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(54) **BED SUPPORT SYSTEM AND BED UNIT**

(57) Bed support system (3) comprising a frame (4) which is formed of one or more frame members and which is configured to extend along an outer perimeter of a bed and define a bed bottom plane, one or more cross members where each cross member extends between two oppositely arranged portions of the frame, a base (1) which is formed as a portion of the respective cross member or which is formed of one or more members

(100a-d, 10a-b, 20a-b) attached to the respective cross member, wherein the base (1) is configured to support the frame (4) and thereby support the bed, wherein the respective cross member (5) is positioned inwardly offset from the outer perimeter the frame (4), and wherein in the base (1) is positioned retracted inwardly from the frame (4). The disclosure also relates to a bed unit (100; 200; 300).

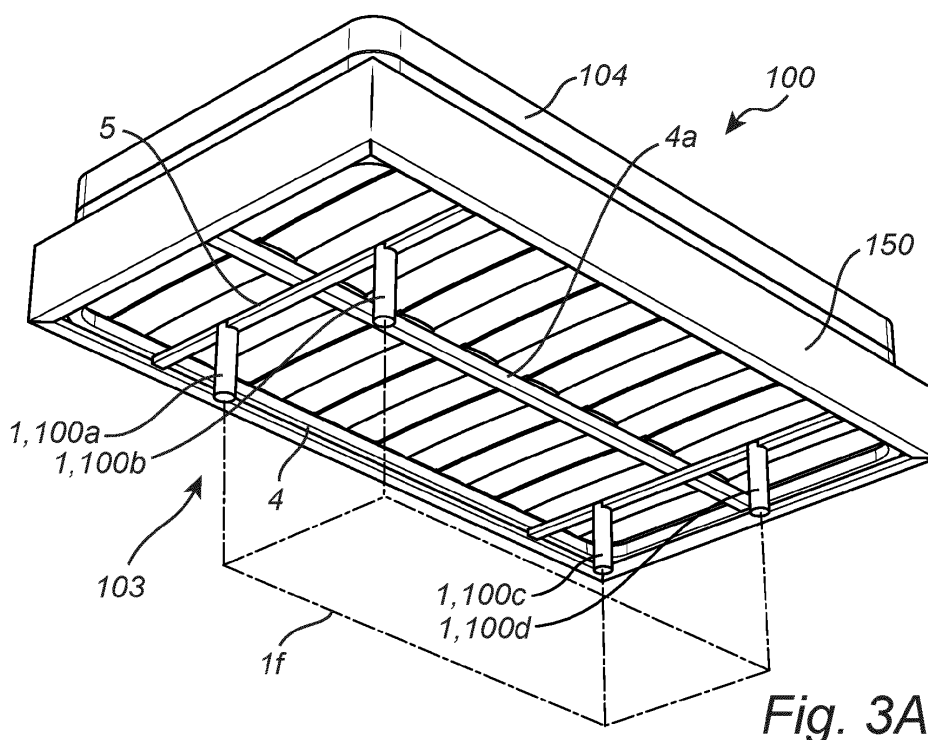


Fig. 3A

Description

Field of invention

[0001] The invention relates to a bed support system. The invention also relates to a bed unit comprising at least one mattress arranged on the bed support system.

Technical Background

[0002] Conventionally, a bed unit comprises one or more mattresses arranged side by side and/or on top of each other. The mattresses are typically supported and kept at a distance from the floor by some kind of support system, typically either in a frame having legs or by the legs being directly attached to a frame integrally formed in the lower most mattress. Typically, there are four legs attached to a respective corner of the frame or the respective lower most mattress. Such legs may be designed in a variety of ways. For instance, the legs may be wood-based or metal-based. In terms of geometric shapes, the legs may be formed as cuboids, cylinders, or the like.

[0003] However, visible legs as discussed above may be considered aesthetically unpleasing per se.

Summary of invention

[0004] It is an object of the invention to provide a bed support system which is aesthetically pleasing while still being structurally strong and stable.

[0005] These objects have been achieved by a bed support system comprising:

a frame formed of one or more frame members, the frame being configured to extend along an outer perimeter of a bed and define a bed bottom plane, and being configured to support said one or more mattresses,

one or more cross members, each cross member extending in a respective first direction between two oppositely arranged portions of the frame,

a base which is formed as a portion of the respective cross member or which is formed of one or more members attached to the respective cross member, the base defining a base footprint, wherein the base is configured to support the frame and thereby support the bed and wherein the base has a height configured to provide a distance between a floor and the bed,

wherein in a second direction, the second direction being transverse to the first direction, the respective cross member is positioned inwardly offset from the frame, and

wherein in the base is positioned retracted inwardly from the frame, in both the first and the second direction such that an in-plane extension, preferably all in-plane extensions in all directions, defined by

said bed bottom plane is greater than a corresponding in-plane extension, preferably all corresponding in-plane extensions, of the footprint of the base.

[0006] With such a design it is possible to provide the appearance of a hovering or levitating bed. Since at least one in-plane extension, preferably all in-plane extensions, of said bed bottom plane defined by the frame is greater than a corresponding in-plane extension, preferably all corresponding in-plane extensions, of the footprint of the base it is implied that the frame extends past the base along at least one direction. Normally, the bed is supported by a base which has dimensions being akin to those of the frame. However, in the design introduced above, the frame and the bed will protrude beyond the base and thereby it will be possible to design the bed and base such that the base becomes more or less invisible and when one looks at the bed one will get the impression that it is hovering or levitating.

[0007] The frame may with this design be supported on the cross members, which cross members in turn are attached to the base. Thus, there is provided a stable bed support system with adequate support and thereby the risk of the bed tipping over due to unfavourable levers is mitigated.

[0008] The structural integrity of the frame is reinforced by means of the cross members. Any forces that are transmitted to the frame risks deforming the frame. By installing at least cross member as introduced above, the frame is structurally reinforced. Forces that may be transmitted to the frame may manifest itself as shear forces. Shearing forces may generally be defined as unaligned forces acting on one part or portion of a body in a specific direction, and another part or portion of the body in the opposite direction. For instance, there may be, on one hand, forces acting on a longitudinally extending portion of the frame along one direction while on the other hand there may be forces acting on an opposing longitudinally portion of the frame along an opposite direction. These forces may be expressed as shearing forces and may result in shearing deformation during which the frame may e.g., crack or tear open, and thereby the frame may collapse from a planar position to a bent position. By installing at least one cross member such that the frame is provided with additional support, the effect of shearing forces may be alleviated. Thus, the risk of any deformation of the frame is reduced.

[0009] Furthermore, the cross members may act as an intermediate support structure with respect to the frame and the base, and may also be configured to improve the resistance to any bending of the frame depending on how the cross members are arranged to extend along the frame. When a person, for instance, lies down on the bed or sits at a side, end, or corner portion of the bed, the resulting torque will result in the bed striving to pivot around a corner or side of the base. Consequently, the frame will inevitably strive to bend due to the torque. Should the frame bend, the bending will allow an initial

movement which in turn may continue into a tipping motion with the risk of damaging the bed support system and/or hurting a person. However, by the cross members being configured to extend between portions of the frame there is provided an improved resistance to any bending of the frame which in turn will ensure that the frame maintains its shape should a person be on top of the bed by e.g., sitting or lying down on a side, end, or corner portion of the bed. By the frame maintaining its shape there will not be any initial movement which otherwise may continue into a tipping motion. Thus, the bed will have a greater resistance from tipping over.

[0010] It may in this context be noted that the footprint of the base generally denotes a geometrical lower support surface that is in contact with an underlying surface with respect to the base. However, the base may also define a geometrical upper support surface that is in contact with an upper structure, such as the cross members and/or the frame. Should the base be formed as a downward protrusion with respect to the one or more cross members such that the base is completely perpendicular to said cross members, the geometrical lower and upper support surfaces may be aligned. In this context it may also be noted that the base has a footprint which preferably has a width in any direction being at least three times, and preferably at least four times, the height of the base.

[0011] It may in this context be further noted that by the frame being formed of a plurality of frame members the frame may e.g., comprise a plurality of subframes, each subframe being a scaled-down unit of a larger frame. In such a case, each subframe may share a common base. For instance, the frame may comprise two smaller subframes. The subframes may be supported on a base comprising four members in the form of legs. Each subframe may be connected to one another directly or indirectly, and each be supported on two legs out of the in total four legs. By directly it is meant, for example, that each subframe may be arranged one after another along a longitudinally or transversally extending edge such that they are in contact with each other. By indirectly it is meant, for example, that each subframe may be spaced apart from each other but still be connected to each other by means of, for example, one or more cross members that extend from one subframe to another. Regardless of how the frame is constructed, that is whether the frame is a single piece, comprises several frame parts, or comprises a plurality of subframes etc., the frame preferably forms a planar structure on which one or more mattresses are to be supported and which planar structure is supported on and attached to the base and/or the one or more cross members. Should the frame comprise a plurality of subframes, the subframes are preferably coplanar. In such case, the subframes may together define a single bed bottom plane. Thus, in this context, in-plane extension generally refers to an extension within the single common bed bottom plane defined by the subframes rather than a plane of merely one individual sub-

frame.

[0012] It may in this context also be noted that the frame, the cross members, and the base may all be integrally formed as a single unit, or that the frame and cross members may be formed as a single unit to be attached to the base, or that the cross members and the base may be formed as a single unit to be attached to the frame.

[0013] It may in this context be further noted that a major surface of the base or the cross member may form an upper support surface on which the frame is configured to be supported on. Should the base be formed as a portion of the respective cross member, both the base and the cross member form a single unit which single unit defines an upper support surface. Preferably, the upper support surface defines a flat surface hence allowing the frame to lie flat on the upper support surface and thereby remain stable. It may in this context be noted that any such physical upper support surface need not extend along the complete geometrical upper surface of the base or the one or more cross members.

[0014] It may in this context be further noted that the frame need not necessarily be in direct contact with the base or the respective cross member. On the contrary, the frame may be in indirect contact with the base or the respective cross member. That is, there may be arranged an intermediate object, such as a flange, between the frame and the base or between the frame and the respective cross member. Similarly, the base need not be in direct contact with the floor. On the contrary, there may be arranged an intermediate object, such as a plate, between the base and the floor. However, if there is any intermediate object between the base and the frame and/or between the base and the floor, any such intermediate object should preferably not have a negative impact on the rigidity of the bed support system. Accordingly, in the preferred embodiment, the frame is in direct contact with an upper surface of the base or the respective cross member such that the resulting abutment and attachment thereto will aid in forming a rigid bed support system. Also accordingly, in the preferred embodiment, the base is designed to rest directly onto the floor.

[0015] It may in this context be further noted that the extension defined by the frame, i.e. the bed bottom plane, is to be compared to the extension of the base footprint in respect of respective direction. That is, it is conceivable that the extension of the footprint of the base may be smaller than the extension defined by the frame when both extensions are seen in a first direction but that the footprint as seen in a first direction may not be smaller than the extension defined by the frame as seen in a second direction different from the first direction. This may e.g., be the case if the bed has a rectangular shape being significantly different from a quadratic shape, such as for a typical single bed having a width being about half the length. However, for a double-bed, a so-called king size bed, and most likely also for a so-called queen-size bed, which are quadratic or at least fairly close to being

quadratic, all extensions of the footprint of the base will typically be smaller than all the extensions defined by the panel members irrespective of if the extensions are compared along the same direction or if the footprint extensions are compared with panel extensions in different directions.

[0016] It may in this context be further noted that the frame may directly support, or indirectly support the one or more mattresses. By directly support, it is meant that the frame is in direct contact with the one or more mattresses. It may be noted that the frame may be integrally formed with the one or more mattresses. By indirectly support, it is meant that there may be arranged at least one intermediate object or structure between the frame and the one or more mattresses. Such intermediate object could be non-structural, such as e.g. an anti-slip mat and/or wooden slats configured to provide additional support for the one or more mattresses, and/or could be structural, such as e.g., additional cross members arranged and attached on top of the frame.

[0017] By the term "in-plane extension" it is herein meant that an item has a physical extension along at least one direction along a plane defined by bed bottom plane.

[0018] By the term "corresponding in-plane extension" it is herein referred to a first item having a first physical extension along a first direction along the plane and a second item having a second physical extension along at a second direction along the plane, the first and second directions being parallel, and preferably also coinciding, with each other.

[0019] It may in this context also be noted that the whole footprint of the base may be defined by a plurality of members, such as legs, or by a single structure. Single structure is in this context intended to refer to a base which can be assembled and kept together in a single piece per se even before it has been attached to the frame.

[0020] It may in this context also be noted that the planar extension of the frame refers to the total extension of the frame in the respective direction and does not only refer to the distance by which the frame extends outside the base.

[0021] It may in this context also be noted that the base may be configured to support at least one bed having a variety of different dimensions. For instance, the bed support system may be configured to support at least one bed being supported by the frame. The bed may for instance be 180 x 200 cm, 210 x 210 cm, 160 x 200 cm, 140 x 200 cm, 120 x 200 cm, or even 220 x 220 cm. By 180 x 200 cm it is meant that the bed is 180 cm wide and 200 cm long. In some circumstances, the bed support system may support two beds being arranged side by side. Preferably, each of these beds have a smaller width. For instance, each of these beds may be 90 x 200 cm, or 105 x 210 cm. In such a case, the beds may be said to together define a larger common bed of the sizes 180 x 200 cm and 210 x 210 cm, respectively. It follows from

this that the frame may have similar dimensions as discussed above. Should a larger bed be supported on the base, it is conceivable that the base may be designed to be larger, and thereby the footprint of the bed would also be greater. Should a larger bed be supported on the frame, the frame may preferably be designed to be larger as well.

[0022] The frame has preferably dimensions such that it in total corresponds to the dimensions of the bed. It may be noted that if the frame is intended to support a surrounding frame into which the mattresses are positioned, the frame may have dimensions being identical to or perhaps a few centimetres larger depending upon the design of the connection between the frame and the surrounding frame. If the frame is designed to be attached directly to an internal structural fixture of the lower most mattress or mattresses, the frame may have dimensions being a few millimetre to a centimetre smaller such that it is secured that the edge of the frame is hidden beneath and within the perimeter of the bed. Or alternatively, the frame is provided with peripheral frame panels which extends on an outside of the frame and also on an outside of the mattresses such that the frame is completely hidden and such that the mattresses are perceived as being positioned in a levitating or hovering box formed by said peripheral frame panels.

[0023] It may in this context be further noted that while beds are conventionally rectangularly shaped, beds may alternatively be shaped in a variety of different ways. For instance, beds may be circular. In such a case, it is preferred that the footprint of the base is circular as well. That is, both the geometrical lower and upper support surfaces of the base are circular as well to match the dimensions of the circular bed. Generally speaking, a shape of the base being similar to the shape of the bed gives a good balance between providing a stable base and still being able of producing the impression of a hovering or levitating bed.

[0024] It may in this context be further noted that the base may be arranged relative the frame in a variety of ways. For instance, the base may be arranged such that a length of the base footprint extends in the longitudinal direction while a length of the frame also extends along the longitudinal direction. In such a case, a respective width of the base footprint and the frame extends in the transversal direction. Alternatively, the base may be arranged such that a length of the base footprint extends transversally to a length of the frame.

[0025] By the term "longitudinally extending" it is herein meant an extension along a longitudinal direction which defines a direction from a head end to a foot end of the bed.

[0026] By the term "transversally extending" it is herein meant an extension along a transversal direction which defines a direction from one side end to another side end of the bed. Alternatively expressed, by the term "transversally extending" it is herein meant an extension along a transversal direction which defines a direction being

transverse to the longitudinal direction.

[0027] The in-plane extension in said at least one direction, preferably all in-plane extensions in all directions, of said base footprint may be between 30% and 80%, preferably between 40% and 65%, of a corresponding in-plane extension, preferably all corresponding in-plane extensions, defined by said at bed bottom plane.

[0028] As discussed above, the base footprint generally denotes the geometrical lower surface of the base footprint being in contact with an underlying surface. The base may thereby form an adequately large lower support surface being able to support the frame and thereby the bed in a secure and reliable manner and still produce the impression of a hovering or levitating bed. These dimensions of the base are also advantageous in that they allow for the bed support system to be designed such that the base is formed of one single piece or unit.

[0029] As discussed above, the base footprint may also refer to the geometrical upper surface as well. The geometrical upper surface that is in contact with an upper structure is preferably dimensioned akin to the geometrical lower surface of the base. In order to improve the stability of the bed support system the geometrical upper support surface may be dimensioned slightly bigger than the geometrical lower support surface. Either way, the base may thereby form an adequately large upper support surface being able to support the one or more cross members and the frame and thereby the bed in a secure and reliable manner. In this context it may be noted that the base may be formed as a portion of the respective cross member. In such a case, the geometrical upper support surface is defined by a plane defined by the extension of the respective cross member.

[0030] It may in this context be noted that the frame is to be strategically placed on the base and/or the respective cross member such that the base is able to support the frame and a bed. Preferably, the frame is placed such that a central portion of the bed bottom plane defined by the frame is supported on the base and/or the respective cross member. If there is a single unit of a frame, the frame is preferably positioned such that the centre point of the frame is within the footprint of the base. If the frame comprises a plurality of subframes e.g., two coplanar subframes positioned side by side, the subframes are preferably positioned such that a division line or division gap between the subframes is positioned within the footprint of the base. Preferably, the plane defined by the subframes is positioned with its centre point, or at least centre portion, coinciding with the centre point of the footprint of the base. In this context centre portion of the plane defined by the frame or subframes is intended to refer to an area around the centre point and having a size being 25% of the total extension of the plane as seen in respective direction, that is an area having the same shape as the plane defined by the frame or subframes but with one-fourth the size.

[0031] The base may be formed as a protrusion pro-

truding downwardly from the one or more cross members, preferably as a plurality of protrusions, one in each corner of the base footprint.

[0032] Such a design of the base provides for a simple, convenient and strong construction. The base may distribute any weight efficiently along its downward extension. A base that protrudes downwardly is also simple and easy to install to the respective cross member, and allows for a variety of ways the base can be formed. For instance, the base may be formed of one or more members, each member having a major straight extension.

[0033] The base may be formed as a plurality of protrusions, such as a plurality of legs, one in each corner of the base footprint. Preferably there is one cross member along a first side of the base footprint, where said cross member is supported by two protrusions, and another cross member along a second side, opposite the first side, of the base footprint, where said another cross member is supported by two other protrusions. That is, a set-up with two cross members and four legs with two of the four legs associated with respective one of the two cross members.

[0034] The protrusion may form at least 50%, preferably at least 75% of said distance.

[0035] An advantage with this design is that the one or more cross members may be shaped and dimensioned in a variety of ways. Preferably, the protrusion of the base forms a higher percentage of the distance. By the base forming a higher percentage of said distance, the cross members can have a simple shape that is convenient to produce from a production point of view. Preferably, the protrusion and the respective cross member has more or less a major straight extension hence allowing the protrusion to form more or less 100% of the distance. In practice, the base and the cross members may be shaped like straight metal-based beams or rods. From a production point of view, it is comparably cheap to produce structures having simple shape. Also, the base and the cross members are preferably separate units. Thus, there is provided both a base as well as cross members being comparably simple and cheap to produce, and logistically convenient, and easy to handle.

[0036] It may be noted that although the base and the cross members may be separate units, this design does not preclude the fact that the base and the cross members may be integrally formed to form a single unit. They may be formed as a truly single unit where the cross members have shape also providing said distance. For instance, the cross members may be shaped like brackets. That is, a first and second end portion of the cross member may extend in parallel with each other while an intermediate portion protrudes downwardly and forms a protrusion being U-shaped and forming 100% of the distance. Alternatively, the intermediate portion may have a height corresponding to e.g., 50% of said distance. Accordingly, the dimension/dimensions of the base forming the protrusion may be easily designed to accommodate the shape of said cross member. In this

particular case, the base would then have a height corresponding to the remaining 50% of said distance. An advantage with the base forming part of the respective cross member is the provision of an efficient instalment of the respective cross member to the frame. Alternatively, the base, in the form of panels or protrusions, such as legs, may be integrally formed with the cross members, such as by welding, such that the cross members and the base may be attached to the frame as an integral unit.

[0037] An upper portion of the respective one or more members of the base may be depressed or recessed such that a respective receptacle is formed in said upper portion of the respective one or more members, wherein the respective receptacle is configured to receive the one or more cross members.

[0038] As discussed above, the cross members and the base may be separate units. In such a case, the base may be attached to the respective cross members in a variety of ways but preferably the base is mechanically attached to the cross members. An advantage with this design with receptacles is the provision of a convenient and strong attachment between the base and the cross members. In this context, receptacles may be formed as hollow slots in the one or more members of the base. Should the base comprise a plurality of legs a receptacle would be formed in an upper portion of the respective leg. It is conceivable that the base forms a single unit and that the receptacles are formed in an upper portion of the base at different points. The receptacle may be dimensioned in order to receive a portion of the respective cross member and thereby keep the respective cross member and thereby the frame in a lying position. By the cross members being received by the respective receptacle, the surrounding walls would keep the cross members from being displaced from their intended position. Furthermore, the weight of the cross members, the frame, and the mattresses would give rise to such a frictional force such that the traction between the contacting surfaces between the cross members and the surrounding walls, reduces the risk of the cross members of sliding relative the base. Thus, this design is convenient in that it may utilize gravitational force in order for the cross members to be kept in their intended positions. Preferably, the cross members and the base are provided with additional means of attachment in order to ensure that sliding of the cross members do not occur. For example, each receptacle may be provided with a layer of anti-slip material. In such case, the receptacle may be dimensioned to be slightly bigger than the cross member to give room to the anti-slip material.

[0039] It may in this context be noted that the one or more members of the base are dimensioned such that a cross section thereof allows the respective cross member to be positioned within that cross section. However, it is conceivable that the one or more cross members are dimensioned such that a surface of the respective cross member actually extends beyond said cross section along all directions. In such a case, the bed support

system may be provided with intermediate attachment members in order to attach the one or more cross members to the base.

[0040] A height of each receptacle may form at least 25%, preferably at least 50% of a height of the respective one or more cross members.

[0041] The frame and thereby the cross members will inevitably strive to pivot around the base. Any pivotal motion of the cross members will allow an initial movement which in turn may continue into a sliding and/or a slight rotational motion with the risk of displacing the cross members relative the base and thereby damage the bed support system and/or hurt a person. By dimensioning the respective receptacle to be deeper there is provided a more reliable attachment between the base and the respective cross member. This would minimize the risk of the cross members continuing into a sliding and/or a slight rotational motion which could hurt a person lying on the bed. It may be noted that should a height of each receptacle form 100% of a height of the respective one or more cross members, an upper surface of the respective cross member may lie completely flush with an upper surface of the surrounding walls forming the receptacles. In this way, the upper surface of the surrounding walls may also support the frame. This would provide for a stable bed support system. Preferably, each receptacle is dimensioned such that once the respective cross member has been received by the receptacle, the cross member is in abutment with the surrounding walls. The traction between the surrounding walls and the respective cross member would keep the respective cross member from continuing into a sliding or an upward motion.

[0042] The respective cross member may be positioned under the frame and may be configured to be connected to, preferably mechanically attached to, the frame at at least two attachment points being separated from each other along an extension of the respective cross member.

[0043] An advantage with this design is the provision of a secure and resilient attachment between the frame and the respective cross member. By securing the respective cross member to the frame and preferably positioning the respective cross member under the frame, the base may support a greater weight without risking deformation since said weight is distributed on the cross members.

[0044] Another advantage with this design is that should the cross members be positioned under the frame, an upper surface of the respective cross member may support the frame. That is, a greater surface of the frame is attached to the base and/or the cross members. The bed support system may function as a lever as discussed above. By attaching the frame on the cross members, a large surface of the frame is attached to the cross members. In doing so, the frame is less likely to bend due to any pivoting of the frame. Hence, the risk of the bed tipping over due to e.g., a person sitting at an end portion of the bed, is reduced.

[0045] The respective cross member is preferably mechanically attached to the base. Such an attachment is secure and facilitates in keeping the respective cross member in its place. Furthermore, by the at least two attachment points being separated from each other, there is provided attachment points that may be appropriately chosen along an extension of the respective cross member such that there is provided a strong and rigid connection between the respective cross member and the frame which in turn will make the bed support system even more rigid and stiff.

[0046] It may in this context be noted that there are, preferably, positioned first and second cross members, under the frame, each of the two cross members being positioned at a respective opposing end portion of the frame. That is, at at least two attachment points between the first cross member and the frame, the attachment points are separated from each other along the an extension of the first cross member, and at at least two attachment points between the second cross member and the frame, the attachment points are separated from each other along the second cross member. Thus, there is at the frame provided at least four attachment points in total, wherein at least two are provided for each of the two cross members. With this design, there is provided a strong attachment between the cross members and the frame. It may in this context be noted that in case the base is formed of one or more box-like structures, each cross member is preferably attached to the respective or same box-like structure at at least two attachment points being separated from each other along an extension of the respective cross member. In a preferred embodiment of this variant, each cross member is also provided with two base attachment points, each in the vicinity of the respective corner of the base. Thereby, the loading conditions will be similar to the variant where each cross member is supported by two respective legs.

[0047] In the second direction the respective cross member may be positioned inwardly offset from the frame at least 10% of an extension of the frame as seen in the second direction.

[0048] The cross members defining a geometrical support surface may be said to act as a fixed hinge relative the frame. When the frame is subjected to a force which in turn results in a torque that strives to pivot the frame relative to the respective cross member, the attachment between the respective cross member and the frame is normally susceptible to stress. Such stress could result in deformation of the attachment, especially should the frame strive to pivot repeatedly. It may be noted that by positioning the respective cross member even more inwardly offset relative the frame, the resulting torque which would be comparably higher, would wear out the attachment between the respective cross member and the frame faster. Thus, the attachment between the frame and the respective cross member would need to be stronger in order to reduce the wear on the attachment and thereby reduce the risk of any tipping motion of the

frame relative the respective cross member. Thus, it is preferred that the respective cross member is positioned inwardly offset from the frame 10-25% of an extension of the frame as seen in the second direction. By positioning the respective cross member in this manner, the frame is supported on an adequately large geometrical support surface defined by the cross members and as such, the frame is less likely to tip over relative the cross members while minimizing wear on the attachment between the cross members and the frame, and at the same time minimizing the visible appearance of the cross members and the base. It may in this context be noted that although the cross members are positioned inwardly offset the frame as seen in the second direction, it is conceivable that the cross members may extend in the second direction between two oppositely arranged portions of the frame while being positioned inwardly offset the frame as seen in the first direction.

[0049] The frame may further comprise one or more additional frame members configured to extend in the second direction between two oppositely arranged portions of the frame.

[0050] Thus, there is provided a stiffer frame hence rendering the frame less susceptible to being deformed due to e.g., shearing forces acting on the frame. Consequently, this reduces the risk of the bed tipping over. Furthermore, the provision of the one or more additional frame members results in the frame being able to support a greater weight resulting from e.g., heavier mattresses, more mattresses, or heavier individuals, with a reduced risk of deformation of the frame since said weight is distributed over a larger area.

[0051] Preferably, one frame member of the one or more additional frame members bisects the frame. Thus, there is provided a symmetrical distribution of weight and shear forces. Thus, the frame is less likely to deform and thereby the bed is also less likely to tip. With this design there is provided a bed support system being strong. Furthermore, if desired it is possible to design the frame mirror symmetrical also when it comes to which side to be facing upwardly whereby it is facilitated to attach the cross members and/or the base to such a frame since the frame may, with such a design, need not be oriented in a certain way during assembling of the bed support system. It is conceivable that the frame may alternatively, or additionally, be provided with additional frame members that extend in the first or second direction between two oppositely arranged portions of the frame in order to further improve the structural integrity of the frame.

[0052] The respective cross member may be configured to extend across one or more of the additional frame members.

[0053] The respective cross member is preferably positioned under the frame such that the frame may be supported on the respective cross members. In doing so, there is provided an adequately large support area that can handle substantial weight. By the respective cross member being configured to extend across at least one of

the additional frame members, the frame is provided with even more support. Hence, the frame can support more weight since the cross members support a large portion of the frame.

[0054] It is possible to form a frame with an outer perimeter and having at least one additional frame member extending between different portions, preferably oppositely arranged portions, of said outer perimeter. It is conceivable that the cross member may also be connected to, preferably mechanically attached, to at least one of the additional frame members. Thus, there is provided a frame with an increased bending stiffness, which in turn reduces the risk of the frame bending and thereby continuing into a tipping motion.

[0055] The above-mentioned object may also be achieved a bed unit comprising at least one mattress arranged on a bed support system of the kind disclosed above in various levels of details.

[0056] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

[0057] The invention may also in short be said to relate to a bed support system comprising a frame formed of one or more frame members, the frame being configured to extend along an outer perimeter of a bed and define a bed bottom plane, one or more cross members, each cross member extending between two oppositely arranged portions of the frame, a base which is formed as a portion of the respective cross member or which is formed of one or more members attached to the respective cross member, wherein the base is configured to support the frame and thereby support the bed, wherein the respective cross member is positioned inwardly offset from the frame, and wherein in the base is positioned retracted inwardly from the frame. The disclosure also relates to a bed unit.

Brief description of the drawings

[0058] The invention will by way of example be described in more detail with reference to the appended schematic drawings, which shows a presently preferred embodiment of the invention. However, different embodiments of the invention will also be shown in the appended schematic drawings.

Fig. 1A-B are two perspective views of a bed support system according to an embodiment.

Fig. 2A-B are two perspective views of a base according to an embodiment.

Fig. 3A-B are two perspective views of a bed unit

according to an embodiment.

Fig. 4A-B are two perspective views of a bed unit according to an embodiment.

Fig. 5A-B are two perspective views of a bed unit according to an embodiment.

Detailed description of preferred embodiments

[0059] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which currently preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as only limited to the embodiments set forth herein.

[0060] A bed may manifest itself in a variety of shapes, forms, and structures. A bed may comprise one or more mattresses and similarly, mattresses may manifest themselves in a variety of shapes, forms, and structures.

[0061] For instance, so called spring mattresses, also called innerspring mattresses, are mattresses that comprise a plurality of springs, often dozens to hundreds of metal springs, to provide an underlying support layer. Spring mattresses often comprise softer plush material layers as well in order to increase comfort. The springs work by distributing the body weight evenly. Some spring mattresses comprises an integrated sturdy bottom frame, often a wood frame. Such mattresses may be provided with legs that are attached to the bottom frame. Hence, such mattresses may be used directly without needing a separate mattress foundation between the legs and the mattress.

[0062] A bed may comprise such a spring mattress. A bed may comprise a mattress topper. Such a mattress topper may be arranged on top of the spring mattress. The spring mattress and the mattress topper may hence define the bed. A bed may also only comprise a mattress topper. The skilled person in the art realizes that a bed may be constructed in a variety of ways. Spring mattresses were merely mentioned above by way of example. For instance, there are mattresses that do not comprise springs but are merely formed of foam, or latex. Irrespective of how the mattress formed, the mattress may comprise an integrated bottom frame. The bed has a head end and a foot end. Often, the bed is arranged in the bedroom such that the head end of the bed extends along a wall of the bedroom.

[0063] The bed may be supported on a bed support system 3 which comprises a frame 4, one or more cross members 5, and a base 1. The base 1 is preferably centrally arranged below the frame 4, with the outer perimeters of the base 1 being retracted, or alternatively expressed; offset inwardly, relative to an outer perimeter of the frame 4. Thus, the bed support system 3 may appear to be hovering above the floor.

[0064] As seen in Figs. 1A-B, the frame forms a rectangular-shaped structure defining an outer perimeter. The frame is rigid and is preferably metal-based, but it is

conceivable that the frame may alternatively be made of other suitable materials being able to provide a similar stiffness, e.g., carbon fibre, a wood-based material that is sufficiently reinforced, such as by metal or carbon fibre, or the like. The frame defines geometrical support surface which extends in a bed bottom plane .

[0065] The frame may be formed of a single piece or may comprise a plurality of parts which are joint to form the frame. The frame parts may e.g., be welded and/or be connected to each other by e.g., being mechanically attached to each other. The frame may include other parts or members, such as covers or the like. Moreover, the structural frame may also be formed of one or more members. The term "member" may thus denote a unit of a frame. As such, by the frame being formed of a plurality of members, e.g., in the sense that the frame may be formed of a plurality of scaled-down subframes being positioned side by side and firmly attached to each other to form a rigid frame. In the preferred embodiment the frame is formed of a metallic tube having a rectangular cross-section. The tube is bent to form four sides interconnected at four bent corners. Where the two ends of the tube meet each other, the tube ends are welded to each other to form a single closed loop of tube forming a rectangular frame 4.

[0066] In the embodiments shown, the frame 4 is provided with one additional frame member 4a that bisects the frame 4 along a longitudinal direction L. The one additional frame member 4a extends from a respective transversally extending edge portion of the frame 4 to an opposing transversally extending edge portion. It is conceivable that the one additional frame member may be arranged to bisect the frame 4 in a transversal direction T. The frame 4 may be provided with additional frame members in order to improve the stiffness of the frame. Such additional frames may extend between the bisecting additional frame member 4a to a portion of the outer perimeter of the frame 4. Alternatively, the frame may be provided with a plurality of additional frame structures being arranged so as to form a cross-like inner structure. Such additional frame members, if present, are preferably welded to the frame but may also be connected to the frame in other ways, such as being mechanically attached.

[0067] Continuing with Figs. 1A-B, in order to provide a large support surface for the bed, the frame 4 is provided with one or more inner panels or slats 6. The panels or slats 6 may be wood-based, metal-based, such as stainless steel, plastic-based, fiberglass, or carbon fibre, or the like. The slats may form a continuous or intermittent panel configured to support one or more mattresses. Such panels or slats may be supported on the frame by resting on an upper surface of the frame 4 and/or may be supported by the frame 4 by being attached to brackets or the like. The slats or panels are capable of supporting a comparably large weight since that weight is distributed on a larger surface. It is conceivable that the panels or slats may be connected to the frame such that the stiffness of the frame is improved.

Alternatively, the slats may be formed of any other suitable materials, such as plastic-based materials, carbon fibre, or the like. However, typically, the panels or slats are comparably weak and they are capable of supporting the mattress or mattresses due to the weight being distributed over a plurality of such slats or panels.

[0068] As seen in Figs. 1A-B, the structural frame 4 is provided with a surrounding frame 4b. The surrounding frame 4b may comprise one or more panels being wood-based, metal-based, stainless steel, plastic-based, fiberglass, or carbon fibre, or the like. Although the surrounding frame completely surrounds the frame, it is conceivable that a portion of the surrounding frame may be omitted. By omitting a portion of the surrounding frame, there is allowed for a headboard to be installed and be attached to the rest of the surrounding frame. It is alternatively conceivable that said headboard may form a downward protrusion and thereby form part of the base 1. In such a case, the base 1 will at the headboard typically have an extension along the full width of the frame 4. As will be explained in more detail below, the base 1 will in such a case be retracted or inwardly offset only at the foot end of the bed. Thus, the bed will have the appearance as if it would be attached only to the headboard with the rest of the bed extending levitating from the headboard. The panels of the surrounding frame 4b may be covered with a fabric-like material. The fabric-like material may be omitted to allow the one or more inner panels to be exposed. A height of the surrounding frame 4b typically exceeds that of the structural frame 4. Thus, the frame 4 may seem to be hidden within the surrounding frame 4b. Typically, the surrounding frame 4b extends upwardly from the structural frame 4 and thereby also aids in keeping the mattress or mattresses from being displaced relative the frame.

[0069] Continuing with Figs. 1A-B, the frame 4 includes or is supported on one or more cross members 5. In the preferred embodiment, each cross member 5 is positioned under the frame. However, it is conceivable that each cross member 5 may be positioned within the bed bottom plane defined by the frame 4. That is, each of the cross members 5 may be positioned within that bed bottom plane and be connected to the frame 4 and also be in abutment with the inner perimeter of the frame 4.

[0070] The cross member is preferably formed of a metal-based material, but it is conceivable that the cross member is formed of any other suitable material that is able to provide a similar stiffness, such as fibre glass, carbon fibre, or reinforced wooden members, or the like. The frame 4 is in the preferred embodiment provided with two cross members 5. However, the frame 4 may be provided with a greater number of cross members, such as three, four, five, six, or more cross members in total. In a first direction FD, each of the two cross members 5 extends between a longitudinally extending portion of the outer perimeter of the frame 4 all the way to another opposing longitudinally extending edge portion of said outer perimeter. Thus, the cross members 5 extend

across the additional frame member that bisects the frame in a first direction FD and may, but need not, support said additional frame member. It is conceivable that each of the cross members 5 is arranged in alternate ways. By way of example, the cross members 5 may instead extend, in a second direction SD being transversal to the first direction FD, between a transversally extending portion of the outer perimeter of the frame 4 all the way to another opposing transversally extending edge portion of said outer perimeter of the frame 4. By way of another example, the cross members may be arranged to form a cross-like structure. That is, each of the cross members may extend diagonally from one corner to another opposing corner of the frame.

[0071] Each cross member 5 has a major straight extension. Each cross member 5 further preferably has a flat upper support surface which allows the frame 4 to be supported on the respective cross member 5. Each cross member 5 has a rectangular cross section although other geometrical cross sections are conceivable should those cross sections be able to provide adequate support for the frame. Such a geometrical cross section may for instance be a hexagonal cross section. Preferably, the cross members 5 are formed of a metallic tube.

[0072] As seen in Figs. 1A-B, the respective cross member 5 is connected to the frame 4. More specifically, the cross members 5 are mechanically attached to the frame 4 at an underside of the frame 4. The respective cross member 5 is mechanically attached to the frame at at least two attachment points being separated from each other along an extension of the respective cross member 5. In this case, the respective cross member is provided with two attachment points. Each attachment point is arranged at a respective opposing end portion of the respective cross member 5. Whenever there is a reference to something being connected to, attached, or mechanically attached, this is preferably performed using some kind of fastener, such as some kind of screw or cam mechanism or the like. A screw may be screwed directly into the other part. The other part is preferably but need not be prepared with a hole before the screw is screwed into the other part. A prepared hole will facilitate correct positioning of the parts relative to each other. The prepared hole may e.g., be threaded or may be provided with a threaded insert. The screw head may interact with the first part directly or via a washer. The screw may be configured to interact with a nut or the hole being threaded or provided with an insert, e.g., made of a metallic or plastic, with the nut or insert acting onto the other part directly or via a washer. Alternatively, the cross members may be connected to the frame by e.g., means of angle fittings/angle brackets/mounting brackets.

[0073] Continuing with Figs. 1-A, the cross members 5 are supported on the base 1. The cross members 5 need not necessarily be in direct contact with the base 1. The cross members 5 may be in indirect contact with the base 1. That is, there may be arranged an intermediate object, such as an attachment member, between the respective

cross member and the base 1. Similarly, the base 1 need not be in direct contact with the floor. There may be arranged an intermediate object, such as a plate, between the base 1 and the floor. It is even conceivable that a bottom portion of the base 1 may be coated with a rubber-like coating in order to prevent twisting of the base 1 relative the floor. It is conceivable that the bed comprises an integrated bottom comprising a frame 4 and/or cross members 5. The frame 4 and/or the cross members 5 may then be directly attached to the base 1 and thereby the bed would be directly attached to the base 1 as well.

[0074] In the following, the base 1 will be described in detail. The base 1, may be formed as a portion of the respective cross member. The base 1 may be formed of one or more members 100a-d, 10a-b, 20a-b. In Figs. 1A-B, the base is formed of four members 100a-d being separate from the respective cross member 5. Whenever there is a reference to the respective member 100a-d, 10a-b, 20a-b of the base 1 having certain geometrical properties or dimensions thereof, this is typically equally applicable to the case where the base 1 is formed as an integral portion of the respective cross member 5. That is, the cross member 5 will in such a case have a base forming portion having such properties. The four members 100a-d are in the preferred embodiment shaped as conventional legs. Each of the members 100a-d has in the shown embodiment a circular cross section, although other geometrical cross sections are conceivable as long as those cross sections provides legs able to provide adequate support for the frame. Such a geometrical cross section may for instance be a rectangular or a hexagonal cross section. Each member may be said to form a protrusion protruding downwardly from the respective associated cross member 5. In this case, the respective member 100a-d of the base 1 is perpendicular to the respective cross member 5 to which it is connected. Each of the members 5 has a major straight extension configured to be arranged vertically.

[0075] An upper portion of each of the base members 100a-d is preferably depressed or recessed such that a receptacle in the upper portion of the respective member is formed. The receptacle is dimensioned such that a portion of the cross member 5 is able to be received by the respective receptacle. The respective cross member is in abutment with the respective receptacle. A height of each receptacle forms at least 25%, preferably at least 50% of a height of the respective one or more cross members. In Figs. 1A-B, the height of each receptacle forms more or less 90-95% of the height of the respective cross member.

[0076] The respective cross member is positioned inwardly offset from the frame at least 10% of an extension of the frame as seen in the second direction SD. In Figs. 1A-B, the respective cross member is positioned inwardly offset the frame about 15% of an extension of the frame as seen in the second direction SD.

[0077] In order to provide adequate support for the bed support system 3, an in-plane extension, preferably all in-

plane extensions, in all directions, defined by a bed bottom plane defined by the frame is greater than a corresponding in-plane extension, preferably all corresponding in-plane extensions, of a footprint 1f of the base 1. The in-plane extension in said at least one direction, preferably all in-plane extensions in all directions, of said base footprint 1f is between 30% and 80%, preferably between 40% and 65%, of a corresponding in-plane extension, preferably all corresponding in-plane extensions, defined by said bed bottom plane.

[0078] The base 1 has a height h and is configured to provide a distance d between a floor and the bed. The protrusions formed by the members of the base 1 form at least 50%, preferably at least 75% of said distance. In Figs. 1A-B, the protrusions form more or less 100% of that distance d. In the preferred embodiment, the different cross members 5 are identical and thereby the height of the different members 100a-d is preferably identical. However, it is also conceivable that the cross members 5 are shaped differently, and in such a case the percentage of the distance d that the protrusions make up may vary. As discussed above, each of the two cross members 5 extends between a longitudinally extending portion of the outer perimeter of the frame all the way to another opposing longitudinally extending edge portion of said outer perimeter. It is conceivable that an intermediate portion of the respective cross member may be omitted. As such, the respective cross member would not extend all the way from one portion of the frame to another portion. In such a case the connection between the frame 4 and the respective cross member 5 need to be able to withstand the resulting torque. Alternatively, the respective cross member 5 may extend between on one side the frame 4 and on the other side an additional member, such as the above mentioned additional frame member 4a. Alternatively, each of the cross members may comprise a proximal end portion and a distal end portion, said portions being interconnected by a downwardly protruding intermediate portion, which e.g., may be U-shaped. The intermediate portion may then form a certain percentage of the distance d. To each of the intermediate portions, one or more base members 100a-d may be attached such that they protrude downwardly from said portions and thereby form the remaining percentage of that distance. It is conceivable that the base 1 extending downwardly from the intermediate portions may be formed of a plurality of upright standing panels-shaped members that form a box-like or cross-like base structure, which box-like or cross-like base structure is connected to the one or more cross members. A box-like version will be discussed in more detail below.

[0079] Alternatively, the base 1 may also be formed as a portion of the respective cross member. What has been discussed in various levels of details above concerning the case where the base 1 is formed of one or more members, is equally applicable to the case where the base 1 is formed as a portion of the respective cross

member. The meaning of "formed as a portion of the cross member" may denote a cross member and a base being integrally formed by e.g., welding together the cross member and the base should the cross member and the base be made of a material suitable for welding. Generally, the frame, the one or more cross members, and the base may be formed by e.g., a roll-forming process or an extrusion process, followed by a cutting and/or bending process.

[0080] In the following, a box-like embodiment of the base 1 will be described in detail.

[0081] As illustrated in Figs. 2A-B, the base 1 comprises two opposing longitudinally extending side walls 10a-b and two opposing transversally extending side walls 20a-b. The side walls 10a-b, 20a-b are interconnected so as to form a box-like frame structure. While the boxlike base 1 is centrally arranged below the frame, it is also conceivable that an end portion of the boxlike frame structure may be configured to extend towards the head end of the bed. In such a case, the bed would still appear to be hovering while being provided with more support. One single unit of such a base 1 forming a box-like frame structure may support the bed. However, it is conceivable that a plurality of smaller box-like frame structures may be centrally arranged below the frame while still providing a bed support system 3 that appears to be hovering.

[0082] As seen in Figs. 2A-B, the base 1 is rectangular and the side walls 10a-b, 20a-b are perpendicular relative to reach other. The corners of the base 1 are sharp but it is conceivable that the corners may alternatively be e.g., rounded or chamfered. It is even conceivable that an outer portion of the respective corner is different from an inner portion of the respective corner. For instance, the outer portion may be chamfered or rounded while the inner portion may be sharp.

[0083] Although the side walls 10a-b, 20a-b of the base 1 forms a box-like frame structure, it is conceivable that the side walls 10, 20 may form a different shape. Preferably, the base 1 is a boxlike frame structure in order to scale to the dimensions of a conventionally shaped bed. However, beds may be of different shapes as well. For instance, beds may be circular. In such case, the base 1 comprises, instead of side walls 10a-b, 20a-b, a circular frame wall which forms a circular structure. It is even conceivable that the base 1 may be configured to support other furniture than beds, such as sofas.

[0084] The base 1 is symmetrical about a geometrical axis extending along the base 1 in the longitudinal direction L. However, it is conceivable that some beds are asymmetrically formed. In such a case, it is preferred that the base 1 is shaped similarly. In other word, in such a case, the base 1 may be asymmetrical.

[0085] As seen in Figs. 2A-B, the base 1 is provided with four support members 30. Each of the four support members 30 has a first extension FE between the two opposing longitudinally extending side walls 10a-b. Each of the four support members 30 has also a second extension SE in a direction transverse to the first extension

FE of the respective support members 30. The cross members 5 are configured to rest upon the thus shaped box-like base 1 and to be attached to upper support members 30. Preferably, the box-like base 1 is oriented such that the support members 30 to which the cross members 5 are attached extend along the same direction, which in the preferred embodiment is the first direction FD and which more preferably also coincides with the transversal direction T. The second extension SE is at least 5%, preferably 10%, of the first extension FE of the respective support member 30. The first extension FE may be said to be a main extension. By this, it is meant that the first extension FE is greater than the second extension SE. However, the second extension SE may in some circumstances be greater than the first extension FE. That second extension SE may thus be said to be the main extension instead. In Fig. 1A, each of the four support members 30 has a second extension SE being approximately 20% of the first extension FE of the respective support member 30.

[0086] Two of the support members 30 are arranged at an upper portion of the respective opposing transversally extending side wall 20a-b. The upper support members 30 are also arranged at an upper portion at the respective longitudinally extending side wall 10a-b. These support members may hereinafter be referred to as upper support members 30 unless nothing else is explicitly mentioned. Upper portion is to be interpreted as an upper portion of a height of the base 1 when the base 1 is configured to be used in its intended manner. By intended manner it is generally meant that the base 1 is arranged on top of a surface, such as a floor. Similarly, an intermediate respectively a lower portion is to be understood as intermediate respectively a lower portion of a height of the base 1 when the base 1 is configured to be used in its intended manner.

[0087] The two upper support members 30 are coplanar.

[0088] A transversally extending edge of each of the upper support members 30 abuts a respective opposing transversally extending side wall 20a-b. However, each of the upper support members 30 need not abut a respective opposing transversally extending side wall 20a-b. There may alternatively be a gap between each of the upper support members 30 and a respective opposing transversally extending side wall 20a-b. In such case, each of the upper support members 30 may be attached to and may abut a respective longitudinally extending side wall 10a-b.

[0089] A longitudinally extending edge of each of the upper support members 30 abuts a respective opposing longitudinally extending side wall 10a-b. However, each of the upper support members 30 need not abut a respective opposing longitudinally extending side wall 10a-b. There may alternatively be a gap between each of the upper support members 30 and a respective opposing longitudinally extending side wall 10a-b. In such case, each of the upper support members 30 may be attached

to and may abut a respective transversally extending side wall 20a-b.

[0090] It is even conceivable that an upper major surface of the respective upper support member 30 may be coated with a rubber-like coating in order to prevent twisting of the panel members 40 relative the base 1.

[0091] Two of the support members 30 are arranged at a lower portion of the respective opposing transversally extending side wall 20a-b. The lower support members 30 are also arranged at a lower portion at the respective longitudinally extending side wall 10a-b.

[0092] These may hereinafter be referred to as lower support members 30. The two lower support members 30 are coplanar.

[0093] A transversally extending edge of each of the lower support members 30 abuts a respective opposing transversally extending side wall 20a-b. However, each of the lower support members 30 need not abut a respective opposing transversally extending side wall 20a-b. There may alternatively be a gap between each of the lower support members 30 and a respective opposing transversally extending side wall 20a-b. In such case, each of the lower support members 30 may be attached to and may abut a respective longitudinally extending side wall 10a-b.

[0094] A longitudinally extending edge of each of the lower support members 30 abuts a respective opposing longitudinally extending side wall 10a-b. However, each of the lower support members 30 need not abut a respective opposing longitudinally extending side wall 10a-b. There may alternatively be a gap between each of the lower support members 30 and a respective opposing longitudinally extending side wall 10a-b. In such case, each of the lower support members 30 may be attached to and may abut a respective transversally extending side wall 20a-b.

[0095] Each of the respective upper and lower support members 30 extend between the same side walls 10a-b, 20a-b. In this particular case, each of the respective upper and lower support members 30 extend between the two opposing longitudinally extending side wall 10a-b.

[0096] It is even conceivable that a bottom major surface of the respective lower support member 30 may be coated with a rubber-like coating in order to prevent twisting of the base 1 relative the floor.

[0097] The base 1 may be provided with more or less than four support members 30. In other words, the base 1 may be provided with at least one support member 30. The support members 30 may be of different shapes and sizes. An intermediate portion of the base 1 may be provided with at least one support member 30. An intermediate support member 30 may in such case be arranged between an upper support member 30 and a lower support member 30 as seen along a height h of the base 1.

[0098] Alternatively, the base 1 may be provided with a single support member 30. It may in this context be noted

that a single support member 30 refers to a single piece of support member 30. The single support member 30 may extend from one opposing transversally extending side wall 20a-b to another opposing transversally extending side wall 20a-b. The single support member 30 may also extend from one opposing longitudinally extending side wall 10a-b to another opposing longitudinally extending side wall 10a-b.

[0099] The base 1 forms a through-going structure having two open ends. The single support member 30 may thus be designed so as to cover one of the open ends completely.

[0100] Alternatively, the single support member 30 may extend from one opposing longitudinally extending side wall 10a-b to another opposing longitudinally extending side wall 10a-b, while there is provided a gap between a respective opposing transversally extending side wall 20a-b and that portion of the support member 30 that is closest to said respective opposing transversally extending side wall 20a-b.

[0101] Alternatively, the single support member 30 may extend from one opposing transversally extending side wall 20a-b to another opposing transversally extending side wall 20a-b, while there is provided a gap between a respective opposing longitudinally extending side wall 10a-b and that portion of the support member 30 that is closest to said respective opposing longitudinally extending side wall 10a-b.

[0102] The single support member 30 is preferably arranged at an upper portion of the base 1. Alternatively, the single support member 30 may be arranged at any portions of the base 1. The single support member 30 may for instance be arranged at an intermediate portion of the base 1, or at a lower portion of the base 1. The base 1 may be provided with a plurality of single support members 30. For instance, the base 1 may be provided with two single support members 30 such that both of the open ends of the base 1 are covered with a respective single support member 30. By way of another example, the base 1 may be provided with two upper support members 30, each of which is arranged at an upper portion of a respective opposing transversally extending side wall 20, and a single support member 30 covering a lower open end of the base 1.

[0103] It is conceivable that the at least one support member 30 may be arranged diagonally. That is, the at least one support member 30 may extend from a corner portion of the base 1 to another opposing corner portion of the base 1. For instance, two support members 30 may be arranged diagonally and extend across each other such that a cross is formed.

[0104] The support members 30 are connected to, preferably mechanically attached, to a respective side wall 10a-b, 20a-b along the first extension FE of the respective support member 30.

[0105] The support members 30 may be attached to a respective side wall 10a-b, 20a-b in different ways. Each support member 30 may have, along an edge, a plur-

ality of dowels. Each of the dowel may be inserted into a respective recess of the side walls 10a-b, 20a-b. Alternatively, the side walls 10a-b, 20a-b may be provided with a plurality of dowels. In such a case, the support members 30 may be provided with recesses. Alternatively, each support member 30 may be glued onto the side walls 10a-b, 20a-b. Alternatively, each support member 30 may be attached to the side walls 10a-b, 20a-b by means of angle fittings/angle brackets/mounting brackets.

[0106] It is conceivable that the support members 30 may have an extension exceeding a distance between two opposing side walls of the opposing longitudinally and transversally extending side walls 10a-b, 20a-b. In order to attach the support members 30 to the base 1, said two opposing side walls 10a-b, 20a-b, or at least portions thereof, may be recessed hence allowing the support members 30 to fit. This is advantageous since no tools are necessary to attach the support members 30 to the base.

[0107] In the following, different embodiments of a bed unit 100, 200, 300 will be described in detail.

[0108] With reference to Figs. 3A-B, an embodiment of a bed unit 100 is shown. The bed unit 100 comprises at least one mattress 104 arranged on a bed support system 3 which in this embodiment is also referred to as bed support system 103. The bed support system 3 comprises a frame unit 4 and a base 1. The base 1 comprises a plurality of support members or legs 110a-d. The frame 4 may be said to form part of a frame unit 102 comprising peripheral frame members 150 also referred to as surrounding frame 4b above. The at least one mattress 104 may comprise a thicker first mattress that is arranged within a space formed between the frame members 150. On top of the first mattress a thinner second mattress is arranged. The second mattress may be said to be a mattress topper. The peripheral frame members 150 are wood-based. The surface of the peripheral frame members 150 are exposed hence revealing the wood-based material of the frame members 150. Alternatively, the surface of the peripheral frame members 150 may be covered, such as by a textile or the like, as discussed above.

[0109] With reference to Figs. 4A-B, an embodiment of a bed unit 200 is shown. The bed unit 200 comprises at least one mattress 204 arranged on a bed support system 203. The bed support system 203 comprises a frame 4 which is provided with cross members 5 and supported by a base 1. The base 1 comprises a plurality of support members or legs 100a-d. Compared to the embodiment shown in Figs. 3A-B, basically, the frame 4 has been enlarged along the first direction FD such that it is capable of supporting a set-up of mattresses where there is two mattresses side by side as the lower-most layer. A division line DL is formed between said lower-most mattresses. The respective cross member 5 extends across the division line DL. In this case it is preferred that there is an additional frame member 4a extending along the

second direction SD. The first or lower-most mattresses are arranged side by side. On top of the first mattresses a bigger second mattress is arranged. An in-plane extension of the second mattress is as big as that of the first mattresses as seen when the first mattresses are arranged side by side. A thickness, as seen along the height of the base 301, of the second mattress is similar to that of the first mattresses. On top of the second mattress a thinner third mattress is arranged. The third mattress may be said to be a mattress topper. It is conceivable that the second mattress may be omitted. Hence, a mattress topper may be arranged directly on top of the first mattresses. It may be noted that in Figs. 4A-B, the peripheral frame members 105 are omitted. In practice, there will typically be peripheral frame members 105 similar to what is shown in Figs. 3A-B. In this embodiment, it is preferred that the peripheral frame members 105 have a slightly greater height such that they hide the division between the lower-most mattresses.

[0110] With reference to Figs. 5A-B, an embodiment of a bed unit 300 is shown. The bed unit 300 comprises at least one mattress 304 arranged on a bed support system 303. The bed support system 303 comprises a frame 4 which is provided with cross members 5 and which is supported by a base 1. The base 1 comprises a plurality of support members or legs 100a-d 430. Basically, the frame 4 has the same configuration as disclosed with reference to Figs. 4A-B. On top of the frame 4 there is a single lower-most or first mattress having a size corresponding to the size of the frame 4. On top of the first mattress a second mattress is arranged. A thickness, as seen along the height of the base 401, of the second mattress is similar to that of the first mattress. On top of the second mattress a thinner third mattress is arranged. The third mattress may be said to be a mattress topper. It is conceivable that the second mattress may be omitted. Hence, a mattress topper may be arranged directly on top of the first mattress. It may be noted that in Figs. 5A-B, the peripheral frame members 105 are omitted. In practice, there will typically be peripheral frame members 105 similar to what is shown in Figs. 3A-B.

[0111] The person skilled in the art realizes that the present invention by no means is limited to the preferred embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

[0112] Each of the above embodiments of a bed unit 100, 200, 300 may comprise a bed support system 3 as discussed in various levels of details above.

[0113] Additionally, variations to the disclosed embodiments can be understood and effected by the skilled person in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these

measured cannot be used to advantage.

Claims

1. Bed support system (3) comprising:

a frame (4) formed of one or more frame members, the frame (4) being configured to extend along an outer perimeter of a bed and define a bed bottom plane, and being configured to support said one or more mattresses, one or more cross members (5), each cross member (5) extending in a respective first direction (FD) between two oppositely arranged portions of the frame (4), a base (1) which is formed as a portion of the respective cross member (5) or which is formed of one or more members (100a-d, 10a-b, 20a-b) attached to the respective cross member (5), the base defining a base footprint (1f), wherein the base (1) is configured to support the frame (4) and thereby support the bed and wherein the base (1) has a height (h) configured to provide a distance (d) between a floor and the bed, wherein in a second direction (SD), the second direction being transverse to the first direction (FD), the respective cross member (5) is positioned inwardly offset from the frame (4), and wherein in the base (1) is positioned retracted inwardly from the frame (4), in both the first and the second direction (FD, SD) such that an in-plane extension, preferably all in-plane extensions in all directions, defined by said bed bottom plane is greater than a corresponding in-plane extension, preferably all corresponding in-plane extensions, of the footprint (1f) of the base (1).

2. The bed support system (3) according to claim 1, wherein the in-plane extension in said at least one direction, preferably all in-plane extensions in all directions, of said base footprint (1f) is between 30% and 80%, preferably between 40% and 65%, of a corresponding in-plane extension, preferably all corresponding in-plane extensions, defined by said bed bottom plane.

3. The bed support system (3) according to claim 1, wherein the base (1) is formed as a protrusion protruding downwardly from the one or more cross members, preferably as a plurality of protrusions (100a-d), one in each corner of the base footprint (1f).

4. The bed support system (3) according to claim 3, wherein the protrusion forms at least 50%, preferably at least 75% of said distance (d).

5. The bed support system (3) according to any one of the preceding claims, wherein an upper portion of the respective one or more members (100a-d) of the base (1) is depressed or recessed such that a respective receptacle is formed in said upper portion of the respective one or more members (100a-d), wherein the respective receptacle is configured to receive the one or more cross members. 5
6. The bed support system (3) according to claim 5, wherein a height of each receptacle forms at least 25%, preferably at least 50% of a height of the respective one or more cross members (5). 10
7. The bed support system (3) according to any one of the preceding claims, wherein the respective cross member (5) is positioned under the frame (4) and configured to be connected to, preferably mechanically attached to, the frame (4) at at least two attachment points being separated from each other along an extension of the respective cross member (5). 15 20
8. The bed support system (3) according to any one of the preceding claims, wherein in the second direction (SD) the respective cross member (5) is positioned inwardly offset from the frame at least 10% of an extension of the frame (4) as seen in the second direction (SD). 25
9. The bed support system (3) according to any one of the preceding claims, wherein the frame (4) further comprises one or more additional frame members (4a) configured to extend in the second direction (SD) between two oppositely arranged portions of the frame (4). 30 35
10. The bed support system (3) according to claim 9, wherein the respective cross member (5) is configured to extend across one or more of the additional frame members (4a). 40
11. A bed unit (100; 200; 300) comprising at least one mattress (104; 204; 304) arranged on a bed support system (3) according to any one of claims 1-10. 45

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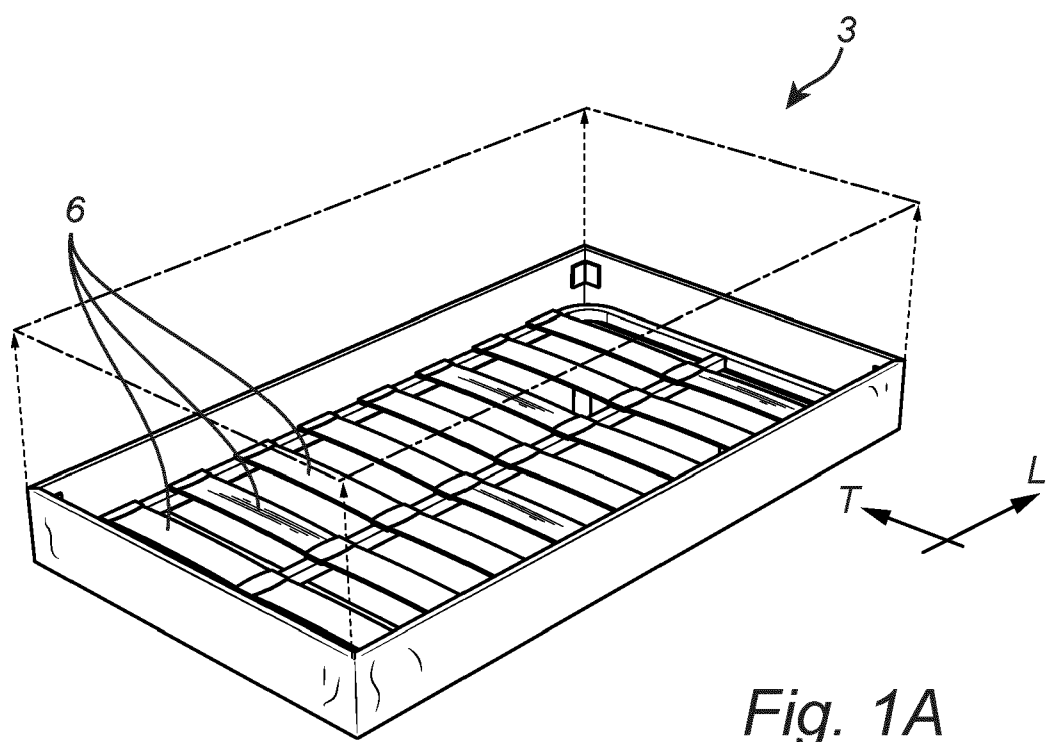


Fig. 1A

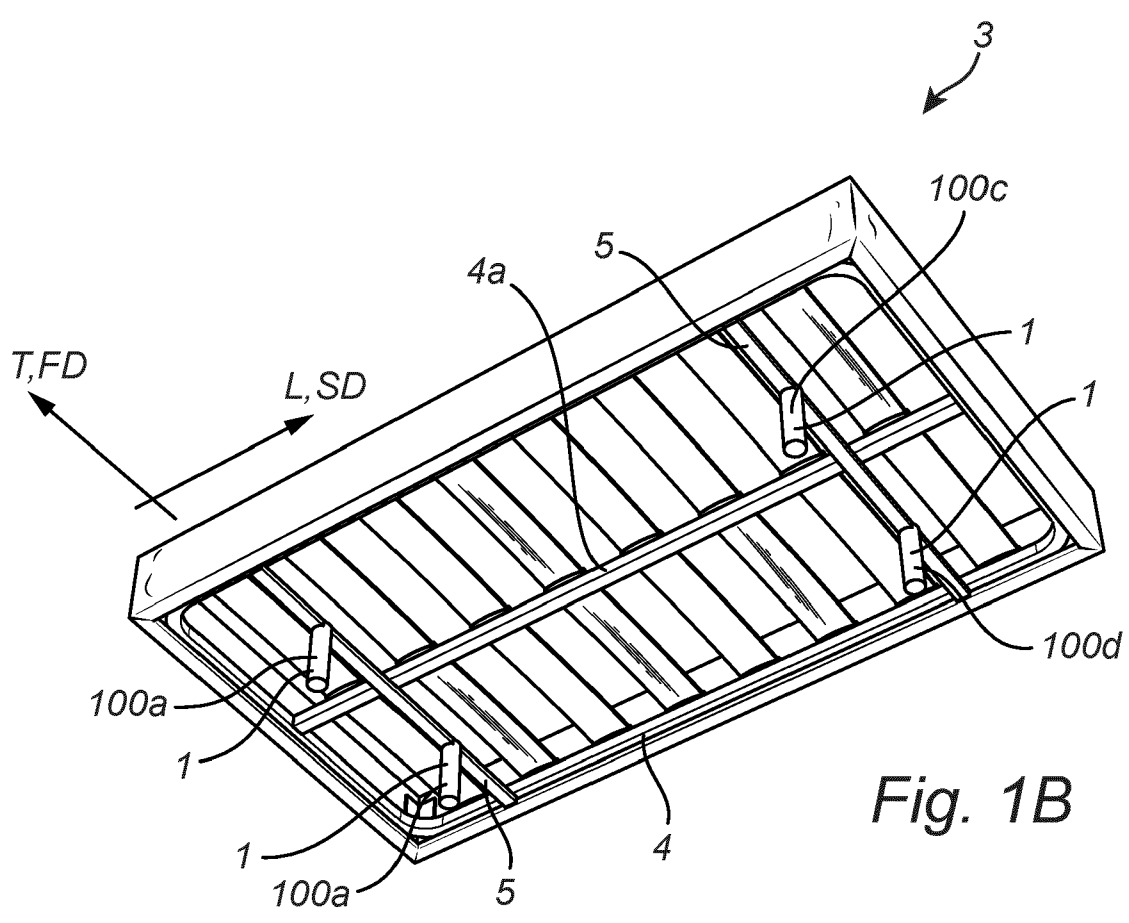


Fig. 1B

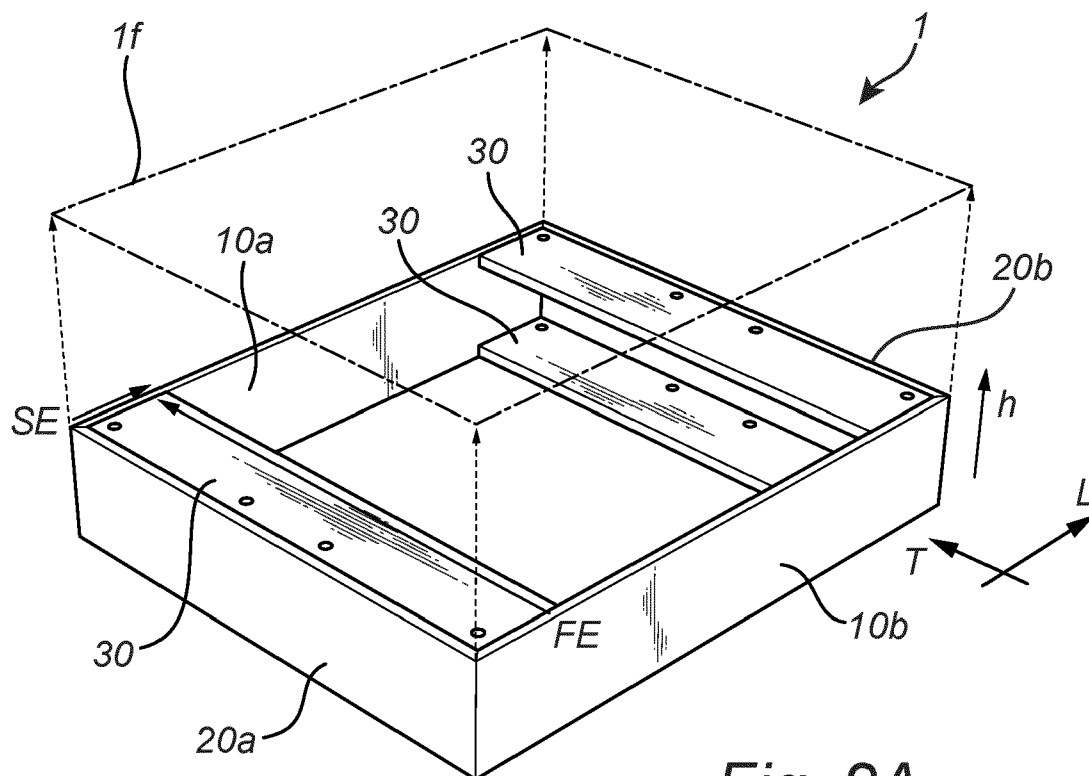


Fig. 2A

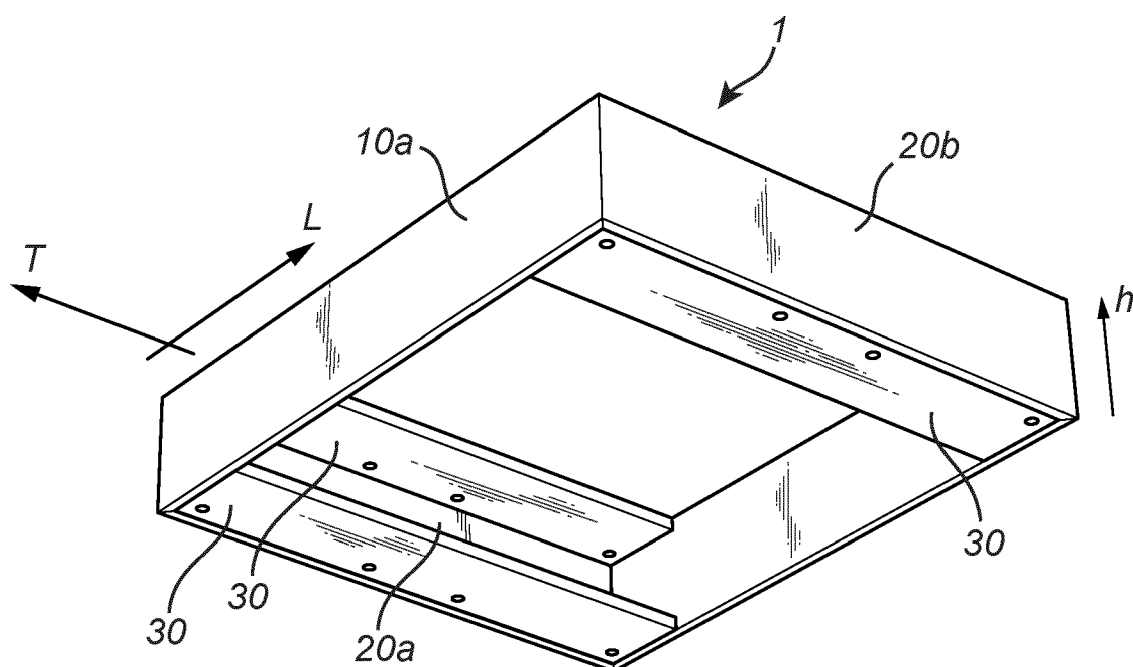
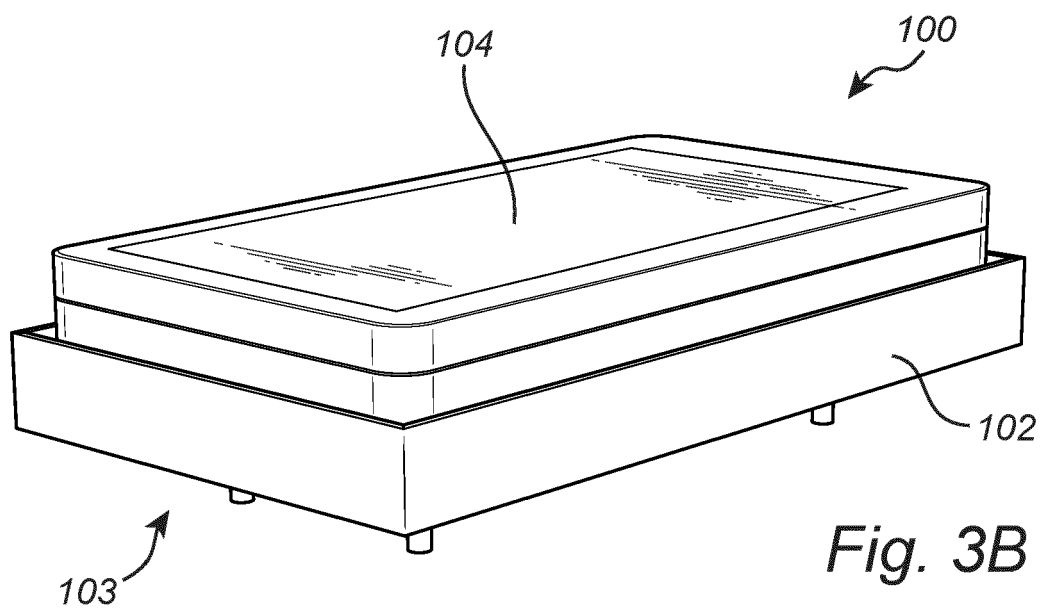
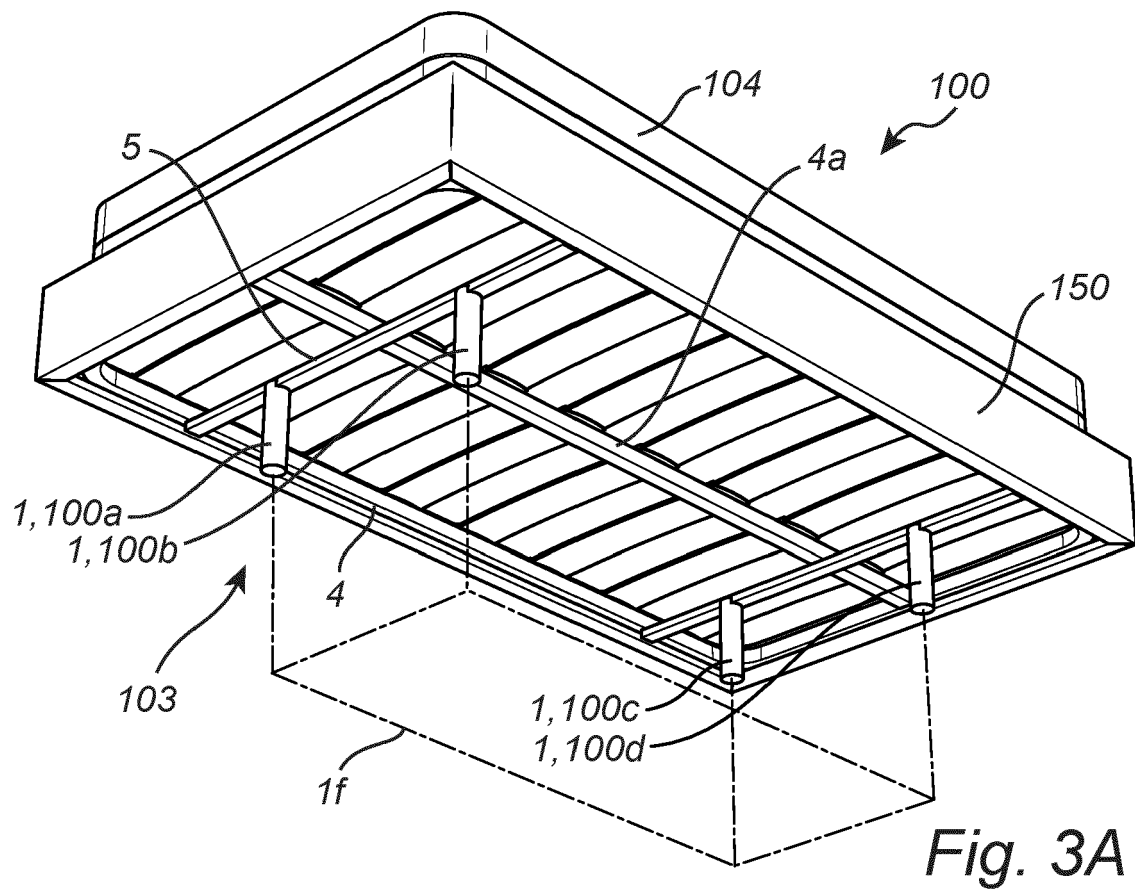
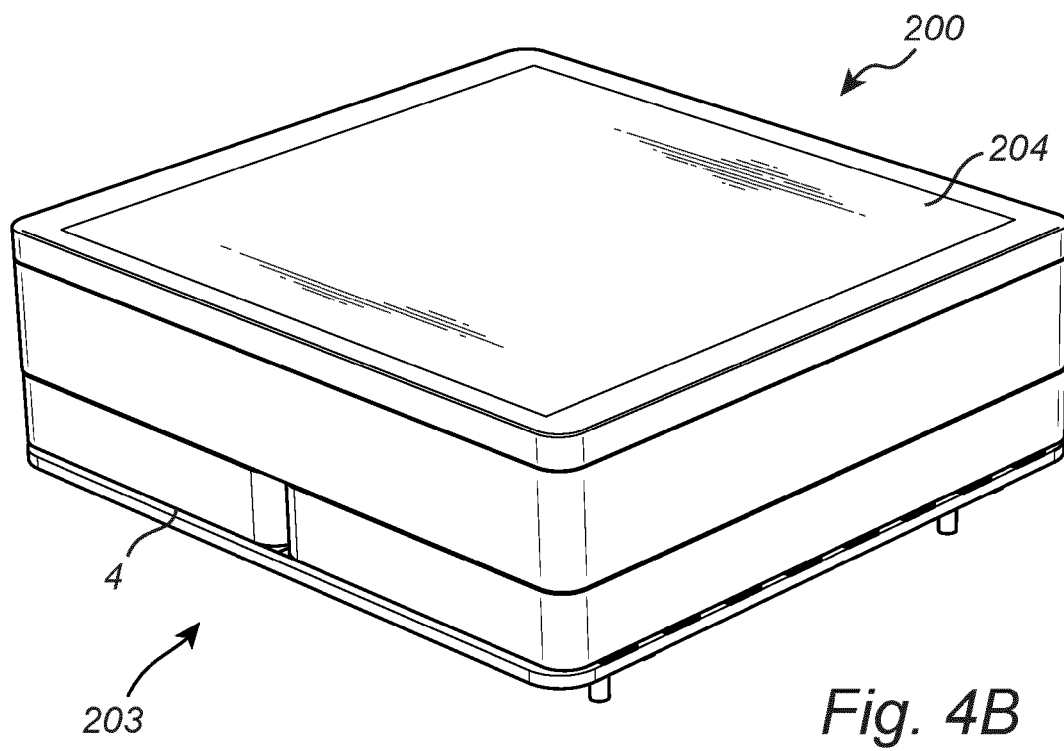
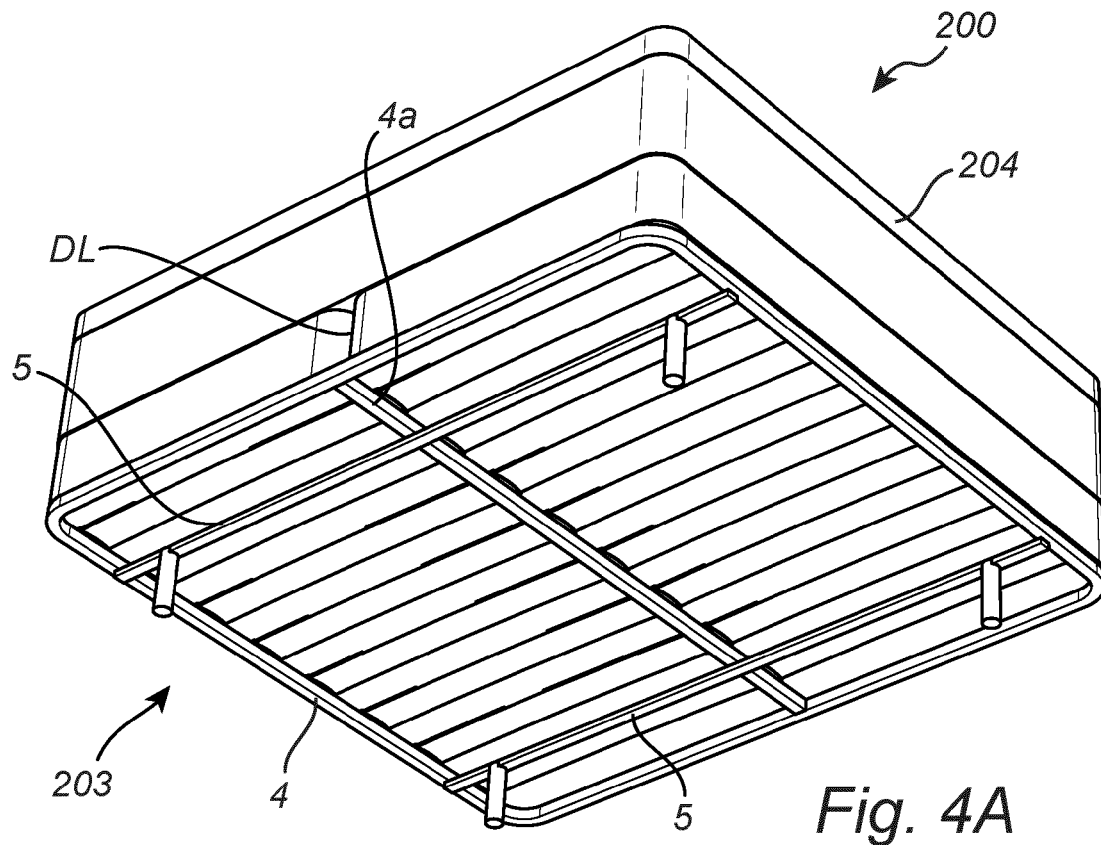
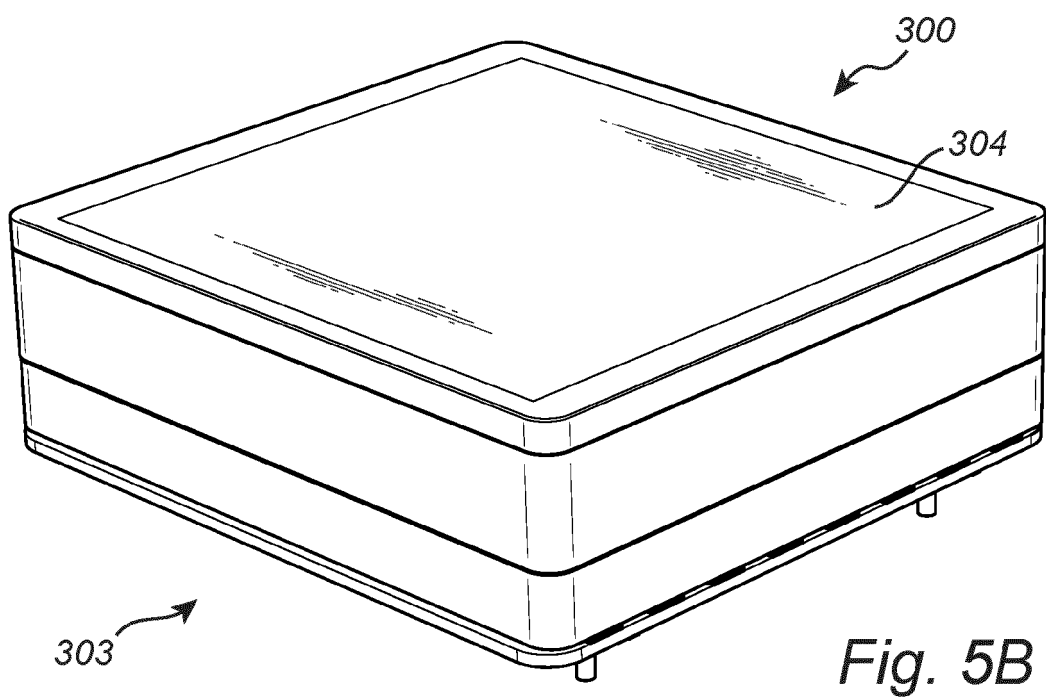
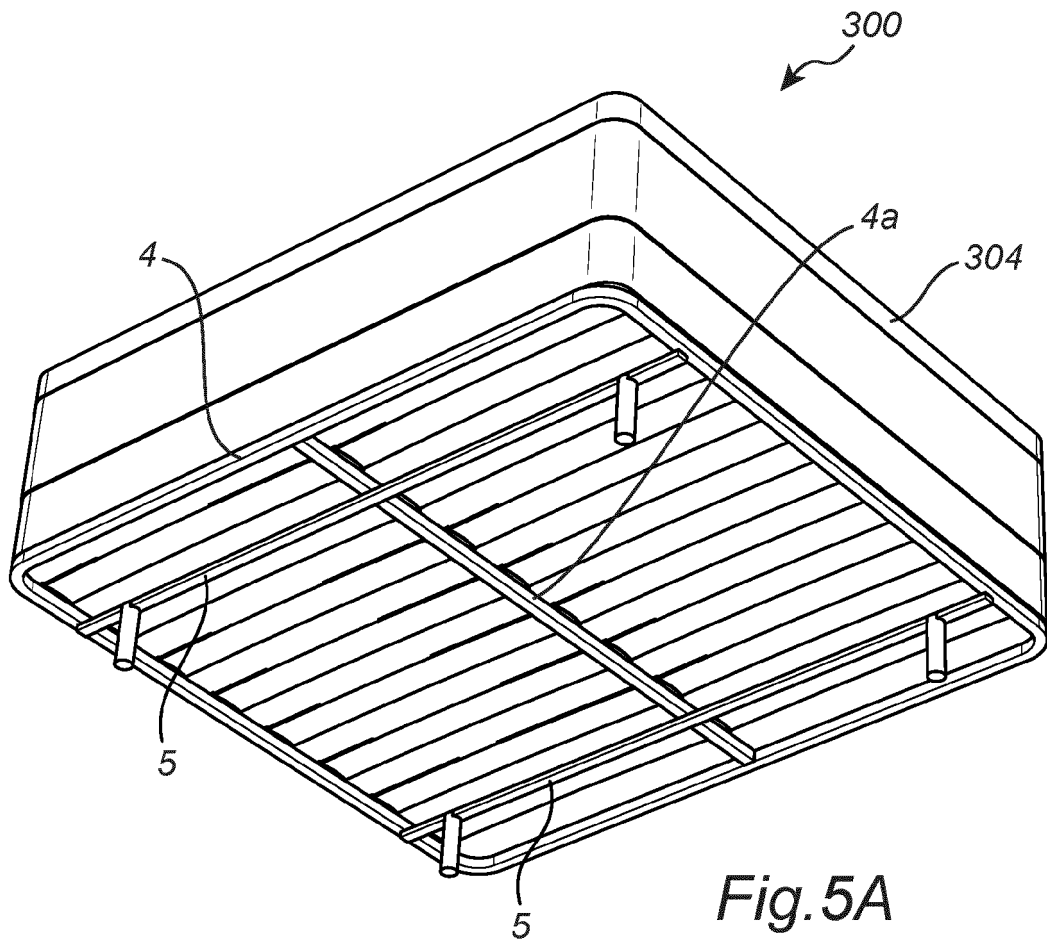


Fig. 2B









EUROPEAN SEARCH REPORT

Application Number

EP 23 19 5513

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 598 434 A (MIS FRANK J [US]) 8 July 1986 (1986-07-08) * column 2, line 55 - column 6, line 25; figures 1-23 *	1-4, 7, 8, 11	INV. A47C19/02
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X	US 2006/195982 A1 (CLOER NOAH M [US] ET AL) 7 September 2006 (2006-09-07) * paragraph [0021] - paragraph [0038]; figures 1-5 *	1-8, 11	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		14 February 2024	Kus, Slawomir
CATEGORY OF CITED DOCUMENTS			
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