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(54) Storage and transport module for workpieces in assembly lines

(57) Module for storing and transporting parts in assembly lines having a modular structure with horizontal (2.1) and vertical (2.2) beams, joined by means of upper interlocking nodes (3) having a mouth (4), and lower interlocking nodes (5) having a projection (6) which can be introduced in the mouth (4) of another module (1) when they are stacked on top of the other. Furthermore, the lower interlocking nodes (5) comprise a dovetail enabling a coupling (10) to be placed therein so as to enable transport thereof. Additionally, it may comprise connectors (20) to attach additional beams so as to modify the measures of the modular structure or reinforce some of its faces.

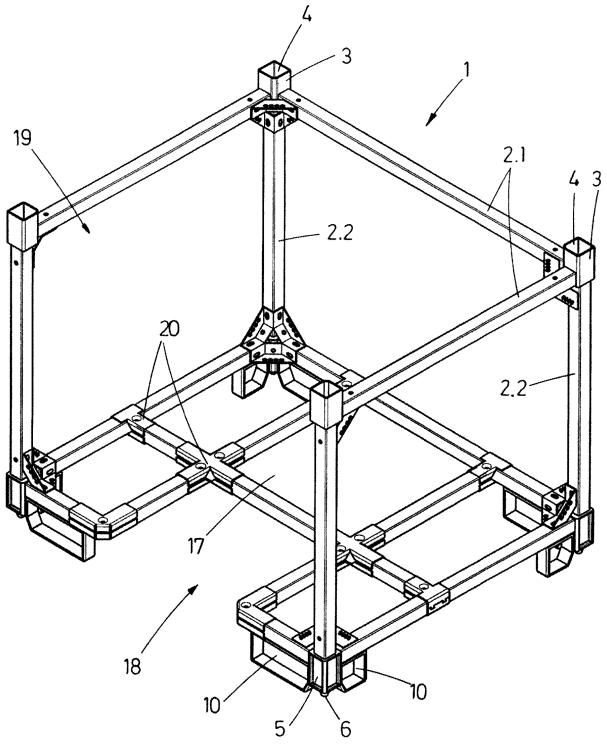

FIG.1

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Description

OBJECT OF THE INVENTION

[0001] The present invention may be included in the technical field of modules for storing and transporting parts in assembly lines. In particular, the module described is especially intended to be used in the automotive industry.

BACKGROUND OF THE INVENTION

[0002] Nowadays, the modules for storing and transporting parts to vehicle assembly lines consist of a robust metallic structure joined by welding. Such a structure includes the tools and fastening means which are required for and specific to the part in question (bumpers, hood, steering wheel, etc.).

[0003] These modules are specifically manufactured for each vehicle model in which they are to be used, with the corresponding tools sized and positioned for each vehicle part.

[0004] This implies that each module should be manufactured individually, being suitable only for the part to be contained therein and for each particular vehicle model. Therefore, vehicle manufacturers must be provided with a great number of modules. This involves high costs and storage problems. Furthermore, it is an additional disadvantage that, when a vehicle model is no longer manufactured, such modules for storing and transporting parts must be withdrawn, since they can neither be reused nor used in other vehicle models.

[0005] As it has been described, said modules are made of metallic structures welded together with the all the tools thereof. This process is precisely done so as to provide them with high robustness, since their operational life should be the same as that of the manufacturing life of the particular vehicle model. These modules are subjected to lot of work and they also form the protection elements for the parts, which is also why they are subjected to many hits and to be continuously moved and transported.

[0006] For that reason, the modules have a very high cost, and once the particular vehicle model manufacturing process is finished, they cannot be reused and are thus wasted as scrap.

[0007] In the present situation of crisis, in which vehicle manufacturers seek to reduce costs, and in which the manufacturing series are shorter and more varied, the current transport and storage modules do not meet the sector requirements. Particularly, this happens because they cannot be reused in other vehicle models.

DESCRIPTION OF THE INVENTION

[0008] The present invention discloses a module for storing and transporting parts in assembly lines. This module can be configured and stacked. Since it is configurable, the versatility thereof increases and it can be used during the manufacturing process of different vehicle models.

[0009] The module comprises a plurality of horizontal beams and vertical beams, attached to each other so as to form the modular structure. In a preferred embodiment, the beams have a square section. The attachment between the horizontal beams and the vertical beams is carried out by means of upper interlocking nodes and lower interlocking nodes.

[0010] The lower beams also comprise couplings being designed to fit in the trucks and/or pallet forks anchoring elements, and as they have the projection which fits in a mouth from the upper interlocking nodes of an identical module, they couple to said upper interlocking node of the other module so that they can be stacked.

[0011] The upper interlocking nodes are indeed designed to receive the lower interlocking nodes of equal modules and allow this coupling. As well as joining the upper tubes and having the mouth described above, they have an upper extension which allows spacing the modules with respect to each other when being stacked.

[0012] In a preferred embodiment, the interlocking nodes are oversized so that they project with respect to the module body (delimiting the tubes), such that they act as a protection for the rest of the structure against possible frontal, side and stacking collisions.

[0013] Preferably, the inner vertexes of the interlocking nodes are chamfered so as to avoid sharp-pointed edges, which may cause damage in the parts being stored and transported within the module.

[0014] Additionally, the module may comprise reinforcement framing square to confer robustness to the module. Likewise, said framing square may comprise a plurality of holes for tie rods, reinforcements, panels, sheets, protection meshes, etc.

[0015] Therefore, some of the most important advantages provided by the present module are versatility (thanks to which it may be configured), capacity of being stackable (these modules can be piled up on top of each other with great stability) and that they may be reused for different types of parts.

[0016] It additionally provides optimization of parts transport, especially because they can be transported both in trucks and in pallet forks. The module has been designed in such a way that it is manufactured in a very short time. Furthermore, parts forming the module are standard parts, a feature which reduces costs of the entire production process.

[0017] Given the modularity and configurability of the module, it can be fitted with all specific tools and fastening means required therein, for transporting and storing any part for the assembly line.

[0018] Likewise, by using standard tubes, the module may be configured and sized depending on user requirements as many times as desired. Every component in the module may be reused.

[0019] The modular structure of the present invention

is based on the reticular modularity feature of the module for storing and transporting parts in assembly lines. This allows construction time optimization, and since they are portable, demountable and may be re-organized, they promote multiple functionalities and reuse thereof by giving them a new use, different to the one they were manufactured for.

DESCRIPTION OF THE DRAWINGS

[0020] To implement the present description and in order to provide a better understanding of the characteristics of the invention, according to a preferred embodiment thereof, a set of drawings is attached as part of this description, with an illustrative but not limitative purpose, which represents the following:

Figure 1.- It shows a perspective view of the module for storing and transporting parts in assembly lines.

Figure 2.- It shows a perspective view of an upper interlocking node.

Figure 3.- It shows a perspective view of a lower interlocking node.

Figure 4.- It shows a view of a three dimensional framing square.

Figure 5.- It shows a profile view of the joint between the two stacked modules.

PREFERRED EMBODIMENT OF THE INVENTION

[0021] The module for storing and transporting parts in assembly lines is now described according to figures 1 to 5, which represent an embodiment example by way of illustration only and not being limitative.

[0022] The disclosed module (1), illustrated in figure 1, comprises a modular structure within which there is a free space (19) intended to receive the parts to be transported and stored therein. Trays or adequate receptacles for each type of part to be transported are later mounted in said free space (19).

[0023] This is a difference itself with respect to the state of the art, since the entire free space (19) may be configured to place the required elements therein at each moment. In the frames from the state of the art the receptacles are fixed to the outer chassis, without the possibility of making any modification at all.

[0024] The modular structure is formed by a plurality of horizontal beams (2.1) and vertical beams (2.2) with open ends being intended to be attached to each other.

[0025] Furthermore, it also comprises a plurality of upper interlocking nodes (3) which are shown in figure 2 and which comprise a mouth (4) on its upper surface. And a plurality of lower interlocking nodes (5), shown in figure 3, which comprise a projection (6) on its lower surface. Said projection (6) is intended to be introduced within the mouth (4) from another module (1) when they are stacked.

[0026] Stacking the modules (1) enables those being stored occupying a smaller space, and thus optimizing the storing solutions of the warehouse or factory where they are.

[0027] The upper interlocking nodes (3) and the lower interlocking nodes (5) comprise at least a horizontal extension (7) intended to be introduced in an open end of a horizontal beam (2.1) and a vertical extension (8) intended to be introduced in the open end of a vertical beam (2.2), attaching said horizontal beams (2.1) and vertical beams (2.2) to each other.

[0028] Referring to the joints between two horizontal beams (2.1) and a vertical beam (2.2), the upper and lower interlocking nodes (2, 5) comprise two horizontal extensions (7), separated from each other 90°, in such a way that each one of them is introduced and attached to the open end from one of the horizontal beams (2.1).

[0029] Likewise, the lower interlocking nodes (5) comprise a lower portion, arranged between the horizontal extension (7) and the projection (6), in which dovetails (9) are arranged to fix couplings (10) intended for the module (1) transportation.

[0030] The couplings (10) may be, for example, rings which enable the module (1) transportation by means of hooked hoists. That being the case, the hoist hooks are introduced in the aforementioned rings.

[0031] The couplings (10) may be attached only to the lower interlocking node (5) or also to the horizontal beam (2.1) attached to the lower interlocking node (5), respectively.

[0032] In another embodiment of the invention, the couplings (10) are elements having through holes intended to receive the pallets of a pallet fork for its transportation. The user may choose what type of coupling (10) to place in the module (1), depending on the type of implements which are to be used for its subsequent movement. Likewise, different couplings (10) may be placed in case different implements are to be used for its displacement, or in case the way in which it is going to be transported has not been decided in the configuration moment.

[0033] The beams (2.1, 2.2) are preferably tubes with a square section. Also the upper and lower interlocking nodes (3, 5) preferably have a square section. Preferably, in this embodiment the upper interlocking nodes (3) and the lower interlocking nodes (5) have an inner edge (11) which is chamfered. The inner edge (11) is the edge oriented towards the free space (19) when the module is already assembled.

[0034] The mouth (4) from the upper interlocking node (3) and the projection (6) from the lower interlocking node are complementary, so that when two or more modules (1) are stacked they completely couple to each other. Thus, possible falls of the modules are prevented due to, for example, hits during storage or transport thereof.

[0035] Additionally, the upper interlocking node (3) may comprise an upper extension (21) which is where the mouth (4) is arranged. Said upper extension (21) enables the upper interlocking node (3) to be higher than the projection (6) from the lower interlocking node (5) of a module (1), so that when they are stacked safety space (22) as the one shown in figure 5 is created between them. The safety space (22) prevents contact between the module (1) from the upper area and the one from the lower area.

[0036] The module may additionally comprise a plurality of three-dimensional framing squares (12) intended to reinforce the junctions between two horizontal beams (2.1) and a vertical beam (2.2). The three-dimensional framing squares (12) can be seen in figure 4 and they comprise three support surfaces (13) to be attached to the corresponding beams (2.1, 2.2).

[0037] Since in a preferred embodiment the beams are tubes having a square section, each of the support surfaces (13) must be adapted to such configuration, so they are preferably surfaces forming a right angle.

[0038] Furthermore, the three-dimensional framing squares (12) comprise junction surfaces (14) placed between said support surfaces (13), holding them in position and forming a triangle in the junction of the beams (2.1, 2.2).

[0039] Additionally, said three-dimensional framing squares (12) may comprise reinforcement surfaces (15) normal to the junction surfaces (14) and to the support surfaces (13), and comprising a plurality of holes (16) intended for reinforcement elements to be introduced therein. The reinforcement elements may be, for example, wire ropes to bear strain, panels to cover the module (1) sides, tie rods, reinforcements, sheets, protection meshes, etc.

[0040] The three-dimensional framing squares (12) provide the module (1) with robustness, which is especially important because it is designed to be transported in warehouses, factories and assembly lines where it can be easily hit. Also the structure must be strong enough as to support a plurality of parts therein (in the free space (19)).

[0041] As it can be shown in figure 1, the module (1) comprises a base (17) which in turn comprises a recess (18) in one of its faces intended to allow a user access to the free space (19). Likewise, it can be appreciated that in the upper area through which the parts are introduced in the free space (19) of the module. The recess (18) is necessary for the module user (probably an operator) may have access to the parts arranged at the bottom of the free space (19).

[0042] Likewise, the module (1) comprises a plurality of connectors (20) to enable attachment between horizontal beams (2.1) or between vertical beams (2.2). In this way, more beams can be added to some of the faces of the module (1) so that it becomes more resistant, as for example in the base (17) which has to support all the parts weight. This can be observed in figure 1.

[0043] In an embodiment of the invention the upper interlocking nodes (3) and the lower interlocking nodes (5) are oversized, in such a way that they project with respect to the horizontal and vertical beams (2.1, 2.2) of the modular structure. In that way, they act as a protection for the rest of the module (1), since in case they contact other elements or other modules (1), parts receiving the hitting first are the upper (3) and lower (5) interlocking nodes.

[0044] All elements forming the module (1) are manufactured with stainless materials or, in case the material of any of the elements can get oxidized itself, the module is covered with an antioxidant layer.

Claims

1. Module for storing and transporting parts in assembly lines comprising a modular structure within which there is a free space (19) intended to receive parts to be stored or transported, and which is formed by a plurality of horizontal beams (2.1) and vertical beams (2.2) having open ends and being intended to be attached to each other, and **characterized in that** it comprises:

   - a plurality of upper interlocking nodes (3) comprising a mouth (4) on their upper surface,
   - a plurality of lower interlocking nodes (5), comprising a projection (6) on their surface to be introduced in the mouth (4) of another module (1) when they are stacked,

   and the upper interlocking nodes (3) and the lower interlocking nodes (5) comprising at least a horizontal extension (7) to be introduced in an open end of a horizontal beam (2.1), and a vertical extension (8) to be introduced in an open end of a vertical beam (2.2), attaching said horizontal beams (2.1) and vertical beams (2.2) to each other.

   and the lower interlocking nodes (5) comprise a lower portion, arranged between the horizontal extension (7) and the projection (6) in which dovetails (9) are arranged to fix couplings (10) intended to enable the transport of the module (1).

2. Module for storing and transporting parts in assembly lines according to claim 1 **characterized in that** the upper interlocking nodes (3) and the lower interlocking nodes (5) have an inner edge (11) which is chamfered.

3. Module for storing and transporting parts in assembly lines according to any of the preceding claims **characterized in that** it additionally comprises a plurality of three-dimensional framing square (12) intended to reinforce the joints between two horizontal

beams (2.1) and a vertical beam (2.2), and comprising three support surfaces (13) to be attached to the corresponding beams (2.1, 2.2), joint surfaces (14) placed between said support surfaces (13), holding them in position and forming a triangle in the joint.

4. Module for storing and transporting parts in assembly lines according to claim 3, **characterized in that** the three-dimensional framing square (12) comprise reinforcement surfaces (15) normal to the joint surfaces (14) and to the support surfaces (13), and comprising a plurality of holes (16) for reinforcement elements to be introduced therein.

5. Module for storing and transporting parts in assembly lines according to any of the preceding claims, **characterized in that** the module (1) comprises a base (17) which comprises in turn a recess (18) in one of its faces, intended to allow a user access to the free space (19).

6. Module for storing and transporting parts in assembly lines according to any of the preceding claims, **characterized in that** it further comprises a plurality of connectors (20) to enable attachment between horizontal beams (2.1) or between vertical beams (2.2).

7. Module for storing and transporting parts in assembly lines according to any of the preceding claims, **characterized in that** the upper interlocking nodes (3) and the lower interlocking nodes (5), are oversized in such a way that they project with respect to the horizontal and vertical beams (2.1, 2.2) of the modular structure.

8. Module for storing and transporting parts in assembly lines according to any of the preceding claims **characterized in that** the upper interlocking nodes (3) comprise an upper extension (21) in which the mouth (4) is arranged.

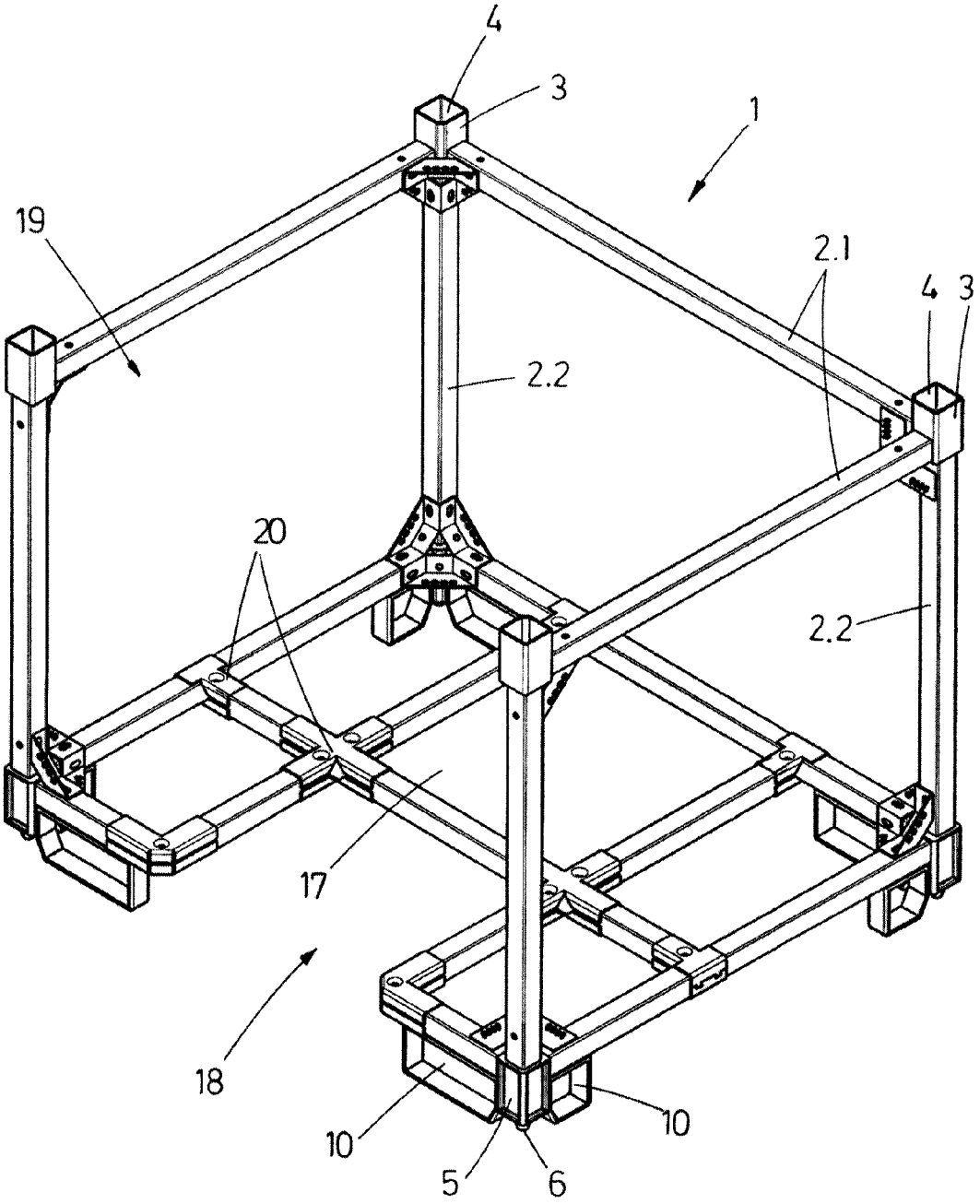

FIG.1

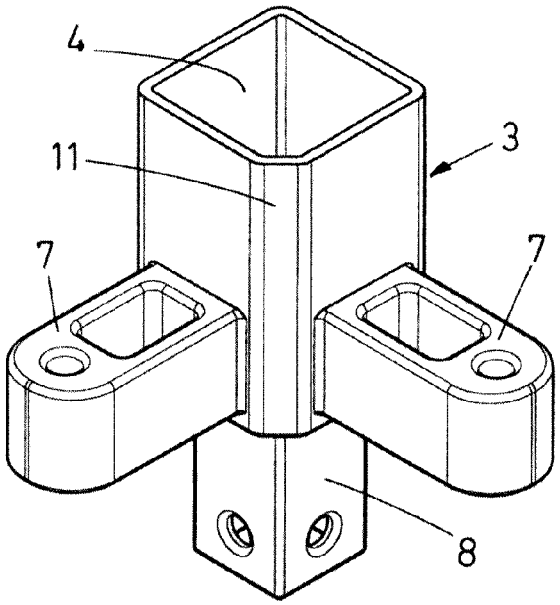

FIG.2

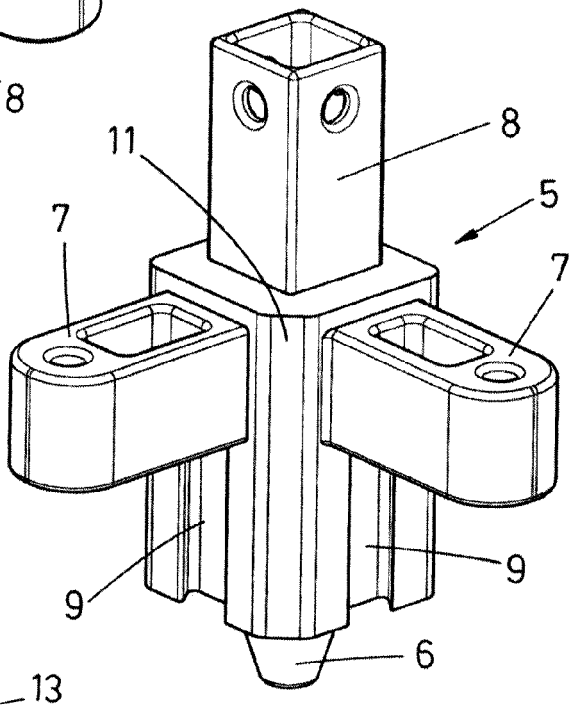

FIG.3

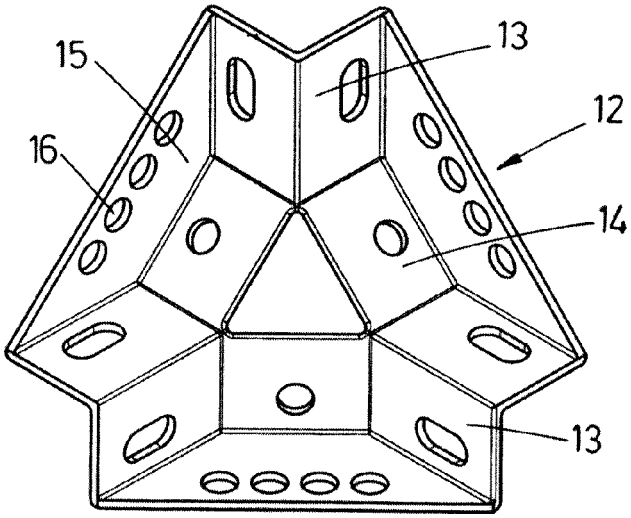

FIG.4

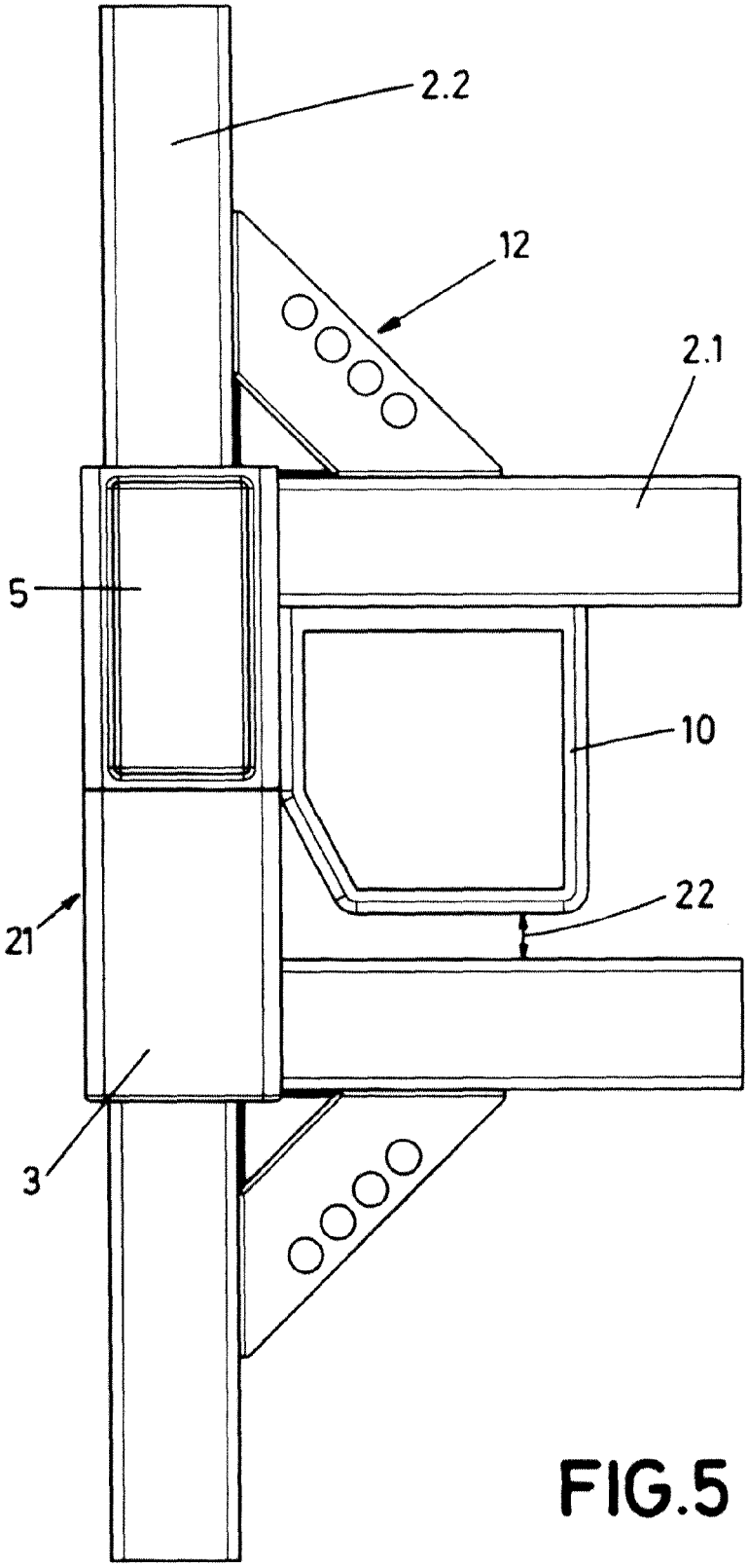

FIG.5

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EUROPEAN SEARCH REPORT

Application Number
EP 13 38 2368

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A47B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	1 April 2014	Szaip, András

CATEGORY OF CITED DOCUMENTS

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