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(54) MECHANICAL LOCKING SYSTEM FOR FLOOR PANELS

MECHANISCHES VERSCHLUSSSYSTEM FÜR BODENPLATTEN

SYSTÈME DE VERROUILLAGE MÉCANIQUE POUR PANNEAUX DE PLANCHER

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Description

TECHNICAL FIELD

[0001] The disclosure generally relates to the field of mechanical locking systems for floor panels and building panels. The disclosure shows floorboards, locking systems, installation methods and production methods.

FIELD OF APPLICATION OF THE INVENTION

[0002] The present invention is particularly suitable for use in floating floors, which are formed of floor panels which are joined mechanically with a locking system integrated with the floor panel, i.e. mounted at the factory, are made up of one or more upper layers of veneer, decorative laminate powder based surfaces or decorative plastic material, an intermediate core of wood-fibre-based material or plastic material and preferably a lower balancing layer on the rear side of the core.

[0003] The following description of known technique, problems of known systems and objects and features of the invention will therefore, as a non-restrictive example, be aimed above all at this field of application and in particular at panels formed as rectangular floor panels with long and shorts edges intended to be mechanically joined to each other on both long and short edges.

[0004] The long and short edges are mainly used to simplify the description of the invention. The panels may be square. The invention is preferably used on the short edges. It should be emphasised that the invention may be used in any floor panel and it may be combined with all types of known locking system formed on the long edges, where the floor panels are intended to be joined using a mechanical locking system connecting the panels in the horizontal and vertical directions on at least two adjacent sides.

[0005] The invention may also be applicable to, for instance, solid wooden floors, parquet floors with a core of wood or wood-fibre-based material and a surface of wood or wood veneer and the like, floors with a printed and preferably also varnished surface, floors with a surface layer of plastic or cork, linoleum, rubber. Even floors with hard surfaces such as stone, tile and similar materials are included and floorings with soft wear layer, for instance needle felt glued to a board. The invention may also be used for joining building panels which preferably contain a board material for instance wall panels, ceilings, furniture components and similar.

BACKGROUND OF THE INVENTION

[0006] Laminate flooring usually comprises a core of a 6-12 mm fibre board, a 0.2-0.8 mm thick upper decorative surface layer of laminate and a 0.1-0.6 mm thick lower balancing layer of laminate, plastic, paper or like material. A laminate surface comprises of melamine-impregnated paper. The most common core material is fibreboard with high density and good stability usually called HDF - High Density Fibreboard. Sometimes also MDF - Medium Density Fibreboard - is used as core.

[0007] Traditional laminate floor panels of this type have been joined by means of glued tongue-and-groove joints.

In addition to such traditional floors, floor panels have been developed which do not require the use of glue and instead are joined mechanically by means of so-called mechanical locking systems. These systems comprise locking means, which lock the panels horizontally and vertically. The mechanical locking systems are usually formed by machining of the core of the panel. Alternatively, parts of the locking system may be formed of a separate material, for instance aluminium or HDF, which is integrated with the floor panel, i.e. joined with the floor panel in connection with the manufacture thereof.

[0008] The main advantages of floating floors with mechanical locking systems are that they are easy to install. They may also easily be taken up again and used once more at a different location.

DEFINITION OF SOME TERMS

[0009] In the following text, the visible surface of the installed floor panel is called *"front side",* while the opposite side of the floor panel, facing the sub floor, is called *"rear side".* The edge between the front and rear side is called *"joint edge".* By *"horizontal plane"* is meant a plane, which extends parallel to the outer part of the surface layer. Immediately juxtaposed upper parts of two adjacent joint edges of two joined floor panels together define a *"vertical plane"* perpendicular to the horizontal plane. By *"vertical locking"* is meant locking parallel to the vertical plane in D1 direction. By *"horizontal locking"* is meant locking parallel to the horizontal plane in D2 direction.

[0010] By *"up"* is meant towards the front side, by *"down"* towards the rear side, by *"inwardly"* mainly horizontally towards an inner and centre part of the panel and by *"outwardly"* mainly horizontally away from the centre part of the panel.

[0011] By *"locking systems"* are meant co acting connecting elements, which connect the floor panels vertically and/or horizontally.

RELATED ART AND PROBLEMS THEREOF

[0012] For mechanical joining of long edges as well as short edges in the vertical and in the first horizontal direction perpendicular to the edges several methods may be used. One of the most used methods is the angle-snap method. The long edges are installed by angling. The panel is than displaced in locked position along the long side. The short edges are locked by horizontal snapping. The vertical connection is generally a tongue and a groove. During the horizontal displacement, a strip with a locking element is bent and when the edges are in contact, the strip springs back and a locking element en-

ters a locking groove and locks the panels horizontally. Such a snap connection is complicated since a hammer and a tapping block may need to be used to overcome the friction between the long edges and to bend the strip during the snapping action.

[0013] Similar locking systems may also be produced with a rigid strip and they are connected with an angling-angling method where both short and long edges are angled into a locked position.

[0014] EP 2 270 291 A1 discloses a device having a core made of wooden material or wooden material-plastic mixture in a direction perpendicular to a visible side. A groove is provided in a recess opened to a lower side and opened in a direction of the recess. An upwardly aligned projection has another recess lying opposite to the groove. A spring element, e.g. a ring, is arranged in the latter recess and deformed in a direction parallel to the visible side in a compressed and/or deformable manner. The spring element is inserted into a structural panel.

[0015] EP 2 034 106 A1 discloses a device that has structural panels with upper and lower sides and profiles provided at side edges. A locking element with a locking projection is provided in the profile. The element cooperates with a locking recess provided in the profile such that the panels are automatically locked in a vertical direction during a joining movement. The locking element is rigidly formed and the locking projection is brought into the recess by a rotary motion of the element that is made of metal or timber material-plastic mixture, e.g. high or medium density fibre board.

[0016] WO 2011/012104 A2 discloses a covering comprising panels that can be connected to each other mechanically. The covering has adjacent first and second panels, each having a groove on the sides thereof that are complementary to each other. The grooves each have upper and lower groove sides having different lengths and in one of the grooves a spring is arranged that can be moved relative to the panel at least in parts. The spring is suitable for engaging in the corresponding groove of the adjacent panel when the adjacent panels are connected, and the spring has at least one projection which points in the direction of the area of the longer groove sides of the other groove that protrudes relative to the shorter groove sides. The projection is intended to be moved transversely to the laying plane of the panels in the event of contact with the area of the groove side, wherein the projection is operatively connected to a locking section of the spring. The locking section can be moved in the direction of the groove of the adjacent panel as a result of the motion of the projection.

[0017] Recently new and very efficient locking systems have been introduced with a separate flexible or displaceable integrated tongue on the short edge that allows installation with only an angling action, generally referred to as "vertical folding". Such a system is described in WO 2006/043893 (Välinge Innovation AB. Several versions are used on the market as shown in figures 1a-1f. Figure 1a, 1b show a flexible tongue 30 with a flexible snap tab extending from the edge. Figure 1c, 1d show a displaceable tongue with an inner flexible part that is bendable horizontally in a cross section of the tongue or along the joint. Such systems are referred to as vertical snap systems and they provide an automatica locking during the folding action.

[0018] The locking system may also be locked with a side push action such that a displaceable tongue 30 is pushed into a locked position from the long side edge when adjacent sort side edges are folded down to the sub floor. Such a side push action could be difficult to combine with a simple angling and the friction may be too strong for wide panels.

[0019] Figure 1e shows a fold down system with a flexible tongue 30 that is made in one piece with the core. Figure 1 f shows a long edge locking system in a fold down system that is connected with angling.

[0020] Although such systems are very efficient, there is still room for improvements. Vertical snap systems are designed with the tongue on the strip panel. The reason is that an inclined sliding surface can only be formed on the fold panel when the upper edges are made without a bevel and this is generally the case. It is difficult to insert the separate tongue 30 during production into a groove 40 over a strip 6 comprising a locking element 8. The locking force is dependant on the snapping resistance. High locking force can only be accomplished with high snapping resistance when the tongue is pressed inwardly and when it snaps back into a tongue groove 40. This creates separation forces that tend to push the panels apart during folding. The locking may lose its strength if the flexibility and pressing force of the tongue decreases over time. The flexibility must be considerable and allow that a flexible tong is displaced in two directions about 1-2 mm. The material, which is used to produce such tongues, is rather expensive and glass fibres are generally used to reinforce the flexible tongue.

[0021] It would be a major advantage if the separate tongue could be fixed to the fold panel and if snapping could be eliminated in a system that locks automatically during folding.

SUMMARY

[0022] An overall objective of embodiments of the present invention is to provide a locking system for primarily rectangular floor panels with long and short edges installed in parallel rows, which allows that the short edges may be locked to each other automatically without a snap action that creates a locking resistance and separation forces of the short edges during folding. A specific objective is to provide a locking system with a separate displaceable tongue on the fold panel that may lock without any contact with the sharp upper edge of the strip panel and that the tongue is displaced essentially in one direction only from an inner part of a groove and outwardly.

[0023] The above objects of embodiments of the in-

vention are achieved wholly or partly by locking systems and floor panels according to the independent claims. Embodiments of the invention are evident from the dependent claims and from the description and drawings.

[0024] A first aspect of the invention are building panels provided with a locking system for vertical locking of a first and a second building panel by a vertical displacement of the panels relative each other. A sidewardly open tongue groove is provided at an edge of the first building panel. A strip protrudes below the tongue groove and outwardly beyond the upper part of the edge of said first panel. A displaceable tongue is provided in a sidewardly open displacement groove at an edge of the second building panel. The displaceable tongue comprises a main body extending along the edge of the second panel and preferably a tongue locking surface, located at an upper and outer part of the displaceable tongue, configured to cooperate with a groove locking surface of the tongue groove for a vertical locking of the first and the second building panel. The displaceable tongue comprises an inner part, spaced inwardly from an upper part of an edge of said second panel, the inner part comprises a tongue pressing surface configured to cooperate with a strip pressing surface on the strip. The displaceable tongue is configured to be displaced into the tongue groove when the tongue and the strip pressing surface are displaced vertically against each other to obtain the vertical locking.

[0025] The displaceable tongue is preferably an injection-moulded tongue.

[0026] The displaceable tongue may be asymmetric and comprises a protrusion and the second panel comprises a cavity for housing the protrusion. The protrusion may comprise a flexible part.

[0027] The strip is provided with a locking element that cooperates with a downwardly open locking groove formed on the second panel for locking the first and the second building panel in a horizontal direction.

The tongue pressing surface is preferably positioned on the protrusion and the strip pressing surface is preferably located on the locking element.

The strip pressing surface is most preferably located on an inclined surface of the locking element that is directed towards the edge of the first building panel.

The locking system may comprise a cavity that extends from the displacement groove to the locking groove.

[0028] The strip and the tongue pressing surfaces may be inclined against a horizontal plane with an angle of about 25 to 75 degrees.

The displacement groove may be inclined and comprise an inner part that extends downwards.

The building panels may be locked vertically by two pairs of cooperating surfaces comprising the groove locking surface and the tongue locking surface, and an upper part of the strip and a lower part of the edge of the second panel, respectively.

The groove locking surface and the tongue locking surface may be inclined against a horizontal plane.

The groove locking surface and the tongue locking surface may be inclined with an angle of about 10 to 60 degrees to a horizontal plane.

[0029] The displaceable tongue may be provided with a flexible friction element.

The displaceable tongue may comprise at least two protrusions extending from the main tongue body and each protrusion may comprise said tongue pressing surface located at an outer part of the protrusion that during locking is in contact with a locking element provided on the strip.

[0030] The building panel may be a floor panel. The outer part of the displaceable tongue is in an unlocked position located in the displacement groove.

The displacement groove may extend vertically above the locking groove.

[0031] The locking groove may be located vertically below the upper part of the displacement groove.

[0032] An upper part of the locking element may be located vertically below the tongue locking surface of the displaceable tongue.

[0033] An upper part of the locking groove may be located vertically below the tongue locking surface of the displaceable tongue.

[0034] The innermost part of the displaceable tongue may be below the outermost part of such tongue.

[0035] The tongue pressing surface may be located vertically below the tongue locking surface.

[0036] An upper part of the locking element may be located in the lower half of an intermediate core of the first building panel.

[0037] The strip may be flexible such that it bends downwards during locking.

[0038] The cavity may be larger than the protrusion such that there is a space S of at least about 1-3 mm.

[0039] The displaceable tongue may be gradually inserted into the tongue groove from a tongue part, which is adjacent an installed long edge, to another tongue part adjacent a free long edge.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] The disclosure will in the following be described in connection to exemplary embodiments and in greater detail with reference to the appended exemplary drawings, wherein:

Figs 1a-f	illustrate locking systems according to known technology.
Figs 2a-d	illustrate a short edge locking system according to an embodiment of the invention.
Figs 3a-3d	illustrate a short edge locking system according to preferred embodiments of the invention.
Figs 4a-e	illustrate preferred embodiments of short

edge locking systems.

Figs 5a-e illustrate vertical folding of three panels according to an embodiment of the invention.

Figs 6a-e illustrate the flexibility of the locking systems during locking and preferred embodiments of displaceable tongues.

Figs 7a-c illustrate tongue blanks according to embodiments of the invention comprising several displaceable tongues.

DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0041] To facilitate understanding, several locking systems in the figures are shown schematically. It should be emphasised that improved or different functions may be achieved using combinations of the preferred embodiments.

[0042] All embodiments may be used separately or in combinations. Angles, dimensions, rounded parts, spaces between surfaces etc are only examples and may be adjusted within the basic principles of the invention. Figures 2a -2d show a first preferred embodiment of a short edge locking system provided with a flexible and displaceable tongue 30 in an edge of a second panel 1' inserted in a displacement groove 40 and extending along the edge of the second panel. The displaceable tongue 30 has a tongue locking surface 31 located at an upper and outer part that cooperates with a groove locking surface 21 located at an inner and upper part of a tongue groove 20 formed in an adjacent edge of a first panel 1. The locking surfaces lock the panels in a first vertical direction. The locking surfaces are preferably inclined with an angle A2 that is about 10 - 60 degrees. The displacement groove is preferably also inclined and the outer part is closer to the panel surface than an inner part.

[0043] The first panel 1 comprises a protruding strip 6 that extends outwardly beyond a vertical plane VP. The strip comprises a locking element 8. The second panel 1' comprises a locking groove 14 that cooperates with the locking element 8 and locks the panels in a horizontal direction. The strip 6 has an upper part 6', which is in contact with a lower part 37 of the adjacent edge and locks the panels in a second vertical direction.

[0044] The displaceable tongue 30 comprises a protrusion 34 extending from a main tongue body 36. The second panel 1' comprises at least one cavity 35 for housing the protrusion. The cavity extends from the displacement groove to the locking groove 14.

The cavity may be formed by a screw cutter or by displaceable saw blades.

The protrusion comprises a tongue pressing surface 32 which cooperates with a strip pressing surface 33 on the locking element. The strip pressing surface 33 and the tongue pressing surface 32 are inclined with an angle A1 which is preferably 25 - 75 degrees against a horizontal plane HP.

[0045] The displaceable tongue is displaced essentially in one direction towards the tongue groove 20 when the inclined pressing surfaces are sliding against each other during the vertical displacement of the adjacent edges. The tongue may be locked with a strong pressure against the groove locking surface 21 and the locking element 8 prevents the tongue from sliding back into the displacement groove.

[0046] One major problem related to a "press lock system" as described above is the risk that panel may split with a crack 50 between the displacement groove 40 and the locking groove 14 as shown in figure 2d. Therefore it is preferable that the upper parts of the locking groove 14a and the locking element 8a are made in the lower part of the floor panel, preferably below the centre line C that divides the floor panel in two equal parts, one upper part UP and one lower part LP. It is also preferable that the tongue pressing surface 32 is located vertically below the tongue locking surface 31. The tongue pressing surface and the tongue locking surface are preferably offset vertically and are preferably located on different horizontal planes H2, H1. It is also preferred that an upper part of the locking element 8a and/or an upper part of the locking groove 14a are located vertically below the tongue locking surface 31. The innermost part of the displaceable tongue 30 is preferably located below the outermost part of such tongue.

[0047] The cavities 35 are preferably formed by rotating saw blades and comprise preferably an upper rounded part with an outer part 35b that is located above an inner part 35a as shown in figure 2d. The cavity is preferably formed such that it intersects the inner part 14b of the locking groove 14.

Figures 3a -3d show the locking function during the vertical displacement of the second panel 1' against the first panel 1. The displaceable tongue 30 is gradually pressed into the tongue groove 20 by the cooperating pressing surfaces 32,33 and the panels are locked vertically with two pairs of cooperating locking surfaces, the tongue locking surface 31 and the groove locking surface 21 and an upper part 6' of the strip 6 and a lower part 37 of the adjacent edge 1'.

Figures 4a-4e show different embodiments. Figure 4a shows a displaceable tongue 30 with a protrusion 34 located under the main tongue body. The locking groove 14 is located vertically under an upper part of the displacement groove 40. Figure 4b shows a tongue pressing surface 32 that locks against a strip pressing surface that is not active in the horizontal locking. Figure 4c shows that the same locking surface 33 on the locking element 8 may be used as a pressing surface and as a locking surface for the horizontal locking. Figure 4d shows that the strip pressing surface may be formed on a separate pushing rod 42 in accordance with a non-claimed aspect. Figure 4e shows a protrusion 34 that comprises a curved

cross section and a locking element that comprises an upper part 44 formed as local protrusion that protrudes above the inner part of the locking groove 14 and into the cavities 35.

[0048] Figures 5a -5e show vertical folding of three panels wherein the long edges 2,2' are connected with angling and the short edges 1, 1' with a scissor like motion that combines angling and vertical displacement. Figure 5b shows that the displaceable tongue is gradually inserted into the tongue groove 20 from one part of the edges that is adjacent to the installed long edge 2 to the other free long edge. Figure 5c shows the tongue in the cross section A-A and figures 5d, 5e show the tongue position in the cross sections B-B, and C-C. The strip 6 and the locking element 8 are in this embodiment designed such that they bend backwards during locking and this facilitates locking since the necessary flexibility may be provided partly or completely with such strip bending. The locking groove is positioned vertically under the lower part of the displacement groove 40.

[0049] Figure 6a shows that the locking system may be formed such that several parts are flexible for example the protrusion 34, the locking strip 6 and the locking element 8. This flexibility may be used to reduce or eliminate production tolerances and to facilitate an easy and strong locking. Figure 6a shows that the strip 6 may be bent downwards and the locking element 8 may be bent downwards and outwardly. Such a strip bending may facilitate locking that may even be accomplished with a displaceable tongue that comprises a limited flexibility such as a tongue that essentially comprises wood fibre material. A locking may be accomplished with a flexibility where a part of the displaceable tongue 30 is bended or compressed marginally for example only about 0,1 - 1,0 mm in the horizontal direction.

[0050] Figure 6b and 6c show embodiments of the tongue. The displaceable tongue 30 may be fixed into the displaceable groove with a friction connection 38. The protrusion 34 may comprise flexible parts 39 that create a pre tension against the tongue groove 20. The cavity 35 may be considerably larger than the protrusion and preferably there is a space S that may be about 1-3 mm.

[0051] Figure 6d shows a locking system with a sliding surface 45 that protrudes beyond a vertical plane VP. The tongue groove 20 is preferably formed on an inclined edge surface 46. Such an embodiment offers the advantages that the displaceable tongue 30 may be pressed inwardly and the conventional two-way snapping action may be combined with a one way pressing motion that may be used to create the final locking.

Figure 6e shows a separate tongue 30, located in a sideway open groove 40 on the second panel 1', comprising an upwardly extending snap tab 47 that cooperates with a downwardly extending sliding surface 45 that is located on the first panel 1 and that protrudes beyond the upper edge and the vertical plane VP. The second panel 1' comprises preferably an inclined edge surface 46' located above and and/or below the tongue 30. An easy snapping may be obtained even with panels that have straight and sharp upper adjacent edges. The snap tab may be replaced with a displaceable tongue that comprises flexible snapping protrusions along its length. The locking system shown in figure 1d may also be adjusted such that it comprises inclined edge surfaces and such a design may be used to increase the strength of the joint.

[0052] The locking system in a non-claimed aspect may also be formed without a locking grove 14 and a locking element 8 such that it only locks the edges in a vertical direction. The locking element 8 may be replaced with local protrusions that extend upwards from a strip 6 and are in locked position located in the cavities. The short edges may be locked horizontally by friction between the long edges.

All locking systems may be designed such that they can be unlocked with angling and/or sliding along the edges.

Figure 7a, 7b show a tongue blank 43 that comprise several displaceable tongues that are preferably asymmetric along the tongue length. Figure 7a shows injection-moulded tongues 30 and figure 7b shows displaceable tongues 30 made of a wood based material that is preferably machined and punched.

The cavities 35 that are preferably formed by rotating saw blades comprises an upper part that is rounded and may comprise an inner part that is located below an outer part.

The locking system may be partly or completely formed by carving tools.

Claims

1. Building panels provided with a locking system for vertical locking of a first (1) and a second (1') building panel by a vertical displacement of the second building panel (1') against the first building panel (1), the building panels comprising:

   a sidewardly open tongue groove (20) provided at an edge of the first building panel (1);

   a strip (6) protruding below the tongue groove (20) and outwardly beyond an upper part of the edge of said first building panel (1), the strip (6) comprising a locking element (8) configured to cooperate with a downwardly open locking groove (14) formed on the second building panel for locking of the first and the second building panel (1,1') in a horizontal direction; and

   a displaceable tongue (30) provided in a sidewardly open displacement groove (40) at an edge of the second building panel, the displaceable tongue (30) comprising a main body extending along the edge of the second building panel and a tongue locking surface (31) located at an upper and outer part of the tongue, the tongue locking surface being configured to cooperate with a groove locking surface (21) of the

tongue groove (20) for vertical locking,
wherein the displaceable tongue comprises an inner part spaced inwardly from an upper part of the edge of said second building panel (1'),
characterised in
that the displaceable tongue (30) comprises an outer part configured to be located in the displacement groove (40) in an unlocked position of the first (1) and the second (1') building panel;
that the inner part comprises a tongue pressing surface (32) configured to cooperate with a strip pressing surface (33) on the strip (6), such that the displaceable tongue (30) is displaced into the tongue groove when the tongue pressing surface (32) and the strip pressing surface (33) are displaced vertically against each other to obtain a locking of the first and the second building panel (1,1') in a vertical direction;
that said inner part comprises a protrusion (34), the tongue pressing surface (32) being provided on the protrusion (34) and the second panel (1') comprising a cavity (35) for housing the protrusion; and
that a surface on the locking element (8) forms said strip pressing surface (33) and a locking surface for the horizontal locking.

2. The building panels as claimed in claim 1, wherein said displaceable tongue (30) is asymmetric.

3. The building panels as claimed in claim 2, wherein the protrusion (34) comprises a part (39) that is flexible.

4. The building panels as claimed in claim 3, wherein the strip pressing surface (33) is provided at an inclined surface of the locking element (8) directed towards the first edge.

5. The building panels as claimed in any one of the preceding claims, wherein the strip pressing surface (33) is provided at an upper part of the locking element (8).

6. The building panels as claimed in any one of the claims 1-5, wherein the cavity (35) extends from the displacement groove (40) to the locking groove (14).

7. The building panels as claimed in any one of the preceding claims, wherein the displacement groove (40) extends vertically above the locking groove (14).

8. The building panels as claimed in any one of the preceding claims, wherein an upper part (8a) of the locking element (8) is located vertically below the tongue locking surface (31) of the displaceable tongue (30) .

9. The building panels as claimed in any one of the preceding claims, wherein an uppermost part of the locking element is located in a lower half of an intermediate core of the first building panel.

10. The building panels as claimed in any one of preceding claims, wherein the first and the second building panel (1,1') are locked vertically by a first and a second pair of cooperating surfaces, the first pair comprising the tongue locking surface (31) and the groove locking surface (21), and the second pair comprising an upper part (6') of the strip (6) and a lower part of an edge (37) of the second building panel (1').

11. The building panels as claimed in any one of the preceding claims, wherein said groove locking surface (21) and tongue locking surface (31) are inclined against a horizontal plane.

12. The building panels as claimed in any one of the preceding claims, wherein the displaceable tongue (30) comprises at least two protrusions (34) extending from the main body (36), each protrusion comprising said tongue pressing surface (32) at an outer part of the protrusion, wherein each tongue pressing surface is configured to be in contact during locking with the locking element provided on the strip.

13. The building panels as claimed in any one of the preceding claims, wherein the tongue pressing surface (32) is located vertically below the tongue locking surface (31).

14. The building panels as claimed in any one of the preceding claims, wherein the second building panel (1') is further configured to be connected to the first building panel (1) by angling, during which angling the displaceable tongue (30) is gradually inserted into the tongue groove (20) along said edge of the first building panel (1), wherein the edges of the first (1) and second (1') building panels are short edges.

Patentansprüche

1. Gebäudeplatten, die mit einem Verriegelungssystem zum vertikalen Verriegeln einer ersten (1) und einer zweiten (1') Gebäudeplatte mittels einer vertikalen Verschiebung der zweiten Gebäudeplatte (1') zu der ersten Gebäudeplatte (1) versehen sind, wobei die Gebäudeplatten umfassen:

eine seitlich offene Feder-Nut (20), die an einer Kante der ersten Gebäudeplatte (1) vorhanden ist;
einen Streifen (6), der unterhalb der Feder-Nut (20) und nach außen über einen oberen Teil der

Kante der ersten Gebäudeplatte (1) hinaus vorsteht, wobei der Streifen (6) ein Verriegelungs-Element (8) aufweist, das so eingerichtet ist, dass es mit einer nach unten offenen Verriegelungs-Nut (14) zusammenwirkt, die an der zweiten Gebäudeplatte ausgebildet ist, um die erste und die zweite Gebäudeplatte (1, 1') in einer horizontalen Richtung zu verriegeln; und
eine verschiebbare Feder (30), die in einer seitlich offenen Verschiebungs-Nut (40) an einer Kante der zweiten Gebäudeplatte vorhanden ist, wobei die verschiebbare Feder (30) einen Hauptkörper, der sich entlang der Kante der zweiten Gebäudeplatte erstreckt, sowie eine Feder-Verriegelungs-Fläche (31) umfasst, die sich an einem oberen und äußeren Teil der Feder befindet, und die Feder-Verriegelungs-Fläche so eingerichtet ist, dass sie mit einer Nut-Verriegelungs-Fläche (21) der Nut (20) zum vertikalen Verriegeln zusammenwirkt,
wobei die verschiebbare Feder einen inneren Teil umfasst, der von einem oberen Teil der Kante der zweiten Gebäudeplatte (1') nach innen beabstandet ist, **dadurch gekennzeichnet,**
dass die verschiebbare Feder (30) einen äußeren Teil umfasst, der so eingerichtet ist, dass er sich in einer entriegelten Position der ersten (1) und der zweiten (1') Gebäudeplatte in der Verschiebungs-Nut (40) befindet;
dass der innere Teil eine Feder-Drück-Fläche (32) umfasst, die so eingerichtet ist, dass sie mit einer Streifen-Drück-Fläche (33) an dem Streifen (6) so zusammenwirkt, dass die verschiebbare Feder (30) in die Feder-Nut hinein verschoben wird, wenn die Feder-Drück-Fläche (32) und die Streifen-Drück-Fläche (33) vertikal zueinander verschoben werden, um ein Verriegeln der ersten und der zweiten Gebäudeplatte (1, 1') in einer vertikalen Richtung zu erreichen;
dass der innere Teil einen Vorsprung (34) umfasst, wobei die Feder-Drück-Fläche (32) an dem Vorsprung (34) vorhanden ist und die zweite Platte (1') einen Hohlraum (35) zum Aufnehmen des Vorsprungs umfasst; und
dass eine Fläche an dem Verriegelungs-Element (8) die Streifen-Drück-Fläche (33) sowie eine Verriegelungs-Fläche für das horizontale Verriegeln bildet.

2. Gebäudeplatten nach Anspruch 1, wobei die verschiebbare Feder (30) asymmetrisch ist.

3. Gebäudeplatten nach Anspruch 2, wobei der Vorsprung (34) einen Teil (39) umfasst, der flexibel ist.

4. Gebäudeplatten nach Anspruch 3, wobei die Streifen-Drück-Fläche (33) an einer geneigten Fläche des Verriegelungs-Elementes (8) vorhanden ist, die auf die erste Kante zu gerichtet ist.

5. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei die Streifen-Drück-Fläche (33) an einem oberen Teil des Verriegelungs-Elementes (8) vorhanden ist.

6. Gebäudeplatten nach einem der Ansprüche 1-5, wobei sich der Hohlraum (35) von der Verschiebungs-Nut (40) bis zu der Verriegelungs-Nut (14) erstreckt.

7. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei sich die Verschiebungs-Nut (40) vertikal oberhalb der Verriegelungs-Nut (14) erstreckt.

8. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei sich ein oberer Teil (8a) des Verriegelungs-Elementes (8) vertikal unterhalb der Feder-Verriegelungs-Fläche (31) der verschiebbaren Feder (30) befindet.

9. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei sich ein oberster Teil des Verriegelungs-Elementes in einer unteren Hälfte eines Zwischen-Kerns der ersten Gebäudeplatte befindet.

10. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei die erste und die zweite Gebäudeplatte (1, 1') durch ein erstes und ein zweites Paar zusammenwirkender Flächen vertikal verriegelt werden, das erste Paar die Feder-Verriegelungs-Fläche (31) sowie die Nut-Verriegelungs-Fläche (21) umfasst und das zweite Paar einen oberen Teil (6') des Streifens (6) sowie einen unteren Teil einer Kante (37) der zweiten Gebäudeplatte (1') umfasst.

11. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei die Nut-Verriegelungs-Fläche (21) und die Feder-Verriegelungs-Fläche (31) zu einer horizontalen Ebene geneigt sind.

12. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei die verschiebbare Feder (30) wenigstens zwei Vorsprünge (34) aufweist, die sich von dem Hauptkörper (36) aus erstrecken, jeder Vorsprung die Feder-Drück-Fläche (32) an einem äußeren Teil des Vorsprungs umfasst, und jede Feder-Drück-Fläche so eingerichtet ist, dass sie während beim Verriegeln mit dem an dem Streifen vorhandenen Verriegelungs-Element in Kontakt ist.

13. Gebäudeplatten nach einem der vorangehenden Ansprüche, wobei die Feder-Verriegelungs-Fläche (32) sich vertikal unterhalb der Feder-Verriegelungs-Fläche (31) befindet.

14. Gebäudeplatten nach einem der vorangehenden

Ansprüche, wobei die zweite Gebäudeplatte (1') des Weiteren so eingerichtet ist, dass sie mit der ersten Gebäudeplatte (1) durch Abwinkeln verbunden wird, wobei während dieses Abwinkelns die verschiebbare Feder (30) entlang der Kante der ersten Gebäudeplatte (1) allmählich in die Feder-Nut (20) eingeführt wird, und die Kanten der ersten (1) und der zweiten Gebäudeplatte (1') kurze Kanten sind.

Revendications

1. Panneaux de construction munis d'un système de verrouillage pour le verrouillage vertical d'un premier (1) et d'un second (1') panneau de construction par un déplacement vertical du second panneau de construction (1') vis-à-vis du premier panneau de construction (1), les panneaux de construction comprenant:

une rainure à languette (20) ouverte latéralement prévue au niveau d'un bord du premier panneau de construction (1);
une bande (6) faisant saillie au-dessous de la rainure à languette (20) et vers l'extérieur au-delà d'une partie supérieure du bord dudit premier panneau de construction (1), la bande (6) comprenant un élément de verrouillage (8) configuré pour coopérer avec une rainure de verrouillage (14) ouverte vers le bas formée sur le second panneau de construction pour verrouiller le premier et le second panneau de construction (1, 1') dans une direction horizontale; et une languette déplaçable (30) prévue dans une rainure de déplacement (40) ouverte latéralement au niveau d'un bord du second panneau de construction, la languette déplaçable (30) comprenant un corps principal s'étendant le long du bord du second panneau de construction et une surface de verrouillage de languette (31) située au niveau d'une partie supérieure et externe de la languette, la surface de verrouillage de languette étant configurée pour coopérer avec une surface de verrouillage de rainure (21) de la rainure à languette (20) pour le verrouillage vertical,
où la languette déplaçable comprend une partie interne espacée vers l'intérieur d'une partie supérieure du bord dudit second panneau de construction (1'), **caractérisés**
en ce que la languette déplaçable (30) comprend une partie externe configurée pour être située dans la rainure de déplacement (40) dans une position non verrouillée du premier (1) et du second (1') panneau de construction;
en ce que la partie interne comprend une surface de pression de languette (32) configurée pour coopérer avec une surface de pression de bande (33) sur la bande (6), de sorte que la languette déplaçable (30) est déplacée dans la rainure à languette lorsque la surface de pression de languette (32) et la surface de pression de bande (33) sont déplacées verticalement l'une contre l'autre pour obtenir un verrouillage du premier et du second panneau de construction (1, 1') dans une direction verticale;
en ce que ladite partie interne comprend une protubérance (34), la surface de pression de languette (32) étant prévue sur la protubérance (34) et le second panneau (1') comprenant une cavité (35) pour loger la protubérance; et
en ce qu'une surface sur l'élément de verrouillage (8) forme ladite surface de pression de bande (33) et une surface de verrouillage pour le verrouillage horizontal.

2. Panneaux de construction selon la revendication 1, où ladite languette déplaçable (30) est asymétrique.

3. Panneaux de construction selon la revendication 2, où la protubérance (34) comprend une partie (39) qui est flexible.

4. Panneaux de construction selon la revendication 3, où la surface de pression de bande (33) est prévue au niveau d'une surface inclinée de l'élément de verrouillage (8) dirigée vers le premier bord.

5. Panneaux de construction selon l'une quelconque des revendications précédentes, où la surface de pression de bande (33) est prévue au niveau d'une partie supérieure de l'élément de verrouillage (8).

6. Panneaux de construction selon l'une quelconque des revendications 1-5, où la cavité (35) s'étend de la rainure de déplacement (40) à la rainure de verrouillage (14).

7. Panneaux de construction selon l'une quelconque des revendications précédentes, où la rainure de déplacement (40) s'étend verticalement au-dessus de la rainure de verrouillage (14).

8. Panneaux de construction selon l'une quelconque des revendications précédentes, où une partie supérieure (8a) de l'élément de verrouillage (8) est située verticalement sous la surface de verrouillage de languette (31) de la languette déplaçable (30).

9. Panneaux de construction selon l'une quelconque des revendications précédentes, où une partie la plus élevée de l'élément de verrouillage est située dans une moitié inférieure d'une âme intermédiaire du premier panneau de construction.

10. Panneaux de construction selon l'une quelconque

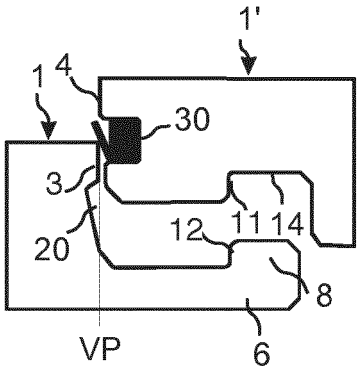
des revendications précédentes, où le premier et le second panneau de construction (1, 1') sont verrouillés verticalement par une première et une seconde paire de surfaces coopérantes, la première paire comprenant la surface de verrouillage de languette (31) et la surface de verrouillage de rainure (21), et la seconde paire comprenant une partie supérieure (6') de la bande (6) et une partie inférieure d'un bord (37) du second panneau de construction (1') .

11. Panneaux de construction selon l'une quelconque des revendications précédentes, où lesdites surface de verrouillage de rainure (21) et surface de verrouillage de languette (31) sont inclinées vis-à-vis d'un plan horizontal.

12. Panneaux de construction selon l'une quelconque des revendications précédentes, où la languette déplaçable (30) comprend au moins deux protubérances (34) s'étendant depuis le corps principal (36), chaque protubérance comprenant ladite surface de pression de languette (32) au niveau d'une partie externe de la protubérance, où chaque surface de pression de languette est configurée pour être en contact pendant le verrouillage avec l'élément de verrouillage prévu sur la bande.

13. Panneaux de construction selon l'une quelconque des revendications précédentes, où la surface de pression de languette (32) est située verticalement sous la surface de verrouillage de languette (31).

14. Panneaux de construction selon l'une quelconque des revendications précédentes, où le second panneau de construction (1') est configuré en outre pour être relié au premier panneau de construction (1) par inclinaison, inclinaison pendant laquelle la languette déplaçable (30) est insérée progressivement dans la rainure à languette (20) le long dudit bord du premier panneau de construction (1), où les bords des premier (1) et second (1') panneaux de construction sont des bords courts.



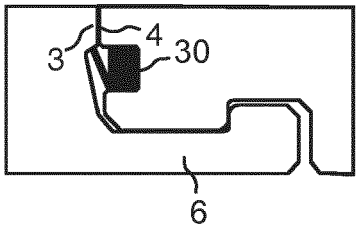
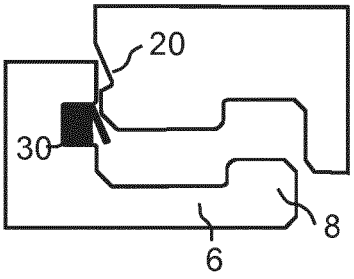


Fig. 1a

Fig. 1b



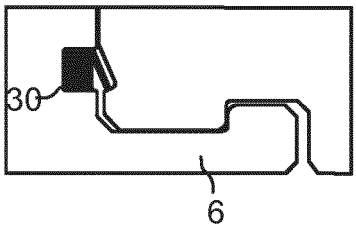
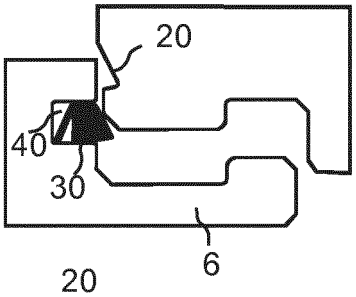


Fig. 1c



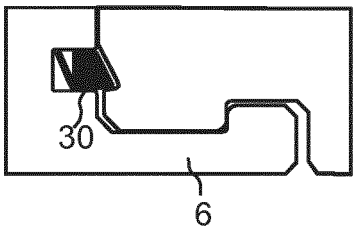
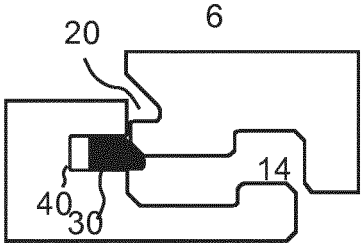


Fig. 1d



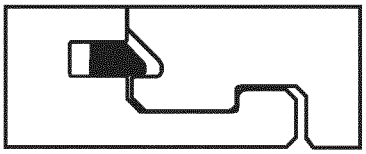
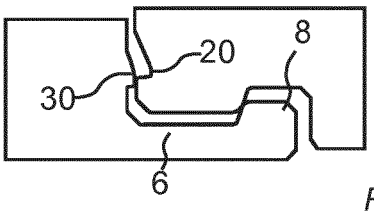


Fig. 1e



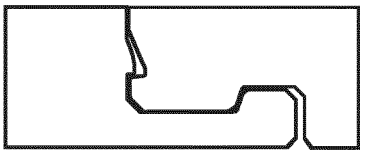


Fig. 1f

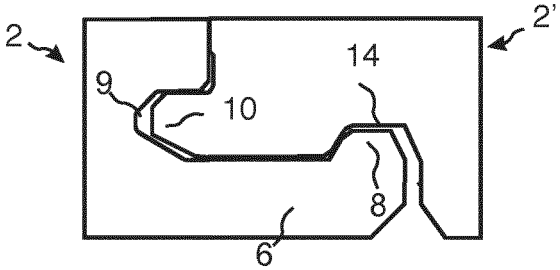


Fig. 2a

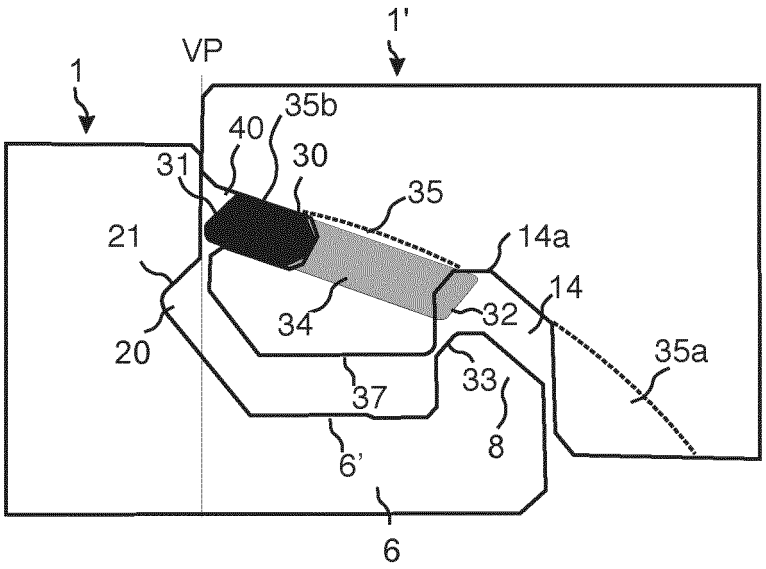


Fig. 2b

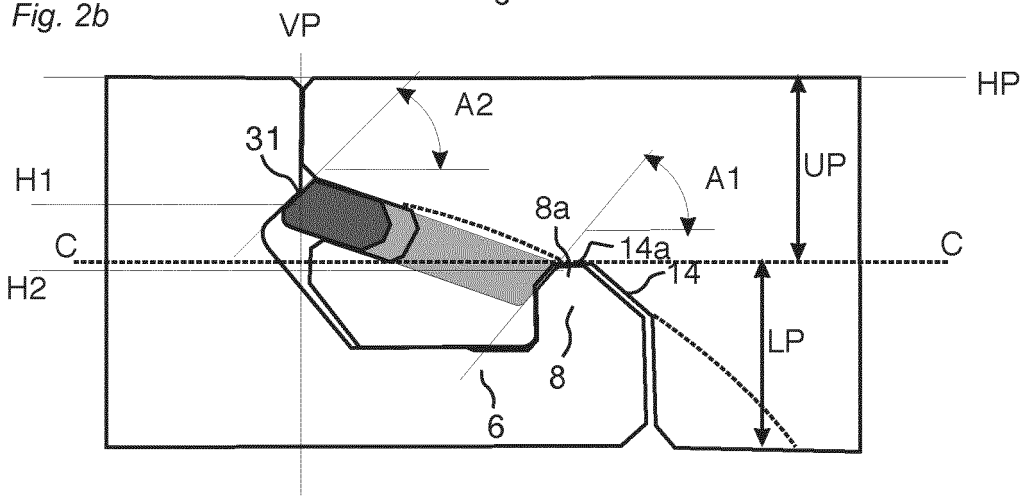


Fig. 2c

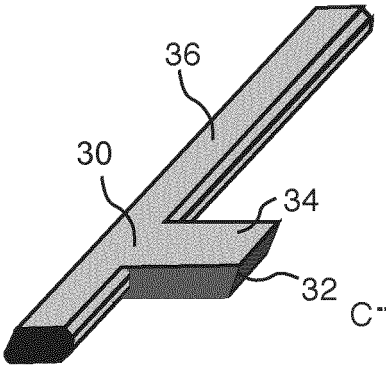


Fig. 2d

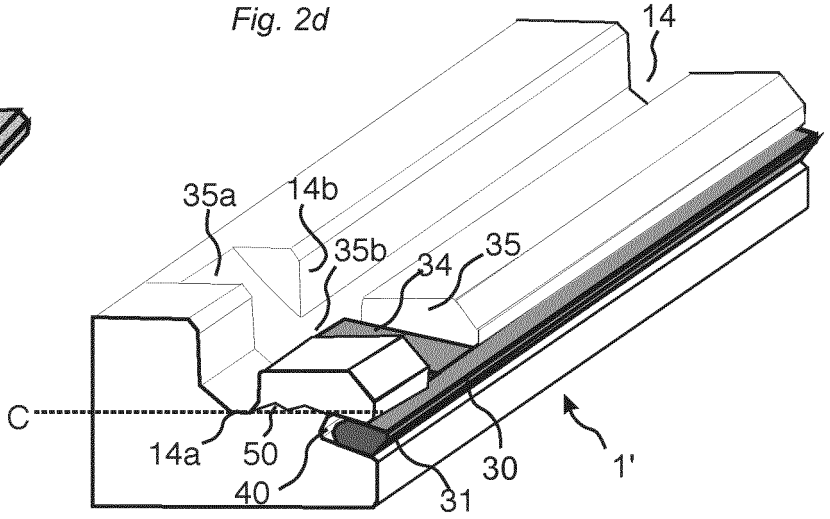


Fig. 3a

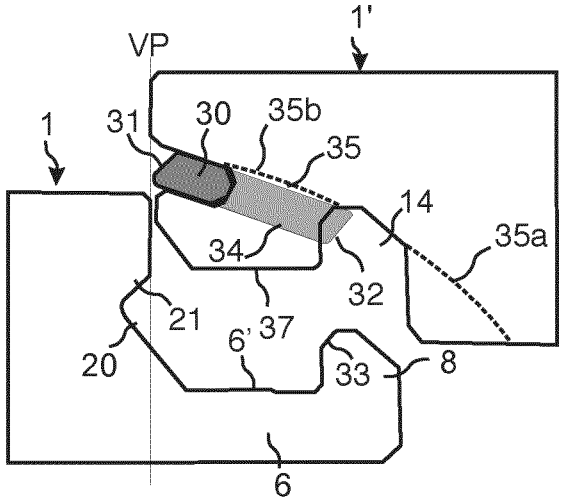


Fig. 3b

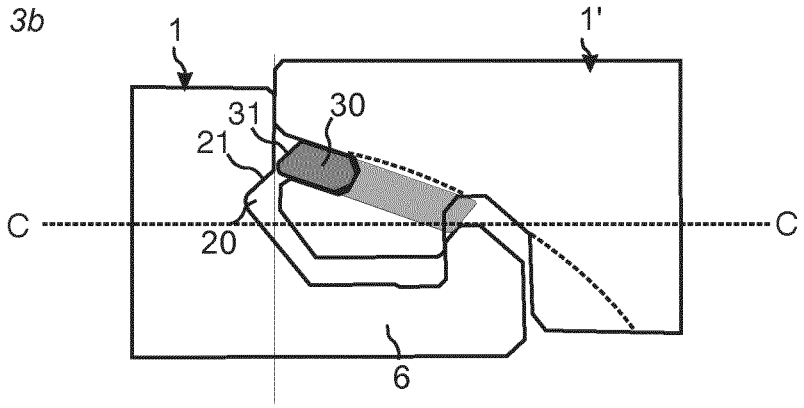


Fig. 3c

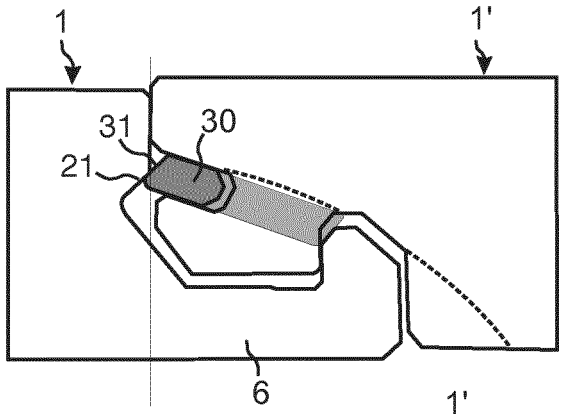


Fig. 3d

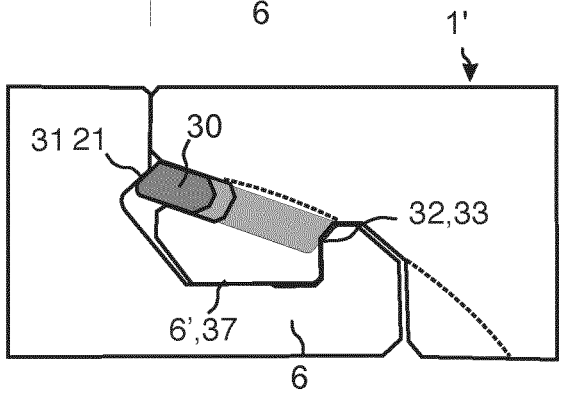


Fig. 4a

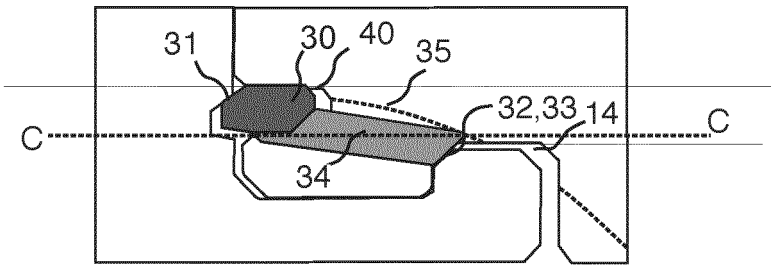


Fig. 4b

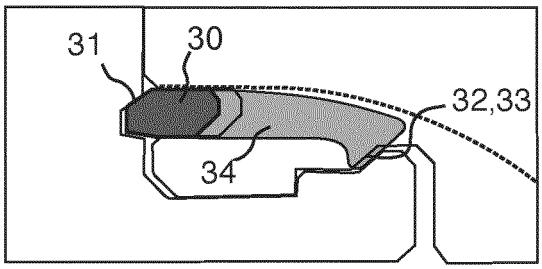


Fig. 4c

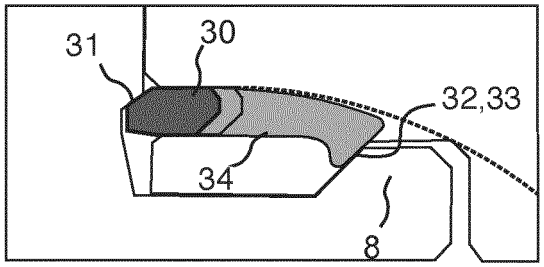


Fig. 4d

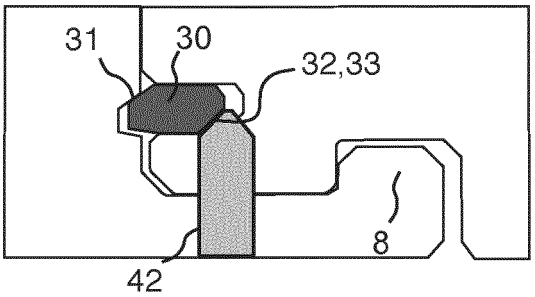


Fig. 4e

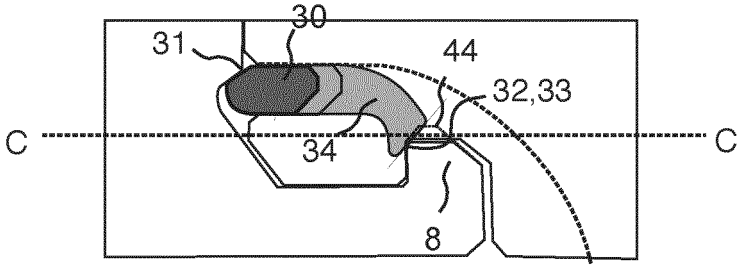


Fig. 5a

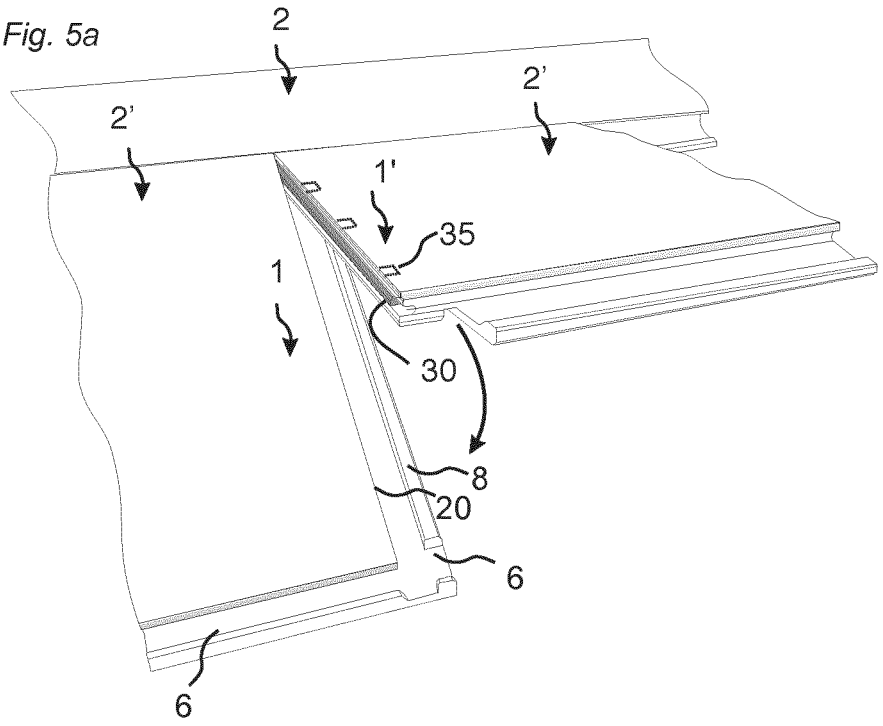


Fig. 5b

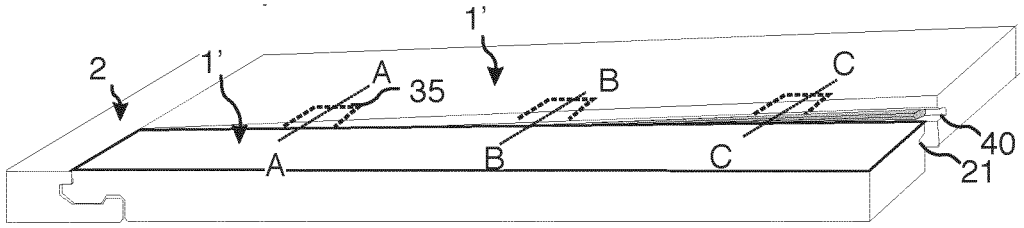


Fig. 5c

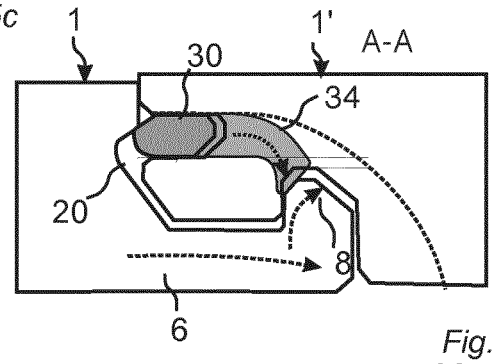


Fig. 5d

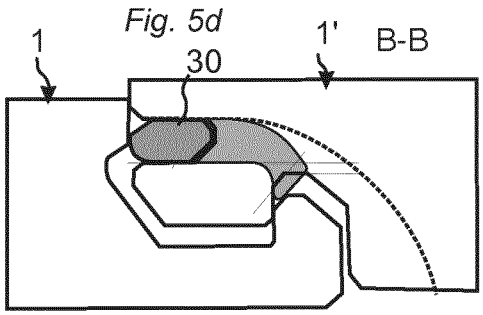


Fig. 5e

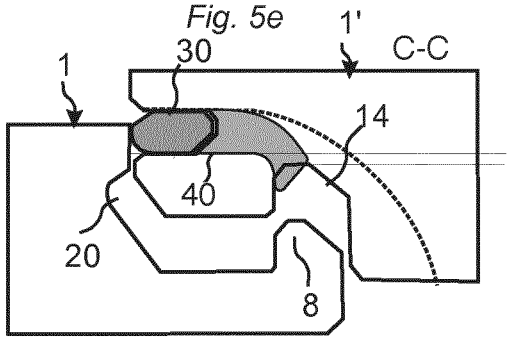


Fig. 6a

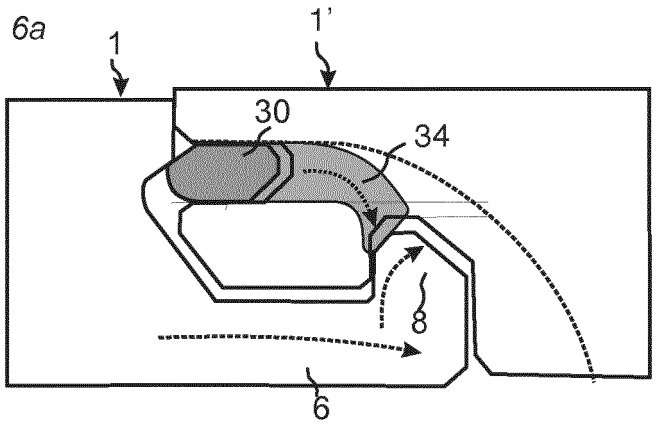


Fig. 6b

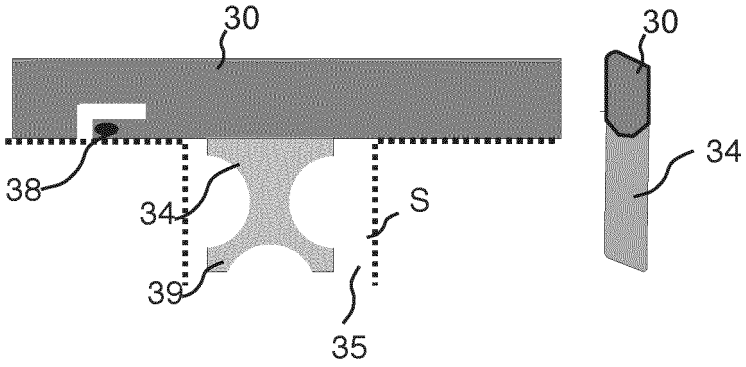


Fig. 6c

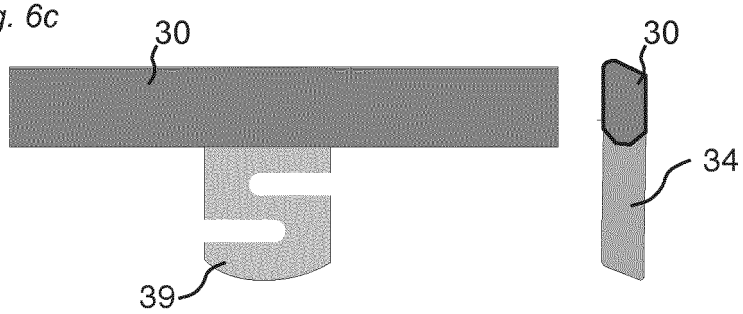


Fig. 6d

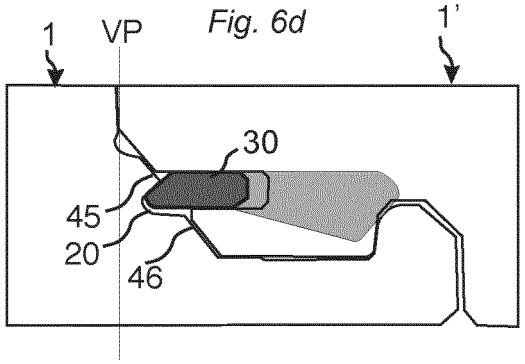


Fig. 6e

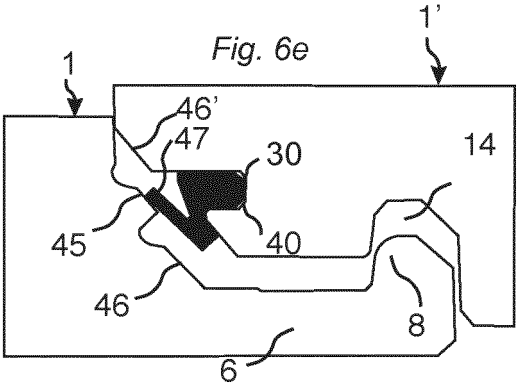


Fig. 7a

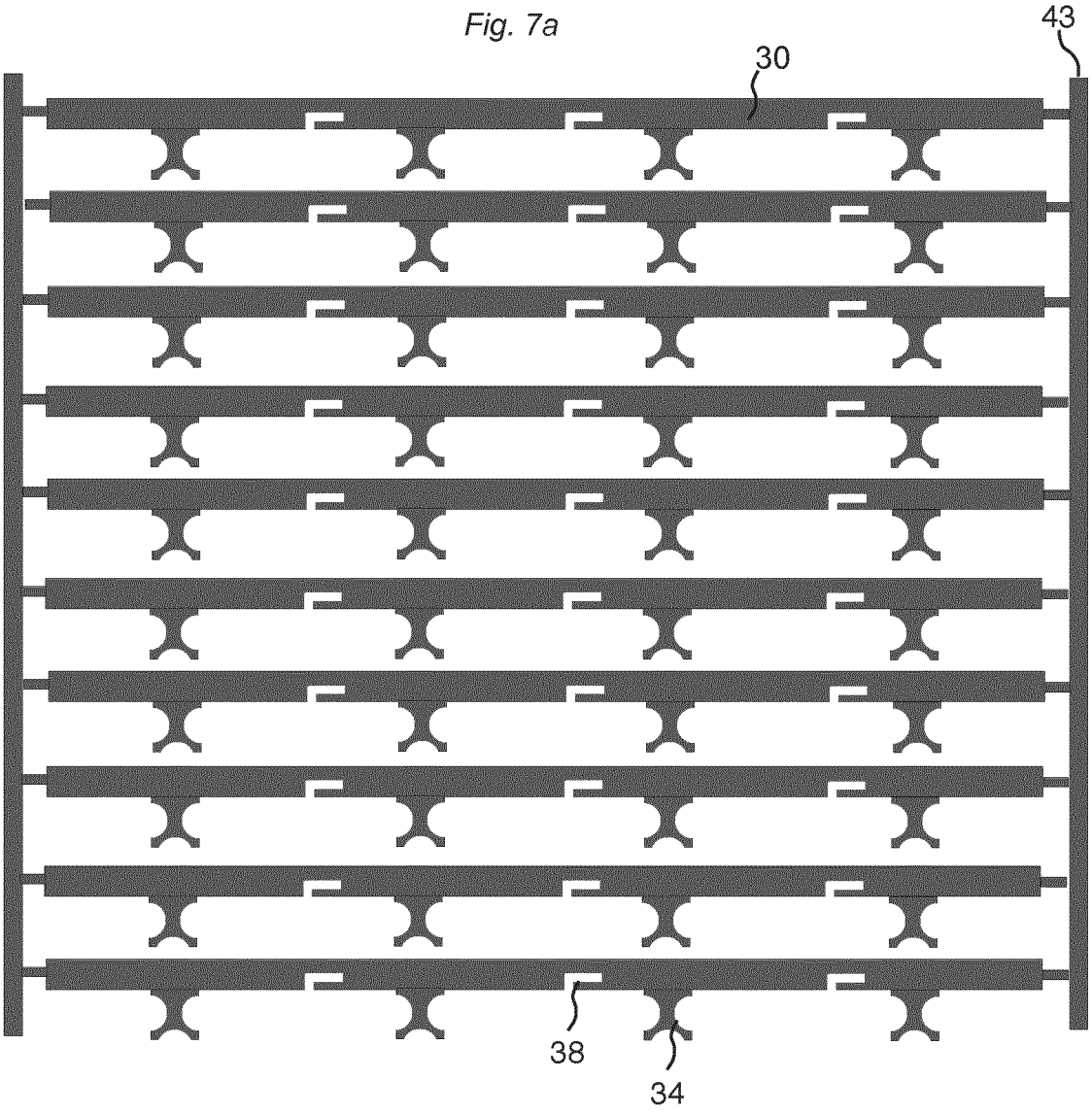
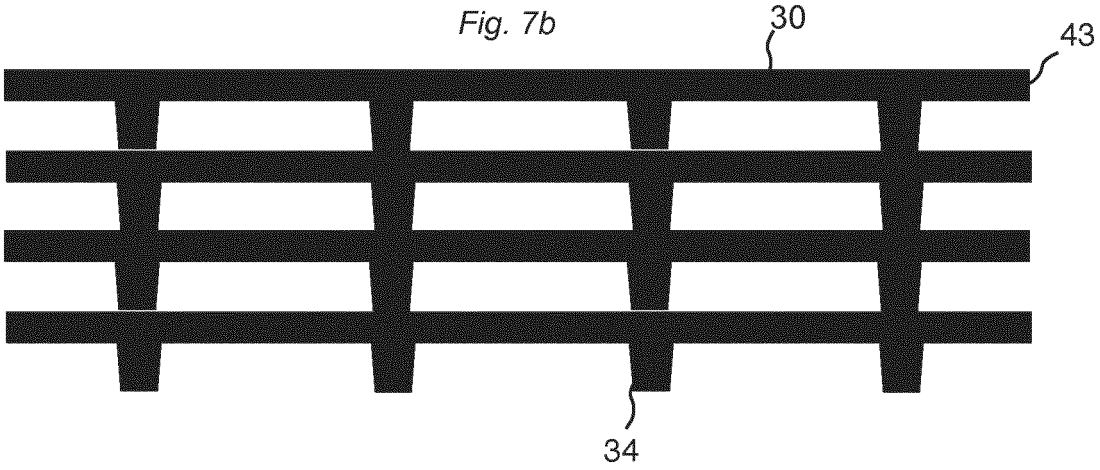


Fig. 7b



REFERENCES CITED IN THE DESCRIPTION

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