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(54) **A LOAD BEARING ASSEMBLY**

(57) An assembly 1700 for supporting a load off of a floor is provided. The assembly includes a panel assembly 1708, a frame assembly and a fixing means. The panel assembly 1708 includes an panel 1710 having an upper surface for receiving a load and a lower surface. The panel assembly 1708 further includes one or more grooves 1718 configured to engage with the frame assembly. The frame assembly includes frame members 1720a, 1720b each having a support member 1722a, 1722b and a connection member 1724a, 1724b. The connection member 1724a, 1724b has a protrusion 1726a, 1726b configured to be received within a groove 1718. The fixing means holds the frame members 1720a, 1720b and the panel assembly 1708 together.

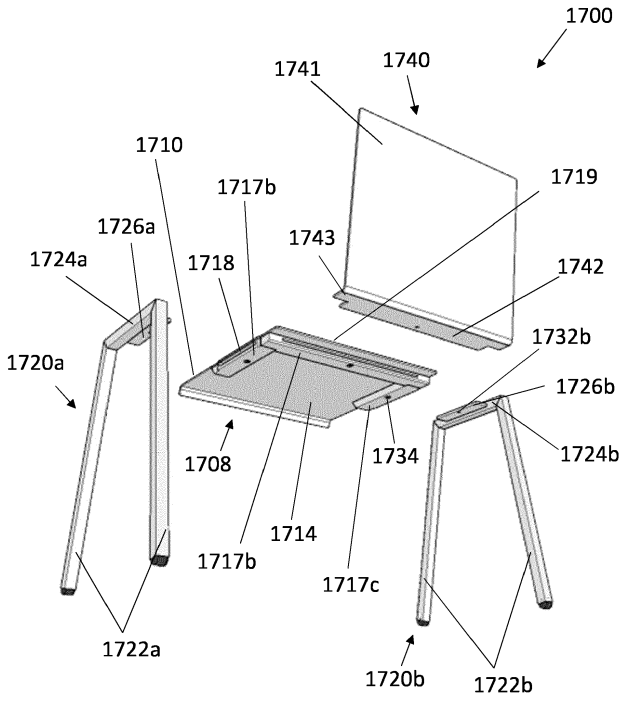


Figure 9

EP 4 501 172 A1

Description

Field of the Invention

[0001] The present invention provides an assembly for supporting a load off of a floor (e.g. a load bearing assembly). The present invention also provides a flat-pack assembly kit for assembling the same.

Background of the Invention

[0002] Load bearing assemblies may be used in a number of applications, such as building structures, walkways, flooring and furniture (such as tables, chairs, shelving units, cabinets, beds). In many applications, the components (e.g., the individual panels and the frame) of a load bearing assembly are fabricated at one location, and then transported to a distant point of use where they are irreversibly assembled. Alternatively, assembly of load bearing assembly may be conducted at a first location, followed by shipping the final assembled load bearing article to a distant point of use at a second location.

[0003] As the purpose of a load bearing assembly is to receive and bear the weight of a load (e.g. a user sitting on a chair), it is necessary that the load bearing assembly as a whole possess physical properties (such as strength and load bearing properties) that prevents the assembly from buckling, breaking or deforming when receiving a load. To achieve this, it is important that each of the components (e.g. frame members and/or panels) themselves possess the requisite physical properties (e.g. strength and load bearing properties, e.g. by being made from suitable materials), but that the mechanical joints between them are also suitably strong.

[0004] To achieve this goal, the components of the load bearing assembly may be made from materials such as steel, having high strength and fracture resistance, with strong mechanical joints such as welding easily accessible. However, such materials are typically heavy, resulting in a load bearing assembly with a significant weight that may make it impractical for use in assemblies that may need to be regularly moved (such as furniture assemblies).

[0005] Weight reduction may be achieved by fabricating individual components from alternative (lighter) materials. For example plastics or lighter metals, such as aluminium, may be used.

[0006] However, moulded plastic load bearing assemblies are typically prone to failure at the points where the panels themselves and/or the panels and the frame are joined together.

[0007] Aluminium (or alloys thereof) is an extremely versatile material and therefore is used in a wide variety of applications. In particular, aluminium provides a good strength-to-weight ratio, corrosion resistance and conductivity whilst being reasonably priced. As such, it is often used to provide engineering materials. However, aluminium is extremely difficult to weld for a number of reasons. Firstly, it is difficult to weld because of the high thermal conductivity of aluminium, aluminium effectively dissipates heat which can result in unwanted distortion due to the need to use a larger heat input. Secondly, molten aluminium very easily adsorbs or dissolves hydrogen gas, resulting in the weld pool or joint absorbing hydrogen during the welding process. When the welding joint cools, hydrogen is trapped within the joint resulting in a high porosity and a compromised weld joint. Thirdly, aluminium (and alloys thereof) typically include an oxide layer which has a significantly higher melting point. As such, during the welding process, the oxide layer may be included which can result in lack of fusion and ultimate undermine the integrity and strength of the weld.

[0008] As a result, alternative mechanical joints to welding are desirable when aluminium is used. However, these alternative joints are typically less strong and thus may fail when a load is received by the assembly, reducing the lifespan of the assembly.

[0009] Moreover, because of the necessary strength required by the components and/or mechanical joints between them, load bearing assemblies are often irreversibly assembled. As such, users are unable to assemble and disassemble the assembly, resulting in a reduction in flexibility and usability for the assembly.

[0010] It would thus be desirable to develop a load bearing assembly that has reduced weight relative to equivalent load bearing assemblies fabricated from heavier materials, such as steel. It would be further desirable that such newly developed load bearing assemblies also possess physical properties, such as static and non-static load bearing properties, that are equivalent to (or improved with respect to) those of equivalent load bearing assemblies fabricated from heavier materials, such as steel. Still further, it would be desirable that such newly load bearing assemblies be easily and reversibly assembled.

[0011] The object of the present invention is to address one or more of the above mentioned problems. In particular, the present invention aims to provide a load bearing assembly that minimises the weight of the assembly whilst maximising the load bearing capacity.

[0012] Furthermore, the present invention aims to provide a flat-pack assembly that can be reversibly assembled whilst still retaining the capacity to receive a load without failure, buckling, breaking or deforming.

Summary of the Invention

[0013] In a first aspect of the invention, an assembly (e.g. a load bearing assembly) for supporting a load off of a floor is provided. The assembly comprises a panel assembly and a frame assembly. Optionally, the panel assembly comprises a panel having an upper surface and a lower surface. Optionally, the panel assembly comprises a panel having an upper surface, a lower surface and an edge extending between the upper surface and the lower surface. Optionally, the upper surface

is for receiving a load, wherein the upper surface may be provided such that the load exerts a normal force on the upper surface of the panel. Optionally, the panel assembly comprises one or more grooves. Optionally, the edge extending between the upper surface and the lower surface comprises the one or more grooves (e.g. the panel comprises the one or more grooves). Optionally, the panel assembly comprises one or more groove elements, wherein each groove element comprises one or more grooves. Optionally, each groove element is affixed to the lower surface of the panel. Optionally, each groove element is affixed to the panel to provide one or more grooves proximate to an edge of the panel. Optionally, each of the one or more grooves are configured to engage with the frame assembly. Optionally, the frame assembly comprises one or more frame members. Optionally, each frame member comprises a support member. Optionally, the support member is configured to engage with the floor (e.g. the floor on which the assembly is placed). Optionally, the support member engages with the floor directly (e.g. direct contact between the support member and the floor) or indirectly (e.g. via a wheel or foot attachment). Optionally, each frame member further comprises, a connection member for engaging with the panel. Optionally, the connection member comprises a protrusion that is configured to be received within a groove of the one or more grooves. Optionally, the connection member and the support member are (e.g. securely, e.g. directly, e.g. indirectly) attached. Optionally, the connection member is provided (e.g. by the attachment to a support member) at a position substantially parallel to the floor when the structure is assembled. The assembly further comprises a fixing means. Optionally, the fixing means is configured to (e.g. securely and/or reversibly) hold the one or more frame members and the panel together. Optionally, the fixing means is configured to hold the protrusion of the connection member and the panel together. Optionally, the fixing means is configured to hold the protrusion of the connection member and the panel assembly together. Optionally, the fixing means is configured to secure the one or more frame members to the one or more groove elements. Optionally, the fixing means is configured to secure the protrusion of the one or more connection members to the one or more groove element(s).

[0014] In a second aspect of the invention, an assembly (e.g. a load bearing assembly) for supporting a load off of a floor is provided, comprising:

a panel assembly, a frame assembly and a fixing means;
wherein the panel assembly comprises:

a panel having an upper surface for receiving a load and a lower surface; and
one or more grooves, wherein each of the one or more grooves are configured to engage with the frame assembly;

wherein the frame assembly comprises:
one or more frame members, wherein each frame member comprises:

a support member; and
a connection member comprising a protrusion that is configured to be received within a groove of the one or more grooves;
wherein the connection member and the support member are attached; and

wherein the fixing means is configured to hold the one or more frame members and the panel assembly together.

[0015] Then first and second aspects of the present invention provides an improved load bearing assembly compared to those known in the art. In particular, the first aspect and the second aspect provides an assembly including a panel which is held off of the floor and is arranged to receive and support a load off of the floor. The load may be any suitable and/or desirable load depending on the intended purpose of the assembly. For example, the load may include all or part of the weight of a person (e.g. if the assembly is a piece of furniture arranged to support a person such as a bed or chair, or if the assembly is arranged to be a floor on which the person is to walk). The load may include an object intended to be placed on the assembly (e.g. dining ware intended to be placed on a table, e.g. furniture intended to be placed on the floor if the assembly is arranged to be a floor of a building or structure).

[0016] The inventors have surprisingly found that, by providing the assembly with a tongue-and-groove style mechanical joint between the frame assembly and the panel assembly (e.g. wherein the protrusion corresponds to the tongue received within a groove of the panel assembly), the load capacity can be maximised using relatively lightweight materials, such as aluminium. This is because the groove may distribute the load across the panel assembly, preventing failure and/or breakage of the assembly and/or mechanical joints when a load is placed on the assembly. As such, the present inventors have managed to provide a load bearing assembly that can take advantage of lightweight materials (such as aluminium) because the mechanical joints do not require any parts to be welded together.

[0017] In a third aspect of the invention, a flat-pack assembly kit for providing a load bearing assembly is provided. The flat-pack assembly kit comprises a panel assembly and a frame assembly. Optionally, the panel assembly comprises a panel having an upper surface and a lower surface. Optionally, the panel assembly comprises a panel having an upper surface, a lower surface and an edge extending between the upper surface and the lower surface. Optionally, the panel assembly comprises one or more grooves. Optionally, the edge extending between the upper surface and the lower sur-

face comprises the one or more grooves (e.g. the panel comprises the one or more grooves). Optionally, the panel assembly comprises one or more groove elements, wherein each groove element comprises one or more grooves. Optionally, each groove element is affixed to the lower surface of the panel. Optionally, each groove element is affixed to the panel to provide one or more grooves proximate to an edge of the panel. Optionally, each of the one or more grooves is configured to engage with the frame assembly. Optionally, the frame assembly comprises one or more frame members. Optionally, each frame member comprises a support member for engaging (e.g. directly, e.g. indirectly) with the floor. Optionally, the frame assembly comprises a connection member. Optionally, the connection member comprises a protrusion that is configured to be received within a groove of the one or more grooves. Optionally, the support member and the connection member are (e.g. directly, e.g. indirectly) attached. Optionally, the flat-pack assembly further comprises a fixing means configured to (e.g. securely and/or reversibly) hold the frame member and the panel together. Optionally, the flat-pack assembly further comprises a fixing means configured to (e.g. securely and/or reversibly) hold the protrusion and the panel together. Optionally, the flat-pack assembly further comprises a fixing means configured to (e.g. securely and/or reversibly) hold the protrusion and the panel assembly together. Optionally, the flat-pack assembly further comprises a fixing means configured to (e.g. securely and/or reversibly) hold the protrusion and the one or more groove element(s) together.

[0018] In a fourth aspect of the invention, a flat-pack assembly kit for providing an assembly for supporting a load off the floor is provided. The flat-pack assembly kit comprises:

a panel assembly and a frame assembly, wherein the panel assembly comprises:

an upper surface and a lower surface; and
one or more grooves, wherein each of the one or more grooves is configured to engage with the frame assembly; and

wherein the frame assembly comprises:
one or more frame members, wherein each frame member comprises:

a support member; and
a connection member comprising a protrusion, wherein the protrusion is configured to be received within a groove of the one or more grooves;
wherein the support member and the connection member are attached.

[0019] In some embodiments of the fourth aspect, the flat-pack assembly further comprises a fixing means configured to (e.g. securely and/or reversibly) hold the protrusion and the panel together. Alternatively, the fixing means may be not be provided as part of the flat-pack assembly, but instead by the end user.

[0020] It will thus be appreciated that the third and fourth aspects of the present invention provide a flat-pack assembly kit that is suitable for providing the load bearing assembly of the first and second aspects. As such, the panel assembly and the frame assembly (and the features relating thereto) of the third and fourth aspects correspond directly to the panel assembly and frame assembly (and the features relating thereto) of the first and second aspects.

[0021] The following features and embodiments thus apply to both the first aspect, the second aspect, the third aspect and the fourth aspects equally. Furthermore, it will be appreciated that any suitable and/or desirable number and/or arrangement of the following optional features may be combined with the features of the above aspects of the invention to provide an embodiment falling within the scope of the present invention, as defined by the appended claims.

[0022] Optionally, the (e.g. load bearing) assembly is a furniture assembly. The (e.g. load bearing) assembly may be a chair assembly (i.e. a chair). The (e.g. load bearing) assembly may be a table assembly (i.e. a table). The (e.g. load bearing) assembly may be a bed assembly (i.e. a bed). The (e.g. load bearing) assembly may be a shelving assembly (i.e. a shelving unit). The (e.g. load bearing) assembly may be a cabinet assembly (i.e. a cabinet or a cabinet unit).

[0023] Optionally, the (e.g. load bearing) assembly is a structural assembly. The (e.g. load bearing) assembly may be a walkway assembly, wherein the upper surface provides the walkway surface. The (e.g. load bearing) assembly may be a building assembly, wherein the upper surface of the panel is the platform on which a user may stand. The structural assembly may form part of a building structure, e.g. a modular building unit.

[0024] Optionally, the upper surface and/or lower surface has any suitable and/or desirable many sided polygon shape. For example, the upper surface and/or lower surface may have a rectangular, square, trapezoidal, pentagonal, hexagonal or octagonal shape. It will thus be appreciated that the panel will have the same number of edges as the number of sides of the shape of the upper and/or lower surface.

[0025] Optionally, the one or more grooves of the panel assembly are provided by one or more groove elements, wherein each groove element itself comprises one or more grooves. For example, the panel assembly may comprise a panel (e.g. a metal sheet panel) to which a plurality of groove elements are affixed to provide the one or more grooves of the groove assembly. Optionally, each of the one or more groove elements are affixed to the panel at a position proximate to a side (e.g. of the many-sided shape) of the panel. Optionally, each of the one or more groove elements provides one or more grooves at a

position proximate to the side of the panel. Optionally, each of the one or more groove elements are affixed to the lower surface of the panel at a position proximate to a side of said panel.

[0026] Optionally, the panel of the panel assembly comprises a lower surface, an upper surface and one or more edges extending therebetween. In the present disclosure, a edge is defined as a surface or plane of the panel which extends (e.g. perpendicularly, e.g. at an angle) between the upper surface and the lower surface of the panel. The (e.g. many sided) shape of a panel may therefore be defined by the upper surface, the lower surface and the one or more edges. It will thus be appreciated that, where it is described above that a groove element is associated with or affixed proximate to a side, this does not necessarily mean that the groove element is associated with or affixed to the edge. Rather, the groove element may be affixed to the upper or lower surface of the panel at an off-centred position such that the groove element provides one or more grooves proximate to the side of the panel. Alternatively, the groove element may be affixed to the edge (e.g. the surface provided thereby) of the panel to provide the one or more grooves substantially along the edges of the panel. For example, the groove elements may be affixed to one or more edges of the panel. For example, the groove elements may be affixed to the panel edges such that they form the perimeter of the panel.

[0027] The groove elements may be affixed to the panel by any suitable and/or desirable means. Optionally, the groove elements are affixable to (e.g. the lower surface of, e.g. to an edge of) the panel assembly. For example, the groove elements may be mechanically attached to the panel (e.g. by screws), welded to the panel, or adhered to the panel using an adhesive. Optionally, in the third and fourth aspects of the invention, the groove elements are provided un-affixed to the panel. Optionally, in the third and fourth aspects of the invention, the groove elements are provided pre-affixed (e.g. the panel assembly is provided in an assembled form) to the panel.

[0028] Optionally, each groove element comprises one groove configured to engage with a frame member. Optionally, each groove element comprises a plurality (e.g. two or more) grooves configured to engage with one or more frame members). Optionally, the one or more grooves of a single groove element are configured to engage with the same frame member. Optionally, the one or more grooves of a single groove element are configured to engage with two or more frame members.

[0029] Optionally, one or more sides of the panel in the panel assembly has a groove element associated therewith (e.g. affixed or affixable proximate thereto, e.g. affixed or affixable to the lower surface, e.g. affixed or affixable to the edges of the panel). Optionally, all of the sides of the panel in the panel assembly have a groove element associated therewith (e.g. affixed or affixable proximate thereto, e.g. affixed or affixable to the lower surface, e.g. affixed or affixable to the edges of the panel). Optionally, at least one side of the panel does not have a groove element associated therewith. In other words, at least one side of the panel is not intended to be joined to a frame member. This may be the case with a chair assembly for example, where it may be desirable for one side of the panel (i.e. the side where the legs are to engage) to be left free.

[0030] Optionally, a side of the panel in the panel assembly may comprise two or more groove elements associated therewith (e.g. affixed or affixable proximate thereto, e.g. affixed or affixable to the lower surface, e.g. affixed or affixable to the edges of the panel). Optionally, each groove element of the one or more groove elements associated with the same side of the panel may be configured to receive (e.g. engage with) the same frame member. Optionally, each groove element of the one or more groove elements associated with the same side of the panel may be configured to receive (e.g. engage with) different frame members.

[0031] Optionally, the groove elements may be any suitable and/or desirable element. For example, the groove element may be any suitable and/or desirable body comprising a groove configured to receive the protrusion of the frame member. Optionally, the groove elements are U-shaped elements. Optionally, the U-shaped elements may be made from metal (e.g. aluminium). Optionally, the groove elements are solid elements comprising a groove machined, moulded or cast into one (or more) sides of the solid elements. Optionally, the groove elements are hollow elongate members and the one or more grooves of each groove element are provided by one or more slots extending through a side (e.g. a wall) of the hollow elongate member. Optionally, the groove elements are hollow elongate members comprising a slot on one or more sides. Optionally, the groove elements (e.g. hollow elongate groove elements) are made from metal, e.g. aluminium. Optionally, the hollow elongate groove element(s) are box-like sections having a square or rectangular cross-section, e.g. aluminium box sections.

[0032] By providing the grooves of the panel assembly as part of separate members (e.g. the groove elements) to the panel, an advantageously customizable load bearing assembly can be provided which allows adjustment and adaptation of the arrangement of the frame assembly with respect to the panel and panel assembly.

[0033] Optionally, the panel comprises the same number of groove elements as there are frame members in the frame assembly. In other words, the load bearing assembly may comprise a 1:1 ratio of frame members groove elements comprising one or more grooves. For example, in some embodiments the assembly comprises two frame members and a panel assembly having a panel with plurality of (e.g. four) sides, wherein each side has one groove element associated therewith. Optionally, the load bearing assembly may comprise at least a 1:2 (e.g. a 1:2, e.g. a 1:3) ratio of frame members to groove ele-

ments.

[0034] Optionally, the frame assembly comprises two frame members, wherein the two frame members are arranged parallel to each other such that the protrusions of each of the two frame members are received within a (e.g. one or more) groove(s) of one of two groove elements, wherein the two groove elements are proximate to opposite sides of the panel.

[0035] Optionally, the (e.g. each) groove element is affixed to the panel such that it provides the one or more grooves at a position substantially in line with the edge of the panel. In other words, an edge or side of the groove element may lie in substantially the same plane as the edge of the panel.

[0036] Optionally, the (e.g. each) groove element proximate to the side of the panel but offset from the edge such that at least part of the frame member received within the groove of the groove element is in contact with the frame member. For example, the groove elements may be provided at a position such that the lower surface of the panel engages with a top surface of the frame member (e.g. a top surface of the connection member or support member) which further distributes the load applied to the panel (when present) across the frame member(s).

[0037] Optionally, each edge (of the one or more edges) comprises one groove configured to engage with a frame member. In other words, the panel has a sufficient thickness (e.g. the dimension between the upper surface and the lower surface) to provide the groove as part of the panel, e.g. without weakening the structural integrity of the panel. Optionally, the panel comprises a two or more (e.g. two, e.g. three, e.g. four, e.g. a plurality of) edges, wherein each edge comprises one groove configured to engage with a frame member.

[0038] Optionally, the panel of the panel assembly comprises one or more edges, wherein each edge (of the one or more edges) comprises a plurality of (e.g. two, e.g. three) grooves. In other words, the panel has a sufficient thickness (e.g. the dimension between the upper surface and the lower surface) to provide a plurality of grooves as part of the panel, e.g. without weakening the structural integrity of the panel.

[0039] Optionally, an edge comprising a plurality of grooves may engage with a single frame member. For example, a connection member may include a plurality of (e.g. two, e.g. three) protrusions, wherein each protrusion is received within one of the plurality of (e.g. two, e.g. three) grooves along one edge such that the frame member can be attached to the panel (e.g. via the protrusion/groove engagement). Optionally, an edge comprising a plurality of grooves may engage with a plurality (e.g. two, e.g. three) frame members. For example, each groove of the plurality of grooves on an edge may engage with different frame members.

[0040] It will be appreciated that, just because a groove is configured to engage with a frame member does not mean that, in the final assembled structure or assembly, said groove is attached to a frame member. One advantage of the present invention is that the same components may be used for a variety of different configurations. As such, a panel having four edges each comprising a groove configured to receive a frame member may be attached to one, two, three, four or more frame members. In other words, some of the grooves may not be used to attach a frame member in the final assembly.

[0041] Optionally, the panel comprises a plurality of (e.g. two, e.g. three, e.g. four) edges, wherein at least two (e.g. three, e.g. four, e.g. all) of the edges comprise one or more (e.g. two, e.g. three) grooves. Optionally, the panel comprises at least one edge (e.g. two) that does not include a groove.

[0042] Optionally, the panel comprises a plurality of (e.g. two, e.g. three, e.g. four) edges, wherein each edge comprises one or more (e.g. one, e.g. two, e.g. three) grooves configured to engage with a frame member. Optionally, each edge of the panel has the same number of grooves. Optionally, the edges of the panel may have different numbers of grooves. Optionally, one or more (e.g. one, e.g. two) edges of the panel do not include a groove.

[0043] Optionally, the panel comprises the same number of edges comprising one or more grooves as there are frame members in the frame assembly. In other words, the load bearing assembly may comprise a 1:1 ratio of frame members to panel edges comprising one or more grooves. For example, in some embodiments the assembly comprises two frame members and a panel having a plurality of (e.g. four) edges, wherein two of the plurality of (e.g. four) edges has one or more grooves. Optionally, the load bearing assembly may comprise at least a 1:2 (e.g. a 1:2, e.g. a 1:3) ratio of frame members to panel edges comprising one or more grooves.

[0044] Optionally, the panel comprises the same number of grooves (e.g. provided by the edge or by groove elements) as there are frame members in the frame assembly. In other words, the load bearing assembly may comprise a 1:1 ratio of frame members to grooves. For example, in some embodiments the assembly comprises two frame members and a panel having a plurality of (e.g. four) edges, wherein two of the plurality of (e.g. four) edges has one groove, wherein each groove receives one of the two frame members. Optionally, the panel comprises a different number of grooves to the number of frame members in the frame assembly. In other words, the load bearing assembly may comprise at least a 1:2 (e.g. a 1:2, e.g. a 1:3) ratio of frame members to grooves.

[0045] Optionally, the panel comprises a different number of edges comprising one or more grooves as there are frame members in the frame assembly. In other words, the load bearing assembly comprises a panel having a plurality of edges comprising a groove, wherein not all the grooves are attached to a frame member when the structure is assembled.

[0046] Optionally, the panel assembly (e.g. the panel,

e.g. the groove elements thereof) is attached to two or more (e.g. three or more, e.g. four or more) frame members. For example, the assembly comprises a panel assembly and a plurality of frame members in a ratio of from at least 1:2 to 1:4.

[0047] Optionally, the assembly comprises a plurality of (e.g. two, e.g. three, e.g. four) panel assemblies, each of which comprises a panel. Optionally, each of the panels in the plurality of panel assemblies are attached to at least one (e.g. at least two, e.g. at least three) frame members. Optionally, a plurality of (e.g. two, e.g. three, e.g. four) panel assemblies may be attached to the same frame members such that the plurality of (e.g. two, e.g. three, e.g. four) panels of different panel assemblies are arranged to be parallel to each other. Optionally, two panels of a plurality of (e.g. two, e.g. three, e.g. four) panel assemblies may be attached to (e.g. share) a common frame member. For example, two (or more) panel or two or more panel assemblies may be connected together by the same frame member.

[0048] Optionally, the panel assembly comprises a plurality of (e.g. two, e.g. three, e.g. four) panels, wherein each of the plurality of panels are attached to at least one (e.g. at least two, e.g. at least three) frame members. Optionally, a plurality of (e.g. two, e.g. three, e.g. four) panels may be attached to the same frame members such that the plurality of (e.g. two, e.g. three, e.g. four) panels are arranged to be parallel to each other. Optionally, two panels of a plurality of (e.g. two, e.g. three, e.g. four) panels may be attached to (e.g. share) a common frame member. For example, two (or more) panels may be connected together by the same frame member.

[0049] Optionally, the frame assembly is configured to hold the (e.g. one or more) panel(s) off of the floor. In other words, when the load bearing assembly is assembled, the panel(s) do not engage with the floor. Optionally, the panel(s) is/are held at a position substantially parallel to the floor. In other words, the upper surface and/or the lower surface of each panel in the assembly is substantially parallel to the floor. Optionally, each edge of the (e.g. one or more edges of the) panel is substantially perpendicular to the floor.

[0050] Within the meaning of the present invention, it is intended that the term "substantially parallel" corresponds to an orientation that deviates from parallel by less than +/- 10 degrees.

[0051] Optionally, the frame assembly is arranged such that, when the frame assembly is attached (e.g. by the fixing means), to the panel assembly (e.g. attached to the panel, e.g. attached to the groove element(s))each panel in the panel assembly (or assemblies) can receive and/or hold a load on the upper surface (e.g. without the load falling or sliding off). Optionally, the load exerts a normal force on the upper surface of the (e.g. one or more) panel(s) on which the load is placed.

[0052] Optionally, the panel is provided as a sheet or a panel. Optionally, the sheet is a metal (e.g. aluminium) sheet. Optionally the sheet or panel has a thickness of less than 1 cm, e.g. less than 5 mm.

[0053] Optionally, the panel comprises a core sandwiched between two sheets. Optionally, the two sheets are substantially planar. Optionally, the core is air such that the panel is substantially hollow. Optionally, the core comprises a cellular material such as a honeycomb structure (e.g. an aluminium honeycomb structure).

[0054] The two sheets may be made from any suitable and/or desirable material. The two sheets may be made of the same material or different materials. Optionally, one or both sheets may be made from a polymeric material such as a thermoplastic polymer or a thermoset polymer. Optionally, the polymeric material may be high molecular weight thermoplastic such as PE500 high molecular weight polyethylene. Optionally, one or both sheets is an acrylic material, such as Perspex. Optionally, one or both sheets may comprise a metal or an alloy. Optionally, one or both sheets may comprise a composite material. Optionally, one or both sheets may be made from wood.

[0055] Optionally, the panel having one or more edges each comprising one or more grooves may be solid (e.g. is integrally formed). For example, the panel may be formed from a solid metal panel. Optionally, the grooves may be milled or machined into the sides of the solid metal panel or may be integrally provided as part of a casting process. Optionally, the panel may be a solid composite panel. Optionally, the grooves may be milled or machined into the sides of the solid metal panel or may be integrally provided as part of a casting process.

[0056] Optionally, the panel is made from a polymeric material such as a thermoplastic polymer or a thermoset polymer. Optionally, the panel may be formed using a casting or moulding process, such as injection moulding, extrusion moulding, blow moulding, thermoforming or metal casting. Optionally, the grooves may be integrally formed using moulds as part of the moulding process. Optionally, the panel may be formed from a block of wood (e.g. timber) with grooves milled into the edges. Optionally, the panel may be formed form a block of wood (e.g. timber) with groove inserts (e.g. U-shaped groove members) made from metal (e.g. aluminium) to provide the grooves along the edges.

[0057] Optionally, the upper surface of the panel may be non-planar. For example, the upper surface of the panel may be concave or stepped. Optionally, the upper surface may be shaped to provide a complementary shape to the load intended to be received. For example, the upper surface may have an ergonomic shape (e.g. a shape which is comfortable and supportive for a user to sit on when the assembly is a chair). Optionally, at least part of the upper surface and at least part of the lower surface are substantially parallel.

[0058] Optionally, the panel comprises a body and a boarder portion, wherein the boarder portion comprises the at least one edge and the one or more grooves. Optionally, the one or more grooves may be integrally formed with the panel. For example, it will be appreciated

that the groove comprises at least one wall that defines a cavity forming the groove. As such, the walls of the one or more grooves may be a continuous with the body of the panel.

[0059] Optionally, the panel may be formed using a mould such that the panel is moulded to include the groove. Optionally, the groove may be formed by drilling or milling the edge of a solid panel. As such, material may be removed from the edge of the panel to provide the groove.

[0060] Optionally, the groove is formed by a U-shaped elongate member. For example, the U-shaped elongate member may be attached to a core panel such that the core panel forms the body of the panel and the U-shaped elongate member forms the boarder of the panel.

[0061] Optionally, when the panel comprises a core sandwiched between two sheets, the U-shaped elongate member may be provided along an edge of the core such that the U-shaped member is also sandwiched between the two sheets. In such embodiments, the two sheets of material are larger than the core such that the sheets of material overhang the core and provide an area where the U-shaped elongate member may be attached. Optionally, the U-shaped elongate member is provided at (e.g. at least one) edge of the sheets.

[0062] Optionally, the edge or groove element comprises a groove that extends substantially the entire length of the edge comprising the groove. For example, the edge or groove element comprises one groove, wherein the length of the groove is substantially equal to the length of the edge of the panel. Optionally, the groove element has a length substantially equal to the length of the edge of the panel. Optionally, the length of the groove element and/or groove is at least 80% (e.g. 85%, e.g. 95%, e.g. 98%, e.g. 100%) the length of the edge of the panel. By providing a groove that extends along a substantial portion of the edge of the panel, the load may be more effectively distributed and the load carrying capacity may be further improved.

[0063] Optionally, the edge or groove element comprises one (or more) grooves that are substantially shorter than the length of the edge comprising the groove. Optionally, the groove element is substantially shorter than the length of the side (e.g. edge) to which the groove element is associated (e.g. affixed or affixable proximate thereto, e.g. affixed or affixable to the lower surface, e.g. affixed or affixable to the edges of the panel). For example, the length of the groove and/or groove element may be from 5% to 80% the length of the edge, e.g. from 5% to 70% the length of the edge, e.g. from 5% to 60% the length of the edge, e.g. from 5% to 40% the length of the edge, e.g. from 5% to 30% the length of the edge, e.g. from 5% to 20% the length of the edge, e.g. from 10% to 20% the length of the edge, e.g. from 10% to 50% the length of the edge. For example, the edge may comprise two grooves, wherein each groove has a length of less than 50% (e.g. from 5% to 45%, e.g. from 10% to 40%, e.g. from 15% to 35%, e.g. from 20% to 30%) of the length of the edge. For example, the edge may comprise three grooves, wherein each groove has a length of less than 33.3% (e.g. from 5% to 30%, e.g. from 10% to 25%, e.g. from 15% to 20%) of the length of the edge. Optionally, if an edge comprises more than one groove, the grooves may be the same length or different lengths.

[0064] Optionally, the groove element may have a length substantially equal to the length of the edge of the panel to which the groove element is associated. Optionally, each grove element comprises two grooves, wherein each groove has a length of less than 50% (e.g. from 5% to 45%, e.g. from 10% to 40%, e.g. from 15% to 35%, e.g. from 20% to 30%) of the length of the edge. For example, the groove element may comprise three grooves, wherein each groove has a length of less than 33.3% (e.g. from 5% to 30%, e.g. from 10% to 25%, e.g. from 15% to 20%) of the length of the edge. Optionally, if a groove element comprises more than one groove, the grooves may be the same length or different lengths.

[0065] Optionally, when an edge comprises more than one (e.g. two, e.g. a plurality of) grooves, the grooves are arranged in-line along the at least one edge. For example, the grooves share a common longitudinal axis. Optionally, the plurality of grooves are substantially equally spaced along the length of the edge.

[0066] Optionally, when a side comprises more than one (e.g. two, e.g. a plurality of) groove elements associated therewith, the grooves of the groove elements are arranged in-line proximate to the side. For example, the groove elements share a common longitudinal axis. Optionally, the plurality of groove elements are substantially equally spaced along the length of the edge.

[0067] Optionally, when a groove element comprises more than one (e.g. two, e.g. a plurality of) grooves, the grooves are arranged in-line along the groove element. For example, the grooves share a common longitudinal axis. Optionally, the plurality of grooves are substantially equally spaced along the length of the groove element.

[0068] Optionally, the fit between a protrusion and a groove is selected to be one of a slide fit, a transition fit or an interference fit. Within the meaning of the present invention, a slide fit is a fit used between mating parts (e.g. a protrusion and a groove) having a substantially zero clearance (e.g. zero within the tolerance of the method of manufacture) between the parts. As such, the protrusion may slide within the groove. Similarly, within the meaning of the present invention, a transition fit (or a push fit) is a fit used between mating parts (e.g. a protrusion and a groove) wherein the tolerance of the protrusion lies below the tolerance of the groove such that the groove is substantially the same size or smaller than the protrusion and slight pressure is required to be applied to insert the protrusion into the groove. Similarly, within the meaning of the present invention, an interference fit is a fit between two parts in which the external dimensions of the protrusion is greater than the internal dimension of the groove such that the pressure is required to be applied to insert the protrusion into the

groove.

[0069] Optionally, the protrusion is configured to be reversibly inserted into the groove. As such, the fit between the protrusion and groove is such that the panel and frame member may be separated without the application of excessive force. Within the meaning of the present invention, excessive force would be force that exceeds the force that may be exerted by a user pulling apart the two parts. For example, excessive force would include needing to use a hammer or tool to separate the two parts. As such, the assembly may be advantageously assembled and disassembled as part of a flat-pack assembly.

[0070] Optionally, the groove comprises a length dimension (e.g. along a longitudinal axis), a width dimension (e.g. along a lateral axis) and a depth dimension (e.g. along a normal axis). Optionally, the longitudinal axis and the lateral axis define the plane of the edge on which the groove is located. Optionally, the longitudinal axis is parallel to the upper and/or lower surfaces of the panel. Optionally, the longitudinal axis of the groove is provided at a position parallel to the floor when the load bearing assembly is assembled. Optionally, the longitudinal axis and the normal axis define a plane of insertion along which the protrusion is inserted into the groove. Optionally, the protrusion is able to move (e.g. slide) along the insertion plane. Optionally, there is substantially no movement of the protrusion within the groove in the plane perpendicular to the insertion plane.

[0071] Optionally, the groove has a substantially U-shaped cross-section. Optionally, the groove has a substantially rectangular or square cross-section. Optionally, the groove has a continuously curved wall defining the cavity of the groove.

[0072] Optionally, the groove is provided by a slot or a slit through a side (e.g. a wall) of the groove element, e.g. a hollow elongate groove element.

[0073] Optionally, the load bearing assembly comprises a plurality (e.g. two or more, e.g. two, e.g. three, e.g. four) frame members. Optionally, each frame member is connected to the same panel assembly. Optionally, each frame member is connected (e.g. directly via the grooves in the edges of the panel) to the same panel in the panel assembly. Optionally, the frame member comprises two frame members, wherein the two frame members are arranged parallel to each other.

[0074] For example, the protrusion of a connection member on a first frame member is received within a groove on a first edge of the panel and the protrusion of a connection member on a second frame member is received within a groove on a second edge of the panel, wherein the first and second edges are parallel to each other.

[0075] For example, the protrusion of a connection member on a first frame member is received within the groove of a groove element proximate to a first side of the panel and the protrusion of a connection member on a second frame member is received within the groove of a groove element on a second side of the panel, wherein the first and second sides are parallel to each other.

[0076] Optionally, the load bearing assembly comprises three frame members, wherein each frame member is received within a groove on different edges of the panel. Optionally, each of the three frame members are arranged to be perpendicular with respect to at least one other frame member.

[0077] Optionally, the load bearing assembly comprises three frame members, wherein each frame member is received within a groove of a groove element located proximate to different sides of the panel. Optionally, each of the three frame members are arranged to be perpendicular with respect to at least one other frame member.

[0078] Optionally, each frame member comprises two or more (e.g. elongate hollow) support members. Optionally each support member is arranged to be substantially parallel to each other. Optionally, each (e.g. elongate hollow) support member comprises a longitudinal axis, wherein the two (e.g. elongate hollow) support members are arranged such that the longitudinal axes of the two (e.g. elongate hollow) support members intersect at an angle from 1 degree to 90 degrees, e.g. from 5 degrees to 85 degrees, e.g. from 10 degrees to 80 degrees, e.g. from 15 degrees to 75 degrees, e.g. from 20 degrees to 70 degrees, e.g. from 35 degrees to 65 degrees, e.g. from 40 degrees to 60 degrees, e.g. from 45 degrees to 50 degrees.

[0079] Optionally, each frame member comprises one or more connection member (e.g. elongate hollow connection member). Optionally, each frame member comprises a plurality of (e.g. two, e.g. three, e.g. four, e.g. five) connection members (e.g. hollow elongate connection members). Optionally, each of the (e.g. hollow elongate) connection members are attached to the same (e.g. hollow elongate) support member(s). For example, the frame member may comprise a plurality of (e.g. two, e.g. three, e.g. four, e.g. five, e.g. six) connection members (e.g. hollow elongate connection members) disposed between two (e.g. hollow elongate) support members such that the plurality of (e.g. hollow elongate) connection members are parallel to each other, e.g. the plurality of connection members are arranged in a plane perpendicular to the floor.

[0080] Optionally, the (e.g. each) support member is configured to engage with the floor (e.g. the floor on which the assembly is placed). Optionally, the support member engages with the floor directly. For example, the support member directly contacts the floor. Optionally, the support member engages with the floor indirectly. For example, the support member indirectly contacts the floor via a wheel or foot. In other words, the wheel or foot directly engages both the floor and is attached to the support member.

[0081] Optionally, the connection member and the support member are attached to each other either directly or indirectly. If the attachment is a direct attachment, the

support member and the connection member are in direct contact and may be (e.g. securely or fixedly) attached together. If the attachment is an indirect attachment, the support member and the connection member are (e.g. securely or fixedly) attached together via a further component or frame member. For example, both the support member and connection member may be fixedly attached to another component such that the support member and connection member form part of a frame assembly which cannot be dissembled but the support member and the connection member are not directly in contact.

[0082] For example, in some embodiments, the frame member may further comprise an offset member. An offset member can connects the support member to the connection member but offsets the position of the support member with respect to the connection member such that the longitudinal axes of the support member and the longitudinal axis of the connection member do not sit in the same plane. Optionally, the connection member is provided (e.g. by the attachment to a support member) at a position substantially parallel to the floor when the structure is assembled. The assembly further comprises a fixing means.

[0083] Optionally, the support member(s) are hollow elongate member(s) (e.g. hollow elongate support member(s)), preferably made from metal, e.g. aluminium. Optionally, the hollow elongate (e.g. support) member(s) are box-like sections having a square or rectangular cross-section, e.g. aluminium box sections.

[0084] Optionally, the connection member(s) are hollow elongate member(s) (e.g. hollow elongate connection member(s)), preferably made from metal, e.g. aluminium. Optionally, the hollow elongate (e.g. support) member(s) are box-like sections having a square or rectangular cross-section, e.g. aluminium box sections.

[0085] As discussed above, being able to use aluminium to provide the frame assembly provides a significant reduction in the weight of the assembly without sacrificing load capacity.

[0086] Optionally, each support member is (e.g. securely, e.g. fixedly) attached to a connection member by a coupling means. For example, the frame member comprises at least two support members, wherein each support member is connected to the connection member by a coupling means.

[0087] Optionally, the coupling means is a plug member. Optionally, the plug member has one or more (e.g. one, e.g. two, e.g. three, e.g. four, e.g. six) projections, wherein each projection is configured to be received within an end of a hollow elongate member. Optionally, the plug member has two or more projections, wherein each of the projections is received within an end of one of the at least two hollow elongate members to be joined together. For example, each of the projections is received within an end of a hollow elongate connection member or a hollow elongate support member. As such, two hollow elongate members (e.g. a support member and a connection member) can be joined together by inserting one projection of the plug into one of the hollow elongate members (e.g. a support member), and another projection of the plug into another hollow elongate members (e.g. a connection member).

[0088] Optionally, the plug member forms a slide fit, a transition fit or an interference fit with the hollow elongate members such that the connection member and elongate members are securely attached. Optionally, the plug member further comprises an adhesive layer such that the plug member is securely attached to an inside surface of the hollow elongate member (e.g. part of the inside surface proximate the end of the hollow elongate member). Optionally, the adhesive is selected to be one of a resin based adhesive. Optionally, the adhesive may be an epoxy adhesive. Optionally, the adhesive may be an epoxy resin mixed with a polyamide hardener. Optionally, the adhesive may include the epoxy resin and polyamide hardener in a ratio of 2:1.

[0089] It will thus be appreciated that, by using an adhesive, the support member, plug member and connection member may be fixedly and securely attached to provide part of a frame member that can bear a high load. As a result, the plug members and adhesive eliminate the need to weld the the support member and connection member together around the plug memberThis allow aluminium to be used and mitigates the downsides associated with welding aluminium.

[0090] Furthermore, preferably, the adhesive is applied only to the ends of the plug members, e.g. the ends of the projections. For example, there is no adhesive applied to the ends of the support and/or connection members. As a result, there is preferably no exposed adhesive present on an external surface of the support and/or connection member. For example, when the projections, including an adhesive proximate the ends, are inserted into an end of a support or connection member, the adhesive is spread along the internal walls of the support/connection members to provide a thin layer of adhesive between the plug member and the support/-connection member without the adhesive being pushed out of the ends.

[0091] Ensuring that there is no adhesive (residue or otherwise) on the outer surfaces of the assembly means that finishing processes, such as powder coating, may be used without yielding a patchy, uneven or imperfect finish. For example, the presence of adhesive or residue influences the quality and aesthetics of a powder-coated finish due to the Faraday Effect, resulting in distinctive (and unattractive) marks on the surface due to an uneven distribution. The inventors have surprisingly found that, by providing the adhesive only on internal surfaces of the connection/support members, the frame members can be powder coated without the draw backs associated with the Faraday Effect. Even more surprisingly, when the join between the connection/support members is sanded down and a powder finish is applied, there is no visible accumulation of powder at the mitred joint such that the

joins are effectively invisible. As such, in some optional embodiments, the frame members comprise a powder coating finish.

[0092] Optionally, each of the (e.g. two, e.g. three, e.g. four, e.g. six) projections of the plug member are perpendicular to another projection of the plug member. As such, two (or more) hollow elongate members may be attached together at a 90 degree angle. Optionally, two hollow elongate members may be attached together at a 180 degree angle. Optionally, the plug comprises (e.g. at least) two projections provided at an angle from 90 degrees to 135 degrees (e.g. from 90 degrees to 120 degrees, e.g. from 90 degrees to 110 degrees, e.g. from 100 degrees to 110 degrees) with respect to each other. As such, two hollow elongate members may be attached together at an angle from 90 degrees to 135 degrees (e.g. from 90 degrees to 120 degrees, e.g. from 90 degrees to 110 degrees, e.g. from 100 degrees to 110 degrees) with respect to each other.

[0093] Optionally, the hollow elongate members each comprise at least one angled end. As such, when one projection of the plug member is inserted into an angled end of a first hollow elongate member, and the second projection of the plug member is inserted into an angled end of a second hollow elongate member, the two hollow elongate members are contiguous. In other words, the two hollow elongate members comprise an angled joint between them. Optionally, the angle of the angled end is from 45 degrees to 70 degrees (e.g. from 50 degrees to 65 degrees, e.g. from 55 degrees to 60 degrees). As such, when two angled ends of two hollow elongate members engage, an angled joint is provided and the two hollow elongate members are joined at an angle from 90 degrees to 135 degrees (e.g. from 90 degrees to 120 degrees, e.g. from 90 degrees to 110 degrees, e.g. from 100 degrees to 110 degrees) with respect to each other. Optionally, the hollow elongate member(s) each have at least one mitred end. As such, when two mitred ends of two hollow elongate members engage, a mitred joint of substantially 90 degrees is provided between the two hollow elongate members.

[0094] Optionally, the (e.g. each) support member is arranged to be perpendicular to the (e.g. at least one) connection member. Optionally, the (e.g. each) support member is arranged to be at an angle from 90 degrees to 135 degrees (e.g. from 90 degrees to 120 degrees, e.g. from 90 degrees to 110 degrees, e.g. from 100 degrees to 110 degrees) with respect to the connection member.

[0095] Optionally, a frame member comprises two (e.g. hollow elongate) support members and one (e.g. hollow elongate) connection members that are arranged in substantially a U-shape. Optionally, a frame member comprises two (e.g. hollow elongate) support members and one (e.g. hollow elongate) connection member, wherein the frame member forms the perimeter of a quadrilateral shape (e.g. square, e.g. rectangle, e.g. trapezioid) with the floor (e.g. the floor forming one side of the shape). Optionally, the frame member comprises two (e.g. hollow elongate) support members and two (e.g. hollow elongate) connection members. Optionally, the frame member forms the perimeter of a quadrilateral shape (e.g. a square, e.g. a rectangle, e.g. a trapezioid).

[0096] Optionally, the (e.g. hollow elongate) connection member is arranged to be parallel to, and offset from, the floor. For example, the (e.g. hollow elongate) connection member has a longitudinal axis that is parallel to, and offset from, the floor. Optionally, the at least two (e.g. hollow elongate) support members extend between the connection member and the floor (e.g. the floor on which the assembly is set). Optionally, the at least two supporting hollow elongate members extend between the floor and the connection member at an angle from 90 degrees to 135 degrees (e.g. from 90 degrees to 120 degrees, e.g. from 90 degrees to 110 degrees, e.g. from 100 degrees to 110 degrees) with respect to the connection member. Optionally, the at least two supporting hollow elongate members extend between the floor and the connection member at an angle from 45 degrees to 90 degrees (e.g. from 50 degrees to 85 degrees, e.g. from 55 degrees to 80 degrees, e.g. from 60 degrees to 75 degrees, e.g. from 65 degrees to 70 degrees) with respect to the floor.

[0097] Optionally, each connection member comprises one or more protrusions, wherein each protrusion is configured to be received within a groove (e.g. of the one or more grooves). Optionally, each (e.g. hollow elongate) connection member comprises a plurality of (e.g. two, e.g. three) protrusions configured to engage with the panel. Optionally, the (e.g. hollow elongate) support members do not include protrusions.

[0098] Optionally, each connection member comprises a protrusion that extends substantially the entire length of the groove into which the protrusion is received. For example, the length of the protrusion is substantially equal to (or greater than) the length of the groove. Optionally, the length of the protrusion is at least 80% (e.g. 85%, e.g. 95%, e.g. 98%, e.g. 100%) the length of the groove that receives the protrusion. By providing a protrusion that extends along substantially the entire length of the groove into which it is received, the load may be more effectively distributed and the load carrying capacity may be further improved.

[0099] Optionally, each (e.g. hollow elongate) connection member comprises a (e.g. one or more) plate(s), wherein the (e.g. one or more) plate(s) form the (e.g. one or more) protrusion(s). Optionally, the plate is a substantially rectangular prism. For example, the plate is a rectangular prism having one or more (e.g. two, e.g. three, e.g. four) chamfered, filleted or bevelled corners.

[0100] Optionally, the (e.g. one or more) plate(s) is attached to the (e.g. hollow elongate) connection member to form the (e.g. one or more) protrusion(s). Optionally, each (e.g. hollow elongate) connection member comprises at least one aperture (e.g. slit), wherein each aperture is configured to receive at least part of a plate. Optionally, at least part of the plate extends from the aperture (e.g. slit) to form the protrusion. Optionally, each

aperture (e.g. slit) has a longitudinal axis that is arranged to be parallel to the longitudinal axis of the (e.g. hollow elongate) connection member. Optionally, part of a plate is received within an aperture (e.g. a slit) and part of the plate extends out from the aperture of the (e.g. hollow elongate connection member) to provide the protrusion.

[0101] Optionally, each plate comprises one or more attachment portions. For example, each plate may comprise one or more tabs extending from an edge of the plate. Optionally, each of the one or more attachment portions (e.g. tabs) is received within one of the apertures of the (e.g. hollow elongate) connection member such that the plate is attached to the (e.g. hollow elongate) connection member. Optionally, a (e.g. each) plate comprises a plurality of attachment portions (e.g. tabs) arranged to be received within a plurality of apertures on the (e.g. hollow elongate) connection members such that the plate is connected to the (e.g. hollow elongate) connection member at a plurality of positions along the (e.g. hollow elongate) connection member.

[0102] Optionally, each attachment portion (e.g. tab) is configured to extend through an aperture on the (e.g. hollow elongate) connection member such that the attachment portion is received against an internal surface of a wall of the (e.g. hollow elongate) connection member. Optionally, the wall comprising the internal surface is opposite to the wall comprising the (e.g. one or more) aperture. Optionally, the plate (e.g. the attachment portion, e.g. the tab(s)) is attached to the internal surface by an adhesive.

[0103] Optionally, the coupling means (e.g. the plug member arranged to connect two frame members) further comprises a (e.g. one or more) groove(s) configured to receive and support the plate inside the hollow elongate frame member. Optionally, the groove is configured to receive and support part of the attachment means, e.g. part of the tab. optionally, the groove is provided at the end of a projection of the plug member. Optionally, the plate (e.g. the attachment portion, e.g. the tab) is affixed to the groove(s) of the coupling means (e.g. the plug member) by an adhesive.

[0104] Optionally, the (e.g. hollow elongate) connection member comprises a plurality of (e.g. two, e.g. three) protrusions extending from a wall of the (e.g. hollow elongate) connection member. Optionally, the plurality of protrusions are arranged inline. Optionally, the (e.g. hollow elongate) connection member comprises a first wall and a second wall. Optionally, the second wall is perpendicular to the first wall. Optionally the second wall is substantially parallel to the ground in the assembled structure. Optionally, the one or more protrusions extend from the first wall.

[0105] Optionally, the fixing means is configured to securely and/or reversibly hold the frame member and the panel together. Optionally, the fixing means is configured to hold the protrusion of the connection member and the panel together.

[0106] Optionally, the fixing means comprises a threaded screw or bolt and a through-hole having a complementary thread to the screw or bolt. Optionally, the panel further comprises one or more first through-hole(s), and each protrusion comprises one or more second through holes, such that when a protrusion is received within a groove, a first through hole on the panel is substantially aligned with a second through hole on the panel. As such, the first and second through holes are configured to receive a fixing means (e.g. a screw or a bolt).

[0107] Optionally, the fixing means comprises a threaded screw or bolt and a through-hole having a complementary thread to the screw or bolt. Optionally, the groove elements further comprise one or more first through-hole(s), and each protrusion comprises one or more second through holes, such that when a protrusion is received within the groove of a groove element, a first through hole on the panel is substantially aligned with a second through hole on the panel. As such, the first and second through holes are configured to receive a fixing means (e.g. a screw or a bolt) and secure the frame assembly (via the protrusion) to the panel assembly (via the groove element).

[0108] This arrangement thus provides the surprising advantage that each frame member(s) may be attached to a panel assembly (e.g. the panel or the groove elements) by a single fixing means (e.g. screw) without any reduction load carrying capacity of the assembly. Furthermore, the fixing means (e.g. screw or bolt) provides a fully reversible attachment without reducing the structural integrity and/or load capacity of the assembly.

[0109] Optionally, the groove comprises a wall and a hollow channel, wherein the first through hole extends from the lower surface of the panel, through the wall of the groove, into the hollow channel. Optionally the first through hole is perpendicular to the longitudinal axis of the groove.

[0110] Optionally, each groove comprises a first through hole extending through the wall, wherein the first through hole is positioned substantially half-way along the length of groove.

[0111] Optionally, each protrusion comprises a first through-hole extending positioned substantially half-way along the length of the protrusion.

[0112] Optionally, each frame member is attached to the panel assembly (e.g. the panel itself, e.g. the groove element(s)) by one fixing means. Optionally, each frame member is attached to the panel assembly (e.g. the panel itself, e.g. the groove element(s)) by two or more fixing means.

[0113] Optionally, the load bearing assembly further comprises an accessory component. Optionally, the accessory component is attached to, and extends from, the second wall on the connection member (e.g. wherein the second wall is perpendicular to the first wall from which the one or more protrusions extend). Optionally, the accessory component is attached to, and extends from, a groove element affixed to the panel. Optionally, the

accessory component is a plate or panel providing a sidewall, a back rest or a headboard for the load bearing assembly. Optionally, the second wall comprises one or more accessory apertures arranged to receive a part of the accessory component.

[0114] Optionally, the accessory component comprises one or more protrusions or tabs, wherein each protrusion or tab is configured to be received within one of the accessory apertures on the second wall. Optionally, the accessory component comprises one or more protrusions or tabs, wherein each protrusion or tab is configured to be received within a groove of one or more groove elements (e.g. affixed or affixable to the lower surface of the panel, e.g. located proximate to a side of the panel, e.g. affixed or affixable to the edge of the panel).

[0115] Optionally, in embodiments where the protrusion is formed by a plate that is inserted within an aperture (e.g. slit) on the first wall, the plate (e.g. the attachment portion(s), e.g. the tab(s)) may further comprise corresponding apertures to the accessory apertures in the second wall. As such, when the plate is inserted within the (e.g. one or more) apertures on the first wall, the corresponding apertures are configured to be aligned with the attachment apertures on the second wall of the (e.g. hollow elongate) connection member. For example, the protrusions or tabs of the accessory component are received through both the attachment apertures (e.g. on the (e.g. hollow elongate) connection member) and the corresponding apertures (e.g. on the plate).

[0116] Optionally, the accessory component is affixed to the hollow elongate member and/or the plate (e.g. the attachment portion, e.g. the tabs) by an adhesive. Optionally, the accessory component is affixed to the groove element by an adhesive.

[0117] Optionally, the accessory component may comprise a panel and an accessory protrusion configured to be received within at least one of the grooves of the seat panel assembly (e.g. the seat panel itself or the groove elements). Optionally, the accessory protrusion extends from the panel at an angle from 90 degrees to 135 degrees, e.g. from 100 degrees to 130 degrees, e.g. from 110 degrees to 120 degrees. Optionally, the accessory protrusion is received within a groove that does not engage with a leg frame member. Optionally, the accessory protrusion engages with a groove on an edge or groove element that does not engage with a leg frame member.

[0118] Optionally, the accessory component is held within the groove by a fixing means. Optionally, the fixing means may be an adhesive. Optionally, the fixing means is the same fixing means as that which holds the protrusion of the connection member within the groove as discussed above. For example, both the accessory protrusion and the groove that receives it comprises a threaded through hole, wherein a threaded screw may extend through both through holes to attach the accessory protrusion to the groove.

[0119] Optionally, the assembly further comprises edge members configured to be received within the one or more grooves on an edge that does not engage with a frame member. For example, the assembly may comprise a rounded trim member that provides a smooth edge to a panel such that the panel is comfortable for a user to sit or lie on.

[0120] In a fifth aspect of the present invention, a (e.g. flat-pack) chair assembly is provided. The chair assembly comprises:

a seat panel assembly, a leg frame assembly and a fixing means, wherein the seat panel assembly comprises:

a panel having an upper surface for engaging with a user sat on the chair and a lower surface; and

two groove elements (e.g. affixed or affixable proximate thereto, e.g. affixed or affixable to the lower surface, e.g. affixed or affixable to the edges of the panel), wherein each groove element comprises one or more grooves, wherein each of the one or more grooves are configured to engage with the leg frame assembly;

wherein the leg frame assembly comprises:
two or more leg frame members, wherein each leg frame member comprises:

two leg support members configured to engage with and extend upwardly from a floor surface; and

a connection member disposed between and attached to each of the two leg support members such that the connection member is provided at a position above, and substantially parallel to, the floor surface;

wherein the connection member comprises a protrusion, and wherein the protrusion is configured to be received within at least one of the grooves; and

wherein the fixing means is configured to secure the connection member to the seat panel assembly (e.g. to each of the groove elements) such that the seat panel is provided at a position above, and substantially parallel to, the floor.

[0121] In a sixth aspect of the present invention, a flat-pack chair assembly kit is provided (e.g. for assembling the chair assembly of the fifth aspect). The flat-pack chair assembly kit comprising:
a seat panel assembly and a leg frame assembly, wherein the seat panel assembly comprises:

a panel having an upper surface and a lower surface; and

two groove elements (e.g. affixed or affixable prox-

imate thereto, e.g. affixed or affixable to the lower surface, e.g. affixed or affixable to the edges of the panel), wherein each groove element comprises one or more grooves, wherein each of the one or more grooves are configured to engage with the leg frame assembly; and wherein the leg frame assembly comprises:
two or more leg frame members, wherein each leg frame member comprises:

two leg support members; and
a connection member comprising a protrusion, wherein the protrusion is configured to be received within a groove of the one or more grooves;
wherein the leg support member and the connection member are attached.

[0122] It will thus be appreciated that the sixth aspect of the present invention provides a flat-pack chair assembly kit that is suitable for providing a chair assembly of the fifth aspect. As such, the seat panel and the leg frame assembly (and the features relating thereto) of the sixth aspect corresponds directly to the seat panel and leg frame assembly (and the features relating thereto) of the fifth aspect.

[0123] It will be also appreciated that the chair assembly of the fifth aspect is an embodiment of the first aspect and the second aspect and the flat-pack chair assemblies of the sixth aspect is an embodiment of the third and the fourth aspects. As such, the leg frame assembly, leg support member(s), connection member(s) and seat panel of the fifth and sixth aspects correspond directly to the frame assembly, support member(s), connection member(s) and panel as described above for the first, third and fourth aspects. As a result, the features and embodiments described above with regards to these components applies equally, in any suitable and/or desirable combination, to the corresponding components in the fifth and sixth aspects. In addition to the features and embodiments described above (in relation to the first, third and fourth aspects), the chair assembly and/or flat-pack chair assembly kit may also include the following optional features in any suitable and/or desirable arrangement.

[0124] Optionally, the leg frame assembly comprises a first frame member and a second frame member, wherein the protrusion of a connection member on the first frame member is received within a groove on a first side (e.g. groove element proximate to the first side) or first edge of the panel assembly (e.g. panel) and the protrusion of a connection member on a second frame member is received within a groove on a second side (e.g. groove element proximate to the first side) or second edge of the panel assembly (e.g. panel), wherein the first and second sides or edges are parallel to each other.

[0125] Optionally, the leg frame assembly comprises three leg frame members, wherein each leg frame member engages with a different side of the panel assembly or a different edge of the at least two edges of the seat panel. Optionally, each of the three leg frame members are arranged to be perpendicular to at least one of the other leg frame members such that each connection member of the leg frame members engages with a perpendicular edge of the seat panel. Optionally, each of the three leg frame members are arranged to be perpendicular to at least one of the other leg frame members, optionally, such that each connection member of the leg frame members engages with a perpendicular side of the seat panel.

[0126] Optionally, the chair further comprises an accessory component, wherein the accessory component is a back rest panel. Optionally, the accessory component may be attached to a connection member of a frame assembly. Optionally, the accessory component may be attached to a groove element of the seat panel assembly. For example, the accessory component may comprise protrusions or tabs that are received within accessory apertures on the connection member. For example, the accessory component may comprise protrusions or tabs that are received within one or more grooves of one or more groove elements.

[0127] Optionally, the accessory component may comprise a panel and an accessory protrusion configured to be received within at least one of the grooves of the seat panel. Optionally, the accessory protrusion extends from the panel at an angle from 90 degrees to 135 degrees, e.g. from 100 degrees to 130 degrees, e.g. from 110 degrees to 120 degrees. Optionally, the accessory protrusion is received within a groove that does not engage with a leg frame member. For example, the accessory protrusion may be received within a (e.g. one or more) groove(s) of a groove element. Optionally, the accessory protrusion engages with a groove on an edge or side of a panel that does not engage with a leg frame member.

[0128] Optionally, the accessory component is held within the groove by a fixing means. Optionally, the fixing means may be an adhesive. Optionally, the fixing means is the same fixing means as that which holds the protrusion of the connection member within the groove as discussed above. For example, both the accessory protrusion and the groove that receives it comprises a threaded through hole, wherein the threaded holes are aligned when the accessory protrusion is inserted into the groove such that a threaded screw may extend through both through holes to attach the accessory protrusion to the groove.

[0129] Wherein the upper surface and/or the lower surface of the seat panel is configured to be non-planar. Optionally, wherein the (e.g. upper surface and/or lower surface of the) seat panel is ergonomically shaped for a person to set thereon.

[0130] In an seventh aspect of the present invention, a (e.g. flat-pack) table assembly is provided. The table assembly comprises:

a tabletop panel assembly, a leg frame assembly and a fixing means, wherein the tabletop panel assembly comprises:

a tabletop panel having an upper surface for receiving items on the tabletop and a lower surface; and
two (e.g. or more) groove elements (e.g. affixed or affixable to the lower surface of the tabletop panel, e.g. affixed or affixable proximate to a side of the tabletop panel, e.g. affixed or affixable to one or more edges of the tabletop panel),

wherein each groove element comprises one or more grooves, wherein each of the one or more grooves are configured to engage with the leg frame assembly;
wherein the leg frame assembly comprises:
two leg frame members, wherein each leg frame member comprises:

two leg support members configured to engage with and extend upwardly from a floor surface; and
a connection member disposed between and attached to each of the two leg support members such that the connection member is provided at a position above, and substantially parallel to, the floor surface;
wherein the connection member comprises a protrusion, and wherein the protrusion is configured to be received within at least one of the one or more grooves; and

wherein a fixing means is configured to secure the tabletop panel and the two (e.g. or more) groove elements together such that the tabletop panel is provided at a position above, and substantially parallel to, the floor.

[0131] In a eighth aspect of the present invention, a flat-pack table assembly kit is provided (e.g. for assembling the table assembly of the ninth aspect). The flat-pack table assembly kit comprising:
a tabletop panel assembly and a leg frame assembly, wherein the tabletop panel assembly comprises:

a tabletop panel having an upper surface and a lower surface; and
two (e.g. or more) groove elements (e.g. affixed or affixable to the lower surface of the tabletop panel, e.g. affixed or affixable proximate to a side of the tabletop panel, e.g. affixed or affixable to one or more edges of the tabletop panel), wherein each groove element comprises one or more grooves, wherein each of the one or more grooves are configured to engage with the leg frame assembly; and wherein the leg frame assembly comprises:
two leg frame members, wherein each leg frame member comprises:

two leg support members; and
a connection member comprising a protrusion, wherein the protrusion is configured to be received within a groove of the one or more grooves;
wherein the leg support member and the connection member are attached.

[0132] It will thus be appreciated that the eighth aspect of the present invention provides a flat-pack table assembly kit that is suitable for providing table assembly of the seventh aspect. As such, the tabletop panel assembly and the leg frame assembly (and the features relating thereto) of the eighth aspect corresponds directly to the tabletop panel and leg frame assembly (and the features relating thereto) of the seventh aspect.

[0133] It will be also appreciated that the table assembly of the seventh aspect is an embodiment of both the first aspect and the second aspect, and the flat-pack table assembly of the eighth aspect is an embodiment of both the third and the fourth aspects. As such, the leg frame assembly, the leg support members, the connection member(s), the tabletop panel assembly and the tabletop panel of the seventh and eighth aspects correspond directly to the frame assembly, support members, connection member(s), panel assembly and panel as described above for the first, second, third and fourth aspects. As a result, the features and embodiments described above with regards to these components apply equally, in any suitable and/or desirable combination, to the corresponding components of the seventh and eighth aspects.

[0134] In addition to the features and embodiments described above, the table assembly and/or flat-pack table assembly kit may also include the following optional features in any suitable and/or desirable arrangement.

[0135] Optionally, the connection member is a hollow elongate member and has a length that is substantially equal to the length of the edge comprising the groove and/or substantially equal to the length of the groove. Optionally, the connection member is a hollow elongate member and has a length that is less than the length of the edge comprising the groove and/or less than the length of the groove.

[0136] Optionally, the table assembly further comprises a trim member. Optionally, the trim member is positioned between the connection member and the edge comprising the groove into which the protrusion of the connection member is inserted. Optionally, the trim member comprises an aperture through which the protrusion of the connection member may extend. Optionally, the trim member is arranged to obscure from view the parts of the groove that do not engage with a protrusion of the connection member. Optionally, a protrusion of the connection member is inserted within a groove of the

edge, through the aperture of the trim member. Optionally, the connection member is flush to the trim member.

[0137] Optionally, the tabletop panel is a rectangular prism in shape. For example, the upper surface and the lower surface are both rectangular having a length and a width, wherein the length is greater than the width. The distance between the upper surface and the lower surface defines the depth of the rectangular prism, wherein the depth is the smallest dimension of the panel.

[0138] Optionally, the two leg frame members are positioned such that they engage with the grooves of edges or groove elements of the tabletop panel assembly on opposite sides of the tabletop panel. For example, the two leg frame members are configured to be parallel to each other. Optionally, the two leg frame members engage with grooves of the edges parallel to the width of the tabletop. Optionally, the two leg frame members engage with grooves of groove elements that are position proximate to the sides defining the width of the tabletop. Optionally, the tabletop panel is a rectangular prism in shape and two leg frame members are positioned such that they engage with the two shortest edges or sides of the rectangular shape.

Brief Description of Figures

[0139] Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figures 1A and 1B shows a chair assembly in accordance with an embodiment of the present invention. Figure 1A shows the chair assembly in assembled form. Figure 1B shows an exploded view of the chair assembly into its constituent parts.

Figure 2 shows an exploded view of a frame member in accordance with an embodiment of the present invention.

Figure 3 shows a perspective view of a plug member in accordance with an embodiment of the present invention.

Figure 4 shows a perspective view of a U-shaped elongate member in accordance with an embodiment of the present invention.

Figure 5 shows an exploded view of an accessory component in the form of a back rest for a chair assembly in accordance with an embodiment of the present invention.

Figure 6 shows a frame member comprising an accessory component in the form of a back rest for a chair assembly in accordance with an embodiment of the present invention.

Figures 7A, 7B and 7C shows a table assembly in accordance with an embodiment of the present invention. Figure 7A shows the table assembly in assembled form. Figure 7B shows an exploded view of the table assembly into its constituent parts. Figure 7C shows an embodiment of the frame member of the table assembly.

Figure 8A-8D shows a chair in accordance with an embodiment of the present invention. Figure 8A shows the chair in assembled form. Figure 8B shows an exploded view of the chair into its constituent parts. Figures 8C and 8D show different views and parts of the frame members.

Figure 9 shows a chair assembly in accordance with an embodiment of the present invention.

Detailed Description

[0140] The following description presents particular examples and, together with the drawings, serves to explain principles of the disclosure. However, the scope of the invention is not intended to be limited to the precise details of the examples, since variations will be apparent to a skilled person and areas deemed to be covered by the description. Terms for components used herein should be given a broad interpretation that also encompasses equivalent functions and features. In some cases, alternative terms for structural features may be provided but such terms are not intended to be exhaustive.

[0141] The description herein refers to examples with particular combinations of features, however, it is envisaged that further combinations and cross-combinations of compatible features between embodiments will be possible whilst still falling within the scope of the appended claims. Indeed, isolated features may function independently as an invention from other features and not necessarily require implementation as a complete combination.

[0142] With reference to Figures 1A and 1B, in one embodiment of the present invention a chair assembly 100 is provided. The chair assembly 100 includes a frame assembly having two frame members 120a, 120b. Each frame member 120a, 120b has two support members 122a, 122b which engage with the floor and provide the legs of the chair 100. A connection member 124a, 124b joins the two support members 122a, 122b together such that each frame member 120a, 120b forms a u-shape with 90° angles between the support members 122a, 122b and the connection members 124a, 124b.

[0143] The chair 100 further includes a panel 110 having an upper surface 112 (with which the user engages when they sit on the chair) and a lower surface 114. In the embodiment shown, three of the edges 116 of the panel 110 includes a groove 118 running substantially the length of the edge 116. The fourth edge has a rounded

profile to improve the comfort of the user when they are sat on the chair. Each of the three edges 116 including a groove 118 engage with a protrusion 126a, 126b, 142 to provide a mechanical joint between another part and the panel 110.

[0144] For example, the connection member 124a, 124b of each frame member 120a, 120b includes a protrusion 126a, 126b which is insertable into the grooves 118. As shown, in this embodiment the protrusions 126a, 126b have a length that is substantially equal to the length of the edge 116 and groove 118 therein. This provides a greater load distribution and improves the strength of the mechanical joint between the panel 110 and the frame members 120a, 120b. The third edge 116 engages with a protrusion 142 which extends from the back rest panel 140. All of the protrusions 126a, 126b, 142 are attached to the panel 110 by a screw which extends through a pair of complementary apertures in the protrusion 126a, 126b, 142 and the groove 118 via the lower surface 114. This allows the panel 110 and the frame member 120a, 120b to be securely, but reversibly, attached together.

[0145] In the example shown, the panel 110 is made from a planar sheet of Perspex formed as a unitary panel comprising the grooves 118 as part of the panel. The grooves 118 are formed as part of the panel (e.g. via a moulding process or by removing material at the edges). Figure 2 shows an exploded view of an embodiment of a frame member 320. It will be appreciated that this frame member 320 could be used as part of the frame assembly for the chair 100 shown in Figure 1, or as a frame member for any other embodiment described herein.

[0146] The frame member 320 is formed by two support members 322a, 322b and one connection member 324. The support members 322a, 322b each include a foot stopper 370 and are arranged such that they extend perpendicularly from the floor on which an assembly may be placed. The connection member 324 extends between the two support members 322a, 322b such that it is substantially parallel to the floor and perpendicular to each support member 322a, 322b.

[0147] The connection member 324 includes a slot 360 which extends along a wall of the connection member 324 (i.e. the slot extends parallel to the longitudinal axis of the connection member 324). The slot 360 is configured to receive a plate 326. When the plate 326 is inserted into the slot 360, part of the plate 326 is contained within the interior of the connection member 324 and part of the plate 326 extends from the slot to form the protrusion of the connection member 324 which can engage with a groove on a panel.

[0148] The plate 326 is held within the connection member 324 by two plug members 328. The plug members 328 shown in Figure 2, correspond to the plug members shown in Figure 3. Thus, with reference to Figure 3, the plug members 328, 428 have two projections 428', 428" which extend perpendicularly with respect to each other. One of the projections 428', 428" is arranged to be received within an end of a support member 322a, 322b and the other is arranged to be inserted within an end of the connection member 324 such that the support member 322a, 322b and the connection member 324 are connected at a 90° angle with respect to each other (the angle being defined by the angle of the projections 428', 428"). To facilitate the assembly of the frame member 320, the ends of the support member 322a, 322b which do not engage the floor and both ends of the connection member 324 are mitred at a 45° angle. As such, when the plug is inserted into an end of each of the support member 322a, 322b and the connection member 326, the mitred ends sit flush together to provide a join. The connection member 326 and the support members 322a, 322b are thus held together by an adhesive which eliminates the need for welding and thus makes the use of aluminium components accessible.

[0149] To provide an aesthetically pleasing finish, the adhesive is applied only to the plug members 328, 428, and preferably only to the ends of the projections 428', 428". As such, when the projections 428', 428", including an adhesive, are inserted into an end of a support or connection member, the adhesive is spread along the internal walls of the support/connection members to provide a thin layer of adhesive between the plug member 328, 428 and the support/connection member without the adhesive being pushed out of the ends.

[0150] Importantly, no adhesive is applied to the mitred ends of the support members 322a, 322b or the connection member 326. As a result, there is no adhesive (residue or otherwise) present on the outer surfaces of the assembly which means that finishing processes, such as powder coating, may be used without yielding a patchy, uneven or imperfect finish. The presence of adhesive or residue influences the quality and aesthetics of a powder-coated finish due to the Faraday Effect which results in distinctive (and unattractive) marks on the surface due to an uneven distribution.

[0151] As shown, one of the projections 428' (i.e. the projection 428', 428" to be received within the connection member 324) includes a channel or groove 429 which is configured to receive part of the plate 326 when the plate is inserted within the slot 360 of the connection member 324. As such, the plug member 328, 428 holds and supports the plate 326 in the connection member and helps to distribute the load transferred to the protrusion from the panel, which in turn improves the load bearing capacity of the assembly.

[0152] Before inserting the projections 428', 428" of the plug members 328, 428 into the support/connection members, the ends of the projections 428', 428" may be coated with an adhesive to ensure that the plug member is fixedly attached to the interior of the support/-connection members. It is preferable to attach the adhesive only to the end of the projections such that, upon insertion, there is no seepage of the adhesive out the top of the end of the member it is being inserted into. The

channels 429 may also be coated with an adhesive such that the plate 326 can be fixedly held within the groove 429. Similarly, the edge 326' of the plate 326 may be coated with an adhesive such that, upon insertion into the slot 360, the edge 326 is received against an interior wall of the connection member 324 and fixed thereto, by the adhesive.

[0153] As noted above, Figure 4 shows a U-shaped elongate member 580 that includes three walls that together define a U-shaped channel or groove 518. In some embodiments of the present invention, can be used to provide the groove 518 at an edge of a panel by including the U-shaped elongate member proximate to the edge of a panel. In the embodiments shown in Figure 1, the U-shaped elongate member is shown to be sandwiched between two planar sheets such that the sheets form the upper 112 and lower 114 surfaces of the panels 110. However, it will be appreciated that the U-shaped elongate member 580 is not limited to use in such an arrangement.

[0154] For example, the U-shaped elongate member 580 may instead be affixed (e.g. glued, welded or otherwise adhered) to an edge of a solid panel body. As such, a wall of the U-shaped member forms part of the upper surface of the panel (in combination with a top surface of the panel body). Similarly, the U-shaped elongate member 580 could be provided between sheets that are not planar.

[0155] Figure 5 shows an exploded view of an embodiment of a back rest for a chair assembly such as the chair 100 shown in Figure 1A and 1B. The back rest includes a back rest panel 640 and a connection member 624, wherein the connection member 624 functions to connect the back rest panel 640 to a panel of the load bearing (e.g. chair) assembly via a protrusion of the connection member 624 in the same manner as the frame members 120,320.

[0156] As shown in Figure 5, the connection member 624 has a square cross-section profile having four walls. One of the walls includes a slot 660 which extends along a wall of the connection member 624 (i.e. the slot extends parallel to the longitudinal axis of the connection member 324). The slot 660 is configured to receive a plate 626. When the plate 626 is inserted into the slot 660, part of the plate 626 is contained or enclosed within the interior of the connection member 624, and part of the plate 626 extends from the slot 660 to form the protrusion of the connection member 624 which can engage with a groove on a panel.

[0157] As shown in Figure 5, a second wall (i.e. a different wall to the wall including the slot 660) of the connection member 624 includes two accessory apertures 644. In the embodiment shown, the accessory apertures 644 are provided in a wall perpendicular to the wall which includes the slot 660 for the plate 626 which forms the protrusion of the connection member. The accessory apertures 644 are arranged to be complementary to, and thus receive, tabs 642 on the back rest panel 640. As such, the back rest panel 640 may be connected to a panel of a load bearing (e.g. chair) assembly via the connection member 624.

[0158] In addition to the accessory apertures 644, the tabs 642 are further received within corresponding apertures or slits 646 on the plate 626 when the plate is inserted within the connection member 624. For example, when the plate 626 is inserted into the slot 660 to form the protrusion of the connection member 624, the apertures or slits 646 are aligned with the accessory apertures 644 of the connection member 624. As such, the tabs 644 of the back rest panel 640 can be inserted into both the accessory apertures 644 and the apertures 646 on the plate 626 such that the plate 626 and the back rest panel 640 are held together. The tabs 642 and/or the plate 626 slits 646 may include an adhesive to help fixedly secure the back panel 640 to the connection member 624.

[0159] The back rest panel 640 is held in place at least partly by the two plug members 628. Unlike the arrangement shown in Figure 2, the plug members 628 shown in Figure 5 have only one projection (i.e. the plug members 628 are linear). Each plug member 628 is thus received within an end of the connection member 624 such that the groove 629 at the end of the projection of the plug member 628 engages with a tab 642 of the back rest panel 640 when the tabs 642 are inserted within the accessory apertures 644. The grooves 629 preferably include an adhesive which fixedly attach the plug members to the tabs 642 and thus secure the back panel 640 within the connection member 624.

[0160] As a result, the plug members 628 act to prevent the tabs 642 of the back rest panel 640 from being removed from the accessory apertures 644 of the connection member 624. In turn, the tabs 642 of the back rest panel 640 prevent the plate 626 from being able to slide out of the slot 660 by virtue of the engagement between the tabs 642 of the back rest panel 640 and the slits 646 on the plate 626. The protrusion formed by the plate 626 may then be inserted within a groove (and secured thereto via the aperture 632) of a panel to provide a back rest panel 640 to the load bearing (e.g. chair) assembly. Importantly, the connection between the protrusion of the connection member 624 and the groove of a panel is strong enough that the back rest does not need to be further supported by any support members that engage with the floor. In other words, the load bearing distribution allows the joint formed by the groove and protrusion to be surprisingly strong that additional support (i.e. via support members engaging with the floor) is not required.

[0161] Figure 6 shows an alternative embodiment of a back rest that, in contrast to the embodiment of Figure 5, includes support members 722a, 722b that provide additional support to the connection member 724. The back rest panel 740 is therefore included as part of a frame member 720 which comprises two support members 722a, 722b, forming the legs of the (e.g. chair) assembly and a connection member 724 which includes the protrusion 726 that can be inserted within a groove of a panel

to connect the frame member 720 to the panel via the aperture 732. The connection member 724 may be substantially the same as the connection member 624 shown in Figure 5, however, it will be appreciated that, because of the presence of the support members, any plug members would include two projections to provide the additional function of connecting a support member 722a, 722b to the connection member 724. Figures 7A and 7B show an embodiment of the present invention in the form of a table assembly 1000. The table assembly 1000 includes a frame assembly having two frame members 1020a, 1020b. Each frame member 1020a, 1020b has two support members 1022a, 1022b which engage with the floor and provide the legs of the table 1000. A connection member 1024a, 1024b joins the two support members 1022a, 1022b together. The connection members 1024a, 1024b and the support members 1022a, 1022b on each frame member 1020a, 1020b form a substantially trapezoid shape with the floor on which the support members 1022a, 1022b are placed.

[0162] The table 1000 further includes a panel 1010 having an upper surface 1012 (with which the user engages when they place items on the tabletop) and a lower surface 1014. In the embodiment shown, two of the edges 1016 of the panel 1010 includes a groove 1018 as part of the edge 1016. The third and fourth edges have a rounded profile to improve the comfort of the user when they are sat at the table 1000. Each groove 1018 extends along substantially the entire length of the edge 1016 and engages with a protrusion 1026a, 1026b of a frame member 1020a, 1020b to provide a mechanical joint between the frame member 1020a, 1020b and the panel 1010.

[0163] As shown, in this embodiment the protrusions 1026a, 1026b (and the connection members 1024, 1024) have a length that is substantially less than the length of the groove 1018, and thus a length that is substantially less than the length of the edge 1016. As such, in theory, the frame members 1020a, 1020b may be attached to the panel 1010 at any position along the length of the grooves 1018. This allows the table to be customisable regarding the positioning of the legs.

[0164] To facilitate the alignment of the frame members 1020a, 1020b in a suitable position along the groove 1018 (i.e. a position where the apertures on the protrusions 1026a, 1026b will be aligned with a corresponding protrusion in the groove 1018 such that a screw 1030 can connect the two together) a trim member 1090a, 1090b can be used. The trim member 1090a, 1090b includes an aperture through which the protrusion 1026a, 1026b may extend. As such, by aligning the trim member 1090a, 1090b with the edge 1016 of the table 900, the position of the aperture in the trim member 1090a, 1090b defines the position at which the protrusion 1026a, 1026b can be inserted into the groove 1018. As such, the trim member is sandwiched between the panel edge 1018 and the connection member 1024a, 1024b.

[0165] Figure 7C shows an exploded view of the frame members 1020a, 1020b. Although shown here as a frame member 1020a, 1020b for a table assembly 1000, it will be appreciated that this frame member 1020 could be used as part of the frame assembly for any suitable load bearing assembly.

[0166] The frame member 1020 is formed by two support members 1022a, 1022b and one connection member 1024. The support members 1022a, 1022b each include a foot stopper 1070 and are arranged such that they extend from the floor at an angle less than 90° (i.e. the support members 1022a, 1022b are not perpendicular with the floor). The connection member 1024 extends between the two support members 1022a, 1022b such that it is substantially parallel to the floor and extends at an angle greater than 90° with respect to each support member 1022a, 1022b. The support members 1022a, 1022b and the connection member 1024 therefore provide a substantially trapezoid shape of the frame member with the floor.

[0167] The connection member 1024 includes a slot 1060 which extends along a wall of the connection member 1024 (i.e. the slot extends parallel to the longitudinal axis of the connection member 1024). The slot 1060 is configured to receive a plate 1026. When the plate 1026 is inserted into the slot 1060, part of the plate 1026 is contained within the interior of the connection member 1024 and part of the plate1026 extends from the slot to form the protrusion of the connection member 1024 which can engage with the groove 1018 on the panel 1010.

[0168] The plate 1026 is held within the connection member 1024 by two plug members 1028a, 1028b. The plug members 1028a, 1028b each have two projections 1028', 1028" which extend at an angle greater than 90° with respect to each other (i.e. the two projections 1028', 1028" are not perpendicular). One of the projections 1028', 1028" is arranged to be received within an end of a support member 1022a, 1022b and the other is arranged to be inserted within an end of the connection member 1024 such that the support member 1022a, 1022b and the connection member 1024 are connected at an angle greater than 90° with respect to each other (the angle being defined by the angle of the projections 1028', 1028"). To facilitate the assembly of the frame member 1020, the ends of the support member 1022a, 1022b which do not engage the floor and both ends of the connection member 1024 are angled at an angle complementary to (e.g. half of) the resulting angle between the projection members 1028', 1028". As such, when the plug 1028a, 1028b is inserted into an end of each of the support member 1022a, 1222b and the connection member 1024, the angled ends sit flush together to provide a join.

[0169] As shown, one of the projections 1028' (i.e. the projection 1028a', 1028b' to be received within the connection member 1024) includes a channel or groove 1029a, 1029b which is configured to receive part of the plate 1026 when the plate is inserted within the slot 1060

of the connection member 1024. As shown, the length of the groove 1029a, 1029b is provided such that the groove 1029a, 1029b engages with a significant proportion (e.g. 50%) of the length of the protrusion 1026, As such, the two grooves 1029a, 1029b engage with substantially the full length of the protrusion 1026 such that the entire length is supported by the plug members 1028a, 1028b. As such, the plug members 1028a, 1028a holds and supports the plate 1026 in the connection member and helps to distribute the load transferred to the protrusion from the panel, which in turn improves the load bearing capacity of the assembly.

[0170] Figures 8A and 8B shows an embodiment of a chair assembly 1600. The chair assembly 1600 includes a frame assembly having two frame members 1620a, 1620b. Each frame member 1620a, 1620b has two support members 1622a, 1622b which engage with the floor and provide the legs of the chair 1600. A connection member 1624a, 1624b joins the two support members 1622a, 1622b together.

[0171] The chair 1600 further includes a panel 1610. In the embodiment shown, three of the edges 916 of the panel 910 includes a groove 1618 as part of the edge 1616. The fourth edge has a rounded profile to improve the comfort of the user when they are sat on the chair 1600 Each of the grooves 1618 of the three edges 1616 containing grooves 1618 engage with a protrusion 1626a, 1626b, 1642 to provide a mechanical joint between another part and the panel 1610.

[0172] For example, the connection member 1624a, 1624b of each frame member 1620a, 1620b includes a protrusion 1626a, 1626b which is insertable into the grooves 1618. The third edge 1616 engages with a protrusion 1642 which extends from the back rest panel 1640. All of the protrusions 1626a, 1626b, 1642 are attached to the panel 1610 by a screw (not shown) which extends through a pair of complementary apertures in the protrusions 1626a, 1626b, 1642 and the groove 1618 via the lower surface. This allows the panel 1610 and the frame members 1620a, 1620b to be securely, but reversibly, attached together.

[0173] The back rest panel 1640 of this embodiment is formed from a single sheet of metal which includes a curved bend and a protrusion 1642 extending therefrom. The protrusion 1642 can be unitary with the back rest panel 1640, i.e. by moulding or cutting the panel 1642 to provide the protrusion.

[0174] Unlike the other embodiments described herein, the frame members 1620a, 1620b of the chair assembly 1600 shown in Figures 8A and 8B are not planar. In other words, the support members and the connection member of a frame member 1620a, 1620b do not sit in the same plane. This is due to the inclusion of an offset member 1623. The offset member 1623 as shown in Figures 8C and 8D. The offset member 1623 has two mitred ends such that the offset member 1623 can engage with the connection member 1624 to provide a perpendicular offset between the connection member 1624 and a support member 1622. The second mitred end (which is provided in a plane perpendicular to the plane of the mitre of the first end) connects the offset member 1623 with the support member 1622 such that the support member 1622 connected to the offset member is provided at a more outwardly position with respect to the panel 1610 than the other support member 1622 and the connection member 1624.

[0175] The offset member 1623 is connected to the connection member 1624 and the support member 1622 by an arrangement of interlocking plug members 1628a, 1628b. The first plug member 1628a has two projections 1628a', 1628a". The first projection 1628a' is arranged to be received within an end of the connection member 1624 and the second projection 1628a" is arranged to be received within an end of the offset member 1623 such that the mitred ends of the connection member 1624 and the offset member 1623 are received flush against each other around the plug member 1628a. The first projection 1628a' also comprises a groove 1629a to hold the plate 1626 as described above in other embodiments.

[0176] The second projection 1628a", which is not inserted into the connection member 1624, is arranged to extend through, and out of, the offset member 1623 such that it can engage with the second plug member 1628b, which is, in turn, received within an end of the support member 1622. The second projection includes a groove 1627' which can engage with a groove 1627" on the second plug member 1628b to connect the first 1628a and second 1628b plug members together. To provide a secure connection between the two plug members 1628a, 1628b the grooves 1627', 1627" may be glued, welded or bolted together to provide a strong connection.

[0177] As such, a horizontal offset of the support member 1622 with respect to the connection member 1624 can be obtained.

[0178] All of the above illustrative embodiments describe the invention with respect to a panel assembly comprising a panel with a plurality of edges, wherein each of the edges have one (or more) grooves configured to receive protrusions of the frame members. However, each of these panel assemblies may be replaced (without modification of other features of the embodiments) with an alternative panel assembly comprising a panel and one or more groove elements affixed thereto, wherein the groove elements provide the grooves into which the protrusions of the frame assembly are inserted. These embodiments allow thin sheet-like panels to be used (which do not have an edge large enough to incorporate a groove) by attaching the grooves as part of separate elements (rather than integrated within the panel itself), which can in turn provide for a more lightweight furniture assembly, without reducing the strength and load bearing capability of the assembly overall.

[0179] This different type of panel assembly will be described with respect to the chair embodiment shown in Figure 9. However, it will be appreciated that these principles can be readily applied to any of the other

embodiments described herein and with respect to Figures 1-8.

[0180] Figure 9 shows a chair assembly 1700 including a frame assembly having two frame members 1720a, 1720b. Each frame member 1720a, 1720b has two support members 1722a, 1722b which engage with the floor and provide the legs of the chair 1700. A connection member 1724a, 1724b joins the two support members 1722a, 1722b together.

[0181] The chair 1700 further includes a panel assembly 1708 which includes a sheet-like (e.g. metal, e.g. aluminium) panel 1710 having an upper surface (with which the user engages when they sit on the chair) and a lower surface 1714. In this embodiment, the panel assembly 1708 also includes three groove elements 1717a, 1717b, 1717c which are affixed to the lower surface 1714 of the panel 1710. The groove elements 1717a, 1717b, 1717c may be glued (e.g. using an adhesive), welded or mechanically fixed (e.g. using bolts or screws) to the panel 1710.

[0182] Each of the groove elements 1717a, 1717b, 1717c provide a groove 1718 into which a protrusion 1726a, 1726b, 1742 of another element of the chair assembly 1700 (e.g. the frame members 1720a, 1720b or the back panel accessory 1740) may be received. The groove elements 1717a, 1717b, 1717c are positioned such that they are each proximate to one of the four sides of the substantially square shaped panel 1710. The groove elements 1717a, 1717c which are intended to engage with the frame members 1720a, 1720b are arranged such that the edge of the groove element 1717a, 1717c which includes the groove 1718 is substantially in line with the edge of the panel 1710. As such, when the protrusions 1726a, 1726b of the frame members are inserted into the groove elements 1717a, 1717c, the connection members 1724a, 1724b abut the sides of the panel 1710.

[0183] In contrast, the groove element 1717b that is intended to engage with the protrusion 1742 of the back rest panel 1740 is proximate to, but not in line with, the side 1719 of the panel to which it is associated. In other words, the groove element 1717b is proximate to, but offset from the side 1719 of the panel 1710. The back rest panel 1740 is designed such that it comprises the back panel 1741 and an insert panel 1743, wherein these two panels are arranged at an angle between 90 degrees and 120 degrees to provide a comfortable resting angle for a user leaning thereagainst. The insert panel 1743 and the back rest panel 1742 may be created by bending a single piece of sheet material (e.g. metal, e.g. aluminium).

[0184] Alternatively, the insert panel 1742 and the back panel 1741 could be separate panels that are welded or glued together at the desired angle. The insert panel 1743 then further includes the protrusion 1742 extending therefrom. As such, the offset of the groove element 1717b, into which the protrusion 1742 of the back rest panel 1740 is inserted, allows the whole of the insert panel 1742 to be received underneath the panel 1710, which in turn improves the load distribution across the protrusion 1742 and the insert panel 1743. The offset of the groove element 1717b is therefore provided such that, when the back rest panel 1740 is in position (i.e. the protrusion 1742 is inserted into the groove 1718 of the groove element 1717b) the back panel 1741 is in line with the side 1719 of the panel 1710.

[0185] However, it will be appreciated that the back rest panel 1740 could be adapted such that the protrusion 1742 extends directly from (i.e. at an angle to) the back panel 1741 (e.g. the insert panel 1743 is omitted). In such embodiments, the groove element 1717b could be provided substantially in line with the side 1719 of the panel, rather than being offset, as shown in Figure 9.

[0186] Similarly, it will be appreciated that the groove elements 1717a, 1717c arranged to receive the protrusions 1726a, 1726b of the frame members 1720a, 1720b could also be offset with respect to the sides to which they are associated. This would then mean that at least part of the connection members 1724a, 1724b are positioned below the panel 1710 (e.g. part or all of the top of the connection members 1724a, 1724b engage with the lower surface 1714 of the panel 1710 and allows the load to be distributed across the connection members 1724a, 1724b as well as the protrusions 1726a, 1726b.

[0187] The groove elements 1717a, 1717b, 1717c are formed from hollow elongate box-like elements (i.e. similar in nature to the hollow elongate members used to provide the frame members 1720a, 1720b), wherein the grooves 1718 are provided by cutting a slot through one side (or wall) of the members.

[0188] All of the protrusions 1726a, 1726b, 1742 are affixed to the panel assembly 1708 by securing the protrusions 1726a, 1726b, 1742 to the groove elements 1717a, 1717b, 1717c by a screw which extends through a pair of complementary apertures 1732, 1734 in the protrusion 1726a, 1726b, 1742 and the groove elements 1717a, 1717b, 1717c. This allows the panel assembly 1710 and the frame members 1720a, 1720b to be securely, but reversibly, attached together.

Claims

1. An assembly for supporting a load off of a floor comprising:

a panel assembly, a frame assembly and a fixing means,
wherein the panel assembly comprises:

a panel having an upper surface for receiving a load and a lower surface; and
one or more grooves, wherein each of the one or more grooves are configured to engage with the frame assembly;

wherein the frame assembly comprises:

one or more frame members, wherein each frame member comprises:

a support member; and
a connection member comprising a protrusion, wherein the protrusion is configured to be received within a groove of the one or more grooves;
wherein the connection member and the support member are attached; and

wherein the fixing means is configured to hold the one or more frame member and the panel assembly together.

2. The assembly of claim 1, wherein the one or more grooves are provided by one or more groove elements, wherein each groove element comprises one or more grooves.

3. The assembly of claim 2, wherein the one or more groove elements are affixed to the lower surface of the panel, and each groove element is arranged to provide one or more grooves at a position proximate to a side of the panel.

4. The assembly of claims 2 or 3, wherein the groove elements are hollow elongate members and the one or more grooves of each groove element are provided by one or more slots extending through a side of the hollow elongate members.

5. The assembly of any preceding claim, wherein the support member and the connection member are each formed by hollow elongate members, optionally, wherein the hollow elongate members are made from aluminium.

6. The assembly of claim 5, wherein the support member and the connection member are attached together by a coupling means.

7. The assembly of claim 6, wherein the coupling means is a plug member having two or more projections, wherein one of the two or more projections is received within an end of the support member and one of the at least two projections is received within an end of the connection member such that the support member and the connection member are joined together.

8. The assembly of claim 7, wherein the plug member includes an adhesive layer such that the projection of the plug member is securely attached to an inside surface of the hollow elongate member.

9. The assembly of any preceding claim, wherein the assembly is a furniture assembly.

10. The assembly of any preceding claim, wherein the frame assembly is configured to hold the panel off of, but substantially parallel to, the floor.

11. The assembly of any preceding claim, wherein the support member is arranged to be perpendicular to the connection member.

12. The assembly of any preceding claim, wherein the connection member comprises one or more apertures through which one or more plates extend to form the protrusion.

13. The assembly of claim 12, wherein the protrusion is formed by one plate that comprises one or more tabs, wherein the one or more tabs are inserted into the apertures of the connection member to attach the plate to the connection member and form the protrusion.

14. A flatpack assembly kit, wherein the kit comprises:
a panel assembly and a frame assembly, wherein the panel comprises:

a panel having an upper surface and a lower surface;
one or more grooves, wherein each of the one or more grooves is configured to engage with the frame assembly; and

wherein the frame assembly comprises:
one or more frame members, wherein each frame member comprises:

a support member; and
a connection member comprising a protrusion, wherein the protrusion is configured to be received within a groove of the one or more grooves;
wherein the support member and the connection member are attached.

15. The flatpack assembly kit of claim 14, wherein the panel assembly comprises one or more groove elements which each in turn comprise one or more grooves; and
wherein the one or more grooves of the panel assembly are provided by the one or more groove elements.

Figure 1A

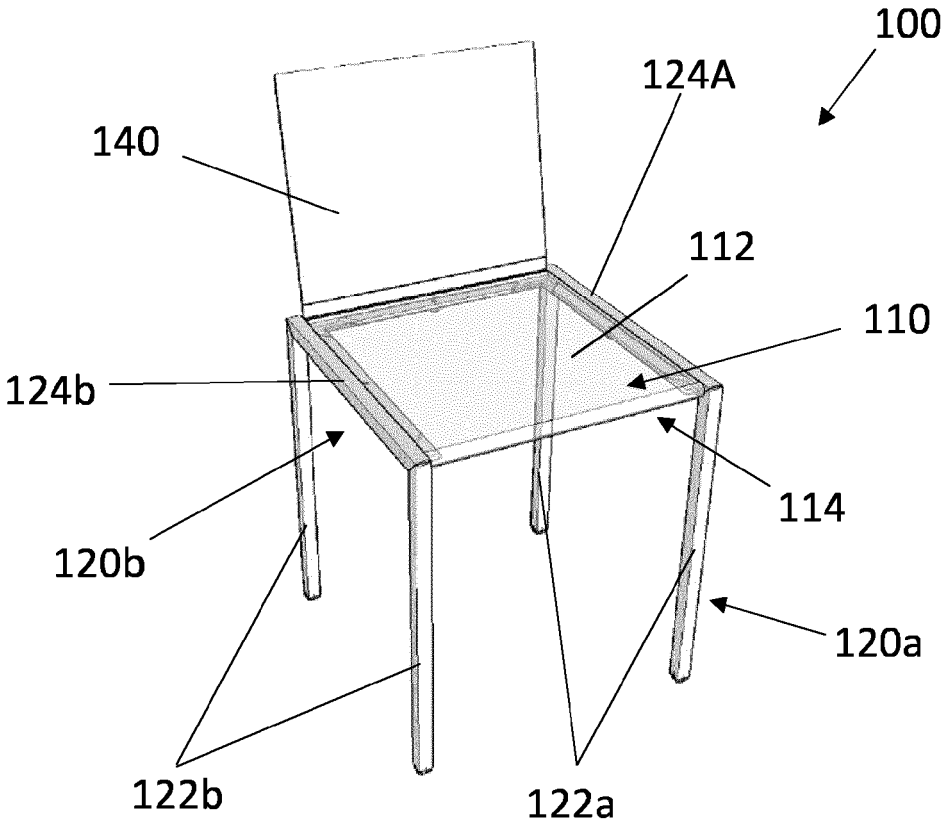
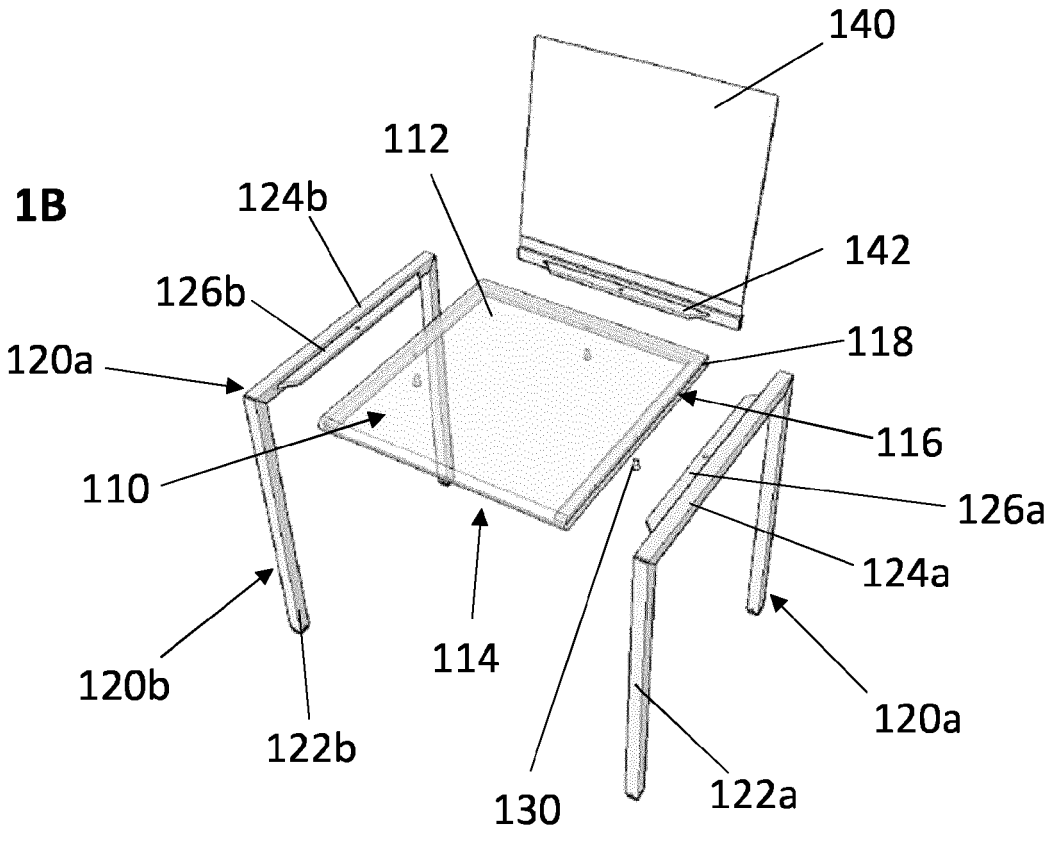


Figure 1B



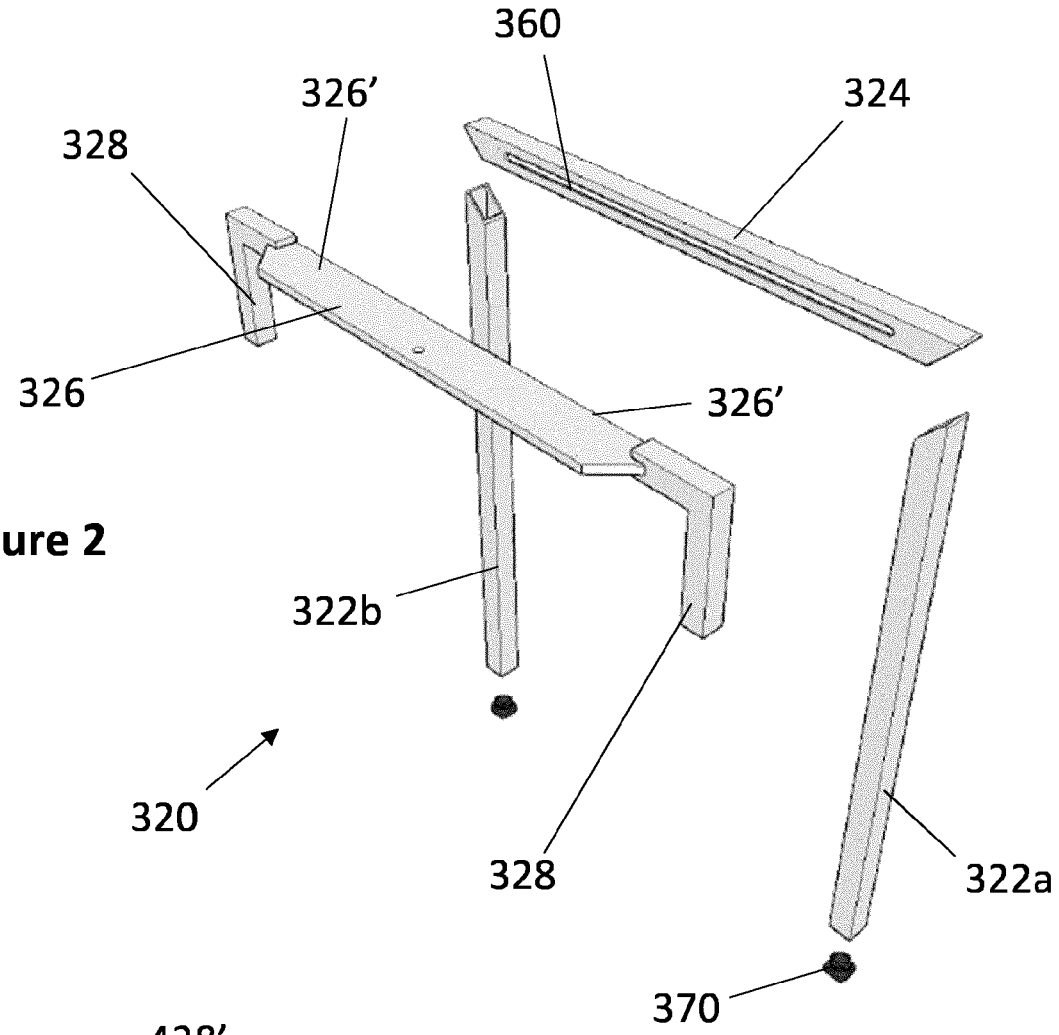


Figure 2

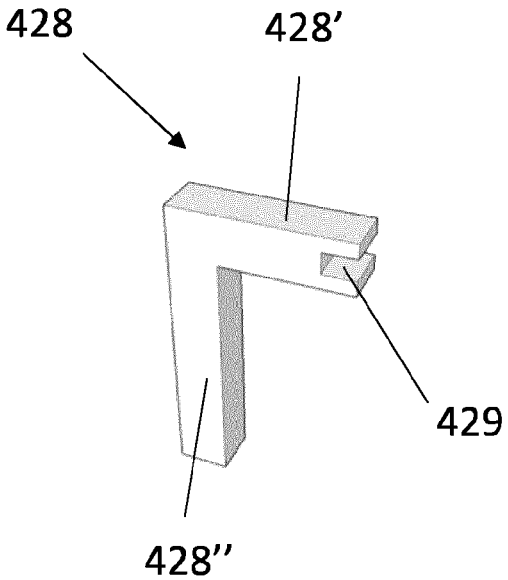


Figure 3

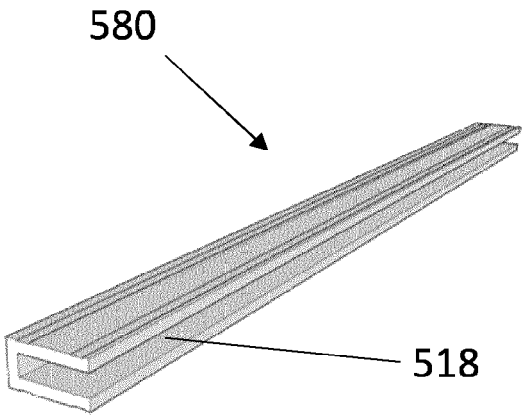


Figure 4

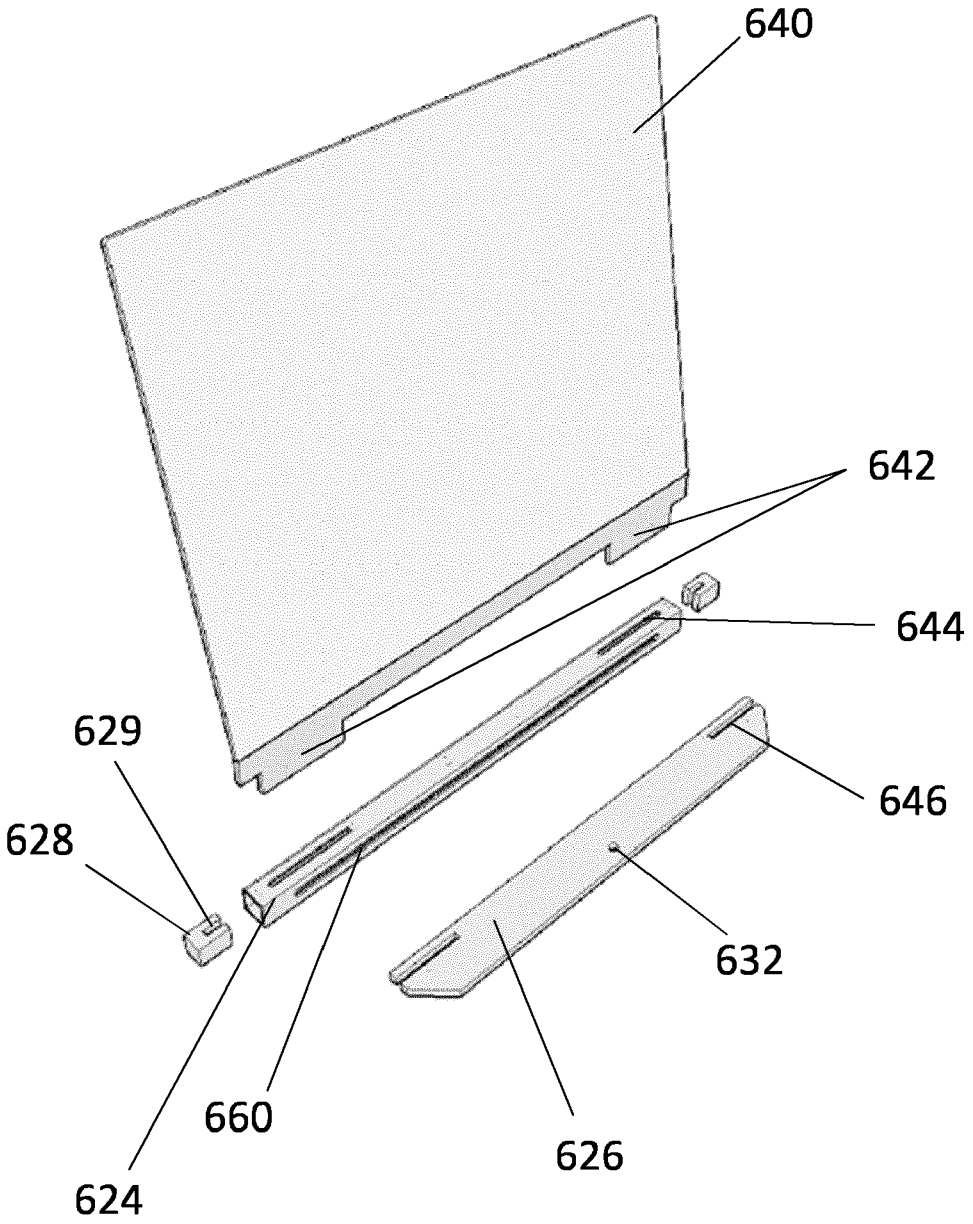


Figure 5

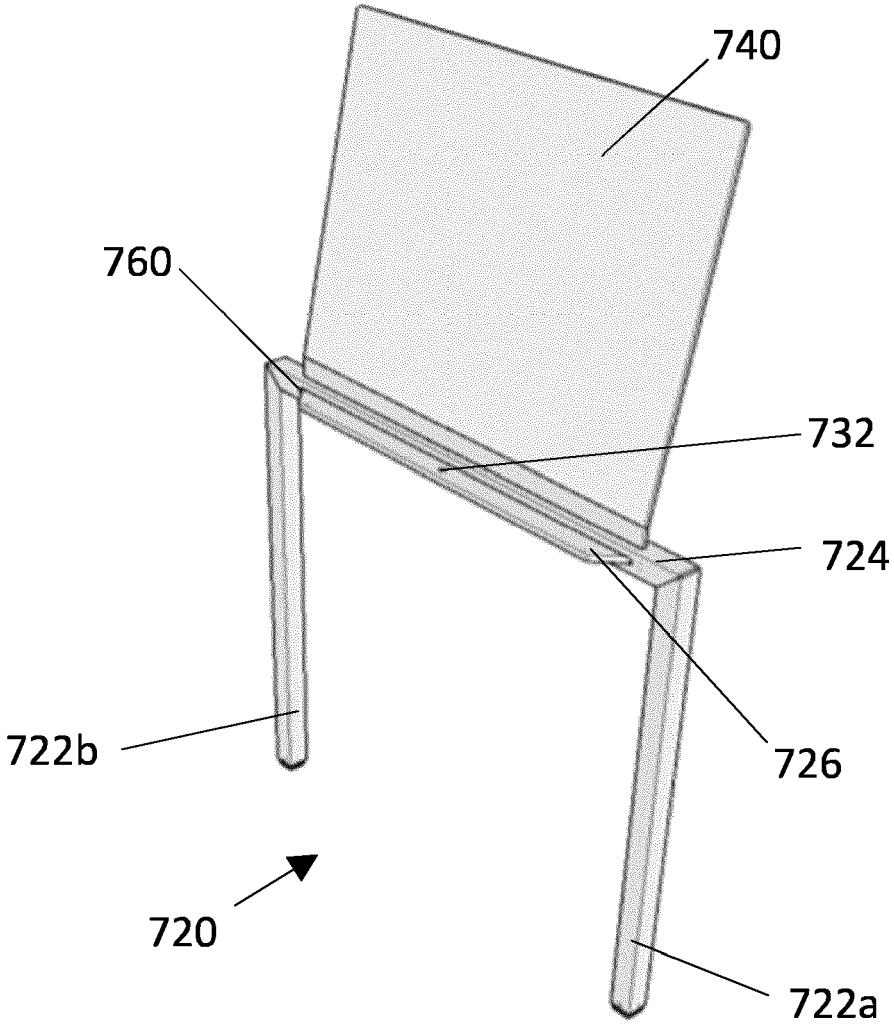


Figure 6

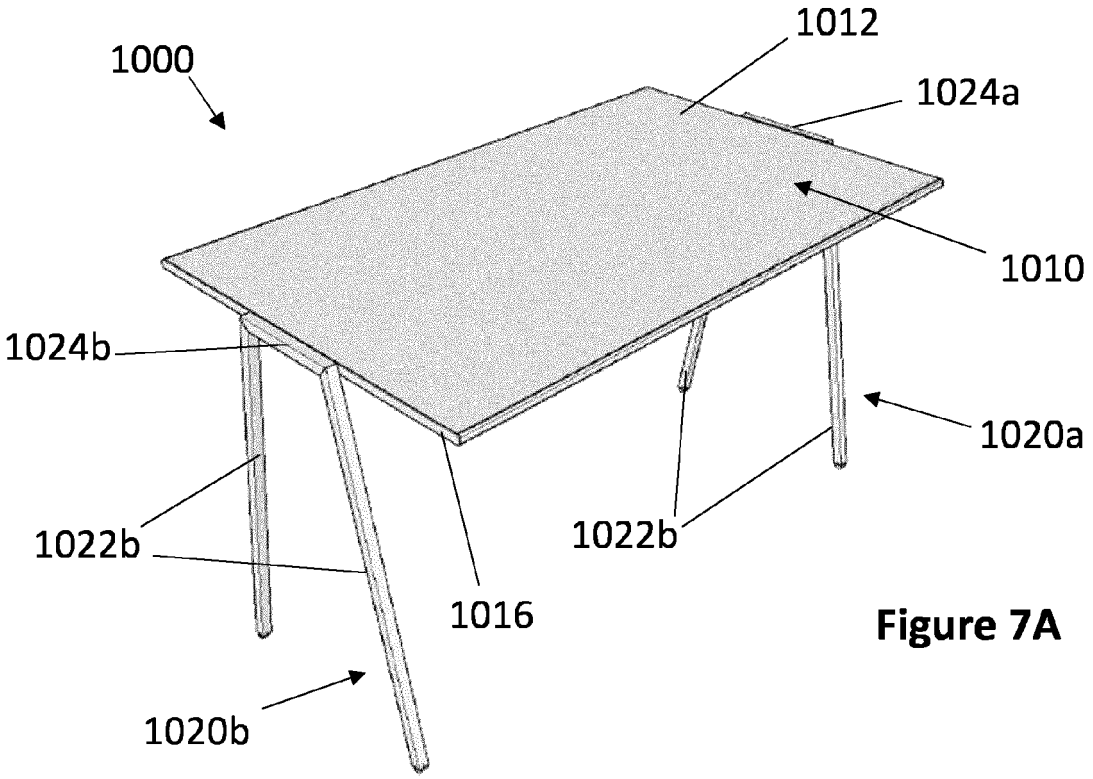


Figure 7A

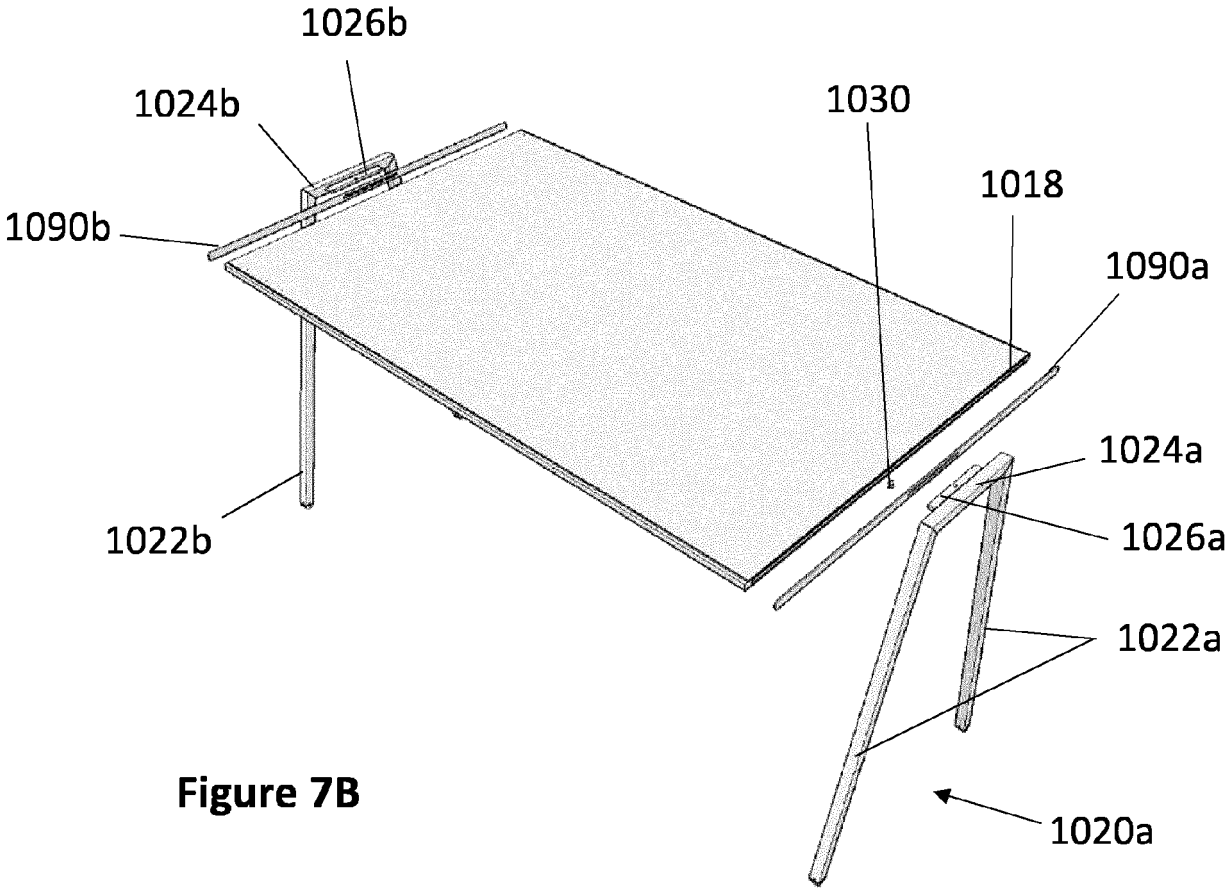


Figure 7B

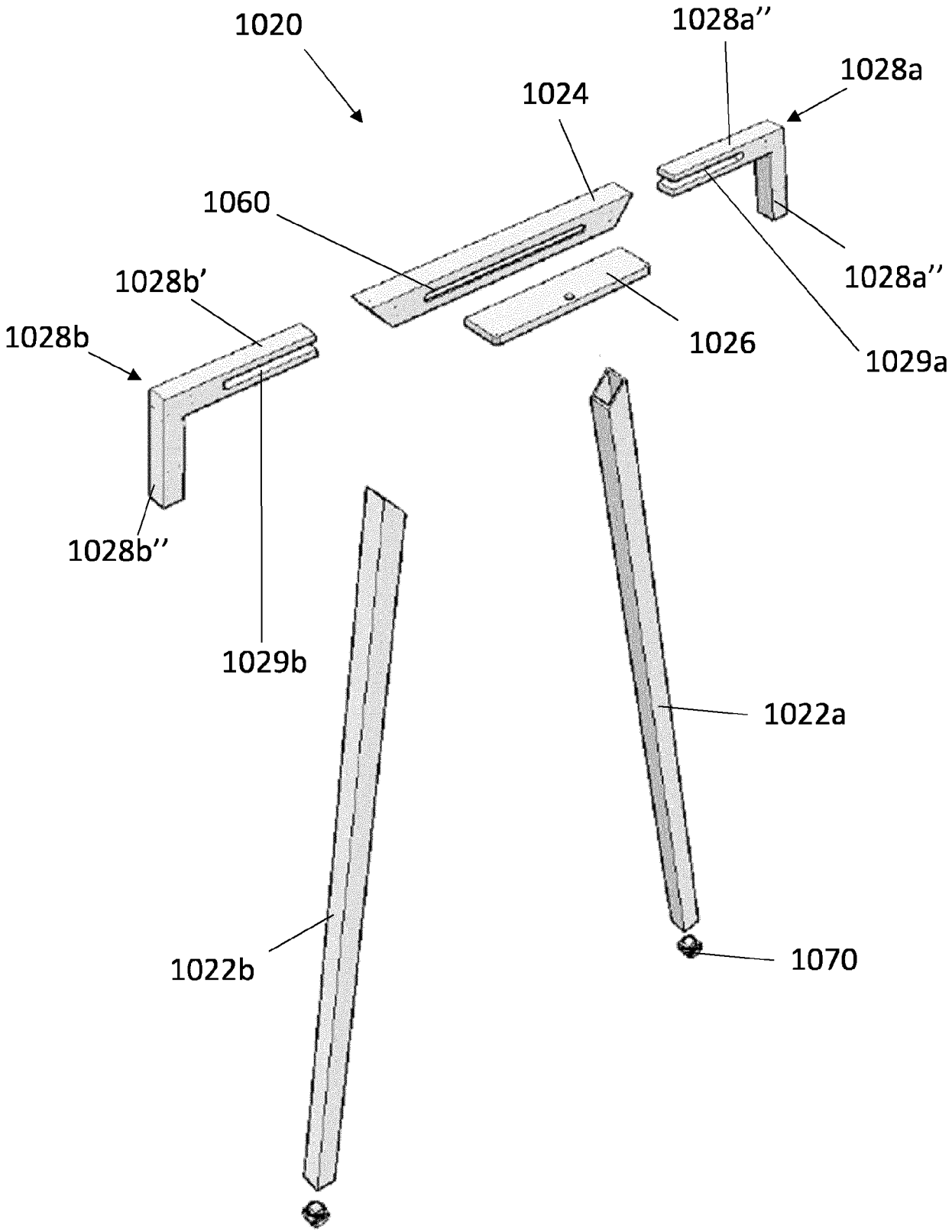

1020
1028a''
1028a
1024
1060
1028a''
1028b'
1028b
1026
1029a
1028b''
1029b
1022a
1022b
1070

Figure 7C

Figure 8A

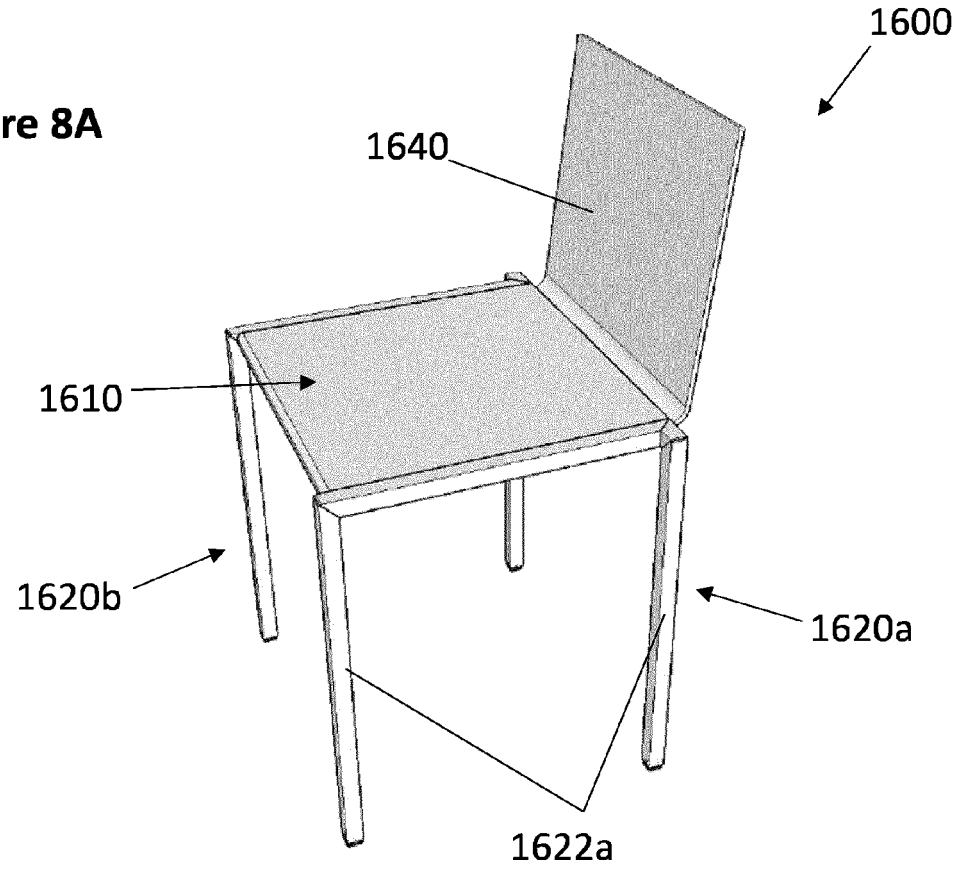
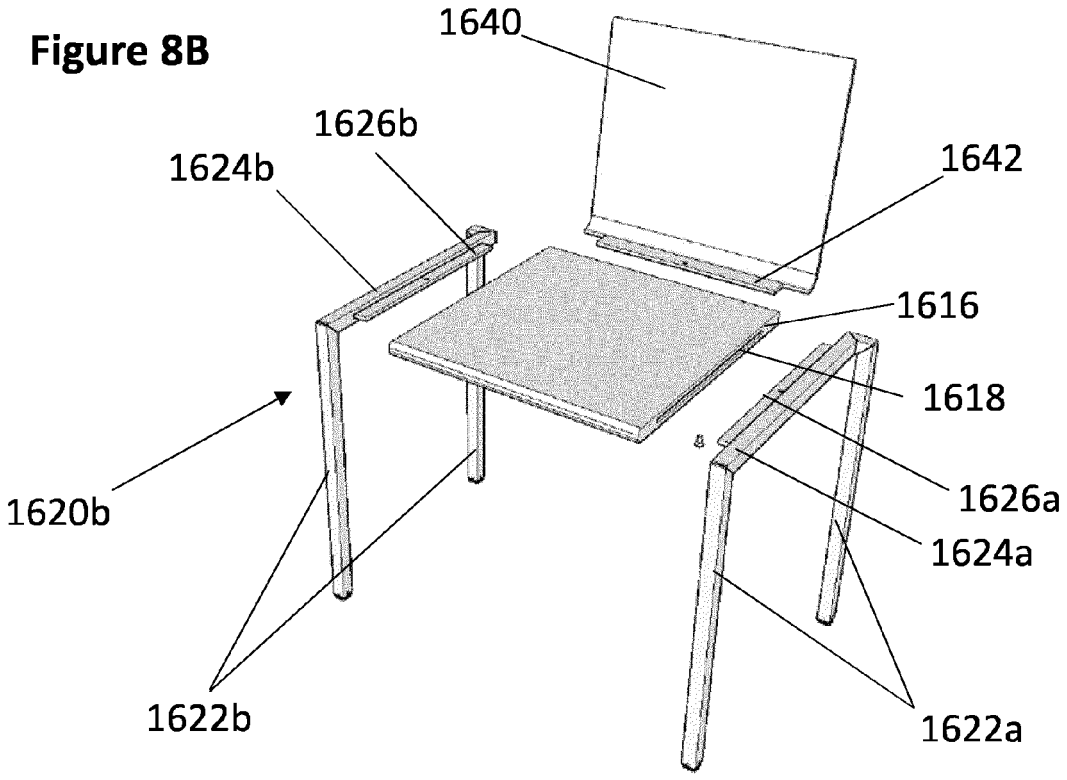


Figure 8B



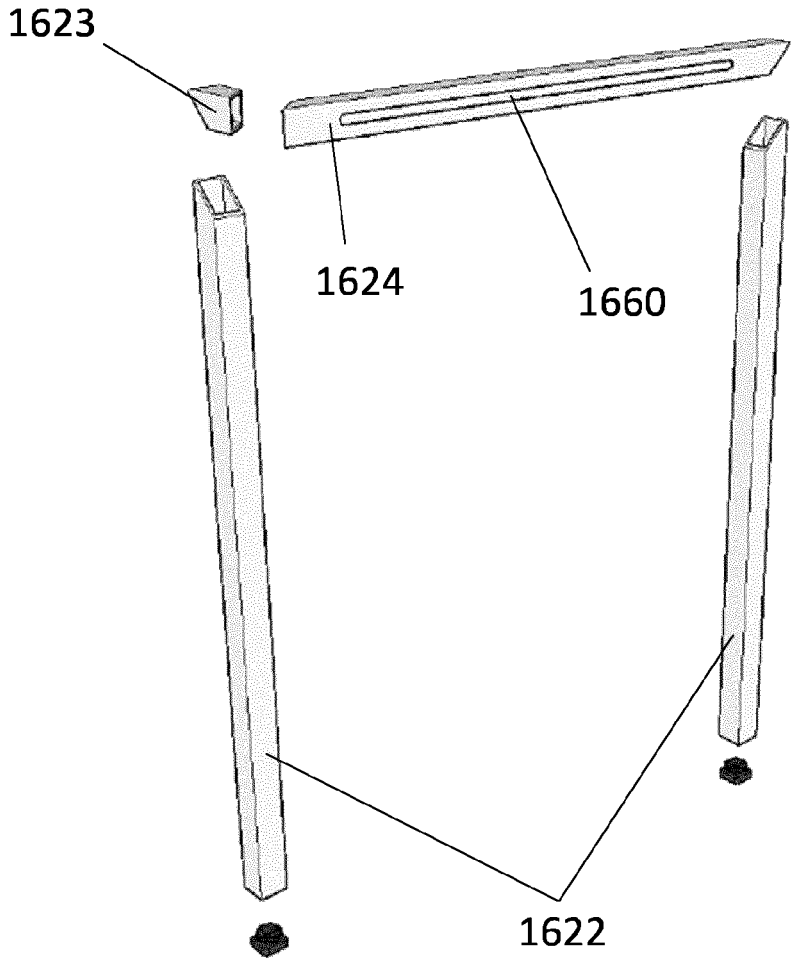
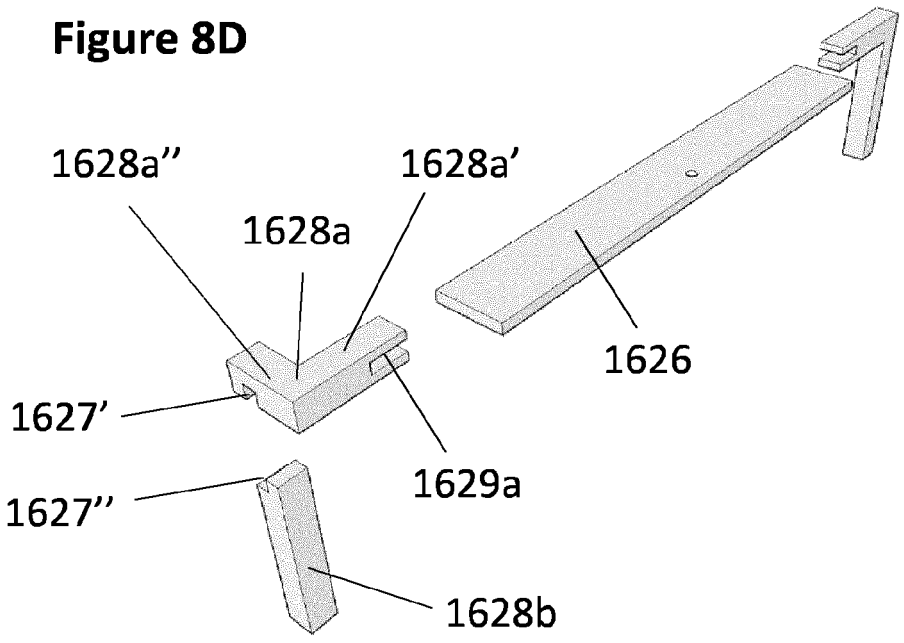


Figure 8C

Figure 8D



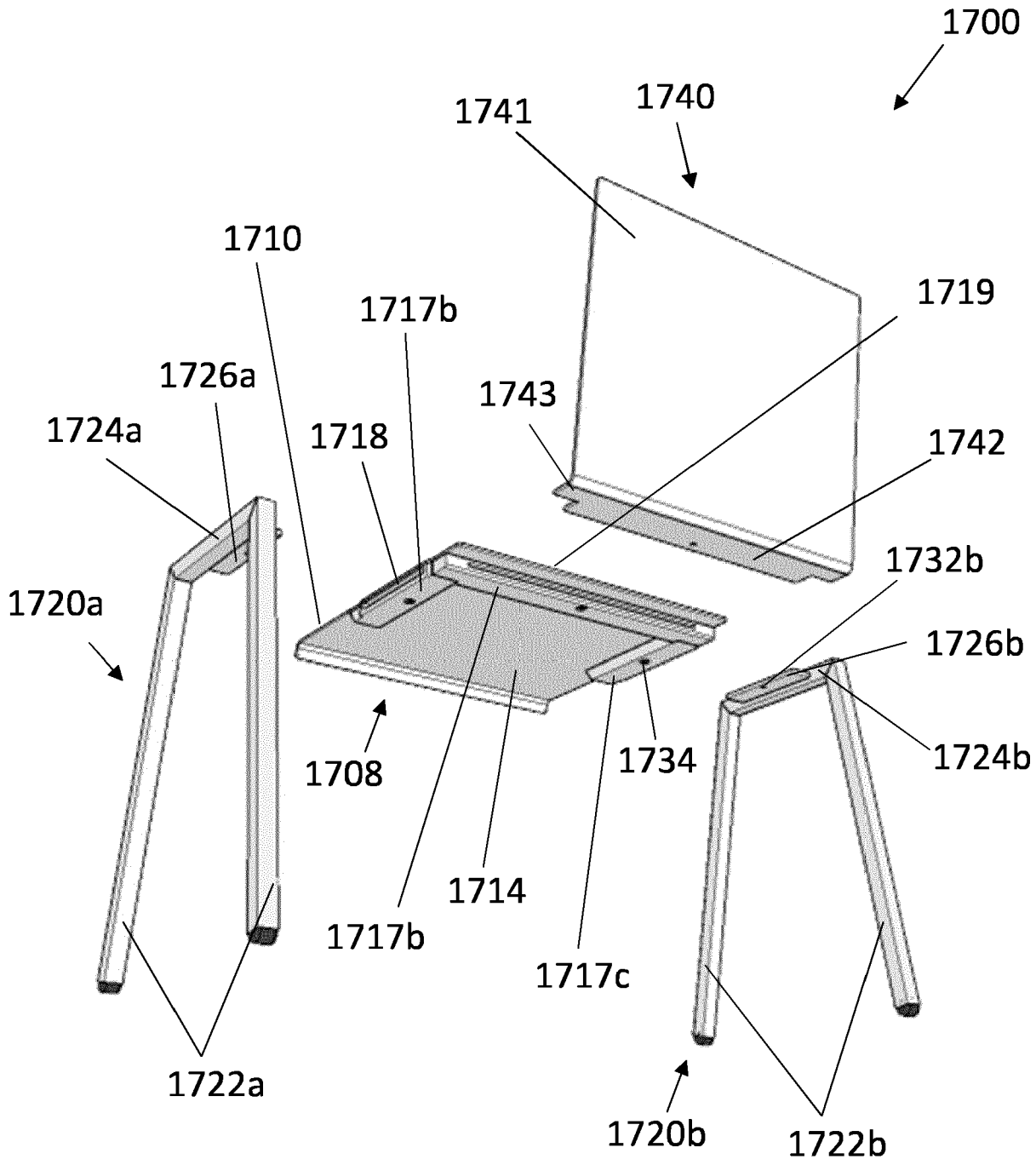

1700
1741
1740
1710
1717b
1719
1726a
1743
1724a
1718
1742
1732b
1720a
1726b
1708
1734
1724b
1714
1717b
1717c
1722a
1720b
1722b

Figure 9

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EUROPEAN SEARCH REPORT

Application Number
EP 24 19 2177

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	KR 102 241 599 B1 (SINAH FUNITURE CO LTD [KR]; KOO BON JIN [KR]) 19 April 2021 (2021-04-19) * figures 1-23 *	1-6,9-15	

TECHNICAL FIELDS SEARCHED (IPC)

A47C
A47B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	1 November 2024	Linden, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 19 2177

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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01-11-2024

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