bevel	42
Inner edge	43
Center projection	44
Depression	45

Gap	46
Substructure	47
Clearance	48
Inner edge	49
Inner surface	51
Shoe	52
Spacer	53
Lateral projections	54
Incisions	55
Gripping webs	56
Space	58
Body	59
Center web	60
Space	61
Rounding	62
Fillet	63
Rounding	65
Clearance	67
Depressions	70
Web region	71
Section	73
Surface	74
Arrow	75
Section	76

P a t e n t k r a v

1. Gulvplankesystem (10) med gulvplanker (11) af dimensionsstabilt materiale, som har en overside (12), en underside (8) samt sider, der omgiver disse, nemlig længde- og endesider (14,15,16), med et forbindelsessystem til brug for en op til hinanden grænsende forbindelse af gulvplankerne (11) med hinanden, hvilket har fremspring og udsparinger (20), der griber ind i hinanden, hvor forbindelsessystemet indeholder en konnektor (30) af et fleksibelt materiale, som i en lagt tilstand af gulvplankesystemet har en støtteflade (31), der rager ud over undersiden (8) af gulvplankerne (11), med henblik på en fleksibel understøtning af gulvplankesystemet på en undergrund (47), og hvor der i det mindste i gulvplankernes (11) langsgående sider (14, 15) er udsparinger (20), som fremspringene (22, 25) på en naboliggende gulvplanke (11) griber ind i til formssluttende sikring af vertikalpositionen af gulvplankerne (11), der grænser op til hinanden, og den fleksible konnektor (30) omfatter mindst et gribeelement (34) til sikring af horisontalpositionen i tværgående retning af gulvplankerne (11), der grænser op til hinanden, hvilket gribeelement, når en af gulvplankerne placeres ved den anden gulvplanke i en indføringsvinkel (α) og svinges til en flugtende position af gulvplankerne, går i indgreb med mindst en af gulvplankerne, hvor fremspringene (22, 25) på gulvplankerne (11), der er tilvejebragt fremspringende i området ved de langsgående sider (14,15), har følgende kendetegn: på en af gulvplankernes (11) langsgående sider (14) er der anbragt optagelsesfremspring (22), der er udformet til optagelse af konnektoren (30), og på den modsatte langsgående side (15) er der tilvejebragt indgrebsfremspring (25) til at gå i indgreb i udsparingerne (20) af en naboliggende gulvplanke (11), - **kendetegnet ved, at** indgrebsfremspringene (25) er anbragt parvist ved siden af hinanden og har plads mellem sig til hver et af optagelsesfremspringene (22) af en af de naboliggende gulvplanker (11), og at den fleksible konnektor (30) har en optagelse til et af optagelsesfremspringene (22) og til anbringelse derpå har mindst et af de følgende kendetegn:

1.1 et fremspring (32) til at gå i indgreb med en udsparring (23) af optagelsesfremspringet (22),

1.2 en underskåret profilering til indskubning af konnektoren på optagelsesfremspringet (22) som en svalehale,

1.3 et hulrum (52), som optagelsesfremspringet (22) griber ind i, og der ved hvert af alternativerne 1.1, 1.2 eller 1.3 er sikret mod at blive trukket af med et sikringsselement.

5

2. Gulvplankesystem ifølge krav 1, **kendetegnet ved, at** konnektoren (30) griber under to naboliggende gulvplanker (11) og mindst et af indgrebsfremspringene (25), og i området ved en naboliggende gulvplankes indgrebsfremspring har indføringsfordybninger (38) og/eller yderligere sikringsselementer til sikring af den horisontale afstand mellem sammenføjede gulvplanker i tværgående retning.

10

3. Gulvplankesystem ifølge krav 2, **kendetegnet ved, at** konnektoren har en flad krop (59) med sin støtteflade (31) på sin underside, med indføringsfordybningerne (38) til optagelse og indføring af indgrebsfremspringene (25) på sin overside, et støttestykke (33) på den ene side og mindst et fremspring (34), der rager op fra oversiden og er forsynet med en indføringsskråning (42) og danner det yderligere sikringsselement.

15

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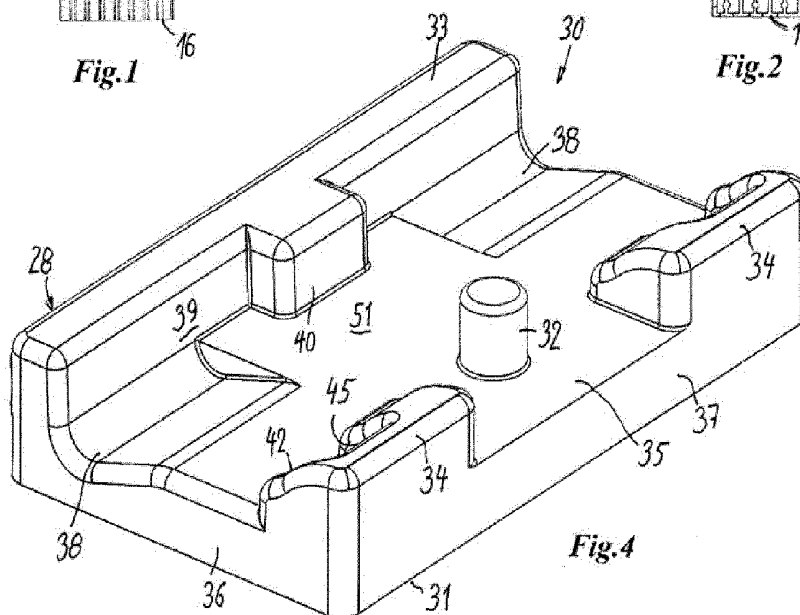
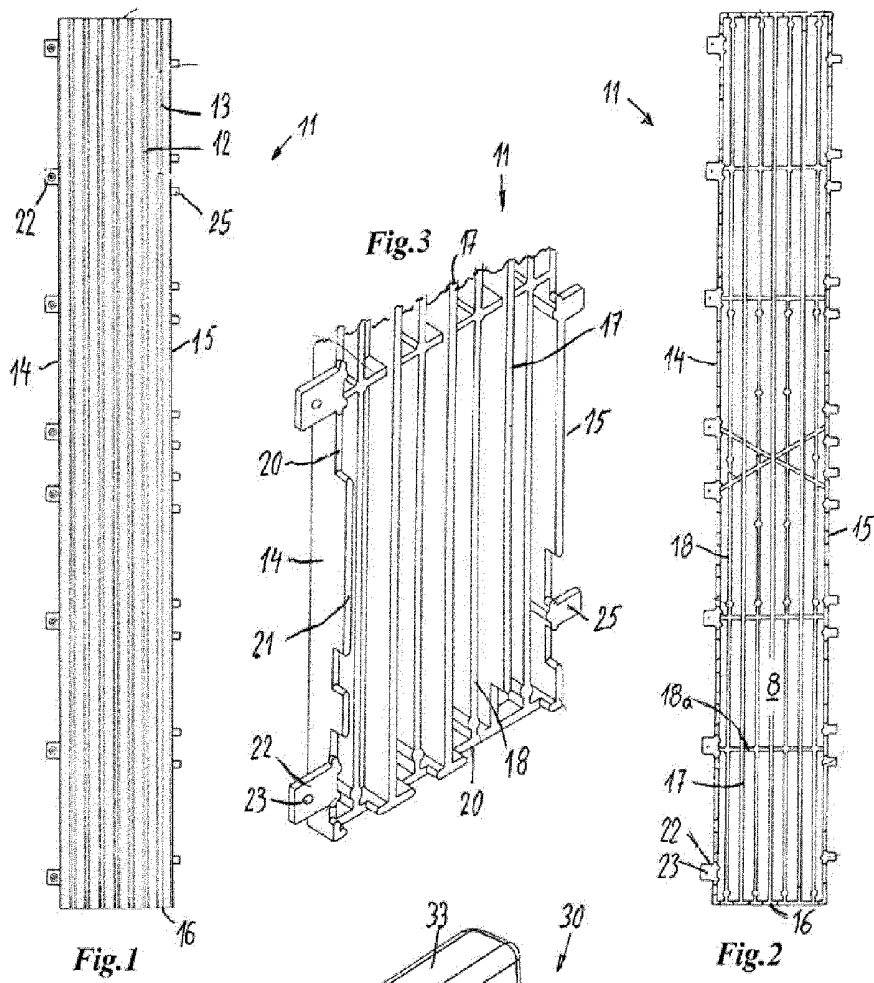
4. Gulvplankesystem ifølge et af kravene 1 til 3, **kendetegnet ved, at** den ene gulvplankes (11) indgrebsfremspring (25) til sammenføjning af to gulvplanker (11) i en indføringsvinkel kan indføres i kamre, der er dannet mellem udsparringerne (20), der er åbne mod undersiden (8) af den anden gulvplanke, og oversiden af konnektorerne (30), der er forbundet med optagelsesfremspringet (22) af denne anden gulvplanke, hvor sikringsflader efter indsvingning til den flugtende position ved indgrebsfremspringene (25) kommer i indgreb med konnektoren (30).

25

5. Gulvplankesystem ifølge et af kravene 1 til 4, **kendetegnet ved, at** indgrebsfremspringene (25) på deres underside har et eller flere gribestykker (56), der går i indgreb med konnektorens (30) udsparringer.

30

6. Gulvplankesystem ifølge et af de foregående krav, **kendetegnet ved, at** konnektoren (30) indeholder afstandselementer (53), der muliggør lægning af gulvplankerne med en forudbestemt fuge (46) mellem dem.
- 5 7. Gulvplankesystem ifølge et af de foregående krav, **kendetegnet ved, at** konnektorens (30) støtteflade (31) har en strukturering eller profilering.
8. Gulvplankesystem ifølge et af de foregående krav, **kendetegnet ved, at** der er tilvejebragt en yderligere konnektor (30), der kan presses ind i fugen (46) mellem de naboliggende sider (14, 15, 16) af to gulvplanker (11) fra undersiden (8) og omfatter indgrebsfremspring (25b), der fungerer som modhager.
- 10 9. Gulvplankesystem ifølge krav 8, **kendetegnet ved, at** indgrebsfremspringene (25b) er elementer på konnektorens (30) midterstykke (60), der snapper klinkeagtigt ind i udsparingerne (20) på siderne.
- 15 10. Gulvplankesystem ifølge et af kravene 8 eller 9, **kendetegnet ved, at** mindst en side af en gulvplanke (11) under tilbagetvingning af et indgrebsfremspring (25b) griber ind i en spalte (67) mellem denne og et gribeelement (9) af den yderligere konnektor (30).
- 20 11. Gulvplankesystem ifølge et af de foregående krav, **kendetegnet ved, at** gulvplankerne (11) består af kunststofsprøjtetøbning og har mindst et af de følgende kendetegn:
- 25 11.1 de består af et kompositmateriale (NFK), der er tilsat fyldstof, såsom naturfibre,
- 11.2 de har på oversiden (12) en rillet skridsikker overflade,
- 11.3 undersiden (8) er forsynet med langsgående og tværgående ribber (13, 18a),
- 30 11.4 mellem ribberne er der tilvejebragt kanaler (19) til kabellægning etc.,
- 11.5 de er selv bærende mellem støttefladerne (31) eller (30).



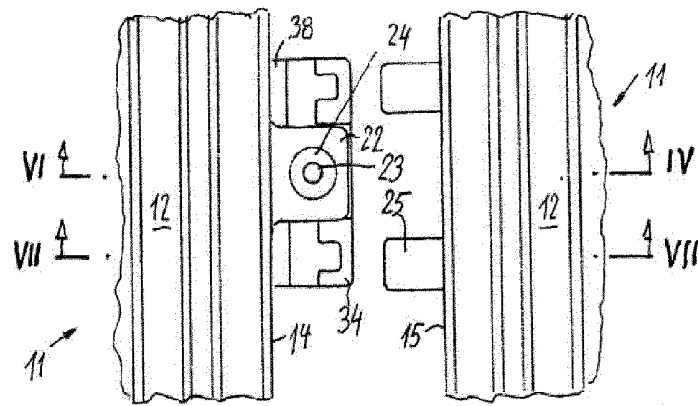


Fig. 5

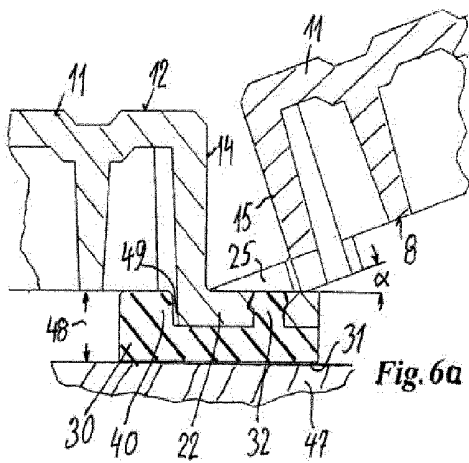


Fig. 6a

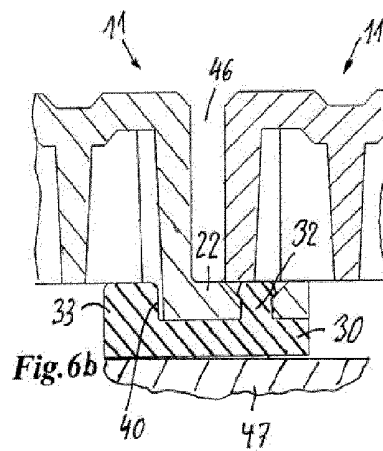


Fig. 6b

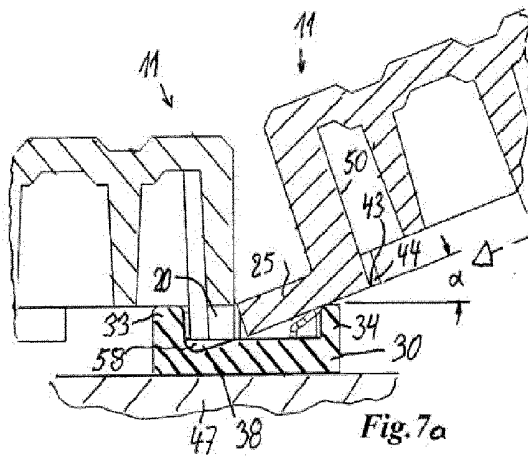


Fig. 7a

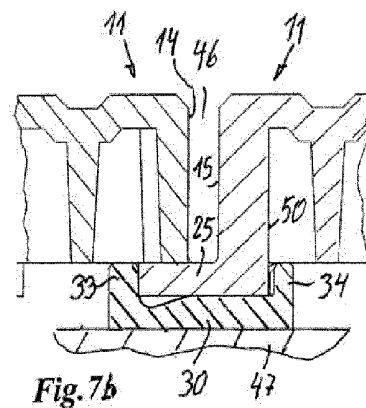
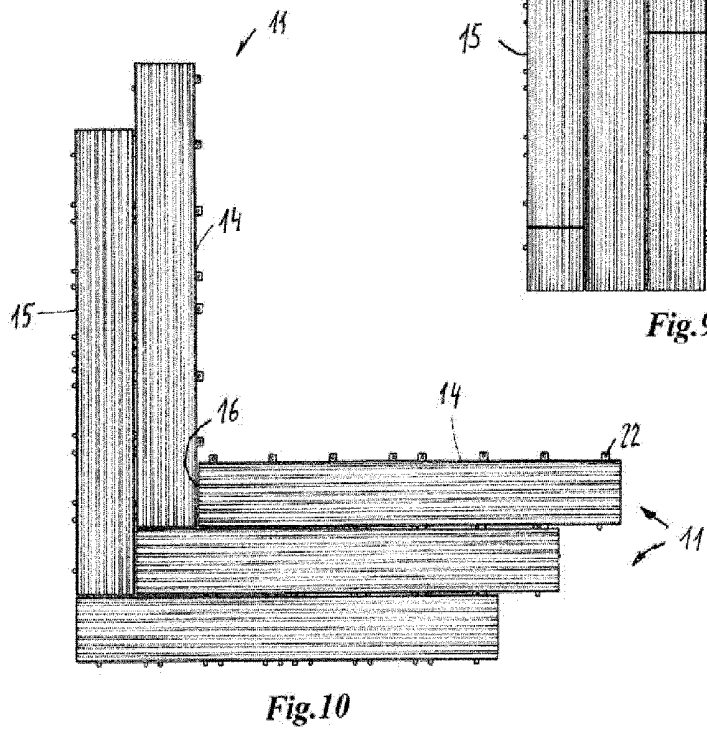
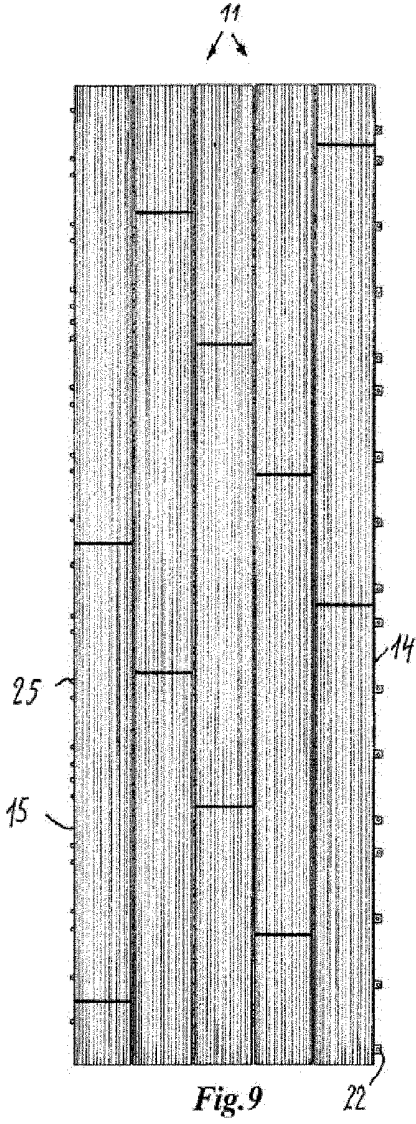
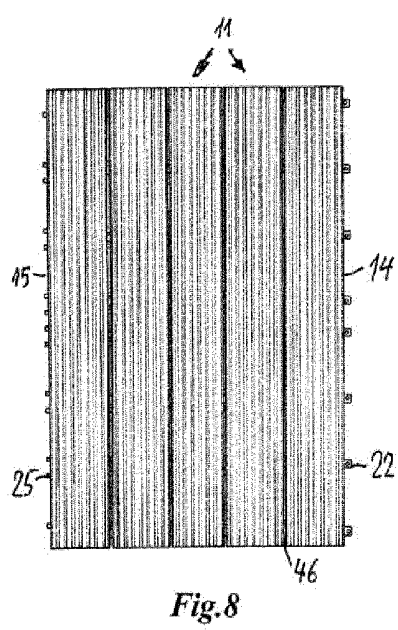
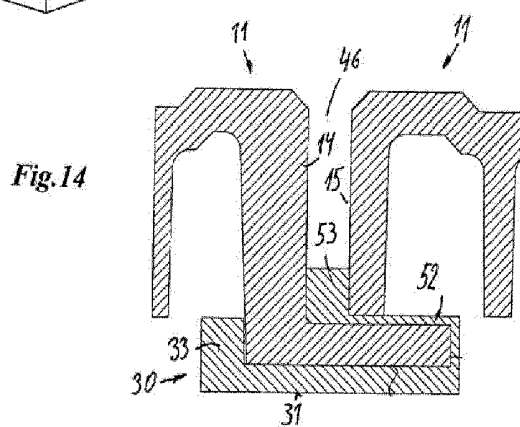
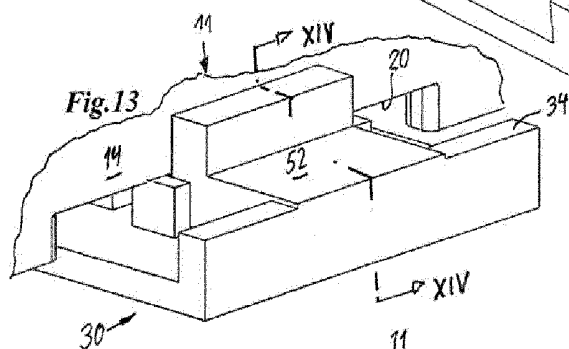
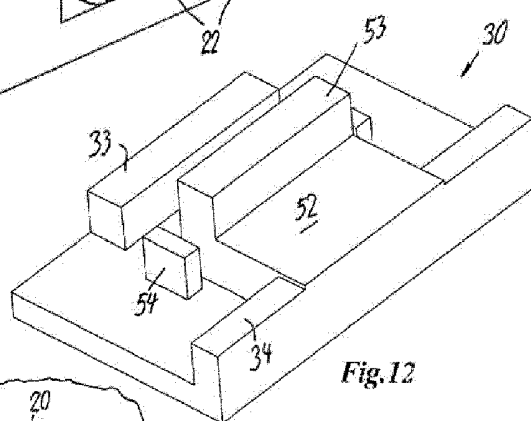
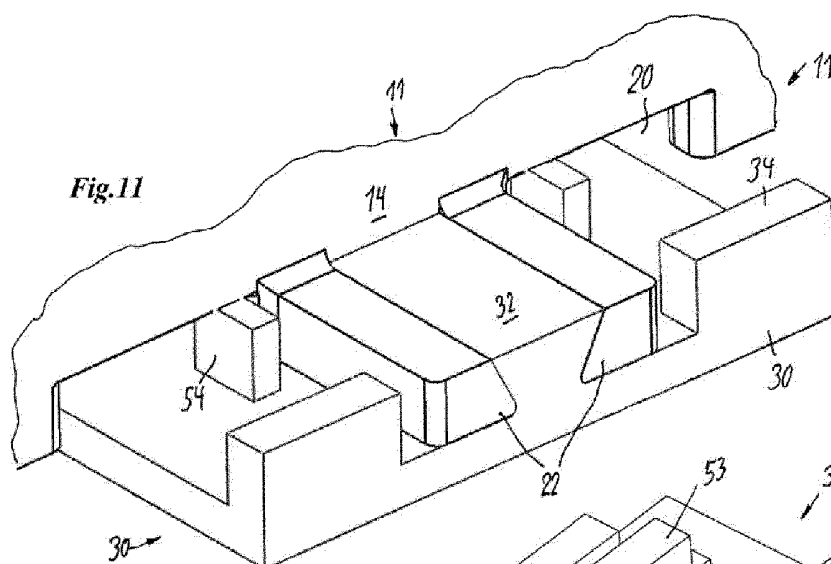


Fig. 7b





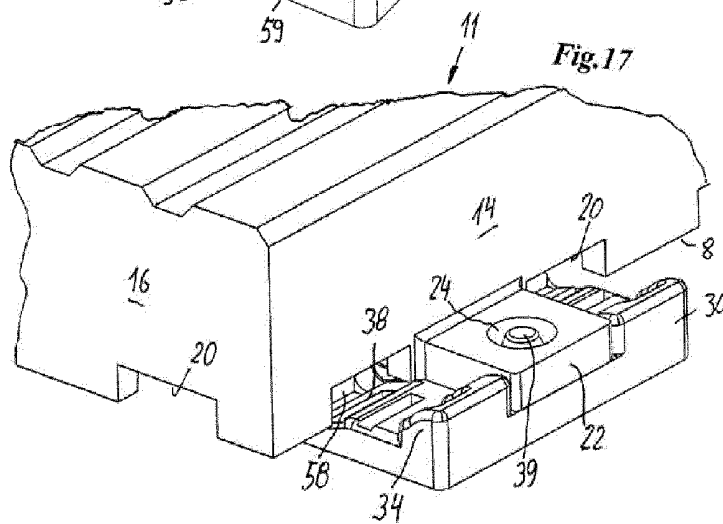
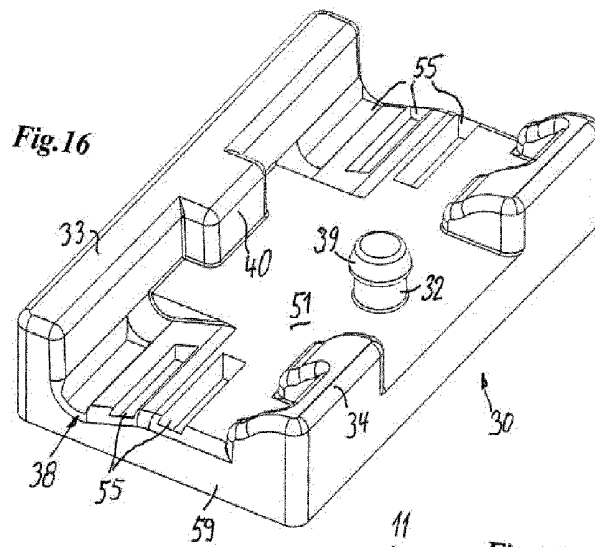
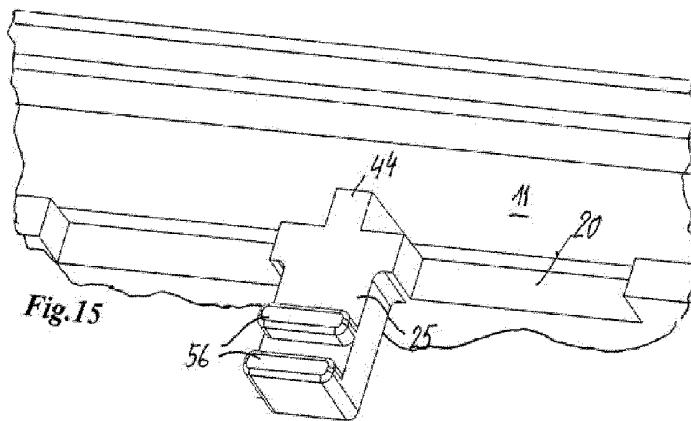


Fig.18

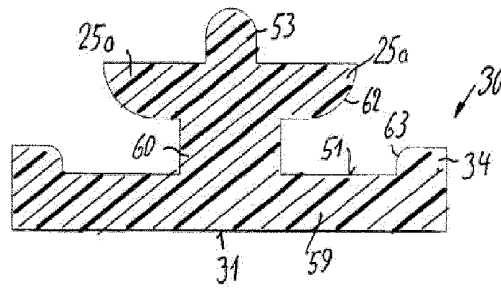


Fig.19

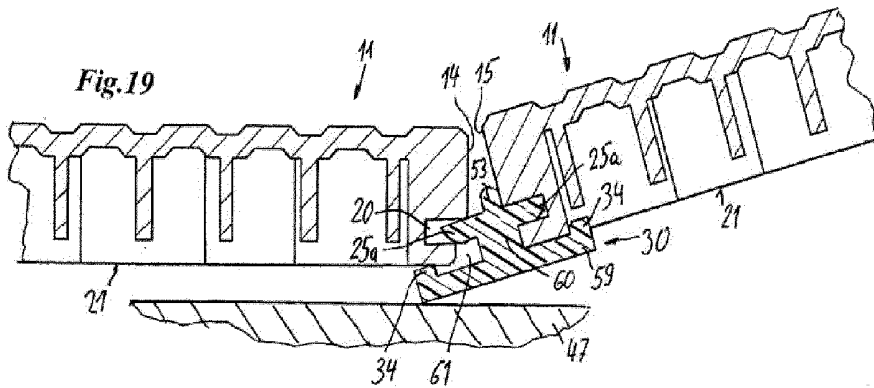


Fig.20

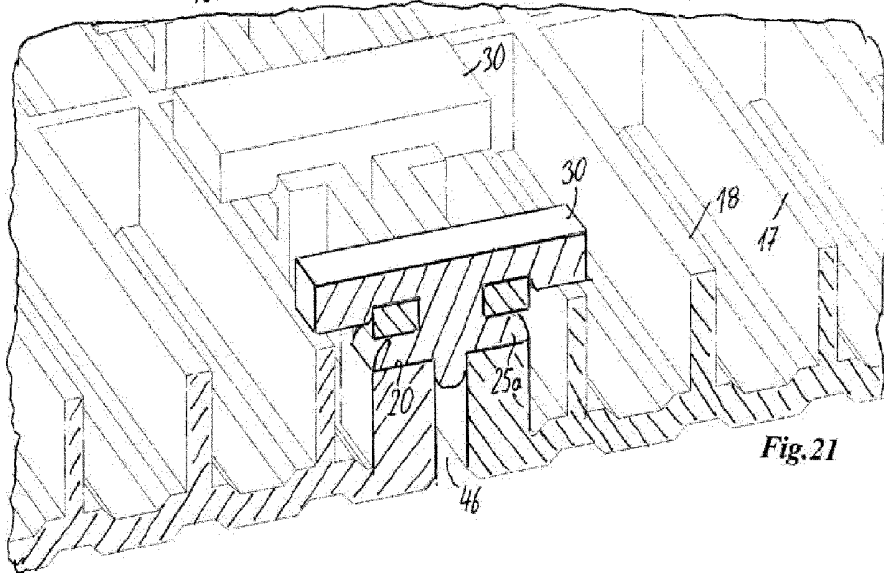
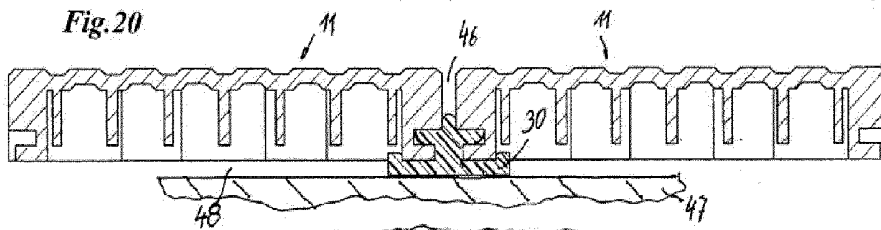


Fig.21

Fig. 22

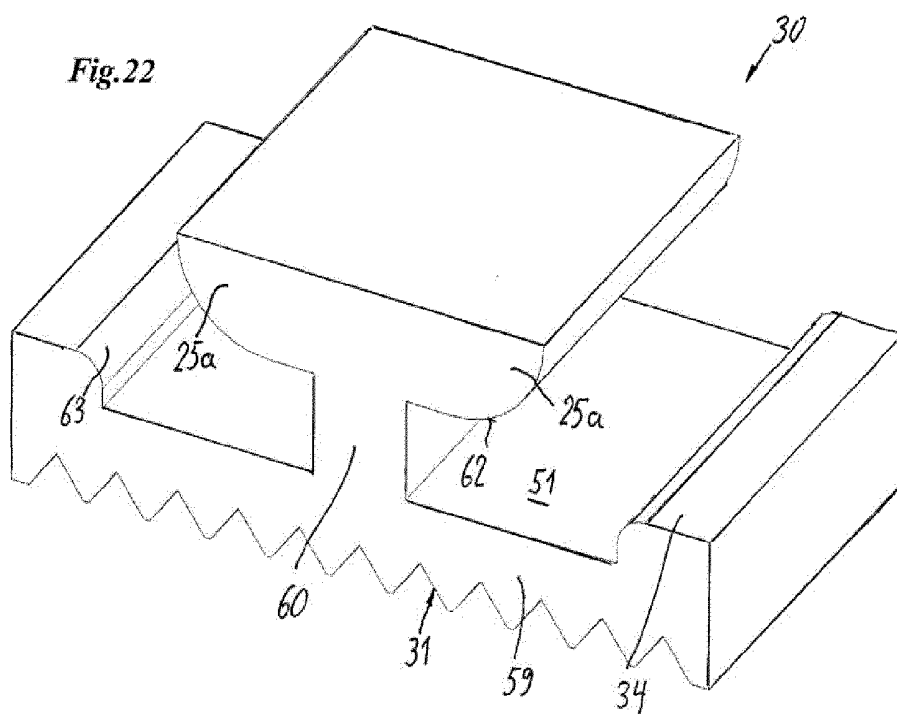


Fig. 23

