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(54) **ACCESS STRUCTURE FOR MODULAR BUILDINGS**

ZUGANGSSTRUKTUR FÜR MODULARE GEBÄUDE

STRUCTURE D'ACCÈS POUR CONSTRUCTIONS MODULAIRES

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to an access structure for modular buildings.

BACKGROUND OF THE INVENTION

[0002] A modular building is a building which is manufactured as individual modules, which can be arranged in different ways to form the building, by means of a single module or several modules. Often these kinds of buildings are temporarily used for some weeks up to some years. Modular buildings include many different buildings, from small site cabins to large multi storey buildings. The modular buildings have to be complemented on site with an access structure, in particular for floors above ground floor, where people otherwise have no access. The access structure includes some kind of base platform, outside the entrance door of the module, and, at least above ground floor, a stair.

Current access structures are often built of wood, which is not satisfactory. The problems are inter alia that the strength of the wooden structures is never calculated, and they are not fire-rated. Besides, they are time consuming to build. There are also access structures built of steel by means of scaffolding, which are neither strength calculated for these kind of applications, nor adapted for use by any person. Therefore, application specific arrangements and complements must be done. Further alternatives are steel structures, which are primarily fastened in the modules, and more particularly in their fork lift pockets. If there are no forklift pockets they are impossible or most difficult to use at all. When the modular building is to be demounted and removed, the current access structures are cumbersome to remove. US3788016 A discloses one example of a mountable and demountable access structure for modular buildings according to the preamble of claim 1. It is a portable porch unit for a mobile home. The access structure has a steel framework module containing many parts which are assembled and deassembled.

SUMMARY OF THE INVENTION

[0003] It would be advantageous to provide a solution for an access structure, which is quick to mount and causes no or little damage to the modular building. This and other objects are achieved by an access structure according to claim 1 and by a method of mounting an access structure according to claim 14. According to the invention there is presented an access structure for modular buildings, wherein the access structure is self-contained and comprises a stackable framework module, which has an overall box shape in a mounting state. The framework module comprises vertical and horizontal edge beams, top interconnection portions, for interconnection with another framework module stacked on top of the framework module, bottom interconnection portions, for interconnection with another framework module on top of which the framework module is stacked, an entrance stairway connection portion, a floor and a roof. Thereby, an access structure is provided, which can be used with both single story and multi storey modular buildings, and which is easy to mount and demount at the modular building.

[0004] In accordance with an embodiment of the access structure the framework module is positionable at a distance from the modular building, in order to facilitate access to the connections at the wall of the modular building. The framework module has a front side and a rear side, and the roof comprises a sliding part, which is slidable between a position where it has been slided to protrude at the front side, thereby providing an opening through the roof letting a person pass and a position where it has been slided to protrude at the rear side. It is common that the modular building has for instance wall connections for sanitary conduits at floor level, which are hereby given space for. In addition to facilitating mounting, the slidable part of the roof adds a flexibility to the structure as regards the positioning of the structure relative to the modular building with a similar weather protection.

[0005] In accordance with an embodiment of the access structure it comprises an additional floor part, which is arrangeable to cover the distance between the framework module and the modular building at floor level.

[0006] In accordance with an embodiment of the access structure the edge beams comprise bottom beams defining a bottom frame, and floor beams defining a floor frame carrying the floor, wherein the floor frame is positioned a distance above the bottom frame. Thereby the floor is levelled with the entrance door of the module, and room is created beneath the floor for providing fork lift pockets and connection possibilities for additional parts stairways and fence posts, which may be included in the access structure.

[0007] In accordance with an embodiment of the access structure the edge beams comprise vertical corner beams defining four corners of the framework module, and top beams defining a top frame, wherein the corner beams comprise end protrusions, which protrude above the top frame, wherein the top interconnection portions comprise the end protrusions. Thereby a simple yet reliable structure is obtained, and the stacking of the access structures is facilitated.

[0008] In accordance with an embodiment of the access structure the framework module is collapsible and raisable between a collapsed state and a raised state. This embodiment has the advantage of reduced storage and transporting volume.

[0009] In accordance with an embodiment of the access structure the edge beams comprise corner posts defining four corners of the framework module, and top beams defining a top frame connected with the vertical corner beams at a top portion of corner posts, wherein

each corner post is foldable.

[0010] In accordance with an embodiment of the access structure each corner post comprises an upper portion and a lower portion, which are hingedly interconnected at a first hinge portion, wherein the upper portion is hingedly and displaceably connected with the top portion, which is fixedly connected with the top frame, and wherein the lower portion is hingedly interconnected with a fixed bottom portion of the corner post at a second hinge portion.

[0011] In accordance with an embodiment of the access structure each top portion comprises a recess, and wherein each upper portion comprises a pin at an upper end of the upper portion, wherein the pin is arranged to be engaged with the recess when the framework module is in the raised state, and thereby to lock the interconnection between the upper portion and the top portion.

[0012] In accordance with an embodiment of the access structure the framework module comprises a first sleeve, which is arranged at one of the corner posts, and which is movable along the corner post.

[0013] In accordance with an embodiment of the access structure each of the corner posts is provided with a first sleeve, which, in the raised state, is arranged to be positioned at the first hinge portion and lock the first hinge portion. By being positioned at the first hinge portion and thereby covering the hinge portion, the sleeve locks the upper and lower parts in the unfolded straight position and thereby prevents the corner post from folding.

[0014] In accordance with an embodiment of the access structure each corner post is provided with a second sleeve, which is movable along the corner post, and which is arranged to lock the second hinge portion when the framework module is in the raised state. Consequently, the second sleeves serve a similar purpose for the second hinge portions as the first sleeves serve for the first hinge portions.

[0015] In accordance with an embodiment of the access structure each one of the first hinge portions comprises a stiffening element, which is operable to stiffen the first hinge portion in the raised state. The stiffening elements are an additional security detail. The hinge portions are already secured by the sleeves to prevent them from folding. However, by additionally stiffening the hinge portions a second folding prevention is provided and additionally, the user perceives the structure as more rigid and safer since the minor play in the hinge portions when not stiffened is removed.

[0016] According to the invention there is provided a method of mounting an access structure for modular buildings. The method provides corresponding problem solutions and advantages as the access structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The invention will now be described in more detail and with reference to the appended drawings in which:

Fig. 1 is a schematic perspective view of an embodiment of the access structure according to the present invention:

Fig. 2 is a schematic perspective view of an embodiment of the access structure according to the invention mounted at a modular building;

Fig. 3 is a schematic perspective view of an embodiment of the access structure according to the invention mounted at a modular building;

Fig. 4 is a schematic perspective view of an embodiment of the access structure according to the invention showing an alternative mounting;

Figs. 5 to 8 are schematic perspective views illustrating raising a framework module included in the access structure from a collapsed state to a raised state.

DESCRIPTION OF EMBODIMENTS

[0018] According to an embodiment of the access structure 1 it comprises a stackable framework module 2, which has an overall box shape in a mounting state, as shown for example in Fig. 1. The framework module 2 comprises vertical and horizontal edge beams 3, 4, 5, 6, 7, top interconnection portions 8, for interconnection with another framework module 75, also included in the access structure 1, as shown in Fig. 2, stacked on top of the framework module 2, bottom interconnection portions 9, for interconnection with another framework module on top of which the framework module 2 is stacked, an entrance stairway connection portion 10, 70 a floor 11 and a roof 12. The edge beams are e.g. made by square tubes, but any useful beam profile will do as recognized by the person skilled in the art. Some of the edge beams constitute bottom beams 3, which define a bottom frame 13, and floor beams 4, which define a floor frame 14. More particularly, the bottom frame 13 and the floor frame 14 are two rectangles of edge beams, one on top of the other, with a distance between them. The floor 11 is attached to the floor frame 14. The bottom frame 13 rests on the ground.

[0019] The roof 12 comprises a fixed part 16 extending from a front side 17 of the framework module 2 and towards a rear side 18 of the framework module 2, covering a fraction of the distance between the front side 17 and the rear side 18. The front side 17 can also be defined as a vertical side plane defined by some of the edge beams, and the rear side 18 can also be defined as a vertical side plane defined by the some other of the edge beams. The fixed part 16 covers about half the depth of the framework module 2, i.e. the distance from between the front side 17 and the rear side 18. Further, the roof 12 comprises a sliding roof part 19, which is slidable between an open position, and a rearwards protruding position. In the open position, the sliding roof part 19 provides an opening extending across about a rear half of

the depth of the framework module 2. The opening provides for the passage of a person who is to fasten the framework module 2 at the modular building, as will be explained below, or do some other work requiring access to the top area of the framework module 2, the modular building, or another framework module 75 placed on top of the first one. In the rearwards protruding position, the sliding roof part 19 protrudes from the rear side 18. Typically, the sliding roof part 19 has been pushed into abutment against the wall of the modular building in order to shield the entrance to the modular building from rain.

[0020] Furthermore, the edge beams 3-7 comprise vertical corner beams 6 defining four corners of the framework module, and top beams 7 defining a top frame 21. Each one of the vertical corner beams 6 comprises an end protrusion 22, which protrudes above the top frame 21. The end protrusions 22 are comprised in the above-mentioned top interconnection portions 8.

[0021] Furthermore, in this embodiment, the framework module 2 is raisable and collapsible, and it is shown in a collapsed state in Fig. 5, and in a raised state in, for instance, Fig. 1. In order to obtain this the edge beams 3-7 comprise corner posts 23, comprising the corner beams 6, and defining four corners of the framework module 2, wherein each corner post 23 is foldable. The corner posts 23 are connected with the top frame 21 at a top portion 27 of each corner post 23.

[0022] Each corner post 23 comprises an upper portion 24 and a lower portion 25, which are hingedly interconnected, at a common first hinge portion 26. Additionally, the upper portion 24 is hingedly and displaceably connected with the top portion 27, which is fixedly connected with the top frame 21. The lower portion 25 is hingedly connected, at a second hinge portion 67, with a fixed bottom portion 28 of the corner post 23. Furthermore, each top portion 27 comprises a vertically, i.e. along the length of the top portion 27, elongated through hole 29, and a recess 30, which opens to one side of the top portion 27. The recess 30 is positioned below the through hole 29. Each upper portion 24 comprises two pins 31, 32, an upper pin 31 and a lower pin 32, at an upper end of the upper portion 24. The upper pin 31 extends through the through hole 29, and thereby forms a hinge. The lower pin 32 is arranged to be engaged with the recess 30 when the framework module 2 is in the raised state, and thereby to lock the interconnection between the upper portion and the top portion. The length of the through hole 29 exceeds the width of the upper pin 31, which is thus arranged with a play in the through hole 29. The recess 30 extends obliquely towards the top of the top portion 27 forming a seat where the lower pin 32 can be retained.

[0023] The framework module 2 further comprises at least one first sleeve 33, and in this embodiment four first sleeves, each arranged at a respective one of the corner posts 23. The sleeves 33 are movable along the corner posts 23. The first sleeve 33 is meant to be positioned at the first hinge portion 26 to enclose and lock the first hinge portion 26 when the framework module 2 is in the raised state.

[0024] Each corner post 23 is, additionally, provided with a second sleeve 35, which is movable along the corner post 23, and which is arranged to lock a second hinge portion 67, i.e. the hinged interconnection between the lower portion and the bottom portion when the framework module is in the raised state.

[0025] Furthermore, the each one of the first and second hinge portions 26, 67 comprises a stiffening element 69, such as a screw acting on a locking member. In this embodiment, the hinge portion 26, 67 has two hinges and a middle element, admitting the upper and lower parts 24, 25 fold 180 degrees, and the stiffening element 69 is a screw arranged in the middle element. When the screw is tightened it protrudes into abutment against the inner wall of the sleeve 33, 35. Thereby the hinge portion 26, 67 is simultaneously forced against the opposite inner wall of the sleeve 33, 35 and a stiff portion is achieved. In other words, when the stiffening element 69 at the first hinge portion 26 is tightened the first hinge portion 26 is stiffened, i.e. the upper and lower portions 24, 25 are fixed relative to each other by the locking element clamping them towards the inner wall of the sleeve 33. The similar stiffening is obtained at the second hinge portion 67 by tightening the stiffening element 69 at the second hinge portion 67. Thereby the user perceives the framework module 2 more stable and rigid, although it is not necessary from a perspective of strength. The first and second sleeves 33, 35 are each provided with a hole giving access to the stiffening element 69 through the wall of the sleeve 33, 35 when the sleeves 33, 35 are positioned at the first and second hinge portions 26, 67.

[0026] It should be noted that even if all sleeves 33, 35 are moved away from the hinge portions 26, 67, and no stiffening element 69 has been tightened, the framework module 2 will keep standing due to the pin locking arrangement at the top of the corner posts 23.

[0027] According to an embodiment of the access structure 15 shown in Fig. 2 it comprises first and second framework modules 2, 75; fences 36, 37 for the respective framework module 2, 75; a first stairway 38 for the first framework module 2; and a second stairway 39 for reaching the second framework module 75. Both stairways 38, 39 are however mounted at the first framework module 2, at respective bottom and top entrance stairway connection portions 10, 70. Thus, in this embodiment, the bottom entrance stairway connection portion 10 used by the first stairway 38 simply is provided by the edge beams 3, 4 of the bottom frame 13 and the floor frame 14, while the top entrance stairway connection portion 70 used by the second stairway 39 is an end beam 7 of the top frame 21. Each stairway 38, 39 comprises a hook portion, which engages with the edge beams to hold the stairway 38, 39 in place. The second stairway 39 is a long stairway adapted to reach the first floor, from the ground. In order to have the second stairway 39 mounted at about the same angle irrespective of unevenness of the ground, it is provided with an extension bottom part

40.

[0028] Referring to Fig. 3, the framework module 42 is provided with a fixed roof part 43, as however best seen in Fig. 4, and a sliding roof part 44 comprising three roof pieces 45, 46, 47, constituted by two side pieces 45, 46 arranged at either side of a middle piece 47. When the side pieces 45, 46 are pulled forwards, i.e. out from the modular building 49 at which the framework module 42 is mounted, openings 50, 51 in the roof are obtained. In this mounting example the access structure 41 has been mounted at a long side of the modular building 49. A person is able to pass the openings 50, 51 from below and secure the framework module 42 to the modular building 49. For instance, the securing is made by means of straps 52, which are fastened on one hand at a centre loop 53 at a centre beam 5 of the top frame 55, and on the other hand at fork lift pockets of the modular building 49. The centre loop 53 can also be used for raising the framework module from the collapsed state. When no fork lift pockets are available other attachment are arranged, such as borings in the bottom portion of the modular building 49.

[0029] As shown in Fig. 4, the access structure 57 has been mounted at a minor distance from the modular building 58, and an end wall of the modular building 58, in order to make room for external connections of for instance water and sanitary conduits to a connection port 59 of the modular building 58 arranged at floor level thereof. The sliding roof part 44, i.e. all three roof pieces 45-47, has been pushed rearwards to protrude from the framework module 60 into abutment against the end wall of the modular building 58. Furthermore, the access structure 57 comprises an additional floor part 62, and additional fence parts 64. Thus, the floor 61 of the framework module 57 has been completed with the additional floor part 62, which has been mounted at the rear side of the framework module to cover the distance up to the entrance door of the modular building 58 at floor level, while leaving a floor opening at the connection port 59. Similarly, the fence 63 has been completed with the additional fence parts 64 closing the gaps.

[0030] As illustrated in Figs. 5-8, the framework module 2 is raised in the following way. In the collapsed state the corner posts 23 have been folded inwards and rest on the floor 11, extending along the floor 11 with the upper portions 24 on top of the lower portions 25. Thereby the framework module 2 is very compact with a height that is only a fraction of its height in the raised state. The framework module 2 is locked in the collapsed state by means of a cotter pin 72 at each corner post 23. The cotter pin 72 works as a transport locking device. The cotter pin 72 extends through an apertures of the top portion 27 and the bottom portion 28 of the corner post 23. The framework module 2 can be raised with any suitable aid, such as a crane lorry. When using straps they can be fastened in for example merely the centre loop 53, or in corner loops 65 at the upper ends of the corner posts 23.

[0031] During the raising of the framework module 2 the corner posts 23 automatically unfolds, as illustrated in Fig. 6. When the corner posts 23 have been fully unfolded and have become straight, as shown in Fig. 7, the lower pin 32 at the upper end of the upper portion 24 of each corner post 23 has entered the recess 30 of the associated top portion 27. Similarly, the upper pin 31 is at a lower edge of the through hole 29. Then, the top frame 21 is slightly lowered causing the through hole 29 and the recess 30 to move relative to the upper and lower pins 31, 32. This movement results in that the lower pin 31 is fully received in the recess 30, as shown in Fig. 8, which thereby locks the lower pin 32, and consequently the upper and lower pins 31, 32 keeps the corner post 23 straight and prevents the corner post 23 from folding. This pin lock provides enough stability to the corner posts 23 to keep them from folding again when the lifting device is lowered to be loosened from the framework module 2. When the framework module 2 has been raised, the first sleeve 33 of each corner post 23 has moved down, by gravity, to a position where it locks the first hinge portion 26 between the upper and lower portions 24, 25 of the corner post 23. The first sleeve 33 is prevented from moving further down by a stop lug 66 comprised in the lower portion 25 just below the first hinge portion 26, see also Fig. 1. The second sleeve 35 of each corner post 23 has moved downwards as well, and locks the second hinge portion 67. Finally, the locking elements69 of the first and second sleeves 33, 35 are tightened. The framework module 2 is now ready to be lifted in place at a modular building.

[0032] While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive; the invention is not limited to the disclosed embodiments.

[0033] Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measured cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. A mountable and demountable access structure for modular buildings, wherein the access structure (1) comprises a framework module (2), which has an overall box shape in a mounting state, wherein the framework module comprises vertical and horizontal edge beams (3, 4, 5, 6, 7), an entrance stairway con-

nection portion (10, 70), a floor (11) and a roof (12), **characterized in that** the access structure is self-contained, and **in that** the framework module is stackable and further comprises top interconnection portions (8), for interconnection with another framework module stacked on top of the framework module, and bottom interconnection portions (9), for interconnection with another framework module on top of which the framework module is stacked.

2. The access structure according to claim 1, wherein the framework module is positionable at a distance from the modular building, in order to facilitate access to the connections at the wall of the modular building, wherein the framework module (2) has a front side (17) and a rear side (18), wherein the roof (12) comprises a sliding part (19), which is slidable between a position where it has been slided to protrude at the front side, thereby providing an opening through the roof letting a person pass, and a position where it has been slided to protrude at the rear side.

3. The access structure according to claim 2, comprising an additional floor part (62), which is arrangeable to cover the distance between the framework module (2) and the modular building at floor level.

4. The access structure according to claim 1, 2, or 3, wherein the edge beams (3, 4, 5, 6, 7) comprise bottom beams (3) defining a bottom frame (13), and floor beams (4) defining a floor frame (14) carrying the floor (11), wherein the floor frame is positioned a distance above the bottom frame.

5. The access structure according to any one of the preceding claims, wherein the edge beams (3, 4, 5, 6, 7) comprise vertical corner beams (6) defining four corners of the framework module (2), and top beams (7) defining a top frame (21), wherein the corner beams comprise end protrusions (22), which protrude above the top frame, wherein the top interconnection portions (8) comprise the end protrusions.

6. The access structure according to any one of the preceding claims, wherein the framework module (2) is collapsible and raisable between a collapsed state and a raised state.

7. The access structure according to claim 6, wherein the edge beams (3, 4, 5, 6, 7) comprise corner posts (23) defining four corners of the framework module (2), and top beams (7) defining a top frame connected with the corner posts at a top portion (27) of the corner posts, wherein each corner post is foldable.

8. The access structure according to claim 7, wherein each corner post (23) comprises an upper portion (24) and a lower portion (25), which are hingedly interconnected at a first hinge portion (26), wherein the upper portion is hingedly and displaceably connected with the top portion (27), which is fixedly connected with the top frame (21), and wherein the lower portion is hingedly interconnected with a fixed bottom portion (28) of the corner post at a second hinge portion (67).

9. The access structure according to claim 8, wherein each top portion (27) comprises a recess (30), and wherein each upper portion (24) comprises a pin (32) at an upper end of the upper portion, wherein the pin is arranged to be engaged with the recess when the framework module (2) is in the raised state, and thereby to lock the interconnection between the upper portion and the top portion.

10. The access structure according to claim 8 or 9, wherein the framework module (2) comprises a first sleeve (33), which is arranged at one of the corner posts (23), and which is movable along the corner post.

11. The access structure according to claim 10, wherein each of the corner posts (23) is provided with a first sleeve (33), which, in the raised state, is arranged to be positioned at the first hinge portion (26) and lock the first hinge portion.

12. The access structure according to any one of claims 8 to 11, wherein each corner post (23) is provided with a second sleeve (35), which is movable along the corner post, and which is arranged to lock the second hinge portion (67) when the framework module (2) is in the raised state.

13. The access structure according to any one of claims 8 to 12, wherein each one of the first hinge portions (26) comprises a stiffening element (69), which is operable to stiffen the first hinge portion in the raised state.

14. A method of mounting an access structure for modular buildings, wherein the access structure (1) is according to claim 1, **characterized by**:

- lifting a first framework module in place at a modular building;
- lifting a second framework module in place on top of the first access structure, wherein the bottom interconnection portions (9) of the second framework module are engaged with the top interconnection portions (8) of the first framework module; and
- mounting an entrance stairway (38) at the entrance stairway connection portion at an upper portion of the first framework module.

15. The method according to claim 14, further comprising:

- moving a slidable part (19) of a roof (12) of the framework module (2) to obtain an opening, and securing a top portion of the framework module at the modular building through the opening.

Patentansprüche

1. Montierbare und demontierbare Zugangsstruktur für modulare Gebäude, wobei die Zugangsstruktur (1) ein Gerüstmodul (2), das im Montagezustand eine insgesamt kastenähnliche Form aufweist, umfasst, wobei das Gerüstmodul vertikale und horizontale Randträger (3, 4, 5, 6, 7), einen Verbindungsabschnitt für die Eingangstreppe (10, 70), einen Boden (11) und ein Dach (12) umfasst, **dadurch gekennzeichnet, dass** die Zugangsstruktur eigenständig ist, und das Gerüstmodul stapelbar ist und ferner obere Verbindungsabschnitte (8) für die Verbindung mit einem anderen Gerüstmodul, das über dem Gerüstmodul gestapelt ist, und untere Verbindungsabschnitte (9) für die Verbindung mit einem anderen Gerüstmodul, auf dem das Gerüstmodul gestapelt ist, umfasst.

2. Zugangsstruktur nach Anspruch 1, wobei das Gerüstmodul in einem Abstand vom modularen Gebäude positionierbar ist, um Zugang zu den Verbindungen an der Wand des modularen Gebäudes zu ermöglichen, wobei das Gerüstmodul (2) eine Vorderseite (17) und eine Rückseite (18) aufweist, wobei das Dach (12) einen Schiebeteil (19) umfasst, der zwischen einer Position verschiebbar ist, wo er verschoben wurde, um an der Vorderseite vorzustehen, um dadurch eine Öffnung durch das Dach bereitzustellen, damit eine Person passieren kann, und einer Position, wo er verschoben wurde, um an der Rückseite vorzustehen.

3. Zugangsstruktur nach Anspruch 2, umfassend einen zusätzlichen Bodenteil (62), der angeordnet werden kann, um den Abstand zwischen dem Gerüstmodul (2) und dem modularen Gebäude auf Bodenhöhe abzudecken.

4. Zugangsstruktur nach Anspruch 1, 2 oder 3, wobei die Randträger (3, 4, 5, 6, 7) untere Träger (3), die ein unteres Gerüst (13) definieren, und Bodenträger (4), die ein Bodengerüst (14) definieren, das den Boden (11) trägt, umfassen, wobei das Bodengerüst in einem Abstand über dem unteren Gerüst positioniert ist.

5. Zugangsstruktur nach einem der vorhergehenden Ansprüche, wobei die Randträger (3, 4, 5, 6, 7) vertikale Eckträger (6) umfassen, die vier Ecken des Gerüstmoduls (2) definieren, und obere Träger (7), die ein oberes Gerüst (21) definieren, wobei die Eckträger Endvorsprünge (22), die aus dem oberen Gerüst vorstehen, umfassen, wobei die oberen Verbindungsabschnitte (8) die Endvorsprünge umfassen.

6. Zugangsstruktur nach einem der vorhergehenden Ansprüche, wobei das Gerüstmodul (2) zusammenklappbar und aufklappbar zwischen einem zusammengeklappten Zustand und einem aufgeklappten Zustand ist.

7. Zugangsstruktur nach Anspruch 6, wobei die Randträger (3, 4, 5, 6, 7) Eckstützen (23) umfassen, die vier Ecken des Gerüstmoduls (2) definieren, und obere Träger (7), die ein oberes Gerüst, das mit den Eckstützen am oberen Abschnitt (27) der Eckstützen verbunden ist, definieren, wobei jede Eckstütze klappbar ist.

8. Zugangsstruktur nach Anspruch 7, wobei jede Eckstütze (23) einen oberen Abschnitt (24) und einen unteren Abschnitt (25) umfasst, die gelenkig miteinander an einem ersten Gelenkabschnitt (26) verbunden sind, wobei der obere Abschnitt gelenkig und verschiebbar mit dem oberen Abschnitt (27) verbunden ist, der fest mit dem oberen Gerüst (21) verbunden ist, und wobei der untere Abschnitt gelenkig mit einem festen unteren Abschnitt (28) der Eckstütze an einem zweiten Gelenkabschnitt (67) verbunden ist.

9. Zugangsstruktur nach Anspruch 8, wobei jeder obere Abschnitt (27) eine Aussparung (30) umfasst, und wobei jeder obere Abschnitt (24) einen Bolzen (32) am oberen Ende des oberen Abschnitts umfasst, wobei der Bolzen so angeordnet ist, dass er in der Aussparung einrastet, wenn das Gerüstmodul (2) im aufgeklappten Zustand ist, und dadurch die Verbindung zwischen dem oberen Abschnitt und dem oberen Teil sperrt.

10. Zugangsstruktur nach Anspruch 8 oder 9, wobei das Gerüstmodul (2) eine erste Muffe (33) umfasst, die an einer der Eckstützen (23) angeordnet ist, und entlang der Eckstütze beweglich ist.

11. Zugangsstruktur nach Anspruch 10, wobei jede der Eckstützen (23) mit einer ersten Muffe (33) versehen ist, die im aufgeklappten Zustand so angeordnet ist, dass sie am ersten Gelenkabschnitt (26) positioniert wird und den ersten Gelenkabschnitt sperrt.

12. Zugangsstruktur nach einem der Ansprüche 8 bis 11, wobei jede Eckstütze (23) mit einer zweiten Muffe (35) versehen ist, die entlang der Eckstütze bewegbar ist, und die so angeordnet ist, dass sie den

zweiten Gelenkabschnitt (67) sperrt, wenn das Gerüstmodul (2) im aufgeklappten Zustand ist.

13. Zugangsstruktur nach einem der Ansprüche 8 bis 12, wobei jeder der ersten Gelenkabschnitte (26) ein erstes Versteifungselement (69), das betätigt werden kann, um den ersten Gelenkabschnitt im aufgeklappten Zustand zu versteifen, umfasst.

14. Verfahren zum Montieren einer Zugangsstruktur für modulare Gebäude, wobei die Zugangsstruktur (1) nach Anspruch 1 ist,
gekennzeichnet durch:

- Platzieren eines ersten Gerüstmoduls an einem modularen Gebäude;
- Platzieren eines zweiten Gerüstmoduls auf die erste Zugangsstruktur, wobei die unteren Verbindungsabschnitte (9) des zweiten Gerüstmoduls mit den oberen Verbindungsabschnitten (8) des ersten Gerüstmoduls eingerastet werden; und
- Montieren einer Eingangstreppe (38) am Verbindungsabschnitt für die Eingangstreppe an einem oberen Abschnitt des ersten Gerüstmoduls.

15. Verfahren nach Anspruch 14, ferner umfassend:

- Bewegen eines verschiebbaren Teils (19) eines Dachs (12) des Gerüstmoduls (2), um eine Öffnung zu erhalten und einen oberen Abschnitt des Gerüstmoduls am modularen Gebäude durch die Öffnung zu sichern.

Revendications

1. Structure d'accès montable et démontable pour constructions modulaires, dans laquelle la structure d'accès (1) comprend un module de châssis (2) qui a une forme générale de boîte dans un état de montage, dans laquelle le module de châssis comprend des poutres de bord verticales et horizontales (3, 4, 5, 6, 7), une partie de connexion d'escalier d'entrée (10, 70), un sol (11) et un toit (12), **caractérisée en ce que** la structure d'accès est autonome, et **en ce que** le module de châssis est empilable et comprend en outre des parties d'interconnexion de dessus (8), pour l'interconnexion avec un autre module de châssis empilé sur le dessus du module de châssis, et des parties d'interconnexion de dessous (9) pour l'interconnexion avec un autre module de châssis sur le dessus duquel le module de châssis est empilé.

2. Structure d'accès selon la revendication 1, dans laquelle le module de châssis peut être positionné à une distance de la construction modulaire afin de faciliter l'accès aux connexions sur le mur de la construction modulaire, dans laquelle le module de châssis (2) a une face avant (17) et une face arrière (18), dans laquelle le toit (12) comprend une partie coulissante (19) qui peut coulisser entre une position où elle a été coulissée pour faire saillie sur la face avant, fournissant ainsi une ouverture à travers le toit, laissant une personne passer, et une position où elle a été coulissée pour faire saillie sur la face arrière.

3. Structure d'accès selon la revendication 2, comprenant une partie de sol (62) supplémentaire qui peut être agencée pour couvrir la distance entre le module de châssis (2) et la construction modulaire au niveau du sol.

4. Structure d'accès selon la revendication 1, 2 ou 3, dans laquelle les poutres de bord (3, 4, 5, 6, 7) comprennent des poutres de dessous (3) définissant un cadre de dessous (13) et des poutres de sol (4) définissant un cadre de sol (14) portant le sol (11), dans lequel le cadre de sol est positionné à distance au-dessus du cadre de dessous.

5. Structure d'accès selon l'une quelconque des revendications précédentes, dans laquelle les poutres de bord (3, 4, 5, 6, 7) comprennent des poutres d'angle verticales (6) définissant quatre angles du module de châssis (2), et des poutres de dessus (7) définissant un cadre de dessus (21), dans laquelle les poutres d'angle comprennent des saillies d'extrémité (22) qui font saillie au-dessus du cadre supérieur, dans laquelle les parties d'interconnexion de dessus (8) comprenant les saillies d'extrémité.

6. Structure d'accès selon l'une quelconque des revendications précédentes, dans laquelle le module de châssis (2) est pliable et relevable entre un état plié et un état relevé.

7. Structure d'accès selon la revendication 6, dans laquelle les poutres de bord (3, 4, 5, 6, 7) comprennent des piliers d'angle (23) définissant quatre angles du module de châssis (2), et des poutres de dessus (7) définissant un cadre de dessus connecté aux piliers d'angle sur une partie de dessus (27) des piliers d'angle, dans laquelle chaque pilier d'angle est pliable.

8. Structure d'accès selon la revendication 7, dans laquelle chaque pilier d'angle (23) comprend une partie supérieure (24) et une partie inférieure (25) qui sont interconnectées de manière articulée sur une première partie de charnière (26), dans laquelle la partie supérieure est reliée de manière articulée et déplaçable à la partie de dessus (27) qui est reliée fixement au cadre de dessus (21), et dans laquelle la partie inférieure est interconnectée de manière articulée à une partie de dessous fixe (28) du pilier

d'angle sur une seconde partie de charnière (67).

9. Structure d'accès selon la revendication 8, dans laquelle chaque partie de dessus (27) comprend un creux (30) et dans lequel chaque partie supérieure (24) comprend une broche (32) à une extrémité supérieure de la partie supérieure, dans laquelle la broche est agencée pour être engagée avec le creux lorsque le module de châssis (2) est dans l'état relevé, et ainsi pour verrouiller l'interconnexion entre la partie supérieure et la partie de dessus.

10. Structure d'accès selon la revendication 8 ou 9, dans laquelle le module de châssis (2) comprend un premier manchon (33) qui est agencé sur un des piliers d'angle (23) et qui est mobile le long du pilier d'angle.

11. Structure d'accès selon la revendication 10, dans laquelle chacun des piliers d'angle (23) est doté d'un premier manchon (33) qui, dans l'état relevé, est agencé pour être positionné sur la première partie de charnière (26) et verrouille la première partie de charnière.

12. Structure d'accès selon l'une quelconque des revendications 8 à 11, dans laquelle chaque pilier d'angle (23) est doté d'un second manchon (35) qui est mobile le long du pilier d'angle et qui est agencé pour verrouiller la seconde partie de charnière (67) lorsque le module de châssis (2) est dans l'état relevé.

13. Structure d'accès selon l'une quelconque des revendications 8 à 12, dans laquelle chacune des premières parties de charnière (26) comprend un élément de rigidification (69) qui peut être actionné pour rigidifier la première partie de charnière dans l'état relevé.

14. Procédé de montage d'une structure d'accès pour des constructions modulaires, dans lequel la structure d'accès (1) est selon la revendication 1, **caractérisé par**

- le soulèvement d'un premier module de châssis en place sur une construction modulaire ;
- le soulèvement d'un second module de châssis en place sur le dessus de la première structure d'accès, dans lequel les parties d'interconnexion de dessous (9) du seconde module de châssis sont engagées avec les parties d'interconnexion de dessus (8) du premier module de châssis ; et
- le montage d'un escalier d'entrée (38) sur la partie de connexion d'escalier d'entrée sur une partie supérieure du premier module de châssis.

15. Procédé selon la revendication 14, comprenant en outre :

- le déplacement d'un partie pouvant coulisser (19) d'un toit (12) du module de châssis (2) pour obtenir une ouverture, la fixation d'une partie de dessus du module de châssis sur la construction modulaire à travers l'ouverture.

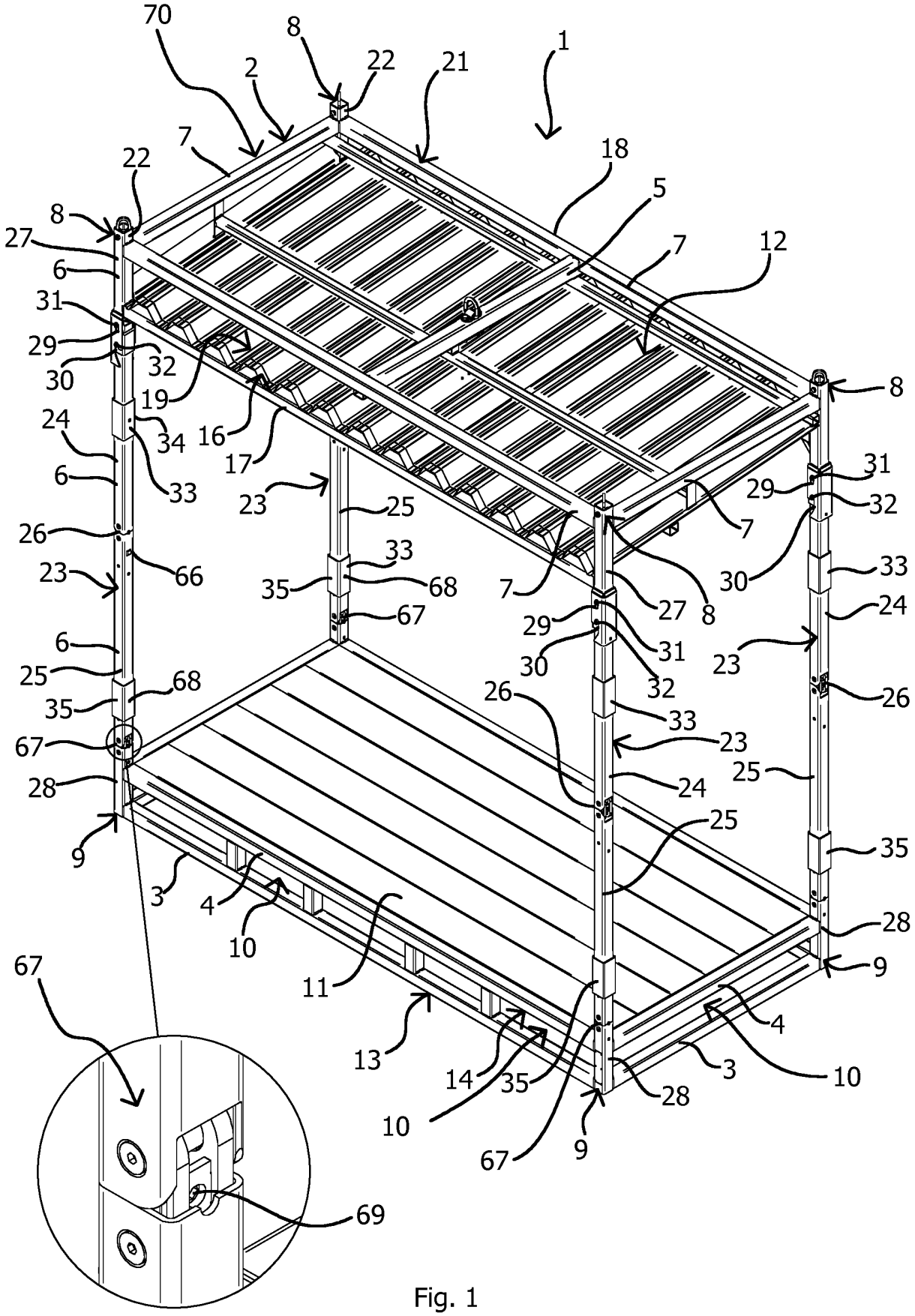
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Fig. 1

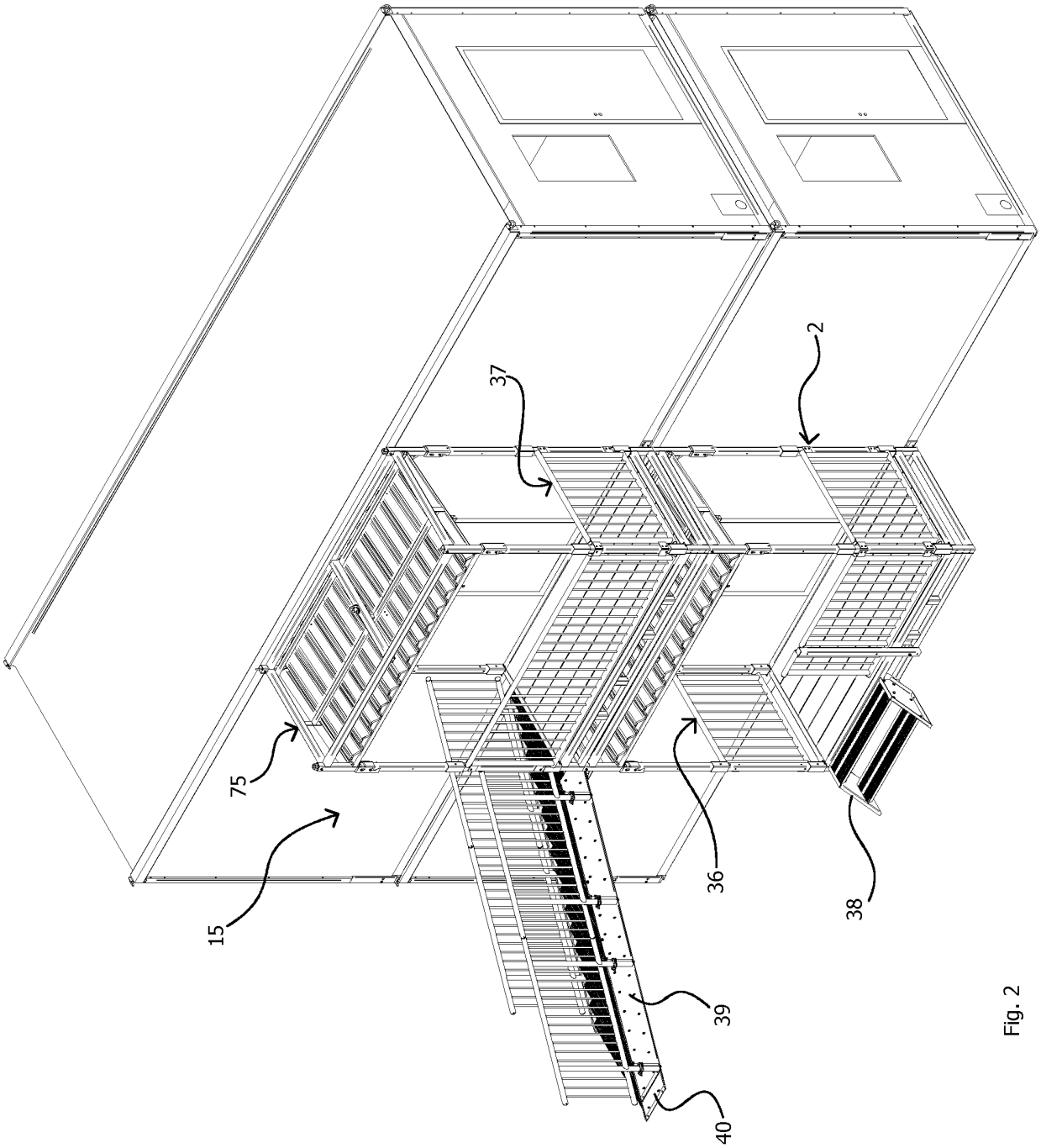

Fig. 2

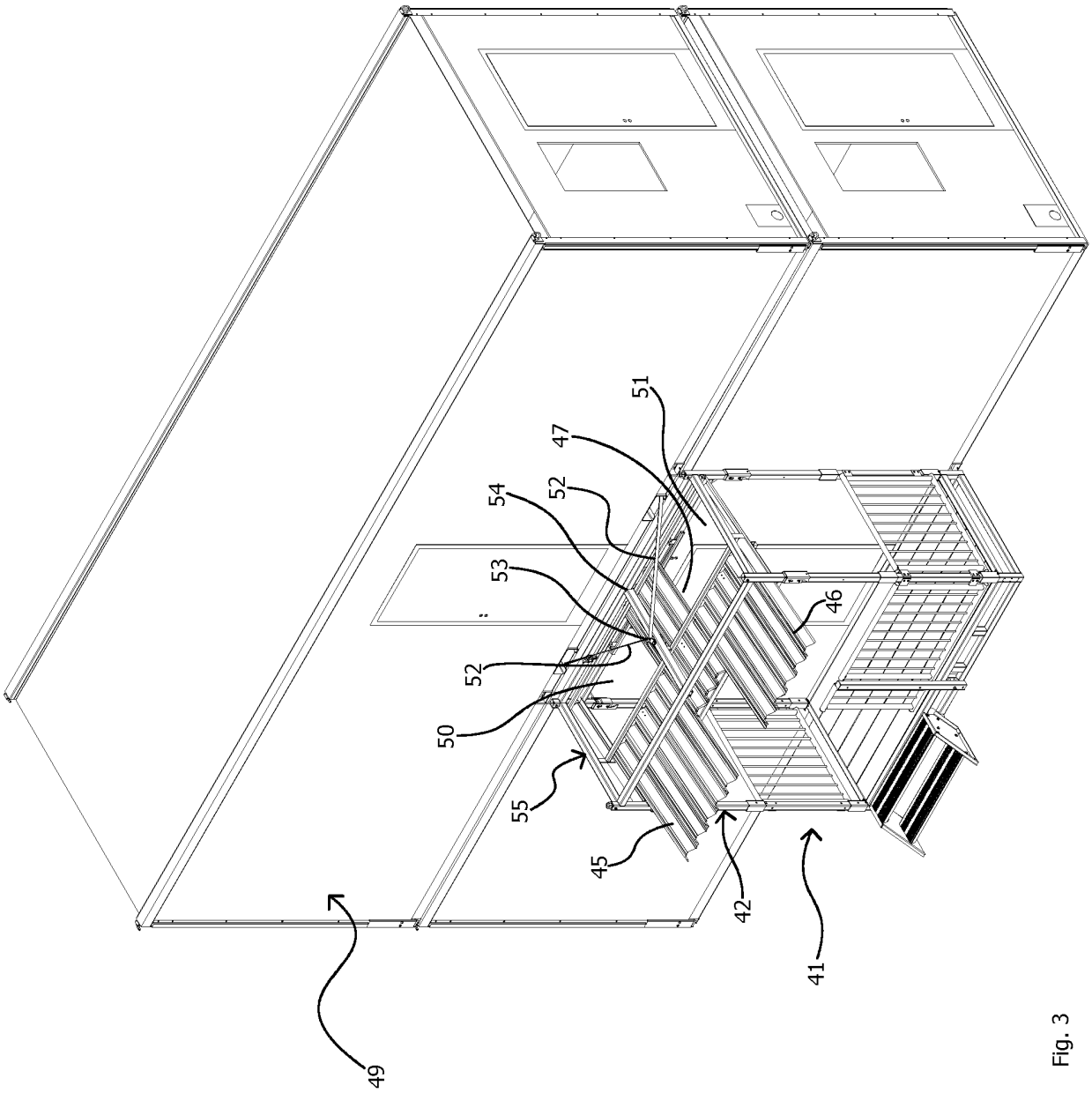

Fig. 3

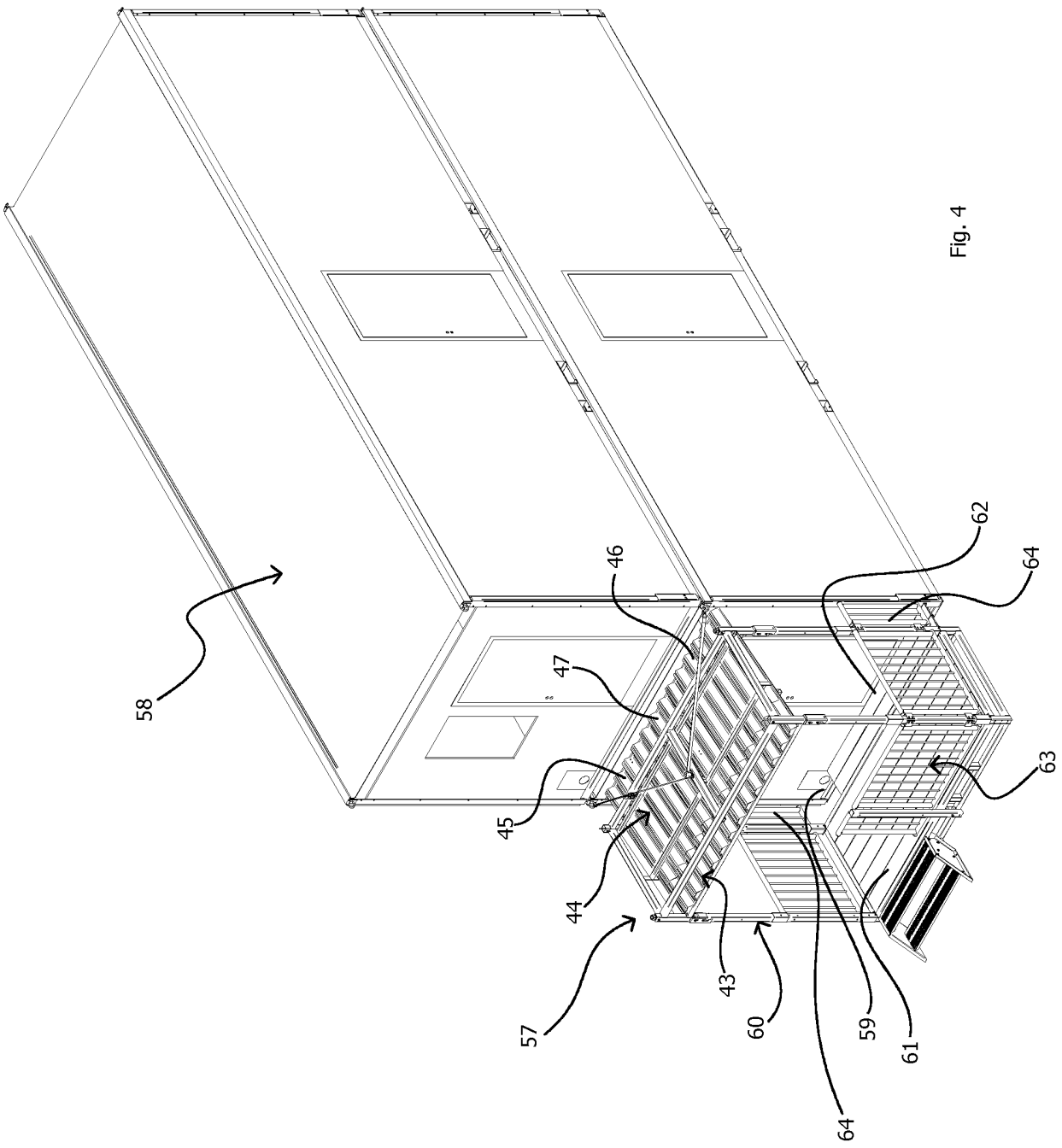

Fig. 4

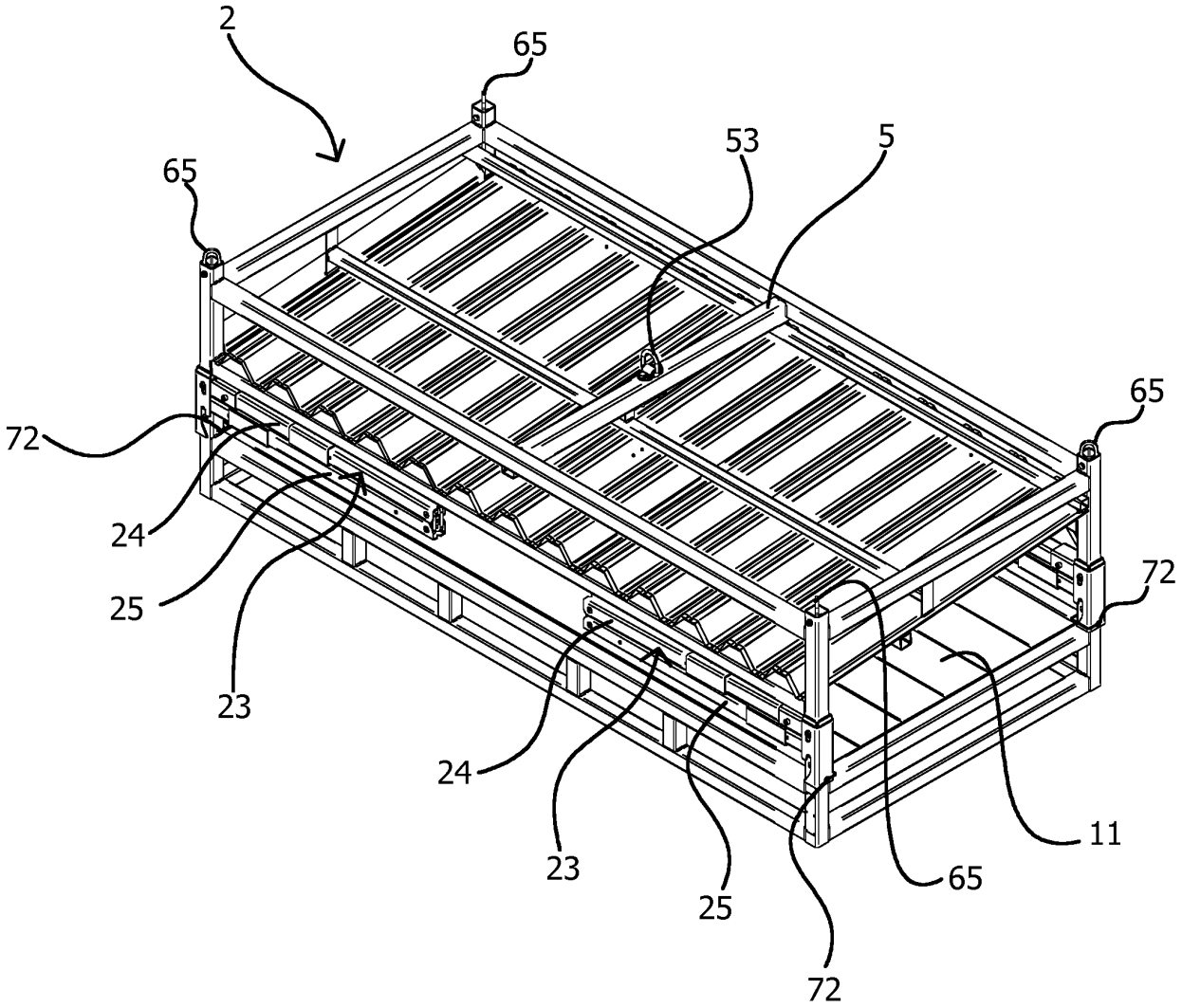

Fig. 5

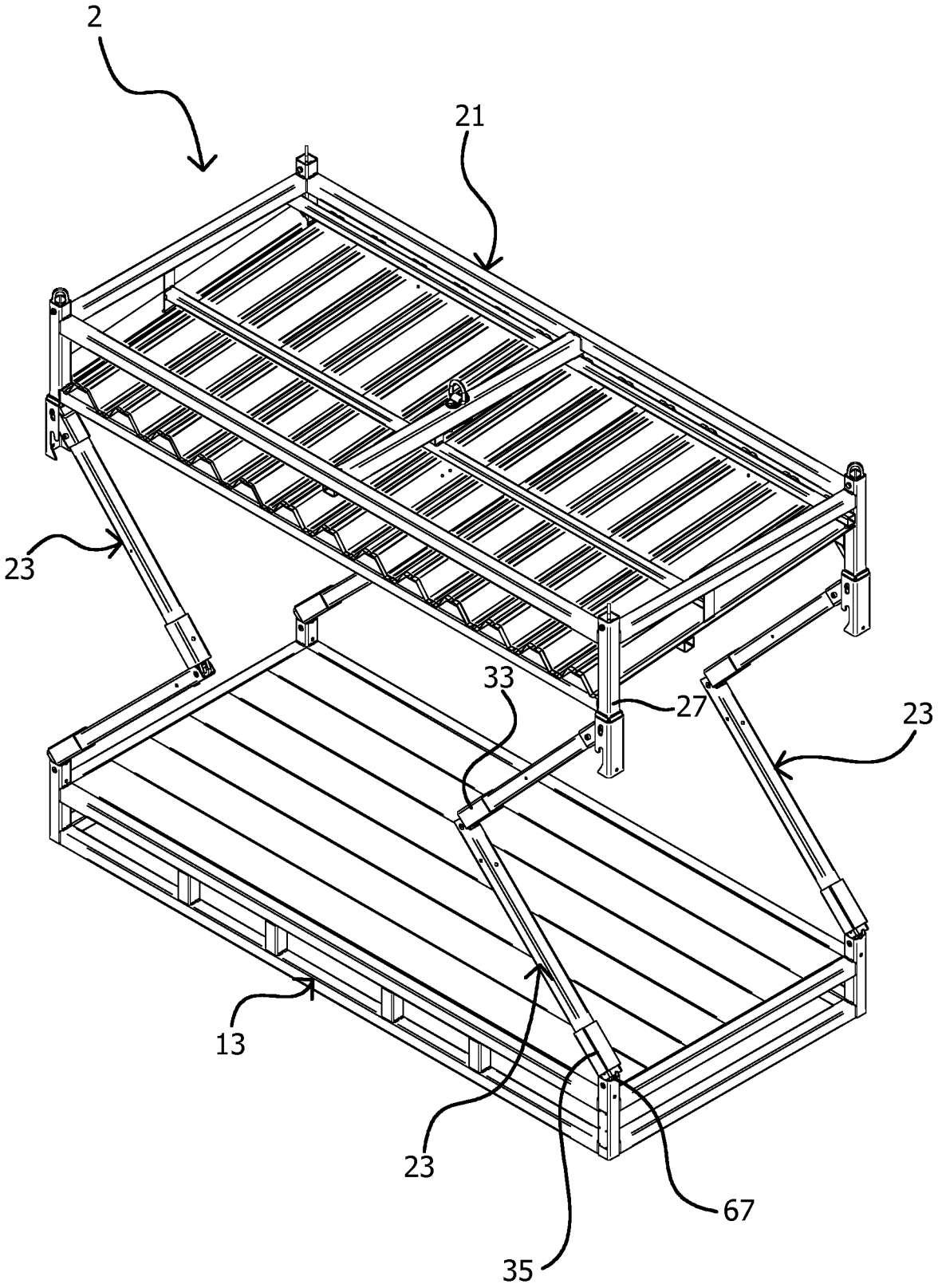

Fig. 6

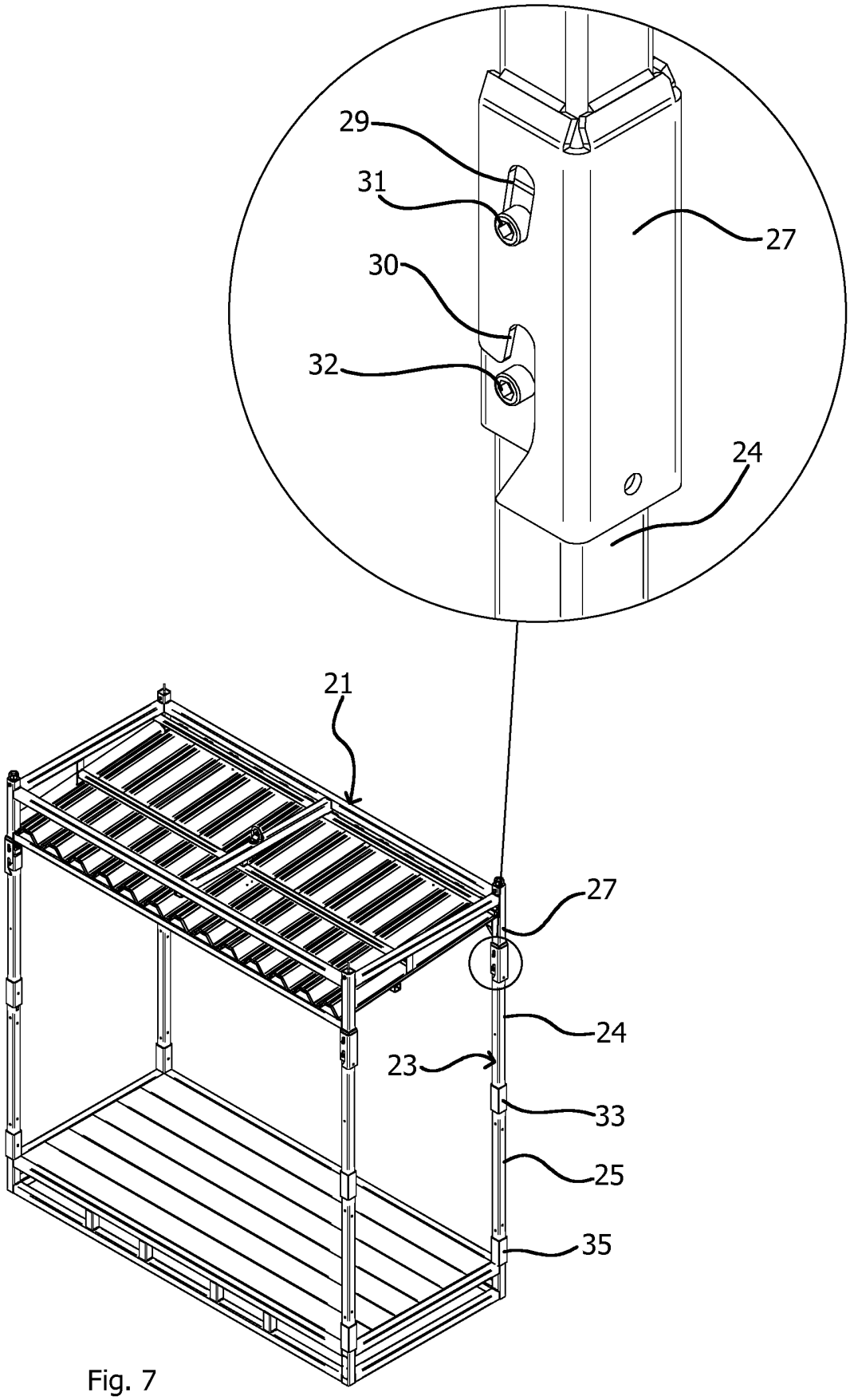

Fig. 7

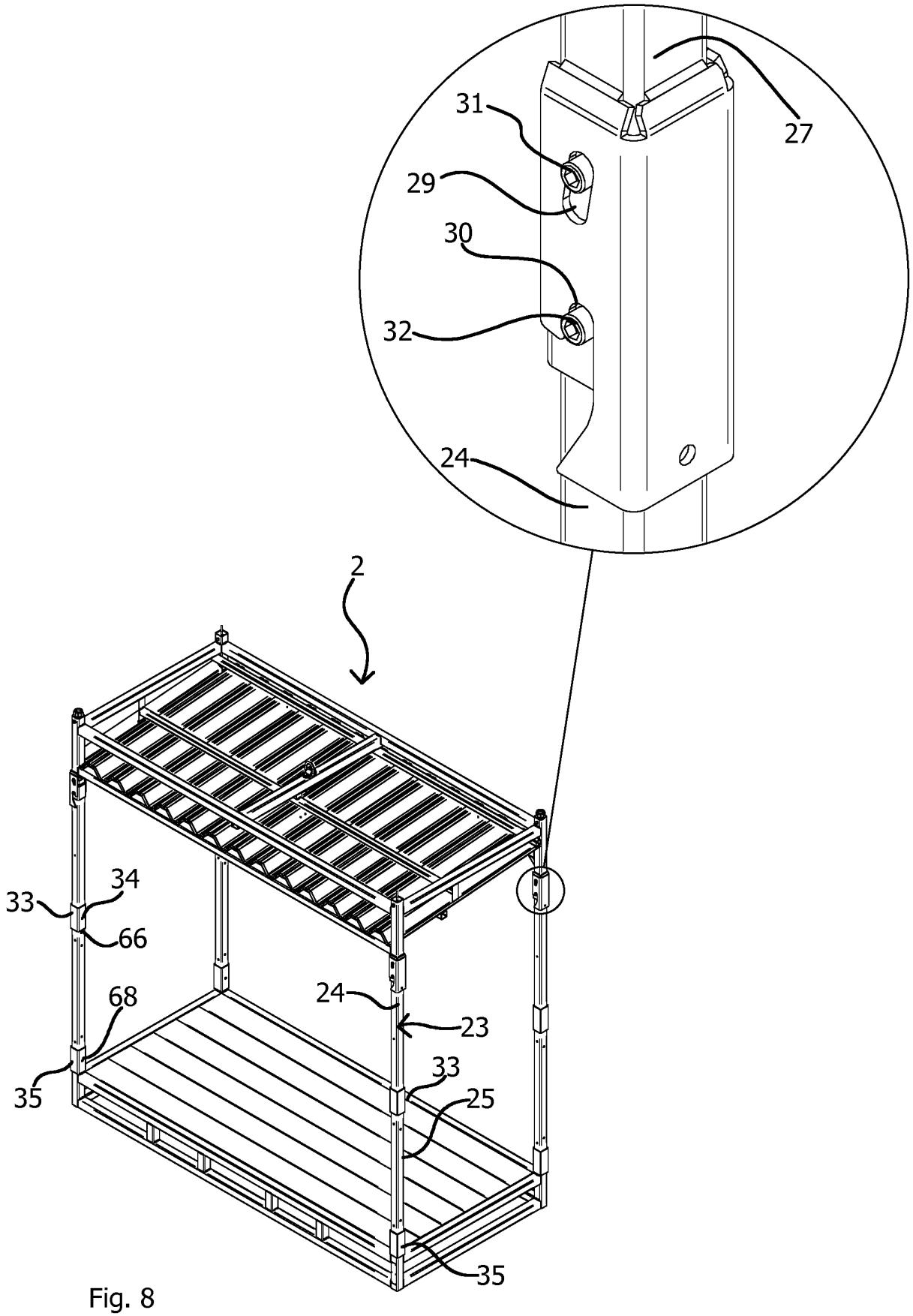

Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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