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(54) Element, fit to create a connection between uprights and beams for the composition of modular reticular structures.

(57) The invention discloses a connecting element for uprights and beams for the composition of modular reticular structures (4). The vertical tubular uprights (3) and the horizontal beams (2 ; 8) are connected to one another through a connecting element (1 ; 80) consisting of an essentially U-shaped profile, with its concavity (40) turned toward the upright (3) and attached at the end of each beam (2 ; 8) having a non-tubular profile. Each connecting element (1 ; 80) is complete with hooks (14 ; 87) latching into corresponding cavities (15) obtained in the upright (3).

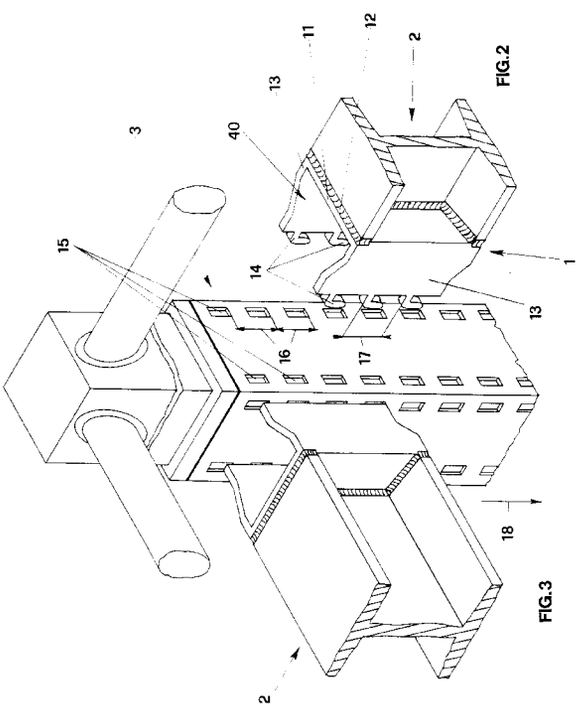

FIG.2

FIG.3

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The invention concerns an element fit to create a connection between uprights and beams for the composition of modular reticular structures, particularly suitable for obtaining shelvings, scaffoldings or others.

It is a known fact that shelvings and scaffoldings are reticular structures consisting of a series of vertical uprights and a series of horizontal beams, wherein the beams are connected to the uprights through connecting elements.

One of the many well-known solutions foresees for the connection between the uprights and the horizontal beams be made by inserting one or more hooks each into a proper pocket or slot belonging to the upright, said hooks being found on the terminal part of each upright.

Such a connection system, being quick and simple, presents a strong limitation in that it can only be used to connect the uprights to beams of the tubular type, since, only in the case of tubular beams, it is possible to attach at their ends hooks being realized directly on the part or added to it, which will be inserted into the pockets or into the slots made in the upright.

On the other end, the current trend, especially concerning the heavy duty structures, is to obtain the beams by using profiles of the IPE type which, the external dimensions remaining the same, present a much higher resistance as compared with the tubular structural steel sections.

One of the known solutions is the object of the patent application N. VI91A000031 in the name of the same inventor. Said patent application contains the description of a reticular structure consisting of tubular vertical uprights connected with one another through beams of the IPE type.

At the end of each beam is attached a first element having a U shape, the concavity of which is turned toward the upright, which is externally coupled with a second element, also having a U shape, attached to the upright and presenting its concavity turned toward the concavity of the first profile attached to the end of the beam. The junction is made possible through a prismatic stopping element transversally inserted between the U channels.

The structures obtained according to such a method turn out to be very stable and safe but they present rather high manufacturing costs, especially because of the incidence of the mechanical working procedures the ends of the beams and of the uprights must undergo, as well as because of the manufacture of the prismatic stopping element.

Moreover, when the sizes of the beam change, it is necessary to change also the sizes of both the first elements having U shape, which are attached to the ends of the beams, and of the corresponding second elements, also having a U shape, which are attached to the uprights, all of these factors further increasing the production costs of the reticular structures.

The present invention intends to obviate such inconveniences.

In particular, it is the purpose of the invention to obtain a connecting element which permits to join the ends of the non- tubular beams with tubular uprights, through hooks inserted within housings or slots made in the uprights themselves.

The described purpose is reached through a connecting element for uprights and beams for the composition of modular reticular structures, wherein said reticular structures comprise: a plurality of tubular vertical uprights connected to one another through a plurality of horizontal beams, wherein, in accordance with the main claim, said connecting element is characterized in that it consists of a profile having an essentially U shape, with its concavity turned toward the upright and attached to the end of each beam not having a tubular profile, said connecting element being provided with hooks made on its lateral faces, facing one another, wherein said hooks latch into corresponding cavities made in the upright.

According to a preferred embodiment, the ends of the lateral faces wherein the hooks are obtained, are always arranged at the same distance in all the connecting elements, regardless of the width of the bottom surface of the U profile to which they are latched. Said bottom surface presents instead sizes changing according to the width of the platbands of the beam to which the connecting element is attached by its end.

Moreover, the hooks are made with a constant pitch in each face of the connecting element.

Advantageously, the use of connecting elements provided with hooks all presenting the same pitch and all arranged at the same distance, permits to keep in stock uprights of different dimensions, all of them having been previously punched and suited to receive a connecting element of any width, it in turn being suited to be connected with beams of any size.

The described purposes and advantages of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific example, while indicating a preferred embodiment of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description and from the drawings, wherein:

- Fig. 1 shows a reticular structure obtained by using the connecting element between uprights and beams according to the invention;
- Fig. 2 shows in an axonometric view the detail of the connecting element according to the invention applied to the end of a beam and not being hooked to the upright;
- Fig. 3 shows the connecting element according

to the invention attached to the end of a beam and hooked to the upright;

- Fig. 4 shows in an axonometric view the connecting element according to the invention applied to the end of the beam;
- Fig. 5 shows the connecting element according to the invention presenting a different size in relation to the connecting element represented in Fig. 4 and connected to a beam having also different sizes;
- Fig. 6 shows in an axonometric view three connecting elements according to the invention used to connect as many beams to the same upright;
- Fig. 7 shows in an axonometric view four connecting elements according to the invention used to connect four beams to a single upright.

The connecting element according to the invention is represented in Fig. 1, wherein it is indicated as a whole with 1 and where it can be observed that it is used for connecting the end of each beam 2 to the corresponding upright 3, in order to obtain the reticular structure indicated as a whole with 4.

It can be observed in particular in Fig. 2 that said connecting element 1 presents a profile having a U shape, with its concavity 40 turned toward the upright 3, consisting of a bottom surface 11, preferably attached by means of a butt welding 12 to the end of a beam 2, and of a couple of lateral surfaces 13 facing one another, a plurality of hooks 14 being obtained in correspondence with each of their free ends.

Each hook 14 is suited to latch into a slot 15 made in the upright 3, wherein said slots 15 are spaced at a pitch 16 equal to the pitch 17 between the hooks 14.

In order to connect each beam 2 with the corresponding upright 3, it is necessary to insert each hook 14 into the corresponding slot 15 and then, as can be observed in Fig. 3, let the beam 2 move? toward the bottom following direction 18, as a consequence of its weight, so that each hook 14 can latch in the interior of the slot 15 within which it is located.

The connecting element 1, represented in the Figs. 2 and 3 and attached to beam 2, is also represented in better detail in Fig. 4, wherein it can be observed that the width 20 of the bottom surface 11 belonging to the connecting element is the same as the width 21 of the platbands, 22 and 23 respectively, forming beam 2, while the distance 24 between the ends of the lateral surfaces 13, wherein the hooks 14 are obtained, is slightly smaller than the width of the platbands themselves, since the lateral surfaces 13 slightly converge toward one another.

The width of the bottom surface 11 belonging to the connecting element 1 must always be approximately the same as the width of the platbands of the beams to which said surface must be connected, likewise its height 30 must corresponds to the distance 25 between the platbands connected with one another through the core 27.

Therefore, for instance, in the case that, as can be observed in Fig. 5, the beam 8 presents its platbands 31 and 32 and its core 83 being of bigger sizes than the sizes of the beam 2 represented in Fig. 4, the connecting element 80 must present a bottom surface 84 having a width 83 corresponding to width 86 of the platbands 31 and 32 and lateral walls 88 having a height 85 corresponding to the distance 90 between the platbands.

In both solutions represented in the Figs. 4 and 5, it can be observed, however, that the distance 24 between the ends of the lateral walls, wherein the hooks 14 of the connecting element 1 and the hooks 87 of the connecting element 80 are realized, remain always the same.

In the same way, both in the connecting element 1 and in the connecting element 80, the pitch 17 between the hooks remains constant.

This permits to obtain in all the uprights, independently from their size, the slots 15, all of them having the same pitch and the same distance and this is done in order to optimize the mechanical working processes and to make it possible to stock uprights already ready to be assembled.

Consequently, in order to realize any kind of structure it will be enough to keep in stock a certain number of uprights of different sizes, all of them presenting slots already punched in the same way and a plurality of connecting elements having different widths and heights in relation to one another but all of them presenting hooks having the same pitch 17 and the same distance 24 in relation to one another.

By using the connecting element according to the invention, it is possible to connect to the same upright 3 two beams, as can be observed in Fig.3, or 3 beams, as can be observed in Fig. 6, or 4 beams, as can be observed in Fig. 7.

On the basis of what has been described, it is easy to understand how the purpose of realizing a connecting element permitting the junction of non-tubular beams with tubular uprights by using the junction method including hooks which latch into slots has been reached. In the solutions belonging to the known techniques this is only possible when the beams have a tubular form and in this case the connecting hooks are realized directly at the end of the beam or they are attached to the end of the beam.

Moreover, the modularity of the pitches and of the distances of the slots and of the hooks yield the advantage of a cheaper manufacturing process and a higher degree of versatility in the compositions.

Moreover, experimental tests performed on the reticular structures obtained by joining together beams and uprights by using the connecting element described herein have proven that the degree of resistance is the same as in analogous reticular structures using the known junction methods.

Variations and changes in the shape of the connecting element, of the hooks and of the slots as well as in the number of slots and of hooks are still to be considered as belonging to the scope and spirit falling under the protection of the present invention.

Claims

1) A connecting element for uprights and beams for the composition of modular reticular structures (4), wherein said reticular structures comprise a plurality of tubular vertical uprights (3) connected to one another through a plurality of horizontal beams (2; 8), characterized in that said element (1, 80) consists of a profile having an essentially U shape, with its concavity (40) turned toward the upright (3) and attached to the end of each beam (2;8) not having a tubular profile, said connecting element (1; 80) being provided with hooks (14; 87) made on its lateral faces (13; 88) facing one another, wherein said hooks (14; 87) latch into corresponding cavities (15) made in the upright (3).

2) A connecting element according to claim 1, characterized in that the lateral faces (13; 88) of said element are connected with a bottom surface (11; 84) which is attached at the end of a beam (2; 8) and presents a width (24; 83) corresponding to the width of the platbands (22, 23; 81,82) of the beam (2), said lateral faces (13; 88) also presenting their ends on which the hooks (14; 87) are obtained arranged at the same distance (24), regardless of the width (24; 83) of the bottom surface (11; 84) to which they are connected.

3) A connecting element according to claim 1, characterized in that all the hooks (14; 87) made on the lateral faces (13; 88) of the connecting element present the same pitch (17) along each lateral face (13; 88) on which they are made .

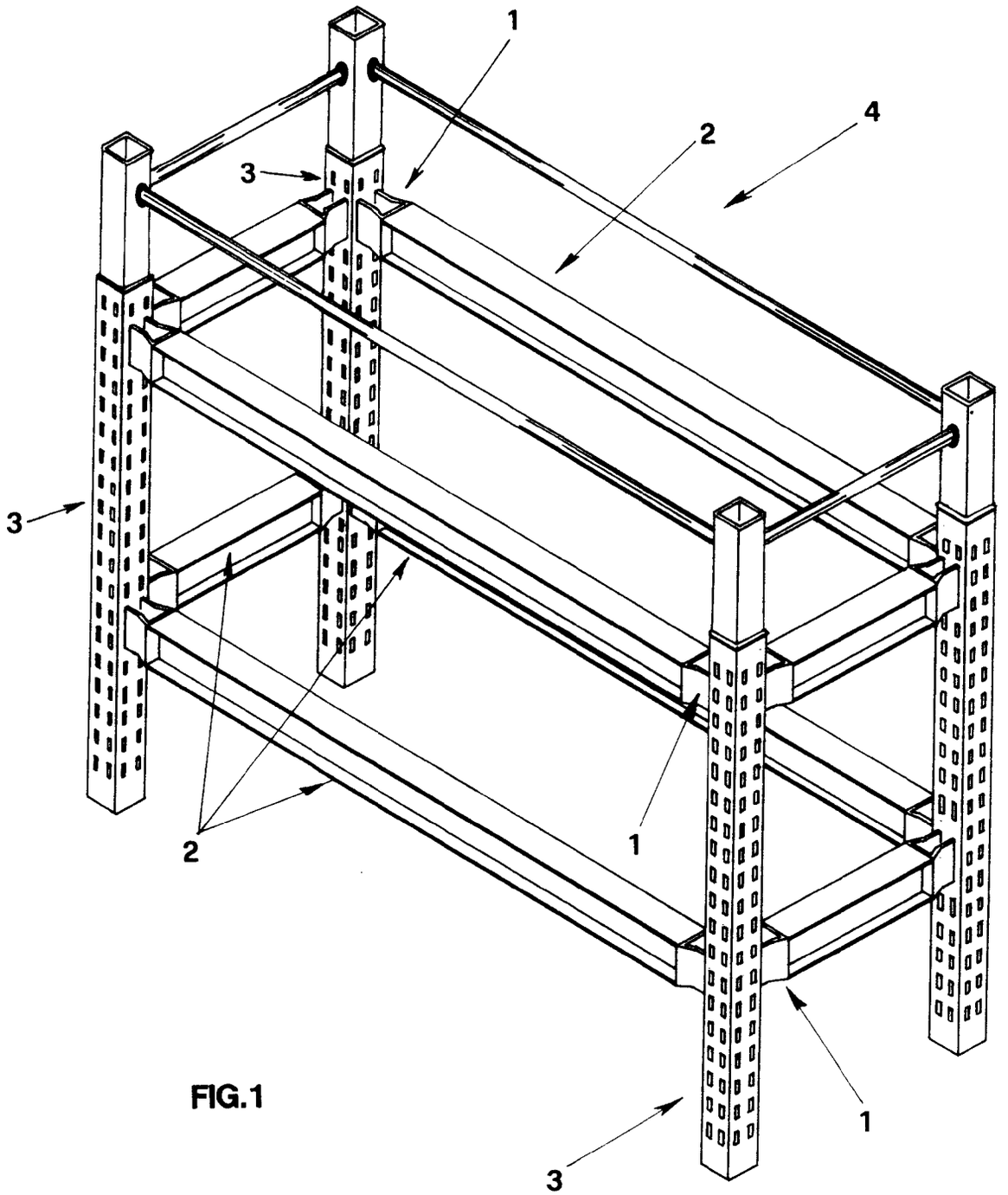

FIG.1

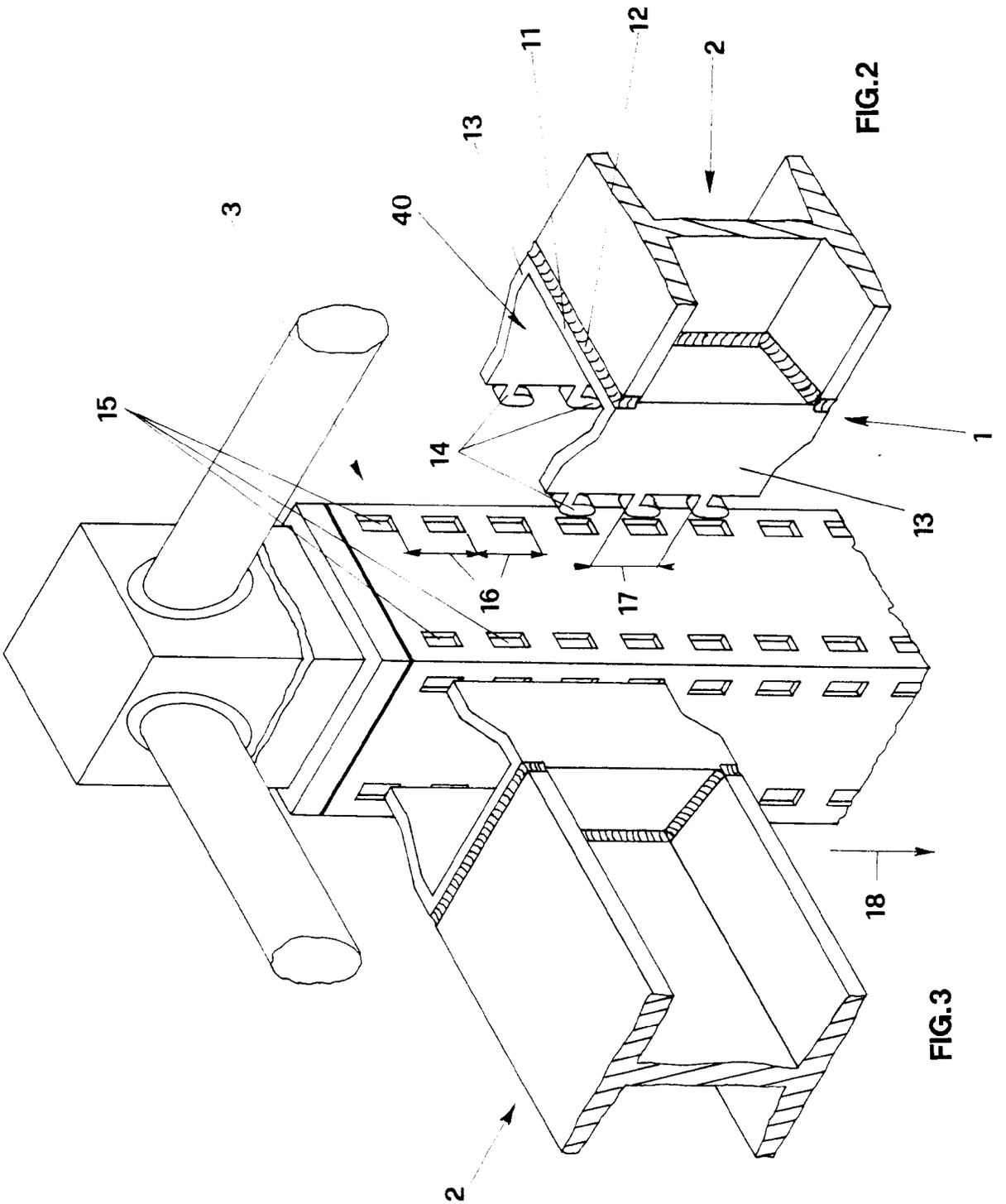

FIG.2

FIG.3

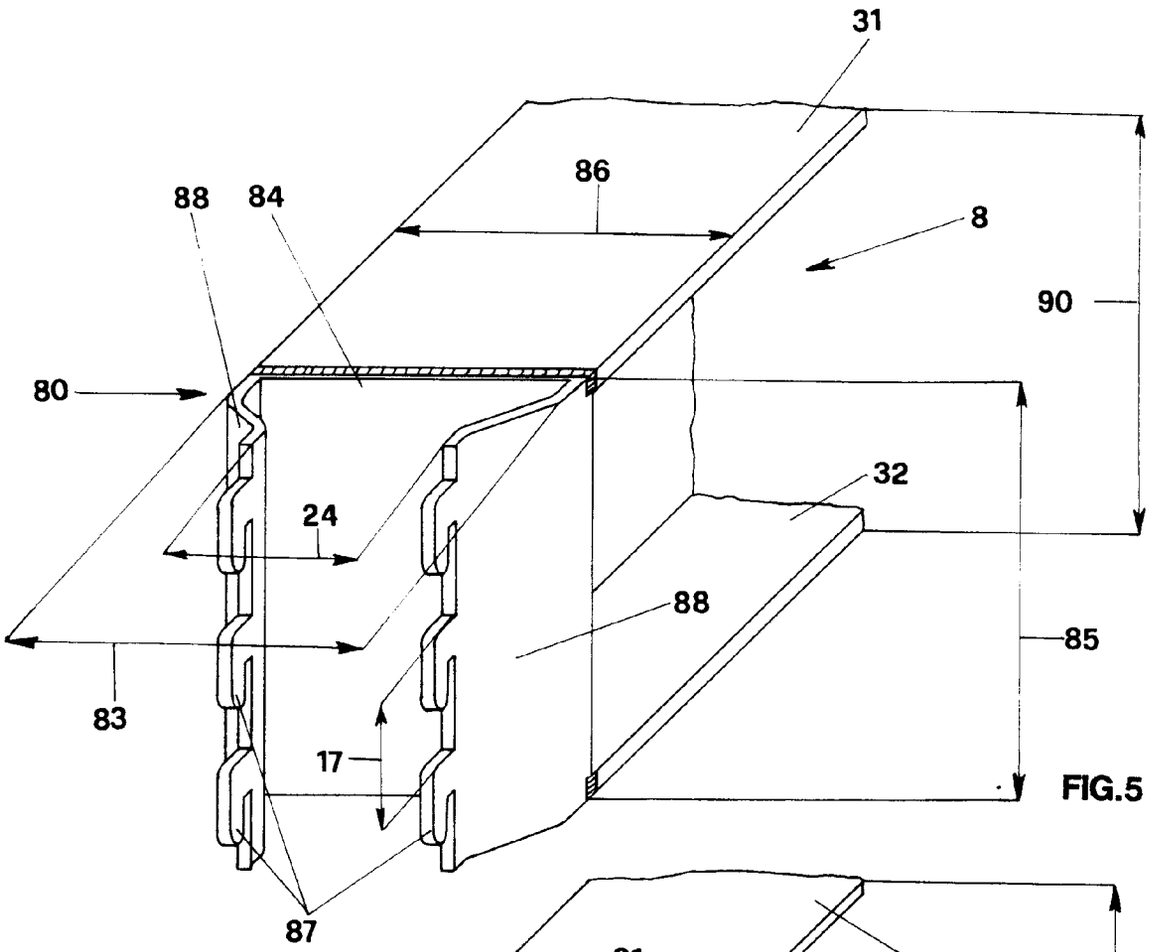
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FIG.5

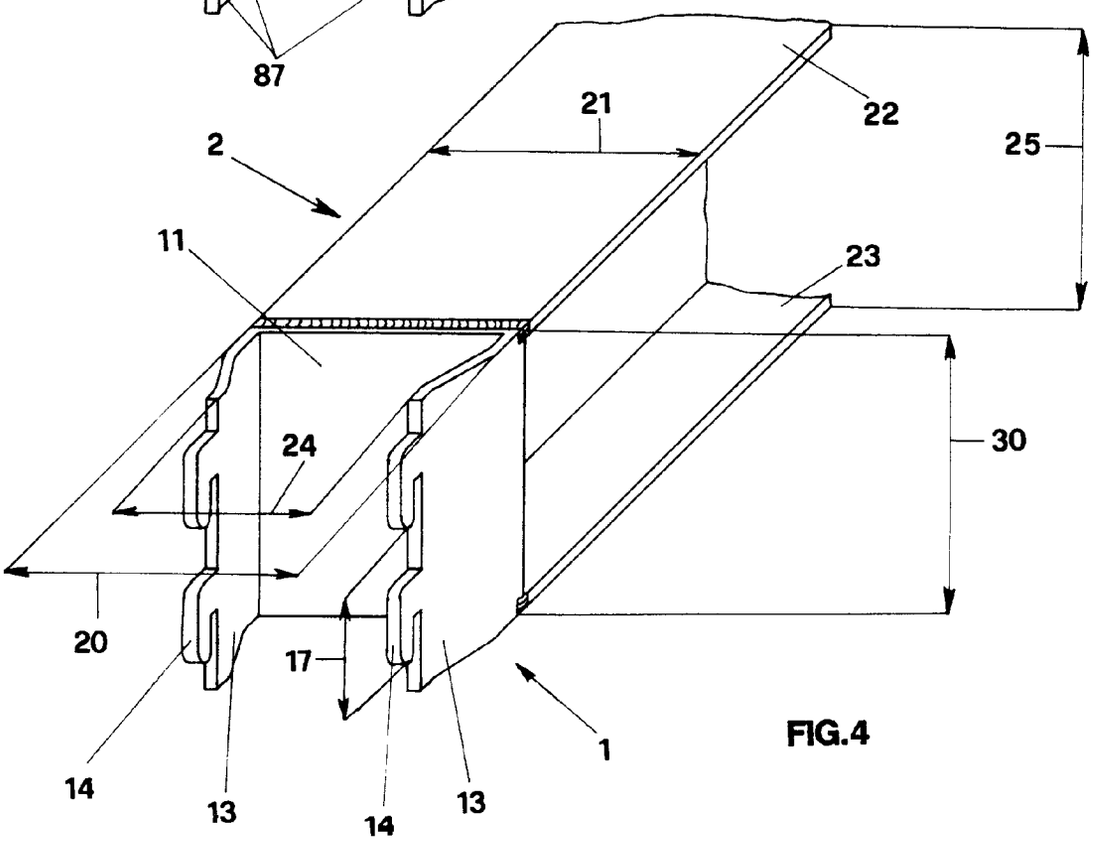
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FIG.4

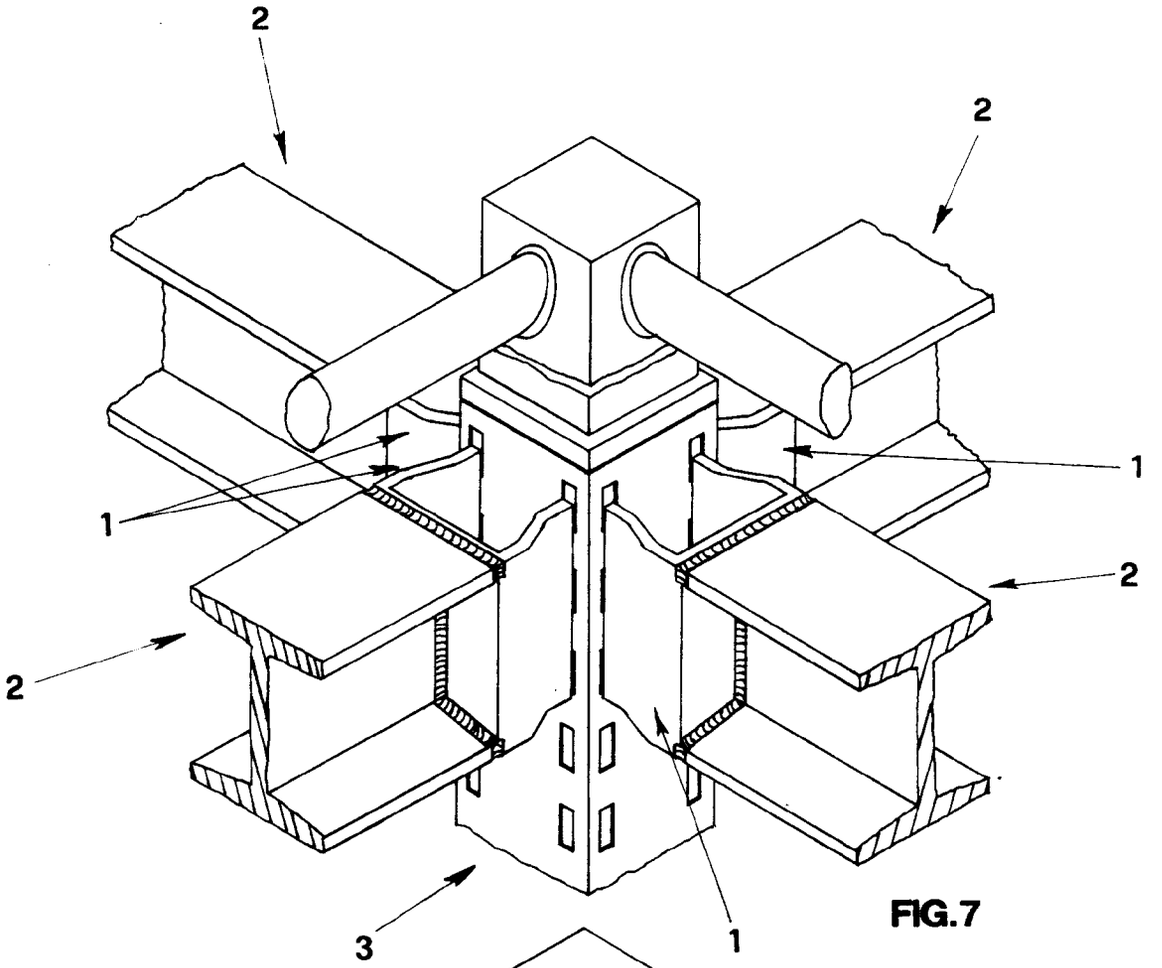

FIG.7

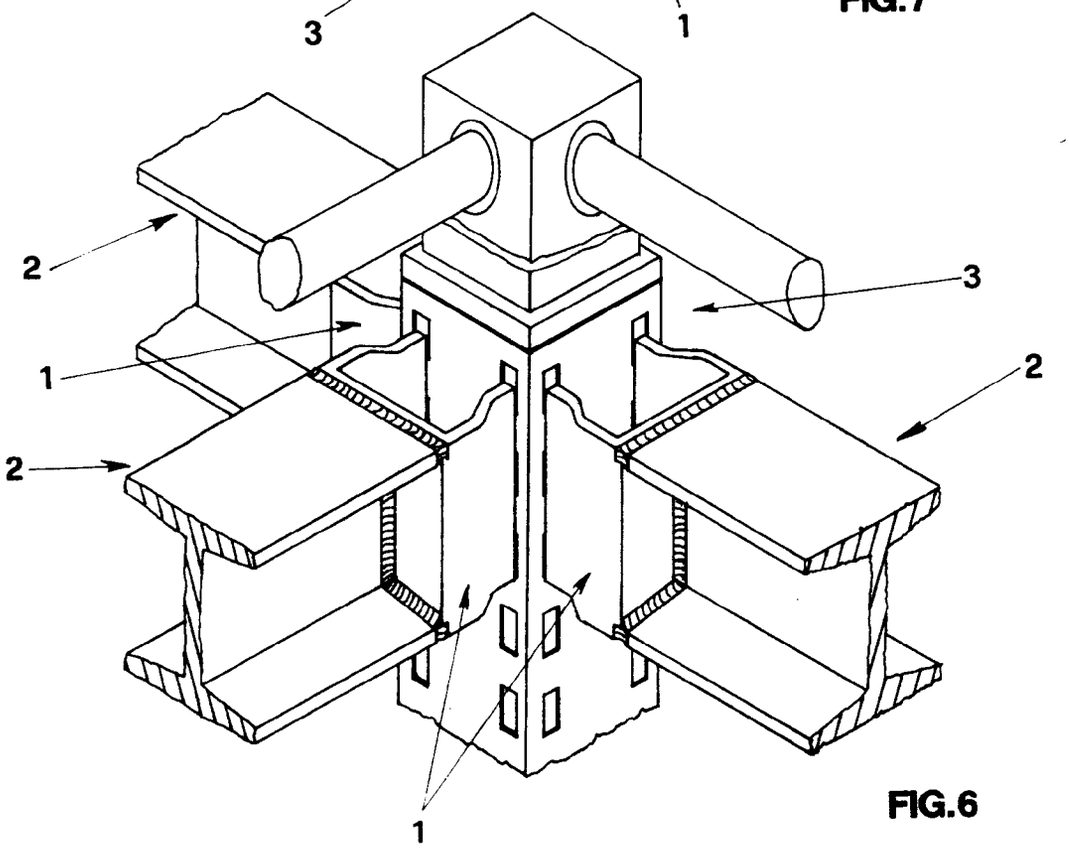

FIG.6