(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 June 2017 (22.06.2017)

WIPO | PCT

(10) International Publication Number
WO 2017/105335 A1

(51) International Patent Classification:
E04F 15/02 (2006.01)

(21) International Application Number:
PCT/SE2016/051272

(22) International Filing Date:
15 December 2016 (15.12.2016)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1551670-1 17 December 2015 (17.12.2015) SE

(71) Applicant: **VÄLINGE INNOVATION AB** [SE/SE]; Prästavägen 513, SE-263 65 Viken (SE).

(72) Inventors: **BOO, Christian**; Tvärgatan 8, SE-268 77 Kågeröd (SE). **JOSEFSSON, Per**; Bruzeliusgatan 2, SE-256 54 Ramlösa (SE).

(74) Agent: **ENGSTRAND, Ola**; Välinge Innovation AB, Prästavägen 513, SE-263 65 Viken (SE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

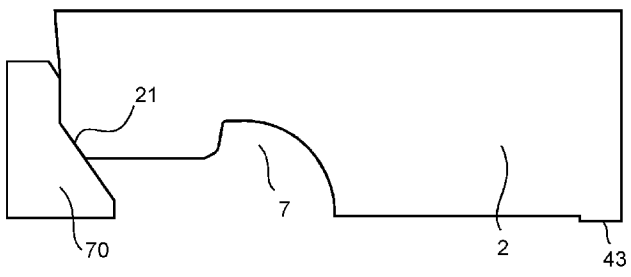
Published:

— *with international search report (Art. 21(3))*

WO 2017/105335 A1

(54) Title: A METHOD FOR PRODUCING A MECHANICAL LOCKING SYSTEM FOR PANELS

FIG 7B



(57) Abstract: A method for producing a mechanical locking system for a first panel and a second panel. The method includes providing a tongue (30), including a first locking surface (22), at a first edge of the first panel (1), forming a tongue groove (10), including a second locking surface (23), at a second edge of the second panel, the first locking surface and second locking surface are configured to cooperate for locking the first edge to the second edge in a first direction (D1), providing a first guiding surface (20) at the first edge and a second guiding surface (21)at the second edge, wherein the first guiding surface cooperates with the second guiding surface during an assembling of the first edge and the second edge, and working of the first guiding surface and/or the second guiding surface to reduce the coefficient of friction between the first guiding surface and the second guiding surface and/or a surface roughness.

A METHOD FOR PRODUCING A MECHANICAL LOCKING SYSTEM FOR PANELS

Technical Field

The present disclosure relates to floorboards provided with a mechanical locking system, and a method for producing a mechanical locking system at edges of floorboards.

Background

Panels provided with a mechanical locking device is known in the art, as evidenced by WO2014/182215 (A1). The panels are, for some materials, difficult to assemble.

Summary

One object of certain embodiments of the present invention to provide an improvement over the above described technique and the known art. A specific objective of certain embodiments is to improve assembling of panels, such as floor, building or furniture panels.

At least some of these and other objects and advantages that will be apparent from the description have been achieved by embodiments of a first aspect of the invention that includes a method for producing a mechanical locking system for a first panel and a second panel, such as building panels or floor panels, wherein the method comprises:

- providing a tongue, comprising a first locking surface, at a first edge of the first panel;
- forming a tongue groove, comprising a second locking surface, preferably by mechanical cutting, at a second edge of the second panel, said first locking surface and second locking surface are configured to cooperate for locking the first edge to the second edge in a first direction;
- providing a first guiding surface at the first edge and a second guiding surface at the second edge, wherein the mechanical locking system is configured such that first guiding surface cooperates with the second guiding surface during an assembling of the first edge and the second edge; and
- working of the first guiding surface and/or the second guiding surface to reduce a coefficient of friction and/or to reduce a surface roughness.

The mechanical locking system may be produced by mechanical cutting, such as milling, preferably in a milling line. Said working of the first guiding surface and/or the second

guiding surface to reduce the coefficient of friction and/or surface roughness may be made in the milling line. The mechanical cutting may result in a guiding surface with a high friction coefficient and/or a coarse surface roughness. An assembling of the first panel and the second panel that comprise guiding surfaces with a high friction coefficient or a coarse surface roughness may be difficult. The assembling may be facilitated by said working of the first and/or the second guiding surface.

The method for forming the second locking surface may be different from the method for working of the second guiding surface.

The method for forming the first locking surface may be different from the method for working of the first guiding surface.

The working of the first guiding surface and/or the second guiding surface may be polishing, sanding, rolling, grinding and/or pressing by, e.g., a fixed tool, such as a sliding bar or pressure shoe. The fixed tool may be of metal, such as steel, and preferably comprises a surface of hard metal or diamond.

The working of the first guiding surface and/or the second guiding surface preferably reduces the surface roughness within the range of about 30% to about 50%, or about 30% to about 40%. The surface roughness value may be decreased from about 3 Ra to about 2 Ra. For example, the surface roughness may be decreased at least 0,5 Ra, such as at least 0,8 Ra, such as at least 1 Ra. For example, the surface roughness may be decreased to a value of less than about 2,5 Ra, such as less than 2,2 Ra, such as less than 2 Ra. Such a decrease of surface roughness may result in a considerable reduction of the coefficient of friction. This may have the effect that the assembling of first panel and the second panel changes from being difficult to easy, or for some embodiments from being impossible to easy.

The first panel and the second panel may comprise a core material comprising a polymer material.

The polymer material may be one or more of the materials:

- Vinyls, such as polyvinyl chloride and polyvinyl butyral;
- Polyolefins, such as PE and PP;
- Polyesters, including polyethylene terephthalate (PET);
- Styrenics, such as polystyrene;

- Acrylics, such as PMMA;
- Co-polymers, such as co-polymers including one or more of the above materials;
- Polymer blends, such as polymer blends including one or more of the above materials.

The core material may comprise a filler and/or a reinforcement material.

The reinforcement material may be arranged as a reinforcement layer extending essentially parallel to an upper surface of the first panel and the second panel, respectively. Said reinforcement layer may increase the friction and may therefore be arranged such that an outer edge of the reinforcement layer is preferably at a non-guiding surface, such as a bottom surface of the tongue groove.

The filler material may be one or more of wood fibre, preferably as dust, or chalk.

The reinforcement material may be one or more of calcium silicate, e.g., wollastonite, or glass fiber.

The working of the of the first guiding surface and/or the second guiding surface may be made before the forming of the tongue groove. Applying a pressure after the forming of the tongue may deform the tongue groove and/or the first edge and/or the second edge.

The method may comprise forming an insertion groove, preferably by mechanical cutting, at the first edge and arranging the tongue, preferably a displaceable tongue, in the insertion groove.

The method may comprise forming the tongue, preferably by mechanical cutting, at the first edge.

The method may comprise:

- forming a locking element at the first edge or the second edge, preferably by mechanical cutting; and
- forming a locking groove at the other of the first edge or the second edge, preferably by mechanical cutting, wherein the locking element is configured to cooperate with the locking groove for locking the first edge to the second edge in a second direction which is perpendicular to the first direction.

The tongue may be formed at the locking element or the locking groove and the tongue groove may be formed at the other of the locking element or locking groove.

One or more of the tongue, the tongue groove, the locking element and the locking groove may be formed of a core material of the first and or the second panel.

The flexible tongue may be according to a flexible tongue described and shown in any one of WO2006/043893, WO2007/015669, or preferably FIGS 8A-8B in WO2014/209213(A1). The entire disclosure of each of which is hereby expressly incorporated by reference herein.

The set of panels may be furniture panels.

The core may be provided with a decorative layer.

A second aspect of the invention includes a set comprising a first and a second panel produced by the method described above.

Brief description of the drawings

Embodiments of the present invention will by way of example be described in more detail with reference to the appended schematic drawings, in which:

FIGS. 1A-1C show a first panel and a second panel according to an embodiment of the invention during an assembling.

FIGS. 2A-2B show a first panel and a second panel according to an embodiment of the invention during an assembling.

FIGS. 3A-3B show a first panel and a second panel according to an embodiment of the invention during an assembling.

FIGS. 4A-4B show a first panel and a second panel according to an embodiment of the invention during an assembling.

FIGS. 5A-5B show a first panel and a second panel according to an embodiment of the invention during an assembling.

FIGS. 6A-6B show a first panel and a second panel according to an embodiment of the invention during an assembling.

FIGS. 7A-7C show tools and methods according to embodiments of the invention for producing embodiments of the first guiding surface.

Detailed description

FIG. 1A-C shows an embodiment of the invention comprising an embodiment of the mechanical locking system at a first panel 1 and a second panel 2 during an assembling. A first edge of the first panel 1 comprises a tongue 30, which in this embodiment of the mechanical locking system is a flexible tongue. The tongue 30 comprises a first locking surface 22. A second edge of the second panel 2 comprises a tongue groove 10, comprising a second locking surface 23. Said first locking surface 22 and second locking surface 23 are configured to cooperate for locking the first edge to the second edge in a first direction D1, which may be in a vertical direction. The first edge comprises a first guiding surface 20 and the second edge comprises a second guiding surface 21. Said first guiding surface 20 and said second guiding surface 21 are configured such that first guiding surface 20 cooperates with the second guiding surface 21 during the assembling of the first edge and the second edge. The mechanical locking system comprises an insertion groove 31, at the first edge and a part of the flexible tongue is inserted in the insertion groove. The first guiding surface 20 is, in this embodiment, at a surface of the flexible tongue. The flexible tongue is preferably displaceable in the insertion groove 31. The mechanical locking system comprises a locking element 8 at the first edge. The locking element 8 is configured to cooperate with a locking groove 7 at the second edge for locking the first edge to the second edge in a second direction (D2), which is perpendicular to the first direction (D1). The locking element 8 is preferably arranged on a locking strip 6 protruding from the first edge and the locking groove 7 is at a lower surface 43 of the second panel. FIG 1A shows the first panel 1 and the second panel 2 at an initial position. The first panel 1 and the second panel 2 are during the assembling displaced vertically relative each other in the first direction D1, as shown in FIG 1B, such that the first guiding surface 20 and second guiding surface 21 cooperate with each other. The flexible tongue 30 will, in this embodiment, be displaced into insertion groove 31 and spring back to a locked position which is shown in FIG 1C. The first locking surface 22 and the second locking surface 23 cooperate with each other in the locked position. The flexible tongue 30 may be according to a flexible tongue described and shown in any one of WO2006/043893, WO2007/015669, or preferably FIGS 8A-8B in WO2014/209213(A1).

FIG. 2A-B shows an embodiment of the invention comprising another embodiment of the mechanical locking system at a first panel 1 and a second panel 2 during an

assembling. The mechanical locking system comprises a locking element 8 at the first edge of the first panel 1. The locking element is configured to cooperate with a locking groove 7 at the second edge of the second panel 2 for locking the first edge to the second edge in the second direction (D2). The locking element 8 is preferably arranged on a locking strip 6 protruding from the first edge and the locking groove is at a lower surface 43 of the second panel. An outer edge of the locking strip 6 comprising a tongue 30 configured to cooperate with a tongue groove 10 at the second edge. An upper edge of the tongue 30 comprising a first guiding surface 20 and a lower surface of a lower lip of the tongue groove 10 comprises a second guiding surface 21. An upper edge of the locking element 8 may comprise a fifth guiding surface 28 and a lower a lower edge at the opening of the looking groove 7 may comprise a sixth guiding surface 29. The tongue 30 and the tongue groove 10 are preferably formed of a core material of the first panel 1 and the second panel 2, respectively. The first panel 1 and the second panel 2 are during the assembling displaced vertically relative each other in the first direction D1, as shown in FIG 2A, such that the first guiding surface 20 and second guiding surface 21 cooperate with each other. The fifth guiding surface 28 may cooperate with the sixth guiding surface during the assembling. The first panel 1 and the second panel 2 are shown in a locked position in FIG 2B. A first locking surface 22 of the tongue 30 and a second locking surface 23 of the tongue groove 10 cooperate with each other in the locked position.

FIG. 3A-B shows an embodiment of the invention comprising another embodiment of the mechanical locking system at a first panel 1 and a second panel 2 during an assembling. The mechanical locking system comprises a locking element 8 at the first edge of the first panel 1. The locking element 8 is configured to cooperate with a locking groove 7 at the second edge of the second panel 2 for locking the first edge to the second edge in the second direction D2. The locking element 8 is preferably arranged on a locking strip 6 protruding from the first edge and the locking groove 7 is at a lower surface 43 of the second panel. An inner edge of the locking element 8 comprising a first tongue 30 configured to cooperate with a first tongue groove 10 at an inner edge of the locking groove 7 for locking the first edge to the second edge in the first direction D1. An upper edge of the first tongue 30 at the locking element 8 comprising a first guiding surface 20 and a lower surface of a lower lip of the tongue groove at the looking groove comprises a second guiding surface 21. An upper most edge of the first panel and an

upper most edge of the second panel may be in contact at a joint plane 33. The second edge comprises a second tongue 31 at the joint plane and the first edge comprises a second tongue groove 11 at the joint plane. The second tongue 32 and the second tongue groove 11 at the joint plane 33 are configured to cooperate for locking the first edge to the second edge in the first direction D1. The first tongue 30 at the locking element and the second tongue 31 at the joint plane 33, respectively, and the first tongue groove 10 at the locking groove and the second tongue groove 11 at the joint plane, respectively, are preferably formed of a core material of the first panel 1 and the second panel 2, respectively. The first panel and the second panel are, during the assembling, displaced vertically relative each other in the first direction D1, as shown in FIG 3A, such that the first guiding surface 20 and the second guiding surface 21 cooperate with each other. The first panel and the second panel are shown in a locked position in FIG 3B. A first locking surface 22 of the first tongue and a second locking surface 23 of the first tongue groove cooperate with each other in the locked position; a third locking surface 24 of the second tongue 32 and a fourth locking surface 25 of the second tongue groove 11 cooperate with each other in the locked position.

FIG. 4A-B shows an embodiment of the invention comprising another embodiment of the mechanical locking system at a first panel 1 and a second panel 2 during an assembling. The mechanical locking system comprises a locking element 8 at the first edge of the first panel 1. The locking element 8 is configured to cooperate with a locking groove 7 at the second edge of the second panel 2 for locking the first edge to the second edge in the second direction D2. The locking element 8 is preferably arranged on a locking strip 6 protruding from the first edge and the locking groove 7 is at a lower surface 43 of the second panel. An inner edge of the locking element 8 comprising a first tongue 30 configured to cooperate with a first tongue groove 10 at an inner edge of the locking groove for locking the first edge to the second edge in the first direction D1. An upper edge of the first tongue 30 at the locking element comprising a first guiding surface 20 and a lower surface of a lower lip of the first tongue groove 10 at the looking groove comprises a second guiding surface 21. An upper most edge of the first panel and an upper most edge of the second panel may be in contact at a joint plane 33. The first edge comprises a second tongue 31 at the joint plane and the second edge comprises a second tongue groove 11 at the joint plane. The second tongue 32 and the second tongue groove 11at the joint plane are configured to cooperate for locking the first edge to the

second edge in the first direction D1. An upper edge of the second tongue 31 at the joint plane comprising a third guiding surface 26 and a lower surface of a lower lip of the second tongue groove 11 at the joint plane comprises a fourth guiding surface 27. The first tongue 30 at the locking element and the second tongue 31 at the joint plane, respectively, and the first tongue groove 10 at the locking groove and the second tongue groove 11 at the joint plane, respectively, are preferably formed of a core material of the first panel 1 and the second panel 2, respectively. The first panel and the second panel are, during the assembling, displaced vertically relative each other in the first direction D1, as shown in FIG 4A, such that the first guiding surface 20 and the second guiding surface 21 cooperate with each other, and such that the third guiding surface 26 and the fourth guiding surface 27 cooperate with each other. The first panel and the second panel are shown in a locked position in FIG 4B. A first locking surface 22 of the first tongue 30 and a second locking surface 23 of the first tongue groove 10 cooperate with each other in the locked position; a third locking surface 24 of the second tongue and a fourth locking surface 25 of the second tongue groove cooperate with each other in the locked position.

FIG. 5A-B shows an embodiment of the invention comprising another embodiment of the mechanical locking system at a first panel 1 and a second panel 2 during an assembling. The mechanical locking system comprises a locking element 8 at the first edge of the first panel 1. The locking element 8 is configured to cooperate with a locking groove 7 at the second edge of the second panel 2 for locking the first edge to the second edge in the second direction D2. The locking element 8 is preferably arranged on a locking strip 6 protruding from the first edge and the locking groove 7 is at a lower surface 43 of the second panel. An inner edge of the locking element 8 comprising a tongue 30 configured to cooperate with a tongue groove 10 at an inner edge of the locking groove 7 for locking the first edge to the second edge in the first direction D1. An upper edge of the tongue 30 at the locking element 8 comprising a first guiding surface 20 and a lower surface of a lower lip of the tongue groove 10 at the looking groove 7 comprises a second guiding surface 21. An upper most edge of the first panel and an upper most edge of the second panel may be in contact at a joint plane 33. The tongue and the tongue groove are preferably formed of a core material of the first panel 1 and the second panel 2, respectively. The first panel and the second panel are, during the assembling, displaced vertically relative each other in the first direction D1, as shown in

FIG 5A, such that the first guiding surface 20 and the second guiding surface 21 cooperate with each other. The first panel and the second panel are shown in a locked position in FIG 5B. A first locking surface 22 of the tongue and a second locking surface 23 of the tongue groove cooperate with each other in the locked position.

FIG. 6A-B shows an embodiment of the invention comprising another embodiment of the mechanical locking system at a first panel 1 and a second panel 2 during an assembling. The mechanical locking system comprises a locking element 8 at the second edge of the second panel 2. The locking element is configured to cooperate with a locking groove 7 at the first edge of the first panel 2 for locking the first edge to the second edge in the second direction D2. The locking element 8 is preferably arranged on a locking strip 6 protruding from the second edge and the locking groove 7 is at a lower surface 43 of first panel. An upper edge of the locking element 8 comprising a second guiding surface 21 and a lower a lower edge at the opening of the looking groove 7 comprises a first guiding surface 20. An upper most edge of the first panel and an upper most edge of the second panel may be in contact at a joint plane 33. The first edge comprises a tongue 30 at the joint plane and the second edge comprises a tongue groove 10 at the joint plane. The tongue and the tongue groove at the joint plane are configured to cooperate for locking the first edge to the second edge in the first direction D1. The tongue and the tongue groove are preferably formed of a core material of the first panel 1 and the second panel 2, respectively. The first panel and the second panel are, during the assembling, displaced vertically relative each other in the first direction D1, as shown in FIG 6A, such that the first guiding surface 20 and the second guiding surface 21 cooperate with each other. The first panel and the second panel are shown in a locked position in FIG 6B. A first locking surface 22 of the tongue and a second locking surface 23 of the tongue groove cooperate with each other in the locked position.

The first and the second panels may comprise a core material comprising a polymer material.

The polymer material may be one or more of the materials:

- Vinyls, such as polyvinyl chloride and polyvinyl butyral;
- Polyolefins, such as PE and PP;
- Polyesters, including polyethylene terephthalate (PET);
- Styrenics, such as polystyrene;

- Acrylics, such as PMMA;
- Co-polymers, such as co-polymers including one or more of the above materials;
- Polymer blends, such as polymer blends including one or more of the above materials.

The core material may comprise a filler and/or a reinforcement material.

The reinforcement material may be arranged as a reinforcement layer 40 extending essentially parallel to an upper surface 42 of the first and the second panel, respectively. Said reinforcement layer may increase the friction and may therefore be arranged such that an outer edge of the reinforcement layer is preferably at a non-guiding surface, such as a bottom surface of the tongue groove.

The filler material may be one or more of wood fibre, preferably as dust, or chalk.

The reinforcement material may be one or more of calcium silicate, e.g., wollastonite, or glass fiber.

A method for producing an embodiment of a mechanical locking system for a first panel and a second panel, such as building panels or floor panels, comprises:

- providing a tongue 30, comprising a first locking surface 22, at a first edge of the first panel 1,
- forming a tongue groove 10, comprising a second locking surface 23, preferably by mechanical cutting, at a second edge of the second panel, said first and second locking surface are configured to cooperate for locking the first edge to the second edge in a first direction D1,
- providing a first guiding surface 20 at the first edge and a second guiding surface 21 at the second edge, wherein the mechanical locking system is configured such that first guiding surface cooperates with the second guiding surface during an assembling of the first edge and the second edge
- working of the first and/or the second guiding surface to reduce the coefficient of friction.

The first and/or the second guiding surface of the above described mechanical locking system preferably has a lower coefficient of friction and/or a finer surface roughness than an adjacent surface in the locking system. For example, an adjacent surface produced by the same or similar process step, such as mechanical cutting.

The mechanical locking system may be produced by mechanical cutting, such as milling, preferably in a milling line. Said working of the first guiding surface and/or the second guiding surface to reduce the coefficient of friction a surface roughness may be made in the milling line. The mechanical cutting may result in a guiding surface with a high friction coefficient and/or a coarse surface roughness.

FIG 7A-7C shows embodiment of the working of the second guiding surface 21 by a tool 70. The working of the second guiding surface may be a polishing, a sanding, a grinding, and/or a pressing by, e.g., a fixed tool, such as a sliding bar or pressure shoe.

The fixed tool may for example reduce the surface roughness value of the first guiding surface and/or the second guiding surface within the range of about 30% to about 50%, or about 30% to about 40%. The surface roughness value may be decreased from about 3 Ra to about 2 Ra. For example, the surface roughness may be decreased at least 0,5 Ra, such as at least 0,8 Ra, such as at least 1 Ra. For example, the surface roughness may be decreased to a value of less than about 2,5 Ra, such as less than 2,2 Ra, such as less than 2 Ra. Such a decrease of surface roughness may result in a considerable reduction of the coefficient of friction. This may have the effect that the assembling of first panel and the second panel changes from being difficult to easy, or for some embodiments from being impossible to easy.

The surface roughness may be measured with a diamond stylus profilometer, such as E-35B from Accretech.

An embodiment may comprise a core comprising a wood based material, such as MDF or MDF. The surface roughness value for this embodiment may be decreased from about 5 Ra to about 3 Ra. For example, the surface roughness may be decreased at least 1 Ra, such as at least 1,5 Ra, such as at least 1 Ra. For example, the surface roughness may be decreased to a value of less than about 4 Ra, such as less than 3,5 Ra, such as less than 3 Ra. The working of the first guiding surface and/or the second guiding surface of this embodiment preferably reduces the surface roughness within the range of about 30% to about 50%, or about 30% to about 40%.

The method and the tool for working the first guiding surface may work the second guiding surface and an adjacent surface which may also be a guiding surface, as shown in the FIGS 7A-7C. The tool may also have a shape configured such that only the second guiding surface is being worked (not shown). FIG 7A shows an embodiment comprising

working of the second guiding surface after the tongue groove 10 is formed. FIG 7B shows a preferred embodiment comprising working of the second guiding surface before the tongue groove is formed. FIG 7C shows an embodiment comprising working of the second guiding surface 21 and the second locking surface 23, at the same time and with an embodiment of the tool 70.

The method and the tool for working the first guiding surface, the third guiding surface or the fourth guiding surface (not shown) may be the same or similar with a shape that is adapted to the first guiding surface, the third guiding surface and the fourth guiding surface, respectively.

The fixed tool may be of metal, such as steel, and preferably comprises a surface of hard metal or diamond.

The method may comprise forming an insertion groove 20, preferably by mechanical cutting, at the first edge and arranging the tongue 30, preferably a displaceable tongue, in the insertion groove 20 by an inserting machine preferably arranged in the milling line.

The method may comprise forming the tongue, preferably by mechanical cutting in the milling line, at the first edge.

The method may comprise:

- forming a locking element 8 at the first or the second edge, preferably by mechanical cutting in the milling line; and
- forming a locking groove 7 at the other of the first or the second edge, preferably by mechanical cutting in the milling line, wherein the locking element is configured to cooperate with the locking groove for locking the first edge to the second edge in a second direction D2 which is perpendicular to the first direction D1.

The method may comprise forming, preferably in the milling line, the tongue at the locking element or the locking groove and the tongue groove at the other of the locking element or locking groove.

The method may comprise forming, preferably in the milling line, one or more of the tongue, the tongue groove, the locking element and the locking groove of a core material of the first and/or the second panel.

Any embodiment of the mechanical locking system described above may be produced by embodiments of the method described above.

CLAIMS

1. A method for producing a mechanical locking system for a first panel and a second panel, such as building panels or floor panels, wherein the method comprises:

- providing a tongue (30), comprising a first locking surface (22), at a first edge of the first panel (1);
- forming a tongue groove (10), comprising a second locking surface (23), preferably by mechanical cutting, at a second edge of the second panel, said first locking surface and second locking surface are configured to cooperate for locking the first edge to the second edge in a first direction (D1);
- providing a first guiding surface (20) at the first edge and a second guiding surface (21) at the second edge, wherein the mechanical locking system is configured such that first guiding surface cooperates with the second guiding surface during an assembling of the first edge and the second edge; and
- working of the first guiding surface and/or the second guiding surface to reduce a coefficient of friction between the first guiding surface and the second guiding surface and/or to reduce a surface roughness of the worked guiding surface(s).

2. The method as claimed in claim 1, comprising working the second guiding surface, wherein the method for forming the second locking surface (23) is different from the method for working of the second guiding surface (21).

3. The method as claimed in claim 1 or 2, comprising working the first guiding surface, wherein a method for forming the first locking surface (23) is different from the method for working of the first guiding surface (20).

4. The method as claimed in any one of the claims 1-3, wherein the working of the first guiding surface and/or the second guiding surface is a polishing, a sanding, a grinding and/or pressing by, e.g., a fixed tool, such as a sliding bar or pressure shoe.

5. The method as claimed in any one of the claims 1-5, wherein the first panel and the second panels comprises a core material comprising a polymer material, such as a thermoplastic material.

6. The method as claimed in claim 5, wherein the core material comprises a filler and/or a reinforcement material.

7. The method as claimed in any one of the claims 1-6, wherein the working of the guiding surface is made before the forming of the tongue groove.

8. The method as claimed in any one of the claims 1-7, wherein the method comprises forming an insertion groove (31), preferably by mechanical cutting, at the first edge and arranging the tongue (30), preferably a displaceable tongue, in the insertion groove (20).

9. The method as claimed in any one of the claims 1-7, wherein the method comprises forming the tongue, preferably by mechanical cutting, at the first edge.

10. The method as claimed in any one of the preceding claims, wherein the method comprises:

- forming a locking element (8) at the first edge or the second edge, preferably by mechanical cutting; and
- forming a locking groove (7) at the other of the first edge or the second edge, preferably by mechanical cutting, wherein the locking element is configured to cooperate with the locking groove for locking the first edge to the second edge in a second direction (D2) which is perpendicular to the first direction (D1).

11. The method as claimed in claim 10, wherein the tongue is formed at the locking element or the locking groove and the tongue groove is formed at the other of the locking element or locking groove.

12. The method as claimed in any one of the preceding claims, wherein one or more of the tongue, the tongue groove, the locking element and the locking groove are formed of a core material of the first and or the second panel.

13. The method as claimed in any one of the preceding claims, wherein the working of the first guiding surface and/or the second guiding surface reduces the surface roughness value within the range of about 30% to about 50%, or from about 30% to about 40%.

14. The method as claimed in any one of the preceding claims, wherein the working of the first guiding surface and/or the second guiding surface reduces the surface roughness to a value of less than about 2,5 Ra, such as less than 2,2 Ra, such as less than 2 Ra.

15. The method as claimed in any one of the preceding claims, wherein the working of the first guiding surface and/or the second guiding surface decreases the surface roughness value at least 0,5 Ra, such as at least 0,8 Ra, such as at least 1 Ra.

16. The method as claimed in any one of the preceding claims, wherein the working of the first guiding surface and/or the second guiding surface reduces the surface roughness value from about 3 Ra to about 2 Ra.

FIG 1A

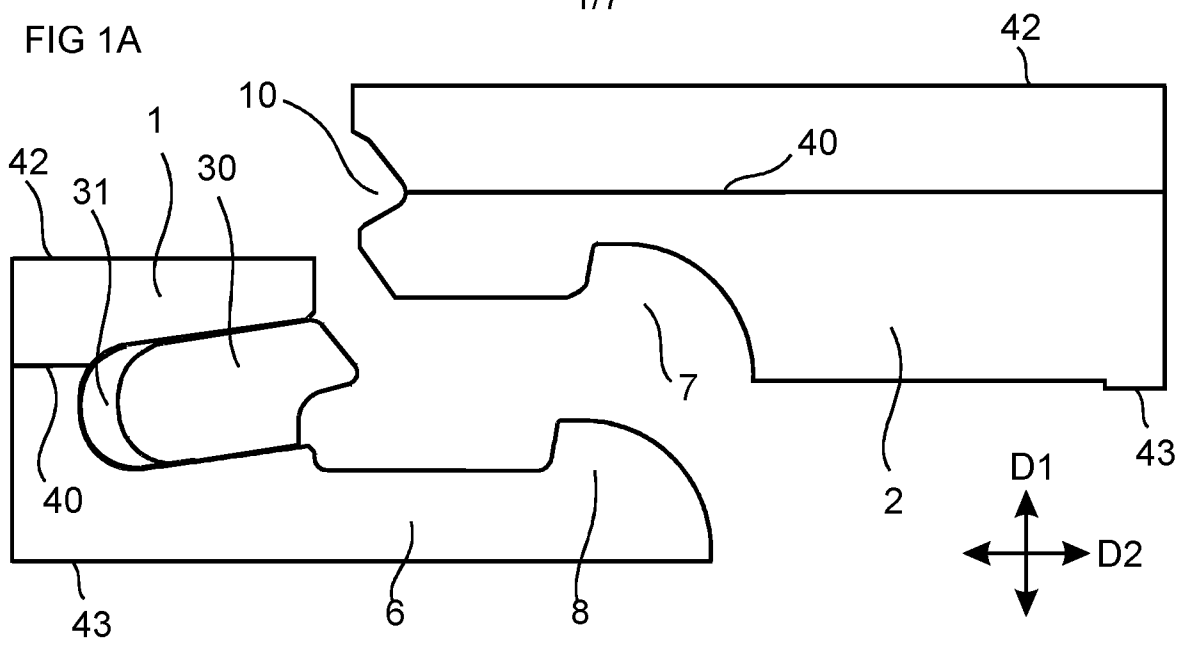


FIG 1B

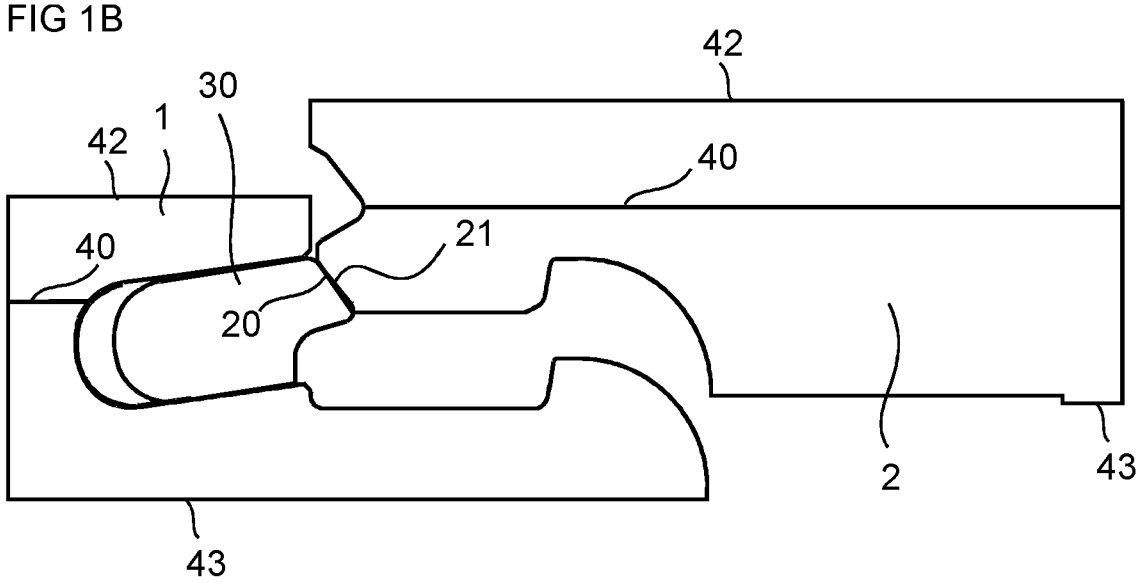


FIG 1C

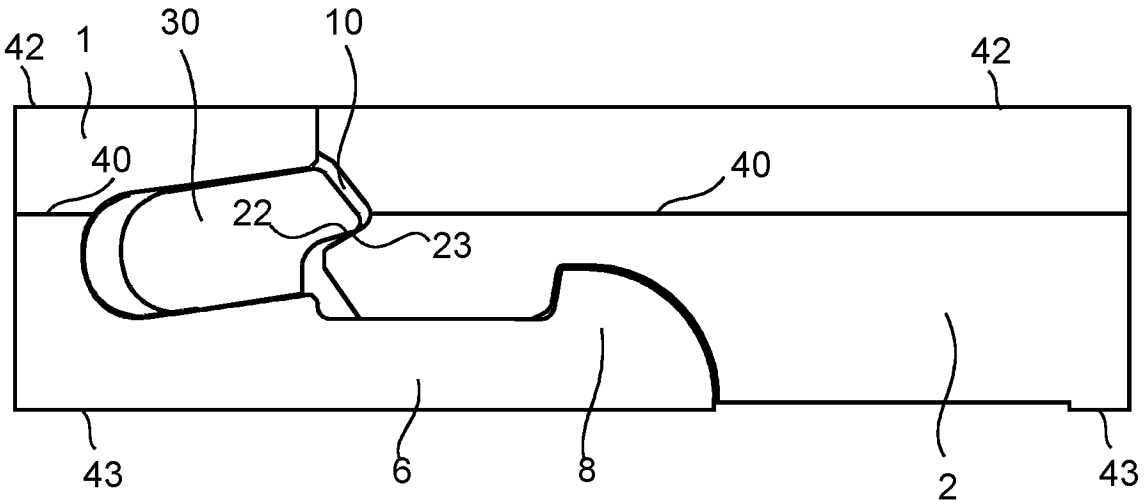


FIG 2A

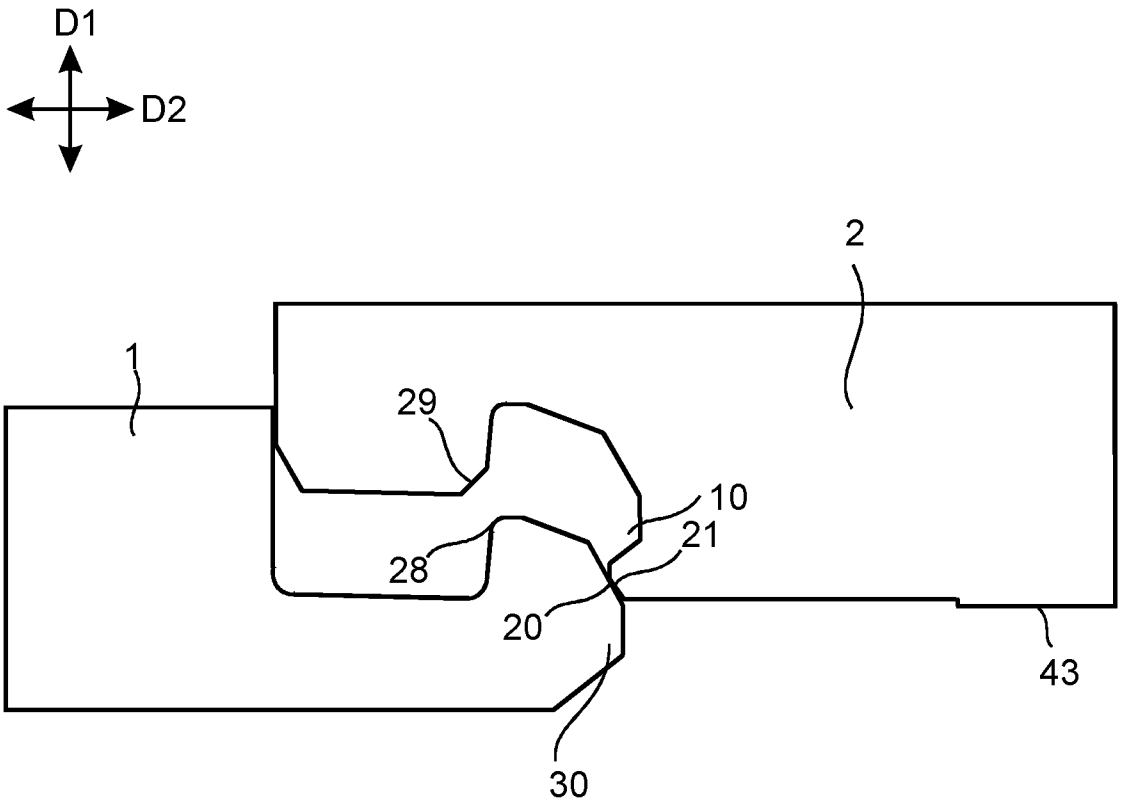


FIG 2B

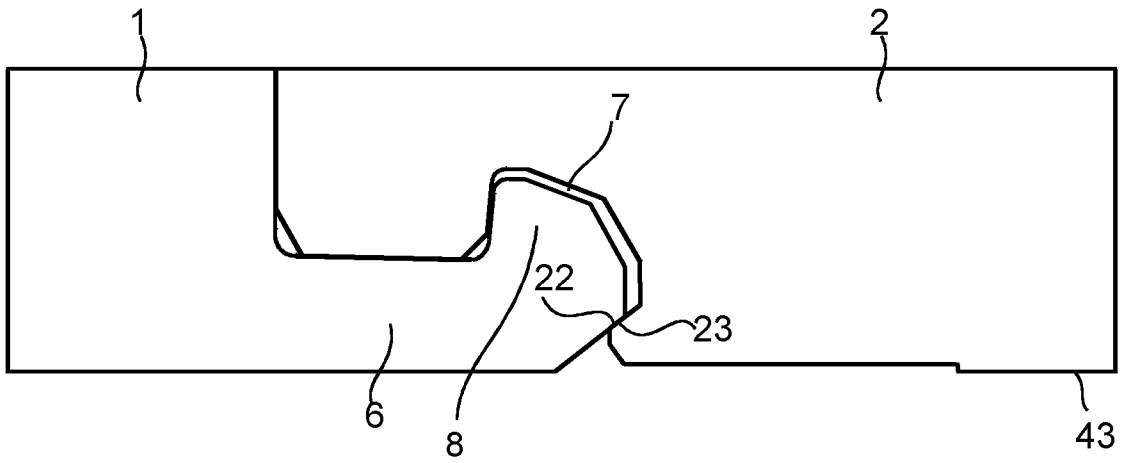


FIG 3A

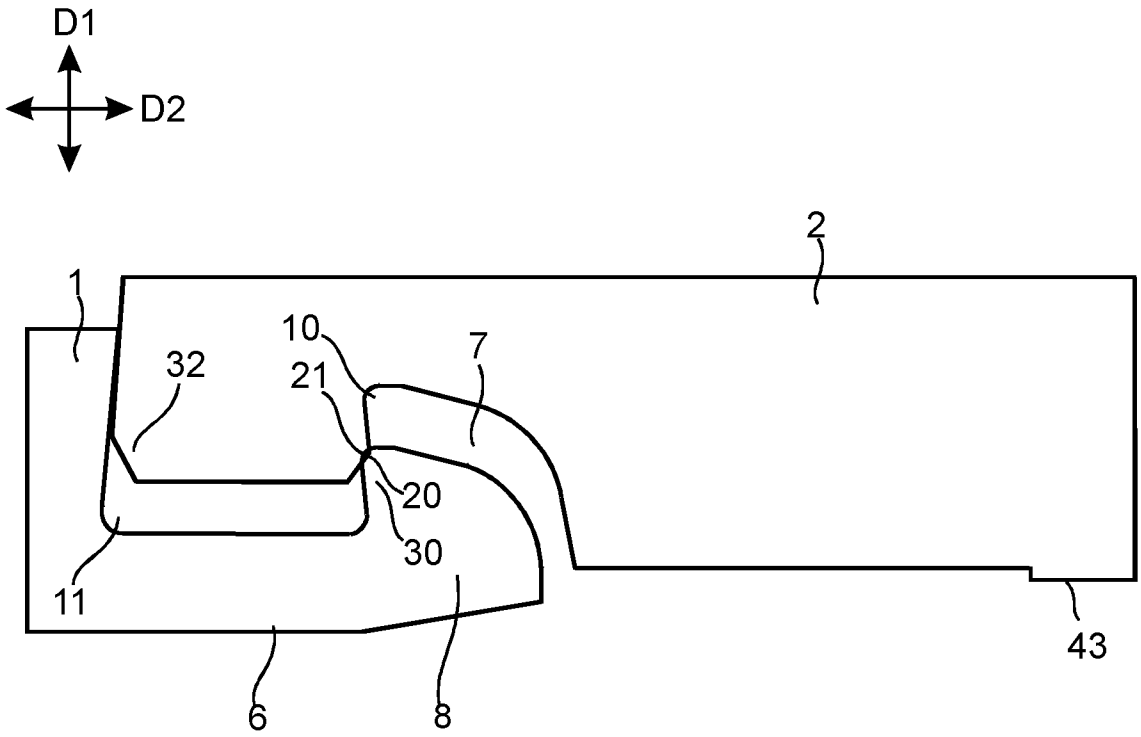


FIG 3B

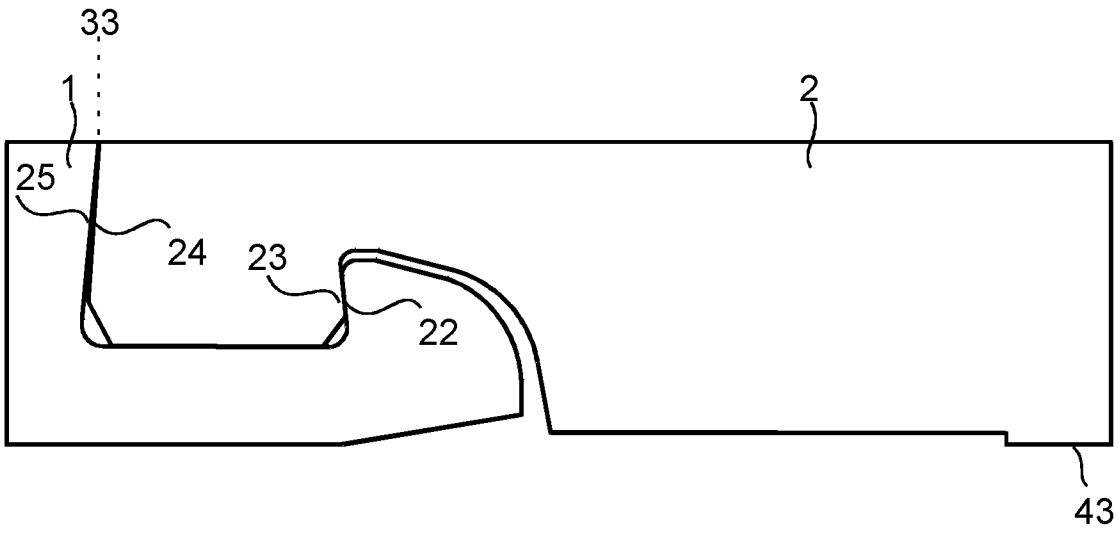


FIG 4A

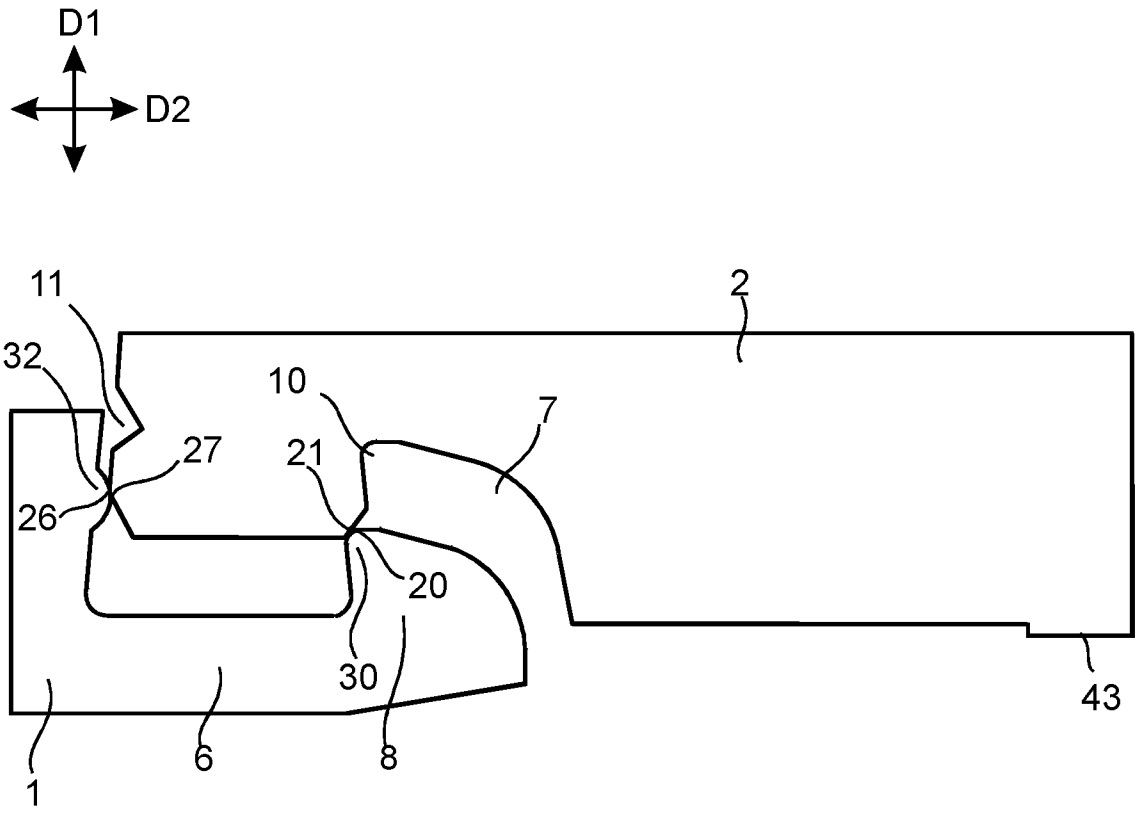


FIG 4B

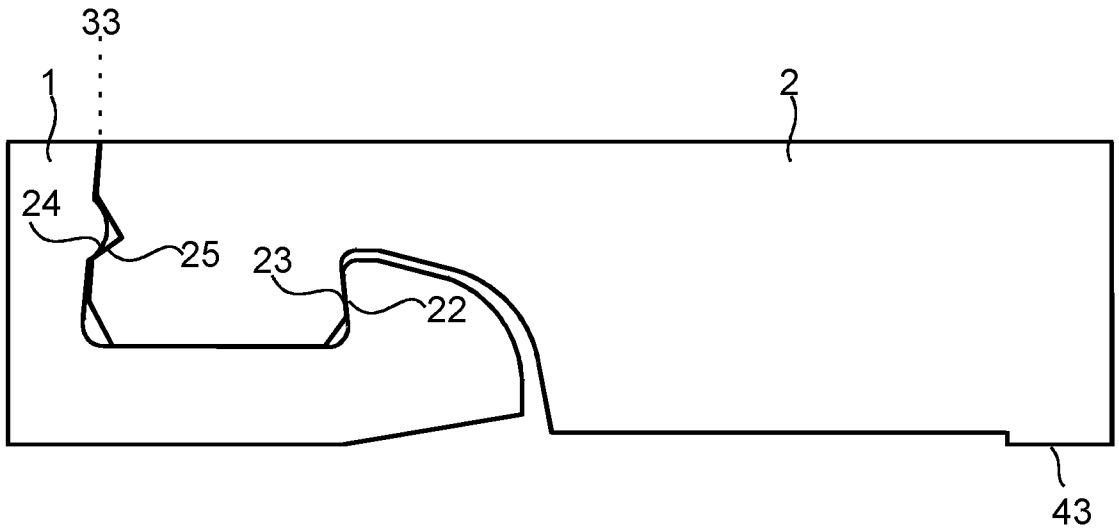


FIG 5A

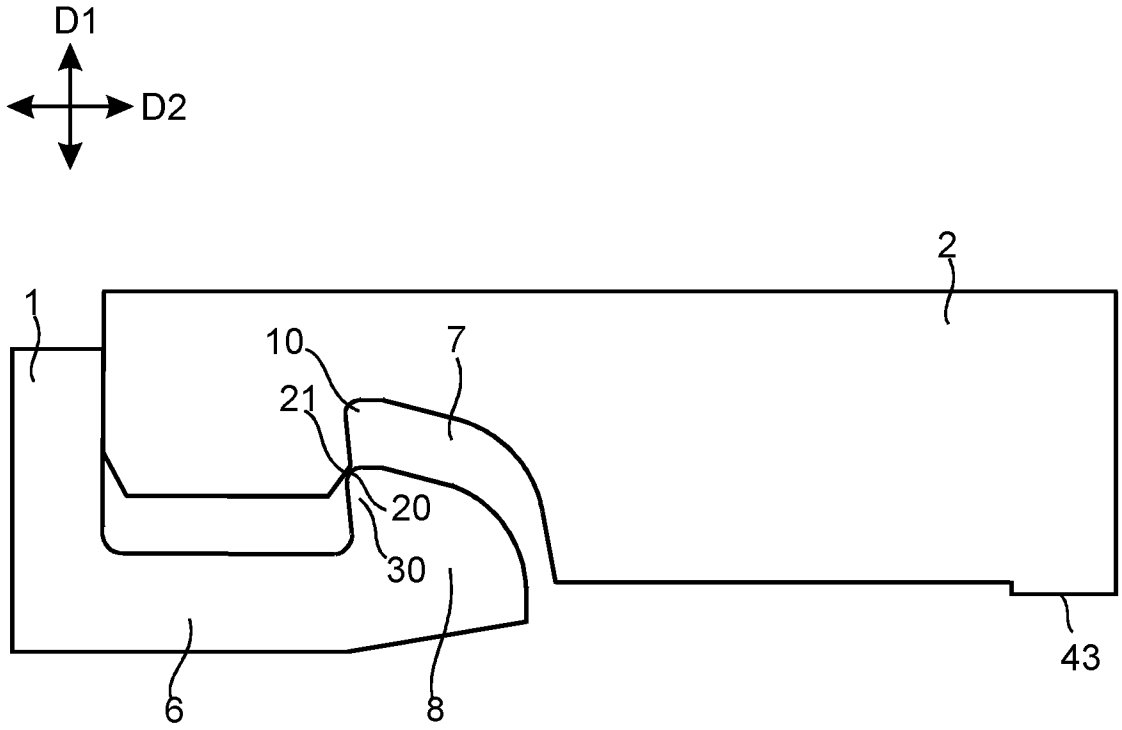


FIG 5B

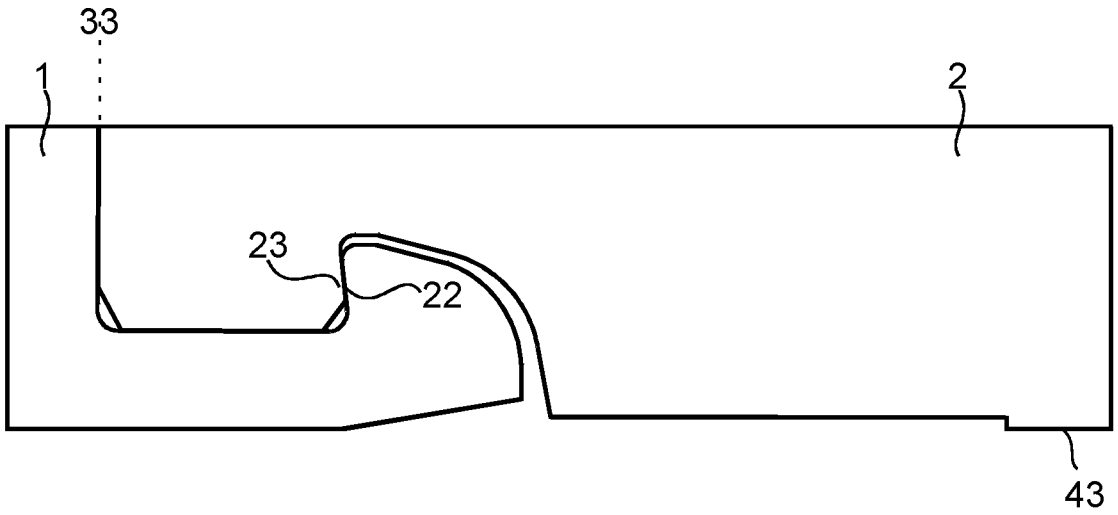


FIG 6A

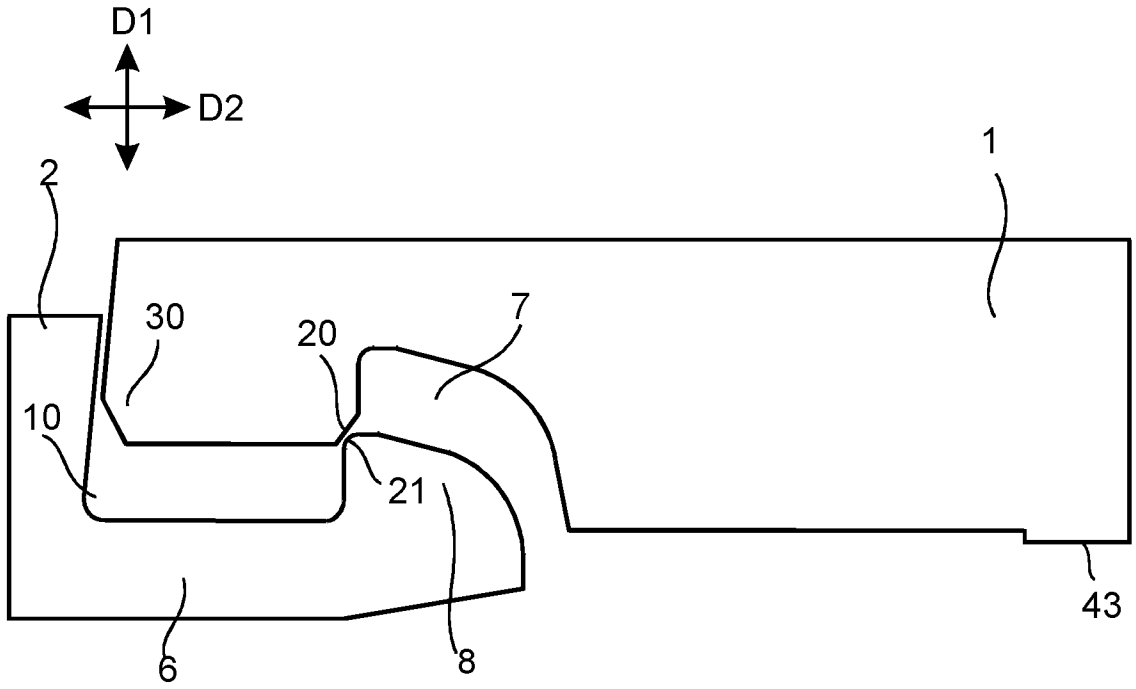


FIG 6B

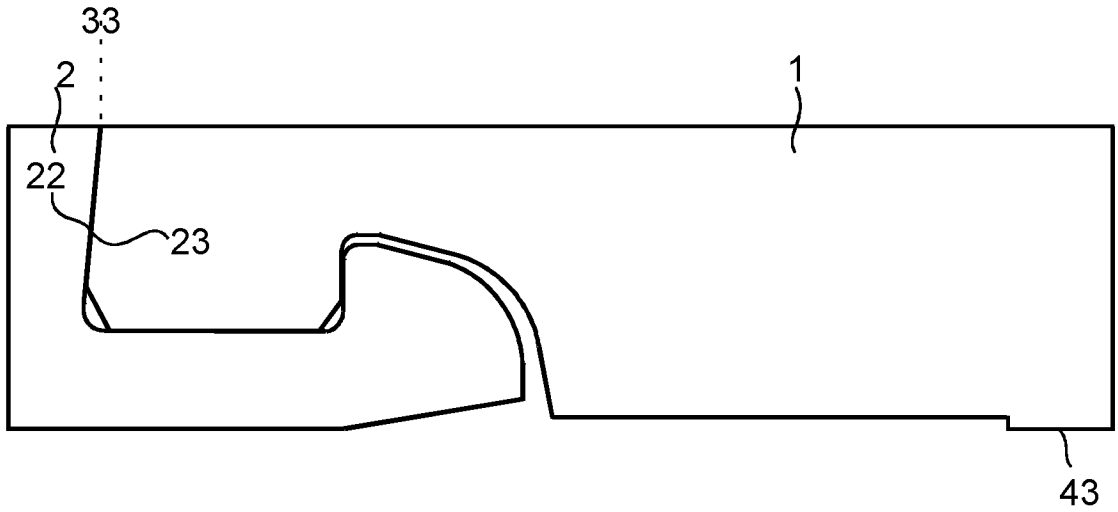


FIG 7A

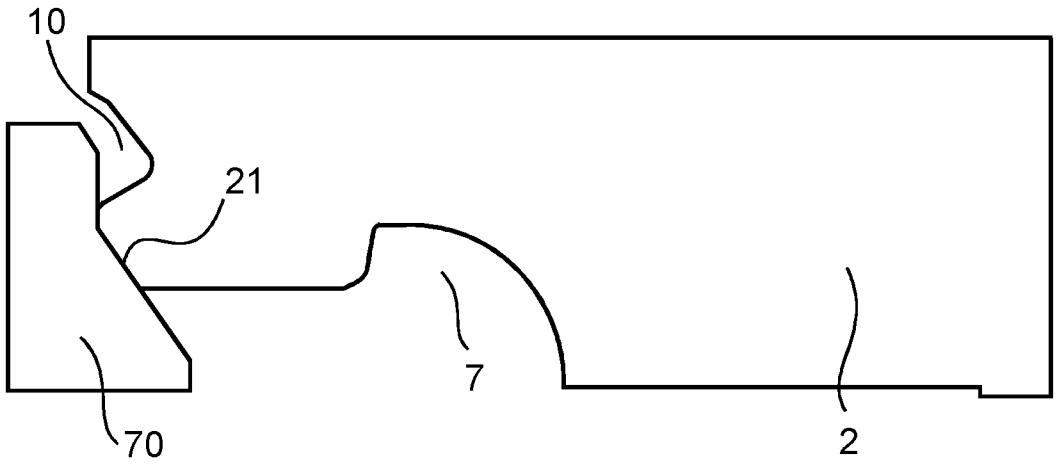


FIG 7B

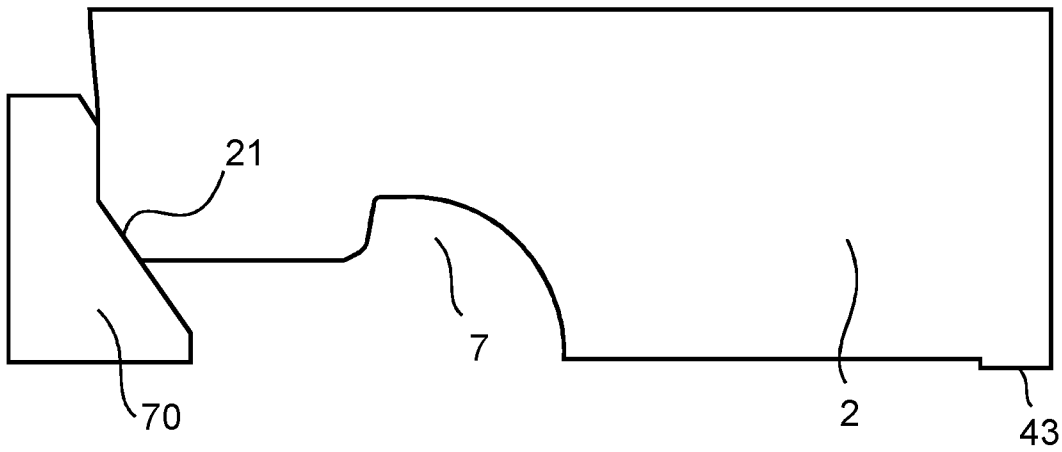
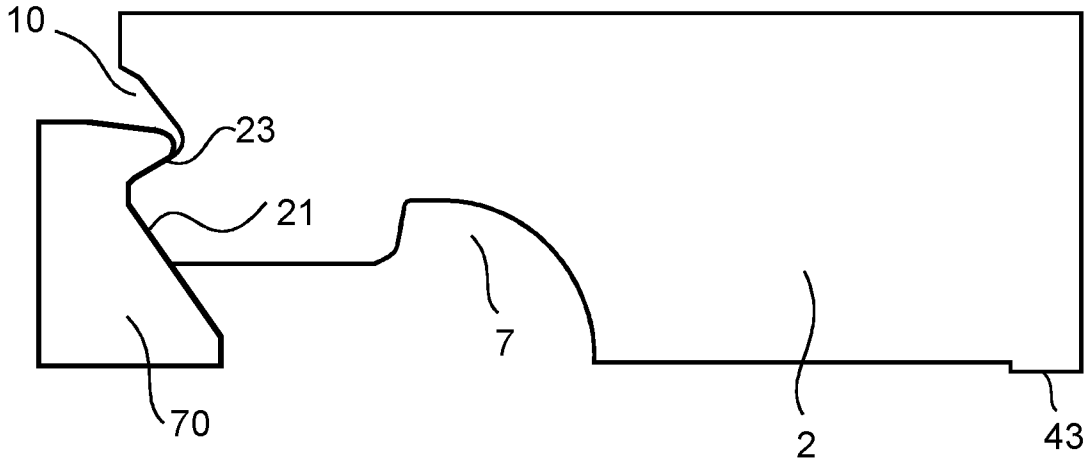


FIG 7C



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2016/051272

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B24B, B27F, B27M, E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 202004021867 U1 (VAELINGE INNOVATION AB), 27 December 2011 (2011-12-27); abstract; paragraphs [0005], [0065], [0067], [0069]; figures 2a-e --	1-16
A	WO 2013151493 A1 (VAELINGE INNOVATION AB), 10 October 2013 (2013-10-10); abstract; page 2, line 25 - line 30; page 4, line 3 - line 5 --	1-16
A	WO 2008008016 A1 (VAELINGE INNOVATION AB ET AL), 17 January 2008 (2008-01-17); abstract; page 12, line 22 - page 13, line 23; figure 7d --	1-16

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01-02-2017	01-02-2017

Name and mailing address of the ISA/SE
Patent- och registreringsverket
Box 5055
S-102 42 STOCKHOLM
Facsimile No. + 46 8 666 02 86

Authorized officer
Örjan Nylund
Telephone No. + 46 8 782 28 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2016/051272

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 20150330088 A1 (DERELOV PETER), 19 November 2015 (2015-11-19); abstract; paragraph [0042]; figure 6D --	1-16
A	US 20140366476 A1 (PERVAN DARKO ET AL), 18 December 2014 (2014-12-18); paragraphs [0067], [0076]; figures 9a-d -- --------	1-16

International application No.
PCT/SE2016/051272

Continuation of: second sheet

International Patent Classification (IPC)

E04F 15/02 (2006.01)

DE	202004021867	U1	27/12/2011	NONE			
WO	2013151493	A1	10/10/2013	CA	2867578	A1	10/10/2013
				CN	104246091	A	24/12/2014
				EP	2855795	A1	08/04/2015
				KR	20140144711	A	19/12/2014
				RU	2014142547	A	27/05/2016
WO	2008008016	A1	17/01/2008	CA	2656920	C	22/07/2014
				CN	101490347	B	20/07/2011
				EP	2041380	A1	01/04/2009
				RU	2436914	C2	20/12/2011
				RU	2009105106	A	27/08/2010
				SE	531110	C2	23/12/2008
				SE	0601566	L	15/01/2008
US	20150330088	A1	19/11/2015	US	9458634	B2	04/10/2016
				WO	2015174914	A1	19/11/2015

US	20140366476	A1	18/12/2014	AU	2006276347	A1	08/02/2007
				BR	PI0621779	A2	20/12/2011
				CA	2853998	C	15/12/2015
				CA	2657020	C	26/08/2014
				CA	2903686	A1	08/02/2007
				CN	101484651	A	15/07/2009
				DE	202006021204	U1	09/08/2013
				EP	2038491	A4	08/06/2016
				JP	2009542946	A	03/12/2009
				JP	4938081	B2	23/05/2012
				KR	20090038899	A	21/04/2009
				KR	101347764	B1	15/01/2014
				MX	2009000364	A	27/01/2009
				NO	20090320	A	06/04/2009
				NZ	574039	A	30/09/2011
				RU	2406809	C2	20/12/2010
				RU	2009104480	A	20/08/2010
				SE	533410	C2	14/09/2010
				SE	0601550	L	12/01/2008
				UA	93413	C2	10/02/2011
				US	8033074	B2	11/10/2011
				US	7908815	B2	22/03/2011
				US	20080104921	A1	08/05/2008
				US	8844236	B2	30/09/2014
				US	8359805	B2	29/01/2013
				US	8341914	B2	01/01/2013
				US	9382716	B2	05/07/2016
				US	20130111845	A1	09/05/2013
				US	20110283650	A1	24/11/2011
				US	20110088344	A1	21/04/2011
				US	20100300031	A1	02/12/2010
				US	20160281368	A1	29/09/2016
				WO	2007015669	A2	08/02/2007
				ZA	200900192	B	28/04/2010