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(54) **BALCONY**

(57) Various embodiments provide balconies for attachment to a building. In some embodiments, the balcony comprises a framework structure for supporting a decking and a balustrade, wherein the framework structure is adapted to receive and secure thereto at least two beams for attaching the balcony to the building. The framework structure further comprises a plurality of parallel and spaced apart joists spanning the framework structure in the width direction of the balcony and transverse to the beams, each joist having apertures sized and positioned to receive the beams. For each beam, a rear clamp and a front clamp are provided, each clamp being fixed to the framework

structure and engageable with the respective beam to secure the balcony to the building. For each beam, a series of standoffs are positioned intermediate the rear clamp and the front clamp and spaced from one another along the length of the beam in the depth direction of the balcony, each standoff being fixed to a respective one of the joists and adjacent to a respective one of the apertures through the joists and extending downwardly in the height direction. Each standoff has an engagement surface for bearing against the beam and each standoff is height-adjustable to maintain a height between the joist and the beam for load transfer from the joist to the beam.

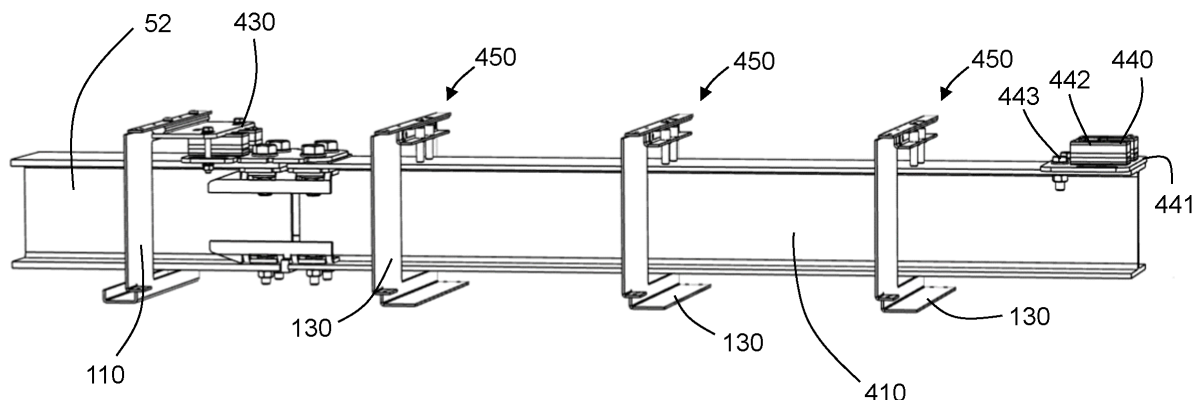


Fig. 10

Description

[0001] This application claims priority from GB 2310978.8 filed 18 July 2023, the contents and elements of which are herein incorporated by reference for all purposes.

Field of the Invention

[0002] The present invention relates to a balcony for buildings. Also disclosed are methods for attaching a balcony to a building and methods for the transportation of balconies.

Background

[0003] It is known to attach balconies to buildings, particularly residential buildings, in order to provide the occupants of the building above ground floor level an outdoor space. Suitable balconies may be provided in the form of balcony cassettes, optionally with a balustrade already fitted. The building is first constructed, typically leaving balcony attachment stubs or beams protruding from the exterior of the building. Subsequently, balcony cassettes, manufactured off-site, are lifted into position, supported on and secured to the attachment beams. The balcony cassettes typically have an arrangement of beams, joists or rafters which attach to the attachment beams and provide support for the balustrade, decking, fascia panels and soffits, and other components of the balcony. The balustrade, fascia panels, soffits and decking provide the balcony with its external appearance.

[0004] The attachment beams may be cantilevered from the building. In known balcony systems supplied to the market by the present applicant, the balcony cassettes are provided with one or more attachment beam receiving apertures, usually at the back of the balcony. The attachment beam receiving apertures correspond to respective attachment beams on the building so that the attachment beams can be passed through the attachment beam receiving apertures and into respective voids in the beams, joists or rafters which make up the structure of the balcony cassette. To secure the balcony to the one or more attachment beams, one or more clamping mechanisms are used. For example, two clamping mechanisms may be used to attach the balcony to each attachment beam, one close to the building and one further away from the building. As well as securing the balcony cassette to the attachment beams, the clamping mechanisms can be adjusted to ensure the balcony is level relative to the building. The clamping mechanisms may be adjusted using adjusters to ensure a secure attachment to the building.

Summary of the Invention

[0005] The present inventors have realised that

further significant improvements can be made to balconies that are for attachment to a building. It is of particular interest to further improve the mechanical properties of the balcony cassette in order to increase the efficiency of material use in the balcony cassette and/or to allow more flexibility in the design of the balcony in terms of its manner of attachment to the building. This creates in turn additional design options for the architect when designing the overall building.

[0006] The present invention has been devised in light of the above considerations.

[0007] In a first aspect, there is provided a balcony for attachment to a building, the balcony having a depth direction perpendicular to a face of the building to which the balcony is to be attached, a width direction perpendicular to the depth direction and parallel to the face of the building, and a height direction perpendicular to the depth direction and width direction and oriented upright when the balcony is attached to the building, wherein a rear of the balcony is for location adjacent the building and a front of the balcony projects from the building, the balcony comprising;

a framework structure;

at least two balcony beams parallel and spaced from each other along the width direction of the balcony, each balcony beam extending along the depth direction of the balcony and secured to the framework structure, wherein each balcony beam is attachable to a building beam secured to and projecting from the building using a load transfer assembly; and

for each balcony beam, the load transfer assembly comprising an upper plate and a lower plate fixed to opposing surfaces of the balcony beam or the building beam in the height direction, the upper plate and lower plate projecting therefrom to form a gap between the upper plate and lower plate for receipt of the other of the balcony beam or the building beam;

wherein for each load transfer assembly, when the balcony is attached to the building, a mechanical fastener secures the load transfer assembly to the other of the balcony beam or the building beam under double shear, the mechanical fastener passing through the top plate, the other of the balcony beam or building beam received in the gap, and the lower plate.

[0008] There is further provided a method of attaching the balcony of the first aspect to a building, the building comprising at least two building beams secured to and projecting from a face of the building, wherein for each building beam, the upper plate and the lower plate of the respective load transfer assembly of the balcony is fixed to opposing surfaces of the balcony beam or the building beam in the height direction of the balcony, the method including the step of:

lifting the balcony to a position in which each balcony beam is adjacent to the respective building beam and, for each load transfer assembly, the other of the balcony beam or the building beam is received by the gap formed by the load transfer assembly; and

attaching the balcony to the building by, for each load transfer assembly, passing the mechanical fastener through the top plate, the other of the balcony beam or building beam received in the gap, and the lower plate to secure the load transfer assembly to the other of the balcony beam or the building beam under double shear.

[0009] The inventors have realised that the double shear fixing through which the load is transferred between the balcony beams and the building beams provides a simplified and strengthened joint compared to known joints. The joint between the balcony beam and the building beam is strengthened when the main bolts that connect the two are under double shear. This provides a particular improvement in strength over bolts in a single shear loading configuration and avoids welded joints which are wholly reliant on the skill of the welder and which are difficult to check. It further prevents the balcony sagging (i.e., rotating) relative to the building.

[0010] In a second aspect, there is provided a balcony for attachment to a building, the balcony comprising:

a framework structure for supporting a decking and a balustrade, the balcony having a depth direction perpendicular to a face of the building to which the balcony is to be attached, a width direction perpendicular to the depth direction and parallel to the face of the building, and a height direction perpendicular to the depth direction and width direction and oriented upright when the balcony is attached to the building, wherein a rear of the balcony is for location adjacent the building and a front of the balcony projects from the building, wherein the framework structure is adapted to receive and secure thereto at least two beams for attaching the balcony to the building, the framework structure further comprising a plurality of parallel and spaced apart joists spanning the framework structure in the width direction of the balcony and transverse to the beams, each joist having apertures sized and positioned to receive the beams;

for each beam, a rear clamp and a front clamp, each clamp being fixed to the framework structure and engageable with the respective beam to secure the balcony to the building; and

for each beam, a series of standoffs positioned intermediate the rear clamp and the front clamp and spaced from one another along the length of the beam in the depth direction of the balcony, each standoff being fixed to a respective one of the joists

and adjacent to a respective one of the apertures through the joists and extending downwardly in the height direction, each standoff having an engagement surface for bearing against the beam and each standoff being height-adjustable to maintain a height between the joist and the beam for load transfer from the joist to the beam.

[0011] The inventors have realised that a series of height-adjustable standoffs may be provided between the joists spanning the framework structure and the beams (either protruding from the building or passing through the balcony for attachment to beams protruding from the building) to bear against the beam, intermediate clamping mechanisms engaged with the beam, thus maintaining a height between each joist and beam for load transfer from the joist to the beam. The load transferred from the joists to each beam is therefore distributed along the length of the beam rather than solely through the clamp mechanisms.

[0012] In a third aspect, there is provided a balcony for attachment to a building, the balcony comprising:

a framework structure for supporting a decking and a balustrade, the balcony having a depth direction perpendicular to a face of the building to which the balcony is to be attached, a width direction perpendicular to the depth direction and parallel to the face of the building, and a height direction perpendicular to the depth direction and width direction and oriented upright when the balcony is attached to the building, wherein a rear of the balcony is for location adjacent the building and a front of the balcony projects from the building;

a support arrangement disposed with respect to the framework structure for securely attaching the framework structure to the building to support the weight of the balcony and any load thereon; wherein the framework structure comprises:

a rear structural member,

a front structural member, and

a plurality of parallel intermediate joists disposed parallel to and between the rear structural member and the front structural member, each of the rear structural member, the front structural member, and plurality of parallel intermediate joists being formed from folded sheet metal and spanning a width of the framework structure and spaced from each other along the depth direction of the balcony;

a plurality of frontal noggins disposed forwardly of a foremost intermediate joist of the plurality of intermediate joists, the plurality of frontal noggins extending between and connecting the foremost intermediate joist to the front structural member; and

a plurality of rearward noggins extending be-

tween and connecting adjacent intermediate joists, wherein, between two adjacent intermediate joists selected from amongst the plurality of intermediate joists, there are fewer rearward noggins counted along the width of the balcony than frontal noggins counted between the foremost intermediate joist and the front structural member.

[0013] The inventors have realised that, when the joists extend across the width direction of the balcony, the number of noggins connecting adjacent joists may be reduced towards the rear of the balcony without significantly compromising the structural integrity of the balcony. This is because load from the balcony is transferred along the joists in the width direction of the balcony, and therefore some of the structural members extending along the depth direction of the balcony in previous balcony designs are no longer needed and therefore may be removed. This both saves material and reduces the weight of the balcony that must be supported by the building.

[0014] Some of the plurality of rearward noggins may also extend between and connecting the rear structural member and the adjacent intermediate joist.

[0015] The plurality of rearward noggins may be arranged to be aligned in the depth direction of the balcony. One of said frontal noggins may also be aligned with rearward noggins.

[0016] The support arrangement may be one of a glide-on support arrangement, a tie-on support arrangement, a clip-on support arrangement, a slide-on support arrangement and a stack on support arrangement.

[0017] The glide-on support arrangement may comprise at least two balcony beams received by apertures in the framework structure (i.e. apertures in one or more of the rear structural member and intermediate joists), each balcony beam secured to the framework structure near the front using a front clamp fixed to the framework structure and near the rear of the balcony using a rear clamp fixed to the framework structure. The balcony may therefore be attached to the building by securing each balcony beam to a respective attachment beam.

[0018] Alternatively, the glide-on support arrangement may comprise apertures in the framework structure (i.e. apertures in one or more of the rear structural member and intermediate joists) for receipt of at least two attachment beams. For each attachment beam, the framework structure comprises a rear clamp and a front clamp (each fixed thereto and) engageable with the attachment beam to secure the balcony to the building.

[0019] The decking may comprise a plurality of parallel decking boards oriented along the depth direction D of the balcony 10, each decking board fixed to the rear structural member, the front structural member, and each intermediate joist. Each decking board may ex-

tend rearward of the rear structural member to the face of the building and provide a cantilever support between the rear structural member and the face of the building.

[0020] In a fourth aspect, there is provided a method of transporting and attaching a plurality of balconies to a building, each balcony, when attached to the building, comprising: a framework structure and a balustrade supported by the framework structure and extending along at least two sides of the framework structure, the balustrade comprising at least two straight balustrade modules each corresponding to a respective side of the framework structure; the method comprising:

(a) providing a plurality of pre-assembly balcony units, each pre-assembly balcony unit comprising a plurality of straight balustrade modules and a framework structure;

(b) configuring the plurality of pre-assembly balcony units for transport, by laying the straight balustrade modules flat on top of each other or on top of the framework structure to reduce the cubic volume of the plurality of pre-assembly balcony units for transport;

(c) transporting the pre-assembly balcony units in the configuration of (b) on a national road network to a building site;

(d) at the building site, assembling the balconies by attaching the straight balustrade modules to the framework structures; and

(e) attaching the plurality of balconies to the building.

[0021] The inventors have realised that a balcony comprising a balustrade formed of straight balustrade modules may be long hauled (i.e., transported on a national road network) to a building site in a configuration in which the straight balustrade modules lie flat on top of each other or on top of the framework structure to reduce the cubic volume of the plurality of pre-assembly balcony units. This provides a more efficient and cost-effective method of transporting a plurality of such balconies. It may further allow increased design options, e.g. for an architect, and allow spare components to be transported to site to account for any damage during transportation.

[0022] Optionally, where for each balcony at least one of the straight balustrade modules is hinged to the framework structure, the method comprises configuring the plurality of pre-assembly balcony units for transport, by laying the at least one of the straight balustrade modules on the framework structure 100 and laying the other straight balustrade modules on top or beneath.

[0023] Optionally, the method comprises stacking the pre-assembly balcony units of each balcony together to allow a single balcony to be removed from the pre-as-

sembly balcony units in the configuration of (b).

[0024] The invention includes any combination of the aspects and/or optional features described except where such a combination is clearly impermissible or expressly avoided.

[0025] For example, some or all of the balcony beams and building beams may be I-beams. The load transfer assembly may therefore be fixed to opposing surfaces of an upper flange of the balcony beam or the building beam.

[0026] A guide plate may be fixed to a lower flange of said balcony beam or building beam to align the gap of the load transfer assembly with an upper flange of the other of the balcony beam or the building beam. This provides a convenient way to ensure that the beams easily align during the process of attaching the balcony to the building.

[0027] For each balcony beam or building beam with the load transfer assembly fixed thereto, where the upper flange is thinner than the upper flange of the other of the balcony beam or the building beam, the load transfer assembly may further comprise a plate disposed between the upper plate and an upward facing surface of the balcony beam or building beam. This can assist in ensuring that the gap is sized to receive the other of the balcony beam or the building beam.

[0028] For each balcony beam or building beam with the load transfer assembly fixed thereto, a spacer may be held in compression between the lower flange and a lower flange of the other of the balcony beam or the building beam when the balcony is attached to the building. The spacer may therefore take account of the gap formed between these lower flanges. The spacer may be formed of a resilient material.

[0029] The balcony may further comprise a rear clamp and a front clamp for each balcony beam. Each clamp may be fixed to the framework structure and engageable with the respective beam to secure the balcony to the building. In this way, the balcony beam may be assembled and held in the balcony even before attachment of the balcony to the building. This is a convenient approach to balcony construction since attachment to the building then only requires attachment of the building beam to the balcony beam at the rear end of the balcony beam. The rear end of the balcony beam may be disposed forwards of an aperture in a width-wise extending member of the balcony, such as a width-wise extending joist. For attachment to the building, the balcony is then lifted and presented to the building beams, which are slid through the apertures in order to be attached to the balcony beams.

[0030] The framework structure of the balcony may be adapted to receive the at least two balcony beams for attaching the balcony to the building. For example, the framework structure may comprise a plurality of parallel and spaced apart joists spanning the framework structure in the width direction of the balcony and

transverse to the balcony beams, each joist having apertures sized and positioned to receive the balcony beams.

[0031] The balcony may further comprise a series of standoffs for each balcony beam. The series of standoffs may be positioned intermediate the rear clamp and the front clamp and spaced from one another along the length of the balcony beam in the depth direction of the balcony. Each standoff may be fixed to a respective one of the joists. Each standoff may be fixed adjacent to a respective one of the apertures through the joists. Each standoff may extend downwardly in the height direction. Each standoff may have an engagement surface for bearing against the balcony beam. Each standoff may be height-adjustable to maintain a height between the joist and the beam for load transfer from the joist to the beam.

[0032] As indicated above, the balcony may comprise at least two beams. The at least two beams may be balcony beams received by and secured to the framework structure. Each balcony beam may be engaged by a corresponding rear clamp and a corresponding front clamp. Moreover, each balcony beam may be attachable to the building. Alternatively, the at least two beams may be building beams that protrude from the building. The at least two building beams may be received by the framework structure and secured thereto by the corresponding rear clamp and corresponding front clamp when the balcony is attached to the building.

[0033] The framework structure may comprise a plurality of parallel and spaced apart joists. Where the plurality of parallel and spaced apart joists of the framework structure comprise at least two joists intermediate the rear clamp and front clamp, each standoff may be fixed to a respective one of the at least two joists intermediate the rear clamp and front clamp, for each beam. Each standoff may be fixed to a bracket secured to the framework structure adjacent the corresponding aperture. Each standoff may comprise a first portion fixed to the bracket and a second portion rotatable with respect to the first portion, the second portion comprising the engagement surface adjustable to bear against the beam received through the respective aperture. It is found that this arrangement provides for convenient load transfer from the joists to the beams, while allowing adjustment by rotation of the second portions.

[0034] As indicated above, the balcony may be attached to a building. The method may further include the step of using a remote locking device to temporarily attach each load transfer assembly to the building, before passing the mechanical fastener through the top plate, the other of the balcony beam or building beam received in the gap, and the lower plate. The balcony may therefore be temporarily remotely secured to the building using the remote locking device, before each load transfer assembly is safely attached to the building using mechanical fasteners.

Summary of the Figures

[0035] Embodiments illustrating the principles of the invention will now be discussed with reference to the accompanying figures in which:

Figure 1 is a perspective view of an exemplary balcony according to the present invention secured to attachment beams of the building (not shown).

Figure 2 is another perspective view of the exemplary balcony of Figure 1.

Figure 3 is a schematic perspective view of a building with a series of balconies attached to the building.

Figure 4 is the same perspective view of Figure 2 with decking of the exemplary balcony removed to show the framework structure of the exemplary balcony.

Figure 5 is a plan view of the exemplary balcony of Figure 4 with soffits of the exemplary balcony removed to further show the framework structure.

Figure 6 is a perspective view of the framework structure seen in Figure 5.

Figure 7 is a perspective view of a portion of the framework structure seen in Figure 6, to show the support arrangement of the exemplary balcony.

Figure 8 is a perspective view of the balustrade unit of the exemplary balcony seen in Figure 4.

Figure 9 is a perspective view of the left-side module of the balustrade unit seen in Figure 8.

Figure 10 is another perspective view of the portion of the framework structure seen in Figure 7, to show the series of standoffs of the support arrangement.

Figure 11 is an enlarged view of a portion of Figure 8, to show one standoff of the series of standoffs.

Figure 12 is a perspective view of another portion of the support arrangement seen in Figure 7, near the front of the exemplary balcony and including the balustrade unit, to show the front clamp of the exemplary balcony.

Figure 13 is a side view of the portion of the support arrangement seen in Figure 12, without the foremost intermediate joist of the exemplary balcony.

Figure 14 is a perspective view of another portion of the support arrangement seen in Figure 7, before attachment to the building, to show the rear clamp of the exemplary balcony.

Figure 15 is a side view of the portion of the support arrangement seen in Figure 14.

Figure 16 is a perspective view of the portion of the support arrangement of Figure 14, after attachment to the building, to show the load transfer assembly of the exemplary balcony.

Figure 17 is a side view of the portion of the support arrangement seen in Figure 16.

Figure 18 is the perspective view of the portion of

the support arrangement seen in Figure 16, with components removed, to show the load transfer assembly in more detail.

Figure 19 is a side view of the portion of the support arrangement seen in Figure 18.

Figure 20 is a simplified view of another balcony according to the present invention with a tie-on support arrangement.

Figure 21 is a simplified view of another balcony according to the present invention with a clip-on support arrangement.

Figure 22 is a simplified view of another balcony according to the present invention with a slide-on support arrangement.

Figure 23 is a simplified view of another balcony according to the present invention with a stack support arrangement.

Figure 24 is a schematic perspective view of the series of balconies detached from the building and assembled.

Figure 25 is a schematic perspective view of the series of balconies configured in pre-assembly units.

Figure 26 is another schematic perspective view of the series of balconies in pre-assembly units.

Figure 27 is a schematic perspective view of the pre-assembly units in a first configuration for transportation.

Figure 28 is a schematic perspective view of the pre-assembly units in a second configuration for transportation.

Figure 29 is a schematic perspective view of the pre-assembly units in a third configuration for transportation.

Figure 30 is a schematic perspective view of the pre-assembly units in a fourth configuration for transportation.

Figure 31 is a schematic perspective view of the pre-assembly units in a fifth configuration for transportation.

Detailed Description of the Invention

[0036] Aspects and embodiments of the present invention will now be discussed with reference to the accompanying figures. Further aspects and embodiments will be apparent to those skilled in the art. All documents mentioned in this text are incorporated herein by reference.

[0037] As explained briefly above, it would be advantageous to further improve balconies that are for attachment to the building. In particular, it is of interest to further improve the mechanical properties of the balcony cassette in order to increase the efficiency of material use.

[0038] The present inventors considered this issue and have realised it is possible to improve load transfer through the balcony and to the building, to increase the

efficiency of material use in the balcony cassette without compromising structural integrity. Accordingly, in a general aspect, the present invention allows an increased efficiency of material use in a balcony for attachment to a building.

[0039] Figure 3 shows a schematic view of a building 50 with a series of such balconies 10 attached to a face 55 of the building 50. As will be understood, in practice, the building 50 may have a more complex configuration than shown and there may be more balconies attached and balconies may be attached to more than one side of the building.

[0040] As shown in Figure 3, the building 50 has a height direction H_{building} , which is the vertical direction. Each balcony 10 also has a height direction H , which is also the vertical direction. Each balcony 10 has a depth direction D perpendicular to the face 55 of the building 50. Each balcony 10 has a width direction W perpendicular to the depth direction D , parallel to the face 55 of the building 50, and extending from the left-side to the right-side of the balcony 10. The height direction H of each balcony 10 is perpendicular to the depth direction D and width direction W and oriented substantially vertically when the balcony 10 is attached to the building 50. A rear of each balcony 10 is for location adjacent the building 50 and a front of each balcony 10 projects from the building 50.

[0041] An exemplary balcony 10 of the present invention is seen in Figures 1 and 2 and will be discussed in detail below. For the sake of efficiency, the same reference numbers are used for similar or identical features as seen in different drawings and embodiments, and certain features may be indicated and described with reference to one drawing or embodiment only.

[0042] Figures 1 and 2 show different views of the exemplary balcony 10. The front of the balcony 10 is facing obliquely towards the viewer in Figure 1, and the rear of the balcony 10 is facing obliquely towards the viewer in Figure 2. To clarify the orientation of the balconies 10 seen in Figures 1, 2 and 3; the height direction H , depth direction D and width direction W of the balconies 10 are shown.

[0043] As shown in Figure 2, the balcony 10 is attached to a pair of attachment beams 52 fixed to the building 50 (not shown). The connection between the balcony 10 and each attachment beam 52 is shown in Figure 10 and will be discussed below. Referring back to Figure 2, the attachment beams 52 are parallel and spaced from each other along the width direction W of the balcony 10, and (while not shown) protrude from the face 55 of the building 50 along the depth direction D of the balcony 10.

[0044] Any suitable method of fixing each beam 52 to the building 50 may be used, such as the beam 52 being bolted to a main structure of the building 50 or fixed with respect to a concrete slab of the building via cast-in anchors. In alternative embodiments of the present invention, the beams 52 may comprise three or

more beams 52. The beams 52 may also protrude from more than one side of the building 50. Moreover, each beam 52 may extend in any direction across a plane defined by the width direction W and the depth direction D of the balcony 10, when the balcony 10 is attached to the building 50.

[0045] The balcony 10 has a framework structure 100 for supporting decking 200, a balustrade 300, a fascia panel 500 and soffits 600. When the balcony 10 is attached to the building 50, the framework structure 100 is covered by decking 200 (on the top), by a fascia panel 500 (around the sides), by soffits 600 (on the underside), and by the face 55 of the building 50 as shown in Figures 1 and 2.

[0046] The framework structure 100 is shown in Figures 4 to 7. Figure 4 is a perspective view of the balcony 10, as seen in Figure 2 but without decking 200. Figure 5 is a plan view of the same balcony 10 further without soffits 600. Figure 6 is a perspective view of the balcony 10, as seen in Figure 5, without a balustrade unit. Figure 7 is a perspective view of the right-side of the framework structure 100 seen in Figure 6 showing how the framework structure 100 is configured to fix to a balustrade unit 340 (shown in Figure 8) that includes the balustrade 300, the fascia panel 500 and the soffits 600.

[0047] The framework structure 100 comprises four continuous and parallel joists 110, 130 (i.e. rafters) that span the balcony 10 along the width direction W . These include a rear structural member 110 (near the rear of the balcony 10), and three intermediate joists 130 that are disposed towards the front of the balcony 10 relative to the rear structural member 110. These joists 110, 130 are connected and spaced apart along the depth direction D of the balcony 10 by rearward noggins 150 that run along the depth direction D of the balcony 10. A front structural member 120 (seen in Figures 4 and 5) spans the balcony 10 along the width direction W and is spaced from a foremost one of the intermediate joists 130 (i.e. a foremost joist 131) along the depth direction D . A series of frontal noggins are fixed to the front structural member 120, such that they are parallel and spaced apart from each other along the width direction W of the balcony 10 and project along the depth direction D of the balcony 10. As shown in Figure 5, there are two rearward noggins 150 between each adjacent joist 110, 120 and 8 frontal noggins 140 between the foremost joist 131 and the front structural member 120.

[0048] The rear structural member 110, the front structural member 120, each intermediate joist 130, each frontal noggin 140, and each rearward noggin 140 are formed by folding of sheet metal such as aluminium. The rear structural member 110, the front structural member 120, and each intermediate joist 130 is folded to provide an upright surface for fixing decking 200 to the framework structure 100. The rear structural member 110 and each intermediate joist 130 is further folded to provide a downward facing surface

for fixing soffits 600 to the framework structure 100. As best seen in Figure 7, the rear structural member 110 and each intermediate joist 130 is further cut and folded, at each end along the width direction W of the balcony 10, to provide a slot and a second downward facing surface to secure the balustrade unit 340 to the framework structure 100. Each frontal noggin 140 is folded to provide an upright surface and a downward facing surface for fixing the balustrade unit 340 to the framework structure 100, and a rearward facing surface for fixing the frontal noggin 140 to the foremost intermediate joist 131. As will be discussed below, the front structural member 120 is both part of the balustrade unit 340 and the framework structure 100 and is secured to the upright surface of each frontal noggin 140. Each rearward noggin 150 is folded to provide a surface at each end (along the depth direction D of the balcony 10) for fixing each rearward noggin 150 to the respective rear structural member 110 and/or intermediate joists 130. Each rearward noggin 150 is further folded to provide a surface at the top and bottom (along the height direction H of the balcony 10).

[0049] The decking 200 (seen in Figure 2) is formed of a plurality of parallel decking boards 210 oriented along the depth direction D of the balcony 10 that are fixed to each upward facing surface of the rear structural member 110, the front structural member 120, and each intermediate joist 130 using mechanical fixings 230. Any load acting on the decking 200 (including the decking boards and closers) is therefore transferred to the rear structural member 110, the front structural member 120, and each intermediate joist 130 of the framework structure 100 that are orientated along the width direction W of the balcony 10, via the upright surfaces.

[0050] The plurality of decking boards 210 further allows greater flexibility of door recess infills because the length of each decking board (corresponding to the depth direction D of the balcony 10) can be adjusted to ensure a flush fit with the building 50. Consequently, they extend across the door reveal (i.e. a gap between the framework structure 100 and the door recess) to provide cantilever support between the rear of the balcony 10 and the building 50. A substructure and door cills are therefore not required. Moreover, narrow gaps are formed between adjacent boards to drain rainwater off the decking 200.

[0051] Decking closers 220 are fixed at the left-side and right-side of the plurality of decking boards 200 (along the width direction W of the balcony 10). Each decking closer is an L-shaped bracket formed of sheet metal, with protrusions that engage with slots in the balustrade unit 340 and apertures near the other end that engage with the mechanical fixings 230 securing the adjacent decking board to the framework structure 100. They allow whole decking boards to be used regardless of the overall width of the balcony 10 by adjusting a width of each decking closer 220 (which corre-

sponds to the width direction W of the balcony 10 when installed) to ensure that the decking 200 covers the entire upper surface of the framework structure 100 without having to machine the width of any decking boards.

[0052] Soffits 600 conceal the lower surface of the framework structure 100 and form a drainage system to drain any rainwater that has passed through the decking 200 and the framework structure 100, out of the balcony 10. They are fixed to the second downward facing surface of the rear structural member 110, each intermediate joist 130, and each frontal noggin 140 of the framework structure 100. Ends of the soffits 600 (near the left-side and right-side of the balcony 10) are also fixed to a lower surface formed by the balustrade unit 340, which itself is fixed to the second downward facing surface of the rear structural member 110 and each intermediate joist 130. The soffits 60 are sloped downwards from the rear to the front of the balcony 10 to drain any rainwater out through a drainage gap at the front of the balcony 10. In alternative embodiments, the soffits 600 may drain the rainwater in other directions. For example, the soffits 600 may curve upwards towards a centre of the balcony 10 to drain the rainwater out of the sides of the balcony 10, or drain towards the rear of the balcony where drainage pipes (not shown) may be provided at the face of the building.

[0053] As shown in Figures 8 and 9, the balustrade unit 340 is formed of three modules that each extend along a respective side of the balcony 10: a left-side module 350, a front-side module 360, and a right-side module 370. Each module 350, 360, 370 comprises a portion of the balustrade 300, a portion 354, 364, 374 of the fascia panel 500, an upper member 352, 362, 372 and a lower member 356, 366, 376.

[0054] The upper members 352, 372 of the left-side and right-side modules 350, 370 define slots along the depth direction D of the balcony that engage with the decking closers 220 to fix the decking closers 220 to the balcony 10, and are fixed within the slot in the rear structural member 110 and each intermediate joists 130 to fix the modules 350, 370 to the framework structure 100. The lower members 356, 376 of the left-side and right-side modules 350, 370 are fixed to the second downward facing surface of the rear structural member 110 and each intermediate joist 130 to secure the balustrade unit 340 to the framework structure 100. As mentioned above, the lower members 356, 376 of the left-side and right-side modules 350, 370 further define the lower surface fixed to the soffits 600 at the left-side and right-side of the balcony 10.

[0055] The upper member 362 of the front-side module 360 (i.e. the front structural member 120) has apertures to fix the framework structure 100 to a support arrangement 400, and is fixed to the upper surface of each frontal noggin 140. The lower member 366 of the front-side module 360 is fixed to the lower surface of each frontal noggin 140.

[0056] Each upper member 352, 362, 372 and each lower member 356, 366, 376 is fixed to the respective portion of the fascia panel 500. Respective bars 310 and a portion of the handrail 320 (i.e. a portion of the balustrade 300) are fixed to a portion of the fascia panel 500. As the fascia panel 500 is fixed between the balustrade 300 and the framework structure 100, the sides of the framework structure 100 are covered when the balustrade unit 340 is constructed and fixed to the framework structure 100.

[0057] The balustrade unit 340 is constructed by fixing the upper members 352, 362, 372, the lower members 356, 366, 376, and the portions of the balustrade 300 (i.e. each portion of the handrail 320) of adjacent modules 350, 360, 370 together. Once the balustrade unit 350 is constructed, the upper members 352, 362, 372 and lower members 356, 366, 376 are fixed to the framework structure 100 to form the balcony 10 as discussed above.

[0058] The present invention is not limited to a railing balustrade, and in alternative embodiments, the balustrade 300 may comprise any one or a combination of the railing balustrade, a glass system (e.g. laminated glass), stress skin panels, and a panel system. Moreover, in alternative embodiments, the fascia panel 500 and/or the balustrade 300 may be split into fewer or more than 3 segments. The fascia panel 500 and/or the handrail 320 may be a continuous, for example.

[0059] As seen in Figure 6, the framework structure 100 is supported by a support arrangement 400 that includes a pair of balcony beams 410 extending through voids in the framework structure 100, that are secured to the balcony 10 using clamping mechanisms 430, 440. In the exemplary embodiment, both the balcony beams 410 and the attachment beams 52 are I-beams. In alternative embodiments of the present invention, other beams, such as box beams, may be used.

[0060] The pair of beams 410 are parallel and spaced on either side of the balcony 10 (i.e. near the left-side and right-side) for securely attaching the framework structure 100 to the building 50. The load on the decking 200, transferred to the framework structure 100, is therefore transferred to the beams 410 by the clamping mechanisms 430, 440 near the left-side and right-side of the balcony 10. Advantageously, because the load from the decking 200 is transferred to structural members 110, 120, 130 running along the width direction W of the balcony 10 towards the support arrangement 400, the structural integrity of the balcony is not compromised by having fewer rearward noggins 150 counted along the width direction W of the balcony 10 between two adjacent joists 110, 130 than frontal noggins 140 counted between the foremost joist 131 and the front structural member. The use of material in the framework structure 100 and the balcony is therefore made more efficient by the use of fewer rearward noggins than frontal noggins.

[0061] In Figure 10, the right-side of the framework structure 100 of Figure 6 is shown. The mechanical fixings 230 for fixing decking 200 to the framework structure 100 have been removed from the view, and the components are viewed more from the front of the balcony 10 compared to Figure 7 to show the support arrangement 400 relating to the balcony beam 410 on the right-side of the balcony 10. Some components of the clamping mechanism 440 near the front of the balcony 10 are not shown in Figure 10 and are instead shown as part of the balustrade unit 350 in Figure 8. As seen in Figure 6, the support arrangement 400 relating to the balcony beam 410 on the left-side of the balcony is identical. As such, the features described above and/or below apply equally to the identical components.

[0062] Each balcony beam 410 extends along the depth direction D of the balcony 10 through an aperture 135 in each intermediate joist 130 and is secured to a respective attachment beam 52 that extends through an aperture 115 in the rear structural member 110. Note that Figures 14 and 15 omit the attachment beam 52, to assist with explanation.

[0063] For each balcony beam 410, standoffs 450 are spaced from one another intermediate the clamping mechanisms 430, 440.

[0064] Figure 11 shows a detailed view of the standoffs between one of the intermediate joists 130 and the beam 410 seen in Figure 8. As seen in Figure 10, the standoffs between each intermediate joist 130 and the beam 410 are identical.

[0065] In the embodiment, there are two standoffs spaced apart from each other along the width direction W of the balcony 10 at each intersection of an intermediate joist and beam. Here, a C-shaped bracket 460 is fixed adjacent to the aperture 135 of the joist 130 (using a pair of mechanical fasteners 462). Each standoff comprises a first portion 451 fixed (i.e. riveted) to the C-shaped bracket 460; and a second portion 455 that is capable of being moved relative to the first portion 451 and has an engagement surface 456 that bears against the beam 410. Each standoff is therefore fixed to the joist 130 adjacent the aperture 130 and extends downwardly in the height direction H of the balcony 10 to bear against an upper surface 412 of the balcony beam 410 extending through the aperture 130.

[0066] For each standoff, the first portion 451 and the second portion 455 have complementary threads to allow the second portion 455 to move along the height direction H of the balcony 10 relative to the first portion 451 (and, as such, relative to the intermediate joist 130). A screw head 457 of the second portion 455 may therefore be rotated to raise or lower the second portion 451 relative to the first portion to bear the engagement surface 456 against the beam 410. Each standoff is individually adjustable to ensure that the engagement surface 456 bears against the beam 410 and that a height between the intermediate joist 130 and the

balcony beam 410 is maintained for load transfer from the intermediate joist to the beam 410.

[0067] The load on the decking 200, transferred to the framework structure 100 as discussed above, is therefore also transferred from each intermediate joist 130 to the balcony beams 410 by the series of stand-offs 450 in addition to the clamping mechanisms 430, 440. The load transferred from the framework structure 100 to the balcony beam 410 is therefore more evenly spread along the balcony beam 410 in the depth direction D of the balcony 10.

[0068] In an alternative embodiment, in which the framework structure 100 is secured directly to attachment beams 52 that extend between and connect to the rear structural member 110 and the front structural member 120 (as with balconies 10 discussed in the background), the series of standoffs 450 bear against each attachment beam 52 to maintain the height between each intermediate joist 130 (through which the attachment beam 52 passes) and the attachment beam 52 for load transfer between the intermediate joist 130 and the attachment beam 52.

[0069] As mentioned above, each balcony beam 410 is secured to the framework structure 100 using clamping mechanisms 430, 440. More specifically, each balcony beam 410 is secured to the framework structure 100 near the front of the balcony 10 using one clamping mechanism (i.e. a front clamp 440) and near the rear of the balcony 10 using another clamping mechanism (i.e. a rear clamp 430). Herein, any reference to clamping or a clamp refers to any mechanism that is suitable for securing the framework structure 100 to the balcony beam 410. There is no requirement for either the framework structure 100 or the balcony beam 410 to be directly clamped themselves.

[0070] In Figures 12 and 13, the front clamp 440 corresponding to the balcony beam 410 positioned on the right-side of the balcony 10 is shown. The front clamp 440 corresponding to the balcony beam 410 positioned on the left-side of the balcony 10 is not shown because it is identical. Figure 12 shows a perspective view of the front clamp 440 and Figure 13 shows a side view of the front clamp 440.

[0071] Each front clamp 440 comprises a lower plate 441 fixed to the balcony beam 410 using a pair of mechanical fasteners 443. This lower plate 441 has a pair of slots extending along the depth direction D of the balcony 10 (i.e. along the length of the beam 410) that each receive a respective mechanical fastener 447 on either side of the beam 410 along the width direction W of the balcony 10. The lower plate 441 further supports a set of spacers 442 that determines the height between the beam 410 and the front structural member 120 of the framework structure 100. The height may therefore be adjusted by replacing the set of spacers 442, or by adding or removing one or more spacers of the set of spacers 442.

[0072] Each front clamp 440 further comprises an

upper plate 444 fixed to the front structural member 120 using a pair of mechanical fasteners 449. These mechanical fasteners 449 pass through a dampener 446 disposed (i.e. sandwiched) between the front structural member 120 and the upper plate 444, and are concealed in a recess in the upper plate 444. The upper plate 444 has a pair of slots extending along the width direction W of the balcony 10 (i.e. perpendicular to the slots of the lower plate 441) that receive the mechanical fastener 447.

[0073] Thus, for each front clamp 440, the lower plate 441 is fixed to the upper plate 444 by the pair of mechanical fasteners 447. The lower plate 441 and the upper plate 444 are parallel to one another and spaced apart (along the height direction H of the balcony 10) by the set of spacers 442 that are clamped between the lower plate 441 and the upper plate 444. Each balcony beam 410 is therefore secured to the framework structure 100 near the front of the balcony 10.

[0074] In Figures 14 and 15, the rear clamp 430 corresponding to the balcony beam 310 positioned on the right-side of the balcony 10 is shown. Figure 14 shows a perspective view of the rear clamp 430 and Figure 15 shows a side view of the rear clamp 430. The attachment beam 52 and corresponding mechanical fasteners have been removed from these Figures. As such, the balcony 10 is shown before attachment to the building 50. The rear clamp 430 corresponding to the balcony beam 410 positioned on the left-side of the balcony 10 is not shown because it is identical.

[0075] Each rear clamp 430 comprises a lower plate 471 fixed to the balcony beam 410 using a pair of mechanical fasteners 474. This lower plate 471 has a pair of slots extending along the depth direction D of the balcony 10 (i.e. along the length of the beam 410) that each receive a respective mechanical fastener 437 on either side of the beam 410 along the width direction W of the balcony 10. The lower plate 471 further supports a set of spacers 432 that determines the height between the beam 410 and the rear structural member 110 of the framework structure 100. The height may therefore be adjusted by replacing the set of spacers 442, or by adding or removing one or more spacers of the set of spacers 442.

[0076] Unlike each front clamp 440, each rear clamp 430 has a thin plate 479 disposed (i.e. sandwiched) between the lower plate 471 and the balcony beam 410 to account for the difference in thickness between an upper flange of the balcony beam 410, and an upper flange of the attachment beam 52 (not shown). This is, as will be discussed below, to form a gap 473 with a thickness (along the height direction H of the balcony 10) that is equal to or larger than the thickness of the upper flange of the attachment beam 52 (again, along the height direction H). In alternative embodiments, in which the balcony beam 410 and the attachment beam 52 are identical in cross-section, the thin plate 479 is not required.

[0077] Moreover, unlike each front clamp 440, the lower plate 471 of each rear clamp 430 comprises a pair of apertures, positioned rearward of mechanical fasteners 433 and the balcony beam 410 along the depth direction D of the balcony 10. As will be discussed below, these apertures allow the balcony beam 410 to be attached to the attachment beam (not shown).

[0078] Each rear clamp 430 further comprises an upper plate 434 fixed to the rear structural member 110 of the framework structure 100 using a pair of mechanical fasteners 439. These mechanical fasteners 439 pass through a dampener 436 disposed (i.e. sandwiched) between the rear structural member 110 and the upper plate 434, and are concealed in a recess in the upper plate 434. The upper plate 434 has a pair of slots extending along the width direction W of the balcony 10 (i.e. perpendicular to the slots of the lower plate 471) that receive the mechanical fastener 437.

[0079] Thus, for each rear clamp 430, the lower plate 471 is fixed to the upper plate 434 such that they are parallel to one another and spaced apart (along the height direction H of the balcony 10) by the set of spacers 432 clamped between the lower plate 471 and the upper plate 434. Each balcony beam 410 is therefore secured to the framework structure 110 near the rear of the balcony 10.

[0080] The relative position of each balcony beam 410 and the framework structure 100 may be adjusted in the width direction W and/or depth direction D of the balcony 10 using the slots in the front clamps 430 and the rear clamp 440. Combined with the height between the framework structure 100 and each balcony beams 410 being adjustable (by adjusting the set of spacers 432, 442), misalignment between attachment beams 52 of the building 50 may be accounted for using the clamping mechanisms 430, 440.

[0081] As mentioned above, the lower plate 471 of each rear clamp 430 has apertures for attaching the balcony 10 to the building 50. The connection between the balcony 10 and the building 50 (i.e. a load transfer assembly 470) will now be discussed with reference to Figures 14 to 19, which show the load transfer assembly 470 near the rear of the balcony 10, on the right-side. The load transfer assembly near the left-side of the balcony 10 is not shown because it is identical.

[0082] Figures 14 and 15 show the load transfer assembly 470 before attachment to the attachment beams of the building (not shown). Figures 16 and 17 show corresponding views of the load transfer assembly 470 after attachment to attachment beams 52. Figures 18 and 19 are similar to Figures 16 and 17 respectively, with components removed to show mechanical fasteners 474 used to connect the balcony 10 to the building 50 in a double shear loading configuration.

[0083] In Figures 14 and 15, the lower plate 471 of each rear clamp 430 can be considered the upper plate 471 of the load transfer assembly 470 attached to the

balcony beam 410. In the exemplary balcony 10, each load transfer assembly 470 therefore shares components with the rear clamp 430. The connection between the framework structure 100, the support arrangement 400 and the attachment beams 52 is therefore simplified.

[0084] Each load transfer assembly 470 further comprises a lower plate 472, disposed below the upper plate 471 along the height direction H of the balcony 10, and parallel and spaced from the upper plate 471 along the height direction H to form the gap for receipt of the attachment beam 52. The lower plate 472 is positioned symmetrically about a web of the balcony beam 410 and is folded to provide: a surface extending along the depth direction D of the balcony 10 over which the attachment beam 52 can slide, and a pair of flanges at the left-side and right-side (relative to the balcony 10) that extend along the height direction H to prevent nuts of the mechanical fasteners 471, 474 spinning when being fastened.

[0085] The balcony 10 may therefore be attached to the building 50 using each load transfer assembly 470 by sliding the balcony onto the attachment beams 52 such that the upper flange of each attachment beam 52 is received in the gap 473, and fixing each load transfer assembly 470 to the attachment beam 52 using mechanical fasteners 474. The mechanical fasteners 474 pass through the upper plate 471, the upper flange of the attachment beam 52, and the lower plate 472 to fix each balcony beam 410 to the attachment beam 52 in a double shear loading configuration. In alternative embodiments, the balcony beam 410 may be attached to the attachment beam 52 in a double shear loading configuration, in which a mechanical fastener passes through the upper plate 471, the upper flange of the balcony beam 410, and the lower plate 472.

[0086] A remote locking device such as that disclosed in WO/2021/175416, the entirety of which is incorporated herein by reference, may be temporarily attached to the balcony 10 before and during attachment to ensure a safe installation. For example, once the balcony 10 has been positioned onto the attachment beams 52 of the building 50, the remote locking device can be used to remotely drive a shaft through one of the apertures for receipt of a mechanical fastener 474 that will be placed in a double shear loading configuration. The balcony 10 is therefore secured to the building 50 by the remote locking device while the adjacent mechanical fastener 474 is installed. The remote locking device may then be removed from the aperture install the other mechanical fastener 474 therethrough.

[0087] It will be recognised that alternative and operationally equivalent remote temporary fastening solutions may be used in the light of the present disclosure and the disclosure of WO/2021/175416.

[0088] As seen in Figures 18 and 19, when the balcony 10 is attached to the attachment beams 52, a horseshoe shaped spacer 476 may be disposed be-

tween each balcony beam 410 and attachment beam 52 to expand the gap 473 to allow the balcony 10 to be easily slid onto the attachment beams 52 during installation. The opening of each horseshoe shaped spacer 476 is facing the web of the balcony beam 410 to allow its removal during installation (without removing the mechanical fasteners 433, 474) to ensure the gap 473 corresponds to the thickness of the flange of the attachment beam 52 once the mechanical fasteners 433, 474 are tightened. Alternatively, the horseshoe shaped spacers 476 may be retained providing the gap 473 corresponds to the thickness of the flange of the attachment beam 52 (i.e. providing the horseshoe shaped spacers 476 are disposed about both mechanical fasteners 433, 474 as seen in the Figures).

[0089] Each load transfer assembly 470 further comprises a guide plate 475 disposed parallel and spaced below the lower plate 472 along the height direction H of the balcony 10. The guide plate 475 is positioned symmetrically about the web of the balcony beam 410 and is folded to provide: a surface extending along the depth direction D of the balcony 10 over which the attachment beam 52 can slide, and a pair of flanges at the left-side and right-side (relative to the balcony 10) that extend along the height direction H to prevent nuts of the mechanical fasteners 478 spinning when being fastened.

[0090] The load transfer assembly 470 therefore receives part of the perimeter of the cross-section of the attachment beam 52, allowing the attachment beam 52 to be slid in during attachment of the balcony 10 to the building 50. Each lower plate 472 and guide plate 475 can further have a tapered leading-edge near the rear of the balcony 10 to further aid installation.

[0091] Each load transfer assembly 470 comprises a spacer 477 that is held in compression between the lower flange of each balcony beam 410 and the attachment beam 52, and below the guide plate 475. It acts to dampen vibrations bridging the balcony 10 and the building 50, and prevents damage to the beams 52, 410. In the present invention, the spacer is adhered to the balcony beam 410 as shown in Figures 14 and 15. In alternative embodiments, it may be manually disposed between the beams 52, 410 during installation and held in place solely by the compressive force. Alternatively, it may be adhered to any one of the guide plate 475, the balcony beam 410, and the attachment beam 52.

[0092] As discussed above, one advantage of the present invention is that the load from the decking 200 is transferred to structural members 110, 120, 130 running along the width direction W of the balcony 10 towards the support arrangement 400. It is also of particular interest to allow more flexibility in the design of the balcony in terms of its manner of attachment to the building. The present inventors have considered this issue and have realised that it is possible to provide a balcony according to the general aspect with different

support arrangements.

[0093] The support arrangement of the exemplary balcony 10 is known as a glide-on support arrangement 400. In alternative embodiments of the present invention, other support arrangements 400 may be used to support the rear and the front of the balcony 10 attached to the building 50. They may be disposed near the left-side and right-side of the balcony 10 to benefit from the efficient load transfer between the decking 200 and the structural members 110, 120, 130 of the framework structure 100 running along the width direction W of the balcony 10. These alternate arrangements include but are not limited to a tie-on support arrangement, a clip-on support arrangement, a slide-on support arrangement, and a stack support arrangement as shown in Figures 20 to 23. A range of support arrangements may therefore be used where better resistance to bomb blast and seismic action is required.

[0094] Figure 20 shows a simplified view of the balcony 10 with a tie-on arrangement 2400, as viewed from the front of the balcony 10. On both the left-side and the right-side of the balcony 10, the front of the balcony 10 is connected to a rod 2410 (using a standard connection 2420) that extends upwards towards the building 50. The rod 2410 may be connected to the rear of another balcony 10 positioned above and fixed thereto using a standard connection 2430a (as illustrated on the left-side of the balcony 10, seen on the right of Figure 20). Alternatively, where an adequate strong point exists, the rod 2410 may be secured to a bracket 2430b fixed to the building 50 at the height of the handrail (not shown) (as illustrated on right-side of the balcony 10 (see on the left of Figure 20). In both embodiments, the rear of the balcony 10 is fixed to the building 50 using a standard connection 2440.

[0095] Figure 21 shows a simplified view of the balcony 10 with a clip-on support arrangement 3400, as viewed from the front of the balcony 10. Here, a frame with a structural skin is fixed to both the left-side and right-side of the balcony 10. The frame is connected to the structural members extending along the width direction W of the balcony 10 (i.e., the rear structural member 110, the front structural member 120, and each intermediate joists 130). On both sides, the frame is secured to a pair of hooks fixed to the building 50, and that are spaced apart along the height direction H of the balcony 10.

[0096] Figure 22 shows a simplified view of the balcony 10 with a slide-on support arrangement 4400, as viewed from the front of the balcony 10. Here, the balcony 10 comprises a recess 4410 at both the left-side and right-side of the balcony 10. In alternative embodiments, the balcony 10 may comprises recesses 4410 in both ends (i.e. the left-side and right-side of the balcony 10). Each recess connects to lugs 4420 secured to the building that provide shear support to the balcony 10. This support arrangement 4400 is suitable for balconies 10 inset into the face 55 of the building 50.

[0097] Figure 23 shows a simplified view of the balcony 10 with a stack support arrangement 5400, as viewed from the front of the balcony 10. Here, the balcony 10 is supported at posts 5410 at each front corner and is supported by a standard connection at each rear corner 5420. Alternatively, each rear corner may be supported by a post fixed to the face 55 of the building 50. This support arrangement 5400 is suitable for low rise developments.

[0098] In further considering the issue of allowing more flexibility in the design of the balcony, the present inventors have realised that it is possible to configure the balcony for efficient transportation between the factory and the building site via a national road network. They have further realised the advantage is amplified when transporting a plurality of such balconies.

[0099] As discussed above, the balustrade unit 340 (and, as such, each of the balustrade 300 and fascia panel 500) is formed of three modules that each run along a side of the balcony 10: the left-side module 350, the front-side module 360, and the right-side module 370. Each module is straight and flat (relative to the balcony 10), as seen in the exemplary embodiment of Figures 4 and 8, and may therefore be configured in a more space efficient manner than the fully assembled balcony 10.

[0100] Figure 24 is a schematic illustration of three of such balconies 10 for transportation and attachment to a building 50. Each comprising the balustrade unit 300 supported by the framework structure 100, the balustrade unit 300 extending along three sides 190 of the framework structure 100 and formed of the three straight modules 350, 360, 370 corresponding to a left-side, front and right-side of the balcony 10 respectively.

[0101] Figure 25 is a schematic illustration of the same balconies 10 in pre-assembly units including the framework structure 100, and each straight module 350, 360, 370. In other words, the balcony 10 is separated into pre-assembly units that are easy to assemble at the building site.

[0102] Figure 26 shows the pre-assembly units for the plurality of balconies 10 arranged in an exploded view. Here, the pre-assembly units are uncollated (i.e. each pre-assembly unit of the plurality of balconies 10 are grouped before the groups of pre-assembly units are stacked on each other). The pre-assembly units are collated when the pre-assembly units of each of the plurality of balconies 10 are stacked on each other.

[0103] With the balconies 10 in pre-assembly units, the balcony 10 may be configured to save space during transportation. Several exemplary configurations of the pre-assembly units for transport are shown in Figures 27 to 31. It is not an exhaustive list of configurations and any configuration that reduces the space required to transport the plurality of balconies 10 may be used.

[0104] In Figure 27, the pre-assembly units are uncollated with the left-side modules 350 and right-side modules 370 of the plurality of balconies 10 stacked

together and placed on a stack of front-side modules 360 of the plurality of balconies 10, all of which is stacked on a stack of framework structures 100 of the plurality of balconies 10.

[0105] In Figure 28, the modules 350, 360, 370 of the plurality of balconies 10 are stacked together, as in Figure 27, however they are not stacked on the stack of framework structures 100. The pre-assembly units for the balustrade units 300 may therefore be transported separately from the framework structures 100.

[0106] In Figure 29, the left-side module 350, the right-side module 370 and the framework structure 100 of each balcony 10 are stacked together, and the stack of pre-assembly units for each balcony 10 of the plurality of balconies 10 are stacked on one another in a collated configuration. This allows each balcony 10 to be removed from the stack at once. Moreover, for each balcony 10, the left-side modules 350 and the right-side modules 370 may be hinged to the framework structure 100.

[0107] In Figure 30, the front module 360 and the framework structure 100 of each balcony 10 are stacked together. Therefore, the front module 360 may be hinged to the framework structure 100, with the left-side modules 350 stacked together and right-side modules 370 stacked together, and both stacks placed on a stack of pre-assembly units comprising the front module 354 and the framework structure 100 of each balcony 10 hinged to one another and stacked in a compact configuration.

[0108] As seen in Figure 31, the front module 360 and the framework structure 100 of each balcony 10 are stacked together. However, the right-side module 370 and the left-side module 350 are stacked on the front-unit 354 of the respective balcony 10. The plurality of balconies 10 are therefore stacked in a collated configuration, so that one balcony 10 can be removed from e.g. the bed of a lorry, without having to move the pre-assembly units around.

[0109] The features disclosed in the foregoing description, or in the following claims, or in the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for obtaining the disclosed results, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

[0110] While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention.

[0111] For the avoidance of any doubt, any theoretical explanations provided herein are provided for the

purposes of improving the understanding of a reader. The inventors do not wish to be bound by any of these theoretical explanations.

[0112] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described. 5

[0113] Throughout this specification, including the claims which follow, unless the context requires otherwise, the word "comprise" and "include", and variations such as "comprises", "comprising", and "including" will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps. 10

[0114] It must be noted that, as used in the specification and the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by the use of the antecedent "about," it will be understood that the particular value forms another embodiment. The term "about" in relation to a numerical value is optional and means for example +/- 10%. 20 25

[0115] In the following numbered "clauses" are set out statements of broad combinations of novel and inventive features of the present invention herein disclosed. 30

1. A balcony for attachment to a building, the balcony having a depth direction perpendicular to a face of the building to which the balcony is to be attached, a width direction perpendicular to the depth direction and parallel to the face of the building, and a height direction perpendicular to the depth direction and width direction and oriented upright when the balcony is attached to the building, wherein a rear of the balcony is for location adjacent the building and a front of the balcony projects from the building, the balcony comprising; 35 40

a framework structure;

at least two balcony beams parallel and spaced from each other along the width direction of the balcony, each balcony beam extending along the depth direction of the balcony and secured to the framework structure, wherein each balcony beam is attachable to a building beam secured to and projecting from the building using a load transfer assembly; and 45 50

for each balcony beam, the load transfer assembly comprising an upper plate and a lower plate fixed to opposing surfaces of the balcony 55

beam or the building beam in the height direction, the upper plate and lower plate projecting therefrom to form a gap between the upper plate and lower plate for receipt of the other of the balcony beam or the building beam; wherein for each load transfer assembly, when the balcony is attached to the building, a mechanical fastener secures the load transfer assembly to the other of the balcony beam or the building beam under double shear, the mechanical fastener passing through the top plate, the other of the balcony beam or building beam received in the gap, and the lower plate.

2. The balcony of clause 1, wherein each balcony beam and building beam is an I-beam, and each load transfer assembly is fixed to opposing surfaces of an upper flange of the balcony beam or the building beam.

3. The balcony of clause 2 wherein, for each balcony beam or building beam with the load transfer assembly fixed thereto, a guide plate is fixed to a lower flange of said balcony beam or building beam to align the gap of the load transfer assembly with an upper flange of the other of the balcony beam or the building beam.

4. The balcony of clause 2 or 3 wherein, for each balcony beam or building beam with the load transfer assembly fixed thereto, the upper flange is thinner than the upper flange of the other of the balcony beam or the building beam, the load transfer assembly further comprises a plate disposed between the upper plate and an upward facing surface of the balcony beam or building beam so the gap is sized to receive the other of the balcony beam or the building beam.

5. The balcony of one of clauses 2 or 3, wherein for each balcony beam or building beam with the load transfer assembly fixed thereto, a spacer is held in compression between the lower flange and a lower flange of the other of the balcony beam or the building beam when the balcony is attached to the building.

6. The balcony of any preceding clause further comprising, for each balcony beam, a rear clamp and a front clamp, each clamp being fixed to the framework structure and engageable with the respective beam to secure the balcony to the building.

7. The balcony of clause 6 wherein the framework structure is adapted to receive the at least two balcony beams for attaching the balcony to the building, the framework structure comprising a plurality

of parallel and spaced apart joists spanning the framework structure in the width direction of the balcony and transverse to the balcony beams, each joist having apertures sized and positioned to receive the balcony beams.

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8. The balcony of clause 7 further comprising, for each balcony beam, a series of standoffs positioned intermediate the rear clamp and the front clamp and spaced from one another along the length of the balcony beam in the depth direction of the balcony, each standoff being fixed to a respective one of the joists and adjacent to a respective one of the apertures through the joists and extending downwardly in the height direction, each standoff having an engagement surface for bearing against the balcony beam and each standoff being height-adjustable to maintain a height between the joist and the beam for load transfer from the joist to the beam.

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9. A method of attaching a balcony according to any one of clauses 1 to 8 to a building, the building comprising at least two building beams secured to and projecting from a face of the building, wherein for each building beam, the upper plate and the lower plate of the respective load transfer assembly of the balcony is fixed to opposing surfaces of the balcony beam or the building beam in the height direction of the balcony, the method including the step of:

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lifting the balcony to a position in which each balcony beam is adjacent to the respective building beam and, for each load transfer assembly, the other of the balcony beam or the building beam is received by the gap formed by the load transfer assembly; and

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attaching the balcony to the building by, for each load transfer assembly, passing the mechanical fastener through the top plate, the other of the balcony beam or building beam received in the gap, and the lower plate to secure the load transfer assembly to the other of the balcony beam or the building beam under double shear.

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10. The method of clause 9, wherein a remote locking device is used to temporarily attach each load transfer assembly to the building, before passing the mechanical fastener through the top plate, the other of the balcony beam or building beam received in the gap, and the lower plate.

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11. A balcony for attachment to a building, the balcony comprising:

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a framework structure for supporting a decking

and a balustrade, the balcony having a depth direction perpendicular to a face of the building to which the balcony is to be attached, a width direction perpendicular to the depth direction and parallel to the face of the building, and a height direction perpendicular to the depth direction and width direction and oriented upright when the balcony is attached to the building, wherein a rear of the balcony is for location adjacent the building and a front of the balcony projects from the building, wherein the framework structure is adapted to receive and secure thereto at least two beams for attaching the balcony to the building, the framework structure further comprising a plurality of parallel and spaced apart joists spanning the framework structure in the width direction of the balcony and transverse to the beams, each joist having apertures sized and positioned to receive the beams;

for each beam, a rear clamp and a front clamp, each clamp being fixed to the framework structure and engageable with the respective beam to secure the balcony to the building; and

for each beam, a series of standoffs positioned intermediate the rear clamp and the front clamp and spaced from one another along the length of the beam in the depth direction of the balcony, each standoff being fixed to a respective one of the joists and adjacent to a respective one of the apertures through the joists and extending downwardly in the height direction, each standoff having an engagement surface for bearing against the beam and each standoff being height-adjustable to maintain a height between the joist and the beam for load transfer from the joist to the beam.

12. The balcony of clause 11 wherein the at least two beams are balcony beams received by and secured to the framework structure, each balcony beam engaged by a corresponding rear clamp and a corresponding front clamp, each balcony beam attachable to the building.

13. The balcony of clause 11 or 12 wherein the at least two beams are building beams that protrude from the building, the at least two building beams received by the framework structure and secured thereto by the corresponding rear clamp and corresponding front clamp when the balcony is attached to the building.

14. The balcony of any one of clauses 11 to 13 wherein the plurality of parallel and spaced apart joists of the framework structure comprise at least two joists intermediate the rear clamp and front clamp, and each standoff is fixed to a respective

one of the at least two joists intermediate the rear clamp and front clamp, for each beam.

15. The balcony of any one of clauses 10 to 14 wherein each standoff is fixed to a bracket secured to the framework structure adjacent the corresponding aperture, and wherein each standoff comprises a first portion fixed to the bracket and a second portion rotatable with respect to the first portion, the second portion comprising the engagement surface adjustable to bear against the beam received through the respective aperture.

Claims

1. A balcony for attachment to a building, the balcony comprising:

a framework structure for supporting a decking and a balustrade, the balcony having a depth direction perpendicular to a face of the building to which the balcony is to be attached, a width direction perpendicular to the depth direction and parallel to the face of the building, and a height direction perpendicular to the depth direction and width direction and oriented upright when the balcony is attached to the building, wherein a rear of the balcony is for location adjacent the building and a front of the balcony projects from the building, wherein the framework structure is adapted to receive and secure thereto at least two beams for attaching the balcony to the building, the framework structure further comprising a plurality of parallel and spaced apart joists spanning the framework structure in the width direction of the balcony and transverse to the beams, each joist having apertures sized and positioned to receive the beams; for each beam, a rear clamp and a front clamp, each clamp being fixed to the framework structure and engageable with the respective beam to secure the balcony to the building; and for each beam, a series of standoffs positioned intermediate the rear clamp and the front clamp and spaced from one another along the length of the beam in the depth direction of the balcony, each standoff being fixed to a respective one of the joists and adjacent to a respective one of the apertures through the joists and extending downwardly in the height direction, each standoff having an engagement surface for bearing against the beam and each standoff being height-adjustable to maintain a height between the joist and the beam for load transfer from the joist to the beam.

2. The balcony of claim 1 wherein the at least two beams are balcony beams received by and secured to the framework structure, each balcony beam engaged by a corresponding rear clamp and a corresponding front clamp, each balcony beam being attachable to the building.
3. The balcony of claim 1 wherein the at least two beams are building beams that protrude from the building, the at least two building beams received by the framework structure and secured thereto by the corresponding rear clamp and corresponding front clamp when the balcony is attached to the building.
4. The balcony of any one of claims 1 to 3 wherein the plurality of parallel and spaced apart joists of the framework structure comprise at least two joists intermediate the rear clamp and front clamp, and each standoff is fixed to a respective one of the at least two joists intermediate the rear clamp and front clamp, for each beam.
5. The balcony of claim 4, wherein the plurality of parallel and spaced apart joists of the framework structure comprise three joists intermediate the rear clamp and front clamp, each intermediate joist having a standoff fixed thereto, for each beam.
6. The balcony of claim 4 or claim 5, wherein for each joist intermediate the rear clamp and front clamp there are two standoffs spaced apart from each other along the width direction W of the balcony, for each beam.
7. The balcony of any one of claims 1 to 6 wherein each standoff is fixed to a bracket secured to the framework structure adjacent the corresponding aperture.
8. The balcony of claim 7 wherein each standoff comprises a first portion fixed to the bracket and a second portion capable of being moved relative to the first portion, the second portion comprising the engagement surface adjustable to bear against the beam.
9. The balcony of claim 8, wherein the first portion and the second portion have complementary threads to allow the second portion to move along the height direction H of the balcony relative to the first portion on rotation of the second portion relative to the first portion.
10. The balcony of any one of claims 1 to 9 wherein each standoff is individually adjustable.
11. A building, having a balcony of any one of claims 1

to 10 attached thereto.

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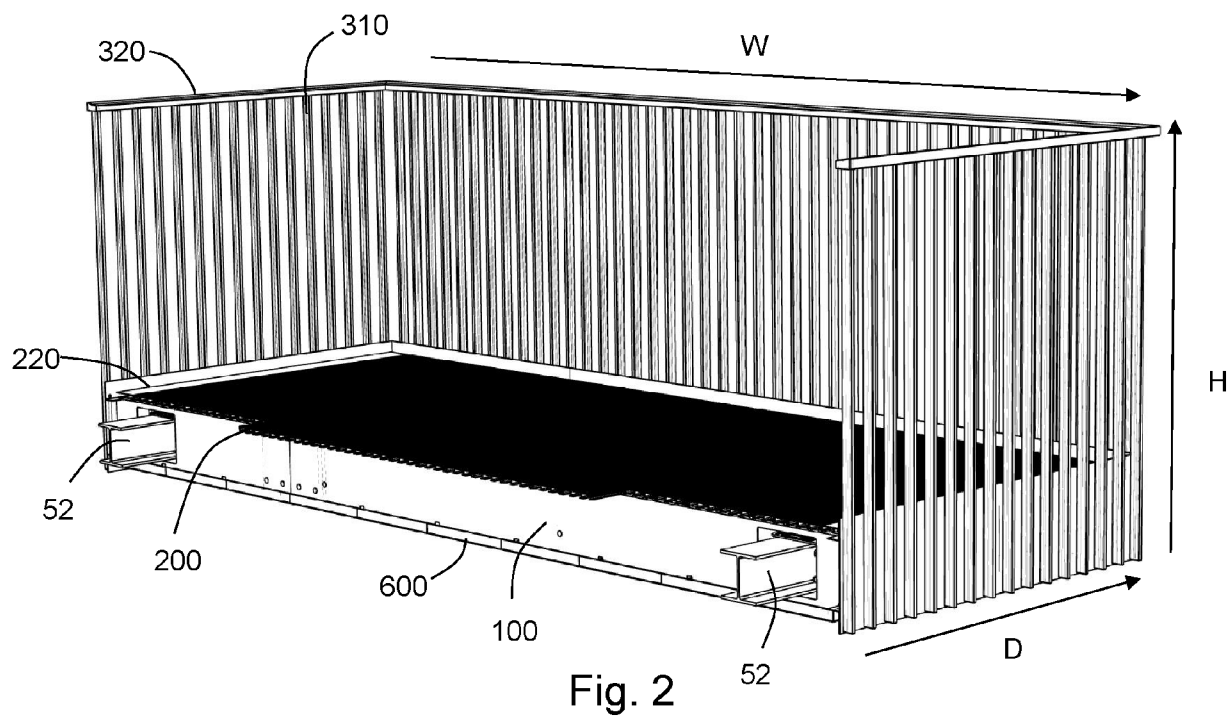
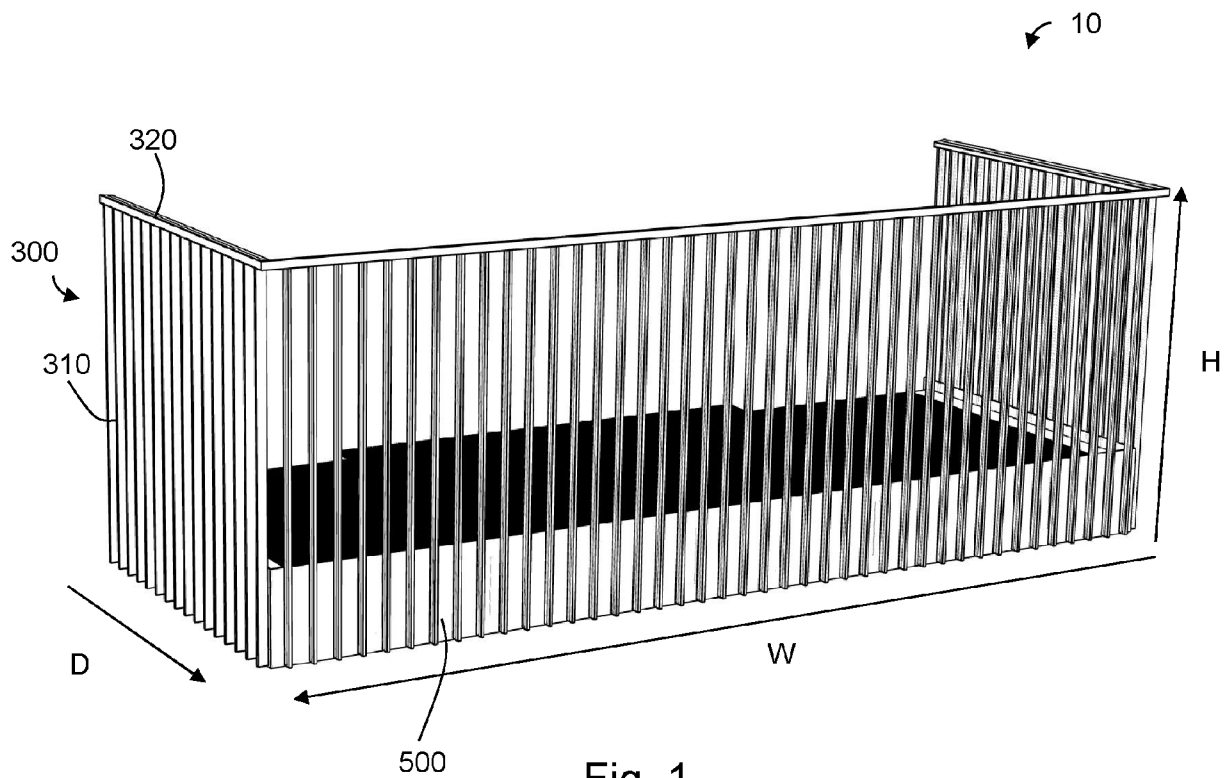
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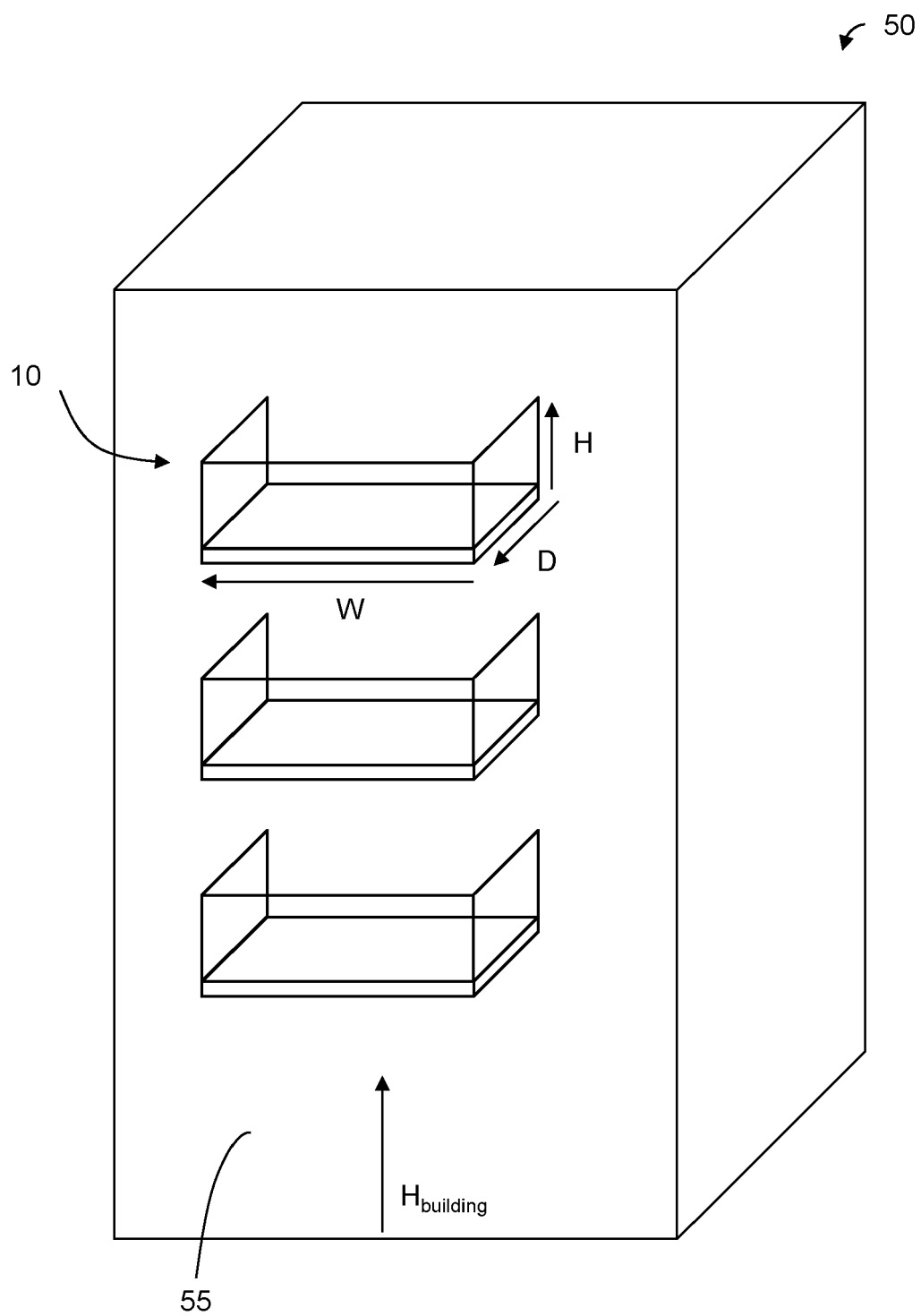


Fig. 3

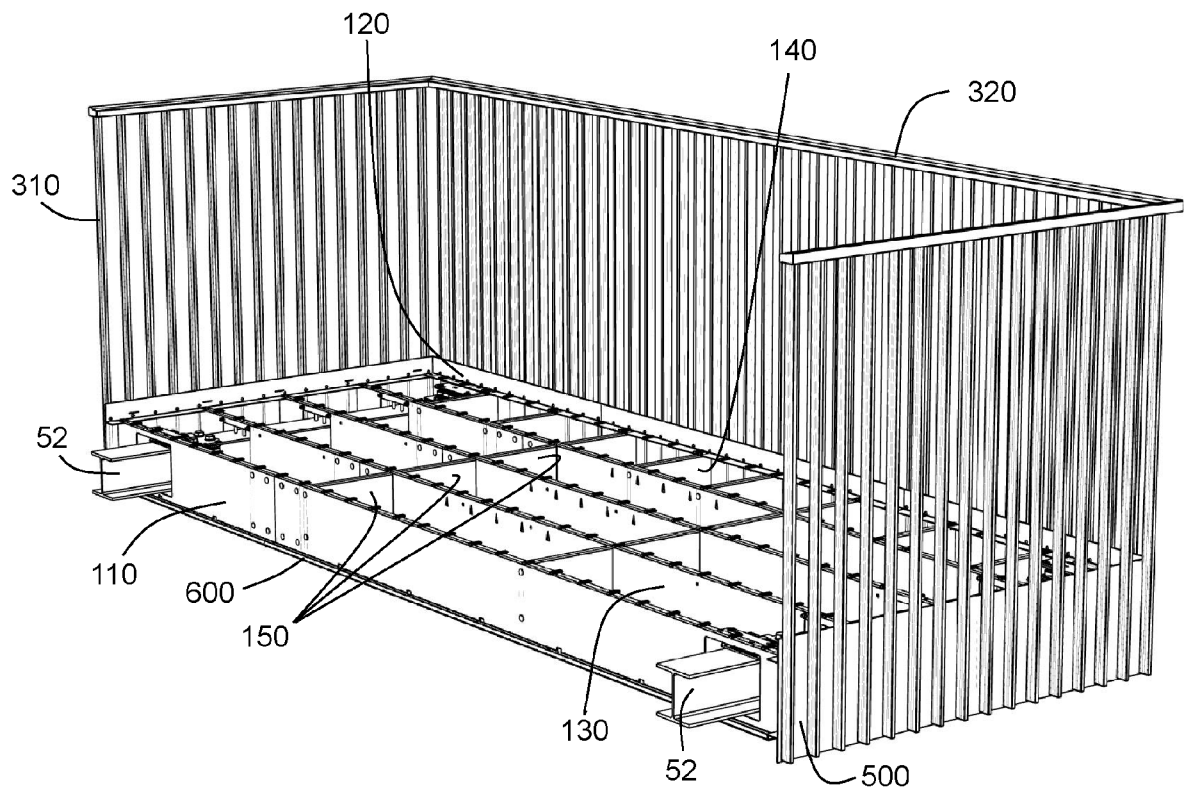


Fig. 4

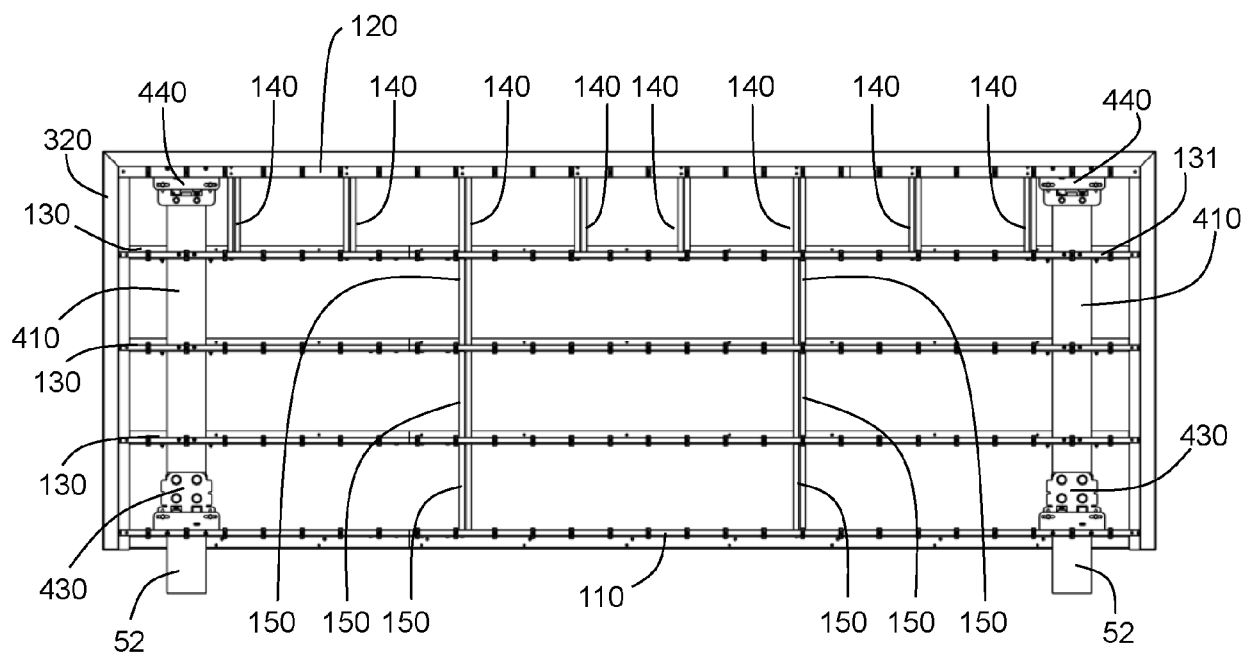


Fig. 5

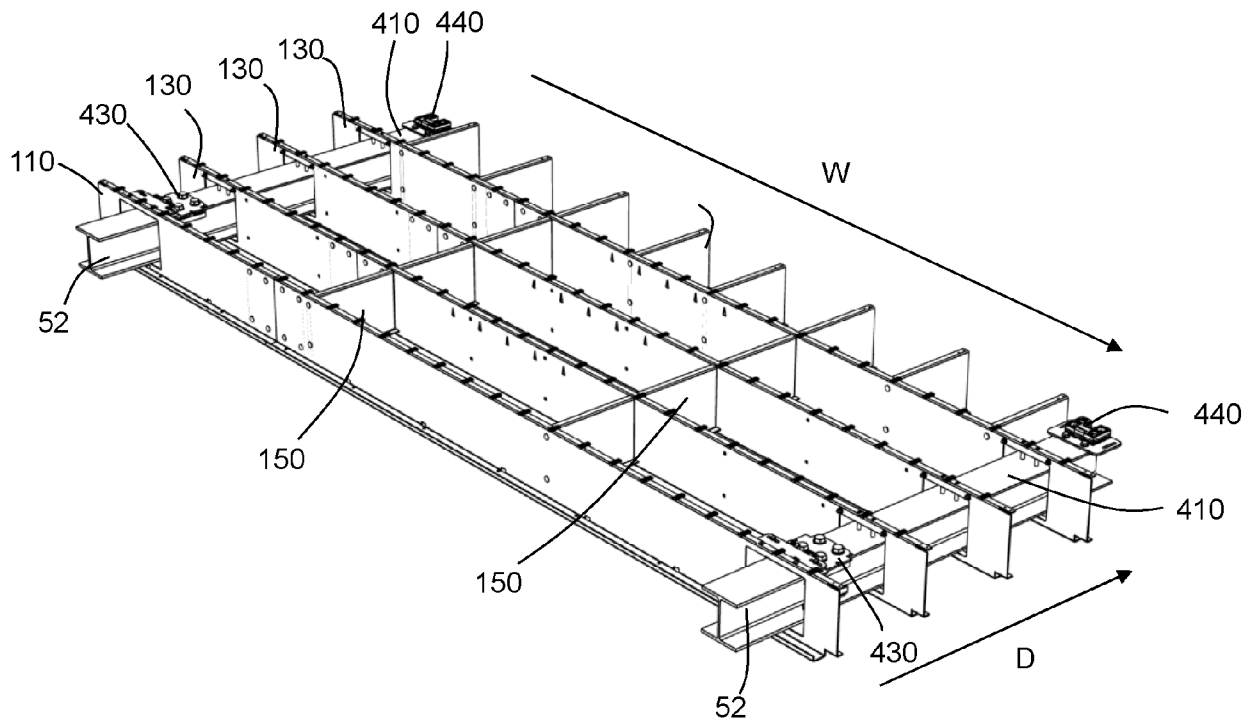


Fig. 6

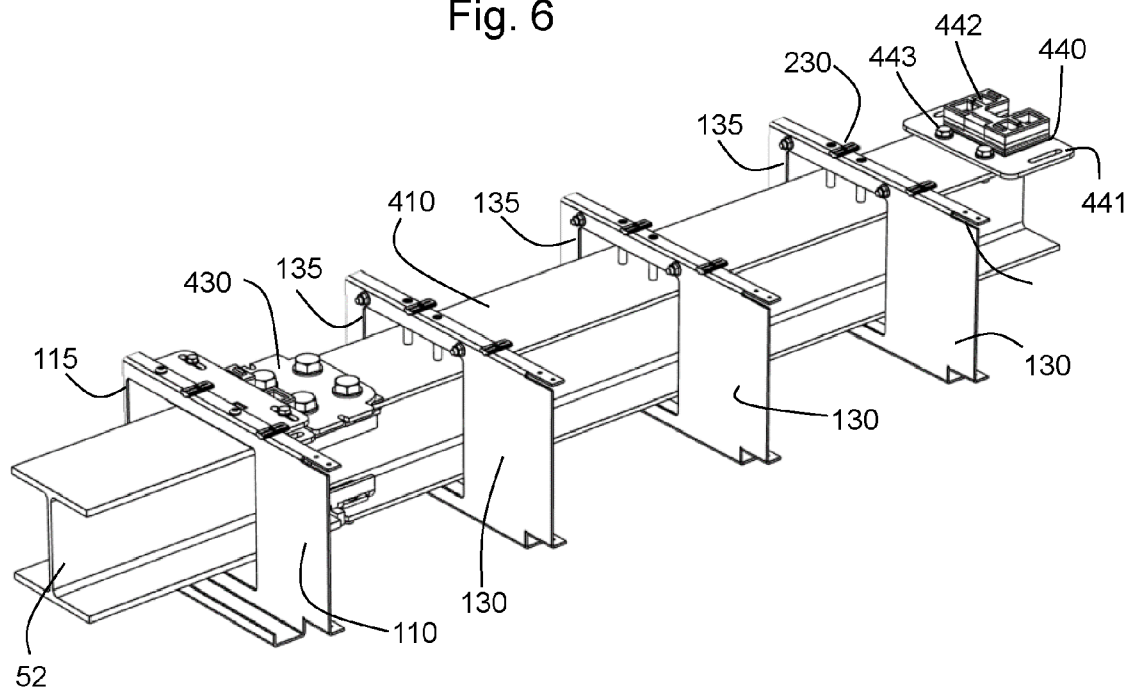


Fig. 7

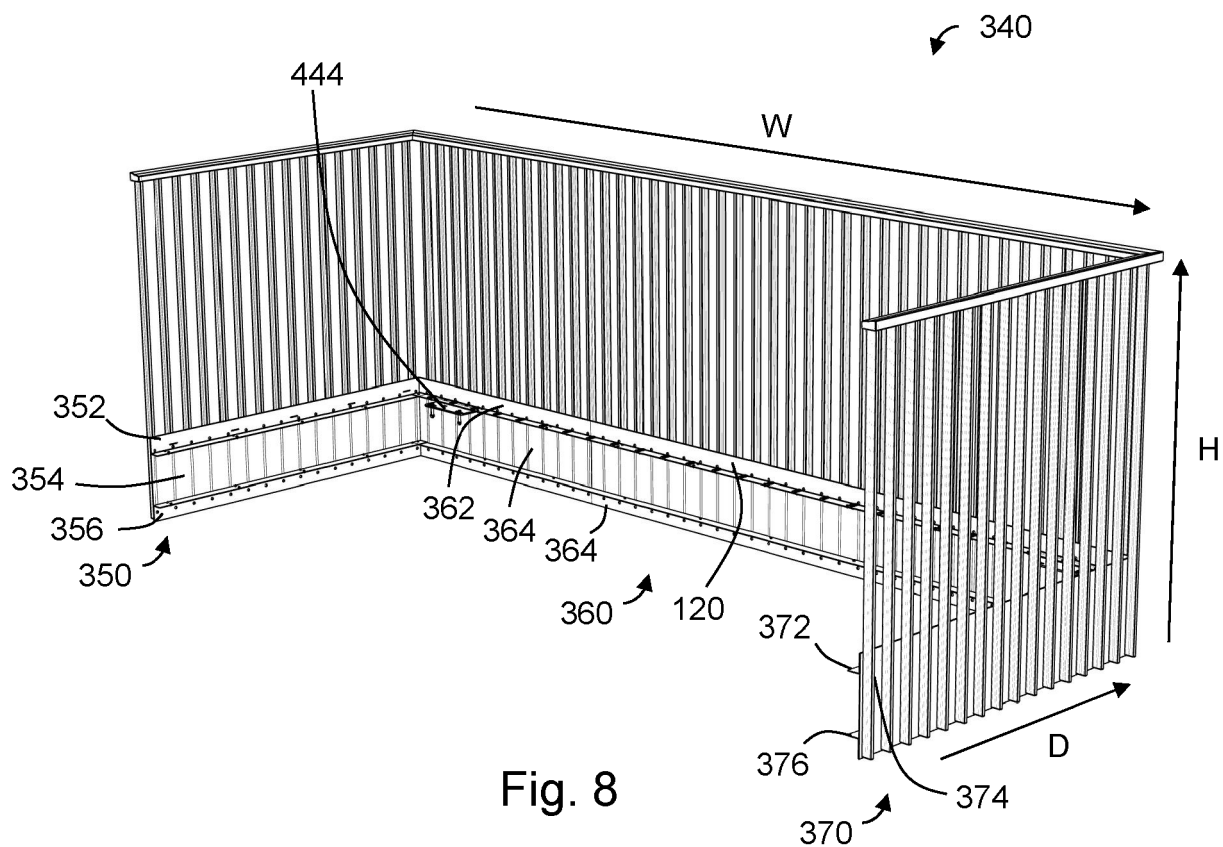


Fig. 8

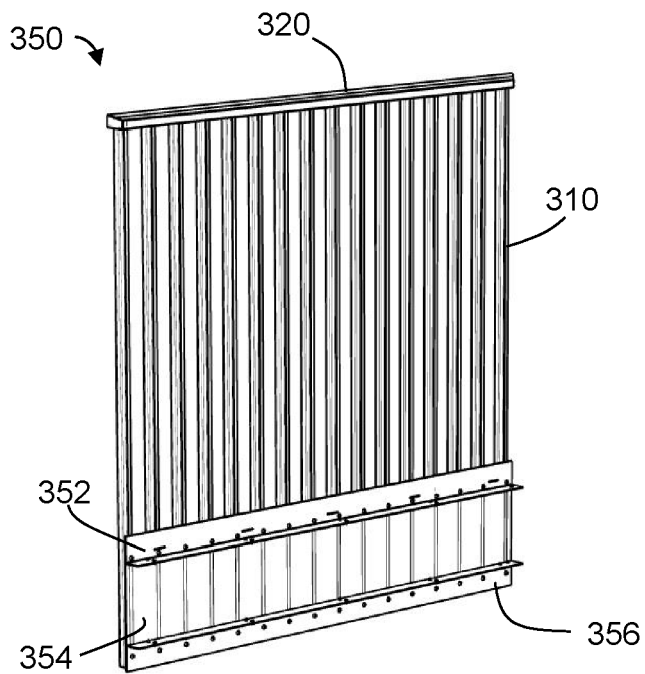


Fig. 9

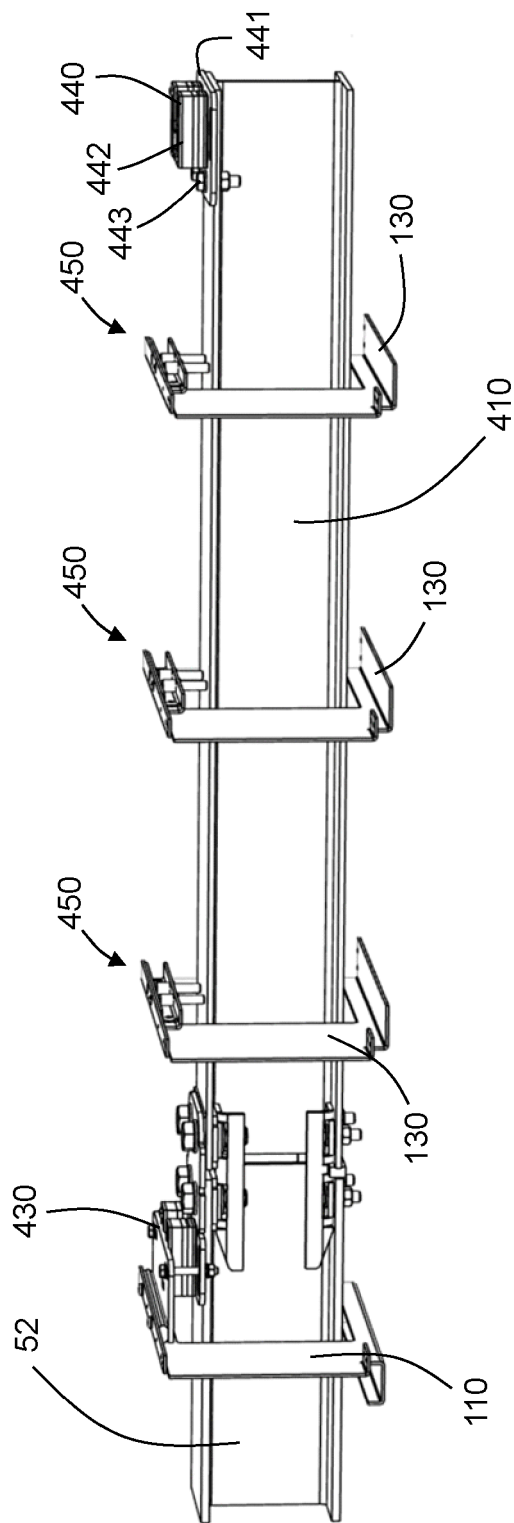


Fig. 10

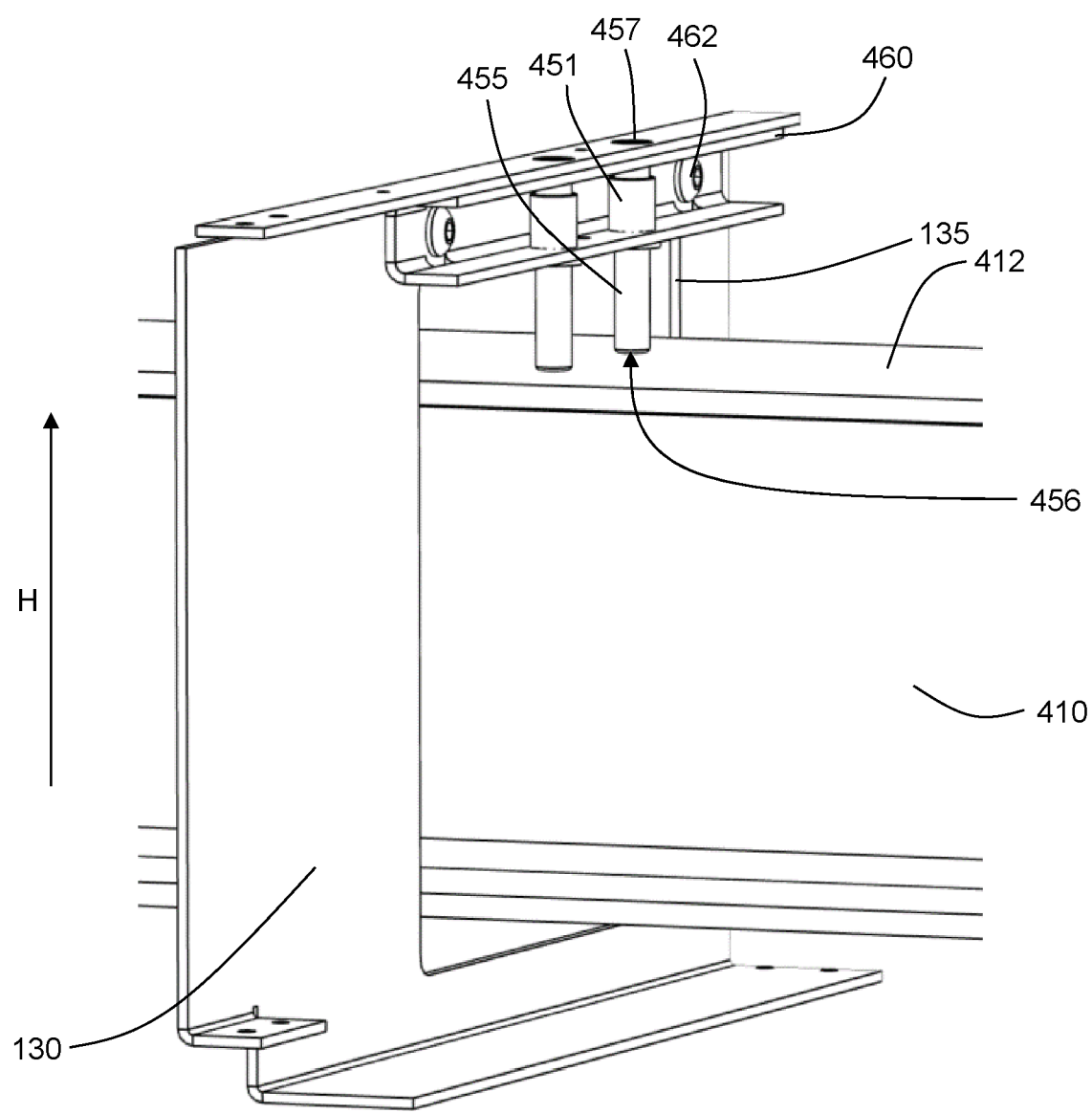


Fig. 11

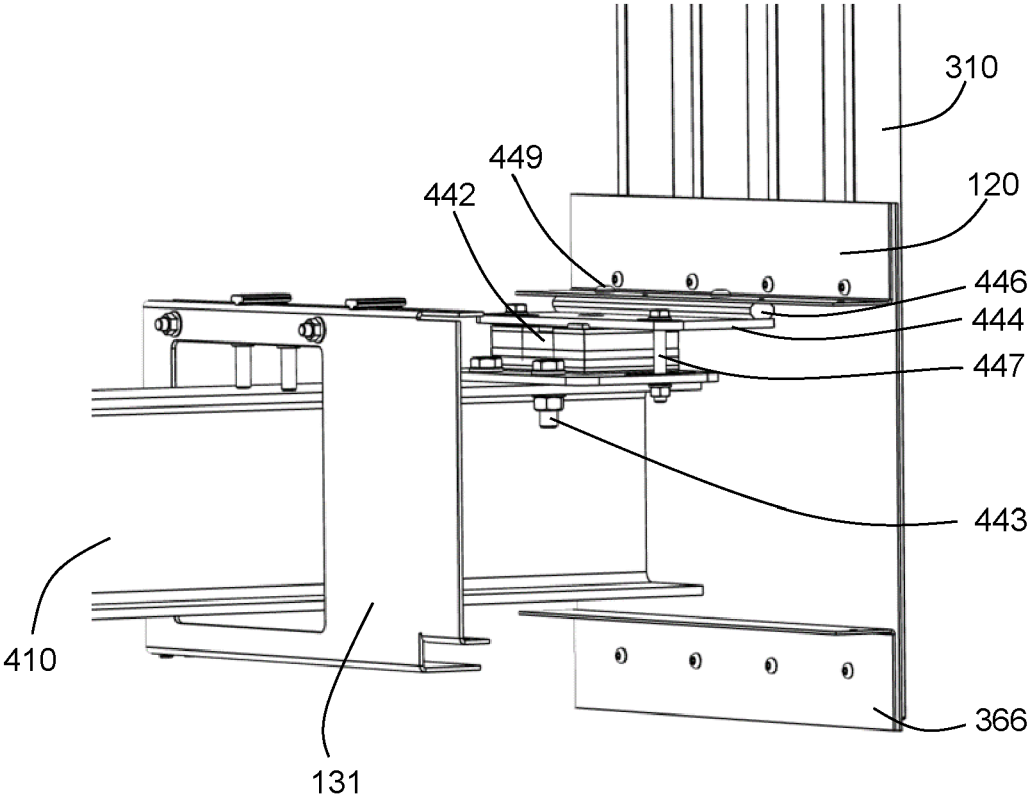


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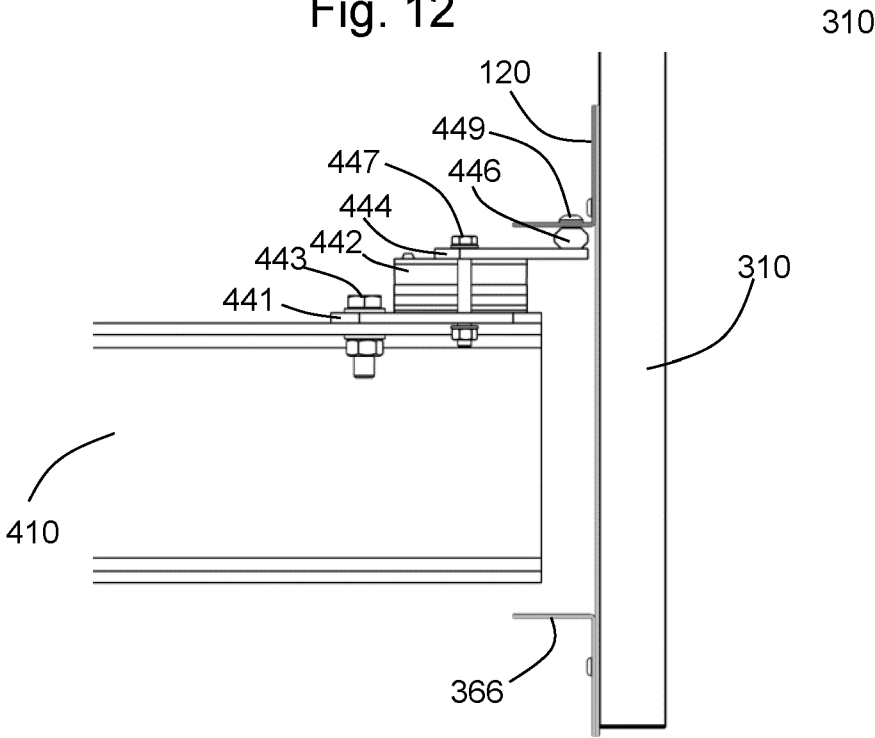


Fig. 13

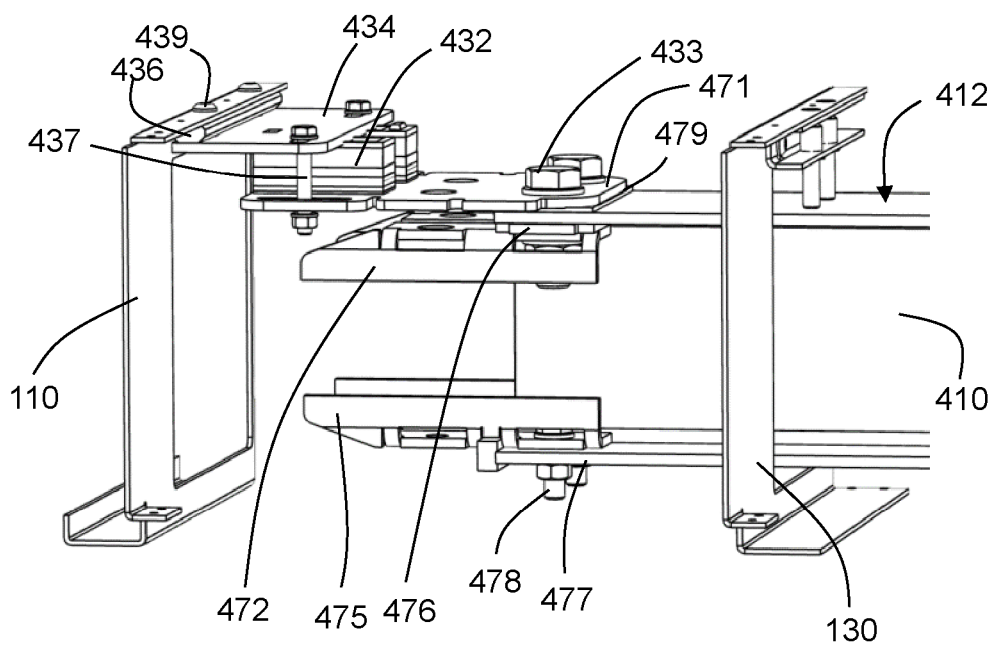


Fig. 14

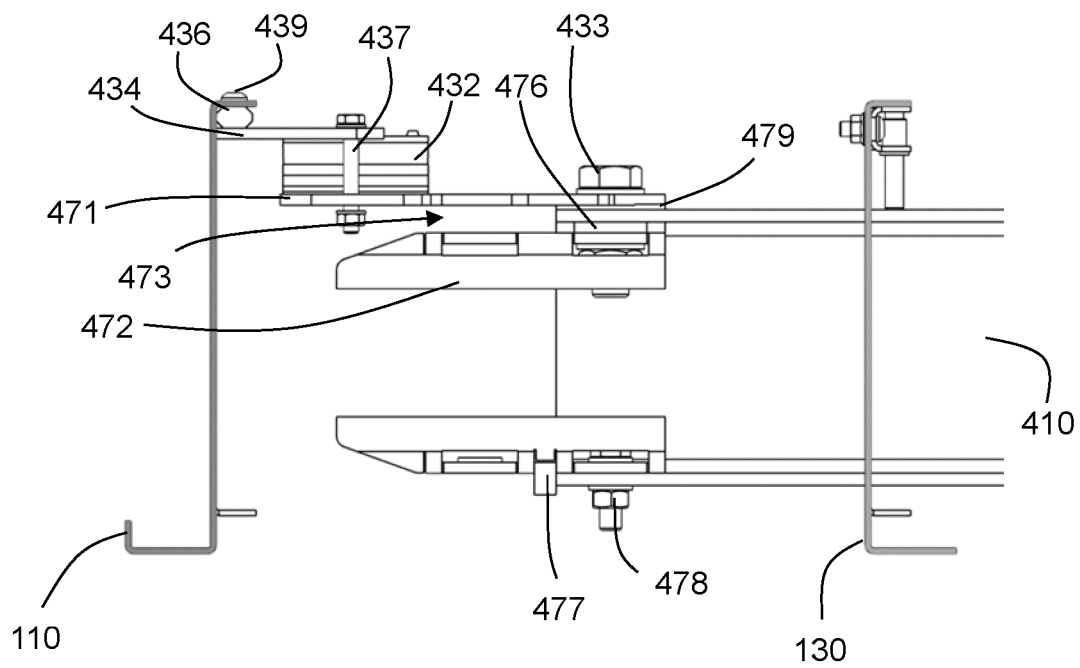


Fig. 15

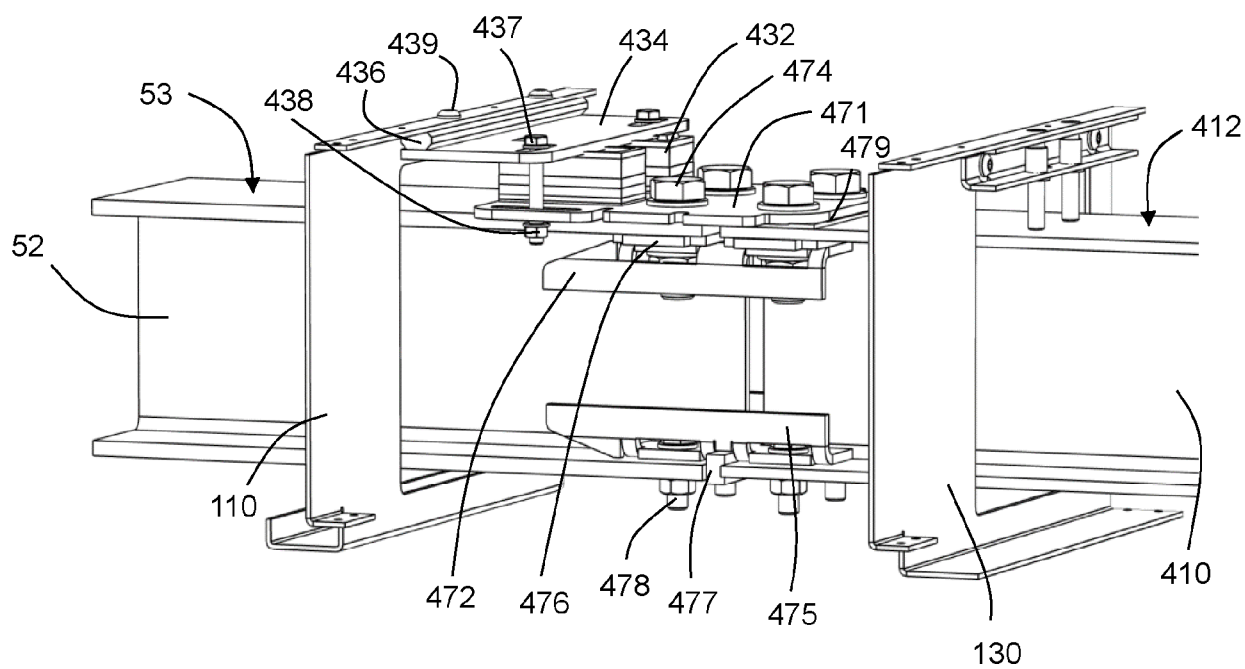


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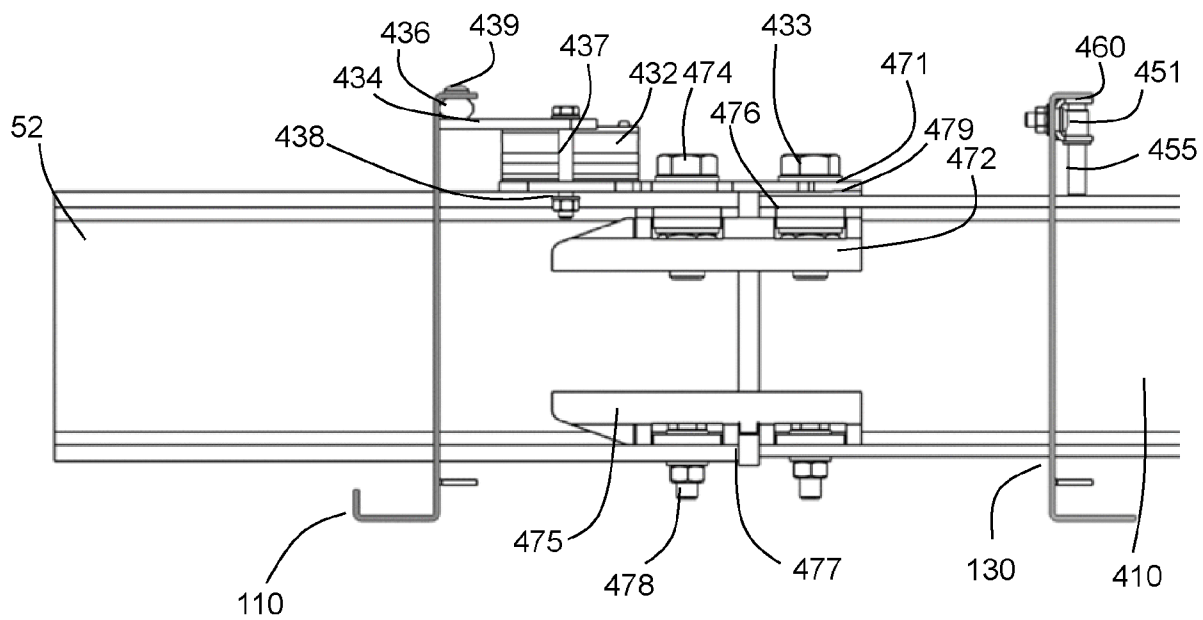


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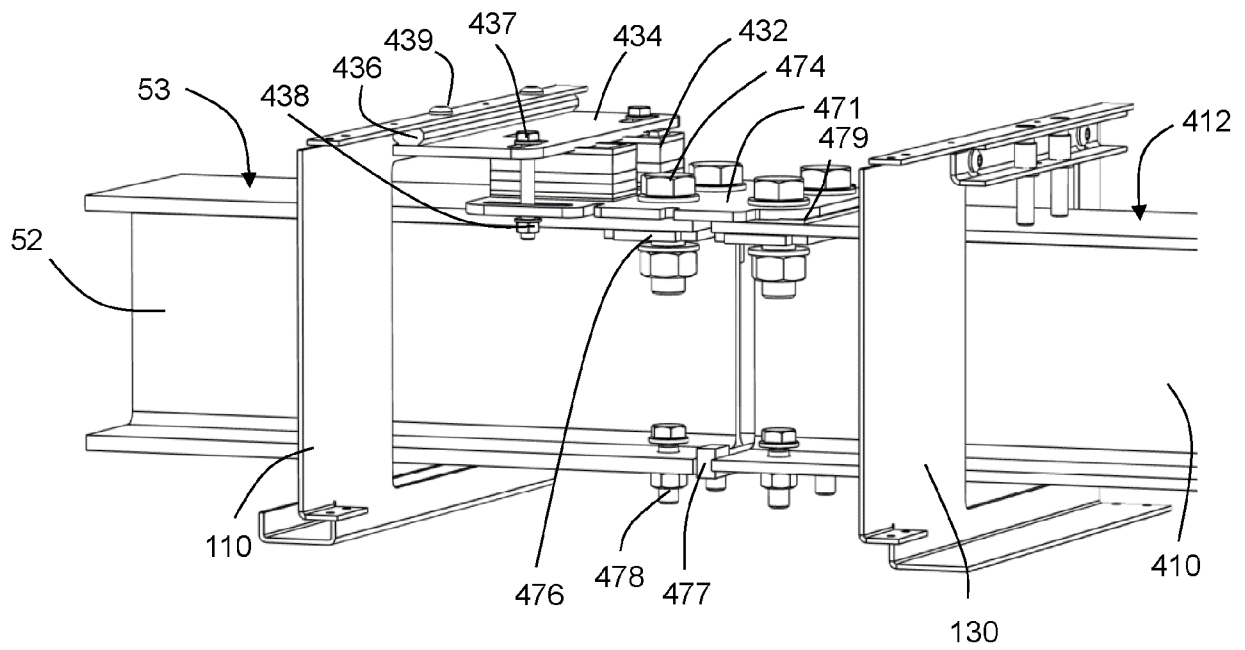


Fig. 18

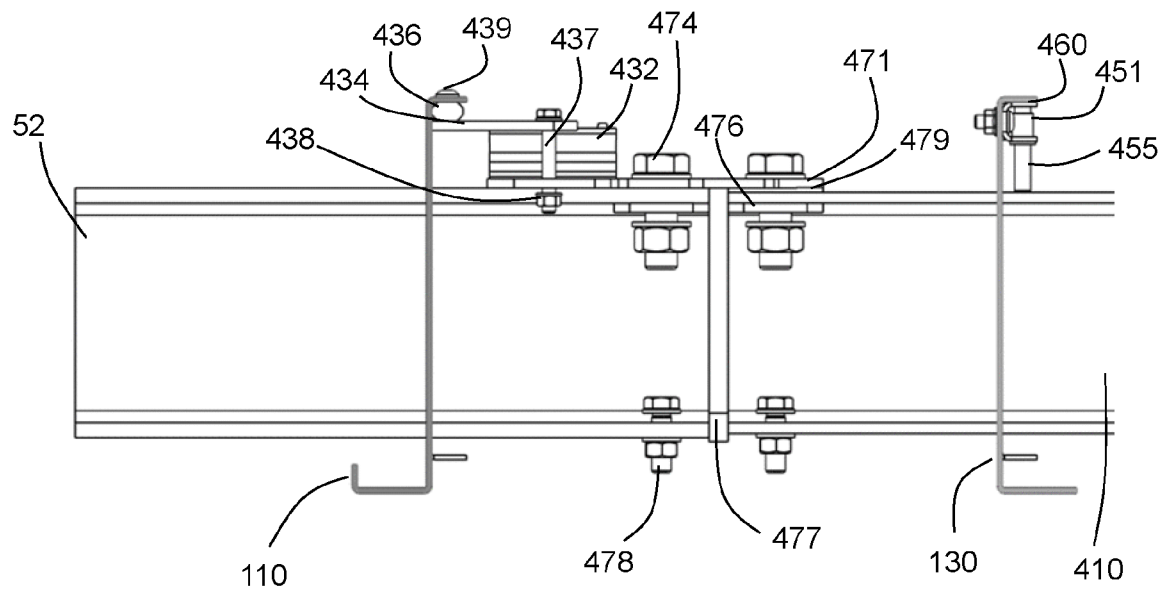


Fig. 19

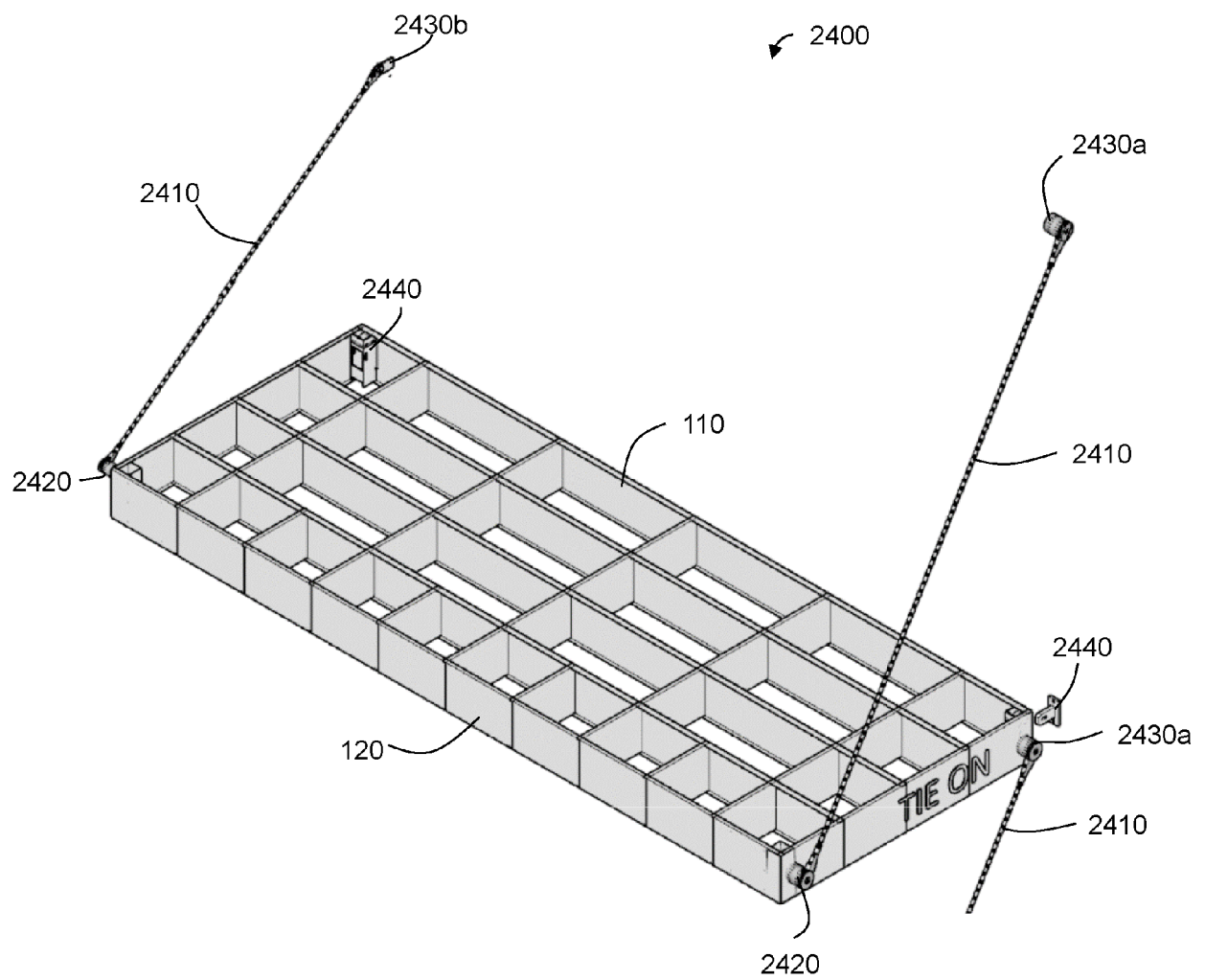


Fig. 20

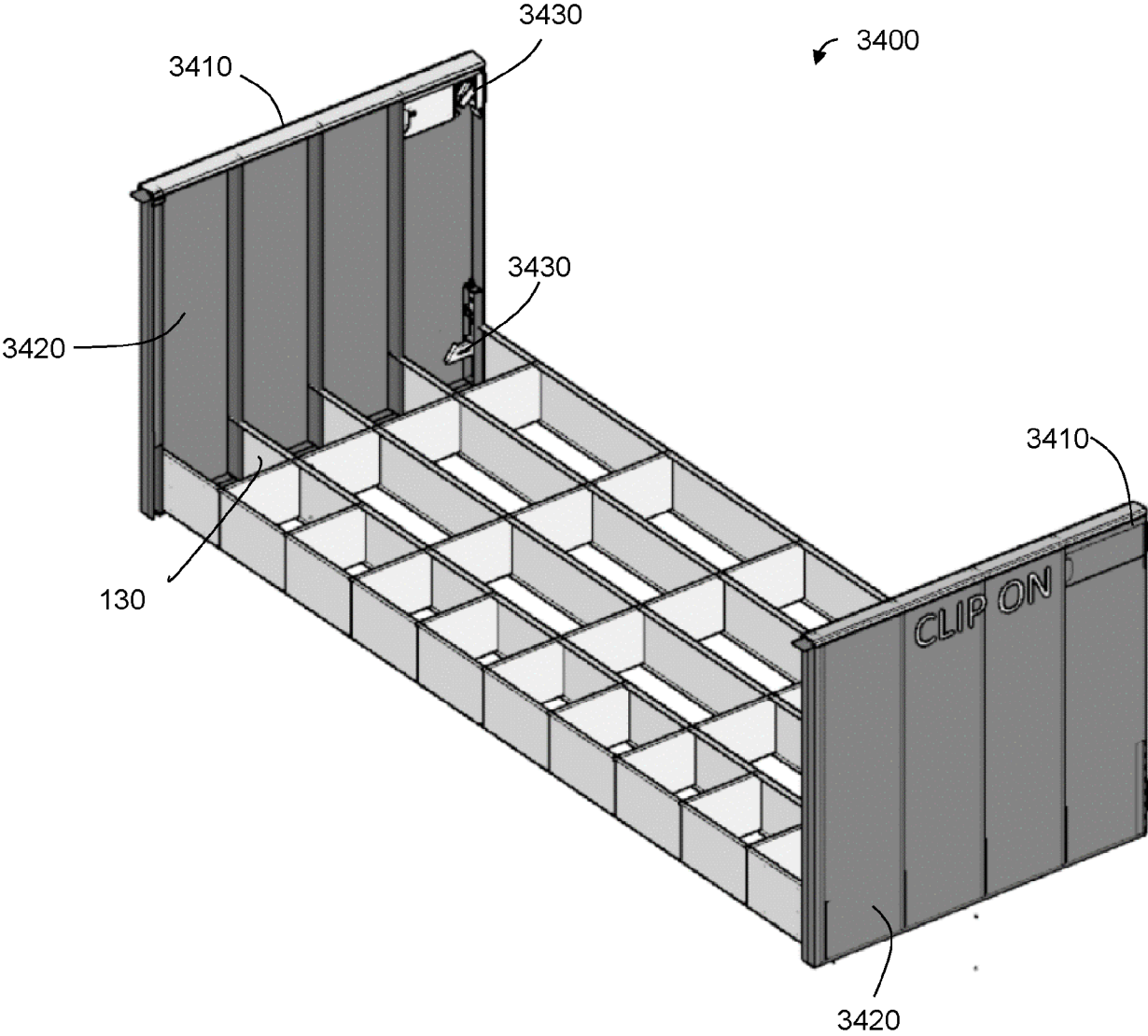


Fig. 21

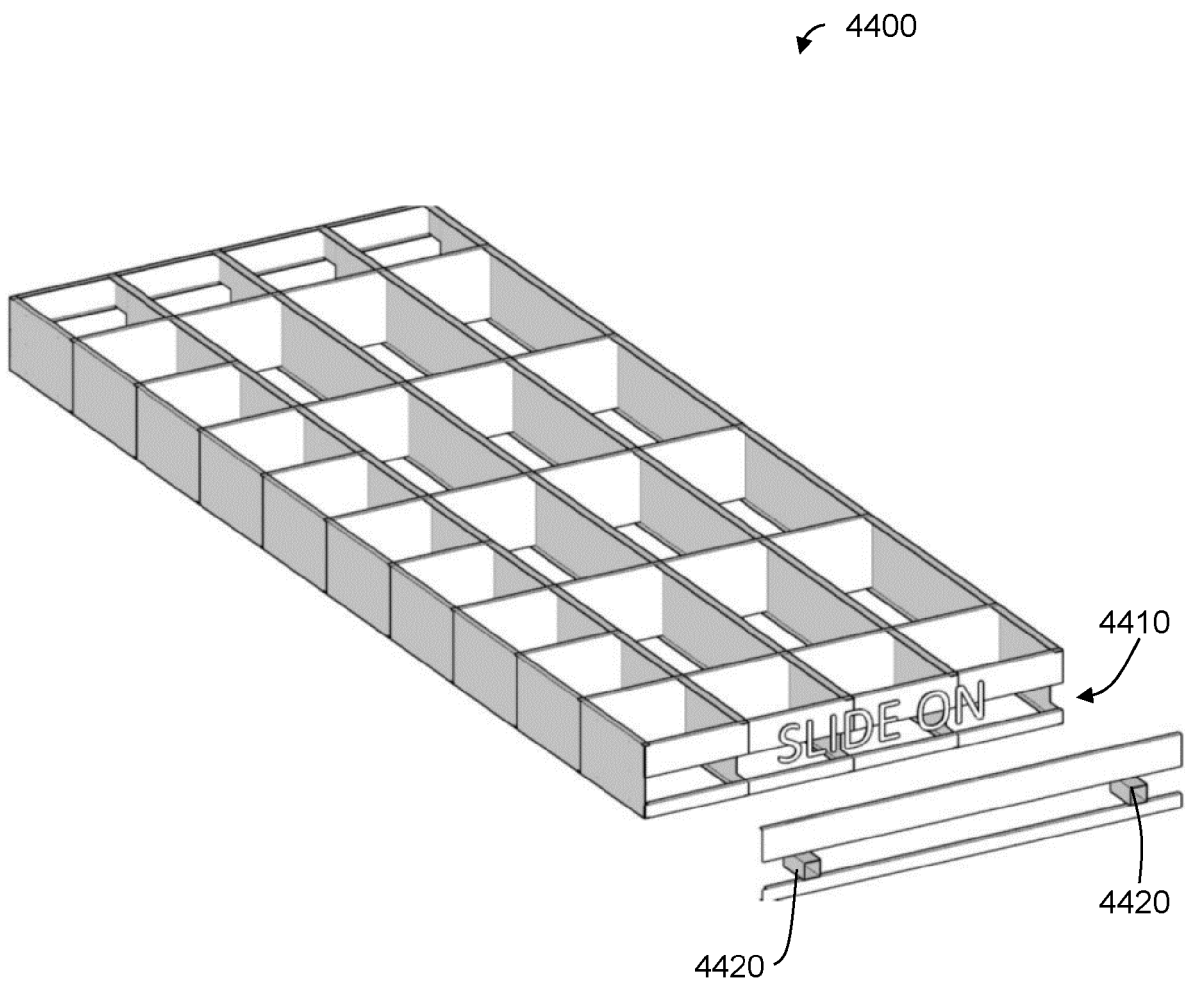


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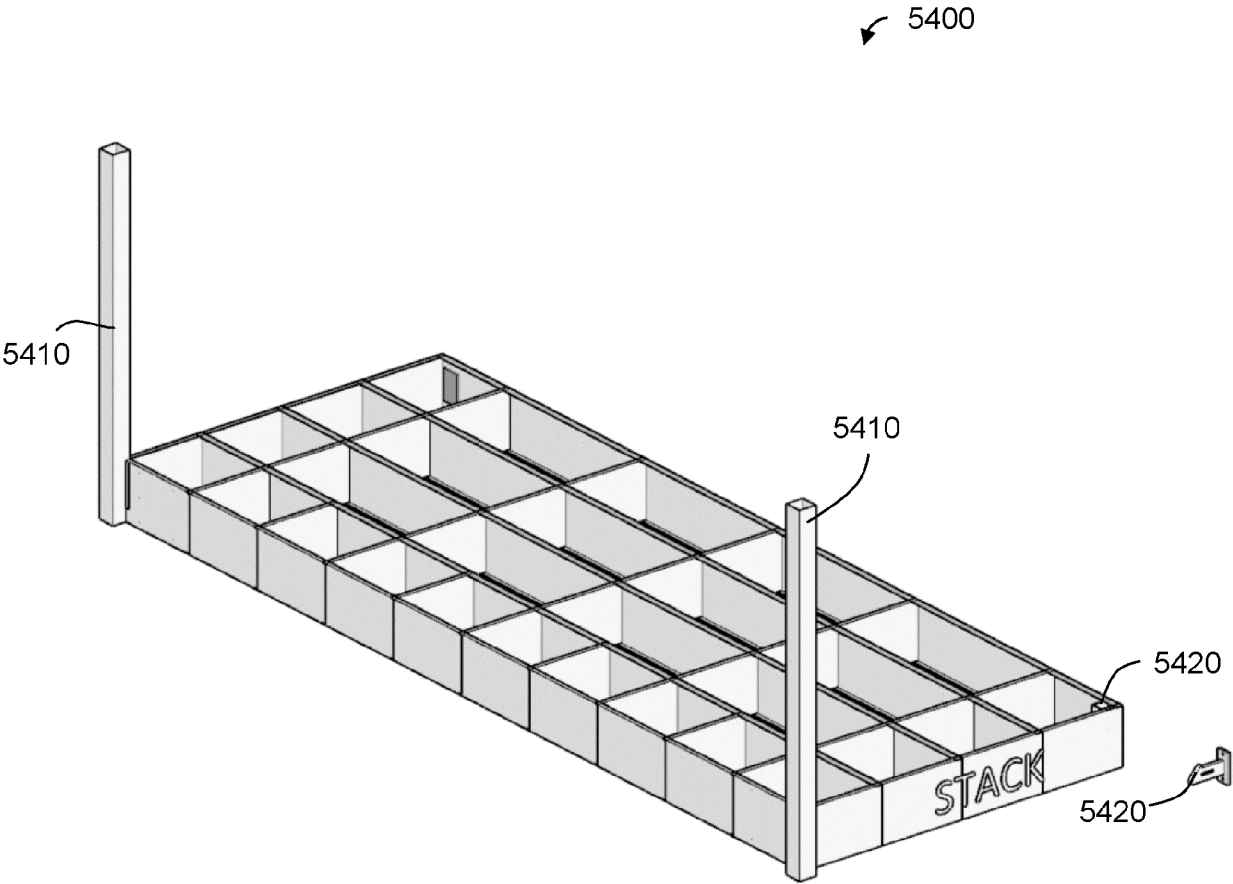


Fig. 23

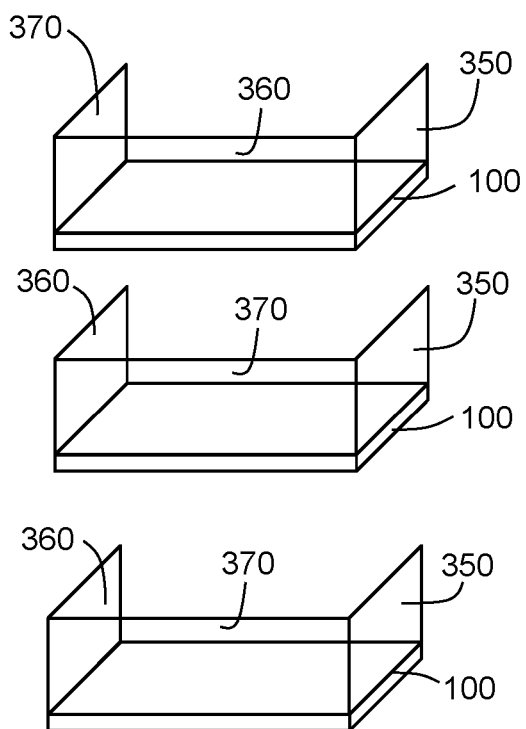


Fig. 24

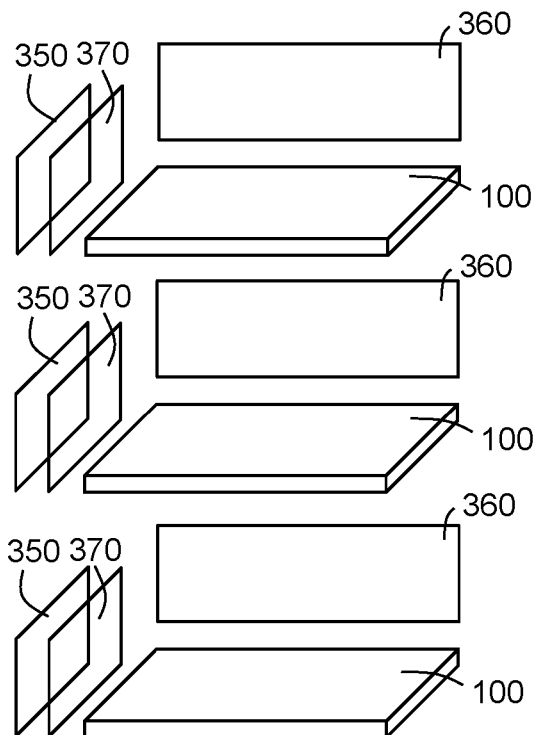


Fig. 25

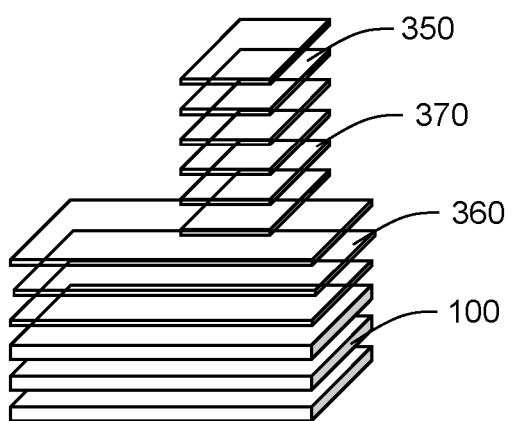


Fig. 26

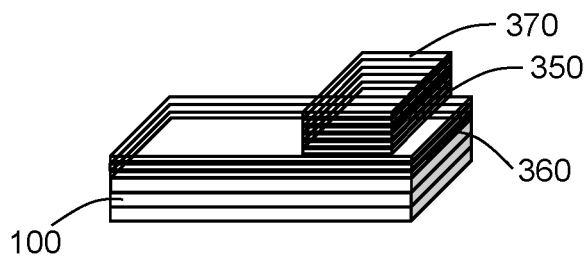


Fig. 27

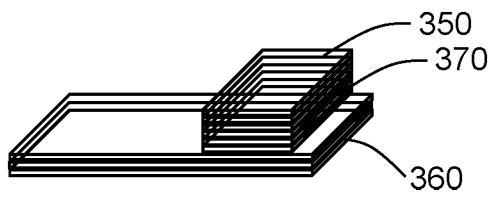


Fig. 28

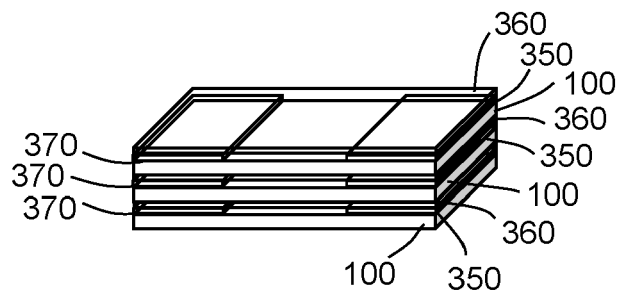


Fig. 29

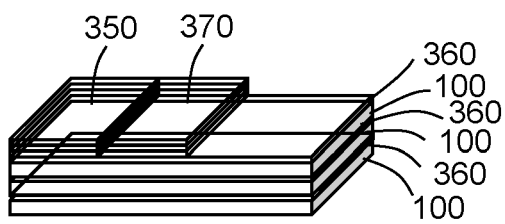


Fig. 30

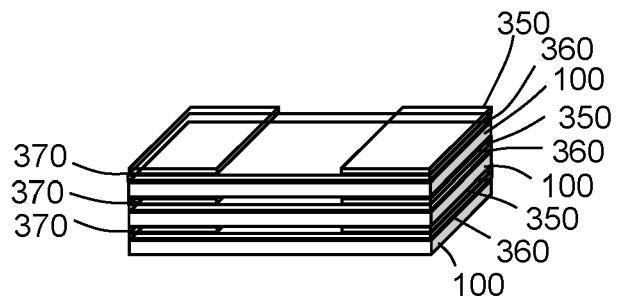


Fig. 31

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2310978 A [0001]
- WO 2021175416 A [0086] [0087]