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(54) Eccentrical capital for planking and modular structures

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EP-A1- 0 364 414
EP-A1- 1 736 616
US-A- 4 577 449

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Description

Field of the invention

[0001] The present invention relates to an eccentric capital in particular for raised flooring and modular structures, preferably for rapid assembly/disassembly modular parking lots.

Prior Art

[0002] It is known to construct modular structures for additional raised parking lots which can be easily assembled and disassembled, also for temporary use. In particular, European patent No. 0 364 411 in the name of the same Applicant describes support pillars or columns which can be adjusted directionally so as to adapt to the underlying ground without the need for foundations, capitals which form the connection node of beams of the structure for supporting the flooring, and elements which cooperate to form basic composite modules, each of which is preferably mounted on-site. The various modules are positioned next to each other and connected together so as to obtain the desired configuration.

[0003] The modular structure of the known type which is particularly suitable for temporary raised parking lots also comprises at least one composite floor slab, support beams along the edges of said slab, pillars and support columns underneath each of the beam intersection nodes, and support bases for the support columns. As is known, each of the bases incorporates rigidifying and reinforcing means, means for adjusting the length of the support columns, a cylindrical collar connected to the base and forming a first ball-joint hinging element, a cylindrical pin which is adjustable heightwise and can be inserted into the aforementioned cylindrical collar, said cylindrical pin having at the bottom end a second ball-joint hinging element complementing the first ball-joint hinging element so as to allow the base to be adapted to the ground and keep the columns in the correct vertical position.

[0004] The support beams along the edges of the floor slabs are connected together by means of connection nodes or capitals arranged in between so that each beam may be assembled and disassembled independently of the other parts of the structure, without the need for modifying the other parts.

[0005] Again in a known manner, the node or capital connection elements are designed to connect together different-size beams, namely, preferably double-T beams which have different web heights, depending on whether they are main beams or secondary beams. The connection of these beams to the node elements is performed by connecting the central web of each beam to the connection plate with holes which is connected to the tubular element of the capital, there being envisaged spacers for supporting the beams which have a central web with a smaller height.

[0006] These structures which are known, in particular from the aforementioned European patent in the name of the Applicant, also have as a fundamental feature the interchangeability of the parts forming them, so that special stocks of parts of different shape and size are not required and disassembly and reassembly with a different arrangement is possible, while always using the same parts. However, the node elements in the document EP 0 364 414 do not have any type of node or hinging system which is able to position the axis parallel to and at a distance from the axis of the corresponding column.

[0007] EP 1 736 616 discloses joining elements arranged coaxially with support columns and formed by a first and second metal plate which are joined together by threaded bars and associated locking nuts. The plates are perforated centrally so as to allow a rainwater pipe to pass inside the column. Each joining element, as a whole, has a supporting function for the beams which are directly connected together. Each joining element does not have any type of ball joint or hinging system allowing the axis to be arranged parallel to and at a distance from the axis of the corresponding column.

[0008] The distributive layout of a parking lot has the main aim of optimizing the efficiency of the parking lot both from the point of view of the user, in relation to the ease, clarity and rapidity of travel along the transit lanes and maneuvering operations, and as regards the most rational use of the space available. In connection with the latter it is important to point out that the greater the number of bays provided within the area available for the parking lot, the smaller will be the mean area for parking and maneuvering a vehicle. Within a parking lot it is possible to define a mean parking area per parking space as being the overall surface area assigned for bays and maneuvering lanes divided by the number of parking spaces present.

[0009] When the layout is optimized the mean parking area tends towards an optimum value of 23-25 square meters per parking space. It must also be considered that the efficient use of the space depends greatly on the arrangement of the bays. The bay angle of 90° for example increases the efficiency of use of the space and tends to reduce the value of the mean parking area. At the same, however, it reduces the ease of maneuvering by the user.

[0010] EP 0 364 414 A1 discloses all the features of the preamble of claim 1.

[0011] In parking lots with structures of the type described in European patent No. 0 364 414 in the name of the present applicant, a further factor which reduces the maneuverability consists in the presence of pillars at the intersection between transit lane and bays.

[0012] This problem is accentuated by the spread, recently, of larger size vehicles (off-road vehicles, SUVs and station wagons), thus increasing the complexity of maneuvering operations.

[0013] A typical feature of these known structures is the close correlation between the modularity of the sup-

port columns/beams of the system and the modularity of the flooring system. In fact, the quadrangular modular configuration of the supporting structure corresponds exactly to that of the flooring elements of the raised level.

[0014] The choice of a square grid arrangement, with measurements preferably of 5 x 5 m, which is identical for parking modules and maneuvering modules, simplifies things from a production point of view and facilitates design and installation which is optimized by the use of standard and uniform structural components.

[0015] However, the static features of the constructional elements which are typical of such a system predominate, in view of the need to maintain a structure which is flexible, light and able to be easily assembled, as well as smaller intervals and spans.

[0016] The problem which is posed, therefore, is that of designing and constructing modular parking lots of the type described above which, along the transit lanes, have a distance between the columns which is greater than that of the bay lanes, without altering the dimension of car spaces, so that the users are able to maneuver more easily and safely; this while using elements forming modular structures which are interchangeable with each other without altering either the dimensions of the upper surface modules and the dimensions/structure of the floor slabs forming said modules, in particular as described in European patent No. 1 165 909 in the name of the same proprietor, or the dimensions and lengths of the beams.

Summary of the invention

[0017] The object of the present invention is therefore to provide a modular parking lot structure which is able to achieve a greater distance between the columns of the transit lanes, so as to facilitate maneuvering into and out of the individual parking spaces as well as improve maneuvering during travel along the actual transit lane.

[0018] Another object of the present invention is to obtain a greater distance between the columns of the transit lane, without altering the dimensions of the beams and slabs for the overlying flooring situated opposite the transit lane.

[0019] A further object of the present invention is to provide an arrangement of the parts such as to be able to use equally well, according to needs and the configuration of the modular parking lot, a main beam or a secondary beam along the transit lane.

[0020] Yet another object of the present invention is to envisage the arrangement of parts such as to facilitate the formation of a water run-off slope.

According to the present invention a capital forming the top end of a column is provided, said capital comprising a first element, or support element, mounted on the column and coaxial therewith, and a second element, or node, with its axis parallel to and spaced from the axis of the first element and the column. This second element forms a node which constitutes a point of intersection of the beams along either one of the said beams. The first and the second element of each capital are connected together via hinging means so as to obtain this spaced position. In this way eccentric positioning of the column with respect to the capital, or of the capital with respect to the column, may be obtained. In the case where the column is eccentric with respect to the node, there will be the undoubted advantage of keeping the node in a predefined position and being able to use the same beams and the same floor slabs in all the parking lot zones, while obtaining lanes of a different width.

[0021] The first support element is able to be positioned coaxially on top of the pillars or columns arranged along the division between the transit lane and the bays, and, by means of the spaced connection of the second node element, it is possible to arrange the columns in a position which is set back from the node element where the beams converge, thus resulting in a greater distance widthwise between the columns of the transit lane, due to the set-back arrangement of the said columns.

[0022] With the eccentric capital according to the invention, while keeping unchanged the dimensions of the floor slabs and the parts forming the beams, it is possible to set back the columns along the transit lane. In this way it is therefore possible not only to build new parking lots using the same elements of the known type, i.e. preferably those described in European patent Nos. 0 364 414 and 1 165 909 in the name of the same proprietor, but also to replace the capitals present along the transit lanes of already existing parking lot structures with the eccentric capitals according to the present invention in order to obtain also on existing structures the advantages arising from the set-back positioning of the columns.

[0023] The eccentric capital according to the invention comprises means for creating a node element which forms the point of intersection between the beams and a support element resting on the column, these elements being joined together in a releasably hinged manner by hinging means such that the whole assembly may be adapted to the type of beam which must be assembled along the transit lane and mounted on the column which is to be arranged in a set-back position.

[0024] The eccentric capital comprising the node element for intersection of the beams and the support element resting on the column - these elements being joined together in a hinged and adjustable manner depending on whether the larger main beam or the smaller secondary beam is supported on the column - forms an adaptable bracket which does not possess the rigidity of a single-piece bracket, allowing moreover the overlying surface to be provided with the desired slope for the water run-off.

[0025] Owing to the interchangeability of the means and the parts which form the node elements and the support elements and the adaptability of these elements for connection using both the main beam and the secondary beam, it is not required to decide in advance the arrangement of the type of beam to be used for the transit lane and the structure can therefore be adapted depending

on where the water run-off must be provided and therefore the slope which is to be given to the surface of the upper level of the parking lot.

[0026] The eccentric capital, which comprises the node and support elements for the structure according to the present invention, is designed to connect beams with varying heights of the central part or web of the double T. In the case of an eccentric capital which must connect the larger-size beam resting on the column, the beam need merely be arranged on the two support plates of the two elements which form the eccentric capital, with the support plates aligned together, then connecting the web of the beam to at least one connection plate with holes provided on the node element for intersection of the beams.

[0027] In the case, instead, of an eccentric capital which must connect the smaller-size beam resting on the column, the beam must merely be arranged on the support plate of the support element on the column side and on at least one spacer provided on the support plate of the node element on the beam intersection side, whereby, in order to support the beam correctly, the two node and support elements assume a position where they are not aligned with each other along the same horizontal plane, but are offset, owing to the inclination of the hinging means which connect together the two elements. The at least one spacer, preferably two spacers, are provided in two opposite positions, below the corresponding at least one connection plate with holes provided on the node element for intersection of the beams.

Description of a Preferred Embodiment

[0028] The present invention will now be described with reference to a currently preferred embodiment thereof. It can be easily understood that many modifications may be made without departing from the scope of the invention.

[0029] These and other characteristic features will become evident from the detailed description which follows with reference to the figures of the accompanying drawings in which:

Figures 1A and 1B show a schematic plan view and perspective view of the layout of a modular structure for parking lots, in particular for temporary parking lots of the known type;

Figures 2A and 2B show a schematic plan view and perspective view of the layout of a modular structure for parking lots, in particular for temporary parking lots according to the present invention;

Figures 3A, 3B, 3C and 3D show, respectively, a plan view, a view from below, a front view and a perspective view of an eccentric capital according to a first arrangement of the present invention, for the set-back positioning of the column in the case of a main beam being supported on the column;

Figures 4A, 4B, 4C and 4D show, respectively, a plan view, a view from below, a front view and a perspective view of an eccentric capital according to a second arrangement of the present invention, for the set-back positioning of the column in the case of a secondary beam resting on the column;

Figure 5 shows the eccentric capital of the arrangement shown in Figures 3A, 3B, 3C and 3D, mounted on a column;

Figure 6 shows the eccentric capital of the arrangement shown in Figures 4A, 4B, 4C and 4D, mounted on a column;

Figure 7 shows a partially exploded perspective view of the eccentric capital of the arrangement shown in Figures 3A, 3B, 3C and 3D, mounted on a column and during connection to the beams;

Figure 8 shows a perspective view of the eccentric capital of the arrangement shown in Figures 3A, 3B, 3C and 3D, mounted on a column and complete with the beams;

Figure 9 shows a perspective view of the eccentric capital of the arrangement shown in Figures 4A, 4B, 4C and 4D, mounted on a column and complete with the beams; and

Figure 10 shows a perspective view, from below, of the eccentric capital according to the invention, including horizontal tensioner and vertical braces.

[0030] With reference to the aforementioned figures, Figures 1A and 1B show schematically a plan view and perspective view of a structural arrangement for a temporary, removable, modular parking lot of the conventional type, for example, able to be constructed in an existing parking area, there being provided a transit lane 1 for vehicle access and bay lanes 2 with parking spaces 4 for the vehicles which all have conventional widthwise dimensions of 5 meters with support columns 3 arranged along the dividing line between the transit lane 1 and the bay lanes 2, and an upper level 5 comprising floor slabs 6 of the known type which are all identical.

[0031] Figures 2A and 2B show a plan view and perspective view of an arrangement for a temporary, removable, modular parking lot, which can be constructed for example in an existing parking area, where, according to the present invention, the columns 3' arranged along the dividing line between the transit lane 1' and the bay lanes 2' can be set back compared to the arrangement of corresponding columns in known parking lots of this type, while still using for the construction of the upper level 5 the same type of known floor slab 6, the same supporting and joining elements, and the same beams having the same dimensions as those used in the known parking lots according to the patents in the name of the same proprietor. Owing to the aforementioned set-back arrangement of the columns it is possible to obtain a greater widthwise distance between the columns of the transit lane 1' without altering the dimension of car spaces. This arrangement is obtained by providing an eccentric capital 7 on the top end of the columns 3' which are

arranged alongside the transit lane 1'. In the non-limiting example of embodiment shown in Figures 2A and 2B each of the columns can be set back preferably by about 50 cm, thus making it possible to achieve, as a result of the set-back arrangement of the said columns, a widthwise distance between the columns defining the transit lane which is greater than the distance between the columns of known parking lots, namely a distance preferably of about 6 meters, instead of 5 meters as in the case of the known parking lots; this can be achieved while using for the upper level the same main and secondary beams frame and the same floor slabs system used in the known structures, thus resulting in the interchangeability and possibility of removal of all the constructional elements of the preceding structures and the advantage of easier maneuvering provided by the solution according to the present invention.

[0032] Advantageously, the eccentric capital according to the invention may replace the capitals which are present in raised flooring and metal structures according to the prior art should the layout of the lanes need to be varied.

With reference now to Figures 3A, 3B, 3C, 3D and 7, these show the eccentric capital as a whole during use in the arrangement where a main beam 28 rests on the column 3'. According to the present invention, the eccentric capital is denoted generally by 7 and comprises a node element 8 for intersection of the beams (also called "node 8" in short) and a support element 9 resting on the column (also called "element 9").

[0033] In particular, the node element 8 for intersection of the beams comprises essentially a hollow tubular element 11 which has, connected thereto, in any suitably manner for example by means of welding, flat irons 12 arranged at 90° relative to each other and provided with holes 13 for removable connection, for example by means of bolts, of the said node 8 to main beams 28 and secondary beams 29 which are typically in the form of a double T. According to the invention at least one, preferably two, of said flat irons 12 for connection to the beams has/have, arranged alongside, a further identical flat iron 12' provided with holes for ensuring a stronger and more reliable connection to the main beam 28 or the secondary beam 29 which are arranged so as to rest on the column 3'.

[0034] A plate 14 with a central through-hole is connected in any suitable manner, for example by means of welding, in the bottom zone of the hollow tubular element 11, perpendicular to its axis, said plate having, for example, a shape which is preferably substantially quadrangular, with holes 15 arranged at the corners for the connection of bracing of the known type not shown.

[0035] Between the hollow tubular element 11 and the plate 14, below the latter, flat irons 16 with a central hole 17 are connected, in any suitable manner, for example by means of welding, both to the plate 14 and to the hollow tubular element 11. Said flat irons 16 are arranged at 90° relative to each other, opposite the flat irons 12 for connection to the beams, for removable connection both to any vertical braces and to the element 9 resting on the column, via hinging means consisting preferably of at least one long flat iron 18, preferably a pair of long flat irons, or other type of hinged connection, for example a telescopic connection.

[0036] In order to make the node 8 for intersection of the beams more compact, shaped flat irons 19, with a preferably substantially trapezoidal or semicircular or similar shape, are provided, said irons being designed to be arranged around the tubular element 11 adjacent to each other in a complementary manner and to be bolted, or otherwise removably connected, to the upper flanges of the double T beam 28 and 29 which combine to form the node 8, so as to fix them together.

[0037] Two spacers 20 for supporting the secondary beams are provided on top of the plate 14 and in positions opposite each other.

[0038] The element 9 resting on the column 3' comprises a hollow tubular element 21 which is designed to be arranged on the top end of the column 3'. Preferably, this column 3' is of the type which incorporates screw means or the like for adjusting the height thereof and hinge means in the form of a ball joint cooperating with associated complementary means included in a collar provided on the base for adapting mounting on the ground (means not shown) for example as described in European patent No. 0 364 414 in the name of the same applicant.

[0039] According to a preferred example of embodiment, the body of the hollow tubular element 21 may be machined at the bottom along a suitable section of its height so as to receive the top end of the column 3'. A shaped plate 22, which is preferably substantially quadrangular, is provided above the hollow tubular element 21 and connected thereto in any suitable manner, for example by means of welding, as well as perpendicular to its axis, said plate being provided at the corners with through-holes 23 for allowing the removable connection of the flange of the double T beam 28 or 29 resting on the column 3' by means of substantially Z-shaped irons 24 which are provided with through-holes 25 opposite the holes 23 in the plate 22. These Z-shaped irons are designed to be removably connected to the plate 22 with the function of a clamp for tight gripping so as to lock the beam on the plate and oppose the horizontal and twisting forces thereof.

[0040] The aforementioned plate 22 has below it, connected thereto and to the hollow tubular element 21, at least two flat irons 26 with a central through-hole 27, situated at 90° relative to each other, for performing a removable connection between the element 9 resting on the column 3' and the node element 8 for intersection of the beams, by means of the said hinging means consisting preferably of at least one long flat iron 18 and preferably a pair of long flat irons 18.

[0041] If, for the needs of assembling the raised modular parking lot, it should be necessary to provide, along

the transit lane 1', secondary beams 29 resting on the columns 3', instead of the main beams 28, as described above, according to the invention it is possible to perform rotation of the node element 8 as shown in Figure 3D through 90° about its axis so as to arrange the spacer 20 on the side directed towards the support element 9. The eccentric capital 7 is thus designed to be used in the case where a secondary beam 29 is arranged resting on the column 3'.

[0042] The figures also show a tensioning device 31 which is connected to the second node element 8 via plates 30 and can be advantageously positioned in the span defined between two eccentric capitals as an optional additional element with the aim of limiting any lowering which might occur in the region of the eccentric capitals so as to reduce amplification of the effects induced by parasitic actions, in particular any rotation of the node around a horizontal axis.

[0043] In particular, Figures 4A, 4B, 4C, 4D, 6 and 9 show the eccentric capital as a whole during use in the arrangement where the secondary beam 29 rests on the column 3'. This arrangement is obtained using the same node elements 8 on the beam intersection side after suitably rotating the tubular element 11 and the shaped plate 14 connected thereto so as to arrange the spacer 20 underneath the pair of connection plates with holes 12,12' on the side facing the support element 9. The secondary beam 29 is then rested both on the shaped plate 22, where it is held in position by means of the said Z-shaped elements 24 of the support element 9, and on the spacer 20 of the shaped plate 14 of the node 8. In this way, by means of the inclined arrangement of the hinging means consisting of the long flat irons 18, the upper flange of the secondary beam 29 is located at the same level as the upper flanges of the other beams of the node element 8 for level supporting of the floor slabs 6, while the two elements, i.e. node element 8 and support element 9, are arranged not aligned in the same horizontal plane, but in two horizontal planes parallel to each other and offset by a sufficient amount to ensure that the secondary beam 29 rests on the spacer 20 so that it can be fixed between the connection plates with holes 12,12' which face the support element 9, as shown in Figure 9.

[0044] Figure 10 shows the eccentric capital according to the invention in which the node element 8 is connected to the horizontal tensioning device 31 by means of the plates 30 and the support element 9 is connected to vertical bracing 32, of the type known per se.

[0045] It is thus possible to obtain a capital which can be easily manufactured, with a reduced weight and size owing to its construction as two parts which can be connected together, this being therefore advantageous for transportation and movement as well as ease of assembly and handling of the parts.

[0046] It is clear that, according to the invention, all these operations are performed always using the same parts, so that it is not necessary to keep stocks for each single part of the structure, but, for example, by means of a simple rotation of the node element 8 for intersection of the beams, it is possible to position the main beam or the secondary beam on the element 9 resting on the column 3', it thus not being necessary to decide in advance which beam must rest on the column 3'.

[0047] Moreover, the advantage of obtaining a parking lot with a variable or different distance between the columns by setting back the columns along the transit lane using the eccentric capital is evident, both in terms of maneuverability of the vehicle entering and leaving the individual parking spaces and in terms of travel along the transit lane itself.

[0048] The same advantage of a variable lane is obtained in raised level structures and/or multi-storey car parks in general, in the case where different lane layouts are required.

[0049] A further advantage of the structure according to the present invention is the use of the same elements, with the same dimensions and same structure, for the temporary modular parking lots of the present applicant, namely the same columns with a ball joint at the base and the same floor slabs with the same water channeling and disposal system, with undeniable results in terms of maneuvering ease and safety.

Claims

1. A system for raised flooring and modular structures, comprising a capital, at least one support column (3'), main and secondary support beams (28, 29) arranged at right angles to each other,
said capital comprising a first element, or support element (9), for performing joining to the column, and a second element or node (8) for forming a node for intersection of main and secondary mutually perpendicular support beams (28, 29),
wherein said first element, or support element (9), is mounted on the top end of the column (3') and coaxial therewith,
characterized in that said second element or node (8) has an axis parallel to and spaced from the axis of the first element (9) and of the column (3');

    - said first and second element of the capital being connected together via hinging means (18) so as to obtain said spaced positioning between said parallel axes;
    - one of the said support beams (28; 29) simultaneously rests on said first element (9) mounted on top of the column, and on the second element or node (8), and is connected to the second element (8) forming the node for intersection of the support beams (28, 29).

2. The system according to claim 1, wherein the first support element (9) comprises a hollow tubular ele-

ment (21) designed to be arranged on the top end of the column (3') connected on top to a shaped plate (22) perpendicular to the axis of the hollow element (21) and provided with through-holes (23) so as to allow the removable connection of the beam (28) or (29) resting on the column (3') by means of substantially Z-shaped irons (24) provided with through-holes (25) arranged opposite the holes (23) in the plate (22).

3. The system according to claim 2, wherein at least two flat irons (26) with a central through-hole (27), positioned at 90° relative to each other, are provided below the plate (22) and connected thereto and to the hollow tubular element (21).

4. The system according to any one of Claims 1 to 3, wherein the second element forming the node (8) comprises a hollow tubular element (11) to which flat irons (12) arranged at 90° relative to each other and provided with holes (13) for removable connection of the said node (8) to the beams (28, 29) are connected; a plate (14) with central through-hole being connected in the bottom zone of the hollow tubular element (11) and perpendicular to its axis.

5. The system according to claim 4, wherein flat irons (16) with a central hole (17) are provided between the hollow tubular element (11) and the plate (14), being connected both to the plate (14) and to the hollow tubular element (11), said flat irons (16) being arranged at 90° relative to each other opposite the flat irons (12) for connection to the beams.

6. The system according to any one of claims 1 to 5, wherein the hinging means (18) comprise at least one long flat iron (18) preferably a pair of long flat irons (18), the opposite ends of which are respectively pivotably mounted on one of the flat irons (26) of the first support element (9) and on one of the flat irons (16) of the second node element (8) for removably connecting together the first support element (9) and the second node element (8).

7. The system according to any one of claims 1 to 6, wherein at least one, preferably two, of the flat irons (12), has/have, arranged alongside, a further flat iron with holes (12') for a strong and reliable connection to the main beam (28) or to the secondary beam (29).

8. The system according to any one of claims 1 to 7, wherein the second node element (8) is rotatable about its axis for connection to the main beam (28) or to the secondary beam (29) resting on the column (3').

9. The system according to any one of claims 1 to 8, wherein above the plate (14) at least one spacer (20), preferably two spacers (20), are provided in positions opposite each other, for supporting the secondary beams (29), one of the spacers (20) being arranged towards the support element (9) in the case where the secondary beam (29) rests on the element (9) mounted on the column (3').

10. The system according to any one of claims 1 to 9, wherein the node (8) is furthermore provided at the top with shaped flat irons (19) which are arranged around the tubular element (11) and can be removably connected to the flanges of the beams (28) or (29).

11. The system according to any one of claims 1 to 10, wherein the column (3') comprises means for adjusting its height and hinging means in the form of a ball joint cooperating with associated complementary means included in a collar provided on the base for adapting mounting on the ground.

12. The system according to any one of claims 1 to 11, wherein the node element (8) and the support element (9) are coplanar.

13. The system according to any one of claims 1 to 11, wherein the node element (8) and the support element (9) are offset.

14. The system according to any one of claims 1 to 13, wherein the node element (8) is connected by means of plates (30) to a tensioning device (31).

15. A modular structure, in particular for raised parking lots, comprising a system according to any claim 1 to 14.

Patentansprüche

1. System für Doppelböden und Modulstrukturen, aufweisend eine Kapitelle, mindestens eine Tragsäule (3'), Haupt- und Nebenträger (28, 29), welche rechtwinklig zueinander angeordnet sind, wobei die besagte Kapitelle ein erstes Element, oder Trägerelement (9), um ein Verbinden mit der Säule durchzuführen, und ein zweites Element oder Knoten (8), zur Bildung eines Knotens für die Kreuzung von zueinander rechtwinkligen Haupt- und Nebenträgern (28, 29) aufweist,
wobei das besagte erste Element, oder Trägerelement (9), am oberen Ende der Säule (3') und koaxial dazu gelagert ist,
dadurch gekennzeichnet, dass das besagte zweite Element oder Knoten (8) eine Achse hat, welche parallel zu und beabstandet von der Achse des ersten Elementes (9) und von der Säule (3') ist;
dass das besagte erste und zweite Element der Ka-

pitelle über Scharniermittel (18) miteinander verbunden sind, so dass die besagte beabstandete Positionierung zwischen den besagten parallelen Achsen erhalten wird;
dass einer der besagten Träger (28; 29) gleichzeitig auf dem besagten ersten Element (9), welches oben auf der Säule gelagert ist, und auf dem zweiten Element oder Knoten (8) aufliegt, und mit dem zweiten Element (8), welches den Knoten für die Kreuzung der Träger (28, 29) bildet, verbunden ist.

2. System nach Anspruch 1, wobei das erste Trägerelement (9) ein hohles rohrförmiges Element (21) aufweist, welches dazu ausgebildet ist, auf dem oberen Ende der Säule (3') angebracht zu werden, welche oben mit einer geformten Platte (22) verbunden ist, die senkrecht zu der Achse des hohlen Elementes (21) und mit Durchgangslöchern (23) versehen ist, so dass die lösbare Verbindung des Trägers (28) oder (29), welcher auf der Säule (3') aufliegt, mittels im Wesentlichen Z-förmigen Eisen (24), welche mit Durchgangslöchern (25) versehen sind, die gegenüber den Löchern (23) in der Platte (22) angeordnet sind, ermöglicht wird.

3. System nach Anspruch 2, wobei mindestens zwei flache Eisen (26) mit einem zentralen Durchgangsloch (27), welche um 90° zueinander positioniert sind, unterhalb der Platte (22) vorgesehen sind und damit und mit dem hohlen rohrförmigen Element (21) verbunden sind.

4. System nach einem der Ansprüche 1 bis 3, wobei das zweite Element, welches den Knoten (8) bildet, ein hohles rohrförmiges Element (11) aufweist, mit welchem flache Eisen (12) verbunden, die um 90° zueinander angeordnet sind und zur lösbaren Verbindung des besagten Knotens (8) mit den Trägern (28, 29) mit Löchern (13) versehen sind.

5. System nach Anspruch 4, wobei flache Eisen (16) mit einem Mittelloch (17) zwischen dem hohlen rohrförmigen Element (11) und der Platte (14) vorgesehen sind, welche sowohl mit der Platte (14) als auch mit dem hohlen rohrförmigen Element (11) verbunden sind, wobei die besagten flachen Eisen (16) um 90° relativ zueinander gegenüber den flachen Eisen (12) zur Verbindung mit den Trägern angeordnet sind.

6. System nach einem der Ansprüche 1 bis 5, wobei die Scharniermittel (18) mindestens ein langes flaches Eisen (18), vorzugsweise ein Paar lange flache Eisen (18), aufweisen, deren gegenüberliegenden Enden jeweils schwenkbar an einem der flachen Eisen (26) des ersten Trägerelements (9) und an einem der flachen Eisen (16) des zweiten Knotenelements (8) gelagert sind, um das erste Trägerelement (9) und das zweite Knotenelement (8) lösbar miteinander zu verbinden.

7. System nach einem der Ansprüche 1 bis 6, wobei mindestens eines, vorzugsweise zwei, der flachen Eisen (12), längsseits angeordnet, ein weiteres flaches Eisen mit Löchern (12') für eine starke und zuverlässige Verbindung mit dem Hauptträger (28) oder mit dem Nebenträger (29) hat / haben.

8. System nach einem der Ansprüche 1 bis 7, wobei das zweite Knotenelement (8) zur Verbindung mit dem Hauptträger (28) oder mit dem Nebenträger (29), welche auf der Säule (3') aufliegen, um seine Achse drehbar ist.

9. System nach einem der Ansprüche 1 bis 8, wobei mindestens ein Abstandshalter (20), vorzugsweise zwei Abstandshalter (20), oberhalb der Platte (14) in zueinander gegenseitigen Positionen zur Unterstützung der Nebenträger (29) vorgesehen sind, wobei einer der Abstandshalter (20) in Richtung des Trägerelements (9) angeordnet ist, für den Fall, wenn der Nebenträger (29) auf dem Element (9) aufliegt, welches an der Säule (3') gelagert ist.

10. System nach einem der Ansprüche 1 bis 9, wobei der Knoten (8) oben weiter mit geformten flachen Eisen (19) versehen ist, welche um das rohrförmige Element (11) herum angeordnet sind und lösbar mit den Flanschen der Träger (28) oder (29) verbunden werden können

11. System nach einem der Ansprüche 1 bis 10, wobei die Säule (3') Mittel zur Einstellung ihrer Höhe und Scharniermittel in der Form eines Kugelgelenkes aufweist, welches mit zugehörigen komplementären Mitteln, die in einem Kragen enthalten sind, welcher auf der Basis zur Anpassung einer Befestigung auf dem Boden vorgesehen ist.

12. System nach einem der Ansprüche 1 bis 11, wobei das Knotenelement (8) und das Trägerelement (9) koplanar sind.

13. System nach einem der Ansprüche 1 bis 11, wobei das Knotenelement (8) und das Trägerelement (9) versetzt sind.

14. System nach einem der Ansprüche 1 bis 13, wobei das Knotenelement (8) mittels Platten (30) mit einer Spannvorrichtung (31) verbunden ist.

15. Modulstruktur, insbesondere für erhöhte Parkplätze, aufweisend ein System nach einem der Ansprüche 1 bis 14.

Revendications

1. Un système pour planchers surélevés et structures modulaires, comprenant un chapiteau, au moins une colonne de support (3'), des poutres de support principales et secondaires (28, 29) arrangées à des angles droits l'une par rapport à l'autre,
ledit chapiteau comprenant un premier élément, ou un élément de support (9), pour effectuer l'assemblage à la colonne, et un deuxième élément ou noeud (8) pour former un noeud pour l'intersection de poutres de support principales et secondaires (28, 29) mutuellement perpendiculaires dans lequel ledit premier élément, ou un élément de support (9), est monté sur l'extrémité supérieure de la colonne (3') et coaxiale avec celle-ci **caractérisé en ce que**

- ledit deuxième élément de ou noeud (8) a un axe parallèle à, et espacé de, l'axe du premier élément (9) et de la colonne (3') ;
- ledit premier et deuxième élément du chapiteau étant connecté ensemble à travers des moyens de charnière (18) de sorte à obtenir ledit positionnent espacé entre lesdits axes parallèles,
- une desdites poutres de support (28, 29) repose simultanément sur ledit premier élément (9) monté sur le sommet de la colonne et sur le deuxième élément ou noeud (8), et est connectée au deuxième élément (8) formant le noeud pour l'intersection des poutres de support (28, 29).

2. Le système selon la revendication 1, dans lequel le premier élément de support (9) comprend un élément tubulaire creux (21) façonné pour être disposé sur l'extrémité supérieure de la colonne (3') connecté au sommet à une plaque façonnée (22) perpendiculaire à l'axe de l'élément creux (21) et pourvu de trous perçants (23) de sorte à permettre la connexion amovible de la poutre (28) ou (29) reposant sur la colonne (3') au moyen de grappins en forme de Z (24) pourvus de trous perçants (25) disposés le manière opposée aux trous (23) dans la plaque (22).

3. Le système selon la revendication 2, dans lequel au moins deux grappins en plaque (26) ayant un trou perçant central (27), positionnés à 90° l'un par rapport à l'autre, sont pourvus au-dessous de la plaque (22) et sont connectés à celle-ci et à l'élément tubulaire creux (21).

4. Le système selon l'une quelconque des revendications 1 à 3, dans lequel le deuxième élément formant le noeud (8) comprend un élément tubulaire creux (11) auquel les grappins en plaque (12), arrangés à 90° l'un par rapport à l'autre et pourvus de trous (13) pour une connexion amovible du dit noeud (8) aux poutres (28, 29) sont connectés ; une plaque (14) avec un trou perçant central étant connectée à la zone inférieure de l'élément tubulaire creux (11) et perpendiculaire à son axe.

5. Le système selon la revendication 4, dans lequel les grappins en plaque (16) avec un trou central (17) sont pourvus entre l'élément tubulaire creux (11) et la plaque (14), étant connectés à la plaque (14) ainsi qu'à l'élément tubulaire creux (11), lesdits grappins en plaque (16) étant arrangés à 90° l'un par rapport à l'autre, de manière opposée au grappins en plaque (12) pour une connexion aux poutres.

6. Le système selon l'une quelconque des revendications 1 à 5, dans lequel les moyens de charnière (18) comprennent au moins un grappin en plaque long (18) préférablement une paire de grappins en plaque longs (18), les extrémités opposées desquels sont respectivement montées de manière pivotable sur un des grappins en plaque (26) du premier élément de support (9) et sur un des grappins en plaque (16) du deuxième élément de noeud (8) pour connecter ensemble de manière amovible le premier élément de support (9) et le deuxième élément de noeud (8).

7. Le système selon l'une quelconque des revendications 1 à 6, dans lequel au moins un préférablement deux, des grappins en plaque (12), a/ont, disposé/s le long de son/leur côté, un grappin en plaque supplémentaire ayant des trous (12') pour une connexion forte et fiable à la poutre principale (28) ou à la poutre secondaire (29).

8. Le système selon l'une quelconque des revendications 1 à 7, dans lequel le deuxième élément de noeud (8) est rotatif autour de son axe pour une connexion à la poutre principale (28) ou à la poutre secondaire (29) reposant sur la colonne (3').

9. Le système selon l'une quelconque des revendications 1 à 8, dans lequel au-dessus de la plaque (14) au moins une entretoise (20), préférablement deux entretoises (20), sont pourvues dans des positions opposées l'une à l'autre, pour supporter les poutres secondaires (29), une des entretoises (20) étant disposée vers l'élément de support (9) dans le cas où la poutre secondaire (29) repose sur l'élément (9) monté sur la colonne (3').

10. Le système selon l'une quelconque des revendications 1 à 9, dans lequel le noeud (8) est d'avantage pourvu en sommet avec des grappins en plaque façonnés lesquels sont disposés autour de l'élément tubulaire (11) et qui peuvent être connectés la manière amovible aux brides des poutres (28) ou (29).

11. Le système selon l'une quelconque des revendica-

tions 1 à 10, dans lequel la colonne (3') comprend de moyens pour ajuster son auteur et des moyens de charnière en forme de tête sphérique coopérant avec des moyens associés complémentaires inclus dans un collier prévu sur la base pour adapter le montage sur le sol.

12. Le système selon l'une quelconque des revendications 1 à 11, dans lequel l'élément de noeud (8) et l'élément de support (9) sont coplanaires.

13. Le système selon l'une quelconque des revendications 1 à 11, dans lequel l'élément de noeud (8) et l'élément de support (9) sont décalés.

14. Le système selon l'une quelconque des revendications 1 à 13, dans lequel l'élément de noeud (8) est connecté au moyen de plaques (30) à un dispositif de serrage (31).

15. Une structure modulaire, en particulier pour parc de stationnement surélevé, comprenant un système selon l'une quelconque des revendications 1 à 14.

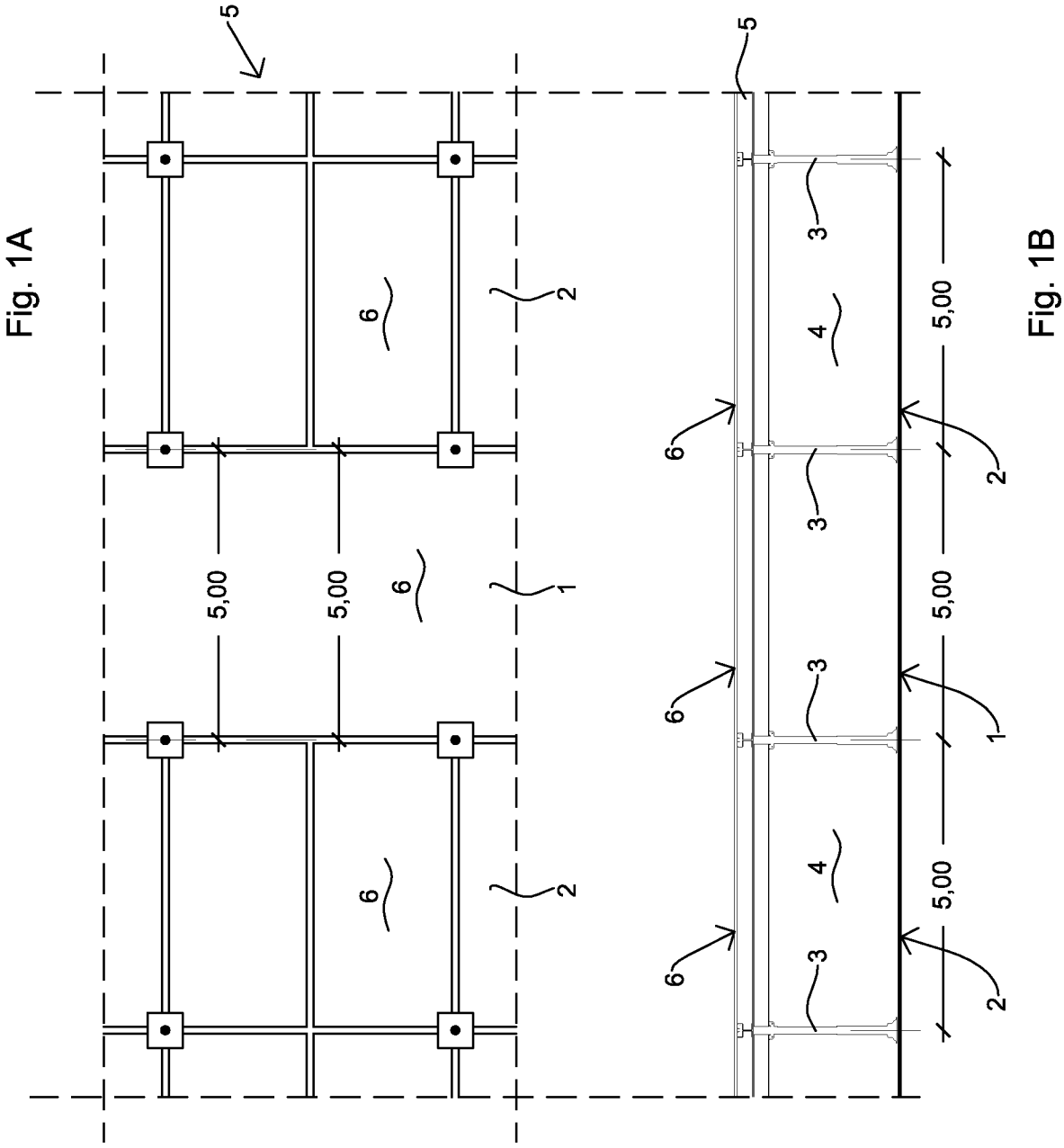

Fig. 1A

Fig. 1B

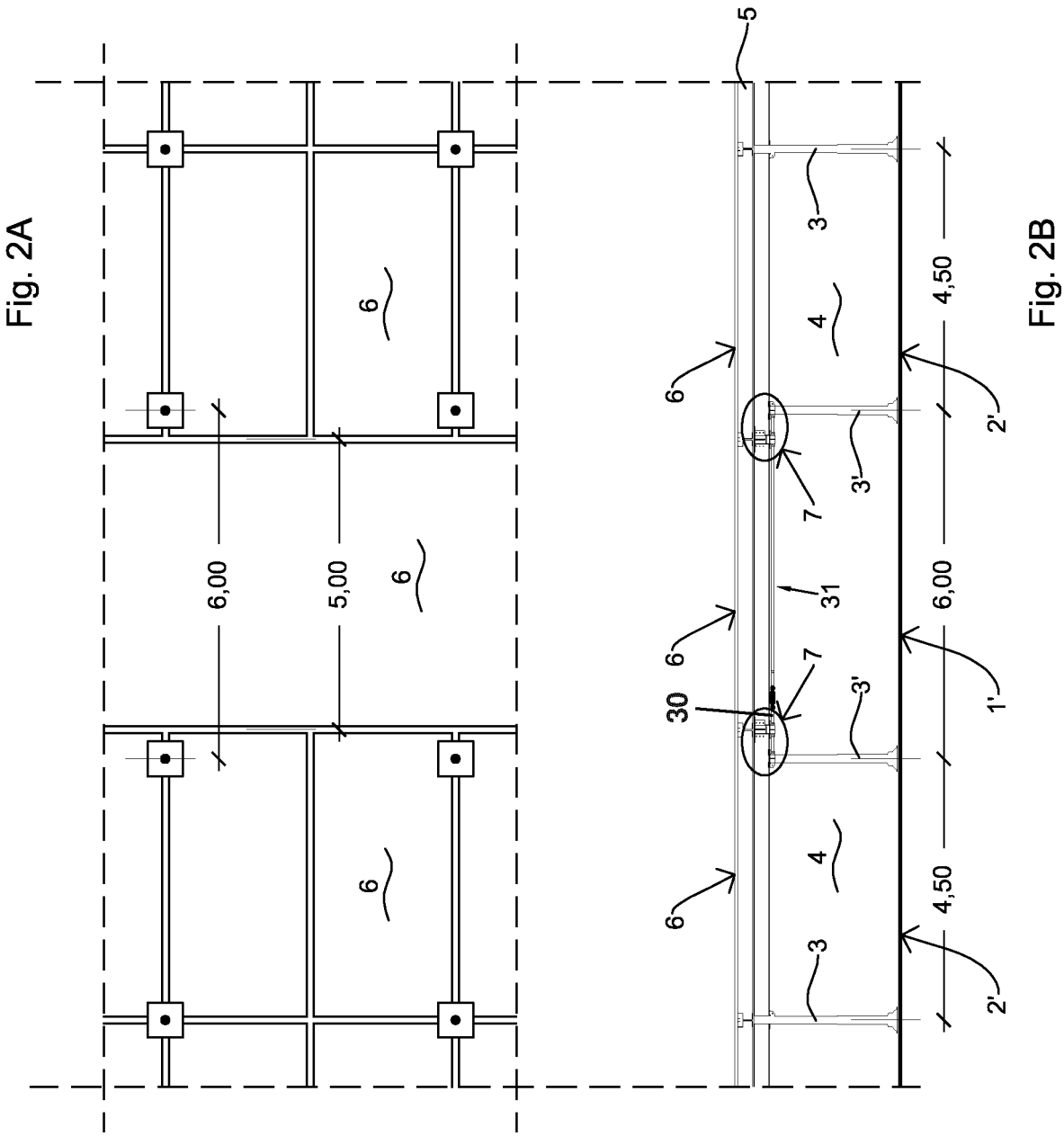

Fig. 2A

Fig. 2B

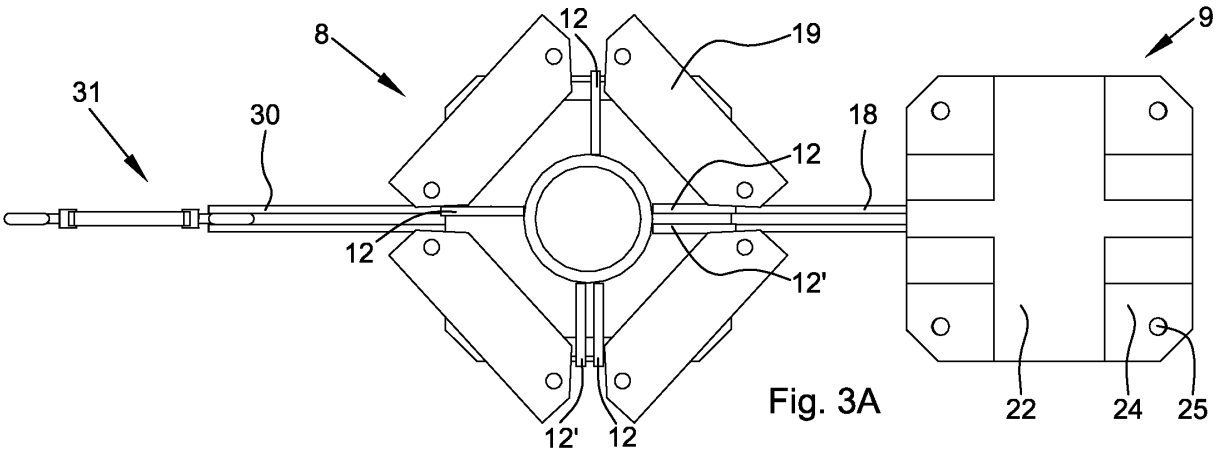

Fig. 3A

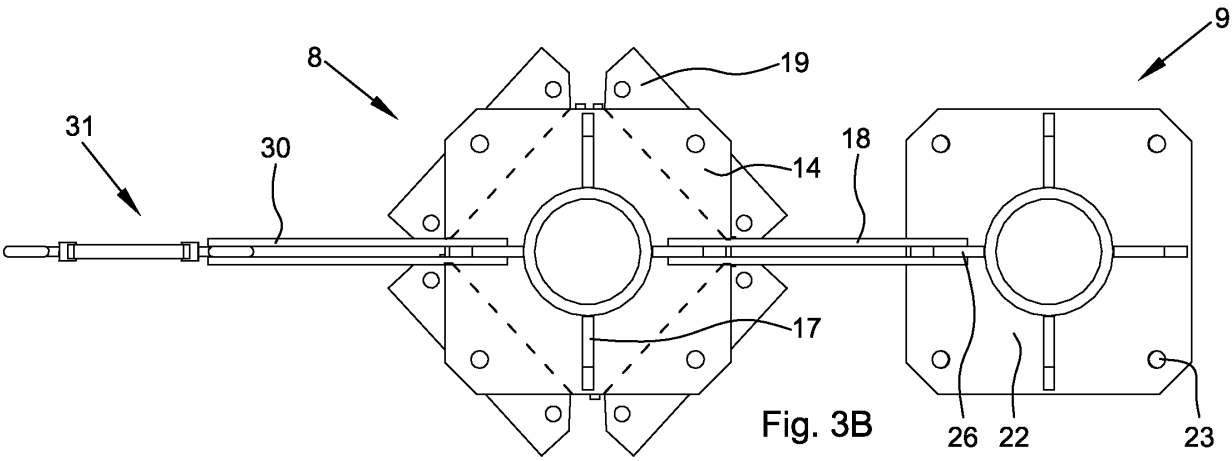

Fig. 3B

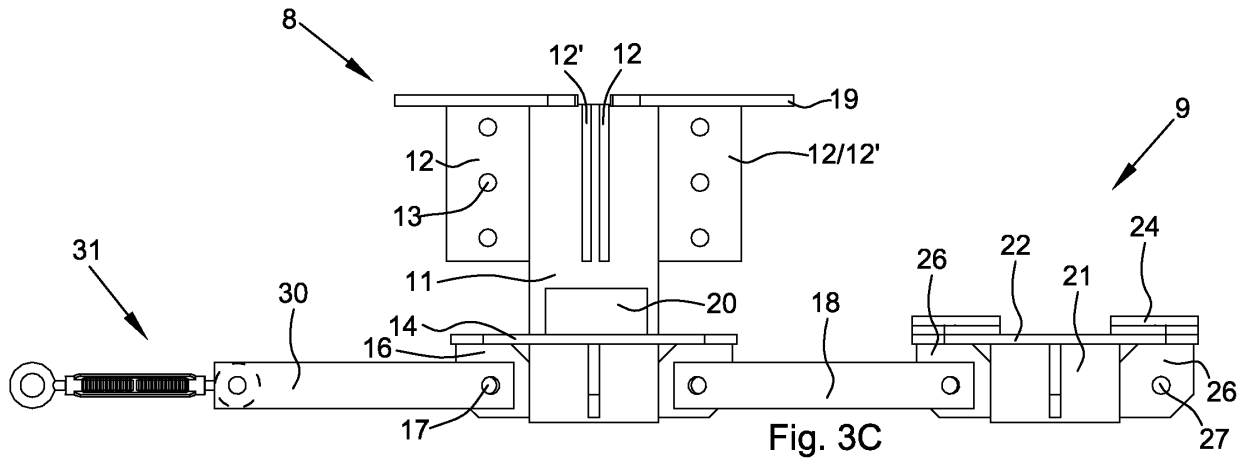

Fig. 3C

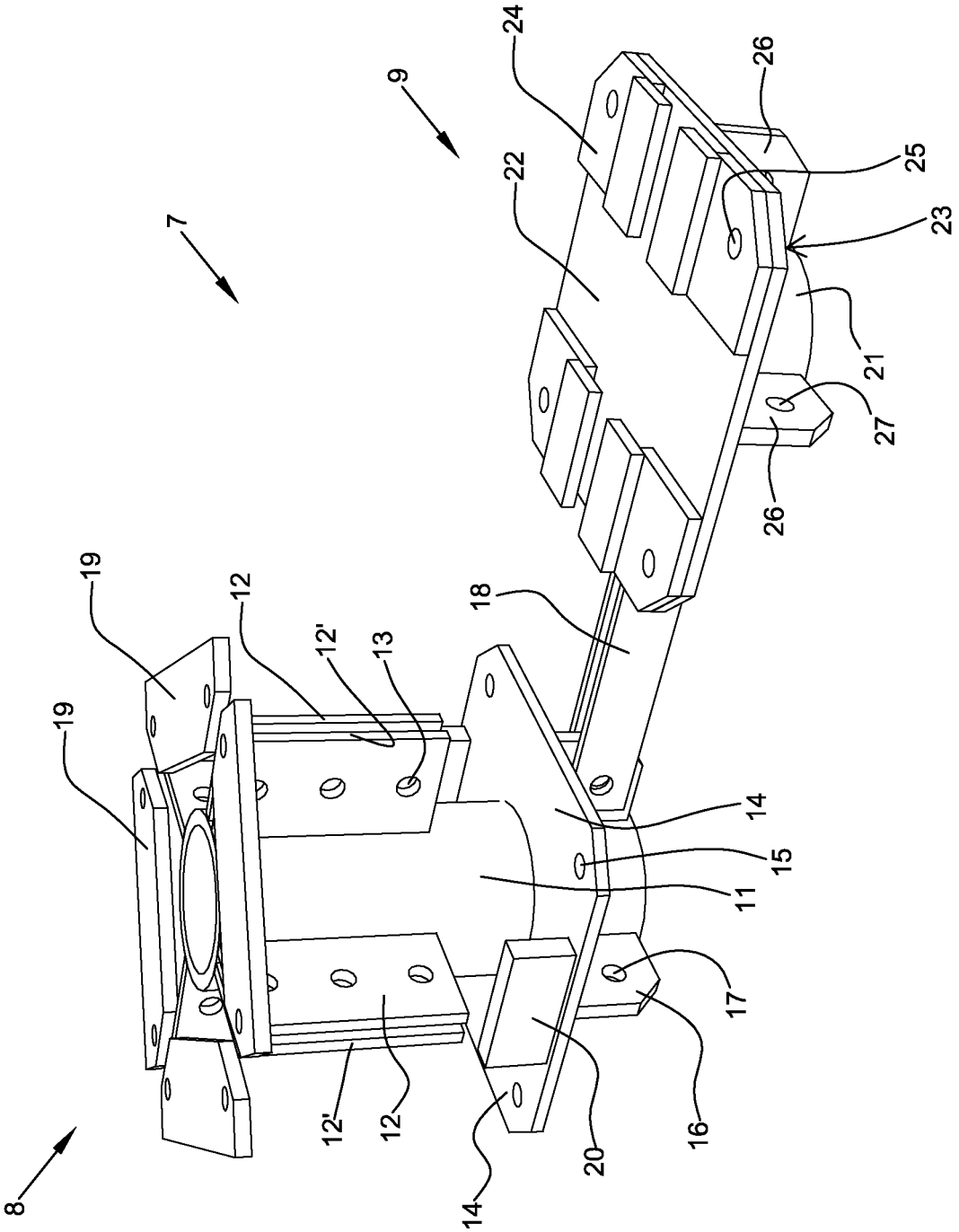

Fig. 3D

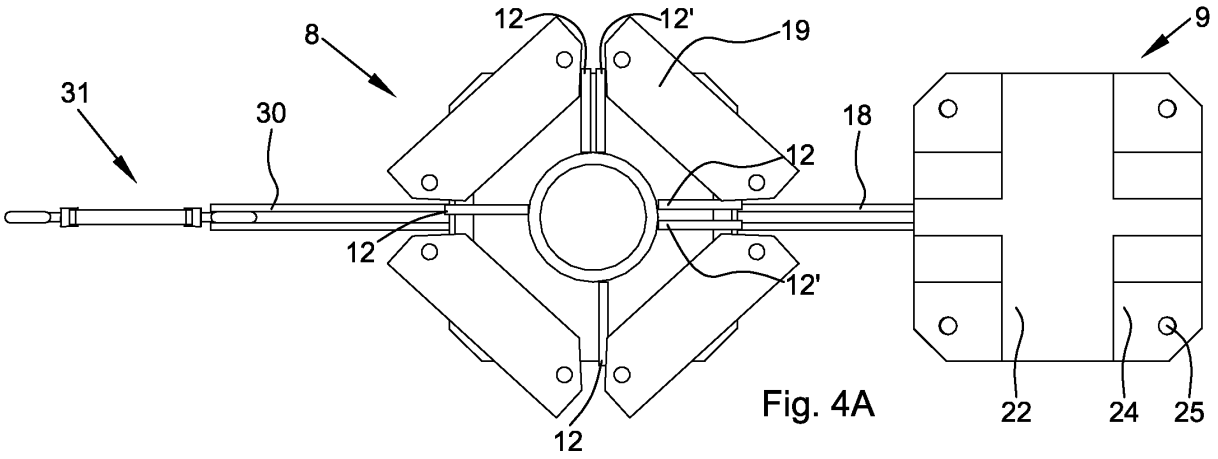

Fig. 4A

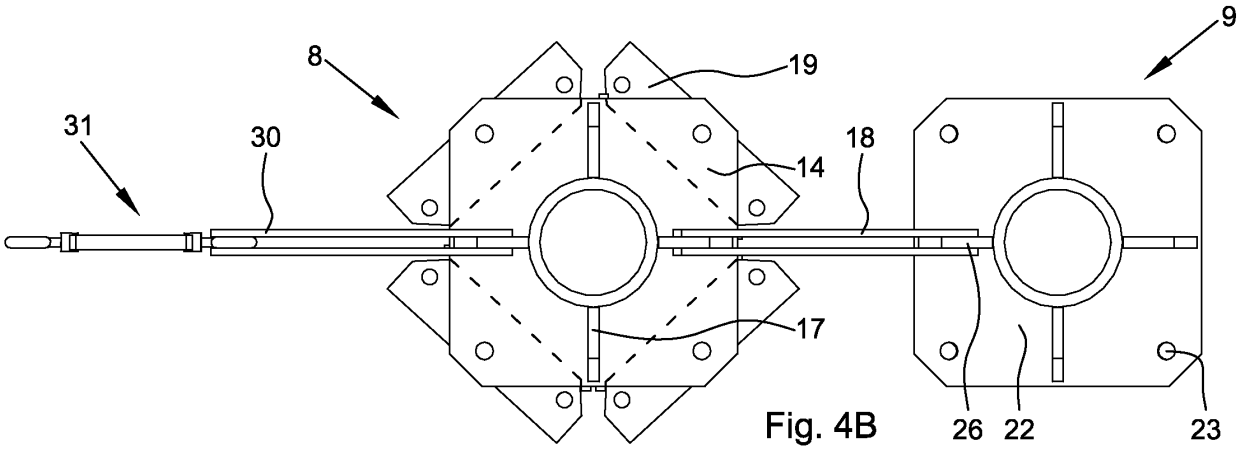

Fig. 4B

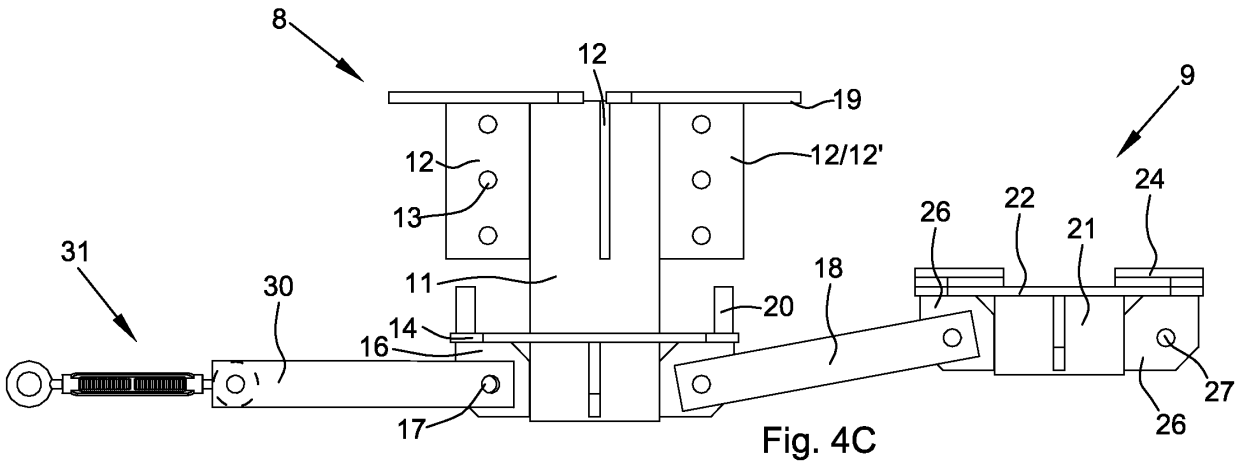

Fig. 4C

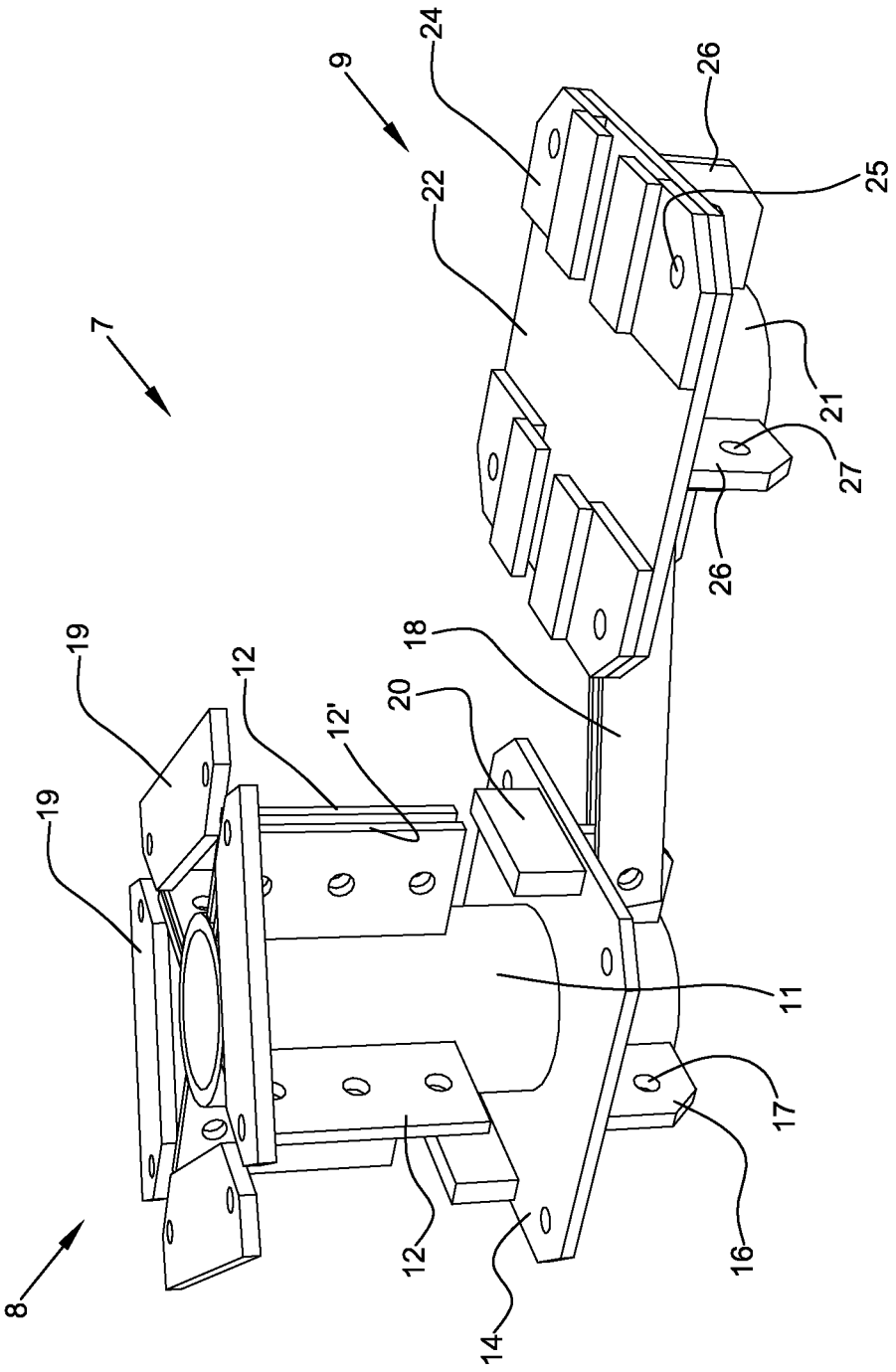

Fig. 4D

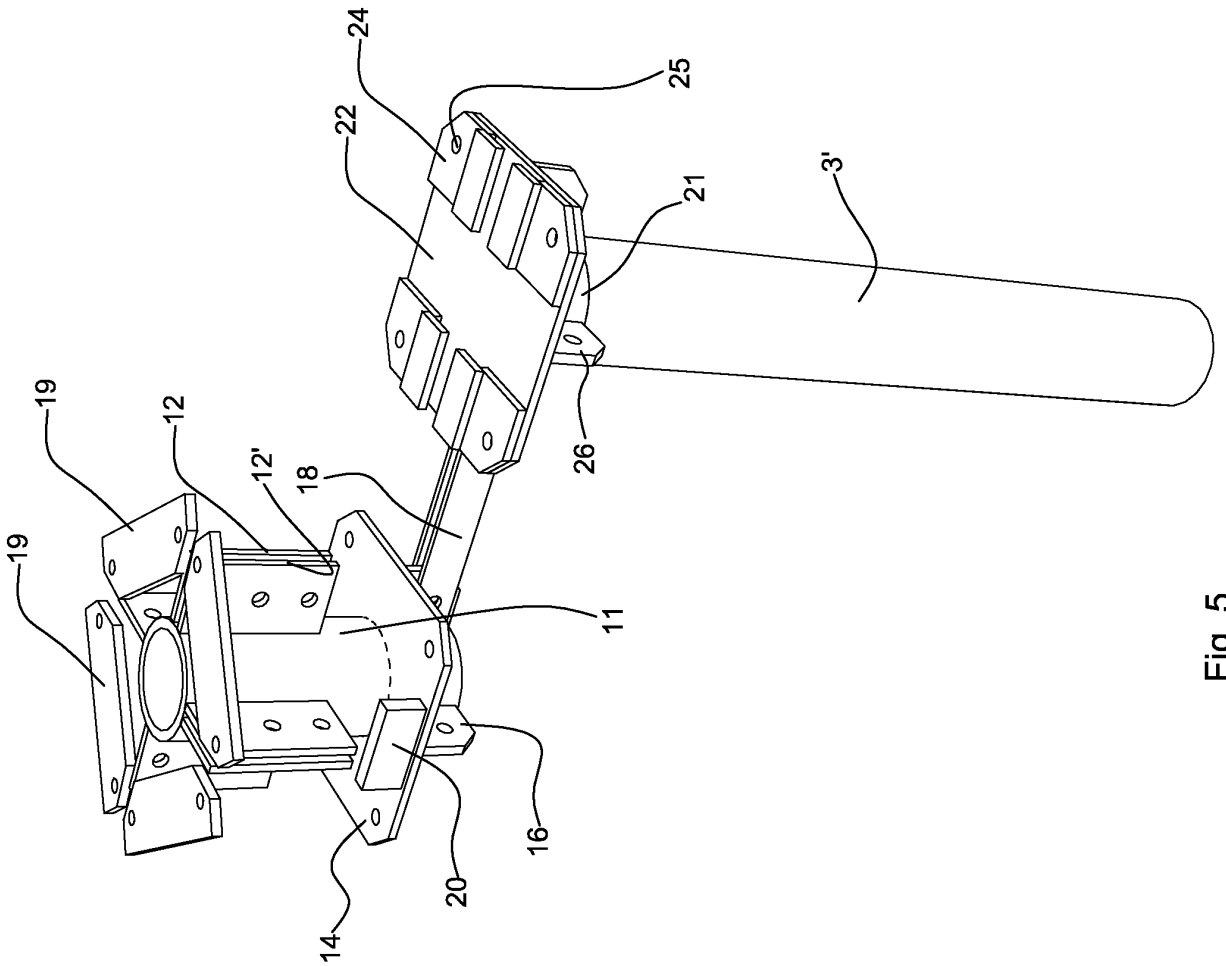

Fig. 5

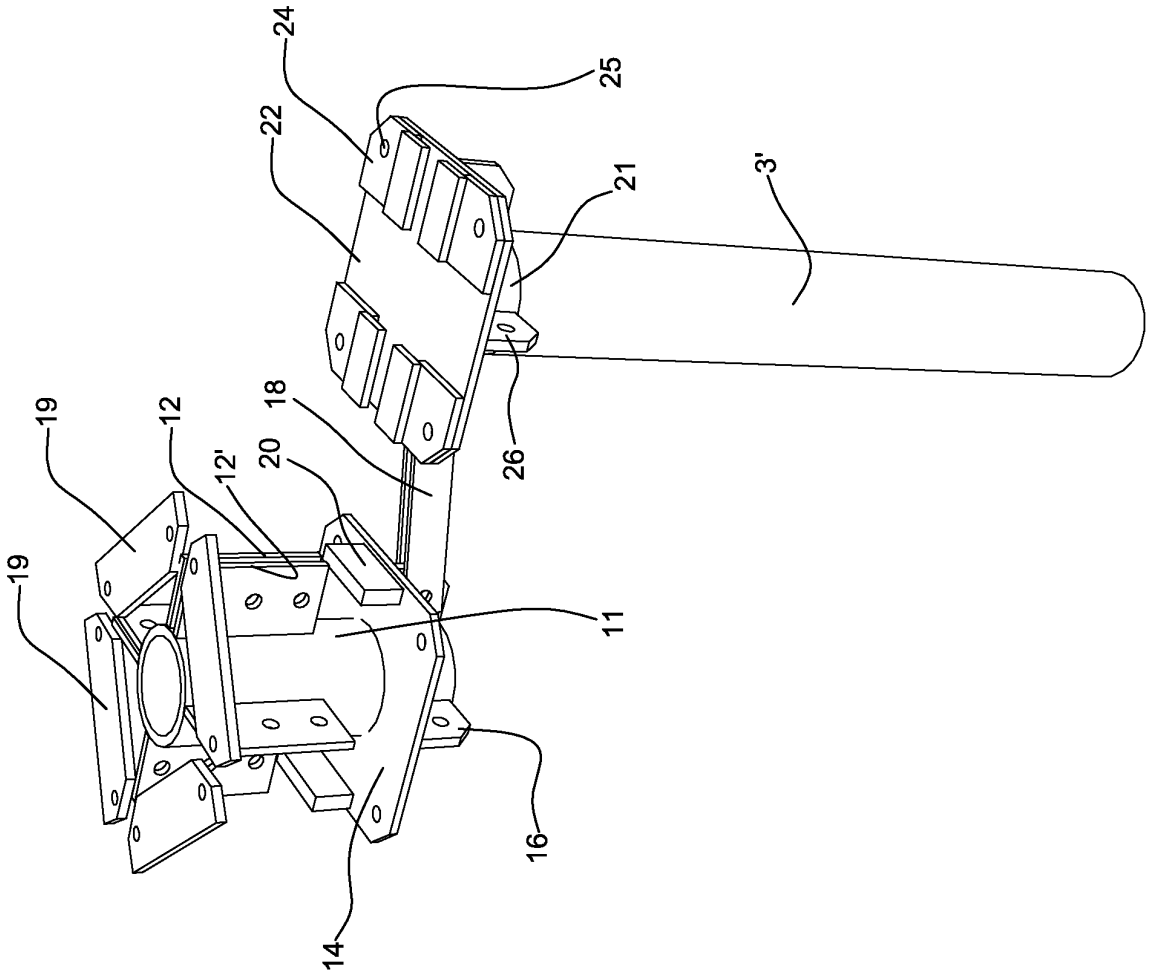

Fig. 6

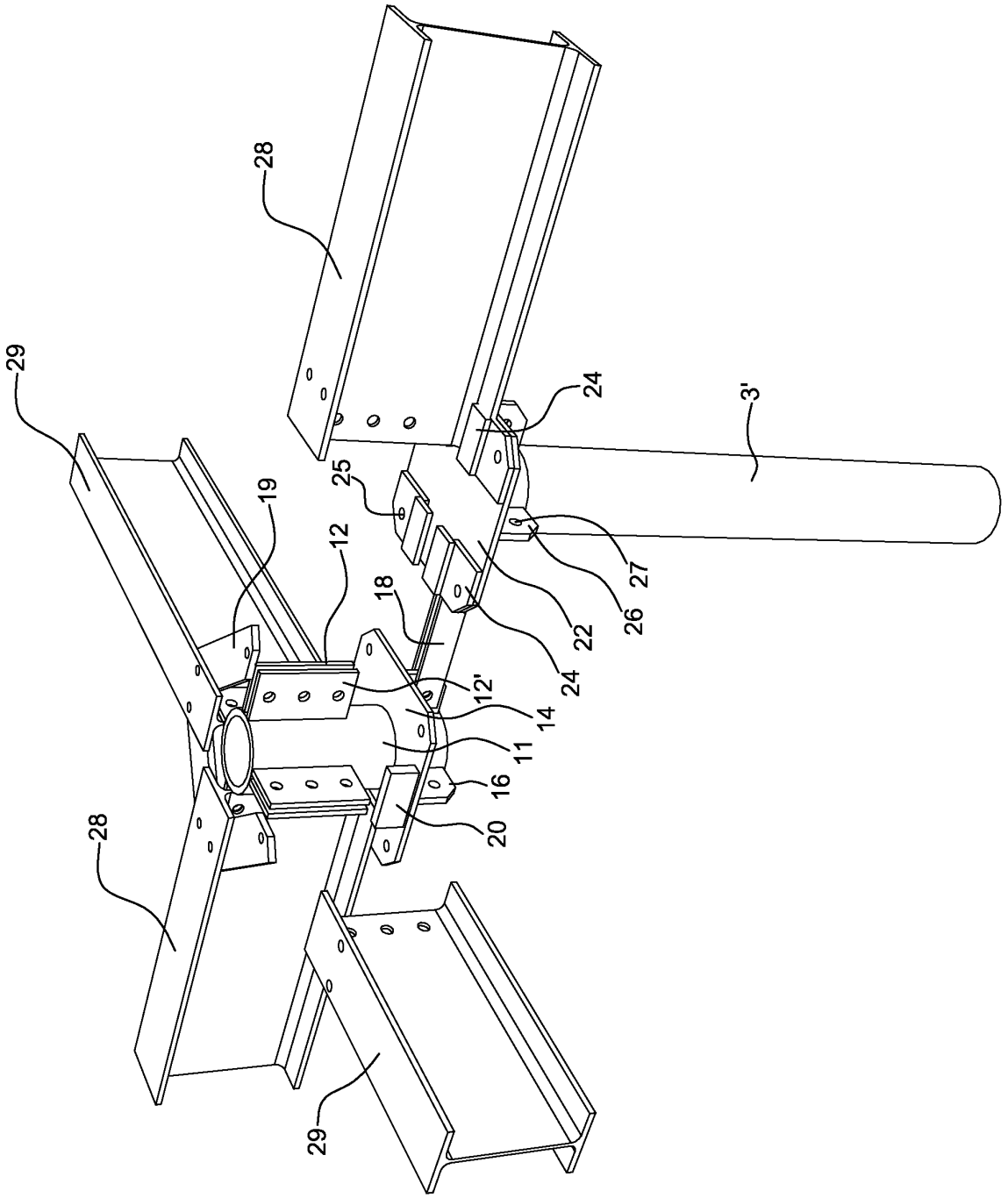

Fig. 7

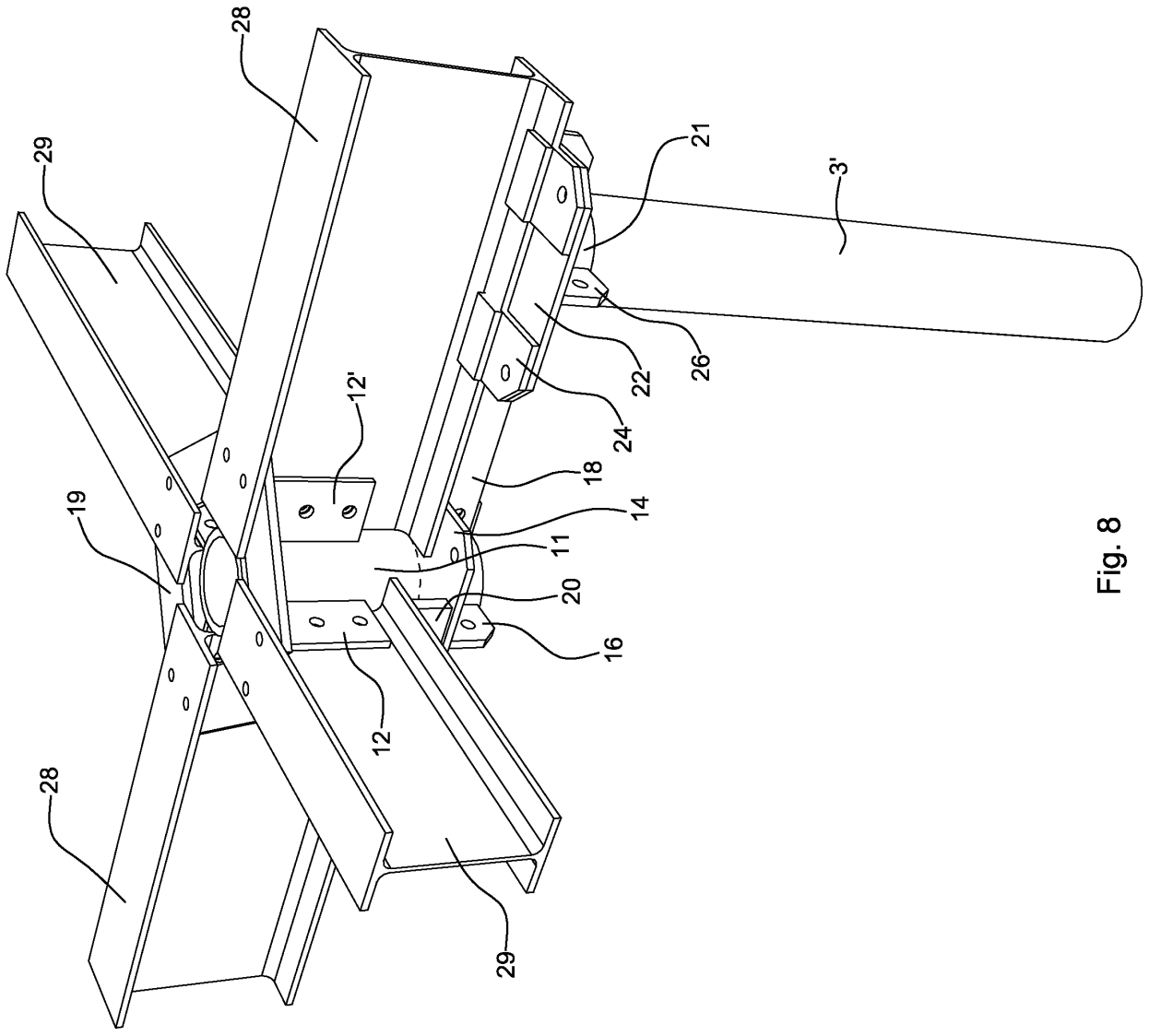

Fig. 8

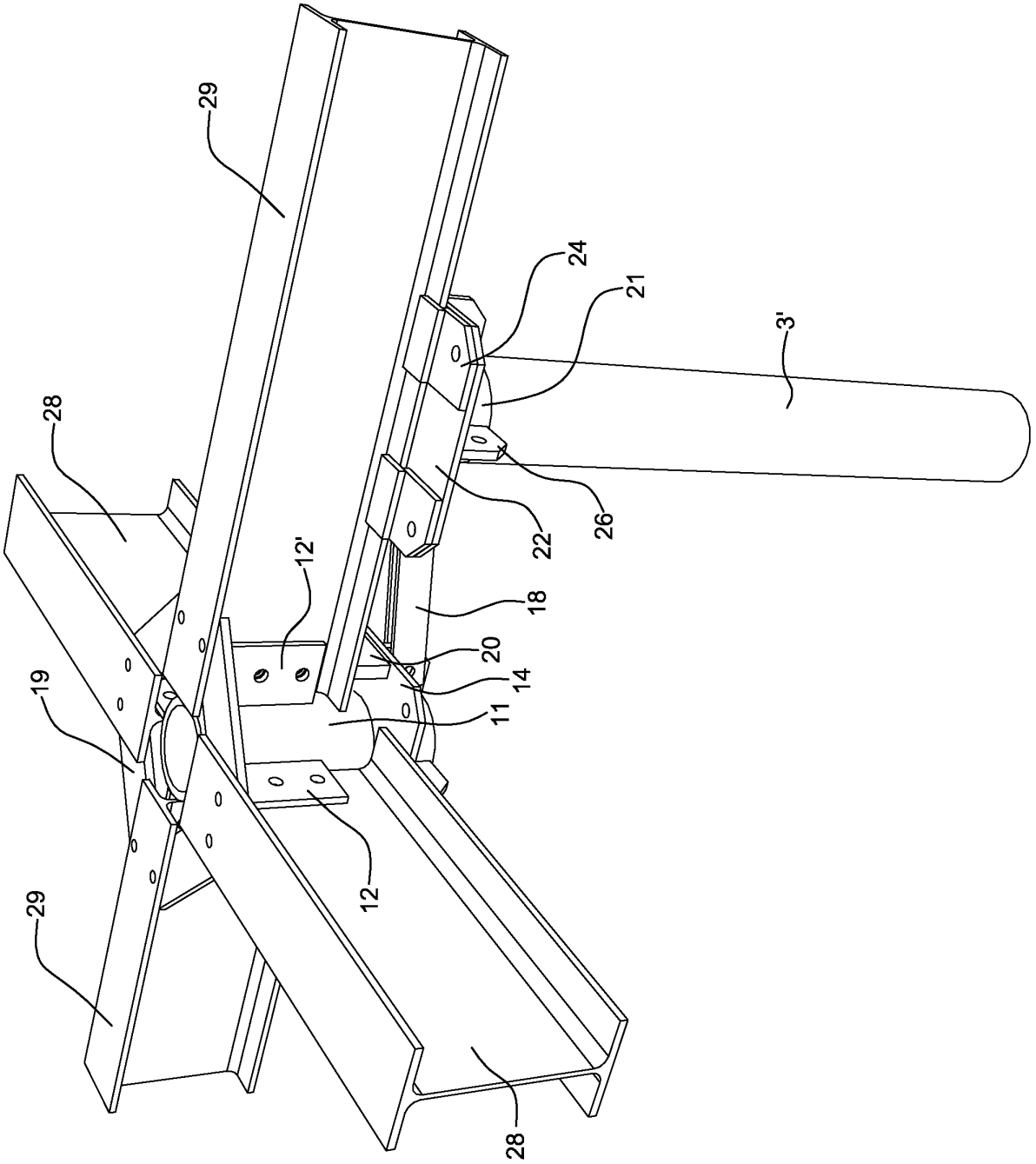

Fig. 9

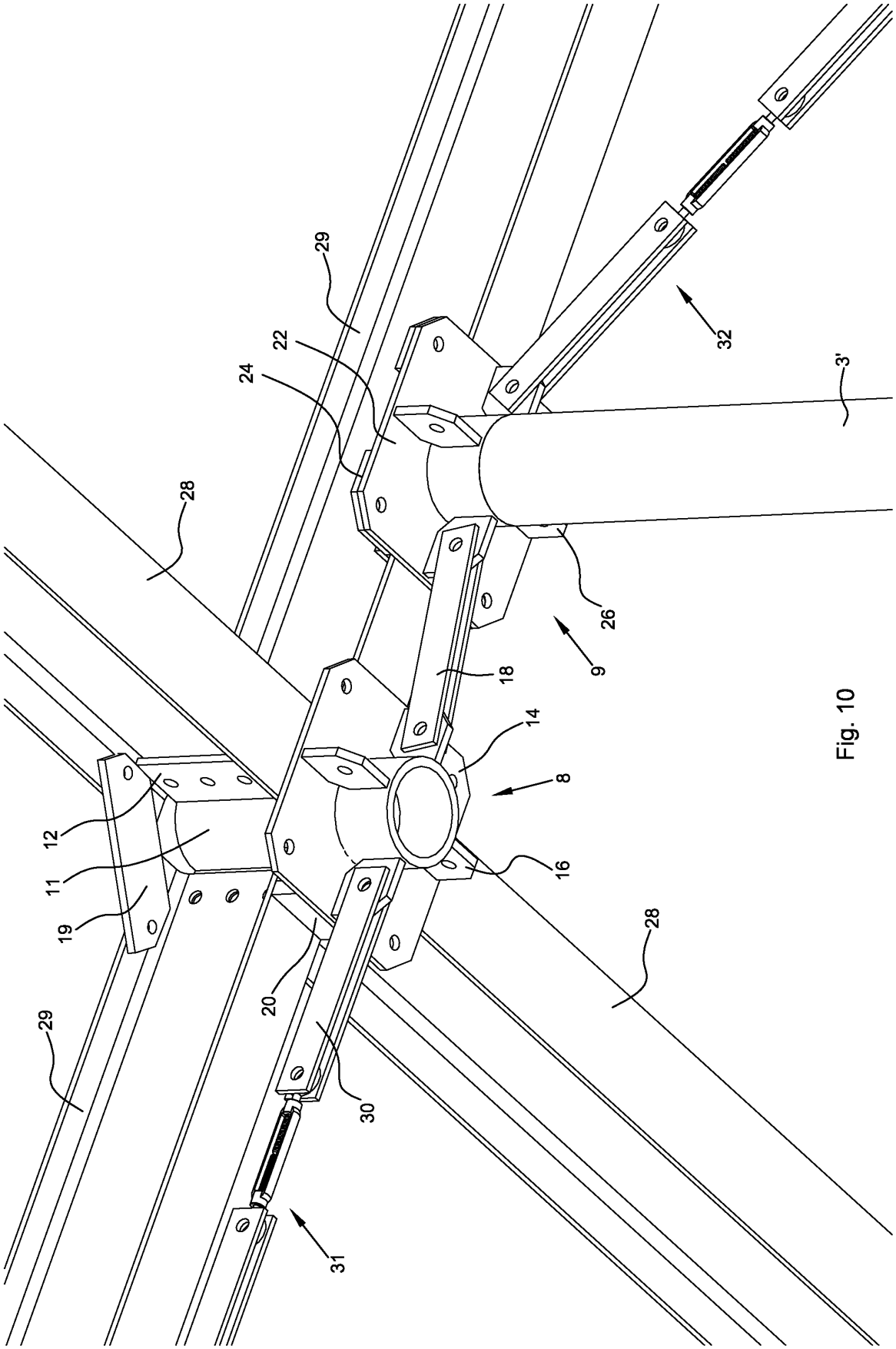

Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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