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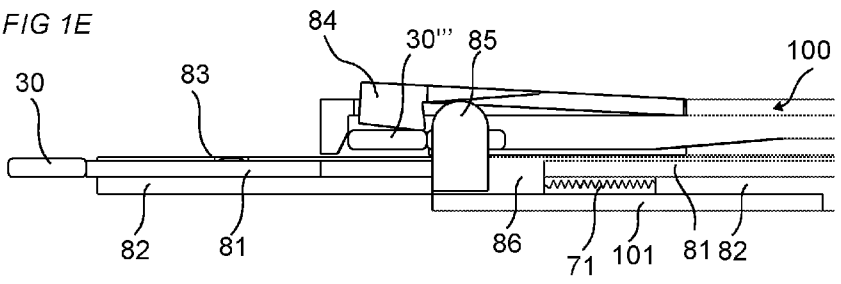
FIG 1E



(57) Abstract: A method and device for inserting a tongue in an insertion groove in a panel by a device, wherein the method includes: · displacing a tongue guiding device in a first direction 91 by displacing a puncher 81 in the first direction 91, and · displacing a tongue 30 between a first part 83 and a second part 82 of the tongue guiding device and into an insertion groove 20 in panel by further displacing the puncher 81.

WO 2018/004439 A1

METHOD AND DEVICE FOR INSERTING A TONGUE

Field of the Invention

Embodiments of the present invention relate to methods and devices for inserting a tongue into an insertion groove in a panel. The panel is configured to be arranged and locked perpendicular to an adjacent panel by a locking device comprising the tongue. The panels may be assembled and locked together to obtain a furniture product, such as a bookshelf, a cupboard, a wardrobe, a box, a drawer or a furniture component.

Background of the Invention

A conventional furniture product may be assembled by a plurality of elements or panels. The panels may be assembled with a mechanical locking device, such as disclosed in, for example, WO 2012/154113 A1. The product comprises a first panel connected perpendicularly to a second panel by a mechanical locking device comprising, an edge tongue at the first panel, an edge groove at the second panel and a flexible tongue in an insertion groove.

WO 2015/038059 discloses a product assembled by a plurality of panels that are locked by mechanical locking devices comprising a flexible tongue in an insertion groove.

The locking devices of the panels are generally produced in a production line by a continuous production process, comprising a number of milling tools. The edge groove and the insertion groove may extend contiguously from a front edge to a back edge of the panel. The edge groove is preferably covered at the front edge by a decorative layer. The edge groove and the insertion groove may also end before the front edge and/or the back edge as disclosed in, e.g., SE 1650135-5.

Embodiments of the present invention address a need to provide an improved method and an improved device for separating a tongue from a tongue blank before inserting the tongue into an insertion groove in a panel.

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 a method for inserting a tongue in an insertion groove in a panel.

A further object of embodiments of the invention is to provide a device for inserting a tongue in an insertion groove in a panel.

Embodiments of the invention may have the advantages that the tongue is guided in a reliable manner close to a correct position and that weights of parts of the device that are displaced are low such that a displacement speed of the parts may be increased and the time for inserting a tongue is reduced.

At least some of these and other objects and advantages that will be apparent from the description have been achieved by a first aspect of the invention comprising a method for inserting a tongue in an insertion groove in a panel by a device, wherein the method comprises:

- displacing a tongue guiding device in a first direction by displacing a puncher in the first direction, and
- displacing a tongue between a first part and a second part of the tongue guiding device and into an insertion groove in panel by further displacing the puncher.

The embodiments may be advantageous for inserting the tongue into an embodiment of the insertion groove in a panel while displacing the panel in a panel feeding direction. The embodiments may be particularly advantageous for inserting the tongue into an insertion groove comprising a side wall in the feeding direction and/or into an insertion groove in an edge groove comprising a side wall in the feeding direction. The side wall may be end of the edge groove or the insertion groove at a distance from an adjacent edge of the panel. The tongue guiding device may be displaced close to an opening of the insertion groove such that the tongue may be guided in a reliable manner close to a correct position. The tongue guiding device may, after the displacing of the tongue into the insertion groove, be displaced towards an initial position, before colliding with any side wall or other

obstacle of the panel which preferably is continuously displaced in the feeing direction.

The method may comprise displacing the puncher in the first direction a longer distance than said displacing of the tongue guiding device.

The method may comprise displacing the first part of the tongue guiding device a longer distance in the first direction than the second part of the guiding device.

The method may comprise displacing the puncher and the tongue guiding device in a second direction, which is opposite the first direction, towards initial positions of the puncher and the tongue guiding device, respectively.

The method may comprise displacing a tongue queue stopper by the tongue guiding device, preferably by a protruding part, and feeding a new tongue. The new tongue is preferably identical or essentially identical to the tongue.

The method may comprise displacing the new tongue into the tongue guiding device when a first part of the tongue guiding device has reached, or is about to reach, its initial position.

The method may comprise displacing the puncher and the tongue guiding device in relation to a tongue queue device.

The method may comprise displacing the puncher in the first direction and preferably in a second direction, which is opposite to the first direction, by a motor, such as an electric motor or a pneumatic motor.

A second aspect of the invention comprises a device for inserting a tongue in an insertion groove in a panel. The device comprises a tongue guiding device, which is displaceable in a first direction, and a puncher which is configured to displace a tongue between a first part and a second part, into an inserting groove in a panel, wherein the tongue guiding device is configured to be displaced by the puncher, which is displaceable in the first direction.

The puncher may be displaceable a longer distance in the first direction than the tongue guiding device.

The first part of the tongue guiding device may be displaceable a longer distance in the first direction than the second part of the guiding device.

The puncher and the tongue guiding device may be displaceable in a second direction, which is opposite the first direction, towards initial positions of the puncher and the tongue guiding device, respectively.

The device may comprise a displaceable tongue queue stopper for controlling a feeding of a new tongue, the tongue queue stopper is preferably configured to cooperate with a protruding part on the tongue guiding device. The new tongue and tongues in the tongue queue are preferably identical or essentially identical to the tongue.

The device may be configured such that a new tongue is displaced into the tongue guiding device when the first part of the tongue guiding device has reached, or is about to reach, its initial position.

The puncher and the tongue guiding device may be displaceable in relation to a tongue queue device.

The device preferably comprises a spring element between a power unit, such as a motor, and the puncher. The spring element may have the advantage that the device and/or the panel is/are not damaged in case any one of the panel, the insertion groove and the puncher is/are positioned in a wrong position(s).

The device may comprise a motor, such as an electric motor or a pneumatic motor, configured to drive the puncher in the first direction and preferably in a second direction, which is opposite to the first direction.

The puncher, the first part and the second part are preferably coupled together by spring element such that desired positions of the puncher, the first part and the second part are obtained.

An advantage of embodiments of the device may be that only one motor is required to drive at least the puncher and the guiding device and preferably also the queue stopper. The weight of the device may be decreased by having only one motor.

The tongue according to the first and/or second aspect may comprise one or more of the features below:

The tongue may be of an elongated shape and may comprise a first long edge and a second long edge. The first edge may be a first short edge, and the second edge may be an opposite second short edge.

A longitudinal direction of the tongue is preferably perpendicular to the first direction.

The tongue may be a flexible tongue and made of, e.g., a polymer and preferably comprising a reinforcement material, such as a fibre, e.g., fiberglass.

The tongue may comprise a bendable part at the first long edge and preferably a groove adjacent the bendable part. The bendable part may be configured to be pushed into the groove adjacent the bendable part. The tongue may comprise several of said bendable part and preferably several of said groove.

The tongue may comprise a polymer material and is preferably produced by injection moulding.

The tongue may be connected to several tongues in the tongue blank by a first rail at the first short edge and preferably by a second rail at the second short edge. A separating device preferably separates the tongue from the first rail and preferably from any second rail before the tongue is displaced to the tongue queue of a tongue queue device.

The first rail and the second rail may extend in a length direction perpendicular to the tongue.

The tongue may be connected to the first rail and/or the second rail, which may be casting gates, by a first and a second casting gate, respectively

The tongue is preferably configured to be displaceable in the insertion groove.

The device is preferably a part of a production line comprising milling tools for forming a locking device at the edge of the panel. The locking device preferably comprises said insertion groove.

The edge groove and the insertion groove may extend contiguously from a front edge to a back edge of the panel.

Brief Description of the Drawings

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

FIGS 1A-1H show a method for inserting a tongue into an insertion groove of a panel according to an embodiment of the invention.

FIG 2 shows a schematic drawing of an enlargement of a device in a cross-section, according to an embodiment of the invention, in a position corresponding to FIG 1A

FIGS 3A-3B show schematic drawings of an enlargement of a device in a cross-section, according to an embodiment of the invention, in a position corresponding to FIG 1E

FIGS 4A-4D show embodiments of the tongue according to embodiments of the invention.

FIGS 5A-5D show an embodiment of the tongue according to an embodiment of the invention.

FIGS 6A-6D show embodiments of the panel according to embodiments of the invention.

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 embodiments illustrated in the accompanying drawings is not intended to be limiting of the invention. In the drawings, like numbers refer to like elements.

Embodiments of the method for inserting a tongue into an insertion groove and a device for the method are shown that may have an improved efficiency. The embodiments may be advantageous for inserting the tongue into an insertion

groove at an edge of a panel while displacing the panel in a panel feeding direction. The embodiments may be particularly advantageous for inserting the tongue into an insertion groove comprising a side wall in the feeding direction and/or into an insertion groove in an edge groove comprising a side wall in the feeding direction.

An embodiment of the method is shown in FIGS 1A-1H. The method comprises inserting a tongue 30 in an insertion groove 20 in a panel by a device, wherein the method comprises:

- displacing a tongue guiding device in a first direction 91 by displacing a puncher 81 in the first direction 91, and
- displacing a tongue 30 between a first part 83 and a second part 82 of the tongue guiding device and into an insertion groove 20 in panel by the puncher 81 by further displacing the puncher 81.

The method may comprise displacing the puncher 81 in the first direction 91 a longer distance than said displacing of the tongue guiding device. FIG 1A shows an initial position of the puncher 81and the guiding device. The guiding device is displaced in the first position until it has reached an outer end position shown in FIG 1D, the puncher continues to be displaced until it has reached an outer end position shown in FIG 1E.

The method may comprise displacing the first part 83 of the tongue guiding device a longer distance in the first direction 91 than the second part 82 of the guiding device. The first part and the second part may have the same outer end position, which is shown in FIG 1D. The first part may have an initial position which is at a distance from an initial position of the second part, see FIG 1A. The distance may be essentially the same or longer than a width of the tongue 30.

The method may comprise displacing the puncher 81 and the tongue guiding device in a second direction 92, which is opposite the first direction 91, towards initial positions of the puncher 81 and the tongue guiding device, respectively. A beginning of a displacement of the puncher 81 in the second direction is shown FIG 1F. A beginning of a displacement of the guiding device in the second

direction is shown FIG 1G, i.e., after the beginning of a displacement of the puncher 81.

The method may comprise displacing a tongue queue stopper 84 by the tongue guiding device in a direction 93, preferably by a protruding part 85, and feeding a new tongue 30''', as is shown in FIG 1D. The method may comprise displacing the tongue queue stopper in an opposite direction 94 when the tongue guiding device is being displaced in the second direction, see FIG 1G.

The method may comprise displacing the new tongue 30''' into the tongue guiding device when a first part 83 of the tongue guiding device has reached, or is about to reach, its initial position, as is shown in FIG 1 H.

The method may comprise displacing the puncher 81 and the tongue guiding device in relation to a tongue queue device 100 which may be stationary.

The method may comprise displacing the puncher 81 in the first direction 91 and preferably in a second direction 92, which is opposite to the first direction, by a motor (not shown), such as an electric motor or a pneumatic motor.

An embodiment of the device 80 in the initial position is shown in FIG 2 and an outer end position is shown in FIG 3A and FIG 3B. FIG 3B shows an embodiment of the panel 1 comprising an insertion groove 20 in an edge groove 21, the tongue 30, the puncher 81 and the first part 83 and the second part 82 of the tongue guiding device. The tongue guiding device is displaced to a position close to an opening of the insertion groove. The distance between the guiding device and the opening is preferably about 1mm or may be in the range of about 0.5 mm to about 2 mm. The device comprises a tongue guiding device, which is displaceable in a first direction 91, and a puncher 81 which is configured to displace a tongue 30 between a first part 83 and a second part 82 and into an inserting groove 20 in a panel, wherein the tongue guiding device is configured to be displaced by the puncher, which is displaceable in the first direction 91.

FIGS 2 and 3A shows an attachment device 88 for coupling the puncher 81 to the motor by a coupling element. The coupling element may comprise a spring element.

The puncher 81, the first part 83 and the second part 82 of the tongue guiding device are preferably coupled together by spring elements 71,72 such that desired positions of the puncher, the first part and the second part of the tongue guiding device may be obtained.

The puncher 81 may be coupled to a coupling device 86 by a second spring 72.

The first part 83 of the tongue guiding device may be attached to the coupling device 86. The first part 83 of the tongue guiding device may not be displaceable relative the coupling device 86.

The second part 82 of the tongue guiding device may be attached to the coupling device 86. The second part 82 of the tongue guiding device may be coupled to the coupling device by a first spring 71.

An embodiment of the device 80 may comprise a fixed structural element 101 comprising a first guiding groove 102. A protruding part 87 of the second part 82 of the guiding device may be configured to be displaceable between a first surface 103 of the first guiding groove 102 and an opposite second surface 104 of the first guiding groove.

The puncher 81 may be configured to drive the protruding part, via e.g. the second spring 72, the coupling device 86 and the first spring 71, between the first surface 103 and the second surface 104 of the first guiding groove 102. The first surface 103 and the second surface 104 may determine the displacement range, in the first direction 91 and the second direction 92, respectively, of the second part 82 of the guiding device.

The second part 82 of the tongue guiding device may comprise a second guiding groove 73 comprising a first surface 61 and an opposite second surface 62. The coupling device 86 may be displaceable relative the second part 82 of the tongue guiding device. The first surface 61 and the opposite second surface 62 may determine the displacement range, in the first direction 91 and the second direction 92, respectively, of the coupling device 86 relative the second part 82 of the tongue guiding device.

The puncher 81 may comprise a third guiding groove 74 comprising a first surface 63 and an opposite second surface 64. The puncher 81 may be displaceable relative the coupling device 86.

The first surface 63 and the opposite second surface 64 of the third guiding groove 74 may determine the displacement range, in the first direction 91 and the second direction 92, respectively, of the puncher 81 relative the coupling device 86.

The coupling device 86 is in the initial position shown in FIG 2 in contact with the second surface 62 of the second guiding groove 73 and the first spring 71 is compressed.

The protruding part of the second part 82 of the guiding device is in the initial position shown in FIG 2 in contact with the first surface 103 of the first guiding groove 102.

The coupling device 86 is in the outer end position shown in FIG 3A in contact the second surface 64 of the third guiding groove 74 and the second spring 71 is compressed.

The protruding part 87 of the second part 82 of the guiding device is in the outer end position shown in FIG 3A in contact with the second surface 104 of the first guiding groove 102.

The puncher 81 may be displaceable a longer distance in the first direction than the tongue guiding device.

The first part 83 of the tongue guiding device may be displaceable a longer distance in the first direction than the second part 82 of the guiding device.

The puncher 81 and the tongue guiding device may be displaceable in a second direction 92, which is opposite the first direction 91, towards initial positions of the puncher 81 and the tongue guiding device, respectively.

The device may comprise a displaceable tongue queue stopper 84 for controlling a feeding of a new tongue, the tongue queue stopper 84 is preferably configured to cooperate with a protruding part 85 on the tongue guiding device.

The protruding part 85 which is configured to displace the tongue queue stopper 84 may be attached to the coupling device 86. The protruding part 85 may not be displaceable relative the coupling device 86.

The device may be configured such that a new tongue 30''' is displaced into the tongue guiding device when the first part 83 of the tongue guiding device has reached, or is about to reach, its initial position. The new tongue and tongues in the tongue queue are preferably identical or essentially identical to the tongue.

The puncher 81 and the tongue guiding device may be displaceable in relation to a tongue queue device 100 which may be stationary.

The device preferably comprises a spring element between a power unit, such as a motor (not shown), and the puncher 81. The spring element may have the advantage that the device and/or the panel are not damaged in case any one of the panel, the insertion groove and the puncher is/are positioned in a wrong position(s).

The device may comprise a motor (not shown), such as an electric motor or a pneumatic motor, configured to drive the puncher 81 in the first direction 91 and preferably in a second direction 92, which is opposite to the first direction.

The tongue queue stopper 84 is preferably coupled to the device by a spring element 75. The tongue queue stopper may be displaced in one direction 93 by cooperation with the tongue guiding device and displaced in a return direction 94 by the spring element.

An advantage of this embodiment of the device may be that only one motor is required to drive the puncher, the guiding device and the tongue queue stopper.

Embodiments of the tongue 30, which may be displaceable in an insertion groove 20, see FIGS 6A-6D, are shown in FIGS 4A-4D. A first embodiment of the tongue, which is shown in FIG 3A-3B, comprises bendable protruding parts 31 at a first long edge of the tongue. The first embodiment is shown in a relaxed state in FIG 4A and in a compressed state in FIG 4B. A second long edge of the tongue is preferably essentially straight. The first embodiment may be inserted into the insertion groove with the bendable protruding parts facing towards a bottom of the insertion groove and the second edge extending beyond an opening of the

insertion groove. A second embodiment of the tongue, which is shown in FIG 4C in a relaxed state, is of an elongated shape and flexible. The second embodiment comprises a recess 37 at a first long edge of the tongue and a second edge which is essentially straight. The recess is decreased in a compressed state of the second embodiment. The second embodiment may be inserted into the insertion groove with the recess 37 facing towards a bottom of the insertion groove and the second edge extending beyond an opening of the insertion groove. A third embodiment of the tongue, which is shown in FIG 4D, comprises a first part 38, which is flexible and configured to be compressed, and a second part 39 which is rigid. The first part may be arranged in the insertion groove and the second part may partly extend beyond an opening of the insertion groove.

The tongue may be configured as any of the embodiments of the displaceable tongue disclosed in, e.g., WO 2006/043893 and WO 2007/015669, the entire contents of which are hereby expressly incorporated herein by reference.

The tongue may be flexible and made of, e.g., a polymer and preferably comprising a reinforcement material, such as a fibre, e.g., fiberglass.

Another embodiment of the tongue 30 is shown in FIGS 5A-5D. The tongue is of an elongated shape and comprises a first short edge 34, an opposite second short edge 36, first long edge and a second long edge 32. FIG 5D shows an enlargement of the encircled area A indicated in FIG 5A. The tongue comprises several bendable parts 31 at the first long edge and a groove 33 at each bendable part 31. The tongue comprises a polymer material and is preferably produced by injection moulding. The bendable part 31 is configured to be pushed into the groove 33 in a compressed state of the tongue.

FIG 5A shows an embodiment of tongue which is connected to several tongues (not shown) in a tongue blank by a first rail 35 at the first short edge 34 and by a second rail 37 at the second short edge 36. The first rail and the second rail extend in a length direction perpendicular to the tongue. The tongue may be connected to the first rail and/or the second rail, which may be casting gates, by a first and a second casting gate 41,42, respectively.

FIG 5B and FIG 5C show the tongue 30 in a cross cut view. The tongue is in FIG 5B in a relaxed state an in FIG 5C in a compressed state. A distance between an outer part of the bendable part 31 and the second long edge 32 is shorter in the compressed state compared to in the relaxed state.

The tongue is preferably configured to be inserted into an insertion groove of a panel for locking the panel to an adjacent panel.

FIGS 6A-6D shows embodiments of the panel 1, each comprising an embodiment of the tongue 30 inserted in an embodiment of the insertion groove 20, connected to an adjacent panel 2. The embodiments of the panel shown in FIGS 6A-6D may be furniture panels. The embodiment of the panel shown in FIG 6C may also be a floor panel.

FIG 6A shows the panel 1 arranged perpendicular to an adjacent panel 2 and locked to the adjacent panel in a first direction and in a second direction, which is perpendicular to the first direction. The panel comprising an edge groove 21 at an upper surface of the panel. The edge groove 21 is of a longitudinal shape and extends along an edge of the panel 1. The edge groove comprising said insertion groove 20, which is extending along the edge groove, comprising said tongue 30. The adjacent panel comprises an edge tongue 22 which comprises a tongue groove 10 extending along an edge of the adjacent panel. The tongue 30 is configured to cooperate with the tongue groove 10 for locking together the panel 1 with the adjacent panel 2 in the first direction. The edge tongue 22 is configured to cooperate with the edge groove 21 for locking together the panel 1 with the adjacent panel 2 in the second direction.

FIG 6B shows the panel 1 arranged perpendicular to an adjacent panel 2 and locked to the adjacent panel in a first direction and in a second direction, which is perpendicular to the first direction. The adjacent panel comprising an edge groove 21 at an upper surface of the adjacent panel. The edge groove 21 is of a longitudinal shape and extends along an edge of the adjacent panel 1. The edge groove comprises a tongue groove 10. The panel comprises an edge tongue 22 which comprises said insertion groove 20 comprising said tongue 30. The insertion groove is extending along the edge tongue. The tongue 30 is configured to cooperate with the tongue groove 10 for locking together the panel 1 with the

adjacent panel 2 in the first direction. The edge tongue 22 is configured to cooperate with the edge groove 21 for locking together the panel 1 with the adjacent panel 2 in the second direction.

FIG 6C shows the panel 1 arranged parallel to an adjacent panel 2 and locked to the adjacent panel in a first direction and in a second direction, which is perpendicular to the first direction. The panel comprising said insertion groove 20 which is extending along an edge of the panel. The edge comprises a strip protruding from the edge and the strip comprises an upwardly protruding locking element. The adjacent panel 2 comprises a tongue groove 10 extending along an adjacent edge of the adjacent panel 2. The adjacent edge comprises a locking groove with an opening facing downwards. The tongue 30 is configured to cooperate with the tongue groove 10 for locking the panel to the adjacent panel in a first direction and the locking element is configured to cooperate with the locking groove for locking the panel to the adjacent panel in the second direction. An embodiment of the said first and second panel comprises the insertion groove 20 at the adjacent edge of the adjacent panel and the tongue groove 10 at the edge of the panel.

FIG 6D shows an embodiment of the panel and the adjacent panel shown in FIG 6A in a 3D-view. The edge tongue 22 is extending along the edge 4 of the adjacent panel and ends before an adjacent edge 6 of the adjacent panel 2. The edge groove 21 is extending along the edge 3 of the panel 1 and ends at a side wall 23 before an adjacent edge of the 5 of the panel 1.

A core material of embodiments of the panel and the adjacent panel described above may comprises a wood fibre based board, such as a HDF, MDF, plywood, solid wood or particleboard, or a reinforced plastic board or a wood fibre composite board. The core may be provided with a decorative layer.

CLAIMS

1. A method for inserting a tongue in an insertion groove in a panel by a device, wherein the method comprises:

- displacing a tongue guiding device in a first direction (91) by displacing a puncher (81) in the first direction (91), and
- displacing a tongue (30) between a first part (83) and a second part (82) of the tongue guiding device and into an insertion groove (20) in panel by further displacing the puncher (81).

2. The method as claimed in claim 1, comprising displacing the puncher (81) in the first direction (91) a longer distance than said displacing of the tongue guiding device.

3. The method as claimed in claim 1 or 2, comprising displacing the first part (83) of the tongue guiding device a longer distance in the first direction (91) than the second part (82) of the guiding device.

4. The method as claimed in any of the claims 1 - 3, comprising displacing the puncher (81) and the tongue guiding device in a second direction (92), which is opposite the first direction (91), towards initial positions of the puncher (81) and the tongue guiding device, respectively.

5. The method as claimed in claim 4, comprising displacing a tongue queue stopper (84) in a direction (93) by the tongue guiding device, preferably by a protruding part (85), and feeding a new tongue (30’’’).

6. The method as claimed in claim 5, comprising displacing the new tongue (30’’’) into the tongue guiding device when a first part (83) of the tongue guiding device has reached, or is about to reach, its initial position.

7. The method as claimed in any one of the claims 1-6, comprising displacing the puncher (81) and the tongue guiding device in relative a tongue queue device (100) which is stationary.

8. The method as claimed in any one of the claims 1-7, comprising displacing the puncher (81) in the first direction (91), and preferably in a second direction (92),

which is opposite to the first direction, by a motor, such as an electric motor or a pneumatic motor.

9. A device for inserting a tongue in an inserting groove in a panel, wherein the device comprises a tongue guiding device, which is displaceable in a first direction (91), and a puncher (81), which is configured to displace a tongue (30) between a first part (83) and a second part (82), into an inserting groove (20) in a panel, wherein the tongue guiding device is configured to be displaced by the puncher, which is displaceable in the first direction (91).

10. The device as claimed in claim 9, wherein the puncher (81) is displaceable a longer distance in the first direction than the tongue guiding device.

11. The device as claimed in claim 9 or 10, wherein the first part (83) of the tongue guiding device is displaceable a longer distance in the first direction than the second part (82) of the guiding device.

12. The device as claimed in any of the claims 9 - 11, wherein the puncher (81) and the tongue guiding device are displaceable in a second direction (92), which is opposite the first direction (91), towards initial positions of the puncher (81) and the tongue guiding device, respectively.

13. The device as claimed in claim 12, wherein the device comprises a displaceable tongue queue stopper (84) for controlling a feeding of a new tongue, the tongue queue stopper (84) is preferably configured to cooperate with a protruding part (85) on the tongue guiding device.

14. The device as claimed in any one of the claims 9-13, wherein the device is configured such that a new tongue (30''') is displaced into the tongue guiding device when the first part (83) of the tongue guiding device has reached, or is about to reach, its initial position.

15. The device as claimed in any one of the claims 9-14, wherein the puncher (81) and the tongue guiding device are displaceable in relative to a tongue queue device (100) which is stationary.

16. The device as claimed in any one of the claims 9-15, wherein device comprises a motor, such as an electric motor or a pneumatic motor, configured to drive the

puncher (81) in the first direction (91), and preferably in a second direction (92), which is opposite to the first direction.

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FIG 1A

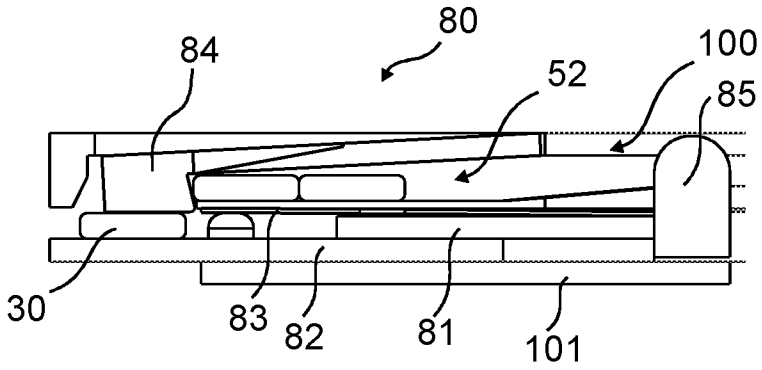


FIG 1B

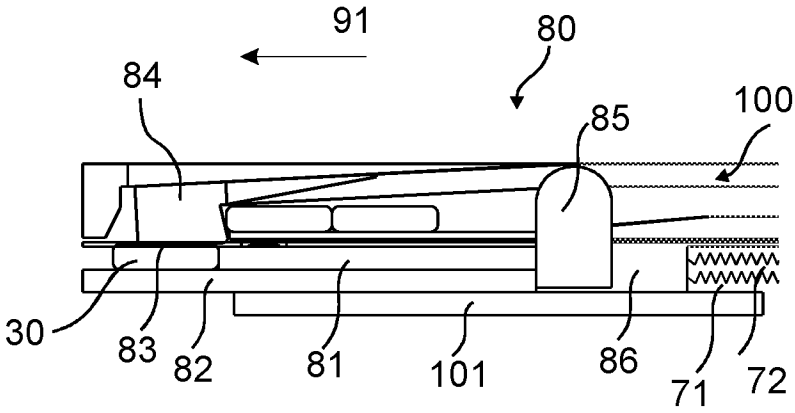


FIG 1C

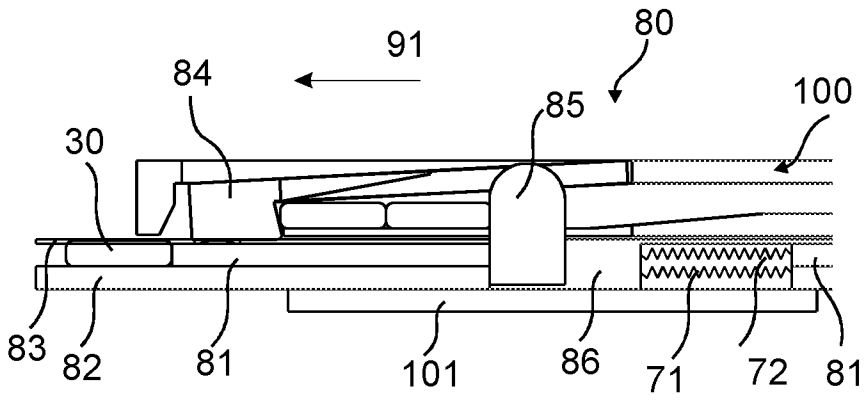


FIG 1D

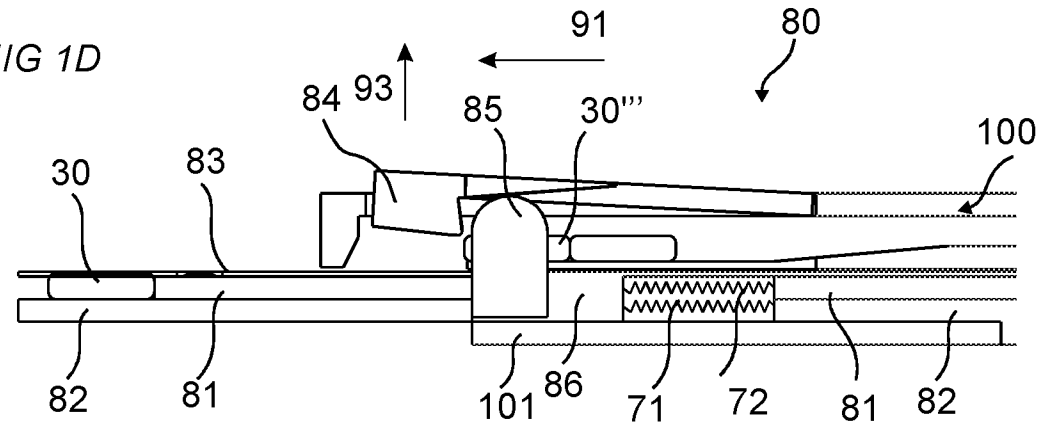
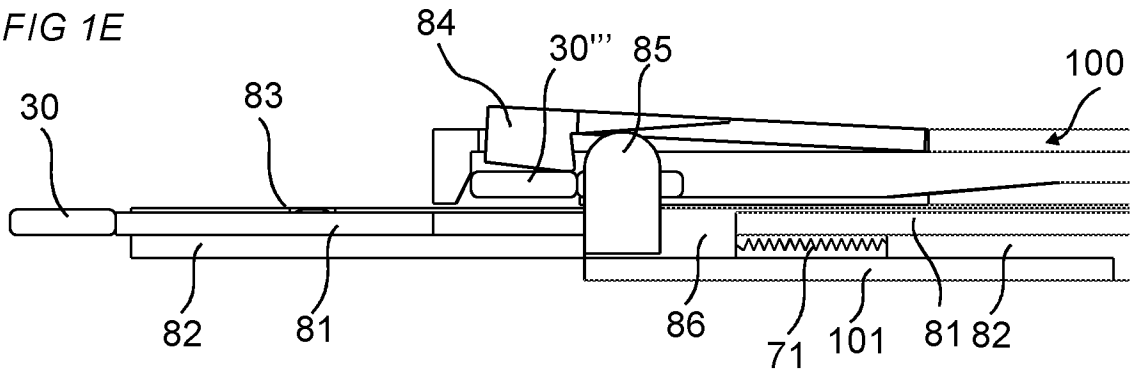


FIG 1E



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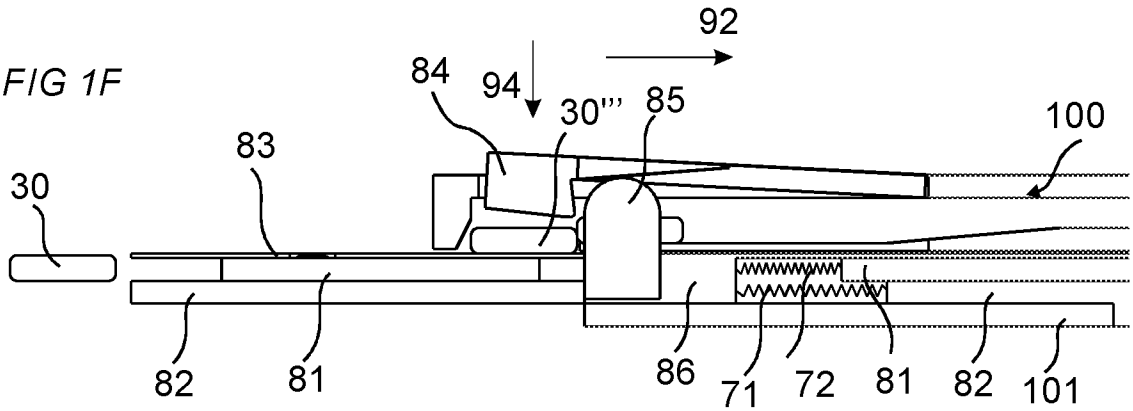


FIG 1G

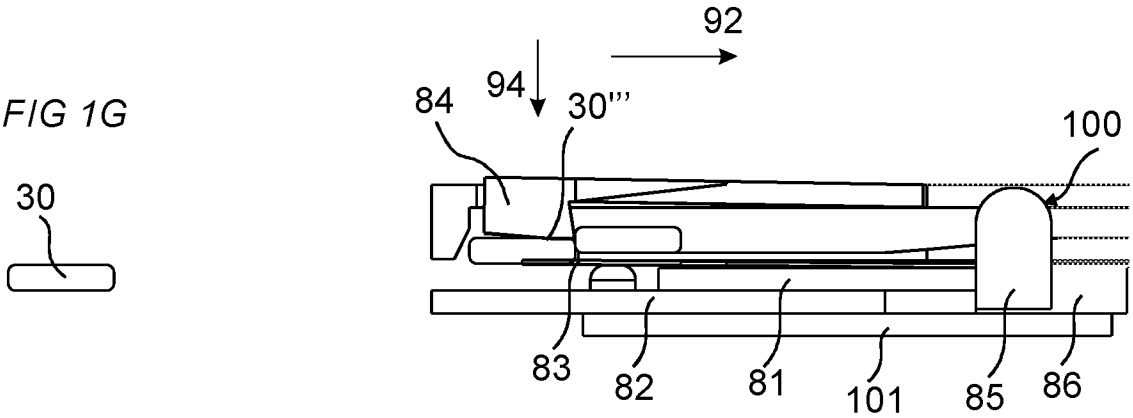
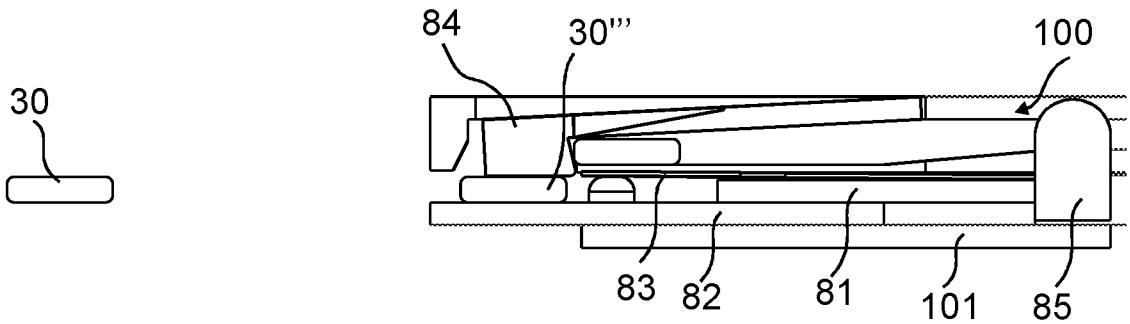


FIG 1H



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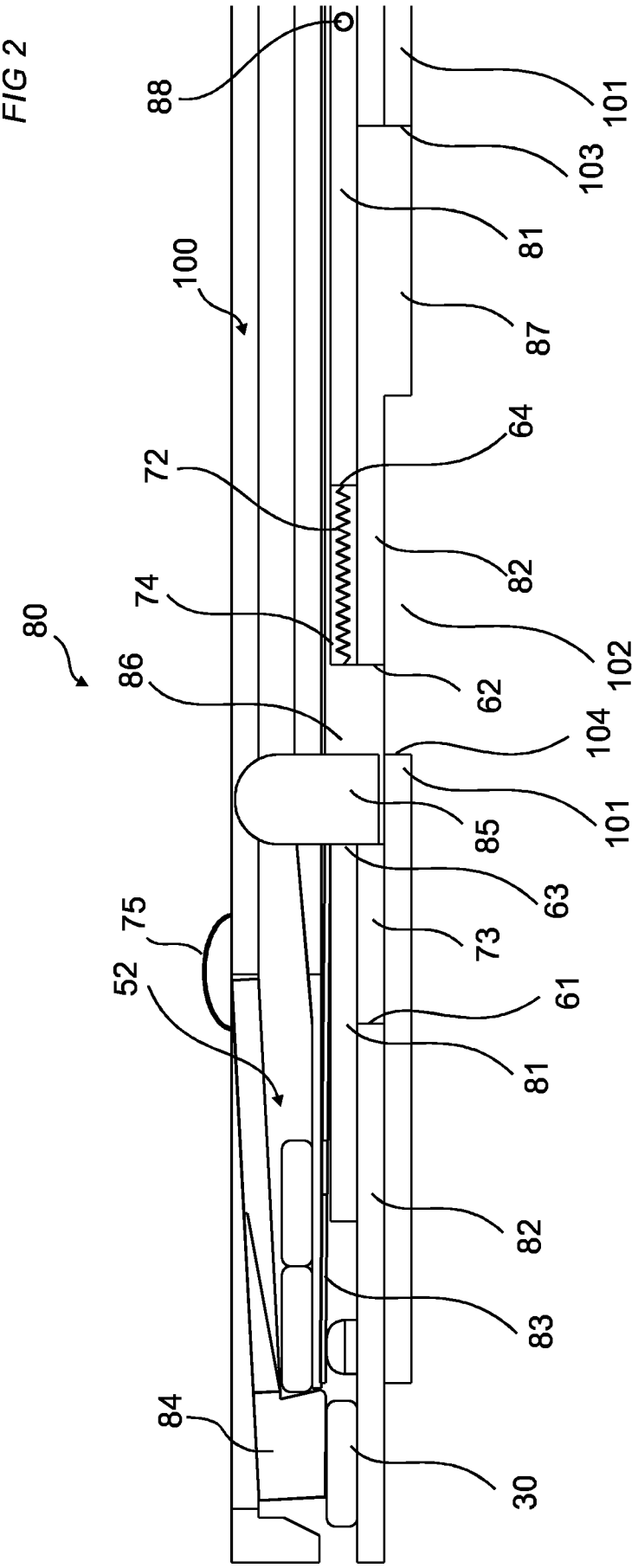
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FIG 3A

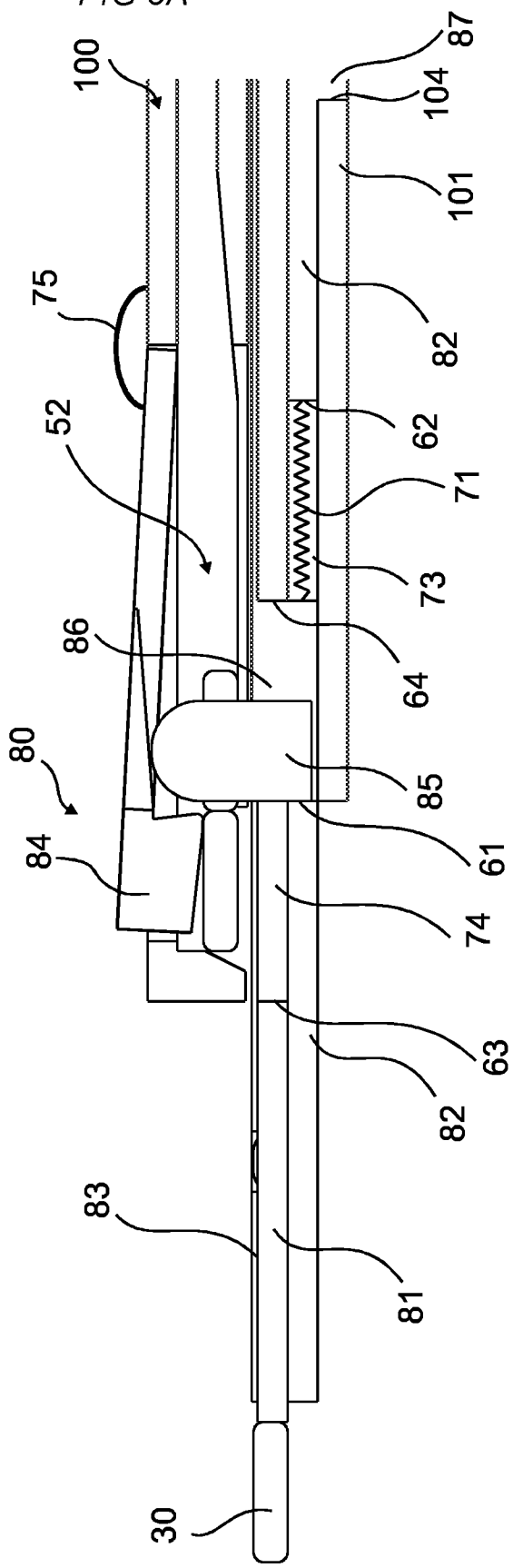
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FIG 3B

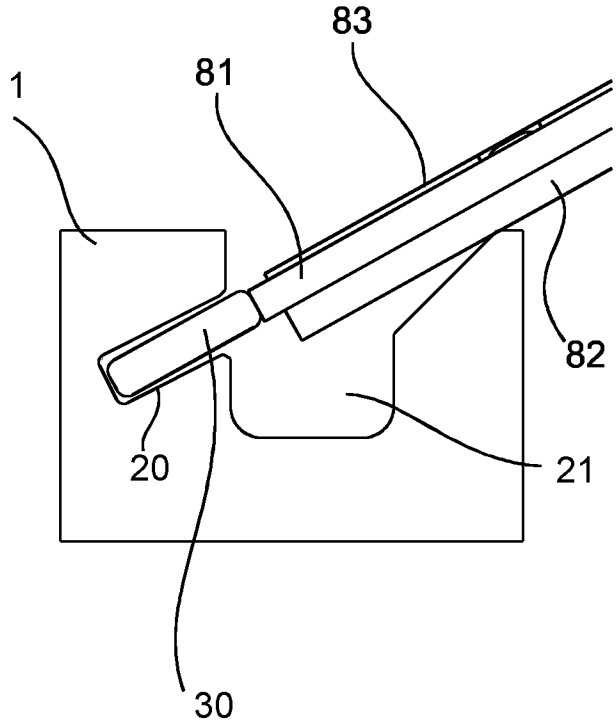
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FIG 4A

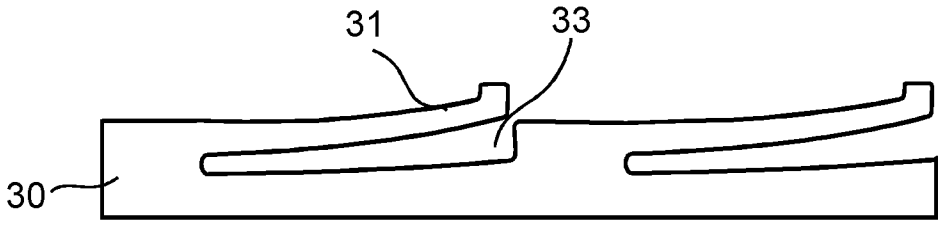


FIG 4B

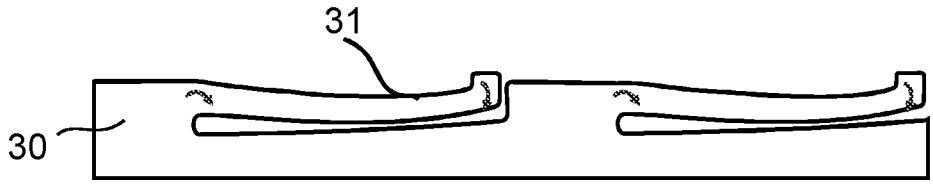


FIG 4C

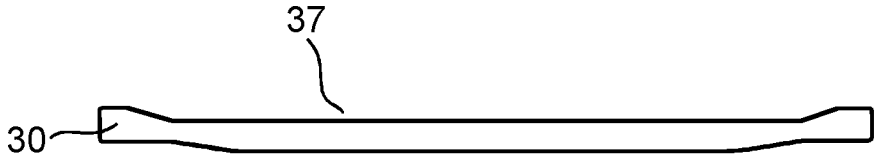


FIG 4D

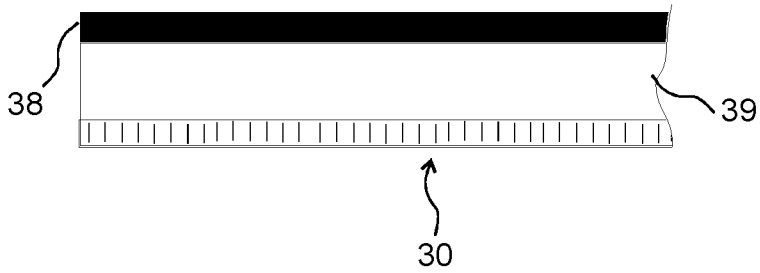


FIG. 5A

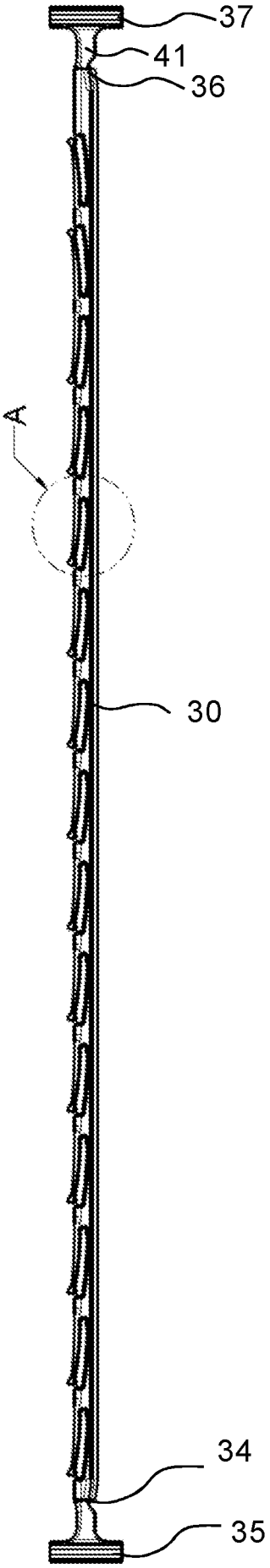


FIG 5B

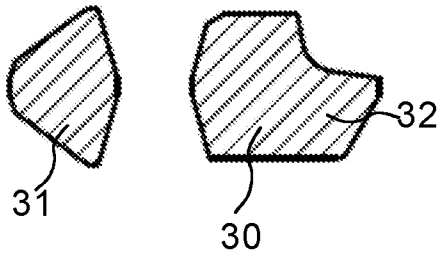


FIG 5C

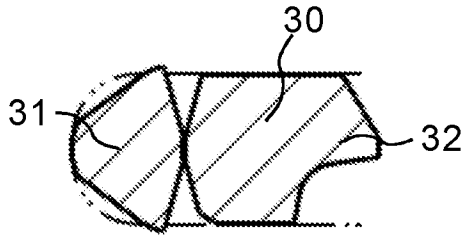


FIG. 5D

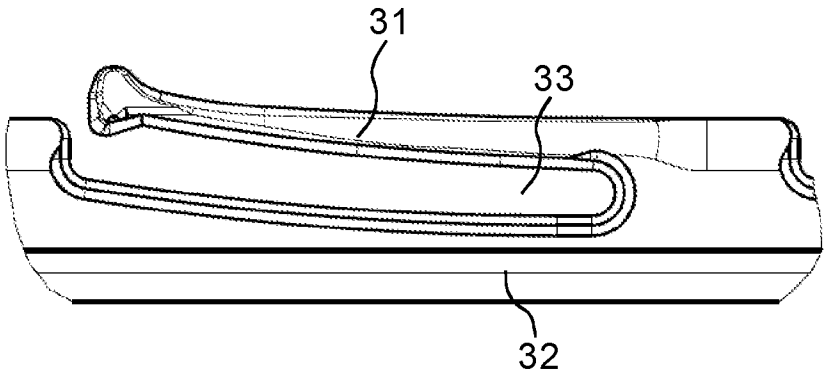


FIG 6A

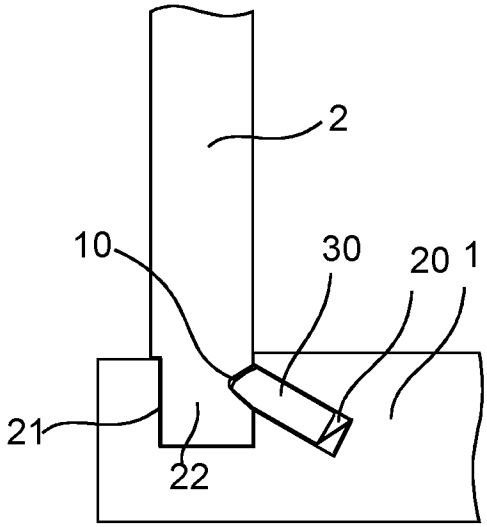


FIG 6B

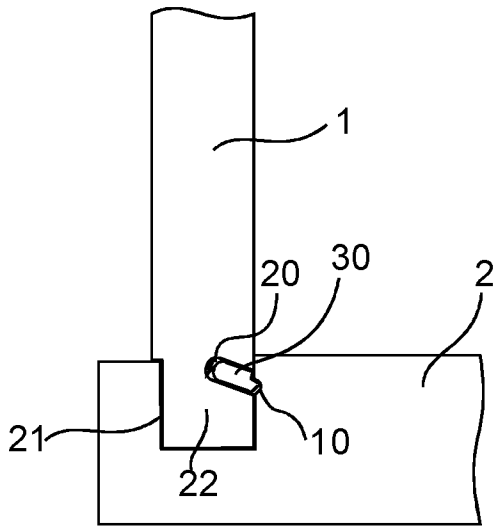


FIG 6C

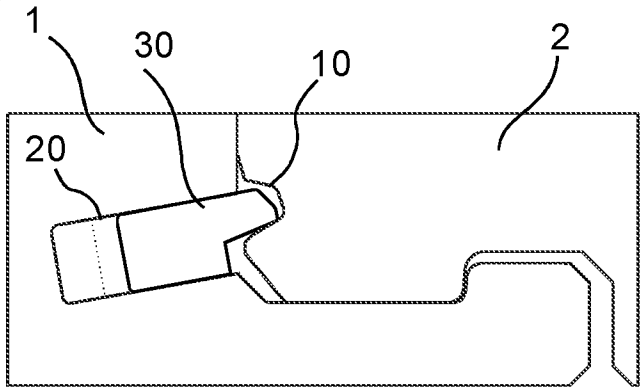
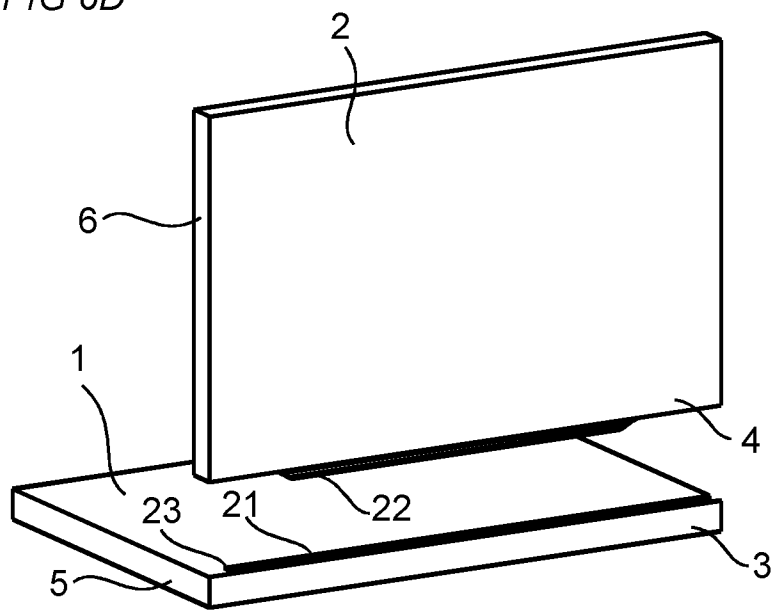


FIG 6D



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2017/050717

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: B25B, B27M, E04F, F16B

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.
A	EP 1650375 A1 (VAELINGE INNOVATION AB), 26 April 2006 (2006-04-26); abstract; figures --	1-16
A	US 20130042563 A1 (PERVAN DARKO ET AL), 21 February 2013 (2013-02-21); abstract; figures --	1-16
A	WO 2010087752 A1 (VAELINGE INNOVATION BELGIUM BV ET AL), 5 August 2010 (2010-08-05); abstract; figures --	1-16
A	EP 2689904 A1 (BARLINEK SA), 29 January 2014 (2014-01-29); abstract; figures --	1-16

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Date of the actual completion of the international search	Date of mailing of the international search report
19-09-2017	19-09-2017

Name and mailing address of the ISA/SE	Authorized officer
Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Cecilia Forslund Telephone No. + 46 8 782 28 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2017/050717

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 20140338177 A1 (VERMEULEN BRUNO PAUL LOUIS ET AL), 20 November 2014 (2014-11-20); abstract; figures --	1-16
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International application No.
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Continuation of: second sheet

International Patent Classification (IPC)

E04F 15/02 (2006.01)
B27M 3/04 (2006.01)
B27M 3/18 (2006.01)
F16B 12/26 (2006.01)

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