



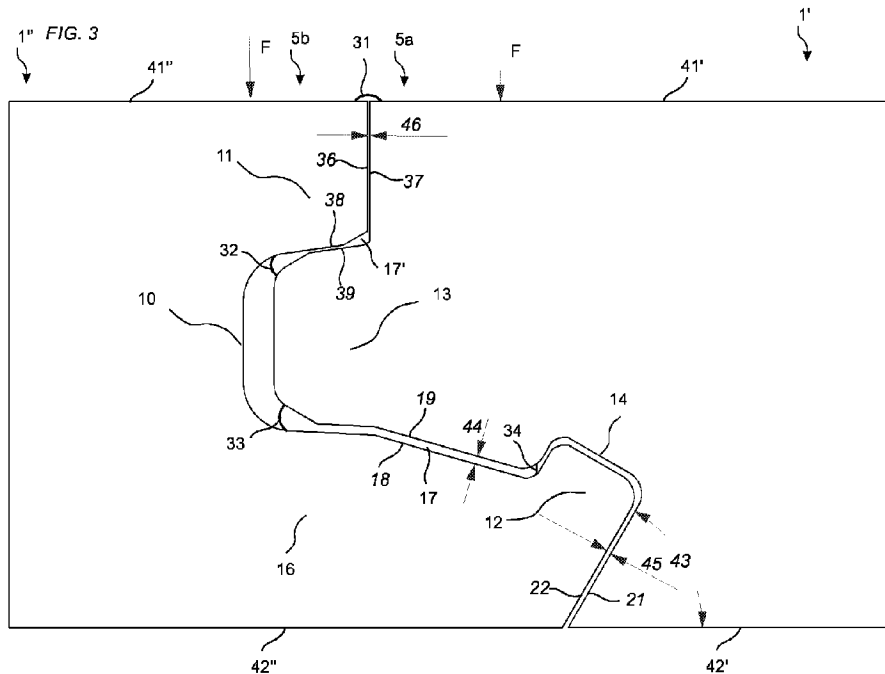
(12) **DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION**

(13) **A1**

(86) Date de dépôt PCT/PCT Filing Date: 2018/12/14
(87) Date publication PCT/PCT Publication Date: 2019/07/18
(85) Entrée phase nationale/National Entry: 2020/06/18
(86) N° demande PCT/PCT Application No.: SE 2018/051321
(87) N° publication PCT/PCT Publication No.: 2019/139519
(30) Priorité/Priority: 2018/01/10 (SE1850029-8)

(51) Cl.Int./Int.Cl. *E04F 15/02* (2006.01),
E04F 15/04 (2006.01)
(71) Demandeur/Applicant:
VALINGE INNOVATION AB, SE
(72) Inventeur/Inventor:
NILSSON, MATS, SE
(74) Agent: SMART & BIGGAR IP AGENCY CO.

(54) Titre : JOINT DE SOUS-PLANCHER
(54) Title: SUBFLOOR JOINT



(57) **Abrégé/Abstract:**

A set of essentially identical subfloor panels 1, 1', 1'' including a joint configured to be glued is provided. The joint includes a tongue 13 at a first edge 5a of a first panel V and a tongue groove 10 at a second edge 5b of a second panel 1''. The tongue 13 and the tongue groove 10 are configured for positioning of the first panel V relative to the second panel 1'' in a vertical direction, wherein a lower lip 6 of the tongue groove 10 extends beyond an upper lip 1 of the tongue groove 10. An element 12 protrudes from the lower lip 6 and an underside of the first edge 5a includes an element groove 14. The element and the element groove are configured for positioning of the first panel V relative to the second panel 1'' in a horizontal direction. An outer edge of the lower lip 16 includes a first impact surface 22, which is downward facing, and the first edge 5a includes a second impact surface 21, which is upward facing. The first impact surface 22 is configured to cooperate with the second impact surface 21 for partly absorbing a force F applied at an upper surface 41 of the first panel 1' and/or at an upper surface 41'' of a second panel 1''.

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

(19) World Intellectual Property
 Organization
 International Bureau

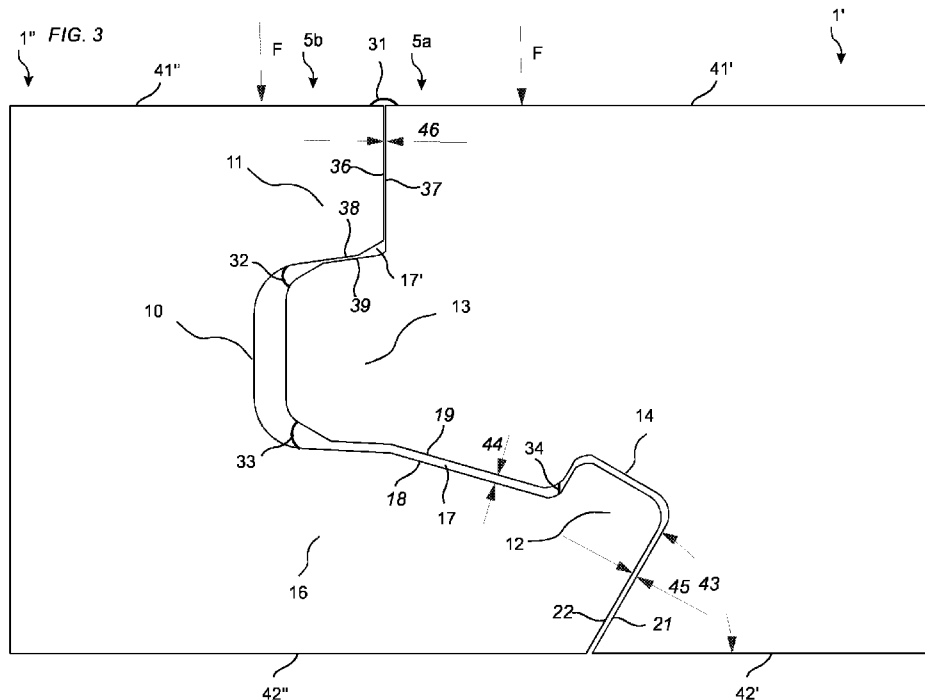
(43) International Publication Date
 18 July 2019 (18.07.2019)



(10) International Publication Number
WO 2019/139519 A1

- (51) International Patent Classification:
E04F 15/02 (2006.01) *E04F 15/04* (2006.01)
- (21) International Application Number:
 PCT/SE2018/051321
- (22) International Filing Date:
 14 December 2018 (14.12.2018)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
 1850029-8 10 January 2018 (10.01.2018) SE
- (71) Applicant: **VÄLINGE INNOVATION AB** [SE/SE];
 Prästavägen 513, SE-263 65 VIKEN (SE).
- (72) Inventor: **NILSSON, Mats**; Kullerstengatan 6, SE-263 65
 VIKEN (SE).
- (74) Agent: **ENGSTRAND, Ola**; Välinge Innovation AB, Präst-
 tavägen 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, JO, 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.

(54) Title: SUBFLOOR JOINT



(57) Abstract: A set of essentially identical subfloor panels 1, 1', 1" including a joint configured to be glued is provided. The joint includes a tongue 13 at a first edge 5a of a first panel V and a tongue groove 10 at a second edge 5b of a second panel 1". The tongue 13 and the tongue groove 10 are configured for positioning of the first panel V relative to the second panel 1" in a vertical direction, wherein a lower lip 6 of the tongue groove 10 extends beyond an upper lip 11 of the tongue groove 10. An element 12 protrudes from the lower lip 16 and an underside of the first edge 5a includes an element groove 14. The element and the element groove are configured for positioning of the first panel V relative to the second panel 1" in a horizontal direction. An outer edge of the lower lip 16 includes a first impact surface 22, which is downward facing, and the first edge 5a includes a second impact surface 21, which is upward facing. The first impact surface 22 is configured to cooperate with the second impact surface 21 for partly absorbing a force F applied at an



WO 2019/139519 A1

WO 2019/139519 A1 

(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))*

Subfloor Joint

Technical Field of the Invention

Embodiments of the present invention relate to subfloor panels comprising a joint.

- 5 The panels are configured to be assembled on joists. The panels and the joists may be wood based.

Background of the Invention

Subfloors are known comprising wood based panels, such as particle boards, comprising tongue and groove joints which are configured to be glued.

- 10 Embodiments of the present invention address a need to provide an improved subfloor and joint.

Summary of the Invention

- Accordingly, embodiments of the present invention preferably seek to mitigate, alleviate or eliminate one or more deficiencies, disadvantages or issues in the art, such as the above-identified, singly or in any combination by providing subfloor panels comprising a joint which enables a faster assembling of the subfloor panels.

Another embodiment of the invention is to provide subfloor panels with a joint with increased strength.

- At least some of these and other objects and advantages that will become apparent from the description have been achieved by an aspect of the invention that includes a set of essentially identical subfloor panels comprising a joint configured to be glued. The joint comprising a tongue at a first edge of a first panel and a tongue groove at a second edge of a second panel. The tongue and the tongue groove are configured for positioning of the first panel relative the second panel in a vertical direction. A lower lip of the tongue groove extends beyond an upper lip of the tongue groove. An element protrudes from the lower lip and an underside of the first edge comprising an element groove. The element and the element groove are configured for positioning of the first panel relative to the second panel in a horizontal direction. An outer edge of the lower lip comprises a first impact surface, which is downward facing, and the first edge comprises a

second impact surface, which is upward facing. The first impact surface is configured to cooperate with the second impact surface for partly absorbing a force applied at an upper surface of the first panel and/or at an upper surface of a second panel when the first and the second panel are joined by the joint and assembled on joists.

Thus, the joint solves the problem of positioning the first panel relative to the second panel before the glue dries or cures and bonds the first panel to the second panel.

The impact surfaces may have the effect that the strength of the joint is improved.

A lower surface of the tongue may be configured to be positioned at a distance from an upper surface of the lower lip, in a joined position of the first and the second panel such that a glue space is obtained.

The glue space may extend essentially from the element to an outer part of the tongue.

The distance between the lower surface of the tongue and the upper surface of the lower lip may be in the range of about 0,2 mm to about 0,5 mm, preferably about 0,3 mm.

An angle between the second impact surface and a lower surface of the first panel may be in the range of about 40° to about 70°, preferably about 60°.

The first impact surface may be essentially parallel to the second impact surface.

The panels may be wood based panels, such as particleboard, OSB, plywood, HDF or MDF.

The first and the second panel may each comprise outer layers and a core layer, wherein the core layer comprises particles that are coarser than the outer layers, wherein the lower surface of the tongue and the upper surface of the lower lip are within the core layer, such that a stronger glue connection is obtained.

The first and the second panel may each comprise outer layers and a core layer, wherein the core layer comprises particles that are coarser than the outer layers,

wherein an upper surface of the tongue is configured to be glued to a lower surface of the upper lip, wherein the upper surface of the tongue and lower surface of the upper lip, are within the core layer, such that a stronger glue connection is obtained.

5

The first impact surface and the second impact surface may be configured to be glued together.

10

The joint may be configured for a joining of the first edge and the second edge by an angling motion of the first panel relative to the second panel.

Brief Description of the Drawings

15

These and other aspects, features and advantages of which embodiments of the invention are capable of, will be apparent and elucidated from the following description of embodiments of the present invention, reference being made to the accompanying drawings, in which

FIG 1A shows in a 3D-view an embodiment of the set of subfloor panels according to an embodiment of the invention.

20

FIG 1B shows in a top view an embodiment of a subfloor panel according to an embodiment of the invention.

FIG 2 shows a crosscut in a side view of an embodiment of the set of subfloor panels during joining according to an embodiment of the invention.

FIG 3 shows a crosscut in a side view of an embodiment of the set of subfloor panels in a joined position according to an embodiment of the invention.

25

FIG 4 shows in a 3D-view an embodiment of the set of subfloor panels during joining on joists according to an embodiment of the invention.

FIGS 5A-5B show crosscuts in a side view of embodiments of the set of subfloor panels in a joined position according to embodiments of the invention.

30

FIGS 6A-6J show embodiments of a flexible tongue according to embodiments of the invention.

FIG 7 shows a crosscut in a side view of an embodiment of the set of subfloor panels in a joined position according to an embodiment of the invention.

FIG 8 shows a crosscut in a side view of an embodiment of the set of subfloor panels in a joined position according to an embodiment of the invention.

Detailed Description of Embodiments

Specific embodiments of the invention will now be described with reference to the accompanying drawings. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the
5
10
embodiments illustrated in the accompanying drawings is not intended to limit the invention. In the drawings, like numbers refer to like elements. When the word "about" is used in this specification in connection with a numerical value, it is intended that the associated numerical value include a tolerance of +/- 10% around the stated numerical value.

15
An embodiment of the invention is shown in FIG 1A in a 3D-view during assembling of a set of subfloor panels. The subfloor panels are essentially identical. An embodiment of a panel 1 in the set is shown in FIG 1B. The panel 1 is of a rectangular shape and comprises a first edge 5a and an opposite second edge 5b. The panel 1 further comprises a third edge 4a and an opposite fourth
20
edge 4b which extend between the first edge 5a and the opposite second edge 5b. The first and the second edge may be long edges and the third and the fourth edge may be short edges. The panel 1 comprises an upper surface 41 and at least two opposite edges comprise a joint for joining the panel 1 to an adjacent panel. FIG 1A shows that a first edge 5a of a first panel 1' may be joined to a second edge 5b
25
of a second panel 1'' by an angling motion 50 and a third edge 4a of the first panel 1' may be joined by the same angling motion to a fourth edge 4b of a third panel 1.

FIG 2 shows a crosscut in a side view of an embodiment of the set of subfloor panels during joining and FIG 3 shows the embodiment in a joined position. The set comprises a joint configured to be glued. The joint comprises a tongue 13 at a
30
first edge 5a of a first panel 1' and a tongue groove 10 at a second edge 5b of a second panel 1''. The tongue 13 and the tongue groove 10 are configured for positioning of the first panel 1' relative to the second panel 1'' in a vertical direction.

A lower lip 16 of the tongue groove 10 extends beyond an upper lip 11 of the tongue groove 10. An element 12 protrudes from the lower lip 16 and an underside of the first edge 5a comprises an element groove 14, wherein the element and the element groove are configured for positioning of the first panel 1' relative to the second panel 1'' in a horizontal direction. An outer edge of the lower lip 16 comprises a first impact surface 22, which is downward facing, and the first edge 5a comprises a second impact surface 21, which is upward facing. The first impact surface 22 is configured to cooperate with the second impact surface 21 for partly absorbing a force F applied at an upper surface 41' of the first panel 1' and/or at an upper surface 41'' of the second panel 1'' when the first and the second panel are joined by the joint and assembled on joists 71, 71' as shown in FIG 4.

FIG 2 shows that glue 17, 17' may be applied on an upper surface 39 of the tongue 13 and on an upper surface 18 of the lower lip 16 before the first and the second panel are joined. Furthermore, glue may be applied on the first impact surface 22 and/or on the second impact surface 21 (not shown) before the first and the second panel are joined. The glue is, during the joining, distributed in parts of the joint. A portion of the glue may be positioned, in the joined position, at the upper surface 41' of the first panel 1' and/or second panel. That portion of the glue is preferably removed before the glue has dried or hardened.

The glue 17' applied on the upper surface 39 of the tongue 13 may be distributed from an inner part 32 at the tip of the tongue 13 to an outer part 31 at the upper surface 41', 41'' of the first panel 1' and/or second panel 1''.

The joint may comprise a first joint surface 37 at the first edge 5a and an opposite second joint surface 36 at the second edge 5b. The first joint surface 37 extends from the upper surface 41' of the first panel 1' towards the tongue 13. The second joint surface 36 extends from the upper surface 41'' of the second panel 1' towards the tongue groove 10. The first joint surface 37 and the opposite second joint surface 36 are configured to be glued to each other. The glue 17' applied on the upper surface 39 of the tongue 13 may be distributed between the first joint surface 37 and the opposite second joint surface 36.

A distance 46 between the first joint surface 37 and the second joint surface 36 may be in the range of about 0,05 mm to about 0,3 mm, or in the range of about 0,1 mm to about 0,2 mm, or about 0,15mm.

- 5 The glue 17 applied on the upper surface 18 of the lower lip 16 may be distributed from an inner part 33 at the tip of the tongue 13 to an outer part 34 at the element 12.

The glue may be a resin, preferably cross-linked, hot melt glue, white glue or glue comprising polyvinyl acetate or polyurethane.

- 10 A lower surface 19 of the tongue 13 may be configured to be positioned at a distance 44 from an upper surface 18 of the lower lip 16, in a joined position of the first and the second panel 1', 1'', such that a glue space is obtained. The glue space may extend essentially from the element 12 to an outer part of the tongue 13. The distance 44 between the lower surface 19 of the tongue 13 and the upper
15 surface 18 of the lower lip 16, may be in the range of about 0,2 mm to about 0,5 mm, preferably about 0,3 mm.

- A distance between the upper surface 39 of the tongue 13 and the lower surface 38 of the upper lip 11, may be shorter than the distance 44 between the lower
20 surface 19 of the tongue 13 and the upper surface 18 of the lower lip 16.

An angle 43 between the second impact surface and a lower surface 42' of the first panel 1' may be in the range of about 40° to about 70°, preferably about 60°.

The first impact surface 22 may be essentially parallel to the second impact surface 21.

- 25 The first impact surface 22 and the second impact surface 21 may have a planar and/or curved shape.

The first impact surface 22 and the second impact surface 21 may have the same shape.

- 30 A distance 45 between the first impact surface 22 and the second impact surface 21 may be in the range of about 0,05 mm to about 0,3 mm, or in the range of about 0,1 mm to about 0,2 mm, or about 0,15mm.

The panels may be wood based panels, such as particleboard, OSB, plywood, HDF or MDF.

FIG 8 shows that the first and the second panel 1', 1'' each may comprise outer layers 82, 83 and a core layer 81, wherein the core layer 81 comprises coarser particles than the outer layers, wherein the lower surface 19 of the tongue and the upper surface 18 of the lower lip 16 is within the core layer, such that a stronger glue connection is obtained.

An upper surface 39 of the tongue 13 is configured to be glued to a lower surface 38 of the upper lip 11, wherein the upper surface 39 of the tongue 13 and lower surface 38 of the upper lip 11, is within the core layer 81, such that a stronger glue connection is obtained.

The first impact surface 22 may be configured to be glued to the second impact surface 21. The first impact surface 22 and the second impact surface 21 may be positioned at least partly in the core layer 81. The glue 17'' between the first impact surface 22 and the second impact surface 21 may be distributed from a lower portion 84 at the lower surface 42', 42'' of the first and the second panel, respectively, to an upper portion 85 adjacent to an upper surface of the element groove 14.

Each of the panels may comprise a decorative layer attached to at least one of said outer layers.

FIG 4 shows an embodiment of the first panel 1', the second panel 1'' and the third panel 1 during assembling on joists 71, 71', 71'', 71'''. The first panel 1', the second panel 1'' and the third panel 1 may also be glued to the joists 71, 71', 71'', 71'''. The joists 71, 71', 71'', 71''' may be wood based. The first panel 1', the second panel 1'' and the third panel 1 may be identical.

FIG 5A shows an embodiment of the joint for joining a third edge of the first panel 1' to a fourth edge of a third panel 1. The joint may comprise a flexible tongue 30 at the fourth edge configured to cooperate with a tongue groove 20 at a third edge for positioning of the first panel 1' relative to the third panel 1 in a vertical direction. The flexible tongue 30 may be positioned in a displacement groove 40. The flexible tongue may be configured to be compressed during assembling and spring back

towards and partly into the tongue groove 20. The joint may comprise a strip 6 that protrudes from the fourth edge. An outer part of the strip 6 may comprise an element 7 and an underside of the third edge may comprise an element groove 14, wherein the element and the element groove are configured for positioning of the first panel 1' relative to the third panel 1 in a horizontal direction. FIG 5B shows an embodiment of the joint comprising an embodiment of the displacement groove 40 which extends in an angled direction relative to an upper surface of the third panel. The joint is shown in a joined position. Glue may be applied in the joint before the fourth edge and the third edge are joined.

Embodiments of the flexible tongue 30, which is displaceable in the insertion groove 40, are shown in FIGS 6A-6D. FIGS 6A-6B show the flexible tongue 30 in a joined position and FIGS 6C-6D show the flexible tongue 30 during assembling of a panel and an adjacent panel. FIG 6B shows a cross section of the flexible tongue 30 in FIG 6A, which shows a top view. FIG 6D shows a cross section of the flexible tongue 30 in FIG 6C, which shows a top view. The flexible tongue 30 comprises bendable protruding parts 64. A space 63 is provided between the flexible tongue 30 and a bottom wall of the insertion groove 40. FIG 6C shows that the flexible tongue 30 is pushed into the insertion groove 40 and towards the bottom wall of the insertion groove 40 during an assembly of a panel with an adjacent panel. The flexible tongue 30 springs back towards its initial position when the panel has reached a joined position. A recess 65 is preferably arranged at each bendable protruding part.

The flexible tongue 30 may have a first displacement surface 66 and an opposite second displacement surface 67, configured to be displaced along a third displacement surface 68 and a fourth displacement surface 69, respectively, of the insertion groove 40.

Another embodiment of the flexible tongue 30, without the protruding bendable parts 64, is shown in FIGS 6E-6F. FIG 6F shows a cross section of the flexible tongue 30 shown in FIG 6E, which shows a top view. The alternative embodiment is bendable in the length direction of the flexible tongue 30 in order to accomplish a similar function as the embodiment shown in FIGS 6A-6D.

Another embodiment of the flexible tongue 30 is shown in FIG 6G in a top view. The tongue 30 comprises an inner part 38 and an outer part 39. The inner part 38 and the outer part 39 are preferably made of two different materials, wherein the inner part 38 is more flexible than the outer part 39. The inner part 38 is configured to be inserted into the insertion groove 40 and the outer part 39 is configured to extend into the tongue groove 20.

FIGS 6G-J show cross section embodiments of the tongue 30 comprising an inner part 91 and a pivoting outer part 92. The inner part 91 is configured to be inserted into the insertion groove 40 and the outer part 92 is configured to extend into the tongue groove 20 and pivot during assembly of a panel and an adjacent panel. The embodiments in FIGS 6H-6I are preferably produced in one material, such as a polymer, by extruding. The embodiment in FIG 6J is preferably produced by coextruding and comprises at least two different polymer materials. The embodiment comprises a hinge portion 93 which connects the inner part 91 and the outer part 92. The material of the hinge portion 93 is preferably more flexible than the inner part 91 and the outer part 93.

FIG 7 shows a crosscut in a side view of an embodiment of the set of subfloor in a joined position. The set comprises a joint configured to be glued. The joint comprises at the first edge a third impact surface 73, which is downward facing, and the second edge comprising a fourth impact surface 74, which is upward facing. The third impact surface 73 is configured to cooperate with the fourth impact surface 74 for partly absorbing a force F applied at an upper surface 41' of the first panel when the first and the second panel are joined by the joint and assembled on joists 71, 71' as shown in FIG 4. The third impact surface 73 may be positioned between the upper surface 39 of the tongue 13 and the first joint surface 37. The fourth impact surface 74 may be positioned between the upper surface 39 of the tongue 13 and the second joint surface 36.

CLAIMS

1. A set of essentially identical subfloor panels (1, 1', 1'') comprising a joint configured to be glued, wherein the joint comprises a tongue (13) at a first edge (5a) of a first panel (1') and a tongue groove (10) at a second edge (5b) of a second panel (1''), wherein the tongue (13) and the tongue groove (10) are configured for positioning of the first panel (1') relative to the second panel (1'') in a vertical direction, wherein a lower lip (16) of the tongue groove (10) extends beyond an upper lip (11) of the tongue groove (10), characterized in that

10 that an element (12) protrudes from the lower lip (16) and an underside of the first edge (5a) comprises an element groove (14), wherein the element and the element groove are configured for positioning of the first panel (1') relative to the second panel (1'') in a horizontal direction,

15 that an outer edge of the lower lip (16) comprises a first impact surface (22), wherein the first impact surface is downward facing, and the first edge (5a) comprises a second impact surface (21), wherein the second impact surface is upward facing, and

20 that the first impact surface (22) is configured to cooperate with the second impact surface (21) for partly absorbing a force (F) applied at an upper surface (41') of the first panel (1') and/or at an upper surface (41'') of a second panel (1'') when the first and the second panel are joined by the joint and assembled on joists (71, 71').

2. The set as claimed in claim 1, wherein a lower surface (19) of the tongue (13) is configured to be positioned at a distance (44) from an upper surface (18) of the lower lip (16), in a joined position of the first and the second panel (1', 1''), such that a glue space is obtained.

3. The set as claimed in claim 2, wherein the glue space extends essentially from the element (12) to an outer part of the tongue (13).

4. The set as claimed in any one of the claims 2-3, wherein the distance between the lower surface (19) of the tongue (13) and the upper surface (18) of the lower lip (16), is in the range of about 0,2 mm to about 0,5 mm, preferably about 0,3 mm.

5. The set as claimed in any one of the claims 1-4, wherein an angle (43) between the second impact surface and a lower surface (42') of the first panel (1') is in the range of about 40° to about 70°, preferably about 60°.

5 6. The set as claimed in claim 5, wherein the first impact surface (22) is essentially parallel to the second impact surface (21).

7. The set as claimed in any one of the claims 1-6, wherein the first panel (1') and the second panel (1'') are wood based panels, such as particleboard, OSB,
10 plywood, HDF or MDF.

8. The set as claimed in claim 7, wherein the first and the second panel (1', 1'') each comprises outer layers (82, 83) and a core layer (81), wherein the core layer (82) comprises coarser particles than the outer layers, and wherein the lower
15 surface (19) of the tongue and the upper surface (18) of the lower lip (16) are within the core layer.

9. The set as claimed in claim 7 or 8, wherein the first and the second panel (1', 1'') each comprises outer layers (82,83) and a core layer (81), wherein the core layer
20 (81) comprises coarser particles than the outer layers (82,83), wherein an upper surface (39) of the tongue (13) is configured to be glued to a lower surface (38) of the upper lip (11), wherein the upper surface (39) of the tongue (13) and lower surface (38) of the upper lip (11), are within the core layer (82).

25 10. The set as claimed in any one of the claims 1-9, wherein the joint is configured for a joining of the first edge (5a) and the second edge (5b) by an angling motion (50) of the first panel (1') relative the second panel (1'').

30

35

FIG. 1A

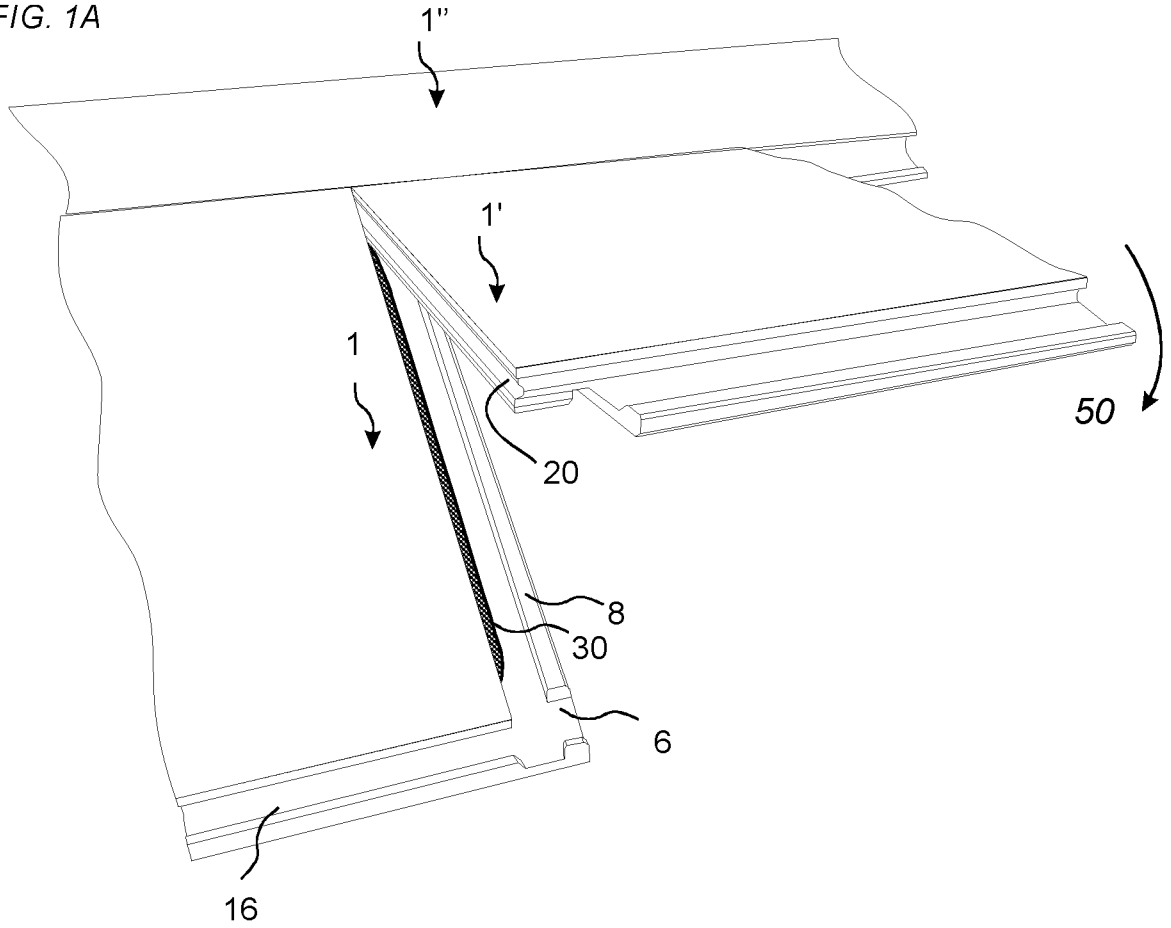
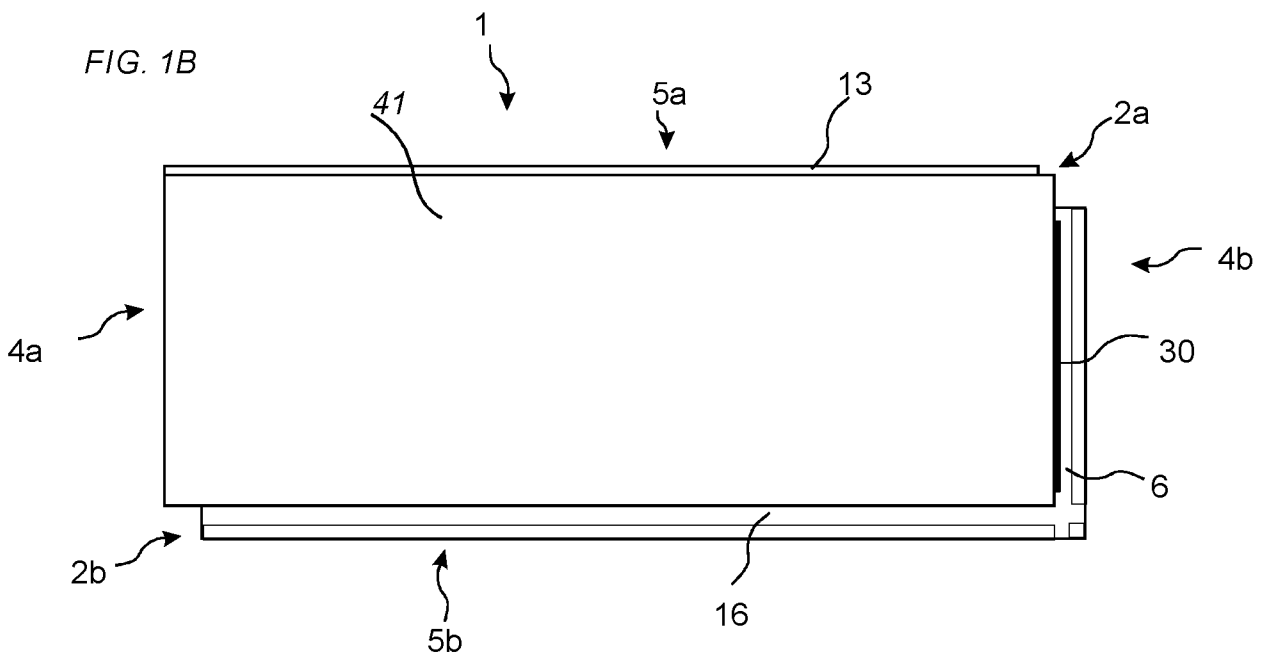
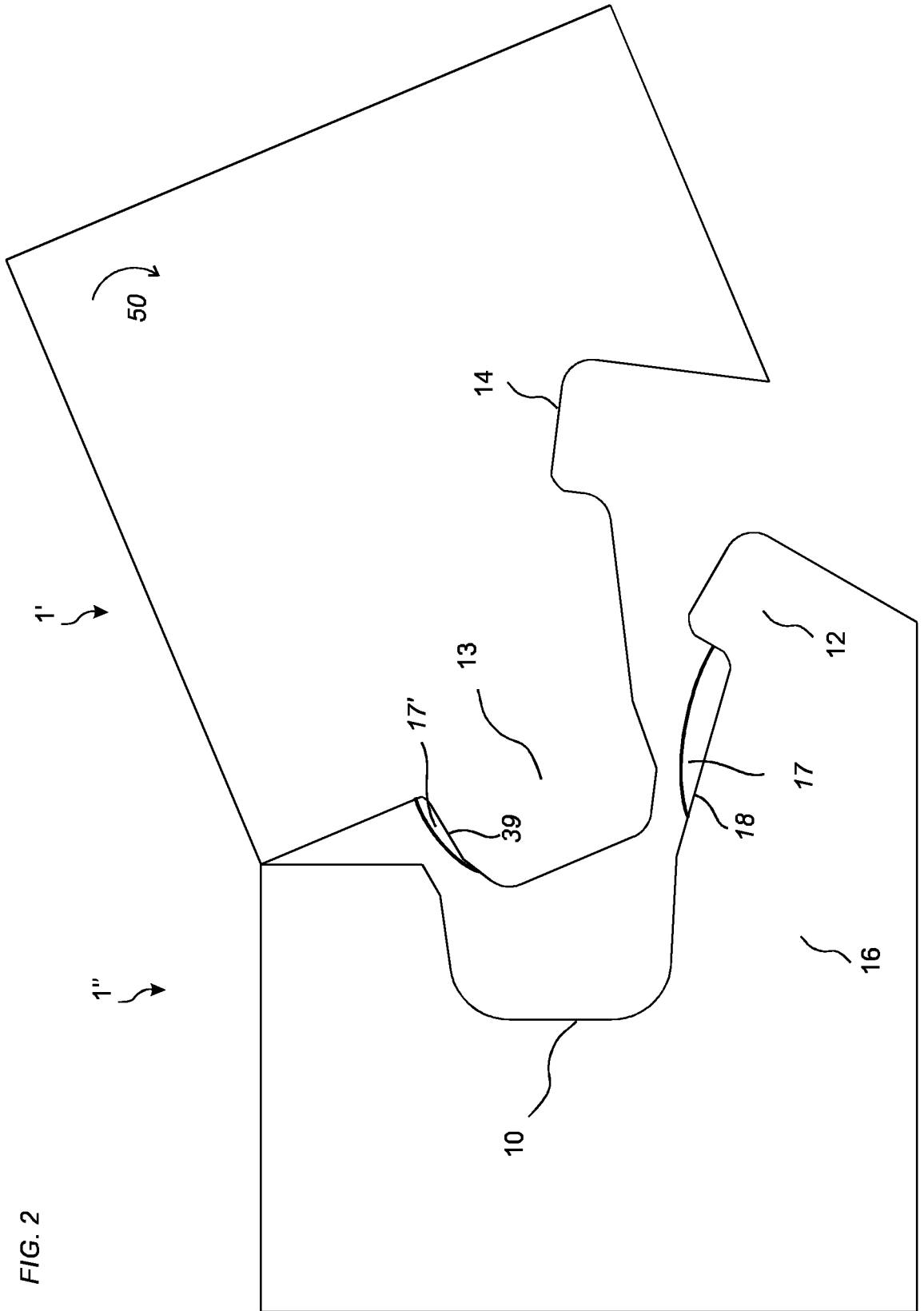


FIG. 1B





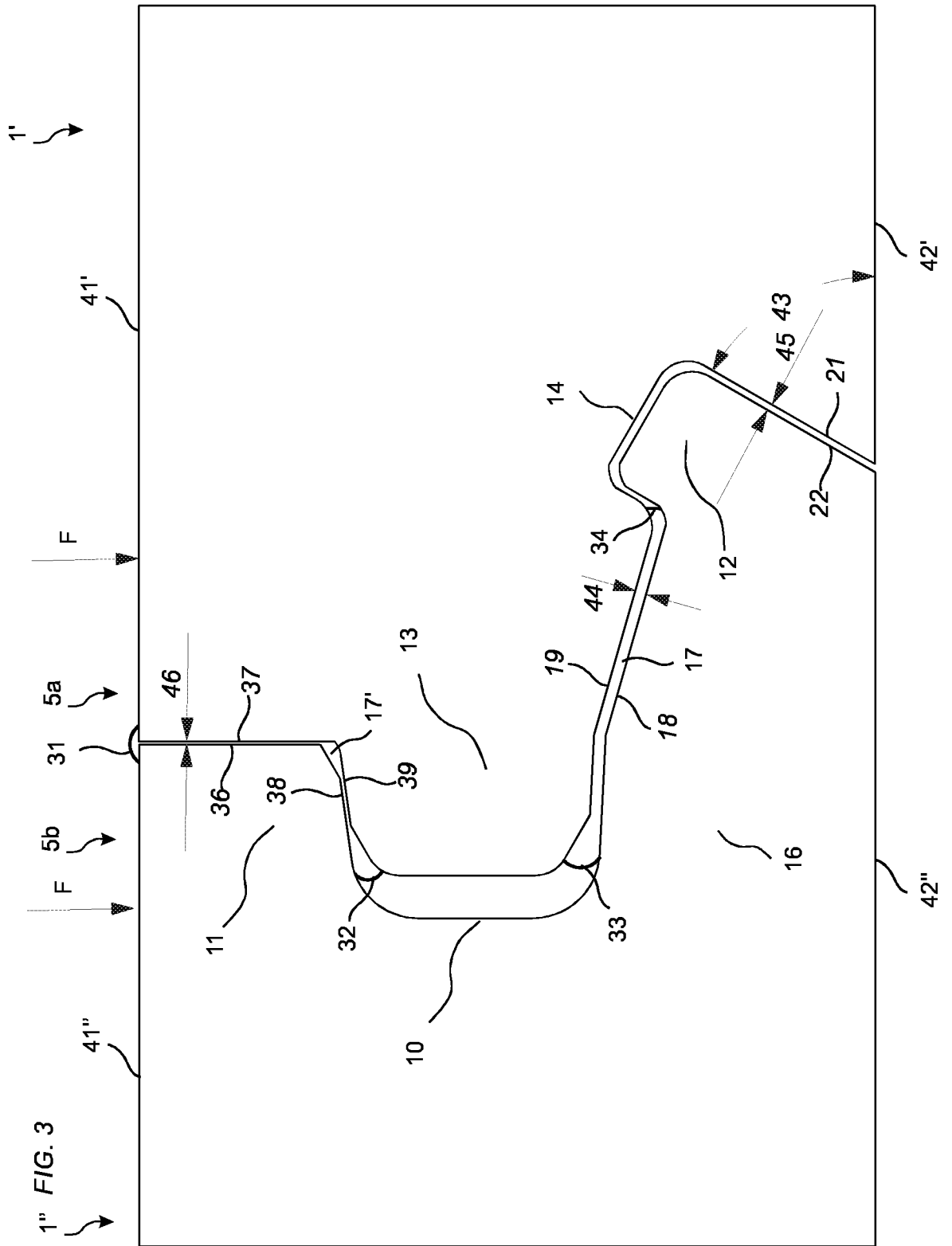


FIG. 4

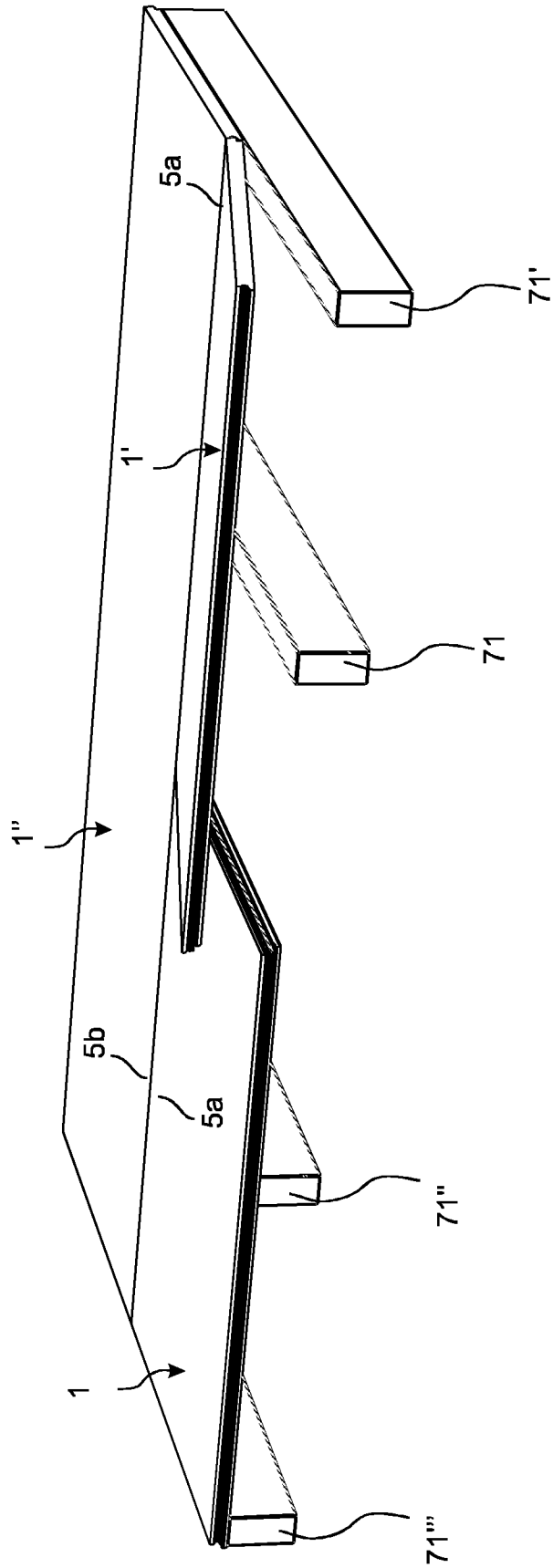


FIG. 5A

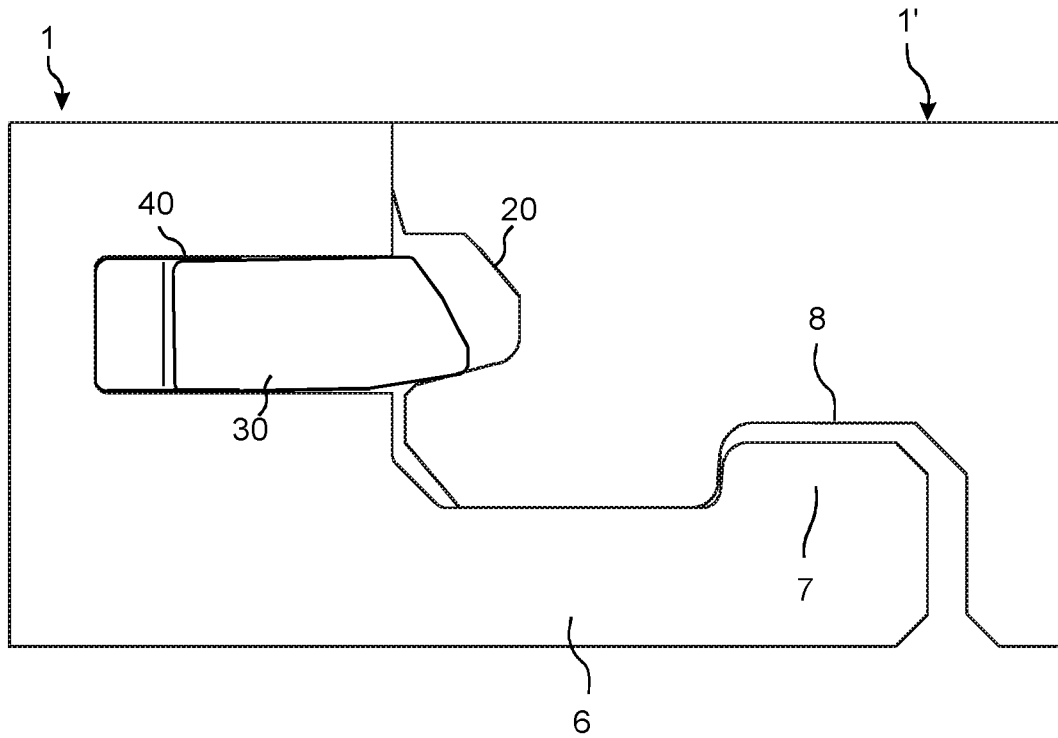


FIG. 5B

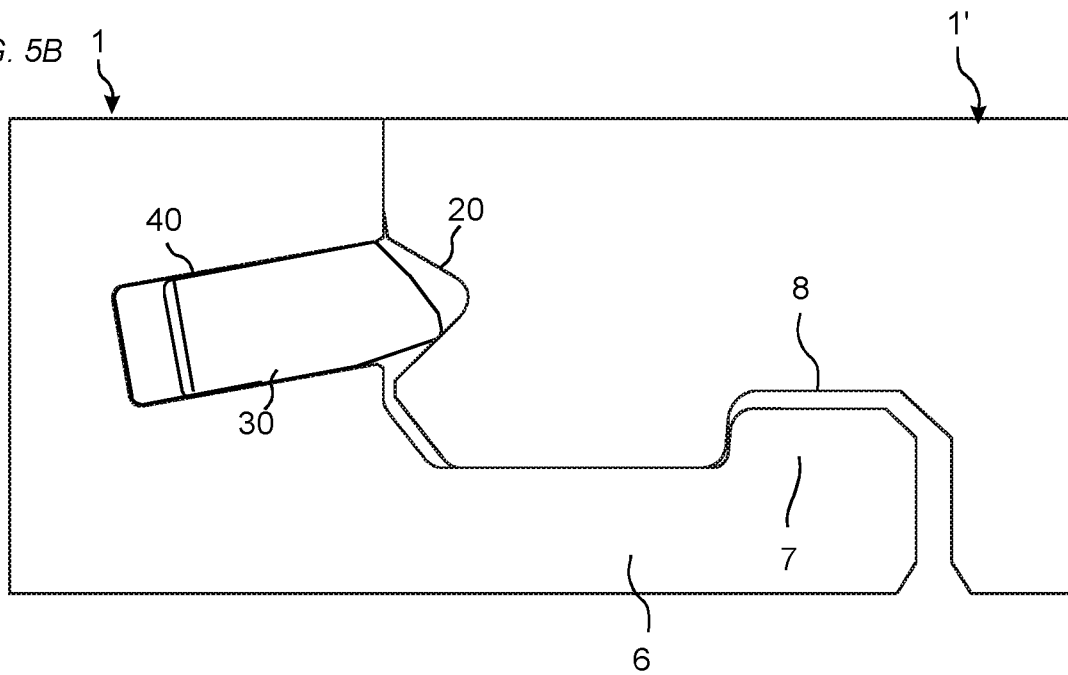


FIG 6A

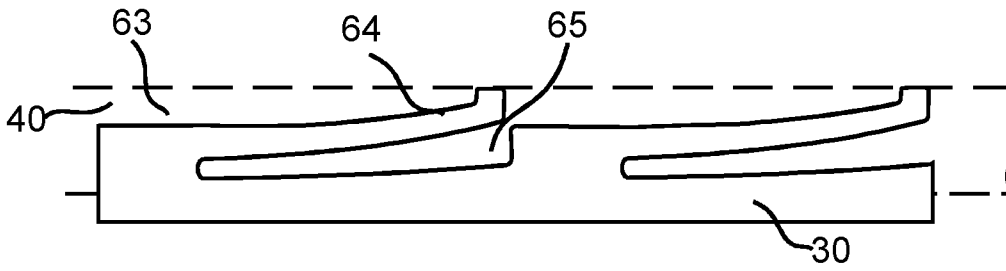


FIG 6B

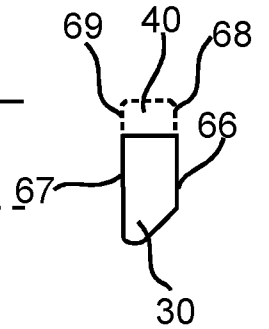


FIG 6C

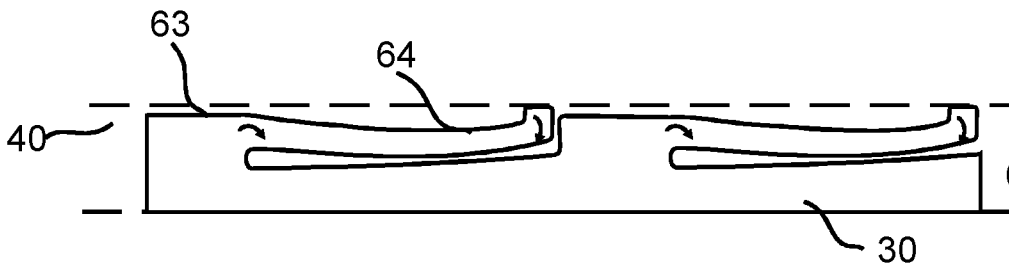


FIG 6D

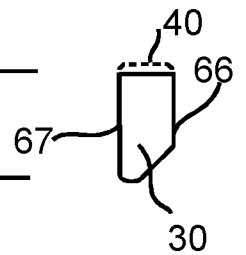


FIG 6E

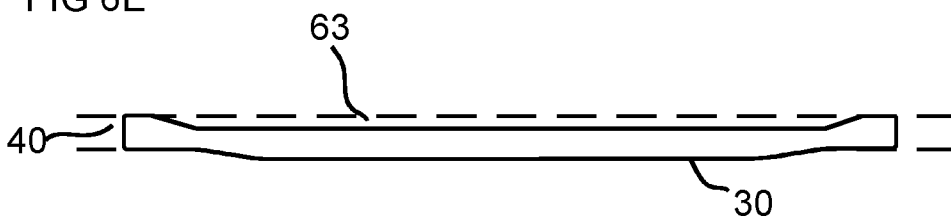


FIG 6F

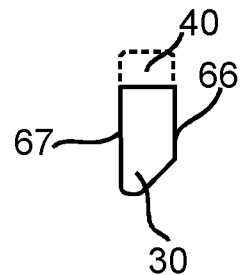


FIG 6G

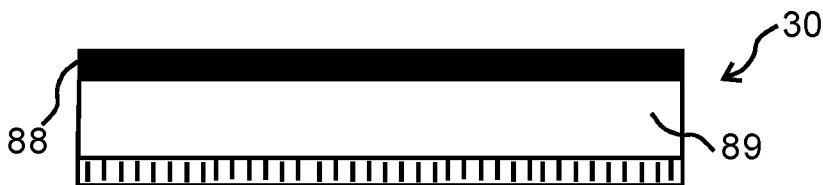


FIG 6H

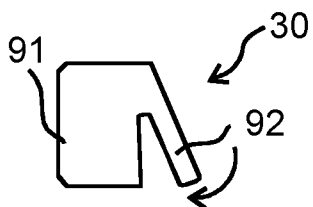


FIG 6I

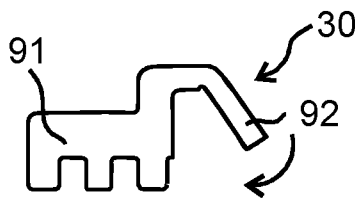


FIG 6J

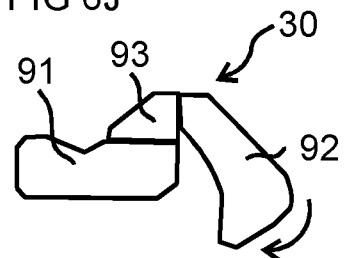
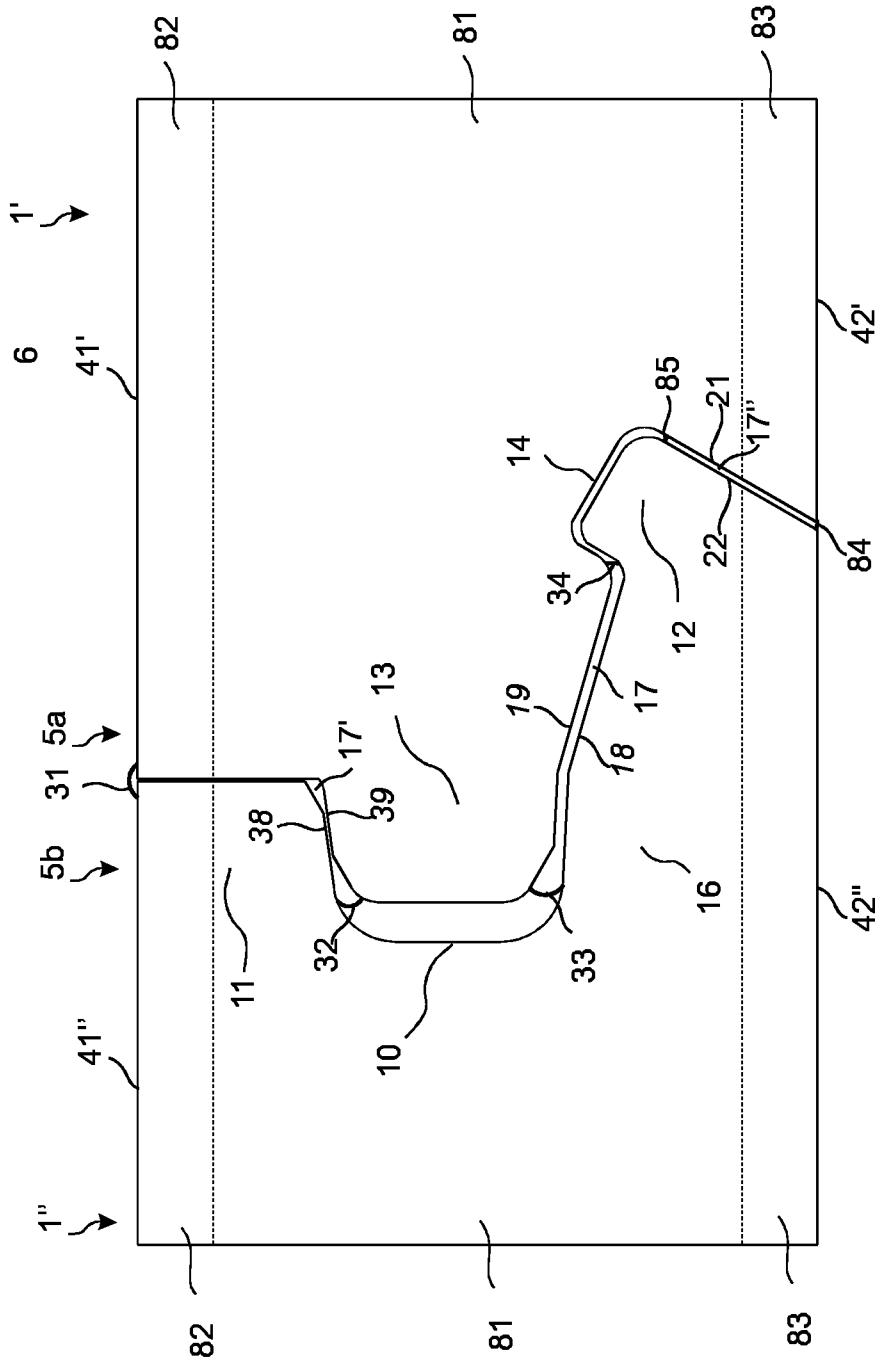


FIG. 8



1" FIG. 3

