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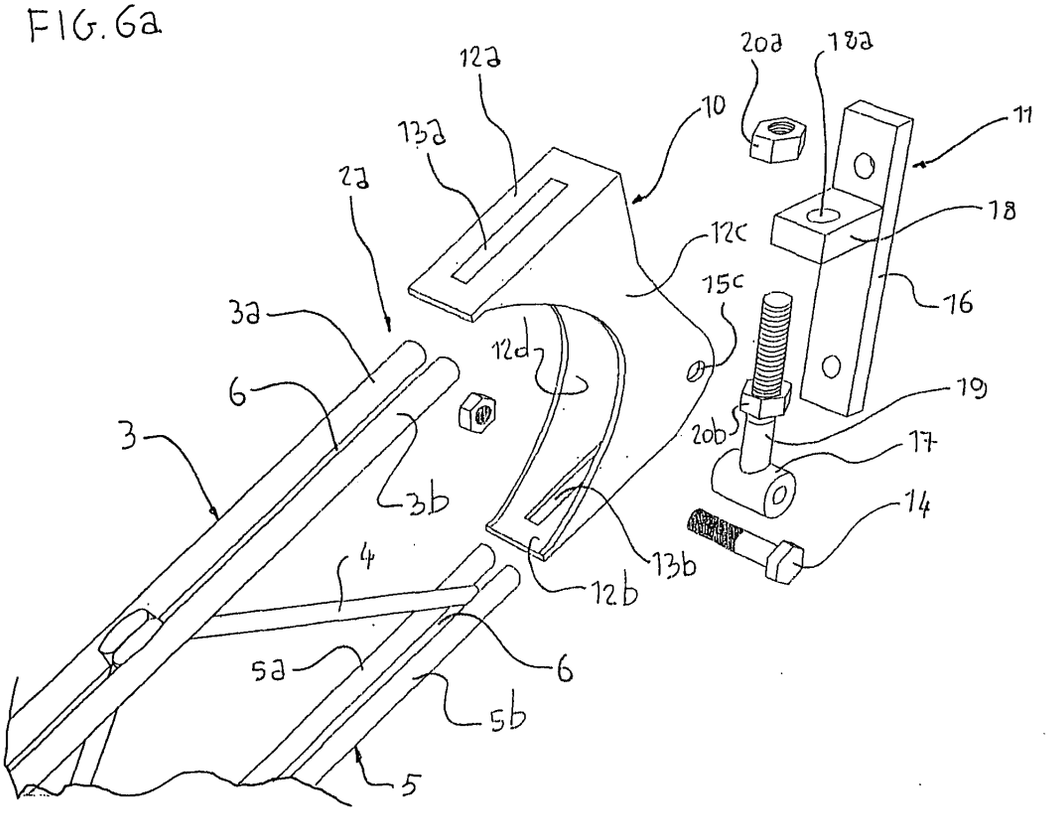
(54) Kit for building composable trellis-like structures

(57) A kit for building composable lattice structures comprises a plurality of lattice girders (2) each of them extending along a respective longitudinal axis (X); a plurality of junction elements (10) to be engaged each with one end (2a) of a girder (2); a plurality of hooking devices (11) each associable with at least one junction element (10); each of the junction elements (10) having a box-shaped structure (12) defined by a plurality of side walls (12a, 12b, 12c, 12d), to surround the end (2a) of the respective girder (2).

FIG. 6a



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Description

[0001] The present invention relates to a kit for building composable "trellis-like" or lattice structures of the type comprising the features set out in the preamble of claim 1.

[0002] In particular, the following description will refer, by way of non-limiting example, to composable lattice structures for construction of building coverings.

[0003] It is known that for building roofs and coverings in general, kits consisting of prefabricated lattice girders are used, typically made of galvanized steel. The lattice girders are joined to each other and to bearing structures such as pillars, main girders or walls of the building that they must cover, by means of connecting plates fastened with bolts, nails, etc. Subsequently panels, roofing tile-carrying laths or other covering elements are applied to the framework formed of said girders.

[0004] Known from the Italian Utility Model No. 243192 in the name of the same Applicant are kits comprising lattice girders consisting of two pairs of round steel bars, or steel rods, extending along respective longitudinal axes and spaced apart by appropriate connecting rods consecutively disposed in an alternated course. The girders are transversely connected with other girders, in particular with ridgepoles, through transverse superposition of the respective pairs of round bars thereon. More particularly, the girders are joined by four U-shaped plates each disposed on either side of a respective pair of round bars, pierced with holes for passage of a joining bolt capable of tightening the pairs themselves on each other.

[0005] Lattices of the above described type presently can be exclusively used as a support for covering elements, in combination with main girders provided with greater flexional and torsional stiffness.

[0006] These main girders have a substantially triangular section and are substantially formed of two lattice girders of the above described type 'disposed longitudinally in side by side relationship along one of the two pairs of round bars and extending transversely of each other.

[0007] Girders of this type are connected with support pillars by junction members formed of a plate butt-resting against the ends of the round bars and carrying three lugs, one at each girder vertex, joined to the girder by bolts passing both through the lugs and the two round bars of each pair.

[0008] The Applicant has found that the devices of the known art briefly described above can be improved under different points of view.

[0009] In particular, the Applicant has thought of using the lattice girders both as a support for the covering elements and as main girders to reduce the typology of the elements to be used and increase the modular character and flexibility of use of the kit.

[0010] However, at the present state of the art there are no suitable systems enabling the lattices to be fastened in a sufficiently simple and reliable manner to the different types of bearing structures present in the building in which said lattices are to be installed.

[0011] It is an aim of the present invention to solve the problems found in the known art by providing a kit for building composable lattice structures that is made up of few modular elements and that, consequently, is also relatively inexpensive.

[0012] It is a further aim of the present invention to devise a kit for building composable lattice structures provided with light-in-weight elements that can be easily transported and are at the same time very strong.

[0013] Another aim of the invention is to devise a kit for building composable lattice structures of easy and quick assembling/disassembling.

[0014] It is a still further aim of the present invention to devise a kit enabling building of lattice structures that while having the same base elements, can be also very different from each other from a geometrical point of view.

[0015] The foregoing and further aims that will become more apparent in the following description are substantially achieved by a kit for building composable lattice structures comprising the features set out in the characterising portion of claim 1.

[0016] Further features and advantages will be best understood from the detailed description of a preferred but not exclusive embodiment of a kit for building composable lattice structures in accordance with the present invention. This description will be set out hereinafter with reference to the accompanying drawings, given by way of non-limiting example, in which:

- Fig. 1 is a front view of a first composable lattice structure to be built by means of a kit in accordance with the present invention;
- Fig. 2 is a perspective view of a second composable lattice structure to be made with the kit of the present invention;
- Fig. 3 is an elevation view of the second composable lattice structure shown in Fig. 2, with some elements removed for a better view of others;
- Fig. 4 is a perspective view of a portion of the second structure in Fig. 2 with some elements removed for a better view of others;
- Fig. 4a is an exploded view of the portion in Fig. 4;
- Fig. 5 is a perspective view to an enlarged scale with respect to the preceding figures, of a first embodiment of a first element of the structure referred to in Figs. 1, 2, 3, 4;
- Fig. 5a is an exploded view of the first element in Fig. 5;
- Fig. 6 is a perspective view of a second embodiment of the first element shown in Fig. 5;
- Fig. 6a is an exploded view of the first element shown in Fig. 6;
- Fig. 7 is a perspective view of a third embodiment of the first element shown in Fig. 5;

- Fig. 7a is a junction assembly made with the elements in Figs. 6 and 7;
- Fig. 8 is a perspective view to an enlarged scale of a portion shown in Figs. 1 and 3;
- Fig. 9 is an exploded perspective view of the portion in Fig. 8;
- Fig. 10 is a perspective view of a third element associated with the composable lattice structures referred to in the preceding figures;
- Fig. 10a is a perspective view of the third element in Fig. 10 disassembled from the respective composable lattice structure;
- Fig. 10b is an alternative embodiment of the third element in Fig. 10 associated with the composable lattice structure and with a wall;
- Fig. 11 is a perspective view from the bottom of a component for fastening the third element to the structure referred to in Figs. 10 and 10a;
- Fig. 12 shows a fourth element associated with the structure in Fig. 1;
- Fig. 13 shows an alternative embodiment of the fourth element in Fig. 12;
- Fig. 13a shows the fourth element in Fig. 13 in two different configurations;
- Fig. 14 is a perspective view of a fifth element associated with the structures referred to in the preceding figures;
- Fig. 15 is an elevation view of the fifth element shown in Fig. 14; and
- Fig. 16 is a perspective view of a sixth element associated with the composable lattice structures referred to in the preceding figures.

[0017] With reference to the drawings, a kit for building composable lattice structures in accordance with the invention is generally identified by reference numeral 1.

[0018] In particular, the composable lattice structures shown in the accompanying drawings.by way of example only are used for constructing coverings in buildings.

[0019] Kit 1 comprises a plurality of lattice girders 2, preferably made of hot galvanized steel, which extend along respective longitudinal axes X.

[0020] As shown in the accompanying drawings, each of the girders 2 has a first pair 3 of round bars or rods, 3a, 3b, disposed in parallel side by side relationship along the longitudinal axis X of the girder 2 itself.

[0021] The first pair 3 of round bars 3a, 3b is fastened, by a plurality of connecting rods 4, to a second pair 5 of round bars 5a, 5b quite similar to the first pair 3. In fact, the round bars 5a, 5b of the second pair 5 too are mutually parallel and extend along the longitudinal axis X of girder 2. The connecting rods 4 space out the two pairs 3, 5 to give girder 2 a suitable bending stiffness in the plane defined by the rods 4 themselves.

[0022] The round bars 3a, 3b; 5a, 5b of each pair 3, 5 are also spaced apart from each other, to form a hollow space 6 between them in which an end of each connecting rod 4 is rigidly engaged, preferably by welding (Figs. 4-7a).

[0023] In accordance with a preferred and herein illustrated embodiment, rods 4 are diagonally disposed between the first 3 and second 5 pairs and consecutively one after the other, to form a zigzag succession. Preferably the ends of two consecutive rods 4 lie in side by side relationship between two round bars 3a, 3b; 5a, 5b of the lattice girder 2.

[0024] Girders 2 can be engaged with one or more bearing structures 7. As shown in Fig. 1, the bearing structure 7 is defined by a ridgepole 8, of the H type (IPE) for example, fastened to the walls of the building to be covered. The lattice girders 2, once they have been mounted on the ridgepole 8, extend transversely of the ridgepole itself, following a double-pitch geometry for example which is not further described as known.

[0025] Alternatively, still in accordance with known diagrams, as shown in Figs. 2 and 3, the bearing structure is a support pillar 9 from which girders 2 extend radially away, to build pergolas and gazebos, for example.

[0026] Further, girders 2 can be directly joined together to obtain support frameworks with different configurations.

[0027] For connection between girders 2, and between the girders 2 and bearing structures 7, kit 1 further comprises a plurality of junction elements 10 associable with respective hooking elements 11.

[0028] Each of the junction elements 10 can be engaged with one end 2a of a girder 2.

[0029] Advantageously, each junction element 10 has a box-shaped structure 12 defined by a plurality of side walls 12a, 12b, 12c, 12d that, after mounting on girder 2, surround the extremity 2a, 2b of the girder 2 itself.

[0030] In particular, as shown in Figs. 5-7, the junction element 10 comprises four walls 12a, 12b, 12c, 12d that are opposite two by two. Two contiguous walls 12a, 12c; 12b, 12d form a right angle.

[0031] A first pair of mutually opposite walls 12a, 12b is associated, in contact relationship, with one of the two pairs of round bars 3, 5, while a second pair of walls 12c, 12d extends in a transverse direction between the walls of the first pair 12a, 12b.

[0032] The walls 12a, 12b of the first pair have at least one first 13a and one second 13b openings, one on each wall 12a, 12b, to house at least two connecting elements 14 of known type, a pair of bolts for example (Figs. 4 and 4a).

[0033] Openings 13a, 13b face the hollow space 6 defined between two round bars 3a, 3b; 5a, 5b disposed side by side, so that each bolt 14 can be suitably positioned between said round bars 3a, 3b; 5a, 5b in order to lock the junction element 10 to girder 2.

[0034] Preferably, the first 13a and second 13b openings have an elongated shape so that several bolts 14 can be received, or insertion of at least one bolt can take place also close to the regions where, between the round bars 3a, 3b; 5a, 5b, the ends of the connecting rods 4 are rigidly engaged.

[0035] According to a first embodiment shown in Figs. 5 and 5a, the walls 12c, 12d of the second pair have at least one first 15c and one second 15d holes, one on each wall 12c, 12d. The two holes 15c, 15d are coaxial so that one connecting element 14, typically one bolt, can be introduced into both of them to carry out a connection between the junction element 10 and one of said hooking devices 11.

[0036] In fact, according to the first embodiment, each of the hooking devices 11 comprises a plate-like element 16 to be engaged, by known connection means, to one of the bearing structures 7, a ridgepole 8 for example. A tubular body 17 (Fig. 5a) is rigidly connected with the plate-like element 16 and is insertable between the second pair of walls 12c, 12d, coaxially with the first and second holes 15c, 15d, to receive the connecting element 14.

[0037] In an alternative embodiment, clearly shown in Figs. 6 and 6a, the tubular body 17 is removably in engagement with the plate-like element 16. In particular, the tubular body 17 is movable in parallel to the plate-like element 16 between a first and a second positions.

[0038] To obtain this type of movement, the hooking device 11 has a tailpiece 18 extending away from the plate-like element 16, preferably in a direction perpendicular thereto.

[0039] A through hole 18a, formed in the tailpiece 18, enables housing of a stem 19 carrying the tubular body 17 at an end 19a thereof.

[0040] During mounting of girders 2, anchoring of the hooking device 11 to the bearing structure 7 is carried out. Subsequently stem 19 is inserted in the through hole 18a and is caused to slide therein until the tubular body 17 is brought to the desired position. Finally, the tubular body 17 is fastened to the tailpiece 18 by suitable locking means 20. Preferably, as shown in Fig. 6a, stem 19 is a threaded stem and screwed thereon is a nut 20a and a lock nut 20b, placed on opposite sides relative to the tailpiece 18, which nuts therefore define the locking means 20.

[0041] Mounting of girder 2 on the hooking device 11 is carried out by means of the junction element 10, as already described for the first embodiment.

[0042] Alternatively, as shown in Figs. 4 and 4a, the stem 19 of each junction element 10 is associated with the support pillar 9 through a hooking capital 60, to form the bearing structure shown in Figs. 2 and 3.

[0043] Advantageously, capital 60 comprises a circular plate 61 to be rigidly mounted to the upper end of pillar 9 and provided with a central hole 62 through which a threaded stem 63 is passed. Capital 60 further has a cup-shaped element 64 having a circular base associable with plate 61 and the concavity of which faces the plate 61 itself. The cup-shaped element 64 too has a central hole 65 within which the threaded stem 63 is placed.

[0044] Mounted between the plate 61 and cup-shaped element 64 is a plurality of connecting bodies 65 each having a prismatic portion 65a provided with a through hole 66 and a cylindrical tailpiece 67 insertable in the concavity of the cup-shaped element 64.

[0045] Stem 19 is fastened, with said nut 20a and lock nut 20b, in the through hole 66 and each of the connecting bodies 65 is locked to capital 60 by tightening the cup-shaped element 64 on the circular plate 61 with a respective nut 68a and lock nut 68b (Fig. 3).

[0046] Fig. 7 shows a third embodiment in which each of the junction elements 10 has a pair of parallel plates 21a-, 21b, provided with respective through holes 22a, 22b. Plates 21a, 21b extend away from the first and second pairs of walls 12a, 12b, 12c, 12d.

[0047] Advantageously, the parallel plates 21a, 21b are placed close to the walls of the first pair 12a, 12b and extend parallel thereto, along the longitudinal axis X of the girder 2 on which the hooking element 10 is mounted to enable butt-connection of a girder 2 with the respective hooking element 11.

[0048] In fact, in accordance with a third embodiment, the hooking device 11 comprises a tubular element 23 to be coaxially disposed between the through holes 22a, 22b of the pair of parallel plates 21a, 21b for housing of a connecting element, typically a bolt in this case too (not shown), which is operatively in engagement both with the parallel plates 21a, 21b and the hooking device 11.

[0049] The longitudinal extension of the tubular element 23 is smaller than the distance between the two plates 21a, 21b. In particular, the distance between the two plates 21a, 21b is substantially the same as the sum of the tubular element 23 length and the thickness of one plate 21a, 21b.

[0050] In fact, the hooking device 11 in accordance with the third embodiment allows two girders 2 to be butt-connected.

[0051] Upon installation, two girders 2 provided each with a junction element 10 having the pair of parallel plates 21a, 21b are butt-approached with association of plates 21a, 21b in such a manner that the four through holes 22a, 22b are positioned in coaxial relationship.

[0052] Subsequently, the tubular element 23 is coaxially disposed between the through holes 22a, 22b of the four plates 21a, 21b and joined thereto by a bolt (Fig. 7a).

[0053] Advantageously, the tubular element 23 further comprises a tailpiece 24 extending away from the tubular element and provided with a through hole 25. Tailpiece 24 enables connection to the tubular element 23 of a third girder 2 equipped with a junction element 10 in accordance with the first or second embodiment.

[0054] To enable girders 2 to rest against a building wall or other bearing structure, at one end 2b opposite to the end 2a provided with the junction element 10 as above described, kit 1 further comprises a rest device 25 (Figs. 8 and 9). Advantageously, the rest device 25 comprises a base 26 to be rigidly engaged with the wall P of a building and an adjustable element 27 to be

mounted on girder 2 and associable with base 26.

[0055] In more detail, the base 26 of the rest device 25 has a U-shaped conformation in section, which defines two mutually parallel walls 28 extending in a transverse direction from a base wall 29 put in contact with the building wall P.

[0056] Rotatably inserted between the walls 28 of base 26 is an auxiliary tubular body 30 being part of the adjustable element 27. The auxiliary tubular body 30 is linked to base 26 by a pin 31 inserted in suitable through holes 32 formed in the mutually parallel walls 28 and in the auxiliary tubular body itself 30.

[0057] The adjustable element 27 further comprises a threaded pin 33 integral with the auxiliary tubular body 30 which is inserted between two round bars 3a, 3b; 5a, 5b of one of the two pairs of round bars 3, 5 of girder 2.

[0058] To lock girder 2 to the threaded pin 33, the adjustable element 27 also comprises a first nut 34a and a second nut 34b and two respective plates 34c, 34d disposed on a first side and a second side opposite to the first one respectively, of the pair of round bars 3, 5 of girder 2.

[0059] During installation, first the adjustable elements 27 are fastened to the building wall P, subsequently pins 33 are inserted between the round bars 3a, 3b; 5a, 5b of the respective girders 2 and finally after positioning girders 2 to the desired height, said pins 33 are locked to girders 2 by said nut and lock nut 34a, 34b.

[0060] Advantageously, kit 1 in accordance with the present invention further comprises at least one first flat netlike support element 35 having a first plurality of meshes 35a and a second flat netlike element 36 having a second plurality of meshes 36a (Figs. 10 and 10a).

[0061] The two netlike elements 35, 36 can be engaged with several lattice girders 2, through appropriate fastening means 37, at the lower portion of the lattice structure for example, to perform the function of supporting one or more plaster layers.

[0062] Advantageously, the meshes 35a of the first flat netlike element 35 disposed directly in contact with girders 2, are larger than the meshes 36a of the second flat netlike element 36 that is associated in contact relationship with the first flat netlike element 35 on the opposite side with respect to girders 2.

[0063] The second flat netlike element 36 with thicker meshes ensures setting of the plaster, whereas the first flat netlike element 35 that is stronger carries out stiffening of the structure.

[0064] The two netlike elements 35, 36 can also be suitably shaped and fastened to both the structure and the walls, to make particular moulded members, as used in shaped cornices for example (Fig. 10b).

[0065] In more detail (Fig. 11), the fastening means 37 comprises a first plurality of auxiliary plates 38 connected to the lattice girders 2 by connecting means 39 of known type.

[0066] In particular, the connecting means 39 of known type, bolts for example, are inserted both in the auxiliary plates 38 and the round bars 3a, 3b; 5a, 5b of the respective girders 2.

[0067] Each of the auxiliary plates 38 has a tailpiece 38a which is deformable between a first position at which said tailpiece 38a lies in a transverse direction to the respective auxiliary plate 38, and a second position at which the tailpiece 38a lies parallel to the respective auxiliary plate 38 to clamp the first 35 and second 36 flat netlike elements superposed on each other, between the tailpiece itself and the plate.

[0068] Advantageously, as shown in Figs. 12-13a, kit 1 in accordance with the present invention further comprises a second plurality of auxiliary plates 50, each of them being susceptible of abutment against a respective girder 2 for butt-connection with an auxiliary girder 41.

[0069] According to the embodiment shown, each auxiliary plate belonging to the second plurality has two lugs 42 extending perpendicular from the plate 40 itself and associable with the two pairs of round bars 3, 5.

[0070] For the purpose, an opening for housing at least two connecting elements 14 is formed in each of the two lugs 42 following the construction diagram already depicted for the junction element 10. In particular, the openings of each lug 42 face the hollow space 6 defined between two round bars disposed side by side 3a, 3b; 5a, 5b, so that each connecting element 14 may be suitably positioned between the round bars themselves 3a, 3b; 5a, 5b to lock lug 42 on girder 2. The auxiliary girder 31 is joined to the plate 40 of the second plurality by butt-welding the round bars 3,5 of the auxiliary girder 41 to the plate 40 itself.

[0071] As shown in Fig. 12, the auxiliary girder 41 has smaller transverse sizes than the main girders 2. In particular, the distance between pairs of round bars 3, 5 of the auxiliary girders 41 is smaller than the distance between the corresponding pairs of the main girders 2. This type of auxiliary girders 41 is used to make the side projections of the lattice structure beyond the building walls P, so as to form the roof portion currently called gutter.

[0072] Alternatively, as shown in Figs..13 and 13a, the auxiliary girder 41 is an end girder or stanchion, terminating at the building wall P or alternatively directly to the ground.

[0073] The end girder 41 has one pair alone of upper round bars 3 that are mutually parallel and butt-associated, through the auxiliary plate of the second plurality 40, with the upper round rods of a main girder 2. The round bars 3 of the end girder 41 are also supported by a connecting rod 4 connected to the auxiliary plate 40.

[0074] Advantageously, as shown in Fig. 13a, the round bars 3 of the end girder 41 are cut to size during mounting of the structure, based on inclination of the main girders 2 and bulkiness of the structure itself.

[0075] Kit 1 further comprises a plurality of support members 44 for hollow tiles T to be engaged with the lattice girders 2 (Figs. 14 and 15) that, like the flat netlike

elements 35, 36, can be associated with several lattice girders 2 at the lower portion of the lattice structure.

[0076] Advantageously, each of the support members 44 has a hooking portion 45 susceptible of engagement with the round bars 3a, 3b, 5a, 5b of one of the pairs 3, 5 of round bars and a rest surface 46 transversely extending from the lattice girder 2 for support of at least one hollow tile.

[0077] Preferably, the support member 44 is defined by a U-shaped auxiliary round bar the end portions 44a of which define the hooking portion 45. In particular, each of the end portions 44a defines a hook 47 to be inserted between the round bars 3a, 3b, 5a, 5b of one of the pairs 3, 5.

[0078] With reference to Fig. 15, hook 47 has a first stretch 47a, a second stretch 47b consecutively in engagement with the first one 47a, and a third stretch 47c consecutively in engagement with the second one 47b. The third stretch 47c is connected to the rest surface 46. The second stretch 47b lies in a transverse direction between the first 47a and third stretches whereas the first stretch 47a and third stretch 47c are parallel to each other and mutually spaced by a distance substantially corresponding to the diameter of one of the round bars 3a, 3b; 5a, 5b. Upon installation, the first stretch 47a rests at the bottom against one of the round bars 3a; 3b, 5a; 5b of a pair, while the third stretch 47c rests at the top against the second round bar 3b; 3a, 5b; 5a of the same pair 3, 5, the second stretch 47b passing between the two round bars 3a, 3b; 5a, 5b.

[0079] Finally, as shown in Fig. 16, a third plurality of auxiliary plates 48 is provided, each of them being of a U-shaped configuration for engagement along the longitudinal extension of a lattice girder 2.

[0080] In more detail, each plate of the third plurality 48 has a central body 49 and two tailpieces 50 extending from opposite edges 49a of the central body 49 and transversely thereof.

[0081] Formed in the central body 49 is one or more through holes 51 for engagement with conventional connecting means not shown, the function of which is to join the lattice girder 2, at intermediate points thereof, to a wall or other bearing structures.

[0082] Plate 48 is fastened to the lattice girder 2 by screws or bolts inserted in a slot 52 formed in each tailpiece 50 that, when plate 48 is mounted on girder 2, faces the hollow space 6 defined between the round bars 3a, 3b, 5a, 5b of the girder 2 itself, and by counter-elements 53 associated with each pair of round bars 3a, 3b, 5a, 5b on the opposite side from the tailpiece 50.

[0083] The invention achieves important advantages.

[0084] First of all, the kit for building composable lattice structures in accordance with the present invention enables light-in-weight and strong structures to be made because it uses as the modular elements, simple lattices with a low weight/capacity load ratio.

[0085] In addition, the kit for building composable lattice structures in accordance with the present invention enables said structures to be made with ease and rapidity. In particular, since all the elements are bolted to each other, no drilling or welding operations are required for erection of the kit.

[0086] The kit in accordance with the present invention enables geometrically complex constructions to be made which may also be very different from each other, using the same base elements.

[0087] The junction elements of the present kit are very versatile because they enable mutual connections to be made between girders, between the girders and bearing structures and between the girders and covering elements. In this connection the hollow space defined between two round bars disposed side by side of each lattice girder enables fittings for covering and false ceiling to be easily bolted at any point along the girder itself. In addition, the particular junction elements being the object of the present invention which are disposed at the girder ends allow severe measuring operations of the lattice length during building and laying to be avoided.

[0088] In addition, the kit in accordance with the invention enables fine adjustment of the relative position between the different elements.

[0089] Finally, the elements constituting the present kit are simple and inexpensive because they are adapted to be mass produced.

[0090] The device as conceived is susceptible of many modifications and variations, all of them falling within the scope of the inventive idea characterising it. All of the details can be replaced by other technically equivalent elements and practically all the materials used as well as the sizes can be of any nature depending on requirements.

Claims

1. A kit for building composable lattice structures, comprising:

   - a plurality of lattice girders (2), each extending along a respective longitudinal axis (X);
   - a plurality of junction elements (10), to be each engaged with one end (2a) of a girder (2) of said girder plurality;
   - a plurality of hooking devices (11) each associable with at least one junction element (10),

   characterised in that each of said junction elements (10) has a box-shaped structure (12) defined by a plurality of side walls (12a, 12b, 12c, 12d) to surround the end (2a) of the respective girder (2).

2. A kit as claimed in claim 1, **characterised in that** each lattice girder comprises:

   - a first pair (3) of mutually-parallel round bars

(3a, 3b), extending along the longitudinal axis (X) of said girder (2);

- a second pair (5) of mutually-parallel round bars (5a, 5b), extending along the longitudinal axis (X) of said girder (2) and spaced out from the first pair (3);
- a plurality of connecting rods (4) between the first (3) and second (5) pairs.

3. A kit as claimed in claim 2, **characterised in that** the round bars (3a, 3b, 5a, 5b) of each round bar pair (3, 5) are spaced apart from each other, to form a hollow space (6); each connecting rod (4) of the plurality of connecting rods being engaged at its end in said hollow space (6).

4. A kit as claimed in claim 2 or 3, **characterised in that** each of said junction elements (10) has:

- a first pair of mutually opposite walls (12a, 12b), each of them being associable in contact relationship with one of said first and second pairs (3) of round bars (3a, 3b) ;
- a second pair of walls (12c, 12d) transversely extending between the walls of the first wall pair (12a, 12b).

5. A kit as claimed in claim 4, **characterised in that** the walls of the first wall pair (12a, 12b) have at least one first and one second openings (13a, 13b), one on each wall (12a, 12b), for housing at least two. connecting elements (14) between the round bars (3a, 3b; 5a, 5b) of said first and second round bar pairs (3, 5).

6. A kit as claimed in claim 4, **characterised in that** the walls of the second wall pair (12c, 12d) have at least one first and one second mutually-coaxial holes (15c, 15d), one on each wall (12c, 12d), for engagement of one connecting element (14) with the hooking devices (11).

7. A kit as claimed in claim 6, **characterized in that** each of the hooking devices (11) comprises:

- a plate-like element (16) for engagement with a bearing structure (7); a tubular body (17) connected to the plate-like element (16); said tubular body (17) being insertable between the second pair of walls (12c, 12d) in coaxial relationship with the first and second holes (15c, 15d), to receive the connecting element (14).

8. A kit as claimed in claim 7, **characterised in that** the tubular body (17) connected with the plate-like element (16) is rigidly fastened to said plate-like element (16).

9. A kit as claimed in claim 7, **characterised in that** the tubular body (17) connected with the plate-like element (16) is removably in engagement with the plate-like element (16) and movable in parallel to said plate-like element (16) between a first position and a second position.

10. A kit as claimed in claim 7 or 9, **characterised in that** each of the hooking devices (11) further comprises:

- a tailpiece (18) extending away from the plate-like element (16) and carrying a through hole (18a);
- a stem (19) insertable in the hole (18a) and carrying the tubular body (17) at one end thereof;
- locking means (20) to lock the stem (19) in the hole (18a).

11. A kit as claimed in claim 4, **characterised in that** each of the junction elements (10) has a pair of parallel plates (21a, 21b) provided with respective through holes (22a, 22b) and extending away from the first and second wall pairs (12a, 12b, 12c, 12d), for engagement of one connecting element (14) with the hooking devices (11).

12. A kit as claimed in claim 11, **characterised in that** the parallel plates (21a, 21b) are disposed close to the walls of the first wall pair (12a, 12b) and extend parallel to the walls of said first pair (12a, 12b).

13. A kit as claimed in claim 11 or 12, **characterised in that** each of the hooking devices (11) comprises:

- a tubular element (23) to be connected in coaxial relationship between the through holes (22a, 22b) of the pair of parallel plates (21a, 21b) for engagement of the connecting element (14).

14. A kit as claimed in claim 13, **characterised in that** each of the hooking devices (11) further comprises a tailpiece (24) extending away from the tubular element (23) and carrying a through hole (25).

15. A kit for building composable lattice structures, in particular as claimed in anyone of claims 1 to 14, **characterised in that** it comprises at least one first flat netlike element (35) having a first plurality of meshes (35a) and suitable for engagement with the lattice girders (2);

- at least one second flat netlike element (36) having a second plurality of meshes (36a) and associable in contact relationship with said at least one first flat netlike element (35);
- fastening means (37) to fasten said at least one

first (35) and one second (36) flat netlike elements to the lattice girders (2);
- the meshes (35a) of said at least one first flat netlike element (35) being larger than the meshes (36a) of said at least one second flat netlike element (36).

16. A kit as claimed in claim 15, **characterised in that** the fastening means (37) comprises:

- a first plurality of auxiliary plates (38), each having a tailpiece (38a) which is deformable between a first position at which said tailpiece (38a) lies transverse to the respective auxiliary plate (38), and a second position at which said tailpiece (38a) lies parallel to the respective auxiliary plate (38);
- connecting means (39) to join the plates (38) to the lattice girders (2).

17. A kit for building composable lattice structures, in particular as claimed in anyone of claims 2 to 16, **characterised in that** it comprises a rest device (25) to bear the girders (2) against a wall (P) of a building having:

- a base (26) to be rigidly engaged with the building wall (P);
- an adjustable element (27) to be mounted on a girder (2) and associable with the base (26).

18. A kit as claimed in claim 17, **characterised in that** the base (26) in cross section has a U-shaped conformation defining two mutually parallel walls (28); the adjustable element (27) having an auxiliary tubular body (30) rotatably insertable between the walls (28) of the base (26) .

19. A kit as claimed in claim 18, **characterised in that** the adjustable element (27) further comprises:

- a first nut (34a) placed on a first side of one of the round bar pairs (3; 5) of the girder (2);
- a second nut (34b) placed on a second side, opposite to the first one, of the round bar pair (3; 5) of the girder (2) ;
- a threaded pin (33) associable with said first and second nuts (34a, 34b) and rigidly connected to the auxiliary tubular body (30).

20. A kit for building composable lattice structures, in particular as claimed in anyone of claims 1 to 16, **characterised in that** it further comprises a second plurality of auxiliary plates (40), each designed to abut against a respective girder (2) for butt-connection with an auxiliary girder (41).

21. A kit as claimed in claim 20, **characterised in that** the auxiliary girder (41) is an end girder having one pair alone of mutually-parallel round bars (3).

22. A kit for building composable lattice structures as claimed in anyone of claims 1 to 16, **characterised in that** it further comprises a plurality of support members (44) for hollow tiles (T) susceptible of engagement with the lattice girders (2).

23. A kit as claimed in claim 22, **characterised in that** each of the support members (44) has:

- a hooking portion (45) for engagement between the round bars (3a, 3b, 5a, 5b) of one of said first and second round bar pairs (3, 5); and
- a rest surface (46) extending transversely of the lattice girder (2) for support of at least one hollow tile (T).

24. A kit as claimed in claim 22 or 23, **characterised in that** each of the support members (44) is defined by an auxiliary shaped round bar.

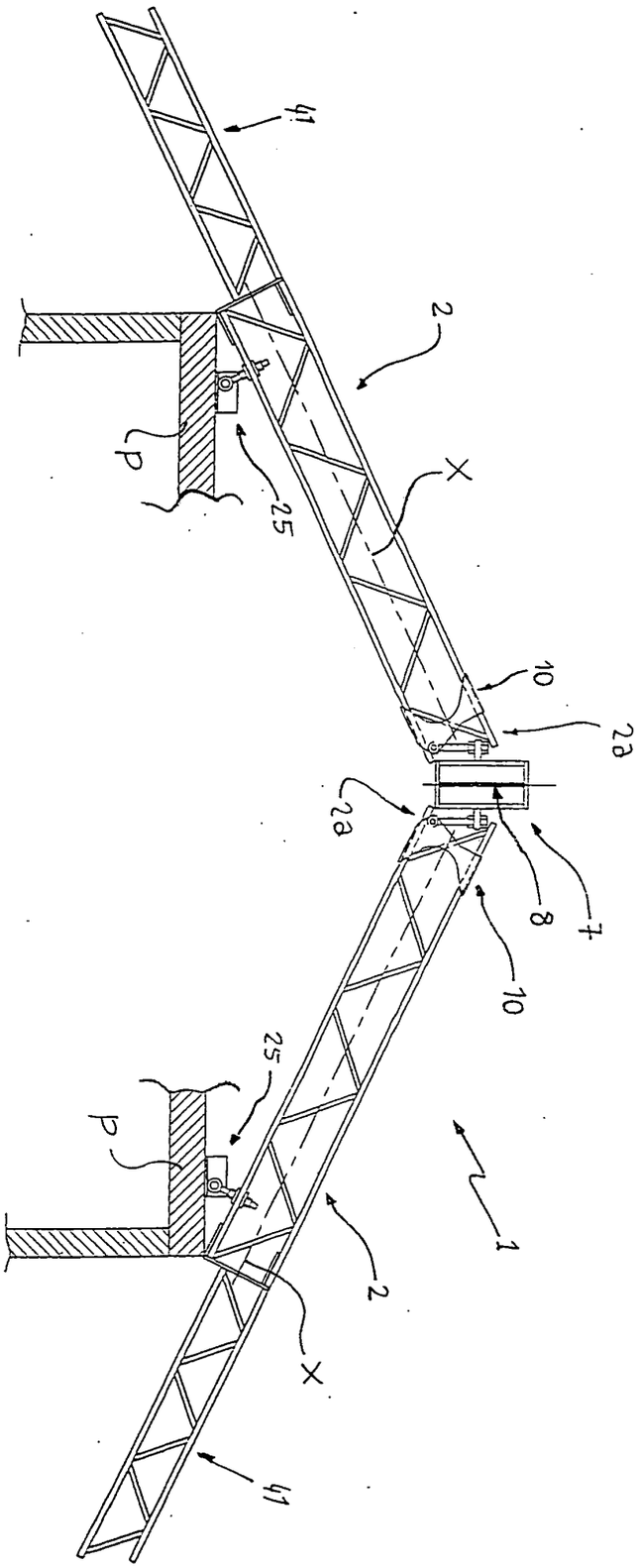


FIG. 1

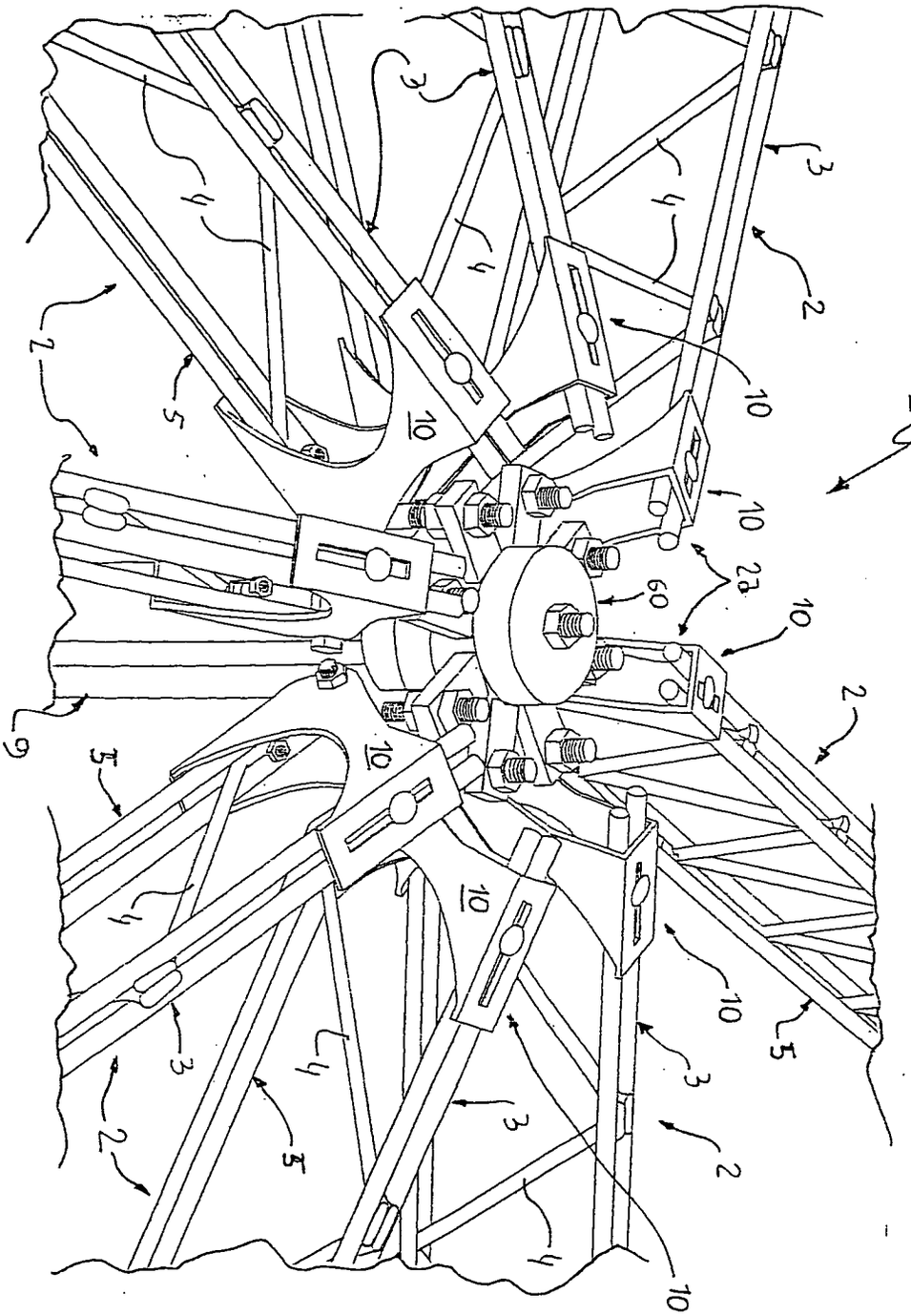


FIG. 2

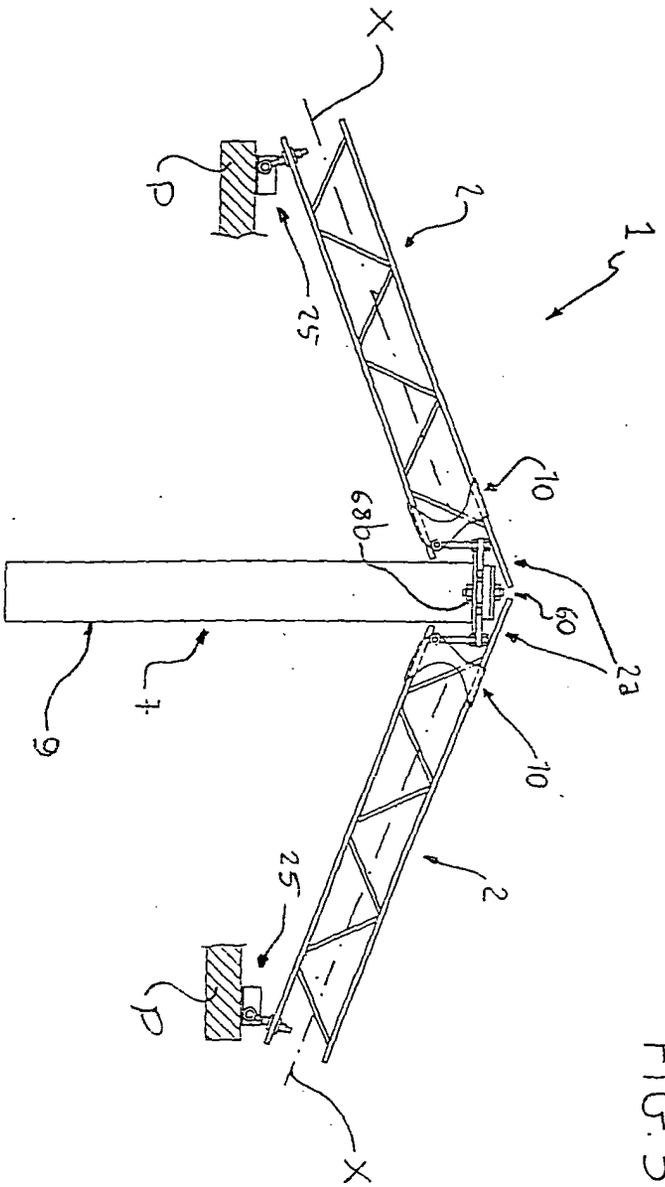


FIG. 3

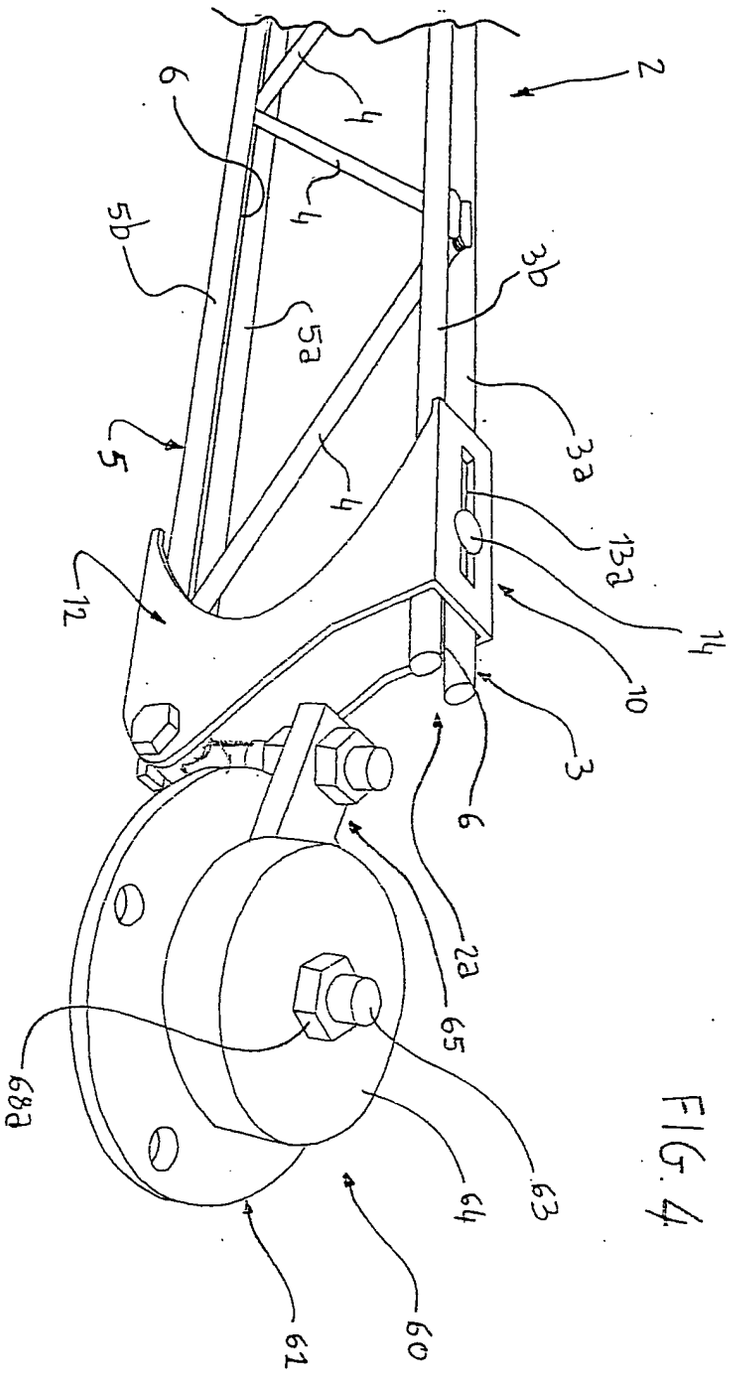


FIG. 4

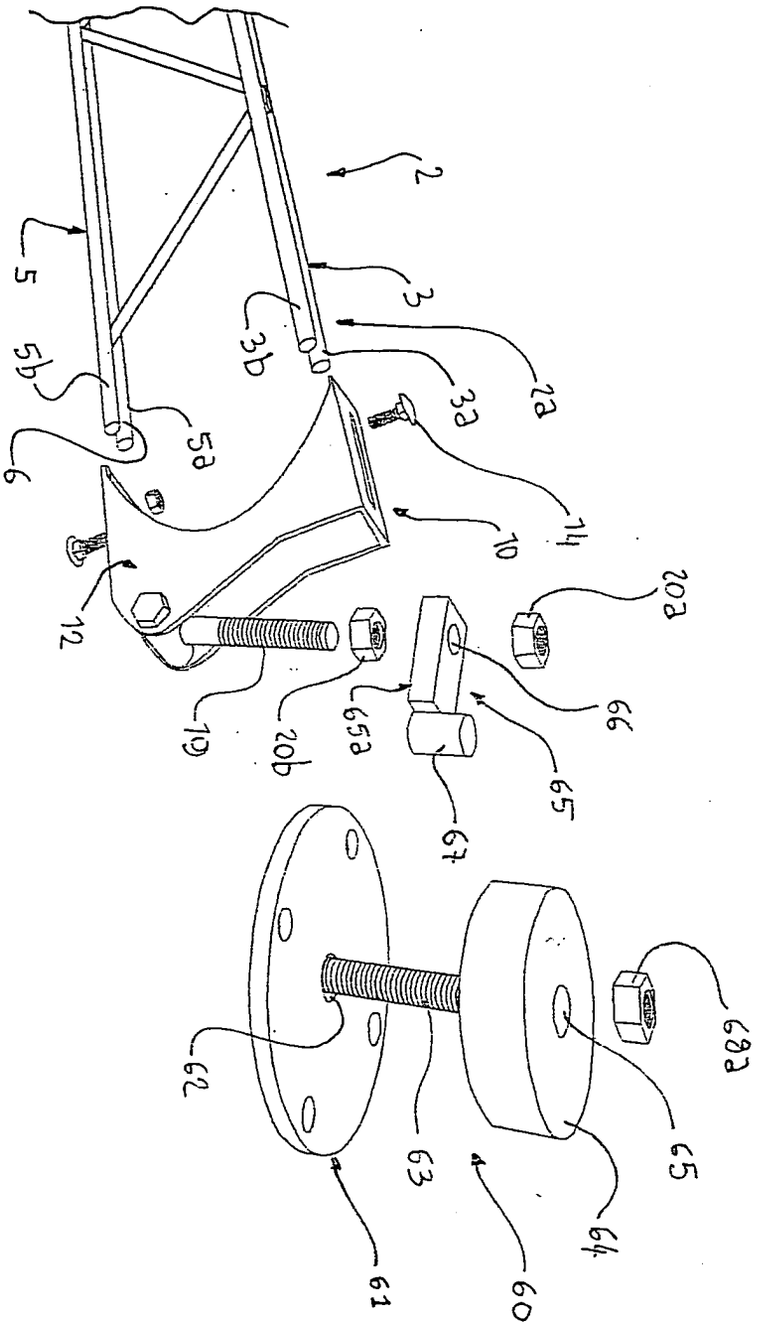
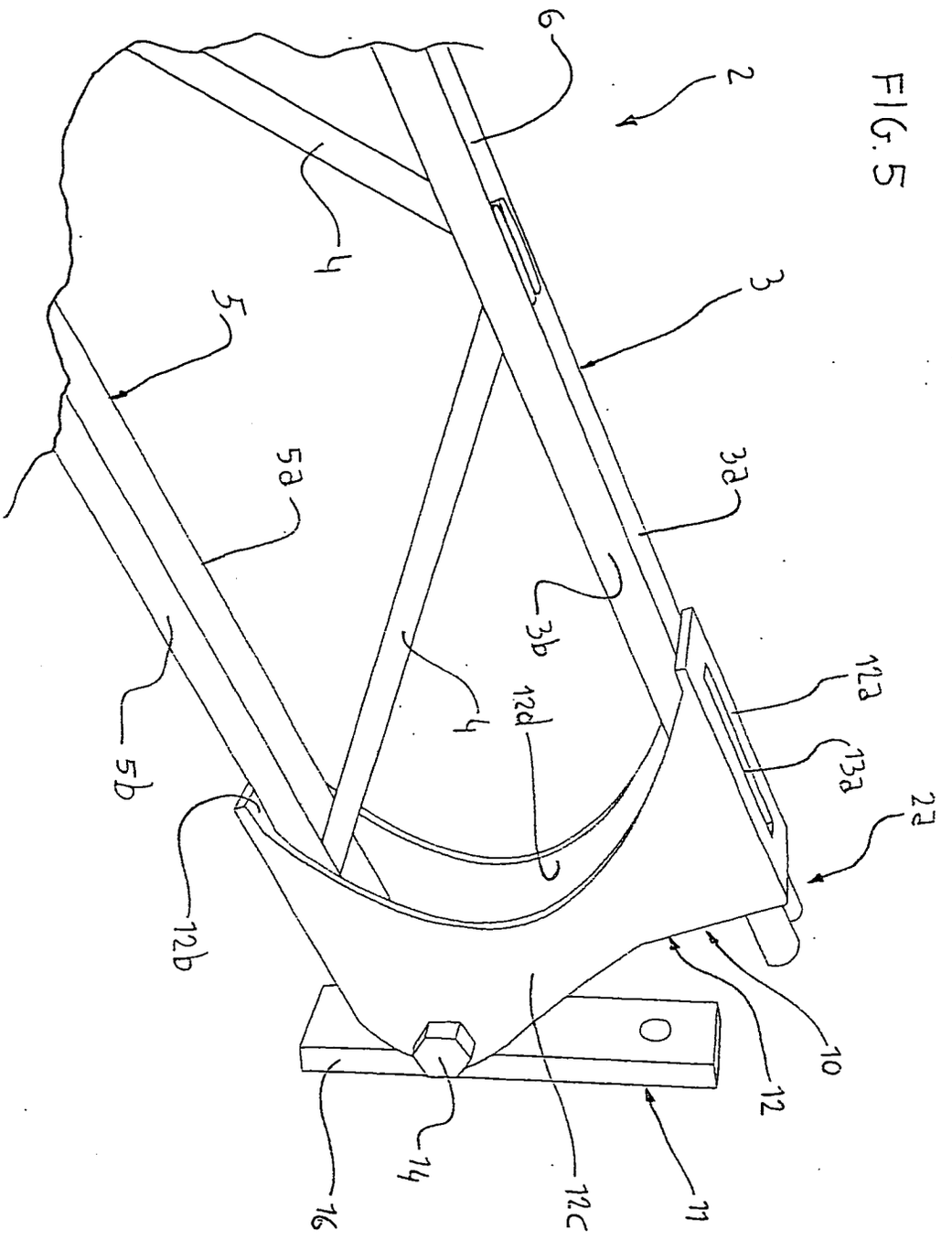

2
5
3
3b
12a
5b
3a
5a
6
14
10
12
20a
66
19
20b
65a
65
67
62
63
68a
65
64
60
61

FIG. 4a

FIG. 5



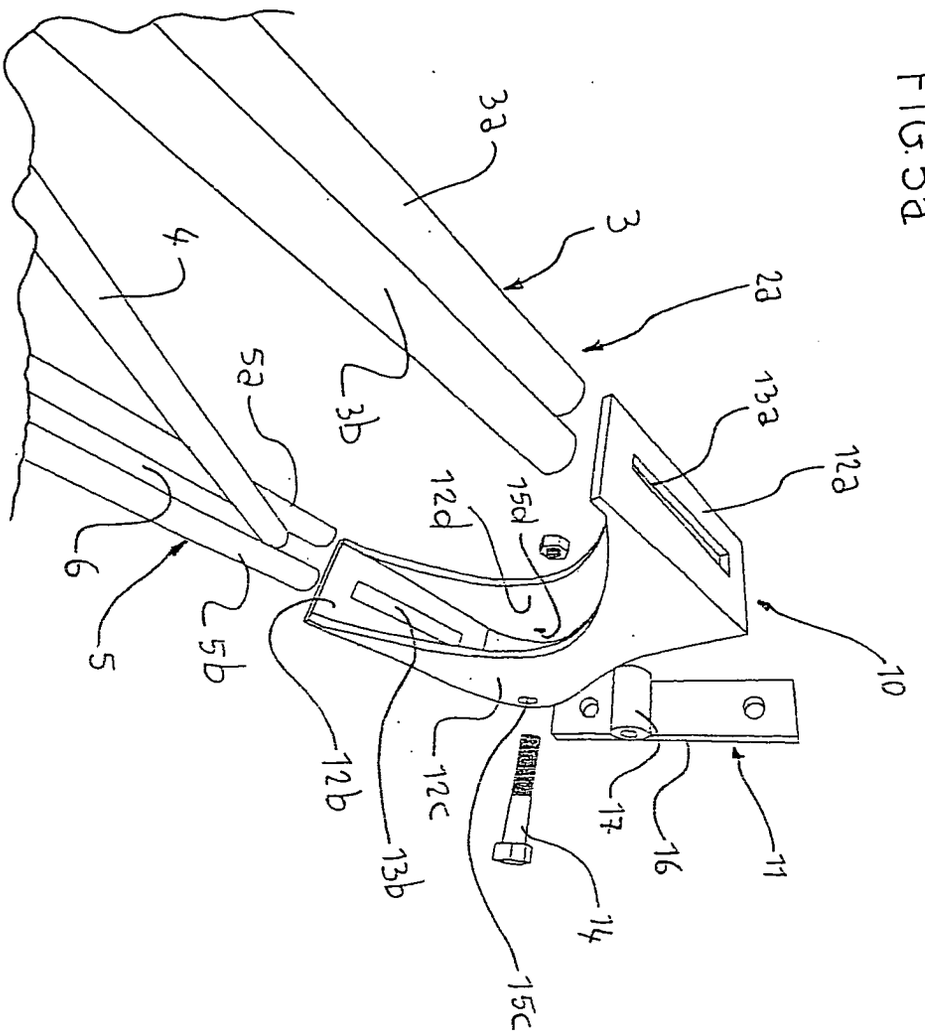


FIG.5a

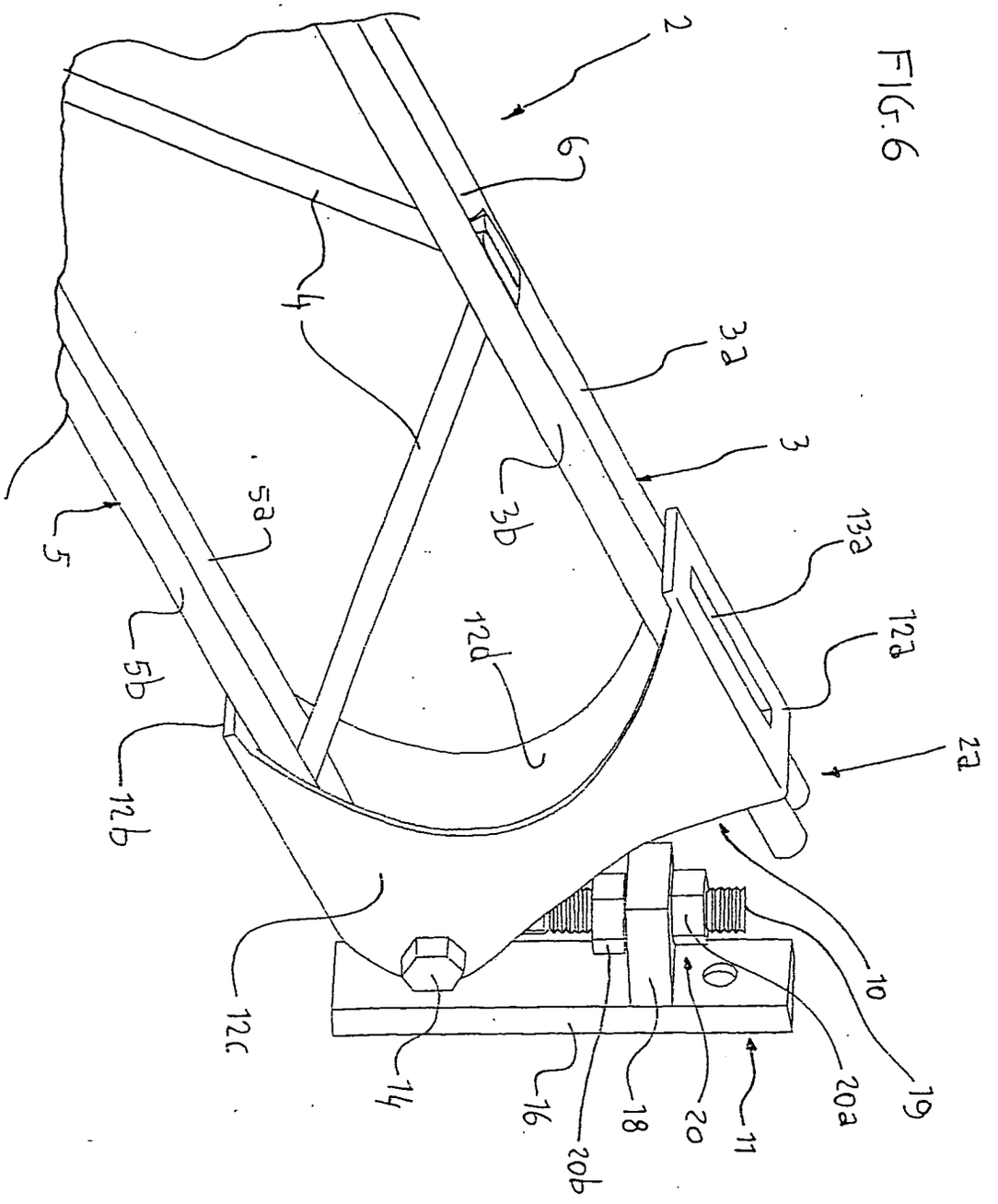
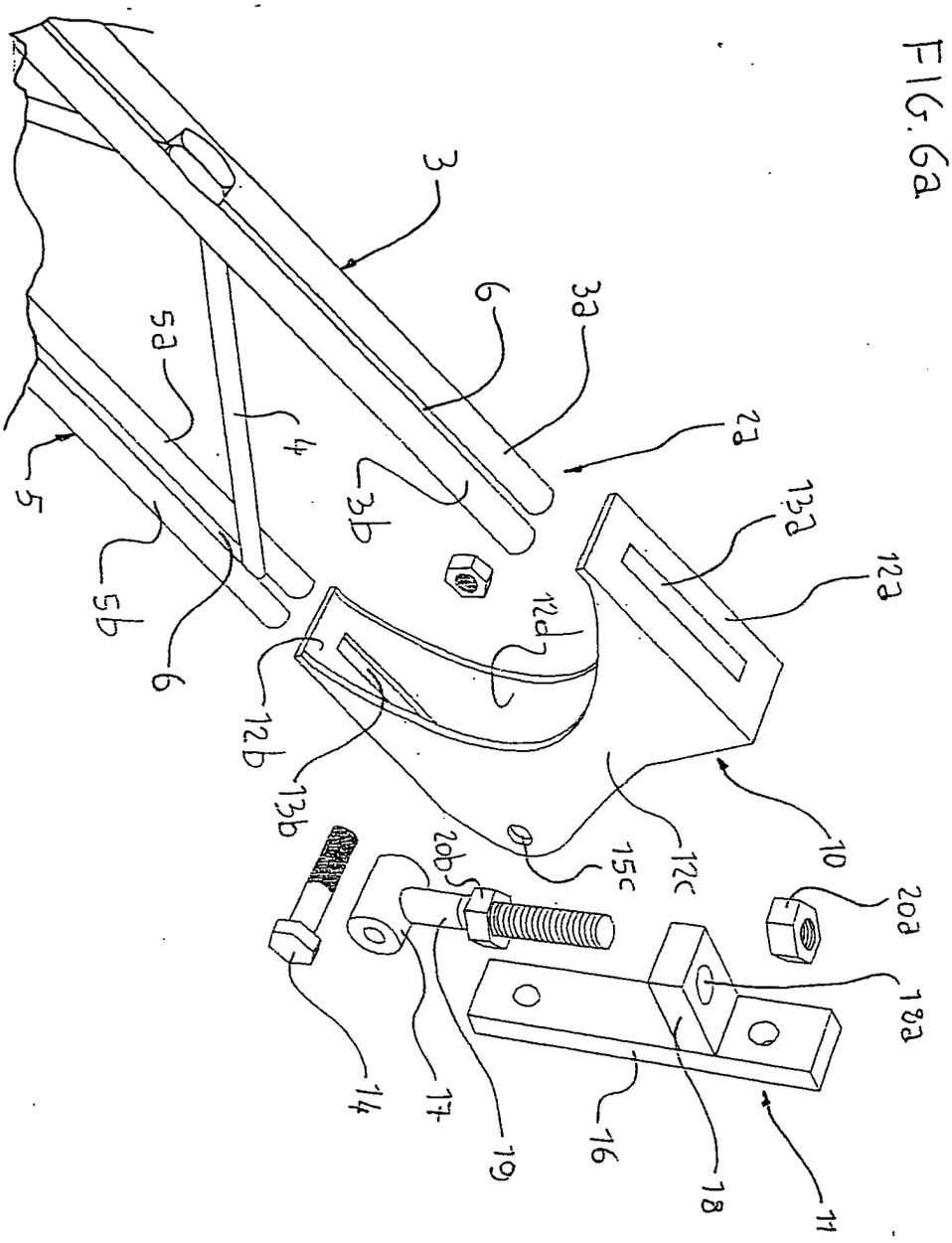

2
6
4
3a
3
3b
5a
5
5b
12b
12d
13a
12a
2a
10
19
20a
11
20
18
16
20b
14
12c

FIG.6

FIG. 6a


3
6
3a
5a
4
2a
5
3b
13a
12a
5b
6
12d
12b
13b
10
12c
15c
20b
20a
18a
14
17
19
16
18
11

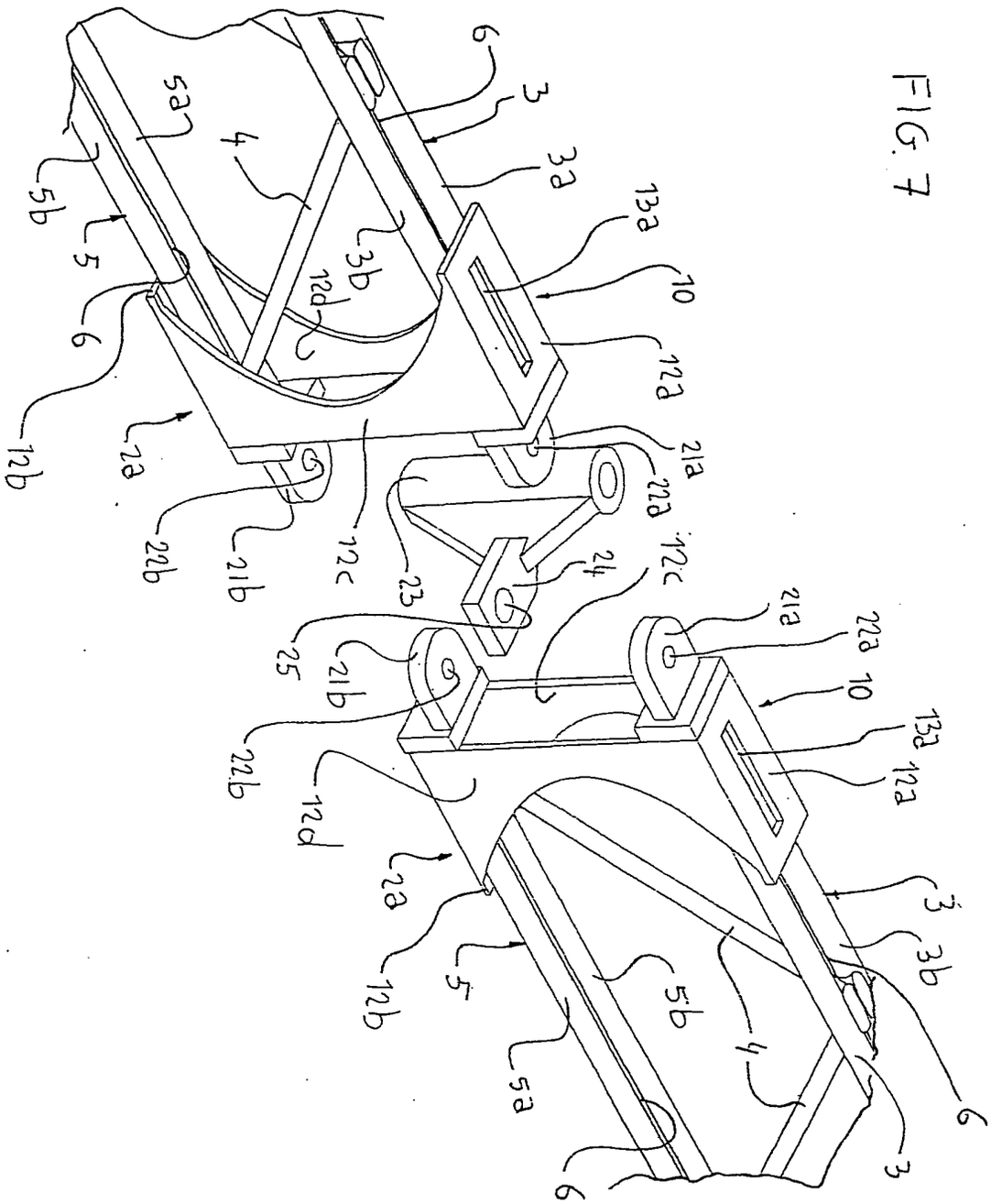

6
3
3a
13a
10
12a
21a
22a
12c
24
23
25
21b
22b
12d
2a
12b
5
5b
4
3b
5a
6
3
6
3
3b
4
5b
5
12b
2a
12d
22b
21b
22a
21a
12c
23
24
12a
13a
10
3a
3
6
5a
4
3b
12d
5
5b
6
12b
2a
22b
21b
12c
22a
21a

FIG. 7

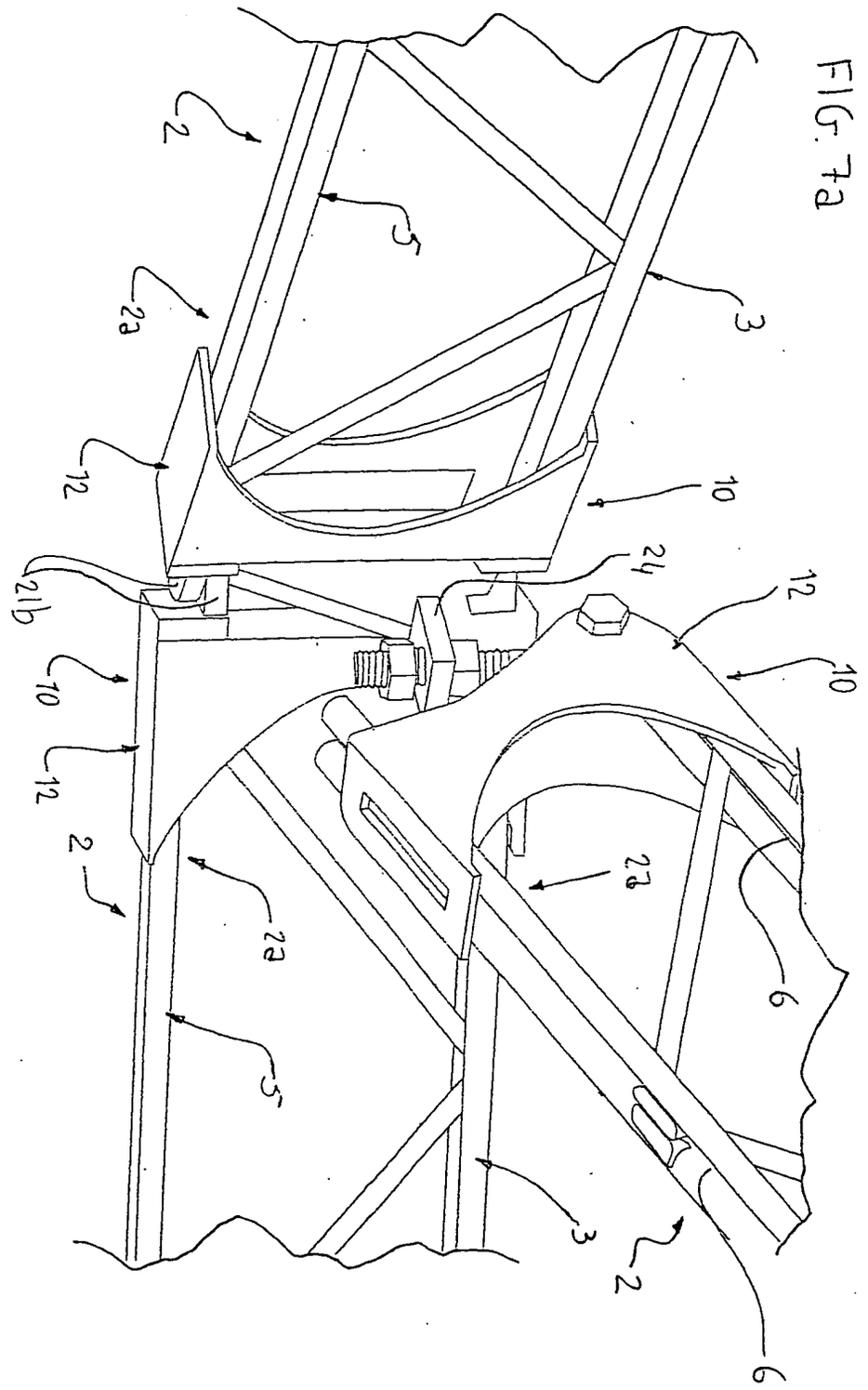


FIG. 7a

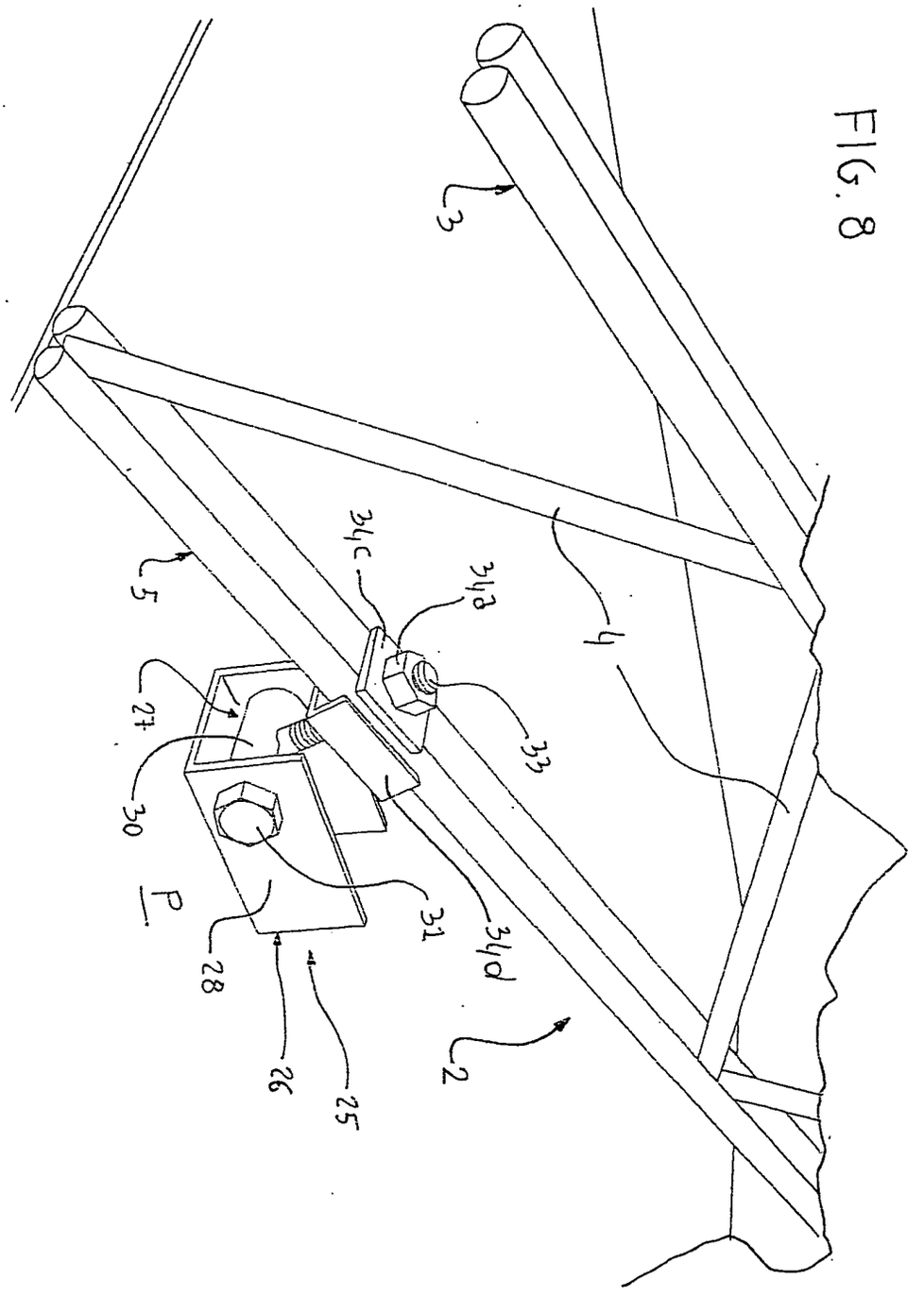
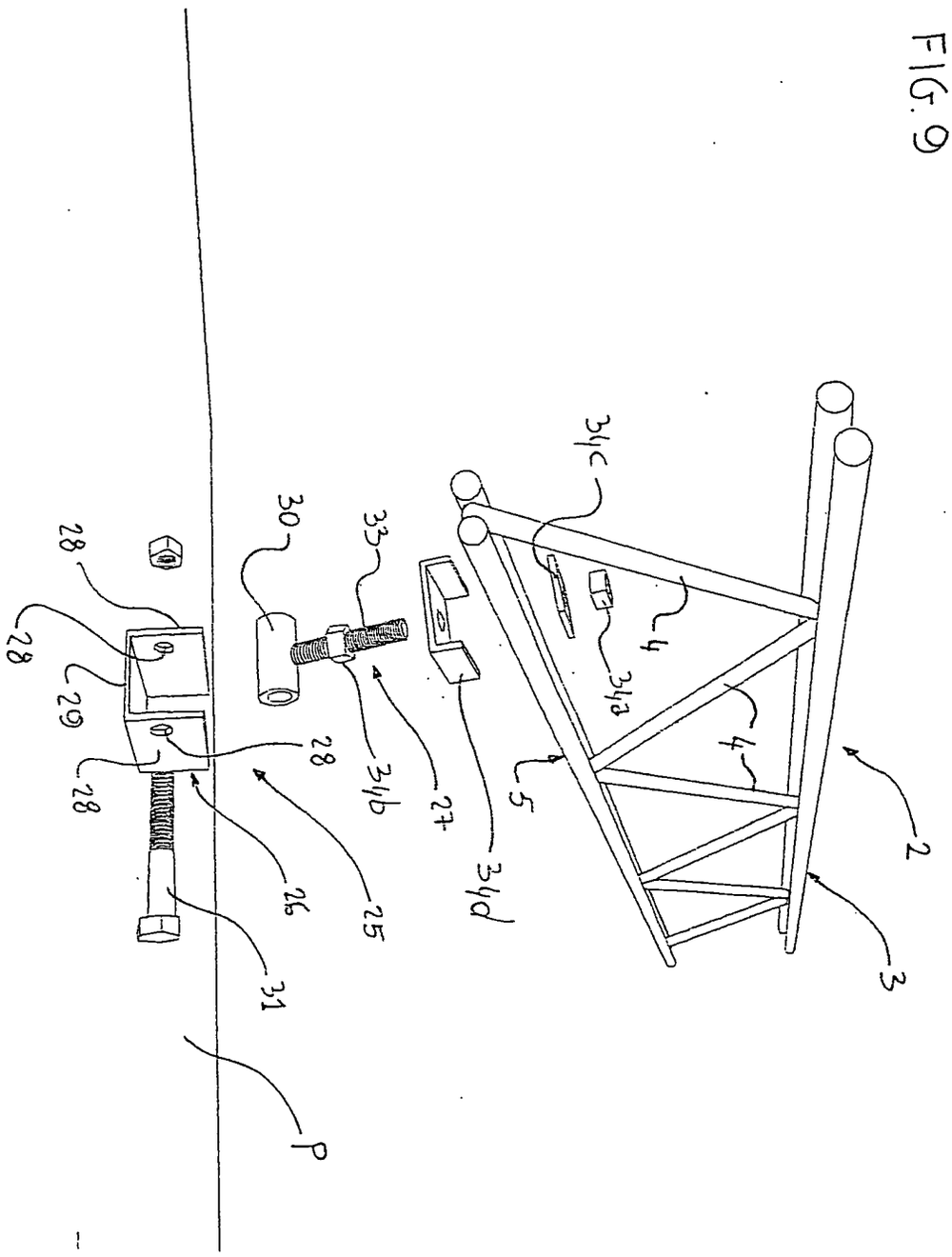


FIG. 8

FIG. 9



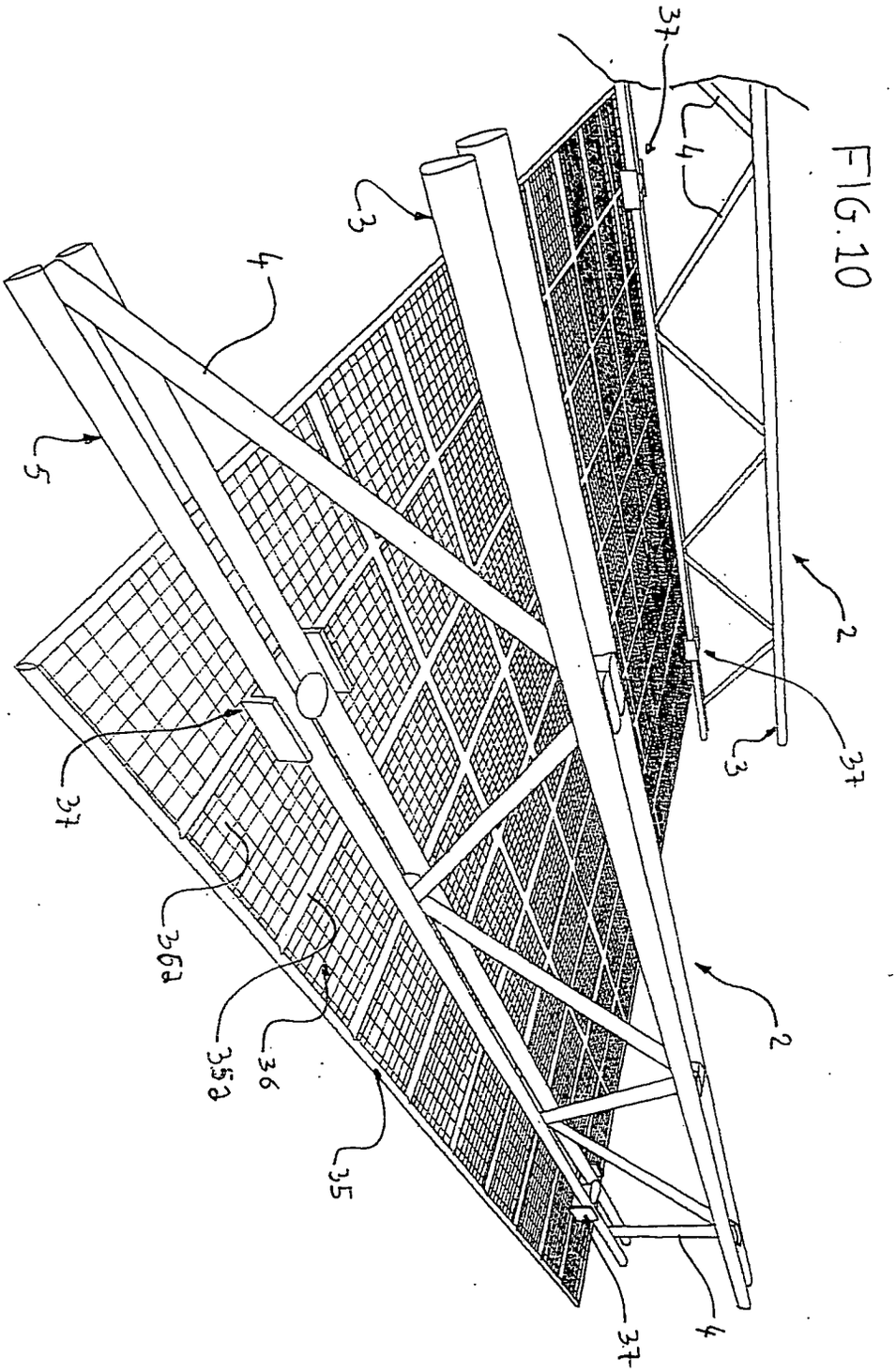


FIG.10

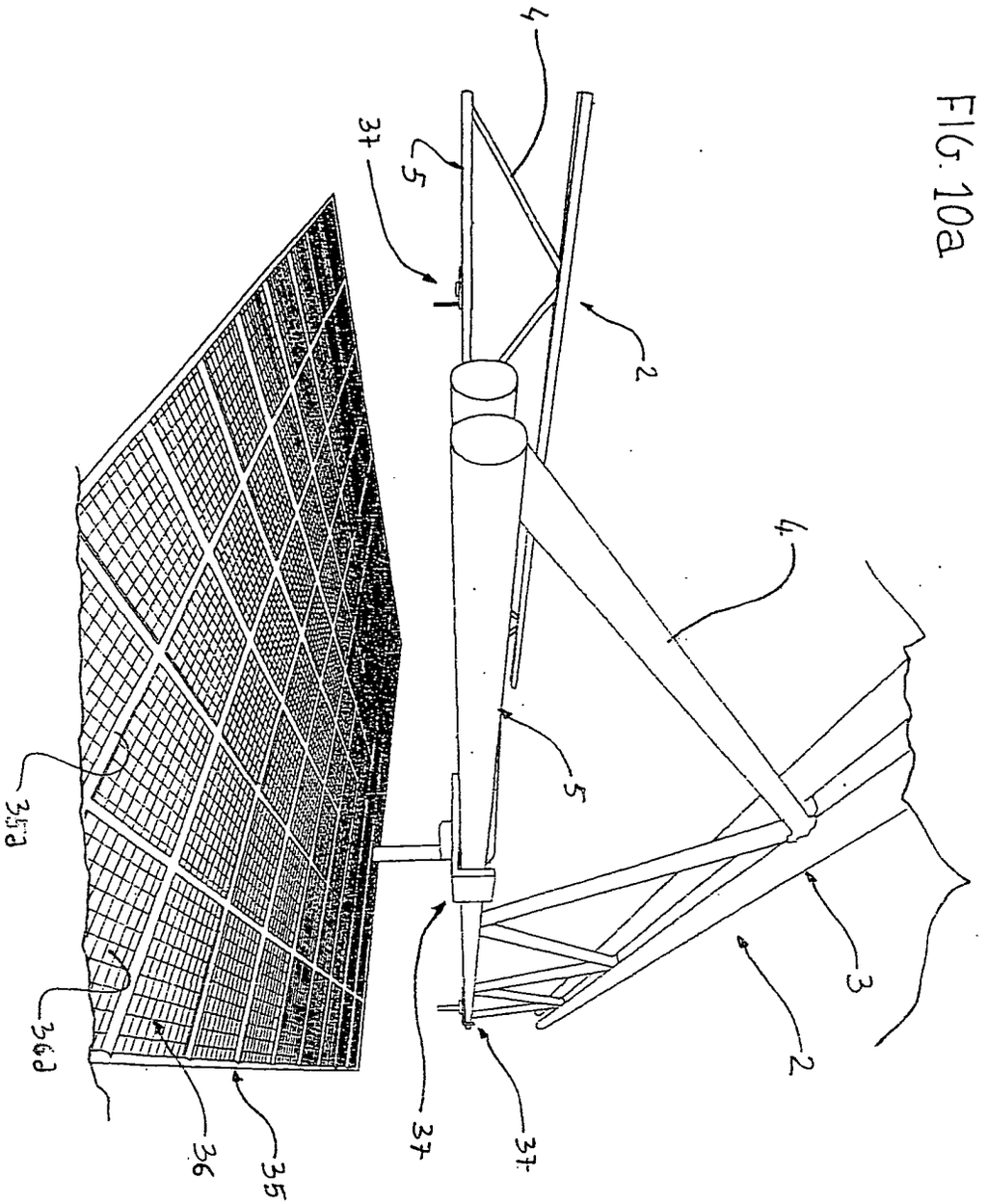


FIG. 10a

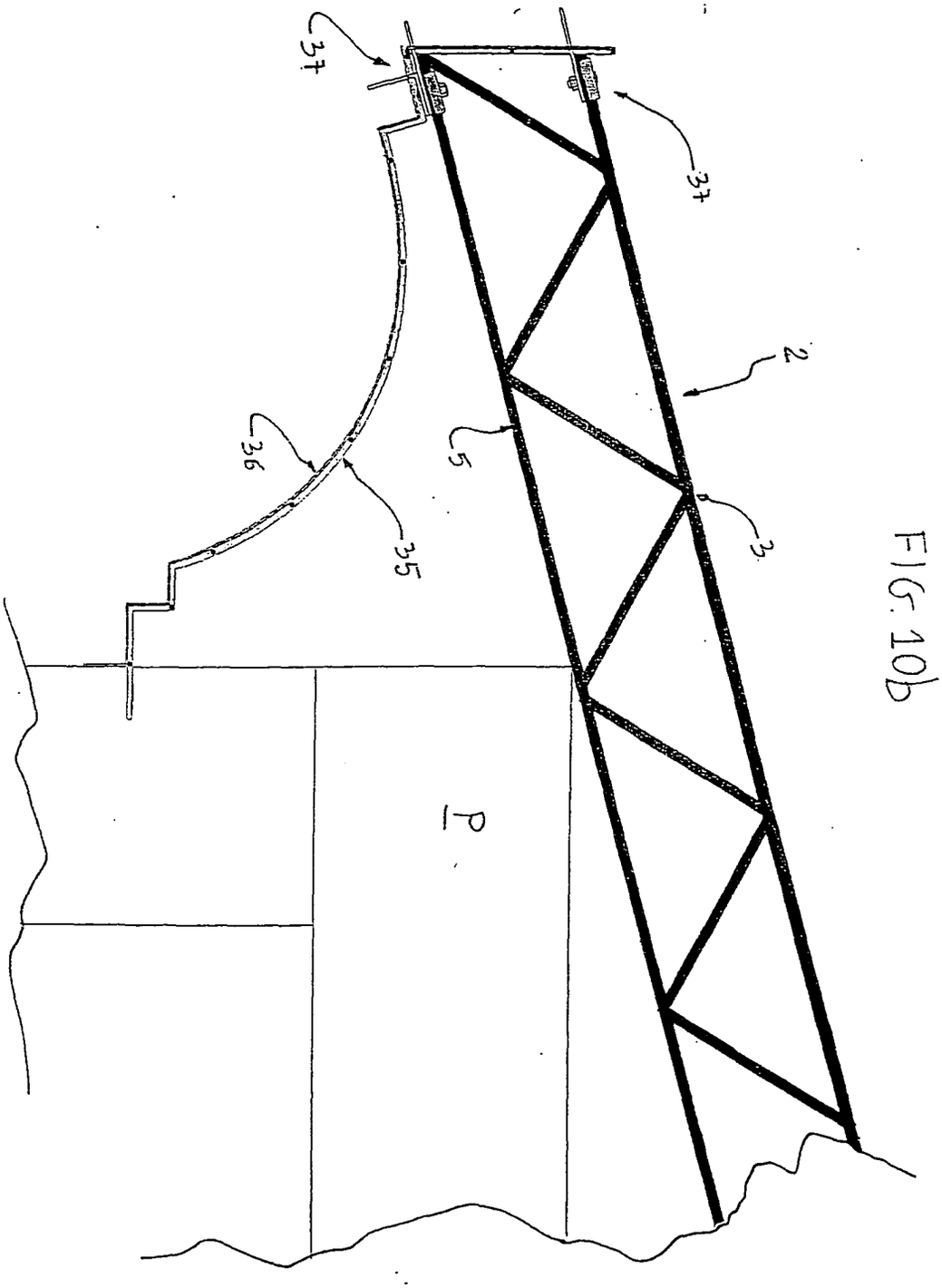


FIG. 10b

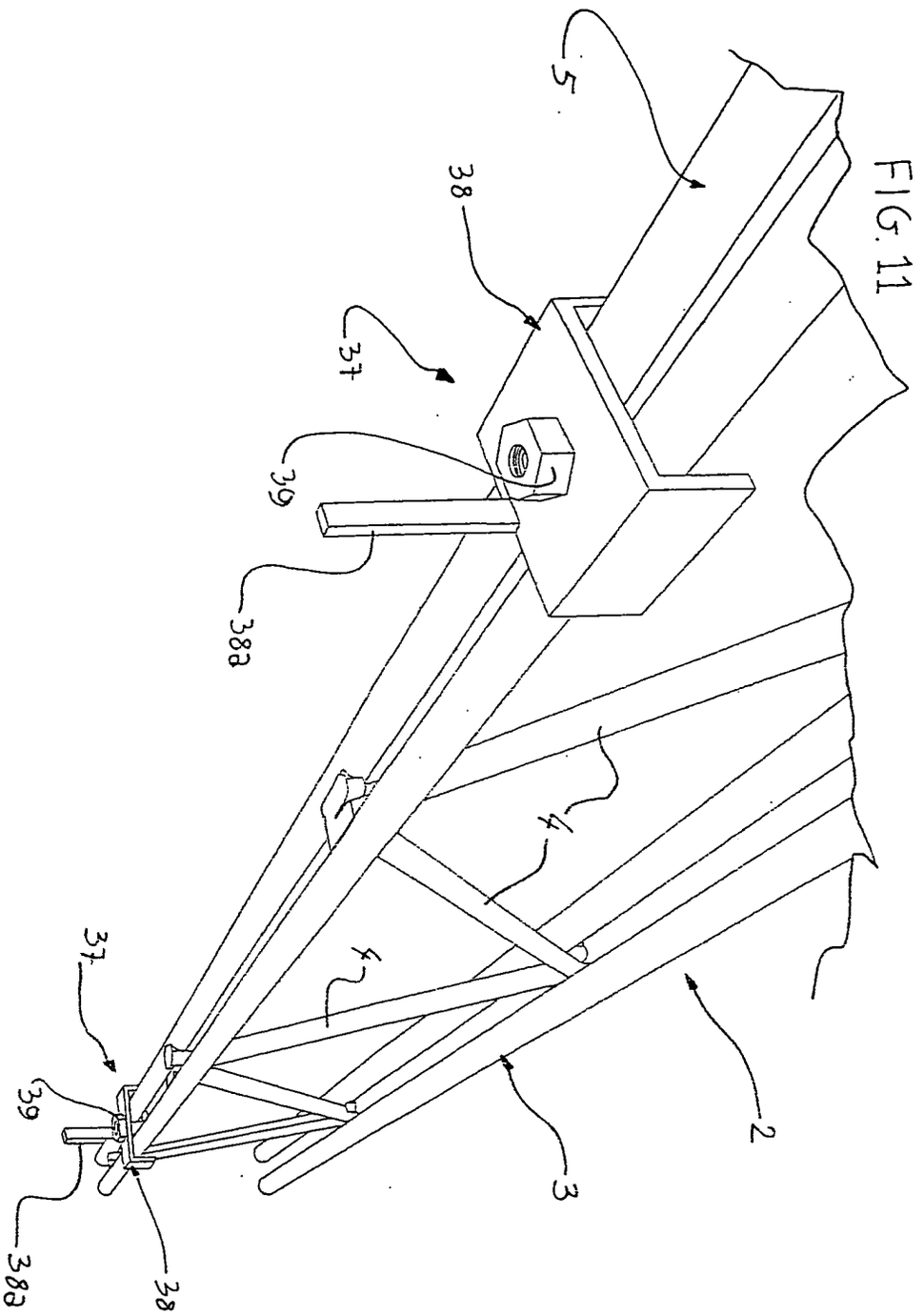


FIG. 11

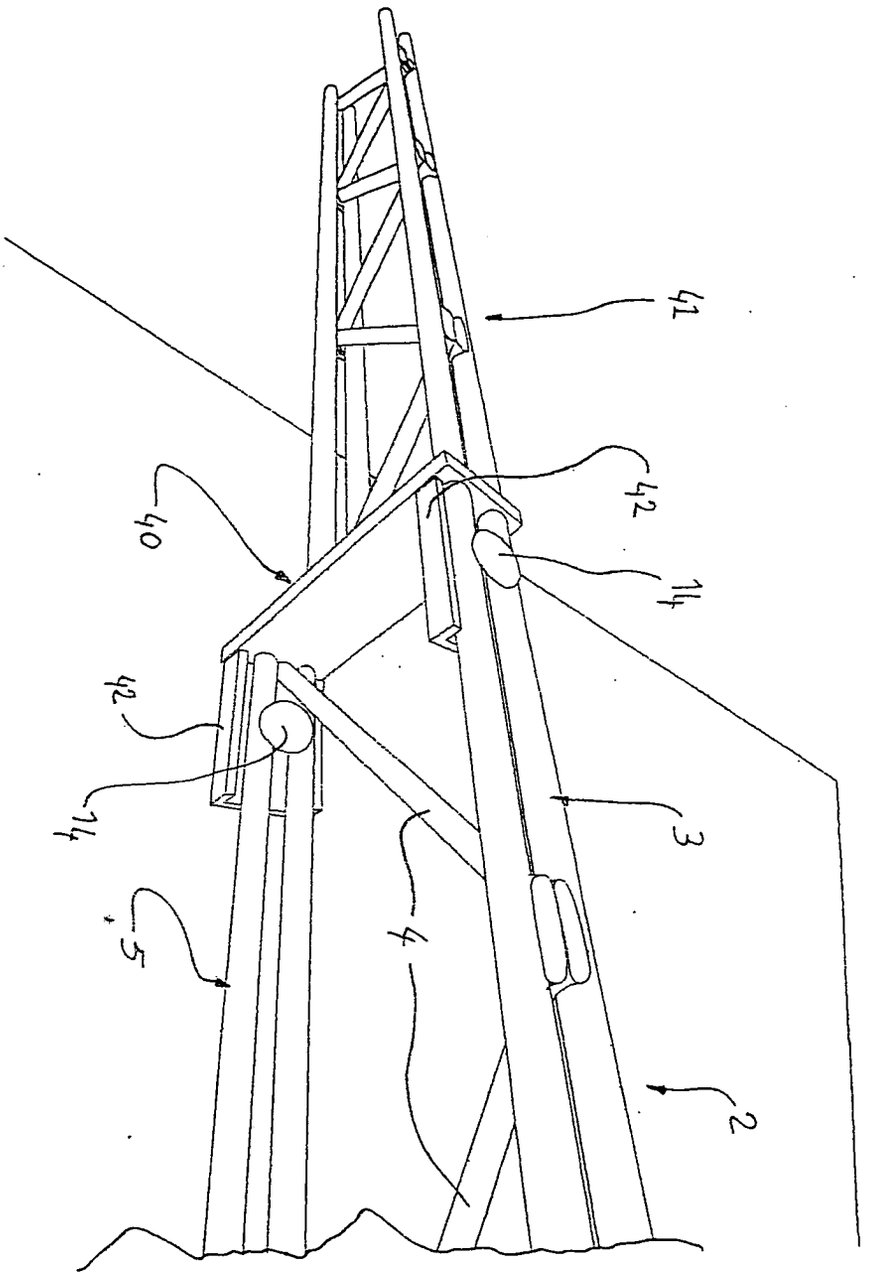
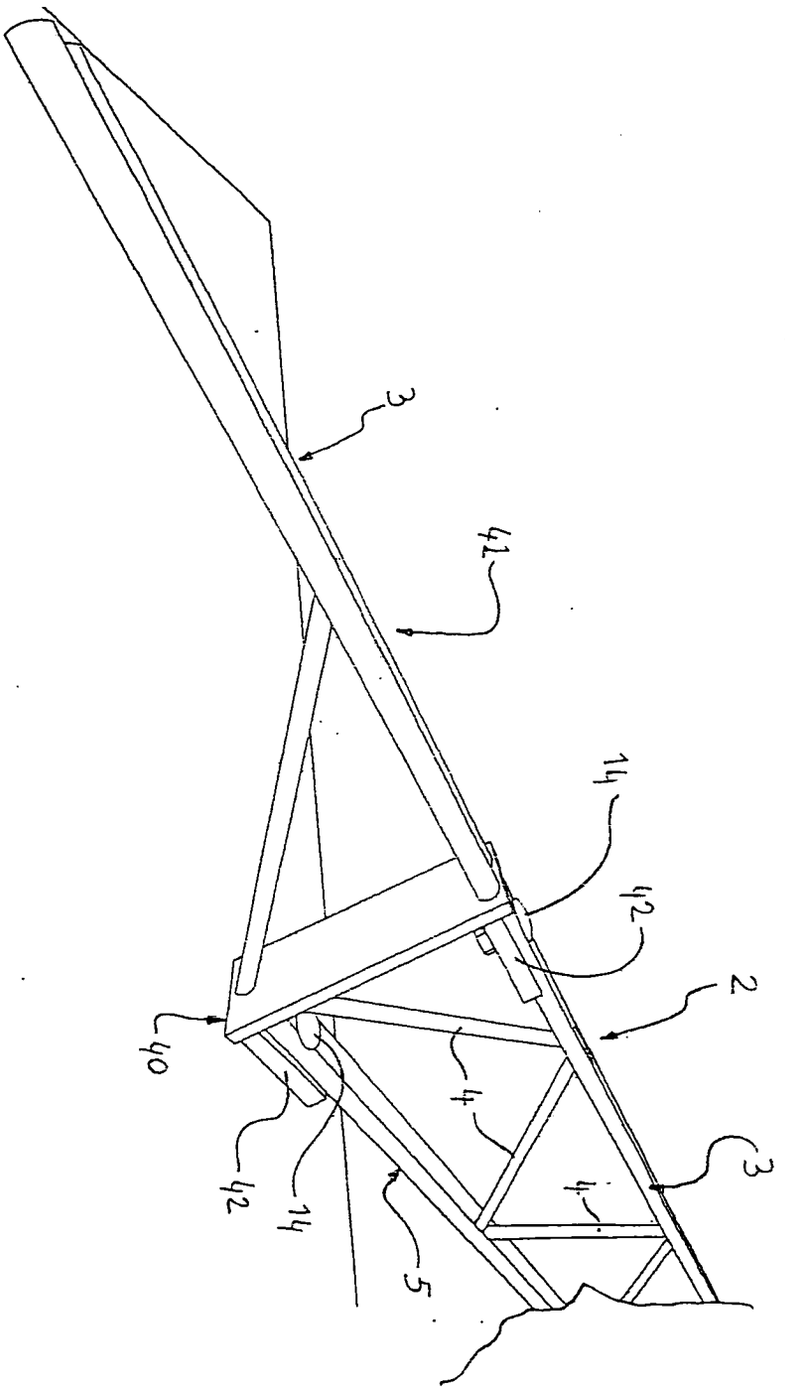


FIG. 12

FIG. 13



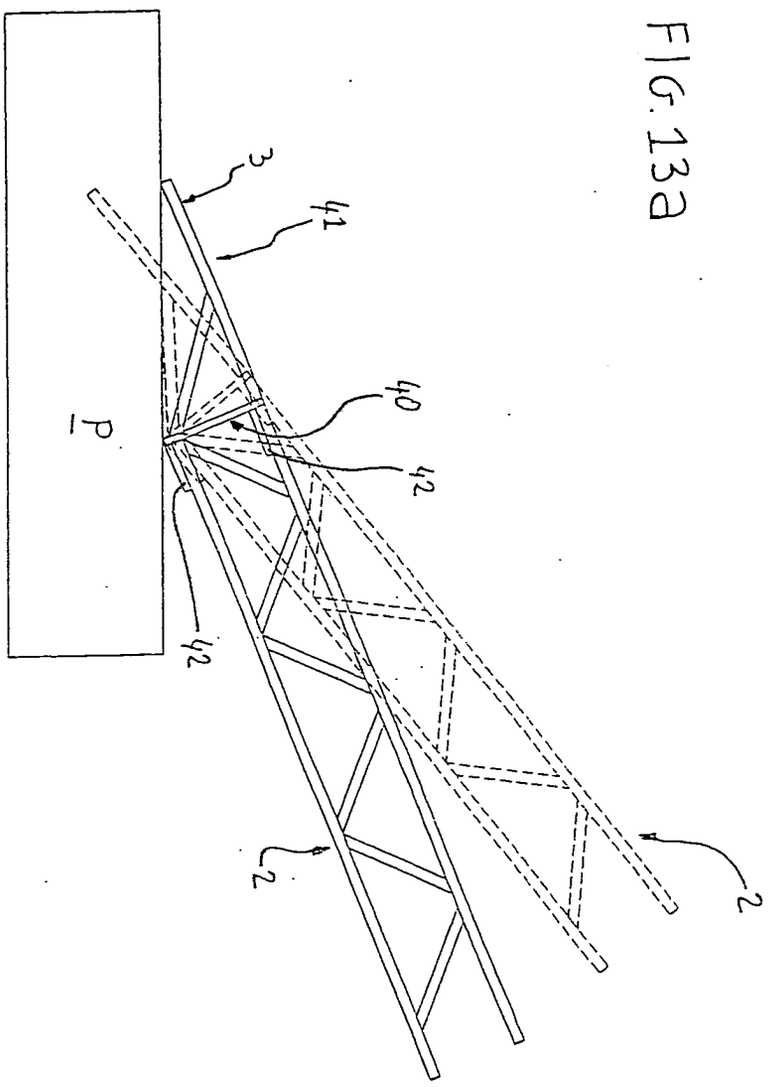
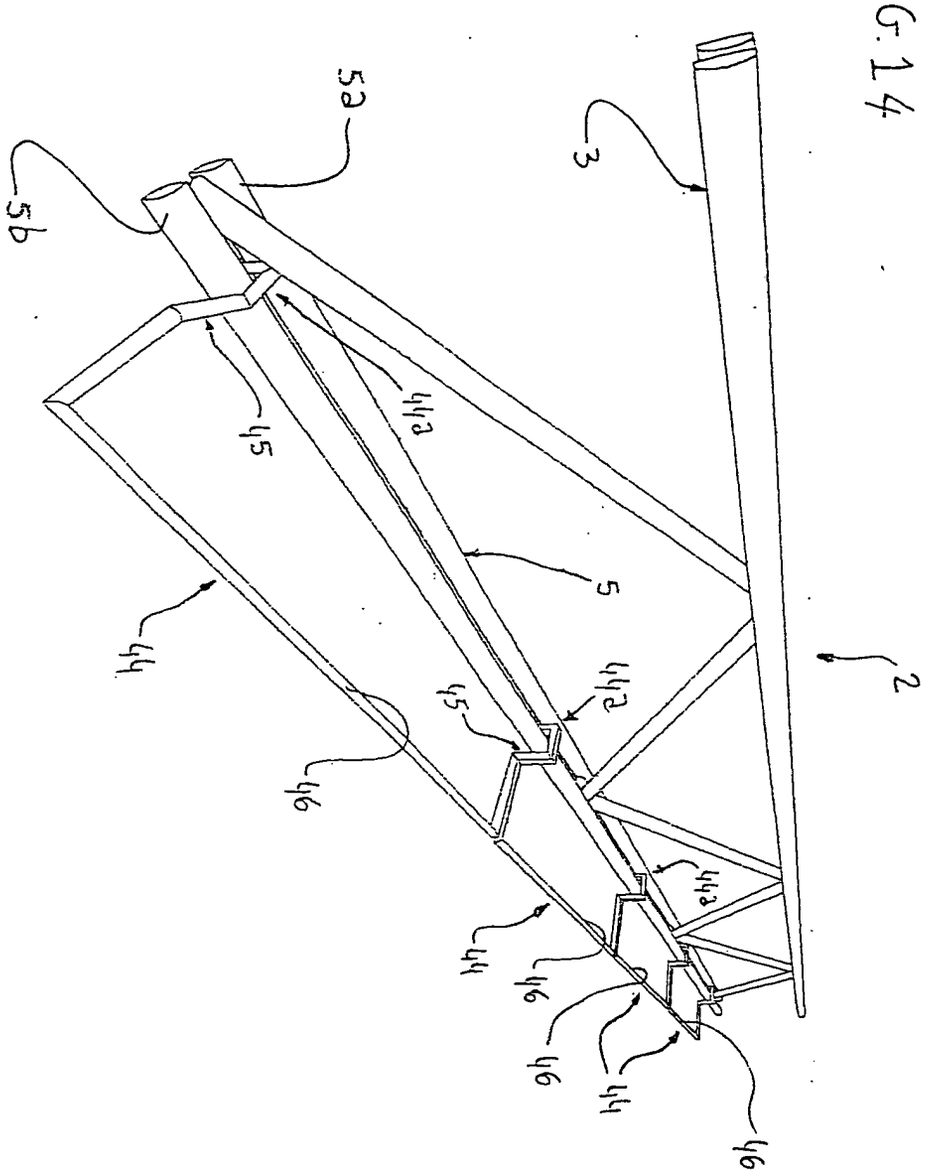
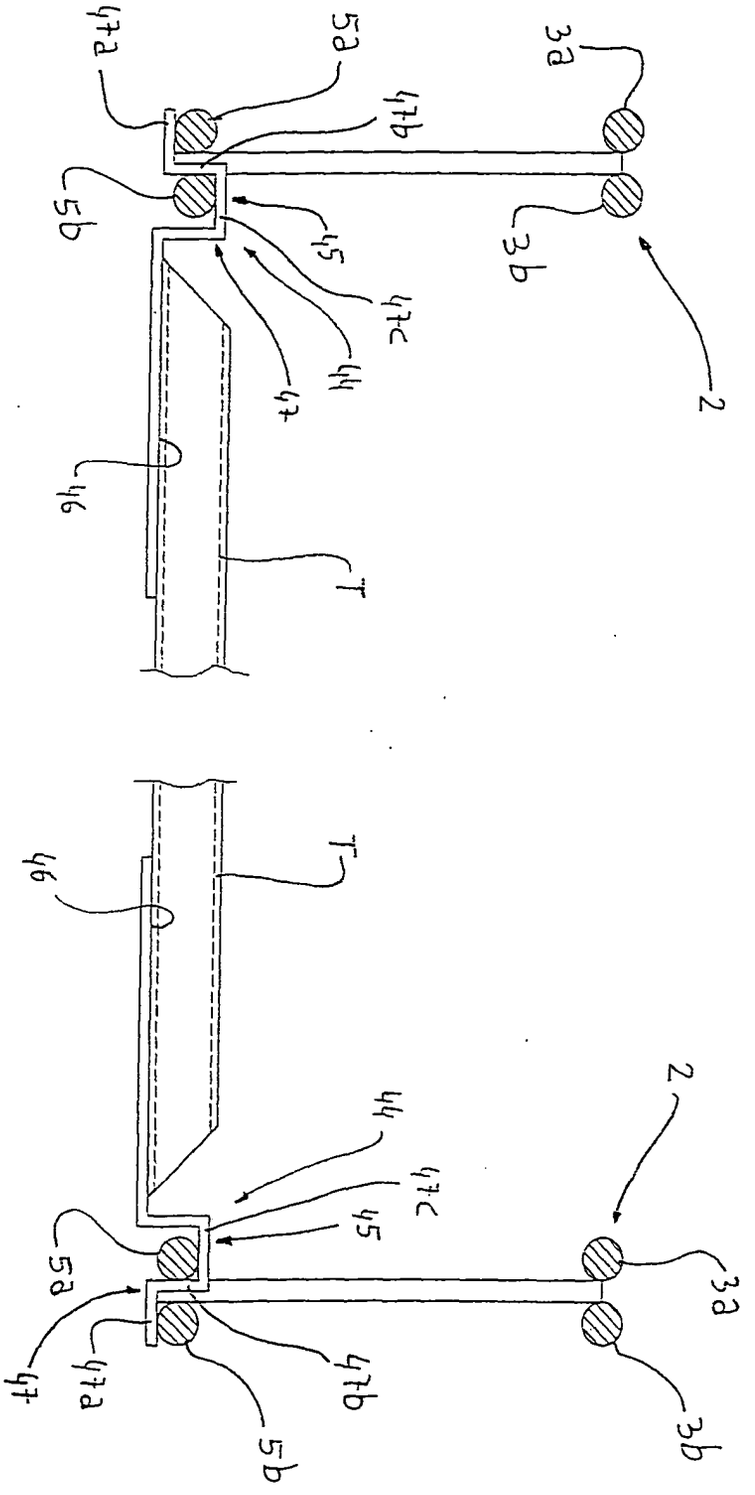


FIG. 13a

FIG. 14




47a
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44
3a
5b
45
47c
44
47
2
3b
46
T
T
46
44
47c
45
5a
2
3a
47
47a
47b
5b
3b

FIG. 15

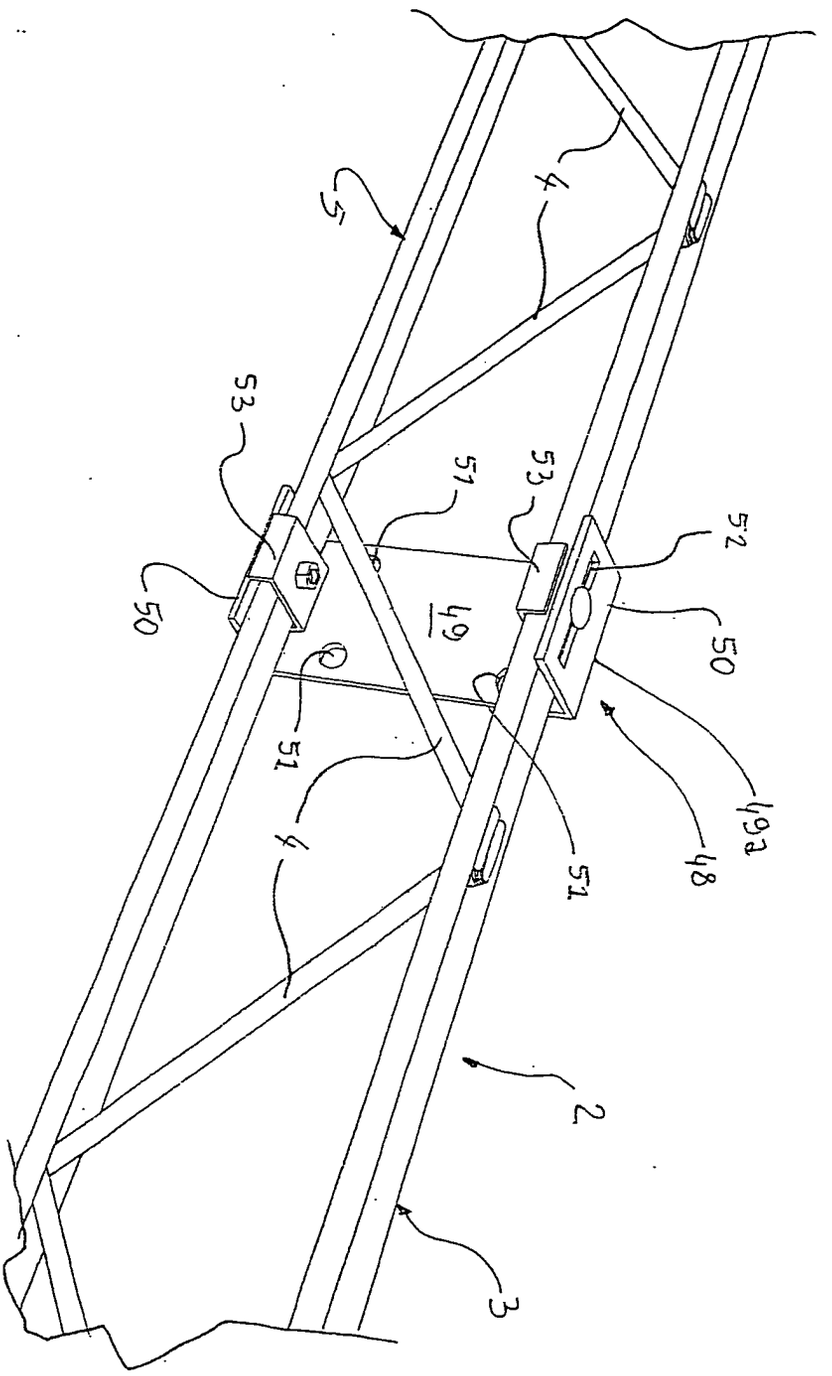

FIG. 16