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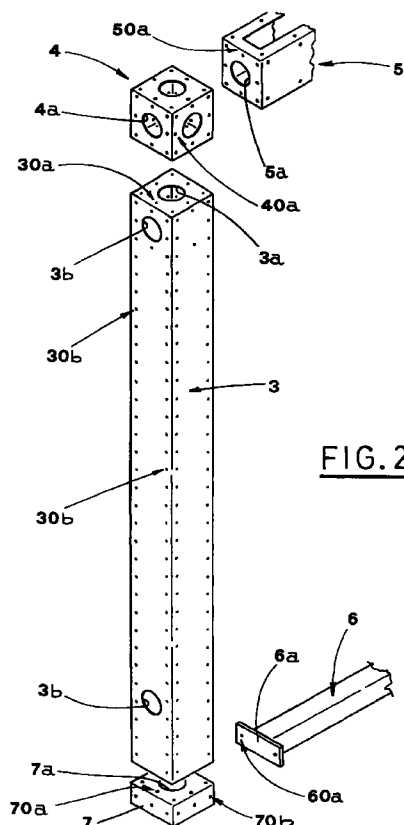
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(54) Modular construction

(57) A modular structure includes modular box-like elements: an upright (3), which features front openings (3a) and two groups of holes: front holes (30a) and lateral holes (30b) spaced apart by a step (P); a connector (4) which features front openings (4a) and a group of holes (40a) spaced apart by a step (P); a transversal bar (5) which features front openings (5a) and two groups of holes: front holes (50a) and lateral holes (50b) spaced apart by a step (P). The upright (3), connector (4) and transversal bar (5) have the same transversal section. The modular structure includes also tightening means (9) which removably tighten the above mentioned basic modular elements (3, 4, 5) in the region of the front holes (30a, 40a, 50a) and/or lateral holes (30b, 40b, 50b).



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Description

[0001] The present invention concerns modular structures, particularly structures which are pretty and at the same time, self-supporting.

[0002] It is known that non permanent structures, like stands for fairs, exhibitions, conventions etc. are installed using self-supporting, pretty modular structures.

[0003] These structures are built according to room characteristics and order requirements, and include metallic gratings or wood elements and panels.

[0004] However, these structures are not self-supporting, because of obvious stability and mechanical resistance, therefore, they cannot be used for preparing stands of more decks.

[0005] If the modular structure is made predominantly of wood, its mounting and subsequent dismantling are extremely long, which results in costs increased because of specialised and non-specialised manpower.

[0006] Moreover, little flexibility of the material, in this case wood, makes it difficult to be adopted for subsequent uses.

[0007] If the modular structure includes predominantly metallic grating elements, the disadvantages resulting from long assembling and reduced possibility of the material re-using, are not so important.

[0008] During the wiring of the complementary equipment, workers' security and aesthetic look of the subject modular structure become more important.

[0009] In fact, the operators' security during assembling of the structures and complementary equipment is very important and regulated by precise and strict rules.

[0010] The object of the present invention is to avoid the above mentioned disadvantages by proposing a non-permanent, modular, self-supporting structure, which reduces preparation time, manpower necessity and allows a bigger versatility for subsequent uses.

[0011] Another object of the present invention is to propose a modular structure, which is self-supporting and can be used for preparing non-permanent constructions of more decks.

[0012] A further object of the present invention is to propose a modular structure which has more versatile structure elements, the structure being obtained by a simple, highly reliable and cheap technical solution.

[0013] The above mentioned objects are obtained in accordance with the contents of claims.

[0014] The characteristics of the present invention will be pointed out in the following description of a preferred, but not unique, embodiment, with reference to the enclosed drawings, in which:

- Figure 1 shows a schematic prospective view of a possible configuration of the proposed modular structure;
- Figures 2 and 3 show exploded prospective views of the basic elements forming the proposed struc-

ture;

- Figures 4, 5, 6 show schematic section views of particularly significant arrangements of the structure basic elements;
- Figure 7 shows the same view of the Figure 3 of another embodiment.

[0015] With reference to Figures from 1 to 6 and according to a first embodiment, reference numeral 1 indicates a modular structure resting on or removably fastened to a support surface 2.

[0016] The structure 1 includes a combination of basic modular elements, such as an upright 3, a connector 4, a transversal bar 5, and, if needed, a base 7.

[0017] These basic modular elements, made of material with high mechanical characteristics, e.g. metal sheets, form box-like structure, substantially parallelepiped.

[0018] Usually, the upright 3, predominantly longitudinal, is removably connected to the support surface 2 by the base 7.

[0019] This base 7 features a front opening 7a, e.g. circular, situated in the region of each of the base front surfaces, in their centre.

[0020] Each edge of each front surface of the base 7 features a series of front holes 70a, aligned and equidistant. The distance between the centres of the two consecutive holes defines the series basic step P.

[0021] Likewise, each lateral surface of the base 7 features a series of lateral holes 70b, aligned and equidistant, having the basic step P.

[0022] In the centre of the front surfaces of the upright 3 there are relative front openings 3a, and along each edge of these front surfaces, there is a plurality of front holes 30a, aligned and equidistant, having the same basic step P.

[0023] This allows a mirror-like coupling between the front surfaces of the upright 3 and the base 7, in particular, between the corresponding front openings 3a and 7a and respective front holes 30a and 70a.

[0024] At least one lateral surface of the upright 3 features, near the front surfaces, lateral openings 3b, arranged symmetrically with respect to this surface symmetry axis (Figure 2).

[0025] The same lateral surface of the upright 3 features also, made along each edge of these lateral surfaces, a series of lateral holes 30b, aligned and equidistant by the basic step P.

[0026] One extremity of the upright 3 is engaged with the base 7, whereas the other extremity of this upright is to be mirror-coupled with the above mentioned connector 4.

[0027] Each surface of this connector 4 features, made in its centre, a front opening 4a and, made along each edge, a series of front holes 40a, aligned and equidistant by the basic step P.

[0028] This allows best coupling between the front surfaces of the upright 3 and the connector 4, in partic-

ular, between the corresponding front openings 3a and 4a and respective front holes 30a and 40a.

[0029] The above mentioned transversal bar 5 can be coupled with any of the front surfaces of the connector 4 that is orthogonal to the surface engaging with the upright 3.

[0030] The front surfaces of the transversal bar 5 feature front openings 5a, made in the centre of these surfaces, and, made along each edge, a series of front holes 50a, aligned and equidistant by the basic step P.

[0031] This allows a mirror-like coupling between the front surfaces of the transversal bar 5 and the connector 4, in particular, between the corresponding front openings 5a and 4a and respective front holes 50a and 40a.

[0032] A plurality, e.g. two, lateral openings 5b are made in the opposite lateral surfaces of the transversal bar 5. These openings 5b are arranged in alignment, equidistant between themselves and from the front faces.

[0033] The transversal bar 5 features also, made along each edge of its lateral surfaces, a series of lateral holes 50b, aligned and equidistant by the basic step P.

[0034] Also the other two lateral surfaces of the transversal bar 5 feature a plurality of lateral holes 50b. One of these surfaces extends in full, whereas the other one, opposite to the closed one, features a plurality of inspecting openings 80, which are delimited by strengthening elements 55, possibly set equidistant from one another.

[0035] Transversal plate-like members 8 are situated inside the transversal bar 5, near each lateral opening 5b and arranged parallel to the front surfaces of this transversal bar 5.

[0036] These transversal plate-like members 8 are designed to create, near the lateral openings 5b, an isolation area 8a, needed for security requirements, explained in detail later.

[0037] The above described basic modular elements 3, 4, 5, 7, whose longitudinal and transversal dimensions are determined in accordance to standard measures, can be suitably combined by tightening groups 9, e.g. bolt with nut, which substantially engage with series of front holes 30a, 40a, 50a, 70a and lateral holes 30b, 40b, 50b, 70b.

[0038] In this way it is possible to prepare any kind of modular structure 1, having the desired aesthetic-structural characteristics and being composed of basic cells C, arranged side by side or one over another, so as to form more decks.

[0039] In order to improve the modular structure 1 compactness and strength, wind braces 10 (Figure 1) and/or strengthening bars 6 (Figure 2) can be used, arranged in a suitable way.

[0040] The wind braces 10, provided at each extremity with fixing plates 10a featuring suitable holes, are fastened to the uprights 3 by tightening groups 9 in the region of the lateral holes 30b made near the front surfaces of these uprights 3.

[0041] The strengthening bars 6 are provided at each end with a fixing plate 6a featuring a series of front holes 60a, aligned and equidistant by the basic step P.

[0042] This plate 6a couples with the desired lateral surface of the base 7 by means of tightening groups 9 which engage the lateral holes 70b of this base 7 and the front holes 60a of the fixing plate 6a.

[0043] Otherwise, instead of using the wind braces 10, two adjacent uprights 3 can be connected by one or more strengthening bars 6, fixing them horizontally at predetermined heights.

[0044] It is also possible to provide, in the basic cell C, additional transversal bars 5, arranged orthogonal to a pair of transversal bars 5 already present in the structure, so that the front openings 5a of the additional transversal bars 5 face the desired lateral openings 5b of the transversal bars 5 already present in the structure (Figures 1 and 3).

[0045] In this way the modular structure 1 is strengthened and can support a possible floor and/or a mezzanine.

[0046] The relations between longitudinal dimensions of the basic modular elements 3, 4, 5 and 7 define a support structure, composed of basic cells C, arranged side by side, for the frame of any non permanent civil, commercial and work setting.

[0047] The box-like structure of these basic modular elements allows to use their inside space for housing electric, data processing, telephone, audio-visual and other kinds of equipment, which are easy to be shielded and separated by suitable raceways, maximising the pleasant aesthetic aspect and, which is more important, observing the safety regulations of these systems.

[0048] The best wiring of these systems, necessary for good functioning of the setting being prepared, is guaranteed by the front openings 3a, 4a, 5a, 7a, similar one to another, and the isolation areas 8a.

[0049] The lateral openings 3b, 4b, 5b and 7a of the basic modular elements speed up the preparation of the modular structure 1 as well as the wiring of the complementary systems, as these openings allow best access to the crucial points of this modular structure 1.

[0050] If not used during the modular structure 1 preparation, the front openings 3a, 4a, 5a, 7a and the corresponding lateral openings 3b, 4b, 5b, 7b can be covered by buttons of complementary shape, thus further improving the structure aesthetic aspect.

[0051] The above described configuration of the modular structure 1 elements presents such mechanical characteristics that allow to prepare bearing structure, even of more decks.

[0052] This is extremely advantageous not only for fairs stands preparation, but also for many other fields, like e.g. preparation of emergency house or work units, semi-permanent structures, also multilevel, inside industrial magazines, office and exhibition furniture and so on.

[0053] The structure 1 can be completed and finished

off according to the requirements, by addition, in an obvious way, of panels, flooring of any type and made of any material.

[0054] Now another embodiment of the modular structure 1 will be described with particular reference to Figure 7.

[0055] In Figure 7, the modifications with respect to the previously described first embodiment, have been applied to the transversal bars 5, but it is understood that these modifications can be applied to all the elements of the structure.

[0056] In particular, the lateral surfaces of the transversal bars 5 are provided with a plurality of longitudinal slots 150 of suitable length and aligned with the front holes 50a.

[0057] Suitable assembling tools, like e.g. screwdrivers or spanners can be introduced through these longitudinal slots 150 inside the transversal bars 5 or other modular structure elements, so as to facilitate these elements mutual fixing.

[0058] The slots 150 are particularly useful when transversal bars 5 or other modular structure elements section is so narrow as to make it impossible or very difficult for the operator to introduce hands inside the openings 80.

[0059] The modular structure 1 is substantially made of metal sheet which is folded as to form a box-like structure and then assembled according to known techniques, but it can be also made of prefabricated metal section bars with openings and holes present in the basic modular elements 3, 4, 5, 7 obtained by tridimensional metal sheet cutting using a laser.

[0060] One of the biggest advantages of the so obtained modular structure 1 derives from the fact that it allows the maximum construction modularity, thus facilitating transport and laying the elements composing this structure, which drastically reduces the manpower costs necessary for its preparation.

[0061] Another advantage of this structure lies in the high flexibility of wiring of data processing, telephone, electric, audio-visual and other systems, maintaining unchanged the aesthetic aspect of the subject modular structure 1 and guaranteeing the maximum safety for the structure users.

[0062] Moreover, the box-like configuration of the basic modular elements 3, 4, 5, 7 together with their suitable dimensions, guarantees the modular structure 1 bearing feature, which allows the structure to support a floor and one or more mezzanines, according to the needs, and to maximise the room for the structure as requested.

[0063] The so obtained structure is extremely strong and light, and at the same time, it is small, simple to transport and versatile in use.

[0064] Yet another advantage, particularly important, results from the fact that the use of this structure allows the personnel responsible for its assembling to define all the assembling procedures, both for the structure itself

and for the additional systems, observing the safety regulations and to follow and control every step of its actuation by operators.

[0065] Moreover, it is to be pointed out that the number of the basic modular elements 3, 4, 5, 7 of the above described modular structure 1 is limited and that their production is simple, which reduces the production cost.

[0066] Modifications can include e.g. uprights having circular section, or transversal bars having triangular section, which can be used in different combinations that need suitably shaped connectors having suitable dimensions.

Claims

1. Modular structure characterised in that it includes basic modular box-like elements including:

uprights (3), each upright featuring, in the centre of its front surfaces, relative front openings (3a), and, along each edge of said front surfaces, a plurality of front holes (30a), aligned and equidistant, with the distance between the axes of two subsequent holes defining a basic step (P), said upright (3) also featuring, on its lateral surfaces, a group of lateral holes (30b), aligned along respective edges and set equidistant by said basic step (P);

connectors (4), each connector featuring, in the centre of each of its surfaces, a front opening (4a) and a group of holes (40a) aligned along the edges of said surfaces and set equidistant by said step (P);

transversal bars (5), each of which features, in the centre of its front surfaces, relative front openings (5a), and, aligned along each edge of said front surfaces, a plurality of front holes (50a), set equidistant by said basic step (P), said transversal bar (5) featuring, on each of its lateral surfaces, a group of lateral holes (50b), aligned along respective edges and equidistant by said basic step (P), and said transversal bar (5) featuring also on at least one lateral surface a plurality of control openings (80), which define strengthening elements (55);

tightening means (9) which removably tighten said basic modular elements (3, 4, 5) in the region of said front holes (30a, 40a, 50a) and/or lateral holes (30b, 40b, 50b).

2. Modular structure according to claim 1, characterised in that it includes a box-like base (7), which is coupled with said upright (3) and/or transversal bar (5) by said tightening means (9), said base (7) featuring, in the centre of each of its front surfaces, an opening (7a), and a group of front holes (70a), aligned along the relative edges and set equidistant

by said basic step (P).

3. Modular structure, according to claim 1, characterised in that at least two lateral surfaces of said transversal bar (5), facing each other and adjacent to the lateral surface equipped with said control openings (80), feature a plurality of lateral openings (5b) which are arranged symmetrically along the symmetry axis of the relative lateral surface and which are coupled with front openings (5a) of the transversal bars (5), that are orthogonal to the respective transversal bar (5). 5 10
4. Modular structure, according to claim 1, characterised in that at least one lateral surface of said upright (3) features lateral openings (3b) made near the front surfaces and arranged symmetrically with respect to the symmetry axis of said lateral surface. 15
5. Modular structure, according to claim 1, characterised in that the front surfaces of said upright (3), of said transversal bar (5) and the surfaces of said connector (4) are rectangular and their areas are the same. 20 25
6. Modular structure, according to claim 1 or 5, characterised in that the front surfaces of said upright (3), of said transversal bar (5) and the surfaces of said connector (4) are identical. 30
7. Modular structure, according to claim 1 or 5 or 6, characterised in that it includes wind braces (10), provided at each extremity with fixing plates (10a) featuring a plurality of front holes, aligned and equidistant by the basic step (P), so as to allow said wind braces (10) to couple with the transversal bar (5) and/or the upright (3) by tightening groups (9), which engage lateral holes (50b) and/or (30b), respectively. 35 40
8. Modular structure, according to claim 1 or 5 or 6 or 7, characterised in that it includes strengthening bars (6) provided at each end with a fixing plate (6a) featuring a series of front holes (60a), aligned and equidistant by the basic step (P), so as to allow said strengthening bars (6) to couple with the transversal bar (5) and/or the upright (3) by tightening groups (9), which engage lateral holes (50b) and/or (30b), respectively. 45 50
9. Modular structure, according to claim 1, characterised in that said basic modular elements (3, 4, 5) feature, made in their lateral surfaces near the respective front surfaces, a plurality of longitudinal slots aligned with said front holes (30a, 40a, 50a), said longitudinal slots allowing suitable assembling tools to be introduced therethrough inside said modular elements (3, 4, 5). 55

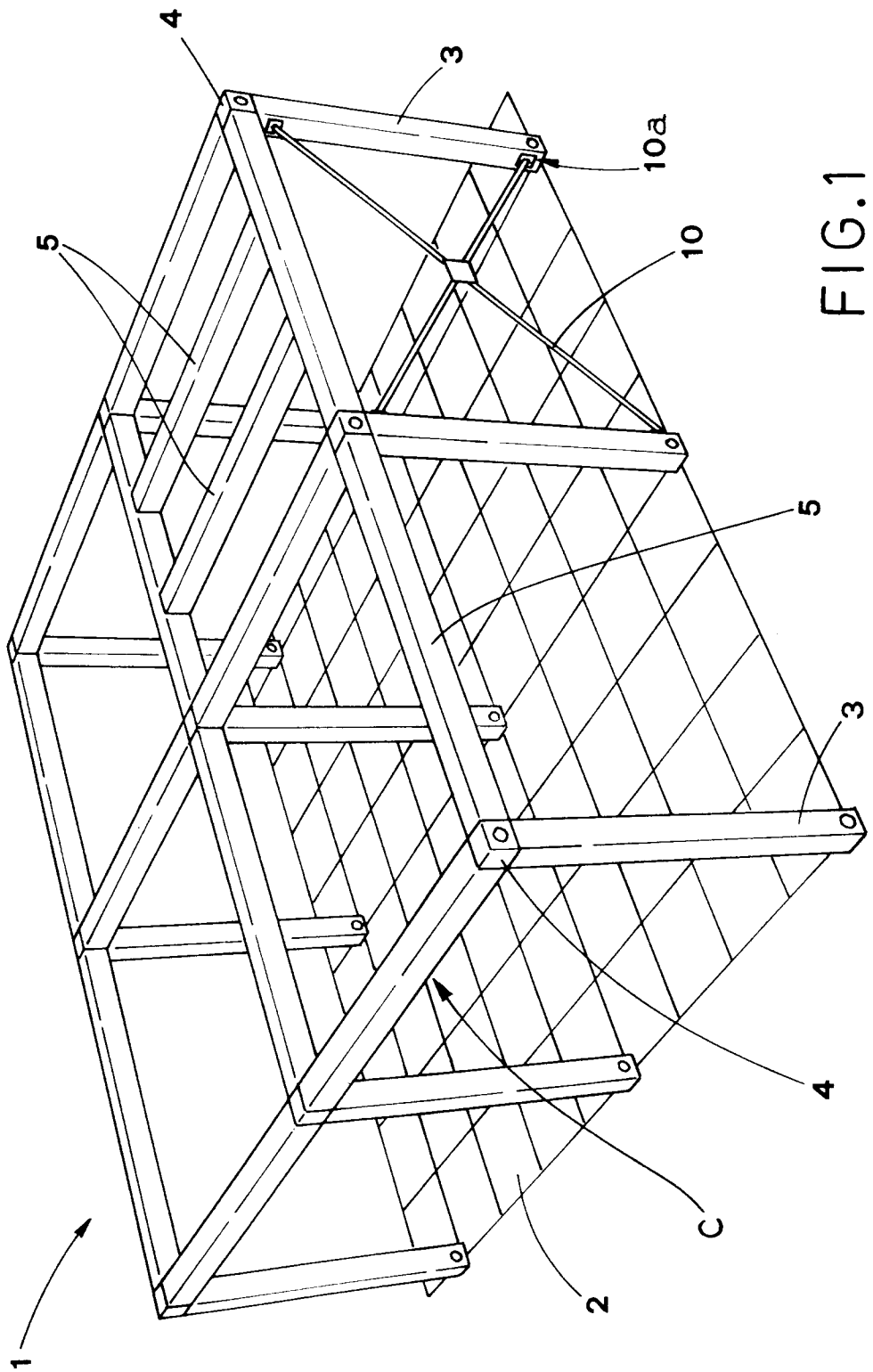
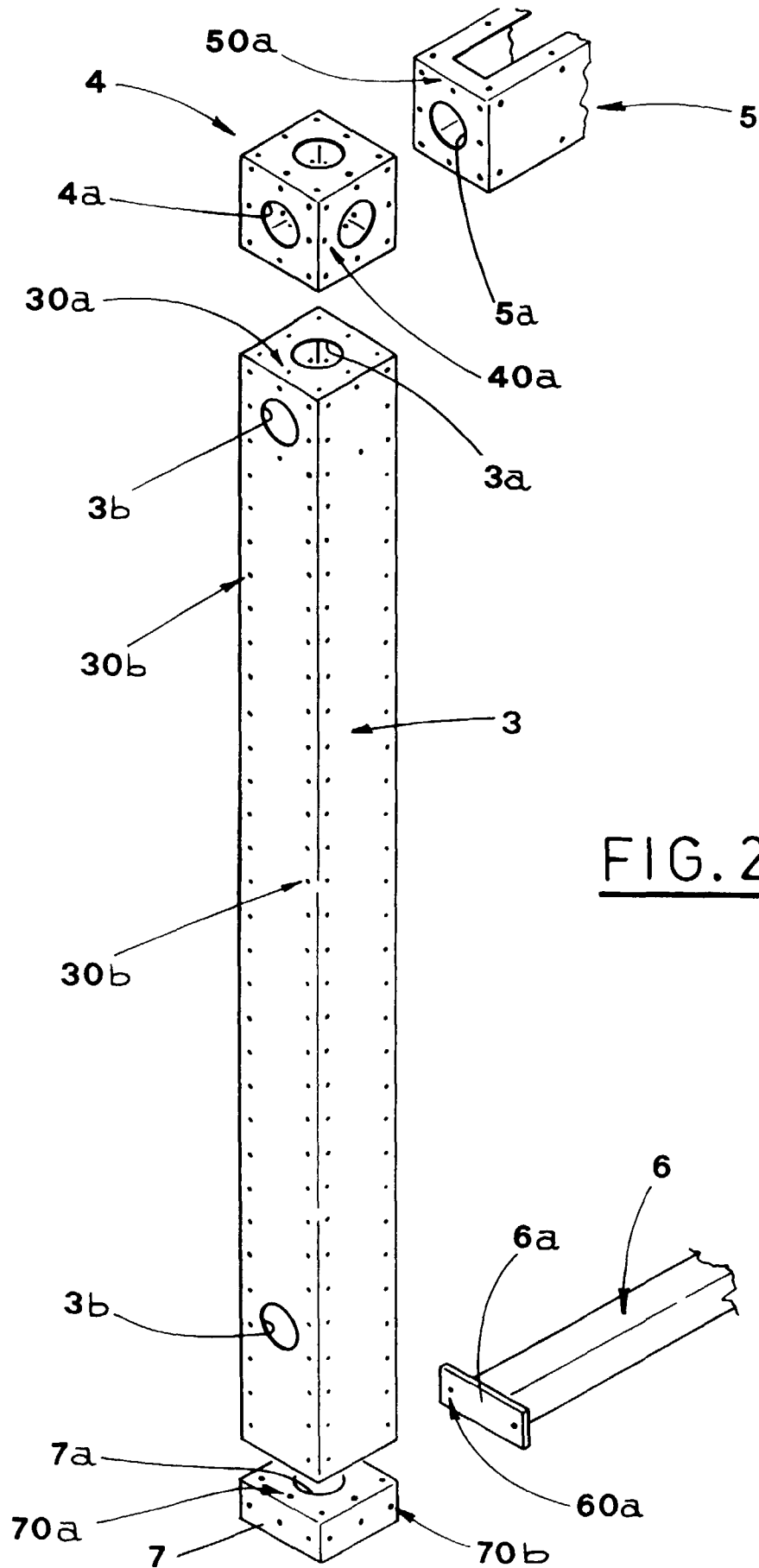
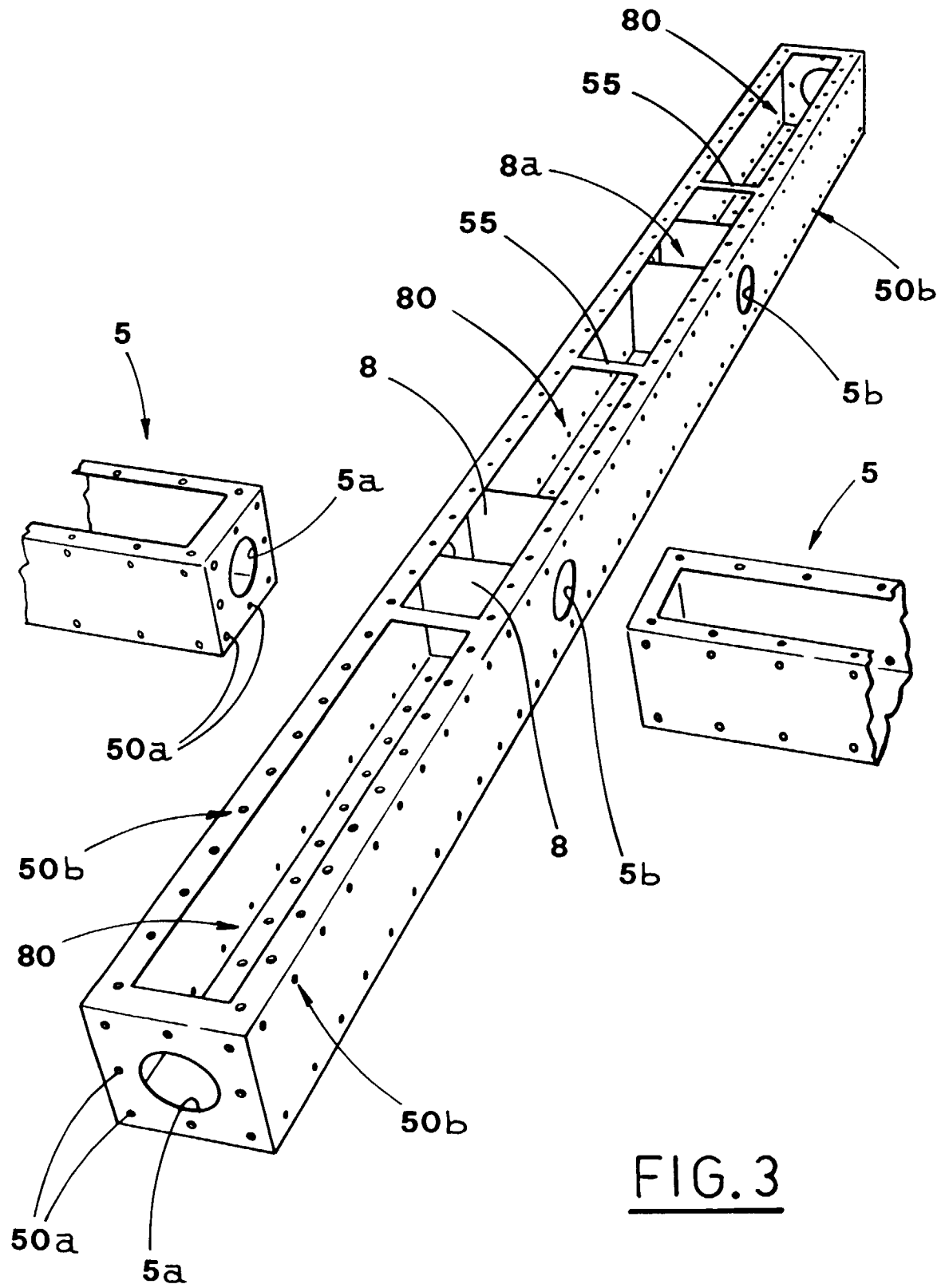
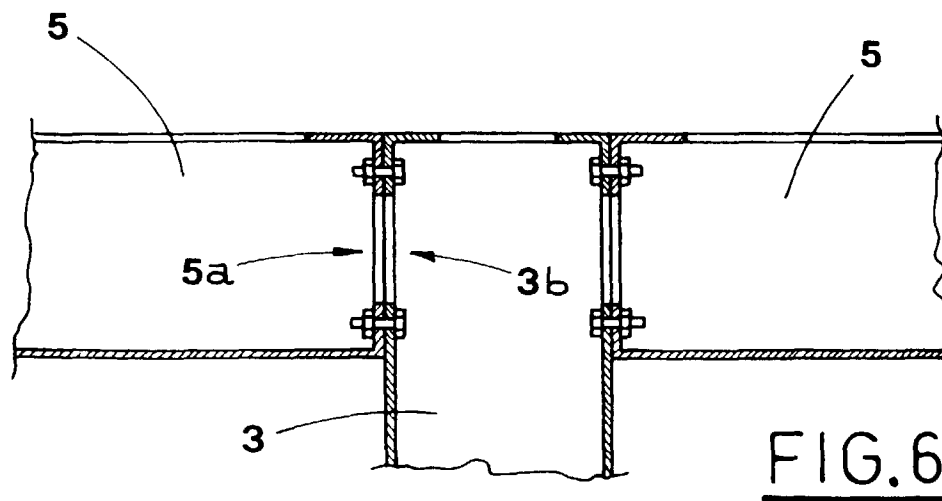
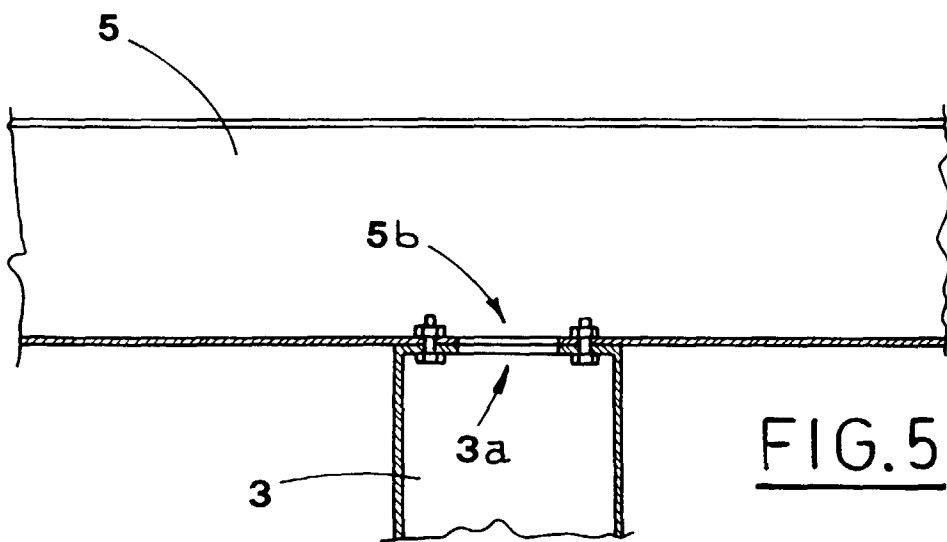
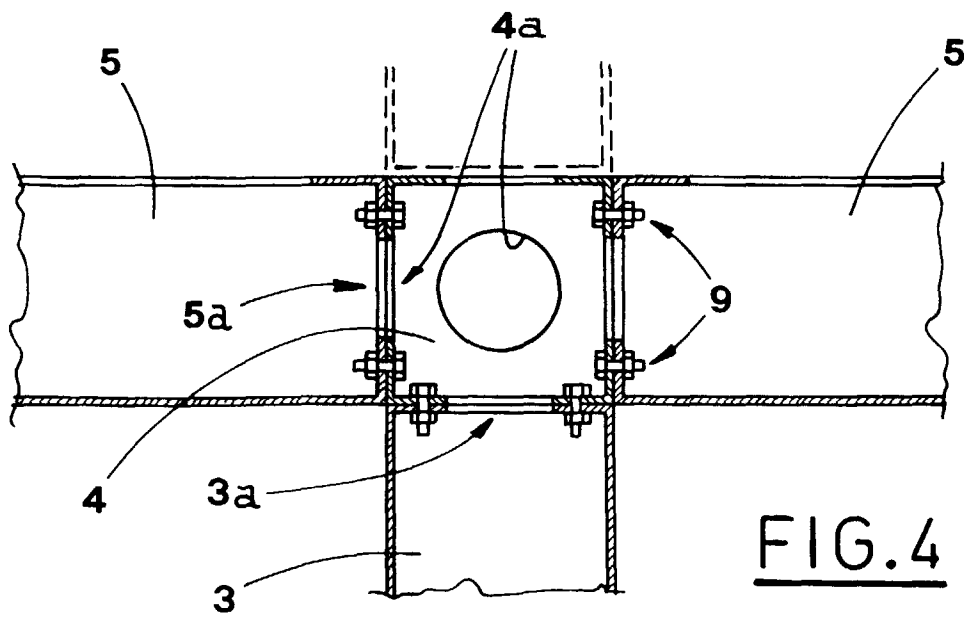


FIG. 1







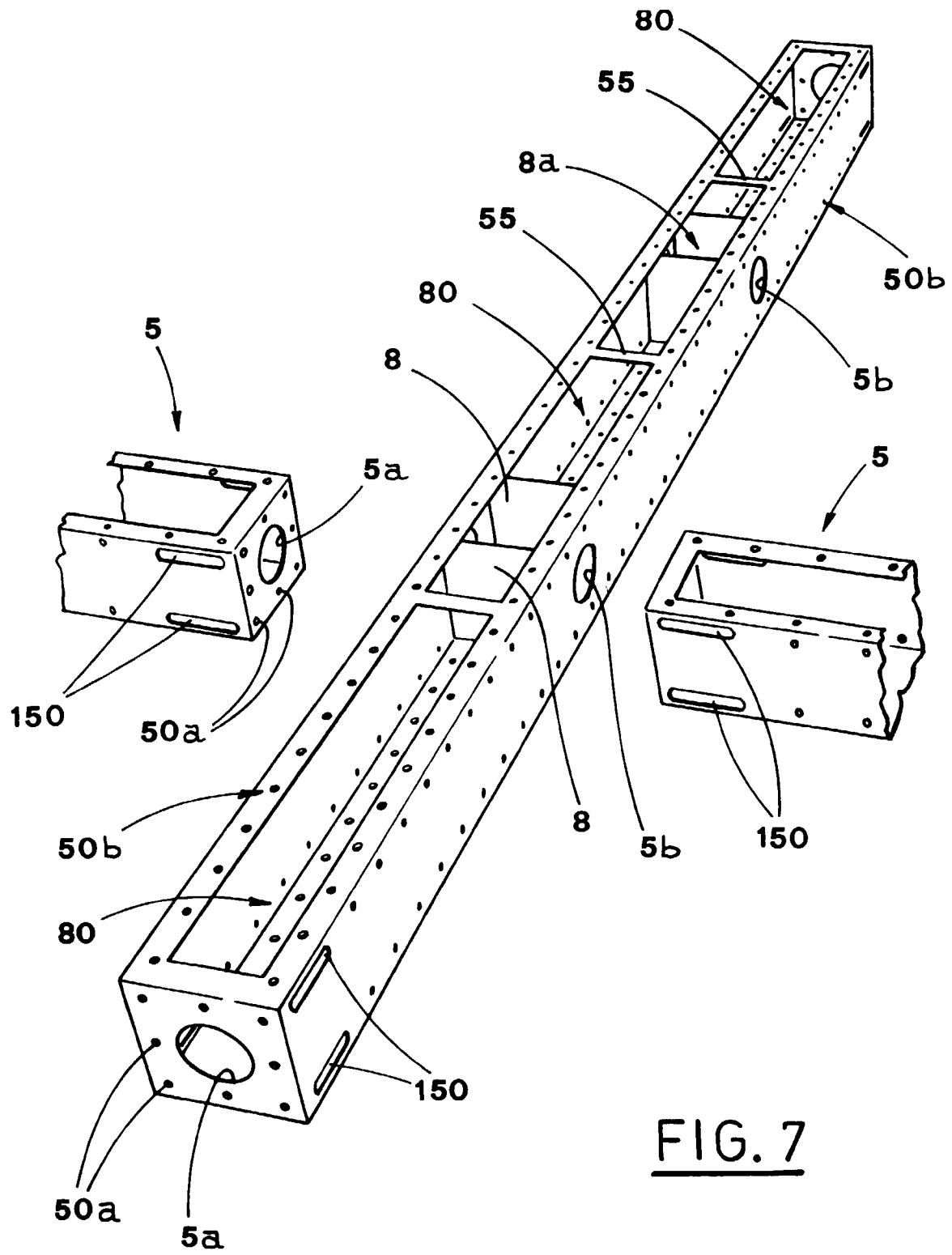


FIG. 7