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(54) CONNECTION POINT FOR METAL STRUCTURES

VERBINDUNGSPUNKT FÜR METALLSTRUKTUREN

NOEUD D'ASSEMBLAGE POUR STRUCTURES MÉTALLIQUES

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Description

OBJECT OF THE INVENTION

[0001] The objective of the present invention is a semi-rigid connecting node for metallic structures which allows connection between beams and pillars, the main application of which is the construction of multi-storey car parks, although it may be destined for the construction of any other metallic structure or construction integrating a metallic structure. This node has a high degree of pre-fabrication in that its components are manufactured and assembled in situ in embedding and screwing operations which make it possible to improve safety in construction and reduce work execution and completion costs and timeframes.

BACKGROUND OF THE INVENTION

[0002] Structures are known to exist, particularly for scaffolds wherein the structure is formed by props or pillars wherewith cross beams are associated, wherein said pillars include rosettes for fixing the beams, while these include fixing forks at the ends of their spans for fixing to said rosettes, envisaging the existence of identical windows and stubs in both parts which are coupled therebetween by dovetail joint, wherein in the case of the scaffolds the fixation is executed by means of a pin or latch disposed subsequently.

[0003] There are currently various references for the construction of metallic structures, the props and beams of which are connected at specific points forming connecting nodes that are secured by weld, rivets or screws. In general, these types of connections have connection stability problems, at least unless the connection is secured using the definitive methods adopted in each case, due to which it is necessary to execute the definitive fixation of the elements while executing the assembly. This operating procedure has various problems, including the lack of flexibility in the assembly given that, once the elements are joined, they cannot be separated to be adequately rearranged or positioned.

[0004] JP H08144383 A (TAMURA NOBUTAKA) discloses a connecting node for metallic structures.

DESCRIPTION OF THE INVENTION

[0005] The invention proposes to resolve this question, for which on the one hand it is possible to execute a fast and effective pre-assembly of the structure and, once it has the adequate configuration and all its elements are in the definitive position, the nodes are definitively fixed. This fixation is preferably performed by means of screws, although it may also be the object of riveted joints.

[0006] The pre-assembly of the constituent parts of a node can only be executed in a stable position, wherein the parts adopt well-defined and geometric positions which therefore do not require subsequent adjustments.

For example, on assembling several beams on a prop disposed at 90°, the interlocking thereof is necessarily a right angle, i.e. perpendicular to the sides of the prop and it is only possible with a minimum tolerance margin.

[0007] The invention provides a connection node according to one of the appended claims 1 to 4.

[0008] This node is composed of two differentiated elements: a post or pillar having coupling means for the relevant beams at an adequate height or heights, identical to other embedding means disposed on the edges of the beams, which allows the fast initial connection of the elements, to be fixed in a second phase by means of screws, which establish a definitive joint. This assembly method will have the greatest advantages since, on being all the components assembled in-factory and transported to the construction site, the structure will be ready to be assembled without need for welds or for dedicating excessive time to aligning the beams and introducing the connecting bolts, screwing them one by one and giving them the necessary tightening torque.

[0009] If we take into account that the calculation of the structures is currently performed using computer programs that determine the necessary dimensions and cross-sections in accordance with the stress generated by the loads introduced, the required design and calculations can be reduced by using a previously determined manufacturing system. Furthermore, these types of nodes are adaptable to any type of profiling among the wide variety of existing profile families, which a priori enables the selection thereof, despite the infinite number of connection combinations and solutions that may be executed.

[0010] Likewise, the development of this construction system makes it possible to reduce environmental pollution and the health risks posed to welders who are frequently exposed to welding fumes and gases. The execution of this product by means of robotised welding enhances the quality and properties of the weld. Another advantage that must be highlighted with respect to the construction materials is that the steel structures are recyclable.

[0011] Furthermore, when designing a type of structure that adapts to the needs of a multi-storey car park, ease of use and obtaining acceptable performance by means of a sufficiently high occupation rate must be taken into account.

[0012] This node makes it possible to eliminate the prior design stage of the connections, thereby reducing the time required to execute the connections between the beams and pillars of the structure, obtaining better characteristics during the execution of the work than using a traditional system. Another advantage consists of improving the structure assembly process with a fast and effective system for executing the connection, such that the beam to be mounted rests on the pillar node, preventing it from remaining in a centred position while the screws are fixed to ensure the connection, said connection being executed by disposing bolts that support shear

stresses, reducing the cost of installation on not requiring high-resistance screws and facilitating the execution of the connection.

[0013] This structural node is composed of beams and pillars of a certain type of profile for each case, which may adopt different dimensions in accordance with the pillars for the first or last floor and depending on the beam span.

[0014] The connection elements are assembled on the pillar and at the ends of the beam span and are composed of two differentiated elements which, on becoming joined, form the connecting node. These elements are serially manufactured at the factory's facilities and are transported ready to be installed onsite, being capable of easily forming the metallic structure of a new multi-storey car park and with faster execution timeframes than conventional timeframes. In addition, the steel structures are more manageable and lightweight compared to those of precast concrete, thereby reducing the necessary foundations for anchoring the pillars of the first floor of the building.

[0015] The pillars that form part of this node incorporate a pair of rosettes fixed thereabout and separated by a predetermined distance. Each of these rosettes includes, at least on each of the sides whereon a cross beam, a polygonal window and at least one circular hole are susceptibly fixed. Each of the beams that form a constituent part of one of these nodes has a C-shaped fork fixed to each of the edges of these beams, the flanges of which are separated therebetween at a distance equivalent to that which separates the rosettes of the pillars. Each of the flanges has a stub having a polygonal configuration that projects from the lower side having an equivalent configuration to the window of the rosettes and also at least one hole in correspondence with that of said rosettes.

[0016] Thus disposed the pillars and beams, a C-shaped fork of any beam fits it into a pair of rosettes of any pillar, introducing and coupling the stubs thereof in the windows existing therein; in such a manner that there is no sideways movement of the beam and the simple coupling between stubs and advantages enables the stable formation of the structure. Subsequently, upon assembling the structure of a floor, it is immobilised by means of screws which, passing through the holes in the rosettes and forks, establish the definitive connection therebetween.

[0017] A variant of embodiment of this node has been envisaged for those assemblies that require connection between two cross beams, joining the ends of one of the beams at an intermediate point of the other; in this case, there is a pair of rosettes fixed at different heights, separated by a predetermined distance, at the intermediate point of the beam and sides thereof. Each of these rosettes incorporates, at least on each side whereon a cross beam, a polygonal window and at least one circular hole are susceptibly fixed. This rosette perfectly emulates that disposed on the pillars, allowing the fixation thereon of a

second cross beam with respect thereto, which carries the node-forming rosettes, provided that it includes a C-shaped fork such as that described earlier.

[0018] The configuration chosen for the windows in the rosettes and for the stubs in the forks is respectively a rectangular cavity and cross-section, since a polygon is the simplest shape and that least susceptible to pitching or sideways movements of the beams, forming the connections at 90° or with the angle marked by these windows disposed on the rosette fixed to the pillar or to the ancillary beam.

[0019] Likewise, the holes in the rosettes and in each C-shaped fork are preferably two and are disposed respectively on the sides of the window and of the stubs, respectively, of the rosettes and fork, coupled therebetween during assembly and disposed in opposition in order to enable the insertion of a safety screw.

DESCRIPTION OF THE DRAWINGS

[0020] As a complement to the description being made and for the purpose of helping to make the characteristics of the invention more readily understandable, this specification is accompanied by a set of figures which, by way of illustration and not limitation, represent the following:

Figure 1 shows a perspective view of a node wherein a pillar (1) and three beams (2) coincide before being coupled therebetween;

Figure 2 shows a plan and sectional view along line A-A of a pillar (1);

Figure 3 shows an elevational and sectional view along line A-A of a beam (2);

Figures 4 and 5 show the node of figure 1, once formed and upon securing the connection by means of screws (6), respectively;

Figure 7 shows a perspective view of a connecting node, in this case between a main beam (2b) and two cross beams (2a-2c); and

Figures 8 and 9 show the node of figure 7, once formed and upon securing the connection by means of screws (6), respectively.

PREFERRED EMBODIMENT OF THE INVENTION

[0021] As can be observed in the referenced figures, on the one hand the node of the invention resolves the connection between a pillar (1) and a series of beams (2) or also between various beams (2), forming in both cases a fast and stable assembly node, susceptible of being immobilised a posteriori or being secured by means of screws (6).

[0022] Figure 1 shows the essential elements for forming this node. These elements are two rosettes (3) fixed perimetally to the pillar (1), which are fixed in a parallel position, separated by a pre-established distance, and a C-shaped fork (4) fixed to the edge of the beams (2), having a distance between their flanges equivalent to

that of the separation between the rosettes (3).

[0023] The rosettes (3) are welded to the pillar (1) in-factory. In the embodiment represented, the body of the rosette is flat and has a polygonal or circular configuration, whereto sections of the profile that forms the pillar (1) are welded on both sides until forming a pillar of the desired height which includes the rosettes (3) in the adequate position. On each of the sides of the pillar (1) (normally, normalised pillars having a quadrangular cross-section shall be used, although any other configuration would be feasible) each rosette (3) has an elongated window (31) and at least one hole (32). In figure 2, this window is rectangular and is accompanied by two lateral holes (32).

[0024] The C-shaped fork-like terminations (4) have corresponding parallel flanges that are separated by a standard distance equivalent to that of the separation of the rosettes (3). Each of these flanges has a stub projecting downwards, with a configuration equivalent to that of the windows (31) and corresponding holes (42) in correspondence with the holes (32) of the rosettes (3).

[0025] Figures 3 and 7 show the possibility of assembling this node between two beams: a pass-through beam (2b) which receives the confluence of another or other cross beams (2a-2b). In this case, the rosettes (5), similar to the rosettes (3) destined for fixing to the pillars (1), are fixed to the sides of a beam (2b) and have a window (51) and holes (52) equivalent to those existing in the rosettes (3) in terms of layout and configuration.

[0026] The assembly can be easily observed in figures 1, 5 and 6 in the case of a node between a pillar and a beam and in figures 7, 8 and 9 in the case that the connecting node is executed between two beams. In both cases the termination (4) of the beam is disposed with its two flanges on top of the rosettes (3 or 5), fitting the stubs (41) into the windows (31) or (51). Coupling the beam (2) by both ends is sufficient to form the structure of an entire floor. The installation of the fixing screws (6) can be performed a posteriori, i.e. before proceeding to assemble the next floor.

[0027] This system has the following advantages with respect to a current welded or screwed joint:

- Fast manufacture (machining of parts and cutting of beams and pillars) thanks to standardisation and serial manufacturing at the factory.
- Fast and secure assembly of the parts in-factory, with the possibility of controlling the optimum necessary conditions for correct welding.
- Easy onsite assembly and disassembly due to its screwed nature (detachable structure).
- Assembly without need to immediately prop or secure with screws due to the housing for embedding the parts, which also ensures greater accuracy in the alignment of the beams between pillars.
- Use of screws without pre-tensing on working with right angles, as opposed to those used in traditionally screwed cap plates, saving in execution time (there

is no need to apply tightening torque) and in cost of screws (it does not require HV high-resistance screws).

Claims

1. A connecting node for metallic structures, specifically for structures based on props or pillars (1) where-with cross beams (2) are associated, said connection node comprising a pillar (1) and beams (2) to be fixed to said pillar (1), wherein said pillar (1) includes rosettes (3) for fixing the beams (2), wherein said beams (2) include a fork (4) on the edges of their ends for fixing to the aforementioned rosettes (3), said rosettes (3) forming a pair of rosettes (3) fixed around the pillar (1) separated by a predetermined distance,

characterised in that:

- each of said rosettes (3) includes, at least on each side wherein a cross beam (2) is to be fixed, a polygonal window (31) providing a polygonal hole and at least one circular hole (32);
- each of said forks (4) being a C-shaped fork (4) fixed on each of the edges at the end of the beam (2), the flanges of said C-shaped fork (4) are separated therebetween by a distance equivalent to that which separates the rosettes (3), each of said flanges has a stub (41) having a cross-section with a polygonal configuration, wherein said stub (41) projects from the lower side and has a polygonal cross-sectional configuration equivalent to the window (31) of the rosettes (3) and at least one hole (42) in correspondence with the hole (32) of said rosettes;

the foregoing in anticipation that the C-shaped fork (4) of each beam (2) can be fitted into said pair of rosettes (3), introducing and coupling the stubs (41) of said fork (4) to the corresponding windows (31) of said pair of rosettes (3), without possibility of sideways movement of the beam (2), and that, upon assembling the structure, it can be immobilised by means of at least one screw (6) which, passing through a hole (42) of said fork (4) and the corresponding hole (32) of said rosette (3), establishes the definitive connection between the pair of rosettes (3) and the corresponding fork (4).

2. The connecting node for metallic structures, according to claim 1, specifically for the connection between beams (2) and for joining the ends of certain beams with intermediate points of others,

characterised in that it further comprises:

- at an intermediate point of one of said beams

(2), wherein the termination of a further beam (2a, 2c) will be fixed, a pair of rosettes (5) fixed at different heights separated by a predetermined distance, each of which incorporates, at least on each side wherein a cross beam (2) is to be fixed, a polygonal window (51) and at least one circular hole (52);

- a further beam (2a, 2c) having a C-shaped fork (4) fixed to each of the edges of the ends of said second beam (2a, 2c), the flanges of said C-shaped fork (4) are separated therebetween by a distance equivalent to that which separates the rosettes (5) at said intermediate point, each of said flanges has a stub (41) projecting towards the lower side having a cross-section with a polygonal configuration, equivalent to the window (51) of the rosettes (5) at said intermediate point and at least one hole (42) in correspondence with the hole (52) of said rosettes (5) at said intermediate point;

the foregoing in anticipation that a fork (4) can be fitted into said pair of rosettes (5) at said intermediate point, introducing and coupling the stubs (41) to the windows (31) thereof, without possibility of sideways movement of the beam (2) and that, upon assembling the structure, it can be immobilised by means of at least one screw (6) which, passing through the holes (52) and (42), establishes the definitive connection between the pair of rosettes (3) and the corresponding fork (4).

3. The connecting node for metallic structures, according to claim 1, **characterised in that** the windows (31-51) of said pair of rosettes on the pillar (1) and at said intermediate point of the beam (2) and said projecting stubs (41) of said forks (4) of said beams (2) and said further beam (2a, 2c) respectively have a rectangular hole and a rectangular cross-section.
4. The connecting node for metallic structures, according to claim 1, **characterised in that** the holes (32-52) in the rosettes (3-5) on the pillar (1) and at said intermediate point of the beam (2) and the holes (42) located on each C-shaped fork (4) of said beams (2) and said further beam (2a, 2c) are two and are located on opposite sides of respectively the window (31) and the stubs (41).

Patentansprüche

1. Verbindungsknoten für metallische Strukturen, insbesondere für Strukturen auf der Grundlage von Stützen oder Säulen (1), denen Querträger (2) zugeordnet sind, wobei der Verbindungsknoten eine Säule (1) und an der Säule (1) zu befestigende Träger (2) umfasst,

wobei die Säule (1) Rosetten (3) zum Befestigen der Träger (2) einschließt,

wobei die Träger (2) an den Kanten ihrer Enden eine Gabel (4) zum Befestigen an den vorgenannten Rosetten (3) einschließen, wobei die Rosetten (3) ein Paar von Rosetten (3) bilden, die um die Säule (1) herum durch einen vorgegebenen Abstand voneinander getrennt befestigt sind,

dadurch gekennzeichnet, dass:

- jede der Rosetten (3) zumindest an jeder Seite, an der ein Querträger (2) befestigt werden soll, ein vieleckiges Fenster (31) einschließt, das ein vieleckiges Loch und zumindest ein kreisförmiges Loch (32) bereitstellt;

- jede der Gabeln (4) eine C-förmige Gabel (4) ist, die an jeder der Kanten am Ende des Trägers (2) befestigt ist, wobei die Flansche der C-förmigen Gabel (4) durch einen zwischen ihnen liegenden Abstand getrennt sind, der dem entspricht, durch den die Rosetten (3) getrennt sind, wobei jeder der Flansche einen Zapfen (41) aufweist, der einen Querschnitt mit einer vieleckigen Konfiguration aufweist, wobei der Zapfen (41) von der Unterseite vorsteht und eine vieleckige Querschnittskonfiguration, die dem Fenster (31) der Rosetten (3) entspricht, und mindestens ein dem Loch (32) der Rosetten entsprechendes Loch (42) aufweist;

durch Vorstehendes wird erwartet, dass die C-förmige Gabel (4) jedes Trägers (2) in das Rosettenpaar (3) eingepasst werden kann, wodurch die Zapfen (41) der Gabel (4) ohne die Möglichkeit einer Seitwärtsbewegung des Trägers (2) in die entsprechenden Fenster (31) des Rosettenpaares (3) eingeführt und mit diesen verbunden werden, und dass nach dem Zusammenbauen der Struktur diese mittels mindestens einer Schraube (6) immobilisiert werden kann, die durch ein Loch (42) der Gabel (4) und das entsprechende Loch (32) der Rosette (3) verläuft und die endgültige Verbindung zwischen dem Rosettenpaar (3) und der entsprechenden Gabel (4) herstellt.

2. Verbindungsknoten für metallische Strukturen nach Anspruch 1, insbesondere zur Verbindung zwischen Trägern (2) und zum Verbinden der Enden bestimmter Träger mit Zwischenpunkten anderer,

dadurch gekennzeichnet, dass er ferner umfasst:

- an einem Zwischenpunkt eines der Träger (2), an dem das Ende eines weiteren Trägers (2a, 2c) befestigt wird, ein Paar von in unterschiedlichen Höhen befestigten Rosetten (5), die durch einen vorgegebenen Abstand getrennt sind, von denen jede zumindest an jeder Seite, an der ein Querträger (2) befestigt werden soll, ein viele-

ckiges Fenster (51) und zumindest ein kreisförmiges Loch (52) beinhaltet;

- einen weiteren Träger (2a, 2c), der eine C-förmige Gabel (4) aufweist, die an jedem der Kanten der Enden des zweiten Trägers (2a, 2c) befestigt ist, wobei die Flansche der C-förmigen Gabel (4) durch einen zwischen ihnen liegenden Abstand getrennt sind, der dem entspricht, durch den die Rosetten (5) am Zwischenpunkt getrennt sind, wobei jeder der Flansche einen Zapfen (41) aufweist, der in Richtung der Unterseite vorsteht und einen Querschnitt mit einer vieleckigen Konfiguration, die dem Fenster (51) der Rosetten (5) am Zwischenpunkt entspricht, und mindestens ein dem Loch (52) der Rosetten (5) am Zwischenpunkt entsprechendes Loch (42) aufweist;

durch Vorstehendes wird erwartet, dass eine Gabel (4) an jedem Zwischenpunkt in das Rosettenpaar (5) eingepasst werden kann, wodurch die Zapfen (41) in dessen Fenster (31) ohne die Möglichkeit einer Seitwärtsbewegung des Trägers (2) eingeführt und mit diesen verbunden werden, und dass nach dem Zusammenbauen der Struktur diese mittels mindestens einer Schraube (6) immobilisiert werden kann, die durch die Löcher (52) und (42) verläuft und die endgültige Verbindung zwischen dem Rosettenpaar (3) und der entsprechenden Gabel (4) herstellt.

3. Verbindungsknoten für Metallstrukturen nach Anspruch 1, **dadurch gekennzeichnet, dass** die Fenster (31 bis 51) des Rosettenpaares an der Säule (1) und am Zwischenpunkt des Trägers (2) und die vorstehenden Zapfen (41) der Gabeln (4) der Träger (2) und des weiteren Trägers (2a, 2c) jeweils ein rechteckiges Loch und einen rechteckigen Querschnitt aufweisen.
4. Verbindungsknoten für Metallstrukturen nach Anspruch 1, **dadurch gekennzeichnet, dass** die Löcher (32 bis 52) in den Rosetten (3 bis 5) an der Säule (1) und am Zwischenpunkt des Trägers (2) und die Löcher (42), die sich an jeder C-förmigen Gabel (4) der Träger (2) und des weiteren Trägers (2a, 2c) befinden, zwei sind und sich an gegenüberliegenden Seiten des Fensters (31) bzw. der Zapfen (41) befinden.

Revendications

1. Nœud de connexion pour structures métalliques, spécifiquement pour des structures basées sur des étais ou des piliers (1) auxquelles sont associées des poutres transversales (2), ledit nœud de connexion comprenant un pilier (1) et des poutres (2) à fixer audit pilier (1),

dans lequel ledit pilier (1) inclut des rosettes (3) pour fixation des poutres (2),

dans lequel lesdites poutres (2) incluent une fourche (4) sur les bords de leurs extrémités pour fixation aux rosettes susmentionnées (3), lesdites rosettes (3) formant une paire de rosettes (3) fixées autour du pilier (1) séparées par une distance prédéterminée,

caractérisé en ce que :

- chacune desdites rosettes (3) inclut, au moins sur chaque côté dans lequel une poutre transversale (2) doit être fixée, une fenêtre polygonale (31) fournissant un trou polygonal et au moins un trou circulaire (32) ;
- chacune desdites fourches (4) étant une fourche en forme de C (4) fixée sur chacun des bords à l'extrémité de la poutre (2), les rebords de ladite fourche en forme de C (4) sont séparés entre eux par une distance équivalente à celle qui sépare les rosettes (3), chacun desdits rebords a un tronçon (41) ayant une section transversale avec une configuration polygonale, dans lequel ledit tronçon (41) fait saillie à partir du côté inférieur et a une configuration en coupe polygonale équivalente à la fenêtre (31) des rosettes (3) et au moins un trou (42) en correspondance avec le trou (32) desdites rosettes ;

ce qui précède en prévision du fait que la fourche en forme de C (4) de chaque poutre (2) peut être montée dans ladite paire de rosettes (3), introduisant et accouplant les tronçons (41) de ladite fourche (4) aux fenêtres correspondantes (31) de ladite paire de rosettes (3), sans possibilité de mouvement latéral de la poutre (2), et que, lors de l'assemblage de la structure, elle peut être immobilisée au moyen d'au moins une vis (6) qui, passant à travers un trou (42) de ladite fourche (4) et le trou correspondant (32) de ladite rosette (3), établit la connexion définitive entre la paire de rosettes (3) et la fourche correspondante (4).

2. Nœud de connexion pour structures métalliques, selon la revendication 1, spécifiquement pour la connexion entre des poutres (2) et pour joindre les extrémités de certaines poutres à des points intermédiaires d'autres,

caractérisé en ce qu'il comprend en outre :

- au niveau d'un point intermédiaire d'une desdites poutres (2), dans lequel la terminaison d'une poutre supplémentaire (2a, 2c) sera fixée, une paire de rosettes (5) fixée à des hauteurs différentes séparées par une distance prédéterminée, dont chacune comprend, au moins sur chaque côté dans lequel une poutre transversale (2) doit être fixée, une fenêtre polygonale (51)

et au moins un trou circulaire (52) ;
 - une poutre supplémentaire (2a, 2c) ayant une fourche en forme de C (4) fixée à chacun des bords des extrémités de ladite deuxième poutre (2a, 2c), les rebords de ladite fourche en forme de C (4) sont séparés entre eux par une distance équivalente à celle qui sépare les rosettes (5) au niveau dudit point intermédiaire, chacun desdits rebords a un tronçon (41) faisant saillie en direction du côté inférieur ayant une section transversale avec une configuration polygonale, équivalente à la fenêtre (51) des rosettes (5) au niveau dudit point intermédiaire et au moins un trou (42) en correspondance avec le trou (52) desdites rosettes (5) au niveau dudit point intermédiaire ;

ce qui précède en prévision du fait qu'une fourche (4) peut être montée dans ladite paire de rosettes (5) au niveau dudit point intermédiaire, introduisant et accouplant les tronçons (41) aux fenêtres (31) de ceux-ci, sans possibilité de mouvement latéral de la poutre (2) et que, lors d'un assemblage de la structure, elle peut être immobilisée au moyen d'au moins une vis (6) qui, passant à travers les trous (52) et (42), établit la connexion définitive entre la paire de rosettes (3) et la fourche correspondante (4).

3. Nœud de connexion pour structures métalliques, selon la revendication 1, **caractérisé en ce que** les fenêtres (31-51) de ladite paire de rosettes sur le pilier (1) et au niveau dudit point intermédiaire de la poutre (2) et lesdits tronçons faisant saillie (41) desdites fourches (4) desdites poutres (2) et de ladite poutre supplémentaire (2a, 2c) respectivement ont un trou rectangulaire et une coupe transversale rectangulaire.
4. Nœud de connexion pour structures métalliques, selon la revendication 1, **caractérisé en ce que** les trous (32-52) dans les rosettes (3-5) sur le pilier (1) et au niveau dudit point intermédiaire de la poutre (2) et les trous (42) situés sur chaque fourche en forme de C (4) desdites poutres (2) et de ladite poutre supplémentaire (2a, 2c) sont au nombre de deux et sont situés sur des côtés opposés respectivement de la fenêtre (31) et des tronçons (41).

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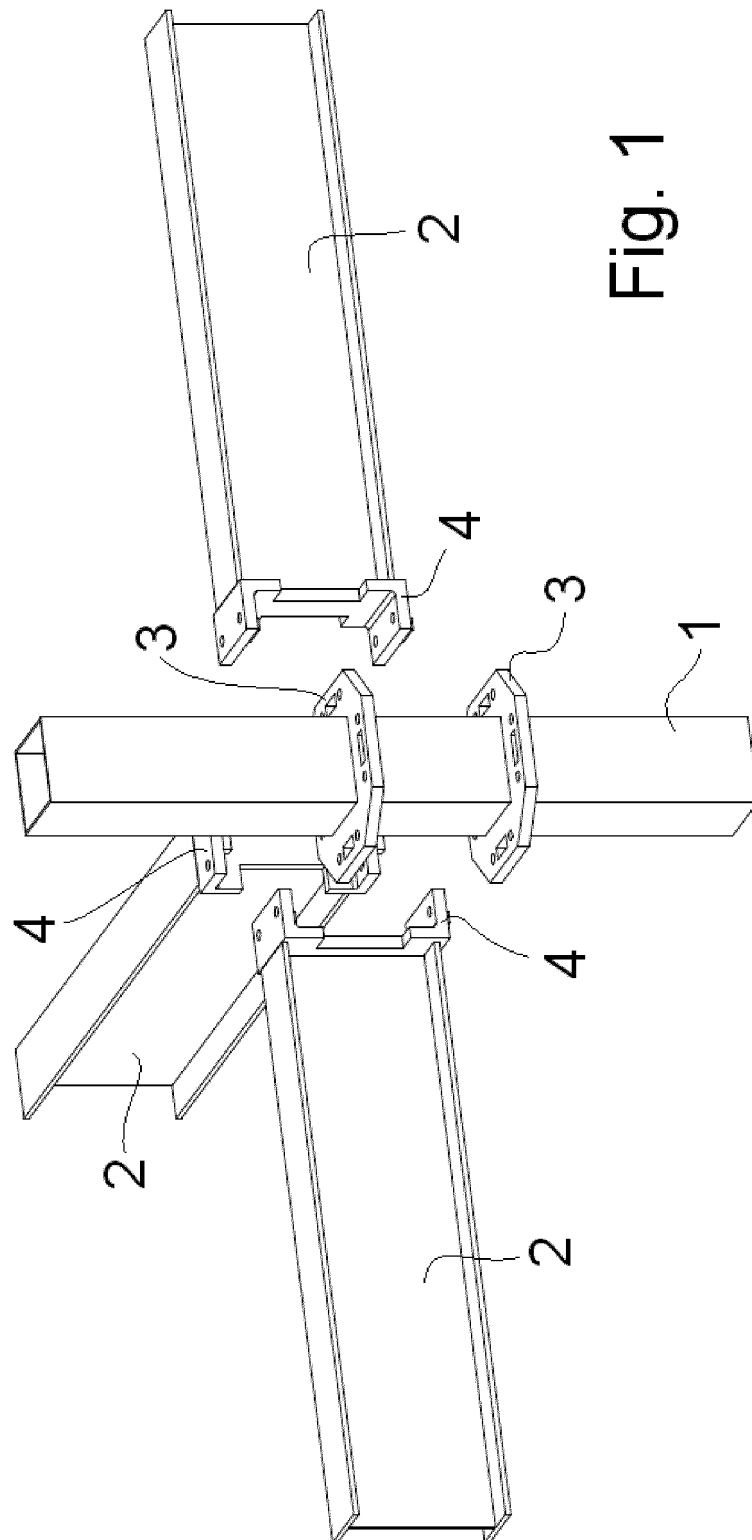


Fig. 1

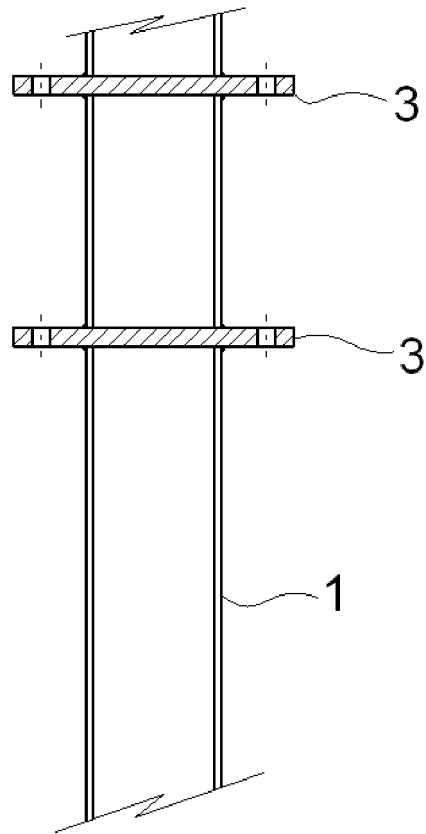
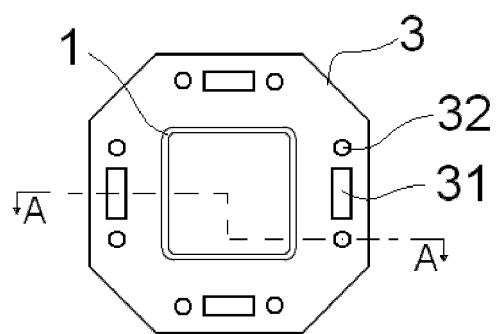


Fig. 2



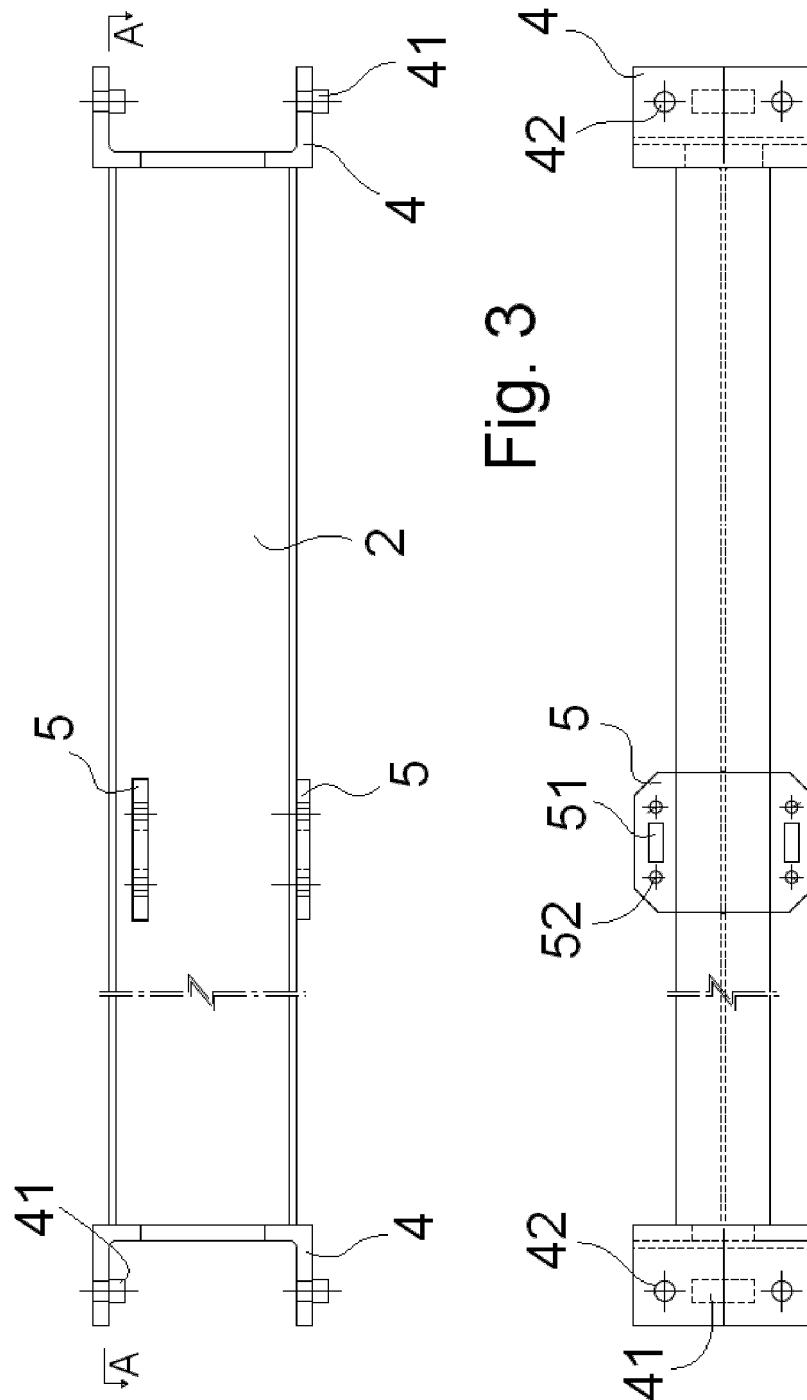


Fig. 3

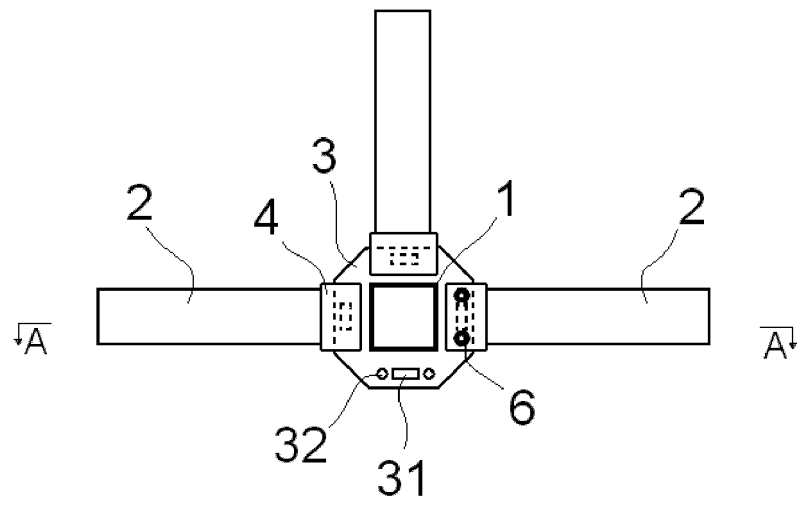


Fig. 4

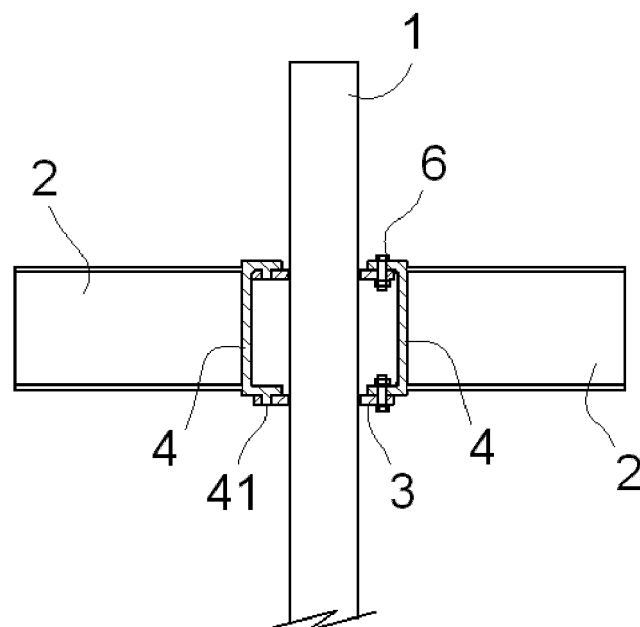


Fig. 5

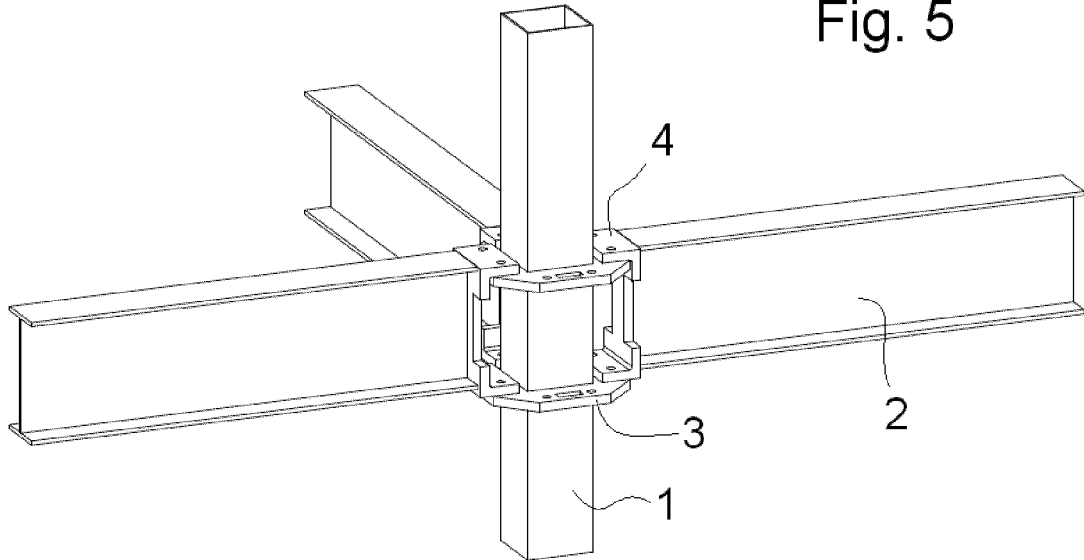
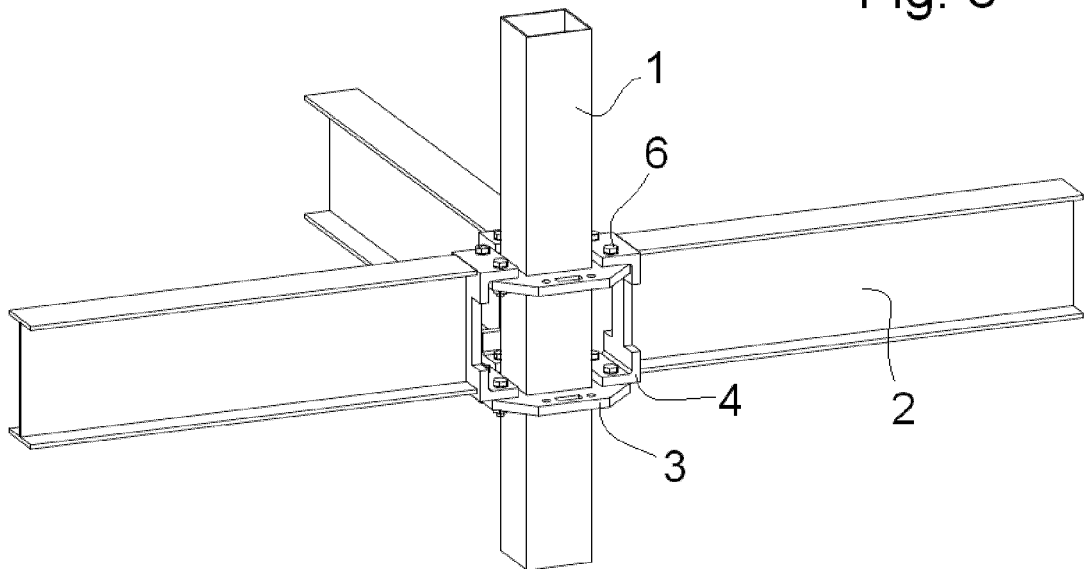


Fig. 6



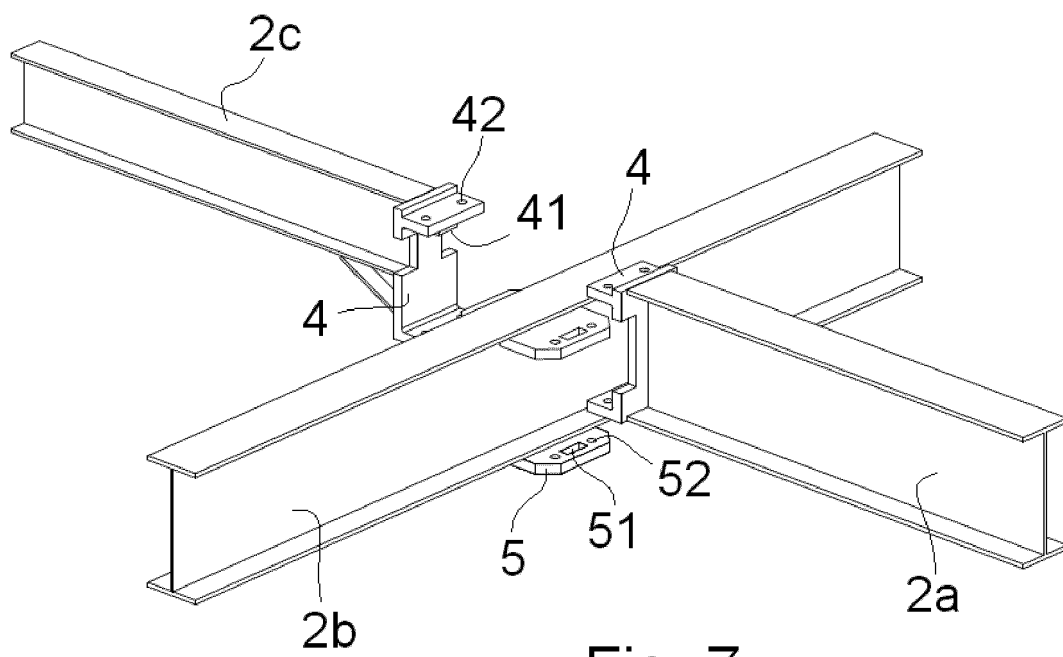


Fig. 7

Fig. 8

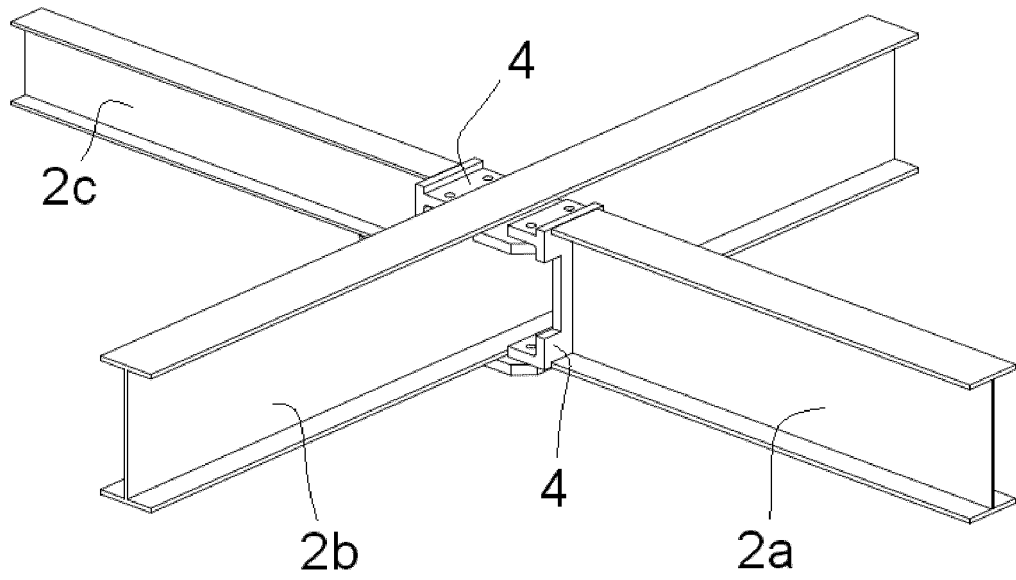
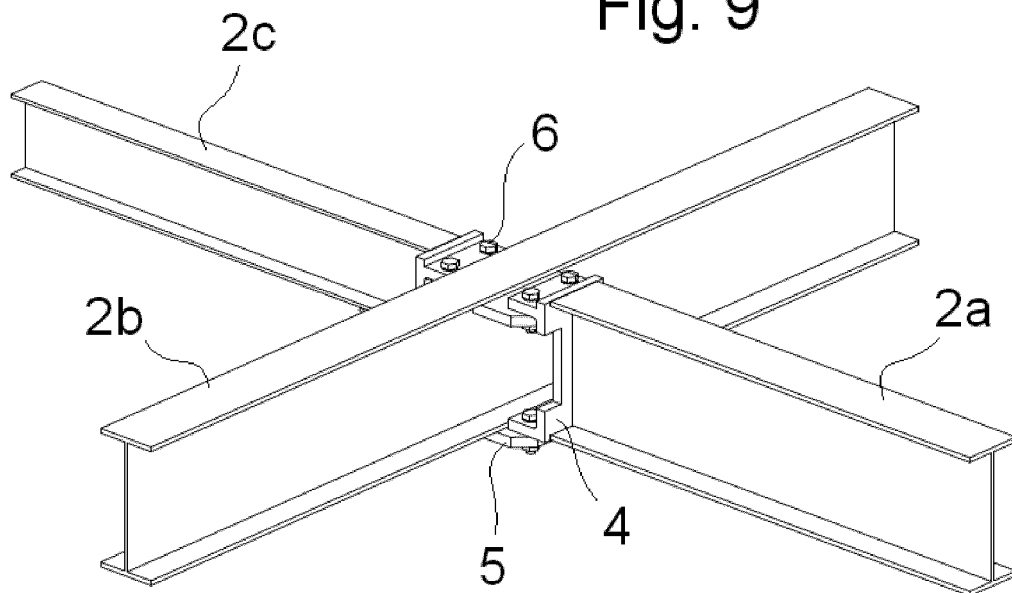


Fig. 9



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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