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(54) A MOUNTING BRACKET FOR A COOLING EQUIPMENT

(57) A mounting bracket for a cooling equipment (1), comprising two horizontally positioned, parallel first support bars (10) providing two mounting platforms (40) for the cooling equipment (1), wherein the mounting platforms (40) to the cooling equipment (1) are adjustable along the first support bars (10); two horizontally positioned, parallel second support bars (20) positioned transversely to the two first support bars (10); wherein both two first support bars (10) are adjustably mounted to both two second support bars (20); at least two stands (30) mounted between the second support bars (20) and a solid platform (2), configured to provide vertical distance between the two second support bars (20) and the solid platform (2). The first support bars (10) comprise first C-channel bars (11), wherein the mounting platforms (40) to the cooling equipment (1) are adjustable along the first C-channel bars (11); and the second support bars (20) comprise second C-channel bars (21), wherein the adjustable mounts to two first support bars (10) are adjustable along the second C-channel bars (21).

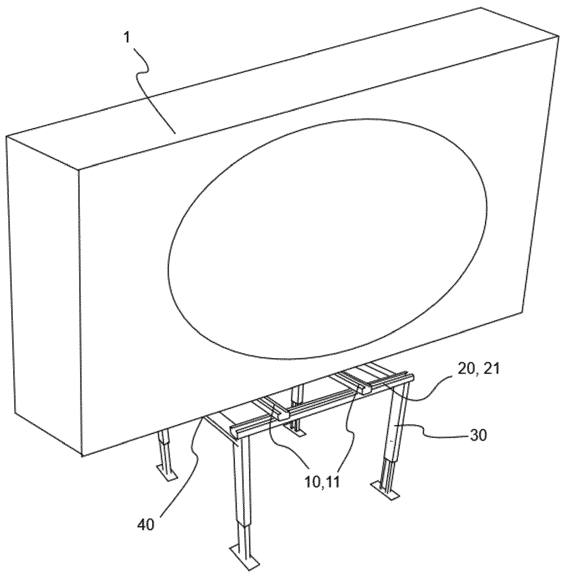

Fig. 1

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Description

BACKGROUND

[0001] The following disclosure relates to supporting structures for a cooling equipment. Examples of cooling equipment are outdoor units of air conditioners, heat pumps, air-to-air heat pumps, air-to-water heat pumps; outdoor units for retail refrigerators or cold rooms. One example of the outdoor unit comprises a compressor configured to pressurize a refrigerant.

[0002] Large cooling equipment may weigh over 2.000 kilograms. In one example the outdoor units are placed close to a building's wall, often to a location where the outdoor unit causes as little obstruction to the pathways as possible or where the outdoor unit is not immediately visible. On a rooftop installation, the positioning of the cooling equipment may be restricted. As a result, moving the heavy cooling equipment in limited spaces is difficult. The cooling equipment should be positioned over the ground-based or rooftop-based mounting bracket as easily as possible. The lifting device required for moving the heavy cooling equipment may have limited reach on tight locations.

[0003] Typically, the mounting brackets have limited adjusting means. One example of adjusting means is a series of oval or elongated openings at a crossing support bars. The lengths of the openings are limited, as the support bar is configured to hold its form along the solid portions between the elongated openings. During the installation procedure, the mounting bracket may end up in a position where it cannot be securely tightened - for example the solid portion may be in the way. Handling heavy objects such as cooling equipment in tight spaces or in dangerous places such as rooftops is even more dangerous if there is additional hassle with relocating the mounting bracket.

SUMMARY

[0004] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. Furthermore, the claimed subject matter is not limited to implementations that solve any or all disadvantages noted in any part of this disclosure.

[0005] A mounting bracket for a cooling equipment is disclosed. The mounting bracket may be mounted on a ground or to the rooftop, inside or outside, supporting the cooling equipment. The mounting bracket comprises two horizontally positioned, parallel first support bars providing two mounting platforms for the cooling equipment, wherein the mounting platforms to the cooling equipment are adjustable along the first support bars. The cooling equipment may be mounted on the mounting platform. Two horizontally positioned, parallel second support bars are positioned transversely to the two first support bars, wherein both two first support bars are adjustably mounted to both two second support bars. The first support bars and the second support bars may form a rectangular horizontal shape. At least two stands are mounted between the second support bars and a solid platform, configured to provide vertical distance between the two second support bars and the solid platform. Examples of the solid platforms are ground-based platforms, rooftops, balconies or any other installation base.

[0006] The first support bars comprise first C-channel bars, wherein the mounting platforms to the cooling equipment are adjustable along the first C-channel bars. According to one embodiment the mounting platforms are adjustable along the length of the first C-channels; the mounting platforms may be mounted to any position on the first C-channels. The second support bars comprise second C-channel bars, wherein the adjustable mounts to two first support bars are adjustable along the second C-channel bars. According to one embodiment the first support bars are adjustable along the length of the second C-channels; the first support bars may be mounted to any position on the second C-channels.

[0007] In one embodiment, the first support bars are the first C-channel bars. The first C-channel bar forms the first support bar, wherein the mounting platform is adjustable at all positions along the first support bar. In one embodiment, a portion of the first support bar is the first C-channel bar.

[0008] In one embodiment, the second support bars are the second C-channel bars. The second C-channel bar forms the second support bar, wherein the first support bar is adjustable at all positions along the second support bar. In one embodiment, a portion of the second support bar is the second C-channel bar.

[0009] In one embodiment, the first C-channel bars and the second C-channel bars are lipped C-channel bars. The lipped C-channel bar comprises two flanges on both sides of the bar, narrowing the longitudinal opening in the middle of the channel bar.

[0010] In one embodiment, the mounting bracket comprises four stands mounted to opposite ends of the second support bars. The four stands are positioned on each corner of the rectangular horizontal shape or each corner of the mounting bracket.

[0011] In one embodiment, the mounting platform comprises first tightening means configured to tighten the mounting platform to at least one first C-channel bar. The mounting platform may be formed by the first tightening means and the first support bars. The tightening means may be on both first support bars or only on one first support bar. In one embodiment, the first tightening means comprise a threaded bolt configured to pass through an opening at a bottom plate of the cooling equipment; and a threaded counterpart configured to slidably move inside the lipped first C-channel bar, the threaded counterpart being larger than an elongated opening of the lipped first C-channel bar, wherein tightening the bolt to the counterpart causes the bottom plate of the cooling equipment to tighten on the lipped first C-channel bar.

The tightening means are tightened against the flange covering the opening of the lipped first C-channel bar.

[0012] In one embodiment, the mounting platform comprises second tightening means configured to tighten the first C-channel bar to at least one second C-channel bar. The tightening means may be on both second support bars or only on one second support bar. In one embodiment, the second tightening means comprise a threaded bolt configured to pass through a wall of the first C-channel bar; and a threaded counterpart configured to slidably move inside the lipped second C-channel bar, the threaded counterpart being larger than an elongated opening of the lipped second C-channel bar, wherein tightening the bolt to the counterpart causes the first C-channel bar to tighten on the lipped second C-channel bar. The tightening means are tightened against the flange covering the opening of the lipped second C-channel bar.

[0013] In one embodiment, at least one stand comprises a hollow vertical bar configured to slidably receive a vertical C-channel bar and third tightening means to tighten the vertical C-channel bar against an inner wall of the hollow vertical bar, wherein the length of the stand is adjustable. All four stands may be adjustable. In one embodiment, the third tightening means comprise a threaded bolt configured to pass through a wall of the hollow vertical bar; and a threaded counterpart configured to slidably move inside the vertical C-channel bar, wherein tightening the bolt to the counterpart causes the hollow vertical bar to tighten on the vertical C-channel bar. The vertical C-channel bar is inside the hollow vertical bar, therefore the tightening is possible without the lip on the vertical C-channel bar. In one embodiment, the vertical C-channel bar is tightened to the outer surface of a vertical bar.

[0014] In one embodiment, a channel of the first C-channel opens upwards when the mounting bracket is in an operating position. In one embodiment, a channel of the second C-channel opens upwards when the mounting bracket is in an operating position. The mounting platform is positioned over the first C-channel and the first C-channel is positioned over the second C-channel. C-channels opening upwards enable continuous adjustability of the mounted components along the C-channels.

[0015] In one embodiment, the first ends of the two parallel second support bars are connected by a first fixed support member and second ends of the two parallel second support bars are connected by a second fixed support member. The first fixed support member, the second fixed support member and the second support bars form a rectangular horizontal shape. The stands may be mounted to the corners of the rectangular shape.

[0016] In one embodiment, the counterpart is a square nut. In an embodiment, the counterpart is of any form suitable for sliding inside the C-channel or inside the lipped C-channel. The counterpart may be disc-shaped or hexagonal part, comprising threads configured to receive the threaded bolt and tightened against the structure.

[0017] The C-channel enables increased adjustability to the mounting bracket. During the installation phase, the mounting bracket may still be adjusted, enabling complicated adjustments along the installation surface. The ground may be uneven, as the mounting bracket is levelled by adjusting the stands. The mounting bracket may be used on tilted surfaces, as the stands may be adjusted to over wide range. When the mounting bracket is firmly over the surface, the installation may be adjusted over the mounting bracket. The stepless adjustability that the C-channel enables, allows moving the cooling equipment at least few centimetres to the desired position while it is already positioned over the mounting bracket. The arrangement allows for example installing the cooling equipment closer to the wall, by sliding the cooling equipment on the C-channel. The solution is safe, as it provides adjustability during the installation. The dangerous phase, when the heavy equipment relies on the lifting device and when it is lowered to the final position may be minimized.

[0018] Many of the attendant features will be more readily appreciated as they become better understood by reference to the following detailed description considered in connection with the accompanying drawings. The embodiments described below are not limited to implementations which solve any or all the disadvantages of known mounting brackets.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The present description will be better understood from the following detailed description read in light of the accompanying drawings, wherein FIG. 1 illustrates schematically one example of an embodiment having a cooling equipment on a mounting bracket;

FIG. 2 illustrates schematically one example of an embodiment of the mounting bracket;

FIG. 3 illustrates schematically a cross-sectional view of various C-channels; and

FIG. 4 illustrates schematically a side projection and a top projection of one example of an embodiment having tightening means; and

FIG. 5 illustrates schematically one example of an embodiment having a rectangular horizontal shape.

[0020] Like reference numerals are used to designate like parts in the accompanying drawings.

DETAILED DESCRIPTION

[0021] The detailed description provided below in connection with the appended drawings is intended as a description of the present examples and is not intended to

represent the only forms in which the present example may be constructed or utilized. However, the same or equivalent functions and sequences may be accomplished by different examples.

[0022] Although the present examples are described and illustrated herein as being implemented on an air conditioner's outdoor unit, they are provided as an example and not a limitation. As those skilled in the art will appreciate, the present examples are suitable for application in a variety of different types of cooling equipment.

[0023] FIG. 1 illustrates one example of an embodiment, wherein a cooling equipment, in this example the air conditioner outdoor unit 1 is positioned on a mounting bracket. The mounting bracket provides distance between the installation surface 2 and the cooling equipment 1. The mounting bracket is configured to support the weight of the cooling equipment and be adjustable along uneven surface 2. The surface 2 may be solid ground, rock, a concrete slab, a rooftop, a solid building structure or anything suitable for sustaining the weight of the cooling equipment. The cooling equipment may weigh from 10 kg to over 2.000 kilograms, wherein the mounting bracket may be scaled to support the weight. In one embodiment, the mounting bracket is configured to be installed to a building wall, wherein any connecting means attached to the wall provide extensions having horizontal support for the mounting bracket.

[0024] FIG. 2 illustrates one example of an embodiment where the mounting bracket is illustrated schematically without the cooling equipment 1. Two horizontally positioned, parallel first support bars 10 provide two mounting platforms 40 for the cooling equipment. The first support bars 10 comprise at least portion of first C-channel bars 11, wherein the mounting platforms 40 may be slidably adjusted along the C-channels of the first C-channel bars 11. The mounting platforms 40 are selected portions of the first C-channel bars 11, to where a bottom plate of the cooling equipment 1 may be mounted. The bottom plate is typically integrated into the cooling equipment 1. Sizes and positions of the bottom plate may vary, therefore the first C-channel bar 11 provides adjustability to the bottom plate installation and to the cooling equipment installation. In one embodiment, the whole first support bar 10 is the first C-channel bar 11. In one embodiment, the first C-channel bar 11 is implemented on the first support bar 10 partially, for example by attaching a piece of the first C-channel bar 11 onto the first support bar 10.

[0025] Two horizontally positioned, parallel second support bars 20 are positioned transversely to the two first support bars 10. Both two first support bars 10 are adjustably mounted to both two second support bars 20. The second support bars 20 comprise at least portion of second C-channel bars 21, wherein the first support bars 10 may be slidably adjusted along the C-channels of the second C-channel bars 21. In one embodiment, the whole second support bar 20 is the second C-channel bar 21. In one embodiment, the second C-channel bar 21 is implemented on the second support bar 20 partially, for example by attaching a piece of the second C-channel bar 21 onto the second support bar 20. The number of first C-channel bars 11 may vary; in one embodiment the mounting bracket comprises one first C-channel bar 11, in one embodiment the mounting bracket comprises two C-channel bars 1. In one embodiment the mounting bracket comprises multiple C-channel bars 11 according to the requirements set by the bottom plates of the cooling equipment 1.

[0026] Together the first C-channel bars 11 and the second C-channel bars 21 provide stepless adjustability to two dimensions along a horizontal plane. The arrangement allows the cooling equipment 1 to be moved, even after it has been lowered onto the mounting bracket. During the lowering stage the mounting bracket may be easily adjusted to correct position.

[0027] At least two stands 30 are mounted between the second support bars 20 and a solid platform 2. The stands 30 provide vertical distance between the two second support bars 20 and the solid platform 2. The stands 30 may be vertical, tilted or connected to a wall-mount structure. In one embodiment, the stands 30 are a portion of the wall-mount structure. In one embodiment, the mounting bracket comprises four stands 30 mounted to opposite ends of the second support bars 20. In an embodiment, at least one stand 30 comprises a hollow vertical bar 30 configured to slidably receive a vertical C-channel bar 31. Third tightening means are configured to tighten the vertical C-channel bar 31 against an inner wall of the hollow vertical bar 30, wherein the length of the stand 30 is adjustable. The continuous, stepless adjustability of the stand 30 enables the mounting bracket to be installed onto various uneven or tilted surfaces.

[0028] FIG. 3 illustrates one example of an embodiment, showing a profile view of two C-channels 8, 9 opening upwards. In one embodiment, the first C-channel bar 11 is a lipped C-channel bar 9. In one embodiment, the second C-channel bar 21 is a lipped C-channel bar 9. A C-channel bar 8 comprises a bottom portion 5 and two flanges 6 are positioned transversely to the bottom portion, wherein a channel is formed between the three sides. The lipped C-channel bar 9 comprises two flanges 7 that are parallel to the bottom portion 5. Between the two flanges 7 is an opening for the channel, along which the elements may be adjusted. Different embodiments of the C-channel 8 or the lipped C-channel 9 may be used. The wall profile may be curved or the two flanges may curve towards the bottom portion 5. In one embodiment, the C-channel or the lipped C-channel is a portion of different profile, such as a H-profile having two opposite C-profiles interconnected by the bottom portions 5.

[0029] The mounting bracket may be made of metal, such as steel, aluminium or an alloy. In one embodiment, the mounting bracket is made of galvanized, powder-coated steel. In one embodiment, the mounting bracket is made of composite material.

[0030] FIG. 4 illustrates two projections to the horizon-

tal elements of the mounting bracket according to one example of one embodiment, the first support bar 10 and the second support bar 20. The mounting bracket comprises tightening means for tightening the elements against each other; first tightening means for tightening the mounting platform 40 or the bottom plate of the cooling equipment 1 to the first C-channel bar 11; second tightening means for tightening the first C-channel bar 11 to the second C-channel bar 21; and third tightening means for tightening the stand 30 against to the vertical C-channel bar 31. In one embodiment the first, second and third tightening means are similar, wherein one example of tightening means is illustrated in FIG. 4.

[0031] The second tightening means 22 comprise a threaded bolt 23 configured to pass through a wall of the first C-channel bar 11. A threaded counterpart 24 is configured to slidably move inside the lipped second C-channel bar 21. In one embodiment, the threaded counterpart is a nut, a rounded nut, a square nut or a device configured to slide inside the C-channel and tighten against the walls or flanges of the C-channel. In one embodiment travel of the threaded counterpart 24 inside the C-channel may be controlled from a distance, for example via a wire extending to the C-channel. The threaded counterpart 24 is larger than an elongated opening of the lipped second C-channel bar 21, wherein the opening is defined between the two flanges 7. Tightening the bolt 23 to the counterpart 24 causes the first C-channel bar 11 to tighten on the lipped second C-channel bar 21. Similar tightening procedure may be applied to the first tightening means 12. The third tightening means comprise a threaded bolt 23 configured to pass through a wall of the hollow vertical bar 30. A threaded counterpart 24 is configured to slidably move inside the vertical C-channel bar 31, wherein tightening the bolt 23 to the counterpart 24 causes the hollow vertical bar 30 to tighten on the vertical C-channel bar 31.

[0032] In one embodiment, the mounting bracket has the first C-channel 11 positioned over the second C-channel 12, wherein the channels of the first C-channel 11 and the second C-channel 12 open upwards when the mounting bracket is in an operating position. The operating position occurs when the cooling equipment 1 is positioned onto the mounting bracket.

[0033] FIG. 5 illustrates schematically one example of an embodiment with top projection, wherein the first support bars 10 and the second support bars 20 are configured having a rectangular horizontal shape. First ends of the two parallel second support bars 20 are connected by a first fixed support member 51 and second ends of the two parallel second support bars 20 are connected by a second fixed support member 52. The first fixed support member 51 and the second fixed support member 52 provide stability to the horizontal structure. The first support bars 10 may be moved easily along the second C-channel bars 20 as the horizontal structure is rigid. The stands 40 may be mounted to the corners, where the second support bars 20 interconnect with the first fixed support member 51 and the second fixed support member 52.

[0034] The structure described hereinbefore may be combined with additional portions. For example, a continuing structure may be used to continue the second support bars 20 and/or the second C-channel bar for enabling installation of multiple cooling equipments on the same row. The continuing structure may comprise at least two stands 30 and any amount of first support bars 10 or first C-channel bars. The continuing structure may be mounted to the mounting bracket, wherein the additional second C-channel bars 21 may continue in the same direction as with the original mounting bracket.

[0035] Any range or device value given herein may be extended or altered without losing the effect sought.

[0036] Although at least a portion of the subject matter has been described in language specific to structural features and/or acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as examples of implementing the claims and other equivalent features and acts are intended to be within the scope of the claims.

[0037] It will be understood that the benefits and advantages described above may relate to one embodiment or may relate to several embodiments. The embodiments are not limited to those that solve any or all of the stated problems or those that have any or all of the stated benefits and advantages. It will further be understood that reference to 'an' item refers to one or more of those items.

[0038] The term 'comprising' is used herein to mean including the elements identified, but that such elements do not comprise an exclusive list and the apparatus may contain additional elements.

[0039] It will be understood that the above description is given by way of example only and that various modifications may be made by those skilled in the art. The above specification, examples and data provide a complete description of the structure and use of exemplary embodiments. Although various embodiments have been described above with a certain degree of particularity, or with reference to one or more individual embodiments, those skilled in the art could make numerous alterations to the disclosed embodiments without departing from the spirit or scope of this description.

Claims

1. A mounting bracket for a cooling equipment (1), comprising:

   two horizontally positioned, parallel first support bars (10) providing two mounting platforms (40) for the cooling equipment (1), wherein the mounting platforms (40) to the cooling equip-

ment (1) are adjustable along the first support bars (10);
two horizontally positioned, parallel second support bars (20) positioned transversely to the two first support bars (10); wherein both two first support bars (10) are adjustably mounted to both two second support bars (20);
at least two stands (30) mounted between the second support bars (20) and a solid platform (2), configured to provide distance between the two second support bars (20) and the solid platform (2), **characterized in that**:

the first support bars (10) comprise first C-channel bars (11), wherein the mounting platforms (40) to the cooling equipment (1) are adjustable along the first C-channel bars (11); and
the second support bars (20) comprise second C-channel bars (21),
wherein the adjustable mounts to two first support bars (10) are adjustable along the second C-channel bars (21).

2. A mounting bracket according to claim 1, **characterized by** the first support bars (10) being the first C-channel bars (11).

3. A mounting bracket according to claim 1 or claim 2, **characterized by** the second support bars (20) being the second C-channel bars (21).

4. A mounting bracket according to any of the claims 1 to 3, **characterized in that** the first C-channel bars (11) and the second C-channel bars (21) are lipped C-channel bars.

5. A mounting bracket according to any of the claims 1 to 4, **characterized by** comprising four stands (30) mounted to opposite ends of the second support bars (20).

6. A mounting bracket according to any of the claims 1 to 5, **characterized by** the mounting platform (40) comprising first tightening means (12) configured to tighten the mounting platform (40) to at least one first C-channel bar (11).

7. A mounting bracket according to claim 6, **characterized in that** the first tightening means (12) comprise a threaded bolt (23) configured to pass through an opening at a bottom plate of the cooling equipment (1); and a threaded counterpart (24) configured to slidably move inside the lipped first C-channel bar (11), the threaded counterpart (24) being larger than an elongated opening of the lipped first C-channel bar (11), wherein tightening the bolt (23) to the counterpart (24) causes the bottom plate of the cooling equipment (1) to tighten on the lipped first C-channel bar (11).

8. A mounting bracket according to any of the claims 1 to 7, **characterized by** comprising second tightening means (22) configured to tighten the first C-channel bar (11) to at least one second C-channel bar (21).

9. A mounting bracket according to claim 8, **characterized in that** the second tightening means (22) comprise a threaded bolt (23) configured to pass through a wall of the first C-channel bar (11); and a threaded counterpart (24) configured to slidably move inside the lipped second C-channel bar (21), the threaded counterpart (24) being larger than an elongated opening of the lipped second C-channel bar (21), wherein tightening the bolt (23) to the counterpart (24) causes the first C-channel bar (11) to tighten on the lipped second C-channel bar (21).

10. A mounting bracket according to any of the claims 1 to 9, **characterized in that** at least one stand (30) comprises a hollow vertical bar configured to slidably receive a vertical C-channel bar and third tightening means to tighten the vertical C-channel bar (31) against an inner wall of the hollow vertical bar (30), wherein the length of the stand (30) is adjustable.

11. A mounting bracket according to claim 10, **characterized in that** the third tightening means comprise a threaded bolt (23) configured to pass through a wall of the hollow vertical bar (30); and a threaded counterpart (24) configured to slidably move inside the vertical C-channel bar (31), wherein tightening the bolt (23) to the counterpart (24) causes the hollow vertical bar (30) to tighten on the vertical C-channel bar (31).

12. A mounting bracket according to any of the claims 1 to 11, **characterized in that** a channel of the first C-channel (11) opens upwards when the mounting bracket is in an operating position.

13. A mounting bracket according to any of the claims 1 to 12, **characterized in that** a channel of the second C-channel (21) opens upwards when the mounting bracket is in an operating position.

14. A mounting bracket according to any of the claims 1 to 13, **characterized in that** first ends of the two parallel second support bars (20) are connected by a first fixed support member (51) and second ends of the two parallel second support bars (20) are connected by a second fixed support member (52).

15. A mounting bracket according to any of the claims 1 to 13, **characterized in that** the counterpart (24) is a square nut.

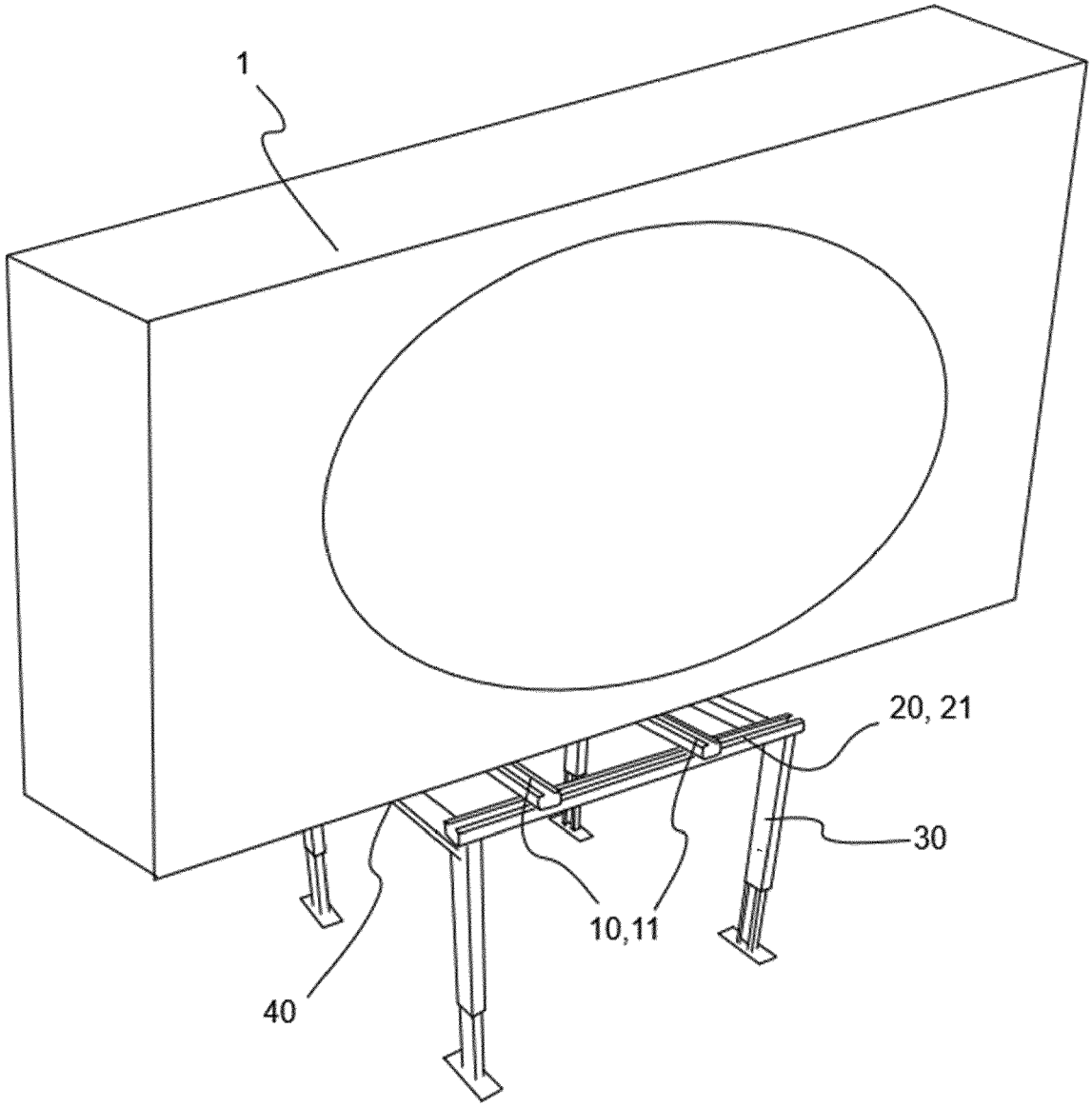

Fig. 1

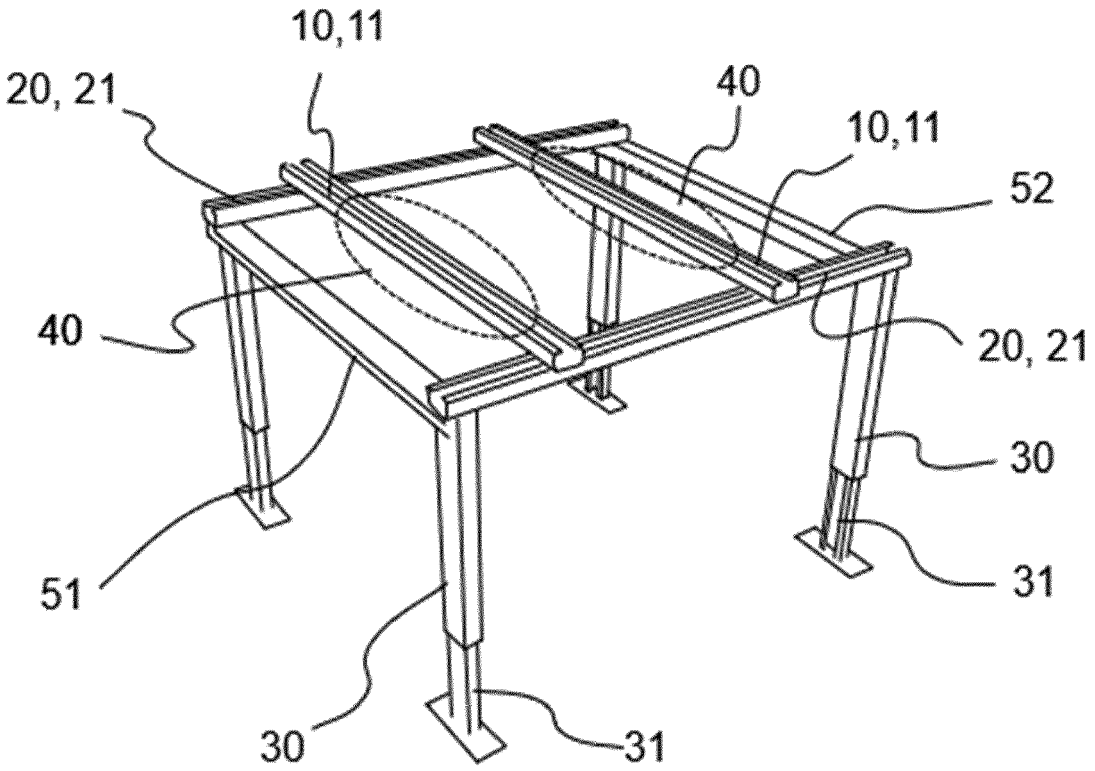

Fig. 2

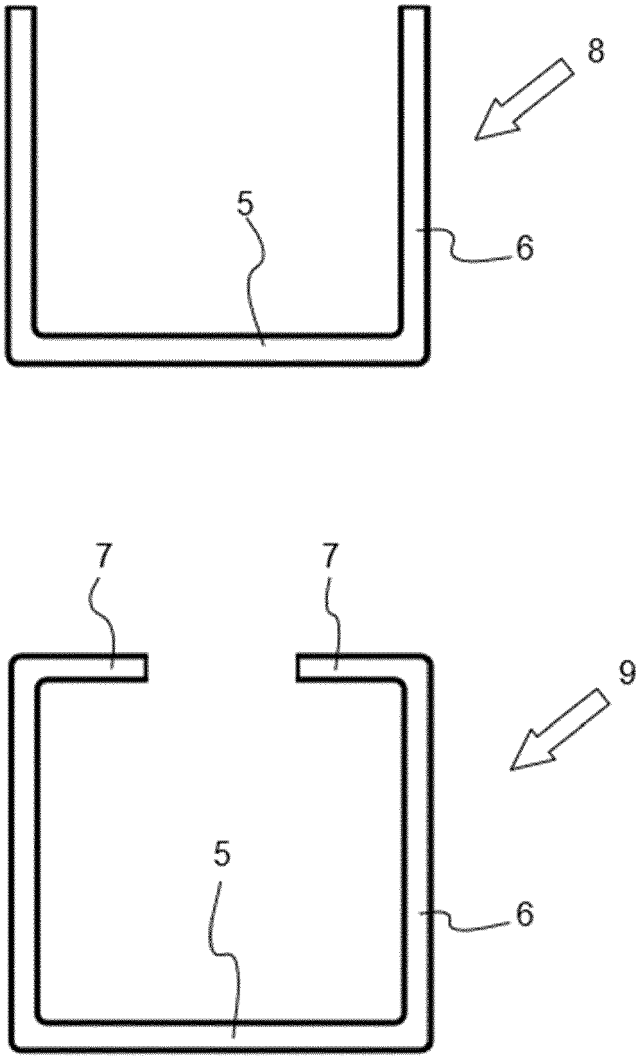

Fig. 3

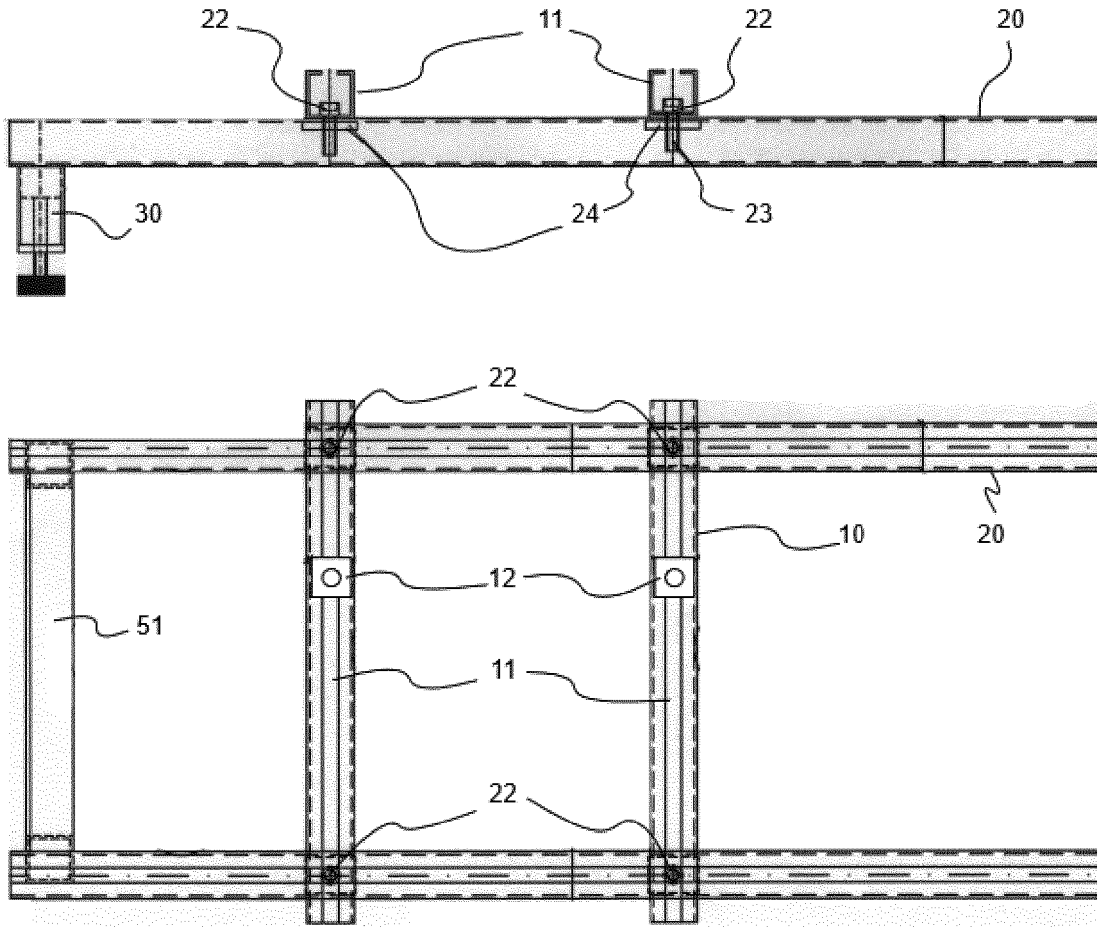

Fig. 4

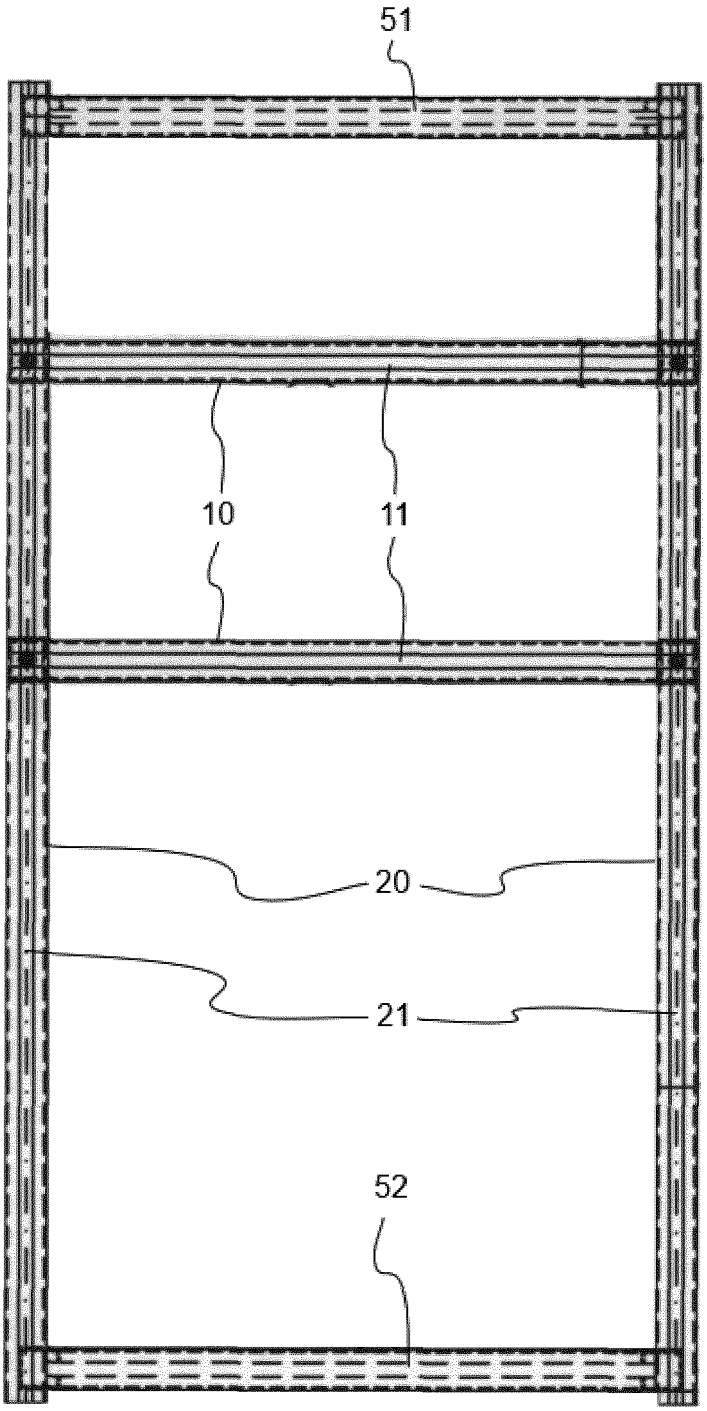

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 6937

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)
F24F
F16M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 February 2018	de Graaf, Jan Douwe

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 18 6937

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