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(54) PANELLING SYSTEM AND CONNECTOR

(57) A planar panelling arrangement comprising: a plurality of elongate supports aligned in parallel with each other, each support being a single integral component comprising, on one face of the support, a central channel aligned parallel to the longitudinal axis of the support, the central channel having a longitudinal aperture which is narrower than the width of the inner walls of the channel; a plurality of connectors, each connector comprising a first portion and a second portion; a plurality of panels configured to be arranged to collectively form a planar surface, the sides of each panel comprising a side groove; wherein the first portion of the connector is configured to clip securely into the channel of the support, the second portion of the connector comprises at least one lateral flange configured to be inserted into the side groove of a panel.

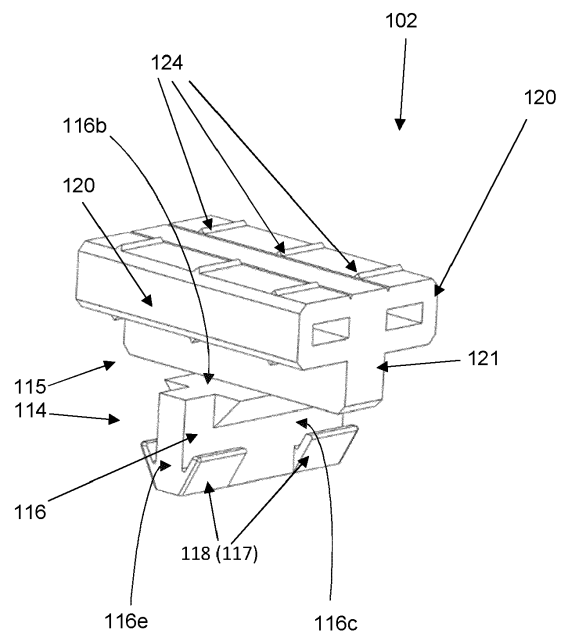


Figure 3A

Description

TECHNICAL FIELD

[0001] The present disclosure relates to an improved panel system or panelling system and an improved method for assembling or installing such a panel system or panelling system. Panelling systems are used in flooring or decking or fencing arrangements. The disclosure relates to a panelling or flooring or decking surface, comprising a plurality of panels or planks or slats or tiles or flooring surface elements, each of them being securely, but removably, attached to supports or beams or supports or elements or elements, below or behind the panels or planks or slats or tiles or flooring elements.

[0002] In particular, the disclosure relates primarily to an arrangement and method for secure, but flexible and reversible, attachment of the panels, planks, slats, tiles or flooring surface elements, to the supports or beams or supports or support elements. The panelling surfaces, thus assembled or installed, may be in a horizontal plane or vertical plane or inclined plane. The arrangement and method disclosed herein is simple and convenient for the user or operator or installer to use. The supports or supports or elements are generally rigid components which are themselves firmly secured directly or indirectly to a base or floor of a building or external terrain: the supports or supports or elements may be aligned parallel to the base or floor of a building or external terrain, where for example the final panelling surface is intended to be aligned in horizontal plane, but may also be aligned perpendicular or obliquely to the a base or floor of a building or external terrain, where for example the assembled panelling surface is intended to be aligned in a vertical plane. In view of the attachment to the supports or supports beneath or behind it, the surface formed by the panels is displaced or raised with respect to the base or floor of a building or external terrain to which the supports or supports are attached. In the case of horizontal panelling surfaces, the flooring or decking surface is raised or elevated above the true floor level and effectively forms a new floor level.

[0003] More specifically, the present disclosure relates to an improved panelling system in which the panels, planks, slats, tiles or flooring surface elements, are attached to the supports or beams or supports or support elements via connecting elements or connectors, which may be positioned or located in accordance with the dimensions of the panelling surface elements. The system will accommodate a vast range of panel dimensions and materials according to user needs and preferences.

[0004] In the interests of brevity, this document hereinafter refers to panels or planks or slats or tiles or surface elements etc, which, after installation, are configured to form an outer external surface or a floor surface, as appropriate, as "*panel(s)*", and refers to the beams or supports or supports or elements or underfloor components, which are generally elongate and form the structure to

which the panels are attached (by means of connectors), as "*support(s)*". The reader will understand that such terms are applied generally and are not limiting.

BACKGROUND OF THE INVENTION

[0005] In general, conventional panelling systems rely on complex structures to attach panels to supports. Intermediate components by which the panels are fixed to the supports are difficult and expensive to manufacture, as well as inconvenient to use. The intermediate components in such conventional systems are designed for panels of specific predetermined dimensions and shapes and are not sufficiently flexible to accommodate any other dimensions and shapes.

[0006] Moreover, in conventional systems both the supports and the panels are generally elongate in format, and, using the intermediate components of conventional systems, the panels must be aligned perpendicular to the supports in order to attach them to the supports. This is a considerable disadvantage: the alignment of the panels is determined by the alignment of the supports and if, for whatever reasons, the alignment of the supports is constrained by the floor surface (or the building itself) to which the supports are fixed, the alignment of the panels is correspondingly constrained.

[0007] In view of their complexity, conventional panelling systems are difficult, time-consuming and inconvenient to install.

OBJECTIVE TECHNICAL PROBLEM

[0008] It is an objective of the present disclosure to provide a panelling system and method of installation which eliminates the shortcomings set out above.

[0009] An objective of the apparatus and method disclosed herein is to provide a system and installation method which accommodates all dimensions and shapes of panel. A yet further objective of the apparatus and method of the current disclosure is to provide a system and process which facilitates alignment of the panels in any direction.

[0010] It is an objective of the system and method disclosed herein to provide a novel and inventive panelling system which provides panelling which is firm and stable, but may be installed easily and conveniently by an untrained installer.

BRIEF DESCRIPTION OF THE FIGURES

[0011] Reference is now made to certain embodiments of the apparatus and method according to the invention, one or more examples of which are illustrated among the accompanying drawings.

Figures 1A and 1B are perspective views of an embodiment of the invention.

Figure 2 is a cross-sectional view of a support according to an embodiment of the invention.

In Figures 3A, 3B and 3C perspective views and side views are provided of a connector according to an embodiment of the invention.

Figure 4 is a cross-section of a connector in accordance with an embodiment of the invention.

Figure 5A is cross-section of two adjacent panels according to an embodiment of the invention and Figure 5B is the same cross-section of the panels but with the connector inserted between the two panels.

Figures 6A provides a perspective view of a connector inserted into a support in accordance with an embodiment of the invention, while Figures 6B and 6C provide cross-sectional views of the same.

In Figures 7A, 7B and 7C perspective views and side views of a connector with a rotary joint according to an embodiment of the invention are provided.

Figure 8A is an exploded view of a connector with a rotary joint, according to an embodiment of the invention; Figure 8B is the same exploded view in cross-section and Figure 8C shows the same components rotatably attached.

Figures 9A and 9B are perspective views of an embodiment of the invention including endpieces and edgepieces at the termination of supports; Figures 9C and 9D show cross-sectional views of the same arrangement as in Figures 9A and 9B, before the attachment of the edgepiece and after the attachment of the edgepiece.

Figures 10A is a perspective view of an embodiment of the invention including endpieces and edgepieces at the termination of panels; Figures 10B and 10C show cross-sectional views of the same arrangement as in Figures 10A, before the attachment of the edgepiece and after the attachment of the edgepiece.

STATEMENT OF THE INVENTION

[0012] This disclosure relates to a novel and inventive connector for connecting a planar panel to an elongate support in a planar panelling arrangement. In an embodiment of the invention the panel comprising, at each side, a side groove, a face of the support comprising a central elongate channel with an elongate channel aperture, the channel and channel aperture being aligned parallel to the longitudinal axis of the support, wherein the connector comprises a first portion and a second portion, the

first portion being configured to clip securely into the central channel, the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.

[0013] In an embodiment of a connector according to the invention the first portion of the connector comprises at least one clip arrangement, each clip arrangement being positioned on a longitudinal surface of the first portion and being configured to clip the first portion into the central channel of the support.

[0014] In an embodiment of a connector disclosed herein the at least one clip arrangement comprises at least one clip projection.

[0015] In an exemplary aspect of a connector the channel aperture is narrower than the width of the inner walls of the channel, wherein the at least one clip projection is made of a resilient material capable of flexure during insertion into a longitudinal aperture of the central channel.

[0016] In an embodiment of the invention at least one clip projection is aligned at an angle to the first portion.

[0017] In a connector according to an embodiment of the invention each clip arrangement comprises two clip projections arranged in a V-formation about the longitudinal axis of the first portion.

[0018] In a further aspect of a connector according to the invention the at least one clip arrangement is dimensioned to be wider than the width of the channel aperture and to flex inwardly when inserted into the channel aperture.

[0019] In a connector according to an embodiment of the invention the second portion of the connector comprises a base and two laterally extending flanges, the flanges and the base collectively arranged in a T-formation.

[0020] In an exemplary aspect of the apparatus herein disclosed the base and flanges of the second portion of each of the plurality of connectors are configured to support each of the plurality of panels at an equal distance from the support.

[0021] In an embodiment of the connector herein disclosed the first and second portions of the connector are fixedly attached to each other.

[0022] In an embodiment of the current disclosure the fixed attachment of the first and second portions of the connector are fixedly aligned to the first and second portions at right angles to each other.

[0023] In an aspect of a connector according to the invention the first and second portions of the connector are rotatably attached to each other and are configured to allow relative rotational displacement between the first and second portions.

[0024] In an embodiment of a connector according to the current disclosure the rotatably attachment of the first and second portions of the connector comprises a cylindrical column extending from the second portion and a cylindrical well in the second portion, the well comprising a first aperture and a second aperture at the respective ends of the well, the column being configured to be in-

serted into the first aperture of the well and to rotate freely within the well.

[0025] In a version of the apparatus herein disclosed the cylindrical column comprises a plurality of elongate column projections interspaced by spaces, the column projections being arcuate in cross-section, the cross-sections of the column projections and the inter-projection spaces being arranged to form an annulus.

[0026] In an embodiment of the connector according to the invention each of the plurality of column projections is configured to be flexed inwards by the inner walls of the well when the column is inserted into the well, each column projection further comprising, at a distal end of an outer surface of the column projection, a column flange, each column flange being configured to clip onto the second aperture of the well and rotatably attach the column to the well.

[0027] In a further exemplary aspect of the invention a planar panel is foreseen for connection by a connector to a planar panel to an elongate support in a planar panelling arrangement, the planar panel comprising, at each side thereof, a side groove, the support comprising, at one face thereof, a central elongate channel with an elongate channel aperture, the channel and channel aperture being aligned parallel to the longitudinal axis of the support, the connector comprising a first portion and a second portion, the first portion being configured to clip securely into the central channel, the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.

[0028] An embodiment of the invention relates to an elongate support for connection by a connector to a planar panel in a planar panelling arrangement, the support comprising, at one face thereof, a central elongate channel with an elongate channel aperture, the channel and channel aperture being aligned parallel to the longitudinal axis of the support, the planar panel comprising, at each side thereof, a side groove, the connector comprising a first portion and a second portion, the first portion being configured to clip securely into the central channel, the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.

[0029] An embodiment of the invention relates to planar panelling arrangement comprising a plurality of elongate supports aligned in parallel with each other, each support being a single integral component comprising, on one face of the support, a central channel aligned parallel to the longitudinal axis of the support, the central channel having a longitudinal aperture which is narrower than the width of the inner walls of the channel; a plurality of connectors, each connector comprising a first portion and a second portion; a plurality of panels configured to be arranged to collectively form a planar surface, the sides of each panel comprising a side groove; wherein the first portion of the connector is configured to clip securely into the channel of the support, the second portion of the connector comprises at least one lateral flange configured to be inserted into the side groove of a panel.

[0030] In a further embodiment of the invention a panelling arrangement comprises at least one support endpiece configured to attach to the end of at least one support and a support edgepiece configured to attach to the at least one support endpiece.

[0031] In an exemplary aspect of a panelling arrangement according to the invention, the panelling arrangement further comprising at least one panel endpiece configured to attach to the end of at least one panel and a panel edgepiece configured to attach to the at least one panel endpiece.

[0032] In an embodiment of the invention the planar panelling arrangement forms a horizontally aligned flooring surface of a flooring system, the supports being secured to a horizontal surface.

[0033] In an embodiment of the panelling arrangement herein disclosed the planar panelling arrangement is aligned vertically, the supports being vertically aligned posts.

[0034] This disclosure also relates to a novel and inventive method for connecting a planar panel to an elongate support in a planar panelling arrangement, wherein the panel comprises, at each side, a side groove, the method comprising providing a support comprising a central elongate channel with an elongate channel aperture, the channel and channel aperture being aligned parallel to the longitudinal axis of the support, and providing a connector comprising a first portion and a second portion, the first portion being configured to clip securely into the central channel, the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.

DETAILED DESCRIPTION OF THE FIGURES AND EMBODIMENTS

[0035] The description makes use of certain numerical and letter references as appropriate to refer to features in the drawings. The same or similar references in the drawings and description have been used to indicate the same or similar parts of the apparatus.

[0036] Unless indicated otherwise by the context, any use of terms such as "first", "second", "third", "next", "successive", "last", as well as "highest", "higher", "upper", "top", "lowest" and "lower" are adopted to distinguish one component from another, and are not intended to define any position, physical location, alignment, structure or actual order, or importance of the components specified, or to limit the alignment or structure of the embodiments described herein.. The singular forms "a", "an", and "the" include plural references, unless, based on the context, this is clearly not the case.

[0037] The figures illustrate panelling arrangements formed in a horizontal plane, as in a flooring surface, but it is not envisaged that the panelling arrangements according to the invention be limited to formations of panels in a horizontal plane. Although not illustrated in the figures, the panels and panelling arrangements are also

envisaged to be formed in a vertical plane, or in planes oriented between the horizontal or the vertical. The secure fixing of the supports may occur in a horizontal plane, being aligned parallel to the base or floor of a building or external terrain, or the supports may be erected vertically, in a manner analogous to posts of a fence, being aligned perpendicular or obliquely to the base or floor of a building or external terrain to which they are attached or in which they are inserted. All orientations of the plane of the assembled panelling arrangements are envisaged.

[0038] Reference will be made in detail to examples and embodiments of a frame assembly, one or more of which are illustrated in the drawings. The embodiments and examples are provided for the purpose of explanation and not to limit the invention in any way. It will be apparent to those skilled in the art that various modifications and variations may be made in the present invention within the scope of the invention which is defined in the claims. Features illustrated or described as present in any one embodiment may also be used with another embodiment, thereby providing a yet further embodiment. The present invention covers any variations, amendments and modifications which fall within the scope of the accompanying claims and their equivalents.

[0039] Various embodiments, aspects and implementations of the present invention, as well as technical objectives and advantages will be apparent to those skilled in the art, upon consideration of the description herein, in combination with the drawings.

[0040] Figs 1A and 1B provide a general overview of system according to an embodiment of the invention, illustrating the relative positions of supports (101), connectors (102) and panels (103). The plurality of panels (103) collectively form an external surface, for example an upper surface or platform or floor. The supports (101) in flooring scenarios are beneath the panels (103), as illustrated (but may be adjacent the panels (103), as appropriate, in other scenarios). In the embodiment illustrated there is a plurality of elongate supports (101), each with a central longitudinal channel (104), and a plurality of panels (103) above the supports (101), the panels (103) being attached to the supports (101) by means of a plurality of connectors (102).

[0041] Each panel (103) is attached to at least one of the supports (101) and each support (101) is attached to at least one panel (103). In an embodiment of the invention, it is envisaged that at each location where a side (105) of a panel (103) traverses the central longitudinal channel (104) of a support (101), the panel (103) is attached to that support (101) by a connector (102). In other words, at each such location there is an attachment between a panel (103) and the support channel (104).

[0042] In the overview of Figs 1A and 1B there are a plurality of such panel/support attachments. In the embodiment illustrated in Fig 1A it is envisaged that, for each panel (103), a pair of connectors (102,102) attach the panel (103) to a particular support (101). In the perspec-

tive of Fig 1A only a first connector (102) (on the leftmost panel) of each pair (102,102) of connectors is visible, the other (102b) being obscured behind the panel (103). In Fig 1B the second connector (102b) of each pair (102,102), on the other side of the panel (103) to the first connector (102) of the pair (102,102), is also visible (between the leftmost panel (103) and the adjacent panel (103)).

[0043] As explained in a later passage, in accordance with an embodiment of the invention, the connectors (102) are configured to insert into side grooves (106) in the side (105) of the panels (103), such that two connectors (102) are configured to together clamp a panel (103) on either side of the panel (103), each of the two connectors (102) being attached to a single support (101). In other words, each support (101) is attached at two points on the support (101), using two connectors (102), to a panel (103).

[0044] Two connectors (102, 102) are located at two points on the support (101), the separation between the two connectors (102, 102) on the support (101) being arranged by the installer to the substantially match the width of the panel (103), such that the two connectors (102) together engage with the side grooves (106) on opposite sides (105) of the panel (103) in order to effectively clamp the panel (103), as mentioned above.

[0045] In another embodiment of the invention a panel (103), not illustrated herewith, may be attached to a particular support (101) just by connectors (102) located on only one side (105) of the panel (103), rather than on both sides (105).

[0046] Figs 2 provides a perspective view of a support (101) in accordance with the invention, before the attachment of any connectors (102) or panels (103). Each support (101) is elongate and linear in form and is a single integral unit composed of a suitable rigid material. As stated previously, the support (101) comprises a central longitudinal channel (104). The central longitudinal channel (104) of each support (101) is open on one side with a longitudinal opening, the central longitudinal aperture (107). The channel (104) and the aperture (107) are configured to receive a portion of a connector (102), with both the channel (104) and its aperture (107) extending longitudinally along the entire length of the support (101). The channel (104) may have the form of a rectangular well in cross-section, its inner walls (108) and base (109) being planar in form, the walls (108) being perpendicular to the base (109), although any suitable geometry may be envisaged, as long as the connector (102) is attachable to the channel (104), by clipping into the channel, as described later. The cross-section of the support (101) (including its channel (104) and channel aperture (107)) is constant, such that a portion of the connector (102) may be inserted into the aperture (107) and received in the channel (104) at any point along the length of the support (101). Once inserted and locked (see below) within the channel (104), the connector (102) is held securely by the channel (104), but is nevertheless displaceable in a

longitudinal direction along the length of the channel (104), at the convenience of the installer. In order to save material and costs the supports (101) are generally hollow, with at least one support cavity (108) extending in a direction parallel to the longitudinal axis of the support (101) along the entire length of the support (101).

[0047] The width of the aperture (107) is defined by longitudinal abutments (110) which, at the level of the aperture (107), protrude perpendicular to, and inwardly from, each of the inner walls (108) of the central longitudinal channel (104) and serve to reduce the width of the aperture (107), as shown in Fig 2. The longitudinal abutments (110) each extend parallel to the central longitudinal channel (104) along the aperture (107) and accordingly, along the entire length of the support (101), the width of the upper aperture (107) is narrower than the width (between the inner walls (108)) of the central longitudinal channel (104). Each longitudinal abutment (110) has a leading planar surface (111), a planar inner surface (112) and a planar trailing surface (113), the inner surfaces (112) of the two longitudinal abutments (110) facing each other, serving as surfaces against which the clip projections (see later) of a first portion (114) of the connector (102) abut, as described below. The planes of the inner surfaces (112) are parallel to each other and parallel to the inner walls (108) of the channel (104). The depth of the abutments (ie how far the inner surfaces (112) extend into the aperture (107)) is sufficient to cause flexure of the clip projections (described later) during insertion of the connector (102) into the channel (104) and to permit reversal of that flexure (such that the clip projection springs back to its original pre-flexure shape) once the first portion (114) of the connector (102) has been fully inserted into the channel (104).

[0048] Each leading surface (111) and each trailing surface (113) of each longitudinal abutment (110) is planar and extends longitudinally along the length of the support (101). The leading surfaces (111) are bevelled, ie inclined with respect to the inner surface (112), such that the planes of the two leading surfaces (111) of each support together form a V-shape, as shown in Fig 2. The plane of the trailing surface (113) of each longitudinal abutment is perpendicular to the inner surface (112) and to the channel inner walls (108), as illustrated.

[0049] Before consideration of the attachment of a connector (102) to a support (101), the structure of a connector (102) will be discussed. Figs 3A, 3B and 3C show various views of a connector (102), configured to attach to the support (101) and the panel (103) according to an embodiment of the invention. Fig 3A is a perspective drawing of a connector (102), Fig 3B is an end view of a connector (102) and Fig 3C is a side view of a connector (102). The connector (102) has a first portion (114) and a second portion (115). In the embodiment illustrated in Figs 3A, 3B and 3C the longitudinal axes of the first portion (114) and second portion (115) are aligned broadly perpendicular to each other (although other relative orientations are also envisaged (see below)).

[0050] The first portion (114) of the connector (102) is configured to engage with the central longitudinal channel (104) of the support (101). The first portion (114) comprises a body (116), which may be substantially cuboid in form, although any suitable shape may be envisaged, and a clip arrangement (117), the clip arrangement (117) comprising at least one clip projection (118). In embodiments where the body (116) is cuboid, the body comprises (in the perspective of Fig 3) a lower surface (116a), an upper surface (116b), two major side surfaces (116c) and two end surfaces (116e). Each clip projection (118) is made of a resilient material and is shaped and dimensioned to permit elastic deformation, ie flexure, of the clip projection (118) during insertion into the central longitudinal channel (104) of the support (101): as the connector (102) is lowered onto the support (101), the first portion (114) of the connector (102) enters the aperture (107) of the longitudinal central channel (104).

[0051] The embodiments illustrated in Figs 3A, 3B and 3C each clip projection (118) is elongate and substantially rectangular, with the axis of each clip projection (118) aligned parallel to the longitudinal axis of the body (116). However, other geometries which are not rectangular may also be envisaged. Each clip projection (118) has a proximal end (118a) (or proximal edge, as appropriate, if the clip projection is elongate and extends parallel to the body's longitudinal axis) at which the clip projection (118) is joined to the body (116), as well as a distal end (118b) (or distal edge, as appropriate). For brevity, references in this document to "proximal end(s)" and "distal end(s)" of clip projections (118) shall include also "proximal edge(s)" and "distal edge(s)", as appropriate, where the clip projection (118) is elongate.

[0052] In relation to the first portion (114) of the connector (102) in some embodiments of the invention, as illustrated herein, the surface of the body (116) comprising the at least one clip arrangement (117) and the surface of the body (116) facing or attaching or fixed to the second portion (115) are at opposite surfaces of the body (116), such that, while the first portion (114) is configured to clip into the longitudinal channel (104) of the support (101), the second portion (115) is proud of (above) the support (101) and is free to engage with the panels (103), as described herein.

[0053] In an embodiment of the invention, the connector shown in Figs 3A, 3B and 3C comprises two clip arrangements (117), each with two such clip projections (118), but it is envisaged that the body (116) can have any suitable number of clip arrangements (117). The clip arrangements (117) are spaced apart from each other, in a line parallel to the longitudinal axis of the body (114): they may be located at opposing ends of the major side surfaces (116c) of the body (116), as shown in Figs 3A, 3B and 3C, to ensure stability and a good clip functionality, but it is envisaged that may be located at any suitable positions on the body (116). It is envisaged that the body (116) can have any suitable length which provides stability once inserted in the longitudinal channel (104)

of the support (101), as discussed later.

[0054] In an embodiment of the invention, as depicted in Figs 3A, 3B and 3C, the clip projections (118) are arranged in pairs symmetrically on either side of the longitudinal axis of the first portion (114) of the connector (102). Thus, in this embodiment each clip arrangement (117) comprises a pair of clip projections (118), both clip projections (118) extending from the bottom of the body (116) of the connector (102). In the example illustrated the body (116) is cuboid, and the clip projections (118) are rectangular and broadly planar in shape, extending from the proximal edge (118a), joined to the body (116), to the distal edge (118b).

[0055] Fig 4 provides a cross-section of the connector (102) in the embodiment of Figs 3A, 3B and 3C. As shown in Fig 4, a clip arrangement (117) according to this embodiment comprises two clip projections (118) each of which extends obliquely from the bottom of the body (116) (substantially at the interfaces of the major side surfaces (116c) and the lower surface (116e)). In other words, the two clip projections (118) are each oriented in one of the planes XX at an angle θ to the major side surfaces (116c) of the body (116c), thereby forming a V-formation symmetrical about a plane YY parallel to, and located at the mid-point between, the major side surfaces (116c) of the body (116). As shown previously in relation to this embodiment (in Figs 3A, 3B and 3C), this clip arrangement (117) is duplicated at each end of the body (116), such that there four clip projections (118) in total.

[0056] In other embodiments (not illustrated), instead of a pairs of clip projections (118), a clip arrangement (117) may comprise just a single clip projection (118) located on one side of the body (116). The reader will understand that, although, for such embodiments, the operation of the clip arrangement (116), as discussed below, is analogous to that of clip arrangement variants with two clip projections (118): in variants with clip arrangements (117) having just a single clip projection the clip projections (118) are correspondingly dimensioned to ensure flexure of the clip projection (118) during insertion of the connector (102) into the channel (104) and a reversal of the flexure as the clip projection (108) passes the longitudinal abutment (110).

[0057] The second portion (115) and first portion (114) may together form a single integral unit, fabricated in a single fabrication process, eg by injection moulding, and there is no relative movement between the second and first portions (114, 115) of the connector. In such embodiments, the whole connector (102) is a single integral unit.

[0058] Alternatively, the entire first portion (114) (body (116) and clip arrangement (117)) of the connector (102) may be a single integral unit, fabricated by a single fabrication process, eg injection moulding, and the entire second portion (115) may be a single integral unit, fabricated in a single fabrication process, eg injection moulding.

[0059] The second portion (115) may, in some embodiments, be permanently fixed to the first portion (114) by

fixing means, such as adhesive, welding, heat treatment or other suitable means: in such variants, the upper surface (116b) of the body (116) may be extended to provide a greater common surface by which the lower and second portions (114, 115) can be joined to each other, thereby providing greater mechanical strength and stability. In some embodiments the second portion (115) may be attachable, permanently or reversibly, to the first portion, and in some embodiments (see later) the attachment may be configured to permit movement between the upper and first portions (114, 115) (eg by means of a joint attaching the second and first portion (114, 115) as described later herein).

[0060] As stated previously herein, the first (114) and second portion (115) of the connector (102) including various clip arrangements described herein, whether fabricated individually or fabricated together the connector (102) as a single integral component, is made of a resilient flexible material by which the clip arrangements are capable of elastic deformation or flexing or bending under an external force but springing back when the force is removed. This material composition may be a standard plastic material, such as any of the following: polyoxymethylene (POM), polypropylene, acetylene butanol styrene (ABS) or another thermoplastic, or a hard polymer, or a composite material such as polyamide with glass fibre. In short, any material exhibiting the described elastic deformation characteristics may be suitable for making the connector.

[0061] For brevity, the second portion (115) is illustrated herein, eg in Figs 3A, 3B, 3C and 4, as being oriented perpendicular to the orientation of the first portion (114), but the relative orientation of the second portion (115) and first portion (114) is not limited to a right angle. Although, in some embodiments the relative orientation of the second portion and first portions (115, 114) is fixed, any suitable angular difference between their orientations may be envisaged, and in other embodiments, as described later, the relative orientation of the second and first portions (115, 114) may be variable by means of a rotary joint.

[0062] As shown in Figs 3A, 3B and 3C, the second portion (115) of each connector (102) comprises one or two laterally extending flanges (120) mounted on a base (121), each flange (120) being configured to insert into a side groove (106) of the panel (103), the side groove (106) extending longitudinally along each side (105) of the panel (103), as shown at Fig 5A, a cross-section of two adjacent panels (103). There is a small gap (122) between the adjacent panels, which therefore do not directly interface with each other: this gap (122) in the next drawing, Fig 5B, is occupied by the second portions (115) of the connectors (102). In order to save material and costs, the panels (103) are generally hollow, with at least one panel cavity (123) extending in a direction parallel to the longitudinal axis of the panel (103) along the entire length of the panel (103). The side grooves (106) on the side (105) of each panel represent open, or exposed,

versions of panel cavities (123), as shown in Figs 5A and 5B, with the same height as the panel cavities (123), as if a panel cavity (123) had been bisected in a longitudinal direction. Each flange (120) of the second portion (115) of the connector (102) is dimensioned and shaped to fit into, and be securely accommodated by, a side groove (106) of the panel, as visible in Fig 5B: a flange (120), once inserted into the side groove (106), fits tightly, but reversibly, therein. Fig 5B shows the flanges (120) and the side grooves (106) of the panel (103), into which the flanges (120) are insertable, are both cuboid in form, but any suitable geometry may be envisaged, as long as the flange (120) can fit tightly in the side groove (106).

[0063] In accordance with an embodiment of the invention, the second portion (115) of the connector (103) is illustrated herein, eg in Figs 3A, 3B, 3C, 4 and 5B, as having two laterally extending flanges (120) mounted on a base (121). In this embodiment the second portion (115), with its two laterally extending flanges (120) on the base (121), is broadly T-shaped in cross-section, the two flanges (120) extending laterally and symmetrically from the longitudinal axis of the second portion (115). The second portion (115) may be generally hollow, as shown in Figs 3A, 3B and 5B to save material and costs. The reader will understand that in this T-shape the two flanges (120) of the same (second portion (115) of a) connector (102) may be fitted into the side grooves (106) of two adjacent panels (103): the T-shape is configured to bridge the small gap (121) between the adjacent panels (103) and connect to each of them, thereby effectively connecting the adjacent panels (103) to each other. This attachment of a connector (102) to two adjacent panels (103) is repeated along the sides (105) of the panels (at each cross-over with a support (101)), as shown in Figs 1A and 1B.

[0064] As shown in Fig 5B the base (121) is dimensioned and shaped to facilitate the full insertion of the flanges (120) into the side grooves (106) of the panels (103) and to facilitate not only support of the panel (103) by the inserted flange(s) (120), but also additional support of the panel (103) by the body of the connector (102), by direct loading of the lower side of the panel (103) on the upper surface (116b) of the body (116).

[0065] For brevity, in accordance with an embodiment of the invention, the second portion (115) of the connector (103) is illustrated herein, eg in Figs 3A, 3B, 3C, 4 and 5B, as having two laterally extending flanges (120). However, the second portion (115) may comprise just one laterally extending flange (120) whereby the second portion (115) only to the groove (106) of one panel (103)

[0066] Figs 3A, 3B, 3C, 4, 5B, 7A, 7B and 7C also illustrate a number of flexible ridges (124) on the external surfaces of each laterally extending flange (120), which are configured to enhance the friction and engagement of the flange (120) with interior of the side grooves (106) of the panel (103) when inserted, thereby improving the security of the fit therein. Any suitable number of such ridges (124) may be envisaged. The ridges are not re-

stricted in size and form to just upper and lower surfaces of the laterally extending flanges (120) but may also "wrap" around the edge and cover also the sides of the flanges (120) (as shown in 7A, 7B and 7C), as appropriate. Although certain embodiments of the invention are illustrated here with a greater or lesser numbers of such ridges and different forms of ridges (124), all variants disclosed herein are unrestricted as to their number, form and location on any external surface of the flange (120).

[0067] The operation of the clip arrangement(s) (117) on the first portion (114) of a connector (102) is now described in more detail.

[0068] Figs 6A, 6B and 6C each provide views of a connector (102) attached to a support (101): Fig 6A provides a general perspective, while Figs 6B and 6C provide cross-sectional views (perpendicular to the longitudinal axis of the support (101)) of the connector (102) and support (101). The clip arrangement (117) on the first portion (114) of the connector (103) is configured to clip the first portion (114) onto the support (101). In particular, the clip arrangement (117) is configured to enter the central longitudinal channel (104) of the support (101) and, once full inserted into the channel (104), to clip on to the interior of the channel (104), such that the first portion (114) is securely held within the channel (104).

[0069] For embodiments in which each clip arrangement (117) comprises two clip projections (118) (eg in the V-formation, described above) the clip projections (118) are dimensioned such that the width of the V-formation clip arrangement, ie the distance between the two distal ends (118b) of the two clip projections (118), effectively the "wing-span" of the V-formation clip arrangement (117), in the absence any flexure, is slightly greater than the width of the channel aperture (107) (the longitudinal abutments (111) at the channel aperture (107)). To install a connector (102) on the support (101), the first portion (114) of the connector (102) (in particular the lower surface (116a) of the body (116)) is aligned with the central longitudinal axis of the channel (104). As the body (116) and clip arrangement(s) (117) are displaced into the channel aperture (107), the outer surfaces of the two clip projections (118) impinge first on the bevelled leading edges (111) of the two longitudinal abutments (110) at the channel aperture. Each of the clip projections (118) of the V-formation are inclined with respect to body (116) and with respect to the respective longitudinal abutment (110). As a result of the displacement, the bevelled leading edges (111), and the two longitudinal abutments (110) in general, apply an inward pressure on the clip projections (118): further displacement of the first portion (114) into the channel (104) causes an elastic deformation of the clip projections (118), the V-formation clip projections (118) flexing (bending) inwards, away from the planes XX (of Fig 4), inclined at θ° , and toward the plane YY.

[0070] As stated above the total width of the clip arrangement (117) (the distance between the distal ends (118b) of its two clip projections (118)) pre-flexure, is

greater than the separation of the inner surfaces (112) of the longitudinal abutments (110), and further displacement of the V-formation into the channel (104) increases the inward flexure of the clip projections (118). The inward flexure of the clip projections (118) entails a reduction in the separation of the two distal (118b) ends of the clip projections (118), ie the two distal ends (118b) approach each other (ie the "wing-span" of the V-formation clip arrangement (117) is in effect narrowed), until the distal ends (118b) are able to enter the channel aperture (107), thereby allowing further displacement of the body (114) into the channel (104).

[0071] Under continued displacement of the connector (102) into the channel (104), the inward flexure of the clip projections (118) facilitates the further insertion of the clip arrangement (117) through the channel aperture (107), the distal ends (118b) of the clip projections (118) passing along the inner surfaces (112) of the longitudinal abutments (111) during the flexure. As the distal ends (118b) move beyond the bottom (in the perspective of Figs 6A, 6B and 6C) of the inner surfaces (112) of the longitudinal abutments (110), the clip projections (118) cease to be constrained by the inner walls (112) and the resilience of the clip projections (118) permits them to spring back to their original pre-flexure form, the separation of the two distal ends/edges (118b) of the clip projections (118) resuming (increasing back to) its pre-flexure size.

[0072] This separation of the two distal ends/edges (118b) is wider than the separation of the inner surfaces (112) of the longitudinal abutments, such that the clip projections (118) now prevent any reversal of the displacement of the connector (102) as described above, ie the clip projections (118) thus serve to lock the first portion (114) within the longitudinal channel (104). The first portion (114) of the connector (102) is securely retained in the longitudinal channel (104) of the support (101), due to the clip arrangement(s) (118) of the first portion (114), as shown in Figs 6A, 6B and 6C.

[0073] Although the first portion (114) of the connector (102) has been thus securely attached to the support (101), the connector (102) may nevertheless be slidably displaced parallel to the longitudinal axis of support (101) within the channel (104). As the reader will understand from Fig 6A and the cross-sectional views in Figs 6B and 6C, there is no impediment to any such longitudinal displacement of the connector (102), which may therefore be displaced to any location on the support (101) as selected by the user. The connector (102) comprises a plurality of clip arrangements (117) in the first portion (114): the length of the body (116) as well the number and/or coverage of the length of the body (116) by the plurality of clip arrangements (117) may be envisaged in order to provide additional stability and mechanical security during the displacement of the connector's first portion (114) within the longitudinal channel (104) of the support (101). It is also envisaged that a connector may be removed from channel at the open ends of the channel (104), by

sliding the connector (102) to the ends of the support (101). As discussed in a later passage, the open ends of the support (101) and the longitudinal channel (104) may be reversibly closed/covered to protect the support end and/or to provide a more aesthetic support end, by means of endpieces.

[0074] Any suitable number of clip arrangements (117) and/or any suitable coverage of the body's length may be envisaged. The flexibility as to the positioning of the connector (102) along the length of the supports (101), provides the advantage that a connector (102), once inserted into the channel (104), as described, may be displaced up or down the length of the longitudinal channel (104) of the support (102) at the convenience of the installer, who therewith controls the position of each connector (102) on the support (101), as well the relative separation of neighbouring connectors (101), facilitating the use of panels (103) of different widths without any adjustment in the positions of the supports (101), ie panels may be easily replaced without any change to the supports (101).

[0075] As stated previously, in an embodiment of the invention, rather than the clip arrangements (117) comprising two clip projections (118) in V-formation as described above, the clip arrangements (117) may have just a single clip projection (118) (not illustrated). The single clip projection (118) in this embodiment extends from the bottom of the body (116) at an angle θ to one the major side surfaces of the body, as described previously in respect of the V-formation variant and has the same resilience and propensity to flex. The operation of this embodiment is analogous to the operation of the V-formation embodiment, as previously described. The main difference between this embodiment and other embodiments is that the clip arrangement, having just a single clip projection (118), is dimensioned appropriately to nevertheless provide the same clip function as other variants: the width of the clip arrangement, ie the distance of the distal end (118b) of the clip projection (118) from the opposite major side surface of the body (116), is dimensioned to be slightly large than the channel aperture (107). Insertion of the first portion (114) into the channel (104) causes flexure of the clip projection (118) in a manner analogous to that previously described for other embodiments and full insertion in the channel (104) allows the clip projection (118) to bounce back and clip onto the trailing surface (113) of the longitudinal abutment (110), as previously described, thereby locking the first portion (114) in the longitudinal channel (104).

[0076] In an embodiment of the invention illustrated at Figs 7A, 7B, 7C, 8A, 8B and 8C the connector (102) further comprises a rotary joint (125) between the second portion (115) and the first portion (114). The rotatable joint (125) is configured to rotatably attach the second portion (115) to the first portion (114), such that the second portion and the first portion (115, 114) are rotatable with respect to each other. The second portion (115) and first portion (114) of the connector (102) do not form a

single integral unit and are fabricated separately. This embodiment differs from other embodiments disclosed herein in that the orientation of the second portion (115) is not fixed in relation to the orientation of the first portion (114), but in other respects it is the same as embodiments previously described.

[0077] As the orientation of the second portion (115) of the connector (102) is not limited to being perpendicular to the first portion (114), the orientation of the second portion (115) relative to the first portion (114) may differ from connector to connector: for each connector (102) deployed in a particular panelling or flooring, the installer may accordingly choose a different relative orientation of the second portion (115) and the first portion (114). As the relative orientation of second and first portions (115, 114) may be chosen for each individual connector (102), this relative orientation may be chosen according to the orientation of the side groove (106) of the relevant panel. Thus, the sides of the panels (103) need not necessarily be perpendicular to the orientation of the supports (101) below. The ability to determine the relative orientation on a connector-by-connector basis, has two significant implications.

[0078] Firstly, for elongate rectangular panels this allows the panels to be aligned at almost any angle to the alignment of the supports (101). Panels (103) can still be installed in parallel and side-by-side, but the alignment of the panels (103) can be at any angle of the installer's choice. This may be particularly useful, for example, where a particular orientation of the panels (103) is desirable, but, for whatever reason, it is inconvenient or impossible to install the supports (101) perpendicular to this specific orientation. Awkward or relatively inaccessible corners of an underfloor or terrain may render a perpendicular relative alignment of panels (103) and supports (101) difficult to achieve, and the rotatable variant will save time and effort.

[0079] Secondly, it also means that the panels (103) need not be rectangular or elongate in shape: as the second portion (115) of each connector (102) can be rotated the sides of the panels (103) can be envisaged with non-parallel, or even in non-linear, sides (105). Whatever the shape of the panel (103), no matter how irregular, the second portion (115) of the connector (103) can be rotated so that the lateral flanges (120) of the second portions (115) directly faces the lateral groove (106) on the side (105) of the panel (103). The ability to re-align the second portion (115) in accordance with the orientation of the panel's side (105) facilitates the installation of panels (103) of any size or shape, as the second portion (115) can always be accordingly aligned to facilitate insertion of the flange(s) (120) into the lateral grooves (106) in the sides (105) of the panel (103).

[0080] The following passage describes the rotary joint (125) in more detail. Figs 7A, 7B and 7C provide perspective views of an embodiment of the connector, as assembled and ready for operation: the embodiment comprises a rotary joint (125), which, because it is ar-

ranged between the second portion and first portion of the connector, is not easily visible in these figures: from an external perspective the rotary variant looks largely similar to the non-rotary variants previously described.

5 However, in the exploded perspective view in Figs 8A and 8B, and the cross-section of Fig 8C, the rotary joint (125) is apparent: these illustrate a variant of a connector (102), comprising a rotary joint (125), with the second portion (115) shown separate to the first portion (114), the rotary joint (125) comprising, at the base (121) of the second portion (115), a central elongate column (126) configured to be inserted in a well (127) comprised in the first portion, at the upper surface (116b) of the body (116). The column (126) is perpendicular to both the longitudinal axes of the second and first portions (115, 114) of the connector (102). The well (127) is cylindrical in form and is open at both ends, and comprises a first aperture (128) and a second aperture (129) at the respective ends of the well (127).

20 **[0081]** In order for the column (126) to be inserted into the well (127) the orientation of the column (126) and the orientation of the well (127) are aligned coaxially. When the column (126) is inserted into the well (127), the column (126) and the well (127) are constrained to remain coaxial. The cross-sections of the column (126) and the well (127) are both circular, the diameter of the column (126) being slightly less than that of the well (127), the column (126) and the well (127) being dimensioned to facilitate both the insertion of the column (126) into the well (127), and, once inserted, to provide a good fit for the column (126) in the well (127) and to facilitate rotation of the column (126) within the well (127).

30 **[0082]** The column (126) comprises a plurality of column clip arrangements each serving to clip the column (126) to the well (127) when the column (126) is fully inserted into the well (127), such that, in its clipped state, the column (126) is free to rotate within the well (127). In the embodiment shown in Figs 8A, 8B and 8C each column clip arrangement is a column projection (130), elongate in form and oriented in parallel to the longitudinal axis of the column (127). The column projections (130) comprise a proximal end (130a), by which the clip projection (130) is attached to the base (121) of the second portion (115) of the connector (102) and a distal end (130b). Each column projection (130) comprises an inner surface ((130c) not visible in illustrations) and an outer surface (130d), both the inner surface (130c) and the outer surface (130d) having arcuate cross-sections which are concentric with the longitudinal axis of the column (126), such that the cross-sections of the column projections (130) collectively form an annulus about the longitudinal axis of the column (126), the annulus being broken by spaces (131) between each adjacent pair of column projections (130), the spaces (131) extending the entire length of, and parallel to, the column projections (130).

55 **[0083]** Each column projection (130) also comprises on its outer surface (130d), at its distal end (130b), a

column flange (132). Each column flange (132) is arcuate in form, its length extending in a circumferential direction along the outer surface (130d) of each column projection (130), the curvature of each column flange (132) being concentric with the longitudinal axis of the column (126). In its transverse dimension each column flange (132) extends radially out from the outer surface (130d). The column flange (132) has two surfaces: a leading surface (132a), which interfaces with the distal end (130b) of the column projection (130) and a trailing surface (132b), which is planar and perpendicular to the longitudinal axis of the column projection (130). The leading surface (132a) of each column flange (132) is bevelled or inclined with respect to the outer surface (130d) of the column projection (130).

[0084] As stated above, in assembling the rotary joint (125), the second portion (115) and first portion (114) of the connector (102) may be positioned so that the column (126) is facing, and coaxial with, the well (127). Due to further relative displacement of the second and first portions (115, 114), the second and first portions (115, 114) are made to approach each other, such that the distal ends (130b) of the column projections enter the first aperture (128) of the well (127). The leading surfaces (132a) of the column flanges (132) impinge on the circumference of the first aperture (128) and further displacement in a coaxial direction forces the column projections (130) to undergo an elastic deformation and to flex inwardly toward the central longitudinal axis of the column (126). The spaces (131) between the column projections (130) permit this inward flexure of the column projections (130): the column projections (128) approach each other such that the diameter of the circular formation formed by the distal ends (130b) of the column projections (130) decreases as a result of the inward flexure.

[0085] Further displacement causes this diameter to fall below that of the circumference of the first aperture (128), thereby allowing the column projections (130) to penetrate further into the well (126). As the relative displacement of second and first portions (115, 114) continues and the column (126) is inserted further into the well (127), the column projections (130) being inwardly flexed during this time, until the column flanges (132) reach the second aperture (129) of the well (127) and pierce through it to the lower surface of the base (121) of the second portion (115). When the trailing surface (132b) of the column flanges (132) passes the second aperture (129) the column projections (130) are no longer constrained in a flexed position and, under their own resilience, resumes their pre-flexure form, as shown in Fig 8C. After the column projections (130) resume their original form, parallel to the longitudinal axis of the column (126), the circular formation formed by the distal ends (130b) of the column projections (130) extends slightly beyond the circumference of the second aperture (129) and the trailing edge (132b) interfaces with the lower surface of the body (116) of the first portion (114). In this position the column projections (130) effectively lock the

column (126) in the well (127): the column (126) is securely but rotatably held within the well (127)

[0086] Apart from the rotary function, facilitating relative angular movement between the first portion and second portion (115, 114) of the connector (102), variants having the rotatory function, as described above, operate in the same way as non-rotary variants. All variants of the connector (102) comprise a first portion (114) with body (116) having at least one clip arrangement (117), configured to attach the connector (102) to a support (101), and an second portion (115) with at least one laterally extending flange (120) configured to attach the connector (102) to a panel (103) in a floor or other surface.

[0087] In order to protect exposed ends of the supports (101), it is envisaged that a support endpiece (133) may be mounted on a support end, as shown in Figs 9A, 9B, 9C and 9D. The support endpiece (133) has a support facing side and an externally facing side. On the support facing side, the support endpiece (133) comprises at least one protrusion (133a) configured to fit into an end opening of the at least one longitudinal support cavity (108) at an end of a support (101). The support facing side of the support endpiece (133) also comprises a laterally extending flange (133b) configured to fit into the side groove (106) on the side of a panel (103) (in the manner already explained in relation to flanges (120) on the second portion (115) of a connector (102)). The ends of the supports (101) are arranged to be colinear with a side (105) of a suitable panel (103), ie the support ends coincide with the side (105), for example, by cutting the support lengths accordingly, as depicted in Fig 9A, 9B, 9C and 9D. The flange (133b) of the support endpiece (133), when attached to the end of the support (101), may be inserted into the side groove (106) of the panel (103), thereby providing additional stability and security to the panel (103) and flooring/panelling surface. Support endpieces (133) may be attached to each or any support ends. The externally facing side of the endpiece comprises a plurality of endpiece clip arrangements (134). The system may further comprise an elongate support edgepiece (135) which serves as an aesthetic cover over a plurality of support ends (support endpieces (133)) and is configured to engage with endpiece clip arrangements (134): the edgepiece (135) has an outer surface (135a) and an inner surface (135b) configured to engage with support endpiece clip arrangements (134). The inner surface (135b) comprises at least one longitudinal groove (135c) configured to clip onto the corresponding clip arrangement (134) in at least one of the plurality of support endpieces (133), the support edgepiece (135) thereby being securely attached to the support endpieces (133) and providing aesthetic cover and mechanical protection to the ends of the supports (101) and the corresponding panel (103). Fig 9C shows a support edgepiece (135) before attachment to the support endpieces (133), while Fig 9D shows a support edgepiece (135) after attachment to the support endpieces (133).

[0088] As well as the support endpieces (133) and sup-

port edgepieces (135) for the exposed ends of supports (101), corresponding endpieces are also envisaged for the exposed ends of panels (103), as shown in Figs 10A, 10B and 10C. The panel endpieces (136) also comprise a panel facing side and an externally facing side. On the panel facing side, the panel endpiece (136) comprises at least one protrusion (136a) for engagement with the end of the cavity (123) at the end of the panel (103), the at least one protrusion (136a) configured to be inserted into and securely attach to the cavity (123). Corresponding to the support endpieces, the panel endpieces (136) also have at least one clip arrangement (137) on the externally facing side, these serving to engage with an elongate panel edgepiece (138). the panel edgepiece (138) having an outer surface (138a) and an inner surface (138b) configured to engage the flooring endpieces (136). The inner surface (138b) comprises at least one longitudinal groove (138c) configured to clip onto the at least one clip arrangements (137) of a plurality of panel endpieces (136), the panel edgepiece (138) thereby being securely attached to the panel endpieces (136) and providing aesthetic cover and mechanical protection to the ends of the panels (103). Fig 10B shows a panel edgepiece (138) before attachment to the panel endpieces (136), while Fig 10C shows a panel edgepiece (138) after attachment to the panel endpieces (136).

[0089] Whereas this disclosure makes reference to several examples of the aspects and embodiments, it will be readily understood that embodiments are not restricted to those which are explicitly referenced: all aspects and embodiments may be modified to comprise any number of amendments, alterations, variations or substitutions, including those not specifically referenced herein. Furthermore, while various embodiments have been described, it will be understood that certain features of the embodiments may relate to only some of the described embodiments. Accordingly, the embodiments of the invention are not to be understood as limited by the above written description, but are only limited by the scope of the appended claims.

[0090] Where some features of various examples or embodiments appear in some examples, embodiments or drawings and not in others, this is only for brevity and intelligibility. Accordingly, any component or feature of any example, embodiment or figure may, in combination with any component or feature of any other example, embodiment or figure, be referenced or claimed. Components, features and structures of the aspects and embodiments disclosed herein may be combined as appropriate. Even if such combinations are not illustrated or explicitly referenced herein in relation to a particular aspect of an embodiment this is merely for brevity of the description and should not be understood to mean that such combinations are excluded or cannot occur: the different features and of the various aspects and embodiments may be mixed and combined as appropriate and this disclosure should be construed as covering all combinations and permutations of features referenced here-

in.

Claims

1. A connector for connecting a planar panel to an elongate support in a planar panelling arrangement,
 - the panel comprising, at each side, a side groove,
 - a face of the support comprising a central elongate channel with an elongate channel aperture, the channel and channel aperture being aligned parallel to the longitudinal axis of the support,
 wherein the connector comprises a first portion and a second portion,
 - the first portion being configured to clip securely into the central channel,
 - the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.
2. A connector as in Claim 1 wherein the first portion of the connector comprises at least one clip arrangement, each clip arrangement being positioned on a longitudinal surface of the first portion and being configured to clip the first portion into the central channel of the support.
3. A connector as in Claim 2, wherein the at least one clip arrangement comprises at least one clip projection.
4. A connector as in Claim 3, the channel aperture being narrower than the width of the inner walls of the channel, wherein the at least one clip projection is made of a resilient material capable of flexure during insertion into a longitudinal aperture of the central channel.
5. A connector as in any of Claims 3 to 4, wherein each clip arrangement comprises two clip projections arranged in a V-formation about the longitudinal axis of the first portion.
6. A connector as in any preceding claim, wherein the second portion of the connector comprises a base and two laterally extending flanges, the flanges and the base collectively arranged in a T-formation.
7. A connector as in Claim 6, wherein the base and flanges of the second portion of each of the plurality of connectors are configured to support each of the plurality of panels at an equal distance from the support.

8. A connector as in any preceding claim, wherein the first and second portions of the connector are fixedly attached to each other.
9. A connector as in any of Claims 1 to 7, wherein the first and second portions of the connector are rotatably attached to each other and are configured to allow relative rotational displacement between the first and second portions.
10. A connector as in Claim 9, wherein the rotatably attachment of the first and second portions of the connector comprises a cylindrical column extending from the second portion and a cylindrical well in the second portion, the well comprising a first aperture and a second aperture at the respective ends of the well, the column being configured to be inserted into the first aperture of the well and to rotate freely within the well.
11. A connector as in Claim 10, wherein the cylindrical column comprises a plurality of elongate column projections interspaced by spaces, the column projections being arcuate in cross-section, the cross-sections of the column projections and the inter-projection spaces being arranged to form an annulus.
12. A connector as in Claim 11, wherein each of the plurality of column projections is configured to be flexed inwards by the inner walls of the well when the column is inserted into the well, each column projection further comprising, at a distal end of an outer surface of the column projection, a column flange, each column flange being configured to clip onto the second aperture of the well and rotatably attach the column to the well.
13. A planar panel for connection by a connector to a planar panel to an elongate support in a planar panelling arrangement, the planar panel comprising, at each side thereof, a side groove,
- the support comprising, at one face thereof, a central elongate channel with an elongate channel aperture, the channel and channel aperture being aligned parallel to the longitudinal axis of the support,
 - the connector comprising a first portion and a second portion, the first portion being configured to clip securely into the central channel, the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.
14. An elongate support for connection by a connector to a planar panel in a planar panelling arrangement, the support comprising, at one face thereof, a central elongate channel with an elongate channel aperture,
- the channel and channel aperture being aligned parallel to the longitudinal axis of the support,
- the planar panel comprising, at each side thereof, a side groove,
 - the connector comprising a first portion and a second portion, the first portion being configured to clip securely into the central channel, the second portion comprising at least one lateral flange configured to be removably inserted into the side groove.
15. A planar panelling arrangement comprising:
- a plurality of elongate supports aligned in parallel with each other, each support being a single integral component comprising, on one face of the support, a central channel aligned parallel to the longitudinal axis of the support, the central channel having a longitudinal aperture which is narrower than the width of the inner walls of the channel;
 - a plurality of connectors, each connector comprising a first portion and a second portion;
 - a plurality of panels configured to be arranged to collectively form a planar surface, the sides of each panel comprising a side groove;
- wherein the first portion of the connector is configured to clip securely into the channel of the support, the second portion of the connector comprises at least one lateral flange configured to be inserted into the side groove of a panel.
16. A panelling arrangement as in any previous claim further comprising at least one support endpiece configured to attach to the end of at least one support and a support edgepiece configured to attach to the at least one support endpiece.
17. A panelling arrangement as in any of Claims 1 to 15 further comprising at least one panel endpiece configured to attach to the end of at least one panel and a panel edgepiece configured to attach to the at least one panel endpiece.
18. A panelling arrangement as in any preceding claim, wherein the planar panelling arrangement forms a horizontally aligned flooring surface of a flooring system, the supports being secured to a horizontal surface.
19. A panelling arrangement as in any one of Claims 1 to 16, wherein the planar panelling arrangement is aligned vertically, the supports being vertically aligned posts.

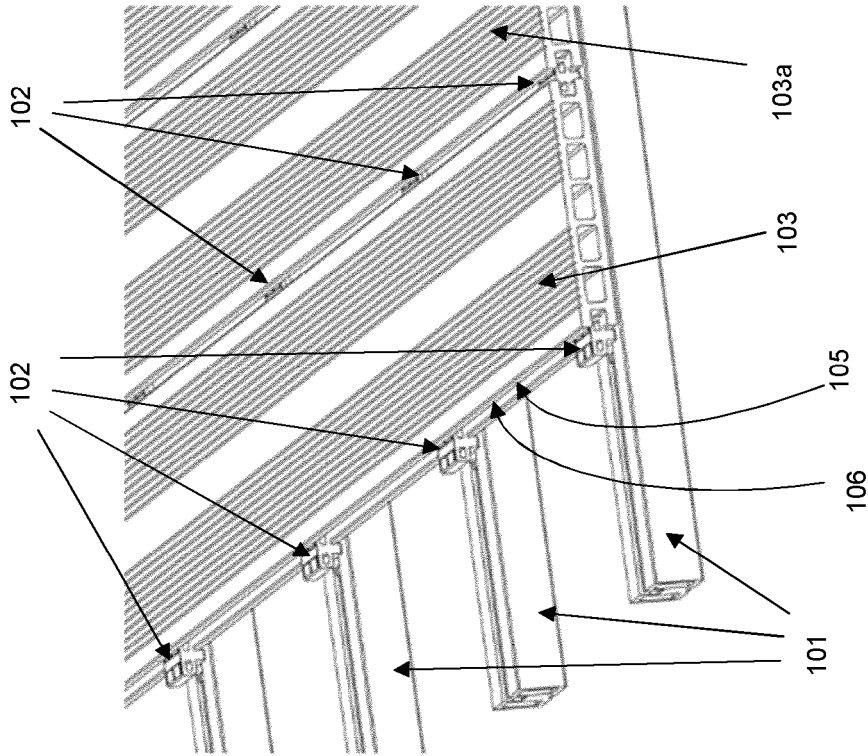


Figure 1B

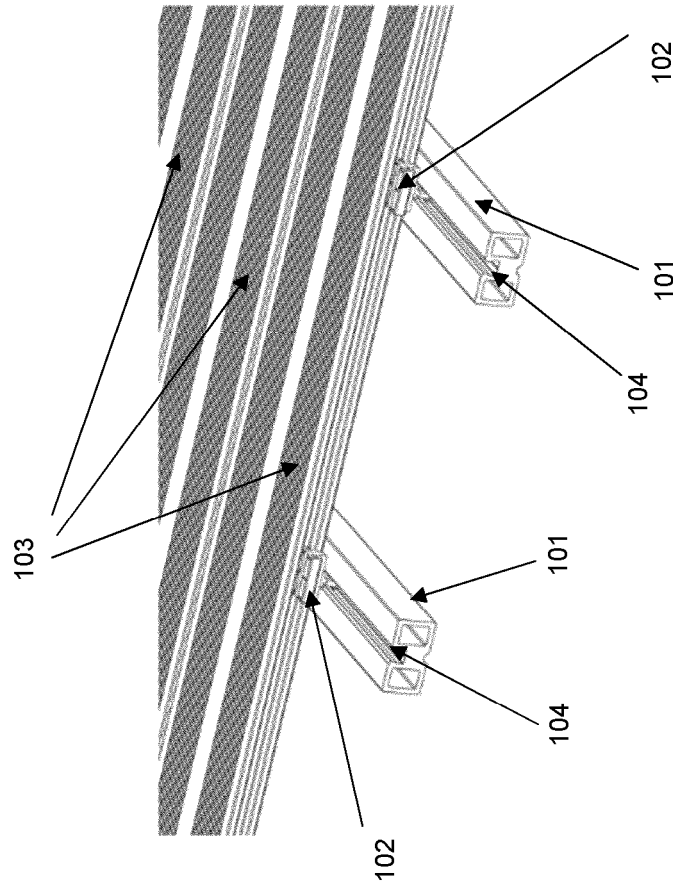


Figure 1A

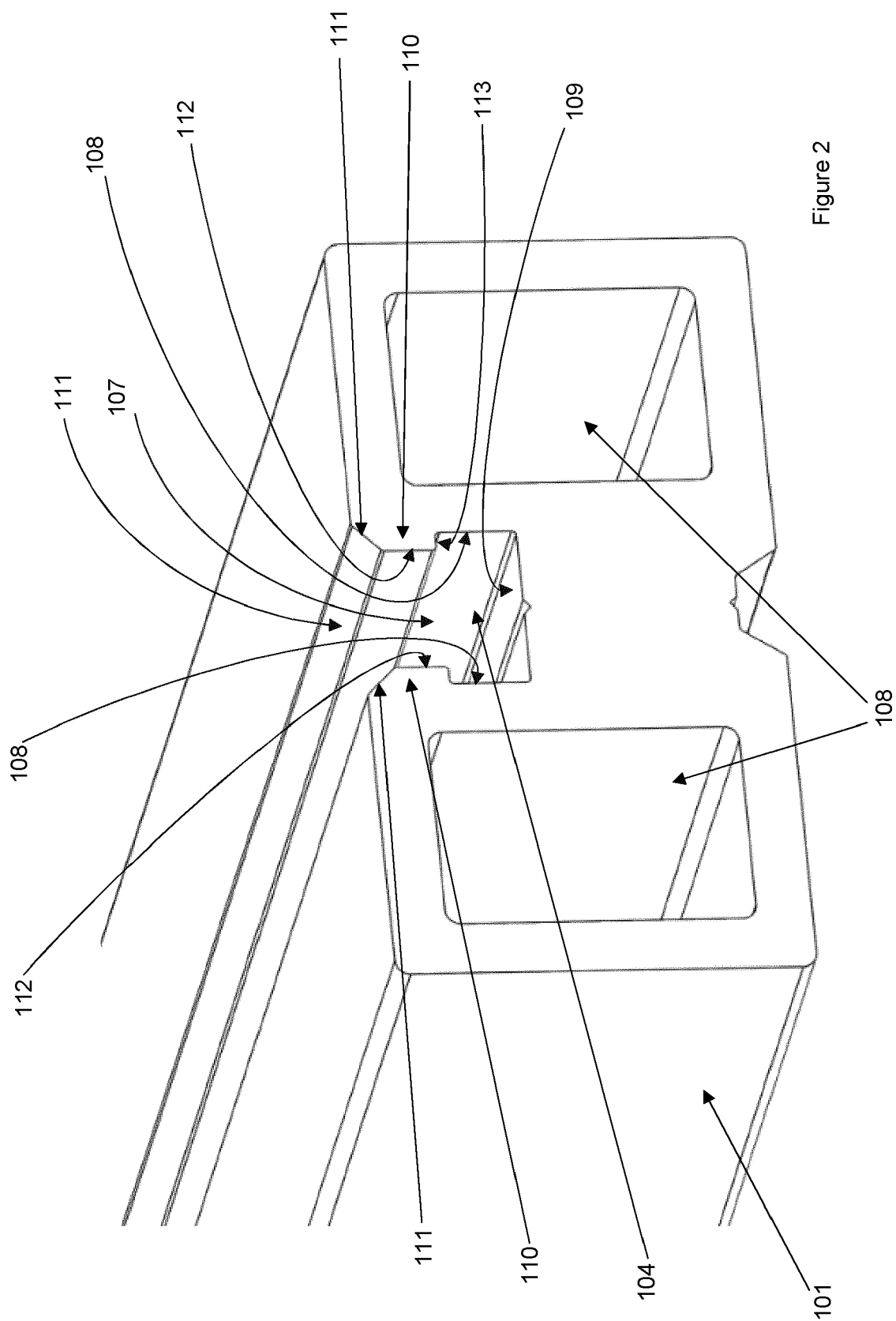


Figure 2

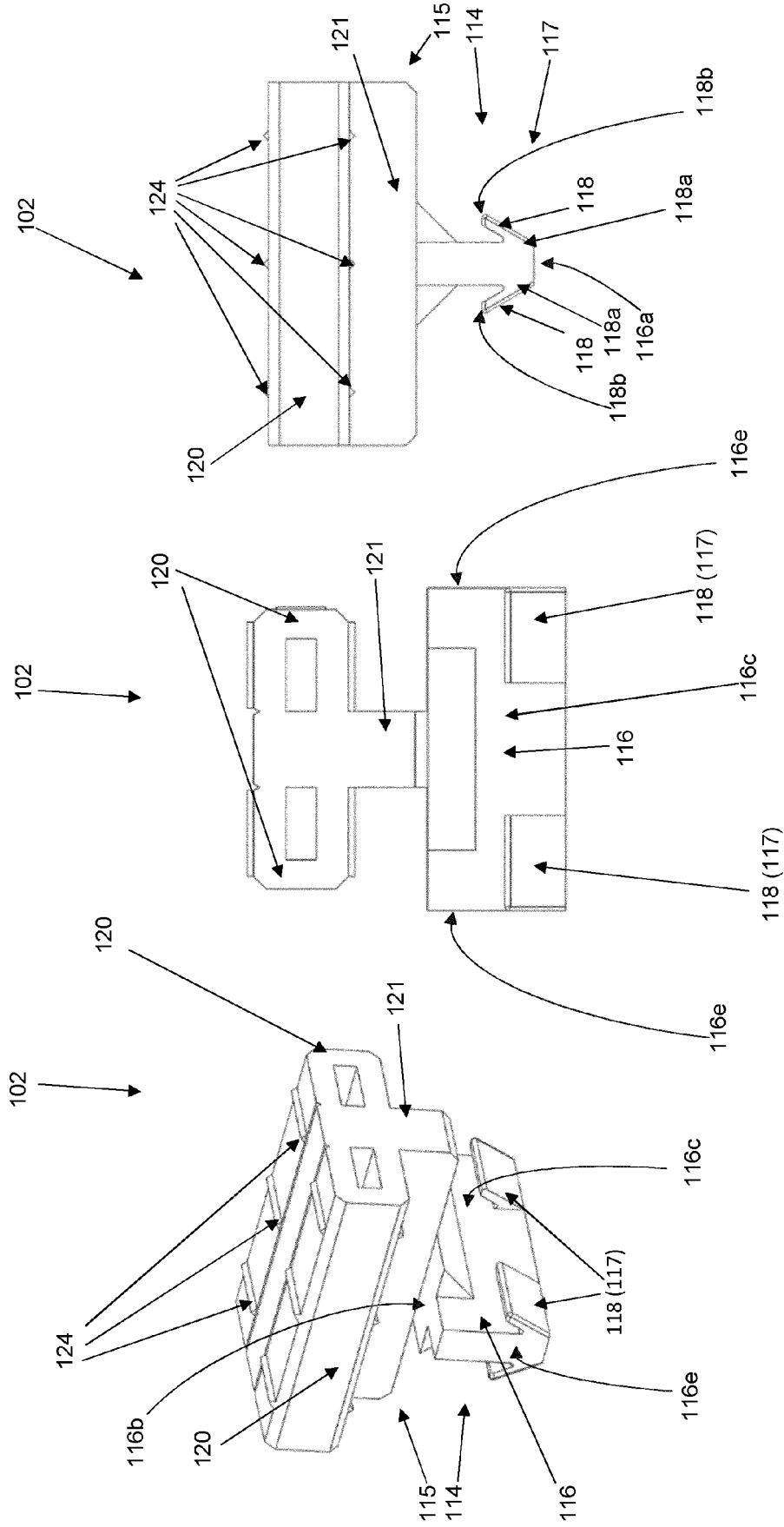


Figure 3A

Figure 3B

Figure 3C

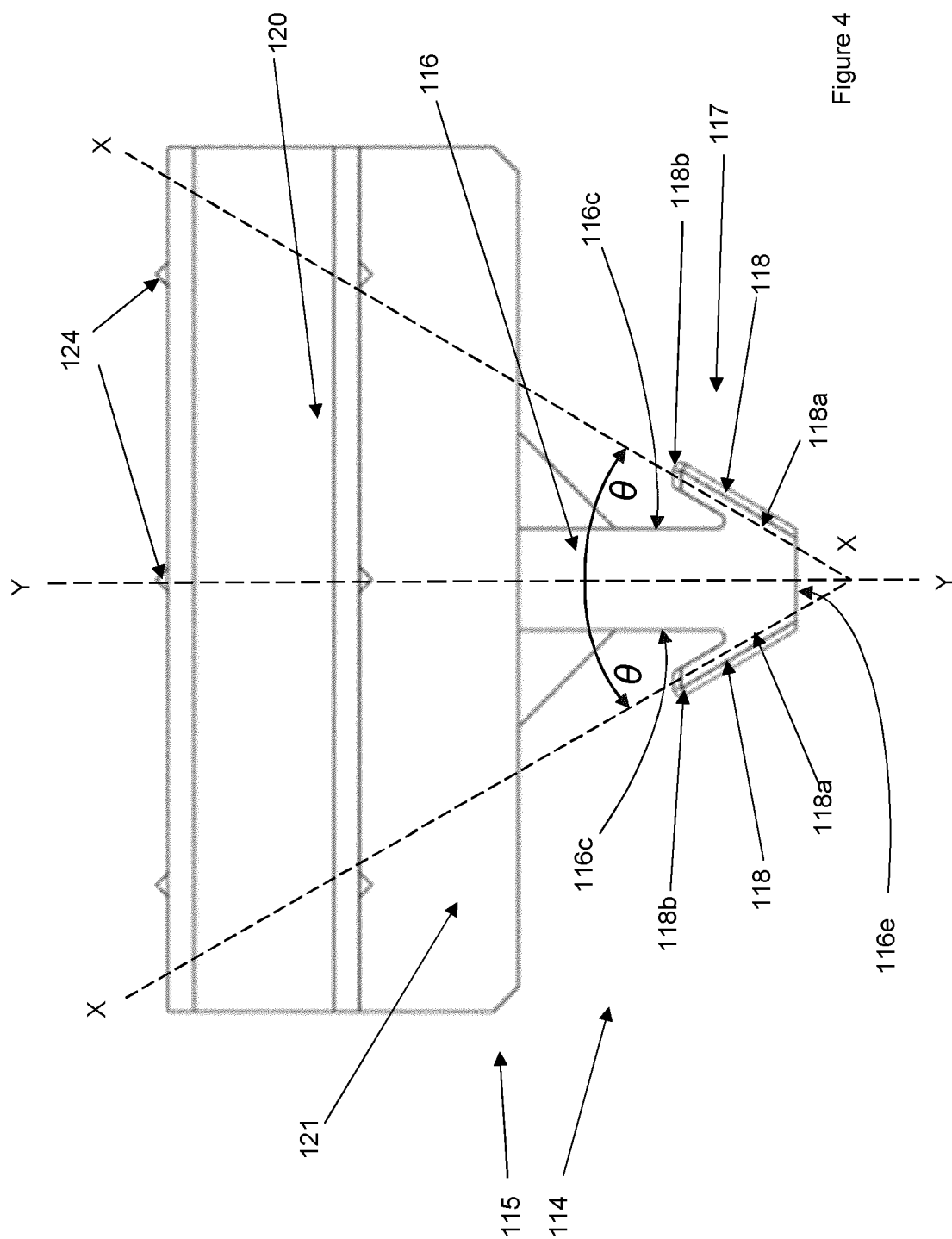
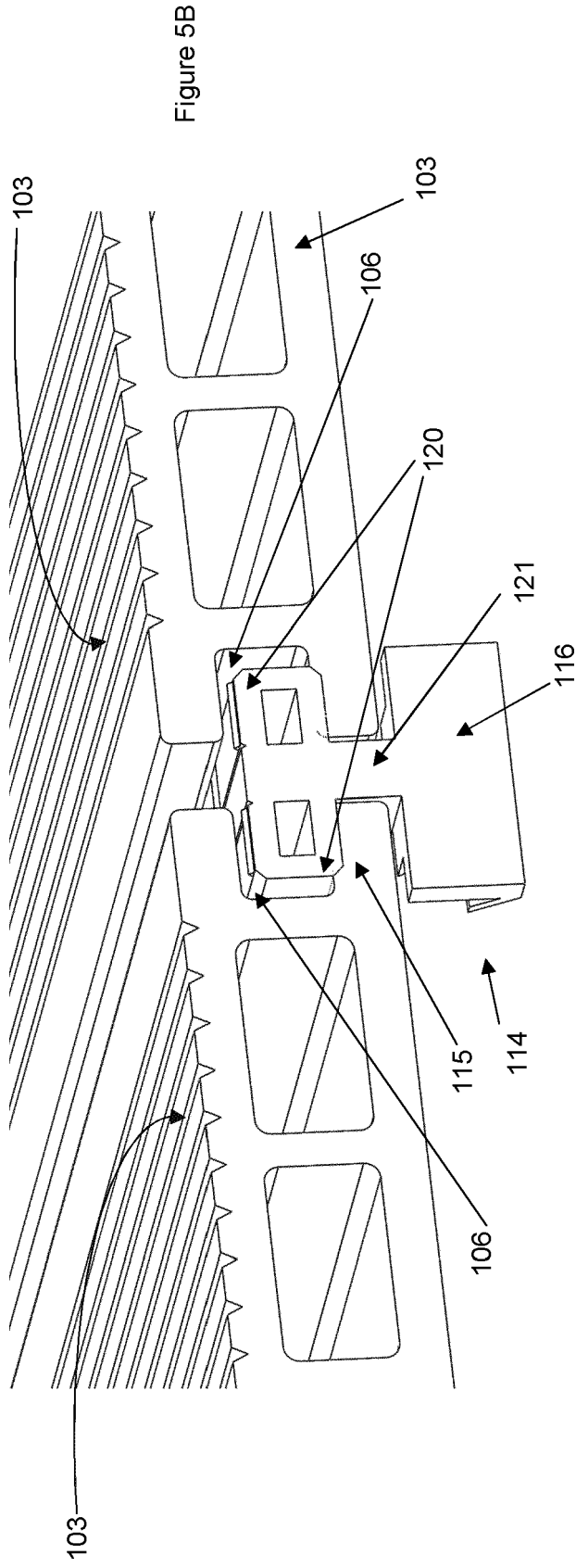
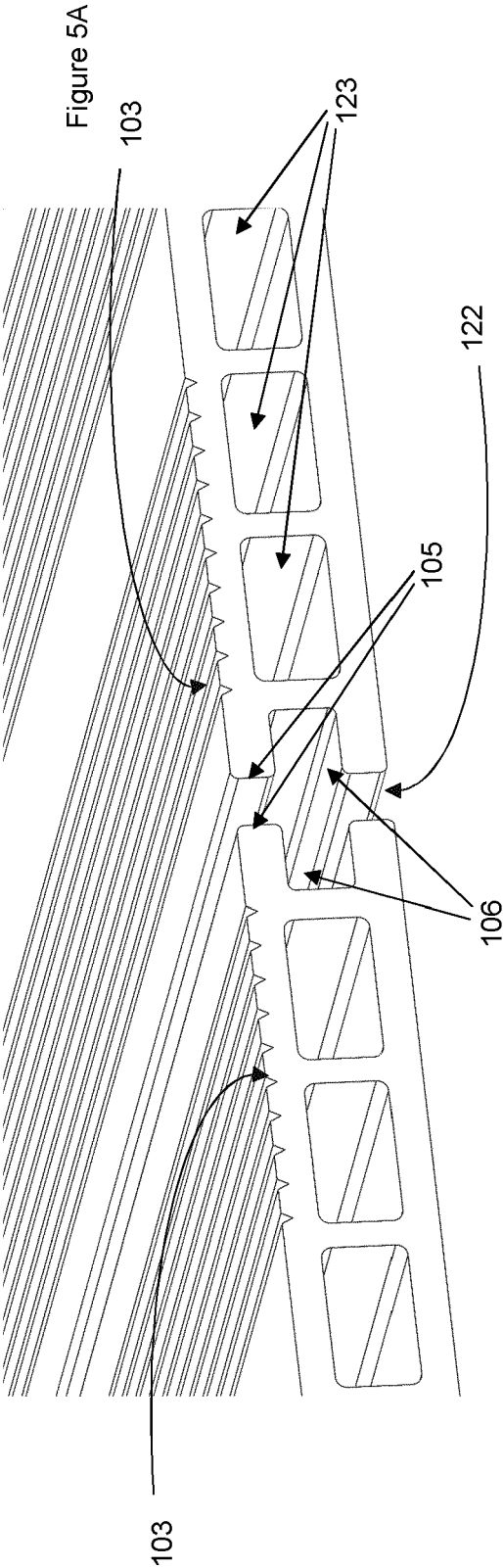
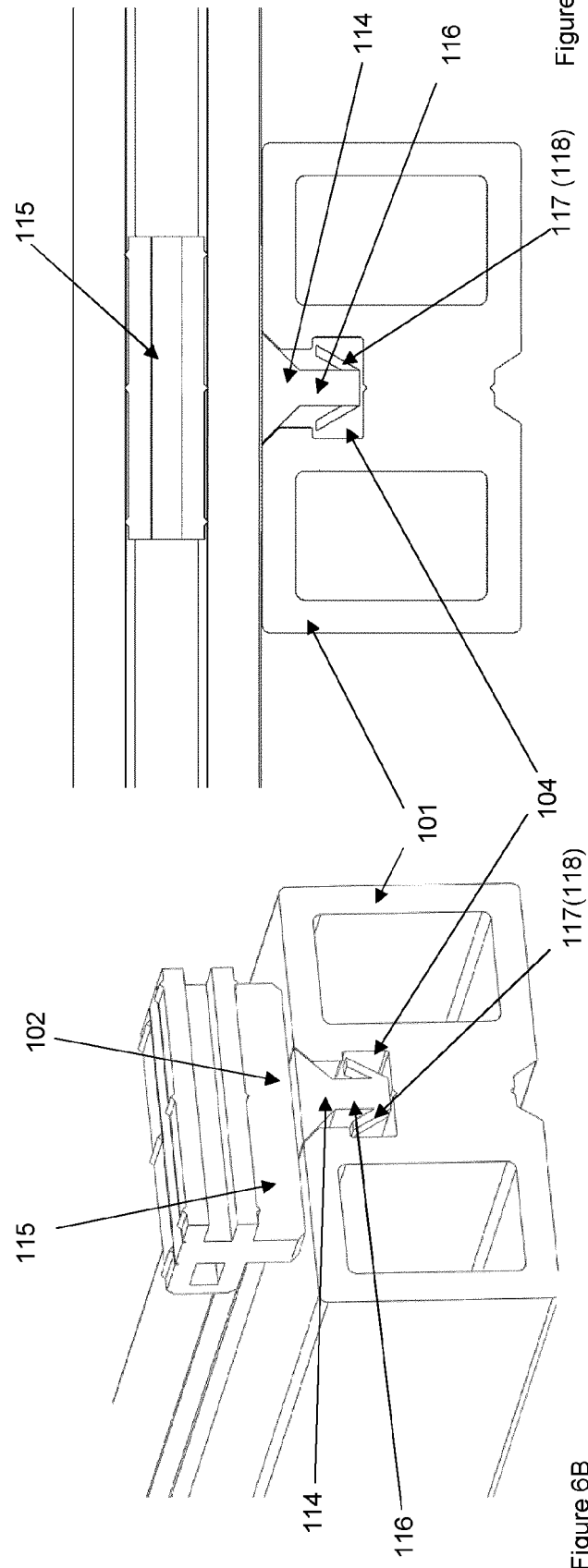
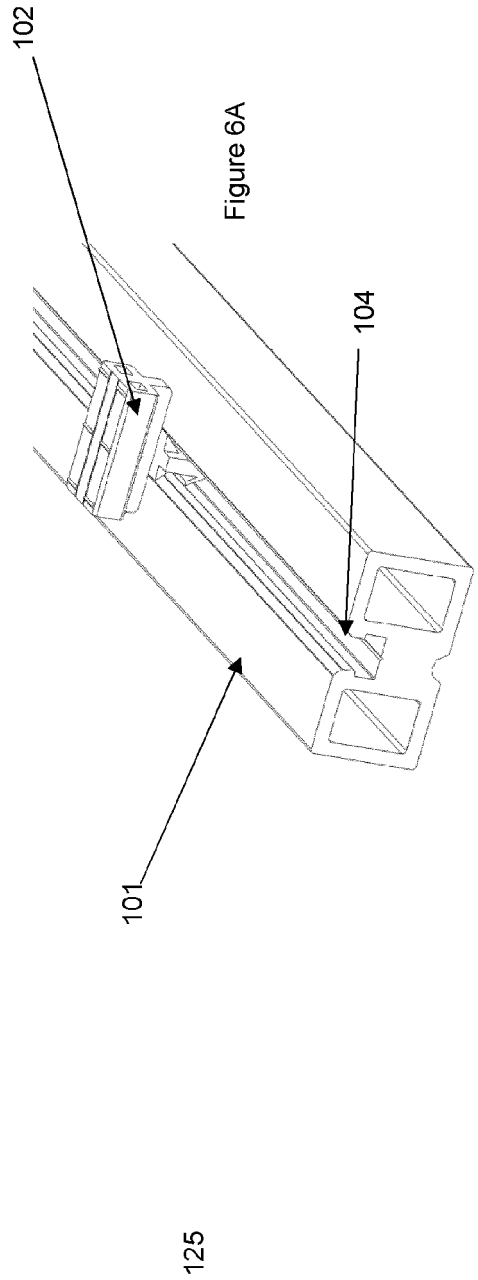


Figure 4





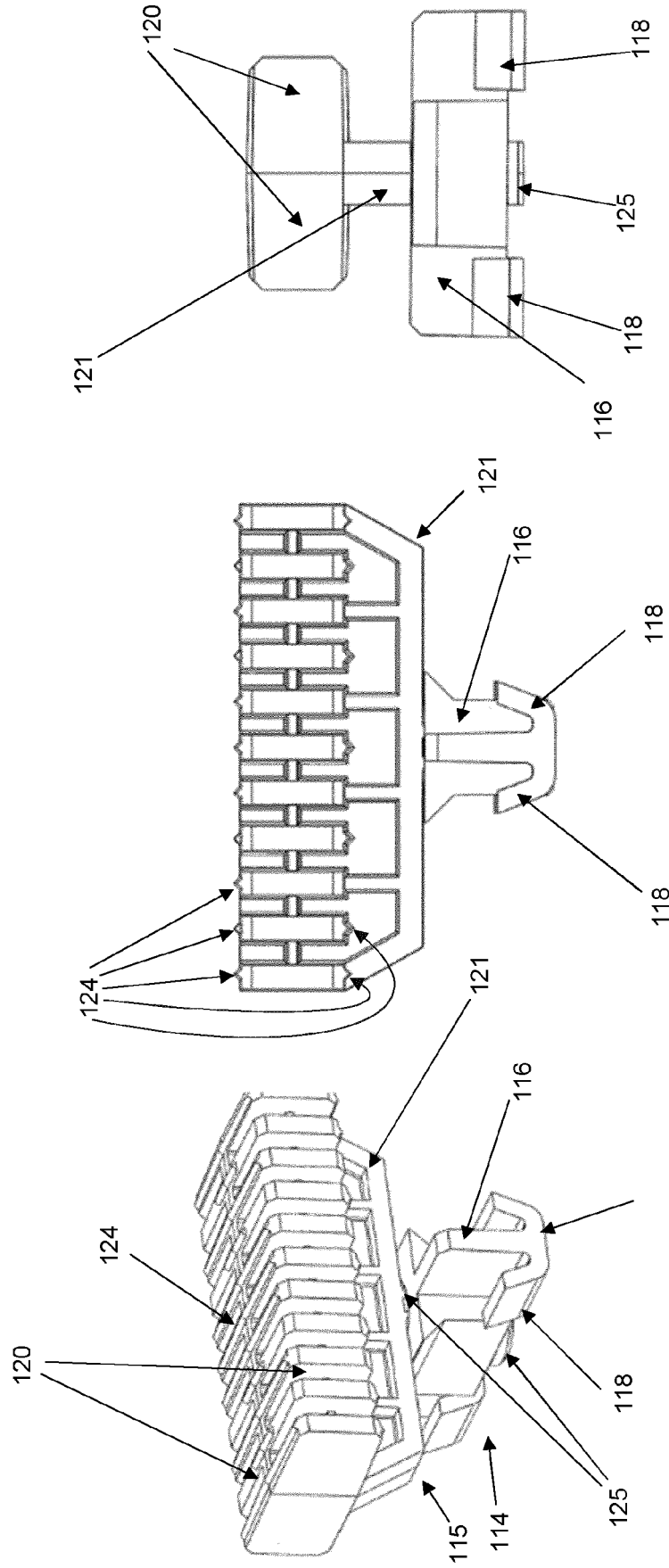


Figure 7C

Figure 7B

Figure 7A

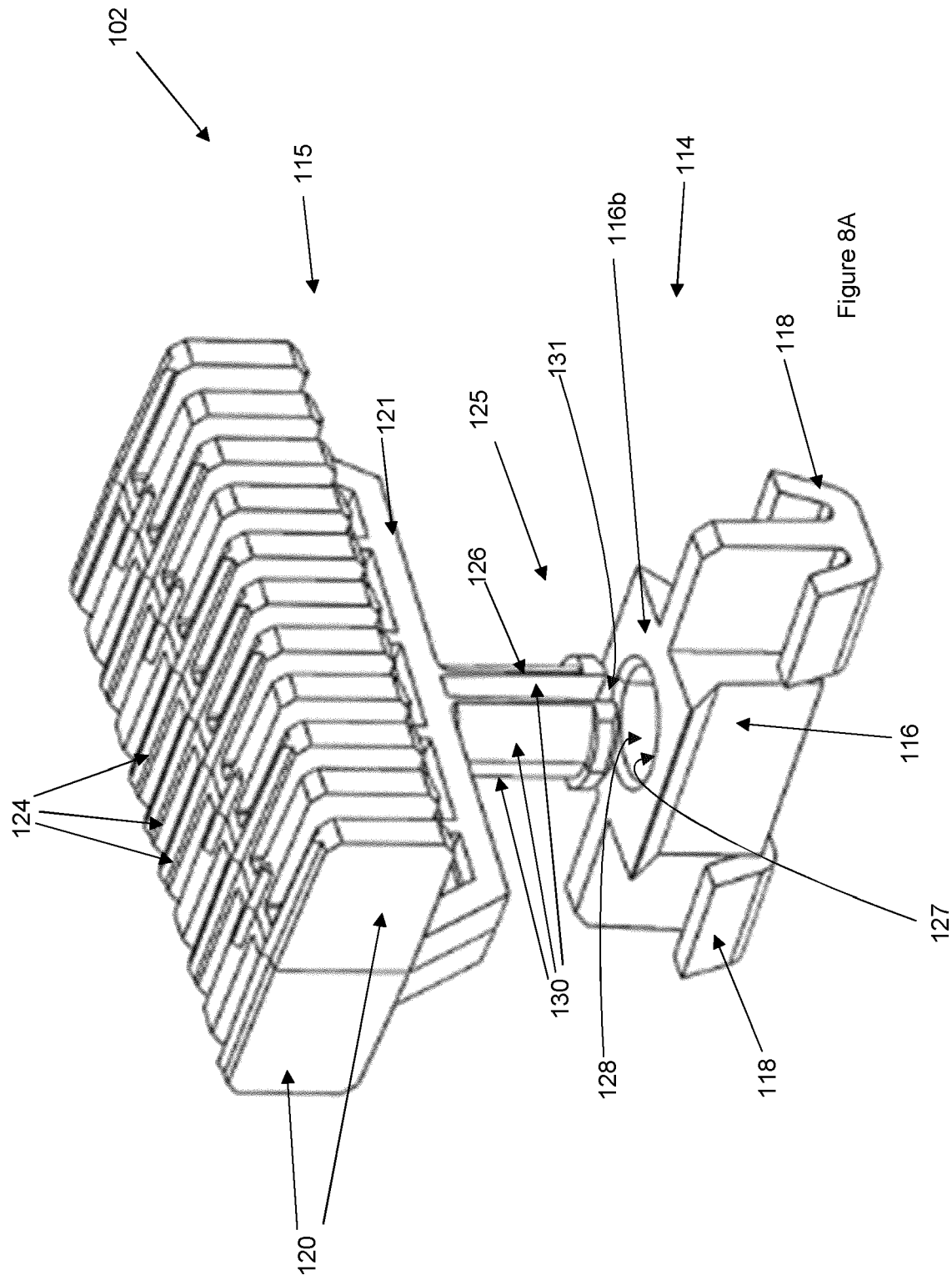
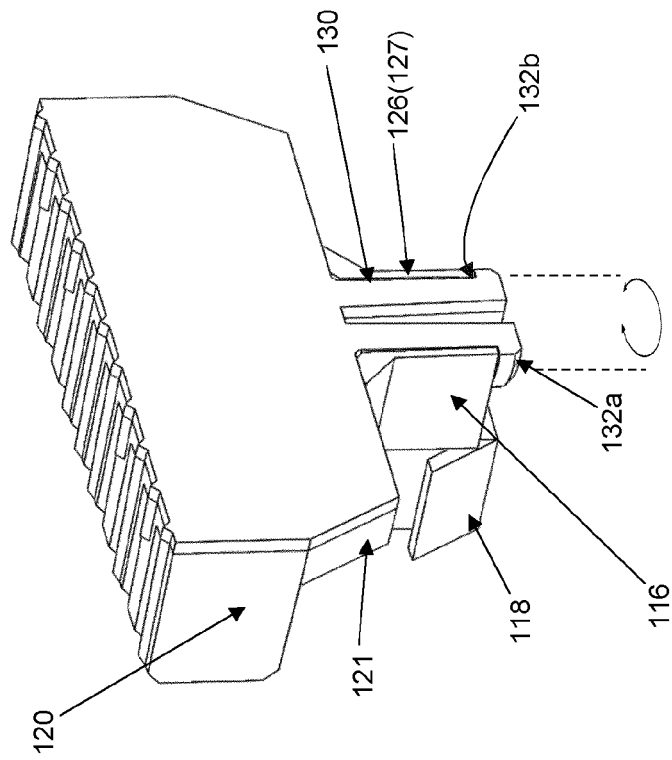
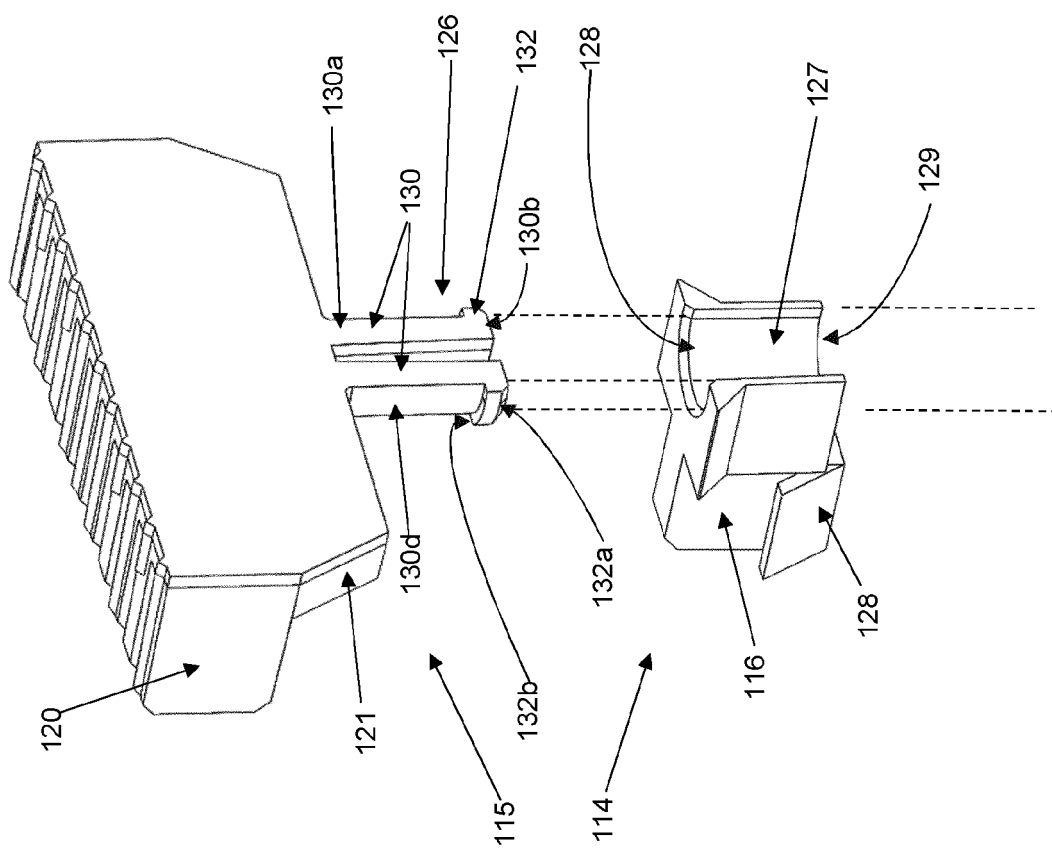


Figure 8A



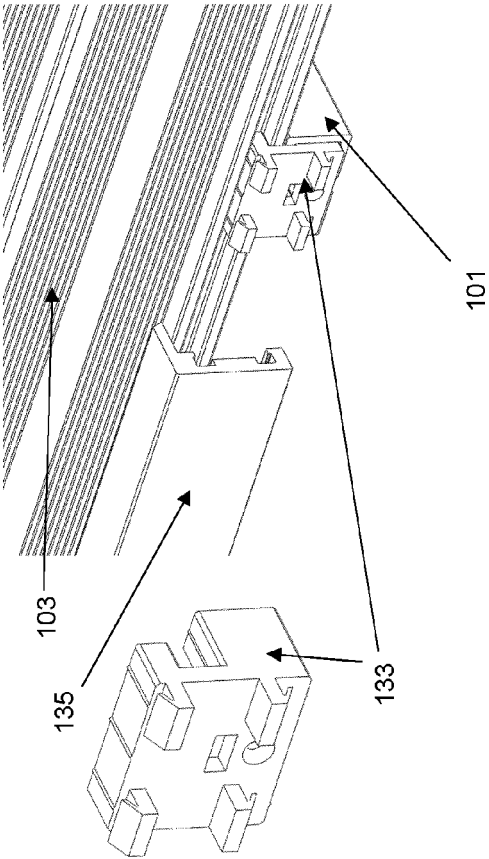


Figure 9B

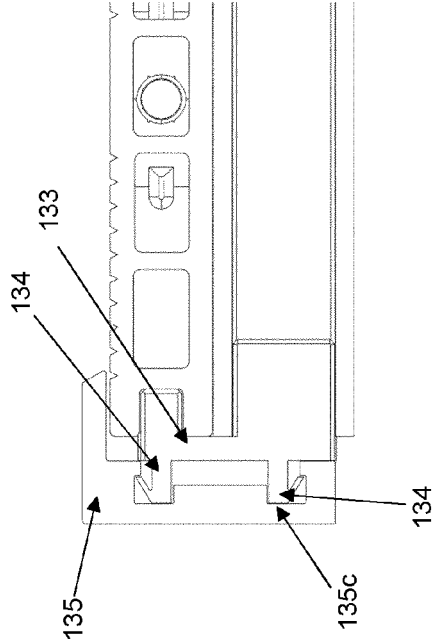


Figure 9D

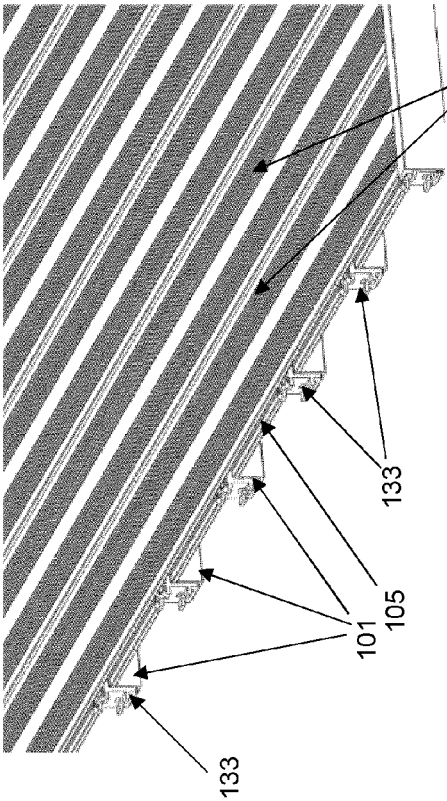


Figure 9A

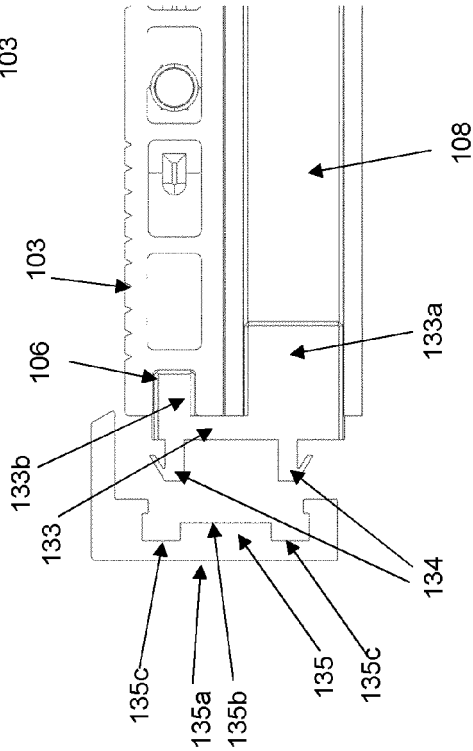


Figure 9C

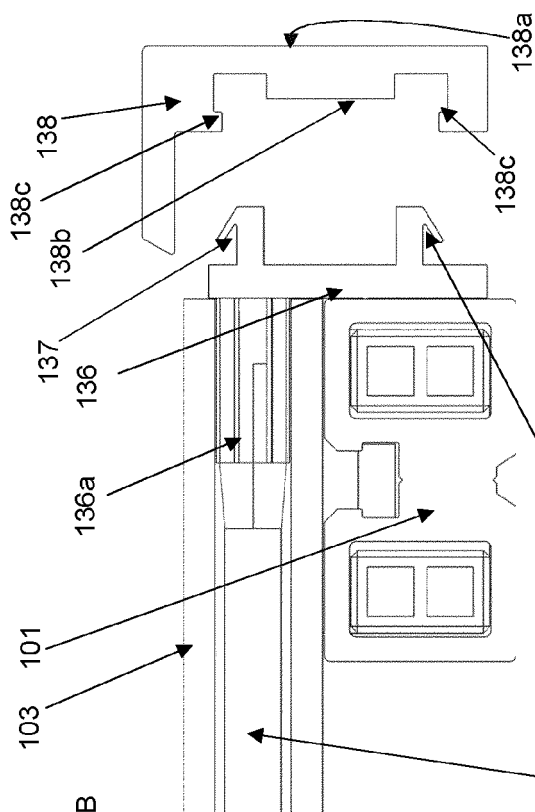


Figure 10B

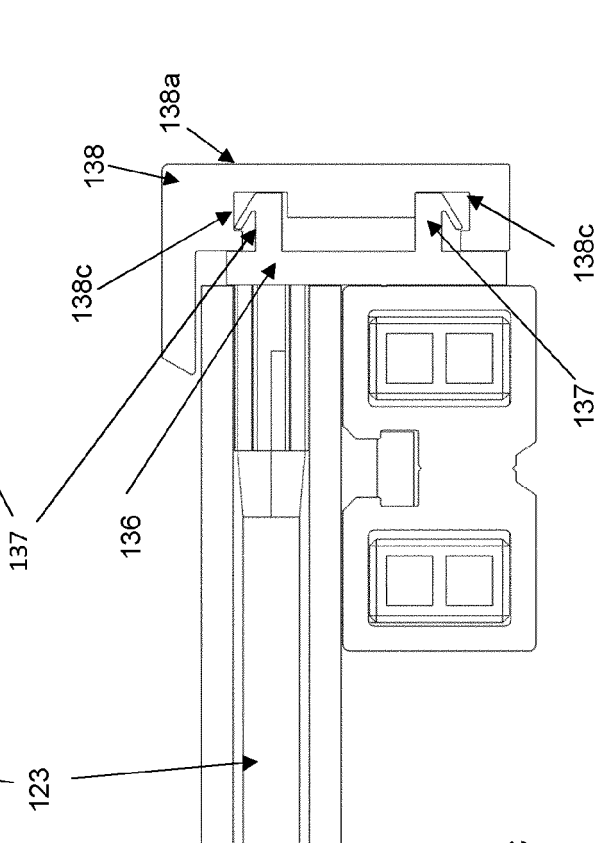


Figure 10C

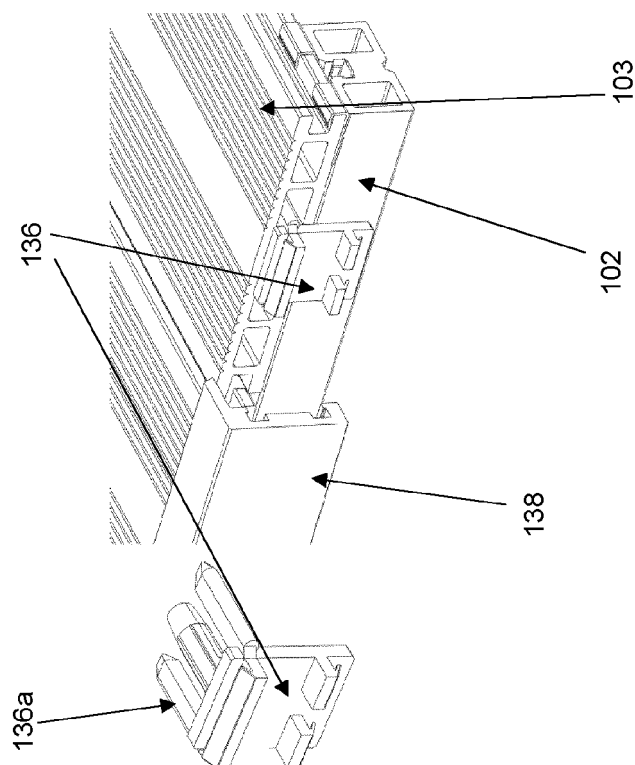


Figure 10A



EUROPEAN SEARCH REPORT

Application Number

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Y	* figures 1-2, 4-5 * * paragraph [0001] * * paragraph [0032] - paragraph [0039] * -----	11, 12, 16, 17, 19	E04F15/024
X	US 2020/408230 A1 (GETSIV STEPHEN [US]) 31 December 2020 (2020-12-31)	1, 8	
Y	* figures 1, 21-22 * * paragraph [0044] - paragraph [0045] * * paragraph [0088] - paragraph [0092] * -----	19	
Y	FR 3 072 700 A1 (T M P CONVERT JOU PLAST [FR]) 26 April 2019 (2019-04-26) * figures 2-4 * * page 13, line 8 - line 21 * -----	11, 12	
Y	FR 3 078 086 A1 (ARCH DU BOIS [FR]) 23 August 2019 (2019-08-23) * figures 10-11 * * page 11, line 1 - line 5 * -----	16	TECHNICAL FIELDS SEARCHED (IPC)
Y	DE 102 54 791 A1 (TREIBER HARTMUT [DE]) 3 June 2004 (2004-06-03) * figures 1-3 * * paragraph [0036] * -----	17	E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 December 2022	Examiner Estorgues, Marlène
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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