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(54) **Modular structure for metal shelving or the like**

Modulare Struktur für Metallregale oder dergleichen

Structure modulaire pour des étagères en métal ou similaire

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Description

[0001] The present invention relates to modular metal lattice structures which can be employed in the realisation of shelves or raised floors both for commercial and industrial uses.

[0002] More specifically, the invention refers to metal structures comprising vertical sides connected to each other by horizontal stringers bearing, at preset heights, a plurality of support elements such as, for instance, shelves, floors or the like. Appropriate removable latching systems arranged along the vertical sides and at the ends of the stringers allow to construct, with great ease, structures according to the different extension requirements, both longitudinal and transverse and they also allow freely to set the support elements at the desired heights.

[0003] The lattices thus constructed are very rugged and they are used not only to assemble small shelving for storing goods or simple raised floors inside loft buildings, but also to build capacious self-supporting warehouses wherein the lattice structure supports, in addition to the goods which are placed thereon also the side walls and the roofing on top of the warehouse itself.

[0004] In the prior art, modular structures of this kind are known, comprising welded or bolted sides, obtained with two identical uprights made with steel section bars connected to each other by braces and crosspieces, whereto are latched horizontal stringers. The crosspieces and the braces are securely connected to the uprights to form the sides whereto the stringers are attached by means of brackets appropriately counter shaped with respect to a portion of the upright. This solution allows to preassemble the sides in the factory and it facilitates the subsequent assembly of the remaining elements on site.

[0005] The distance that separates two sides determines, in the case of shelves, the maximum width of the spaces accessible for goods storage. Such width coincides with the length of the stringers used to connect the sides.

[0006] When particularly long stringers need to be used, for instance to increase the transverse dimensions of the support surfaces, the problem arises of obtaining a connection between the ends of the stringers and the sides that is extremely rigid and strong, able to resist even the most extreme stresses due, for instance, to the weight of the goods placed on the support elements or to the shocks brought about by the often coarse use of the lift trucks employed to handle such goods. Specifically the connection must not weaken the uprights or excessively increase the construction cost of the structure as a whole.

[0007] In the prior art, the technique is known of fastening the brackets to the upright by means of a row of latching tongues, arranged vertically along the bracket, which are inserted in corresponding rectangular slots obtained on the uprights.

[0008] The cross section of such prior art brackets is shaped essentially as a letter "L", in order to bear on the upright on two of its sides.

[0009] The technique is known of improving the rigidity of the connection by employing brackets whose section is shaped essentially as a squared "J", as shown for instance in the Belgian patent BE 634.769A, where both free ends of the brackets present latching tongues. This solution, while improving the transverse rigidity of the brackets, does not however solve the drawback, also shown by "L" shaped brackets, of deforming plastically over time, as an effect of stresses on the crosspieces that exceed the limits set by the designer. Moreover it has also been noted that in the shelves built according to the prior art the deformations undergone by the brackets often extend to the uprights as well, thus making unstable not only the shelf directly involved in the extraordinary event that caused the stress, but also that part of the lattice that bears on the damaged upright. Subsequent maintenance operations, aimed at restoring the initial characteristics of the structure, require the replacement of the uprights. This operation forces to clear out at least part of the goods stored on the shelves and thus it is particularly onerous.

[0010] To overcome this structure rigidity problem, the technique is known in the prior art of increasing the thickness of the material used or of using taller brackets fitted with a greater number of tongues in order to distribute the load on a greater surface of the uprights. The first solution presents the drawback of being costly, whilst accomplishing the second one requires extending the brackets to make room for the additional tongues, thereby limiting, however, the minimum distance whereat two overlaid stringers can be positioned (which is at least equal to the height of the brackets). Connecting stringers to brackets whose sizes are excessively dissimilar (the height of the stringer profile with respect to the height of the bracket), however, also creates local stability problems and requires particular expedients to strengthen the bracket in order to distribute the load of the stringers evenly on the whole vertical surface of the brackets. Moreover, handling long stringers at whose ends are perpendicularly welded long brackets is more difficult and it increases the probability of bending the brackets, before assembly, through accidental shocks due to lack of proper care by personnel assigned to perform the assembly or responsible for the transport. If a bracket is bent even slightly, load distribution over the tongues may no longer take place evenly, as provided for by the designer, but only a part thereof may bear correctly on the edge of the slots of the upright. In this way the load is increased on each of the tongues which have not been deformed, whilst deformed ones do not contribute to transmitting the forces. It is evident that this condition not only favours the deformation of the tongues in action but also noticeably reduces the safety of the structure.

[0011] The solution that entails solely increasing the

number of tongues present on each bracket is therefore too onerous with respect to the advantages obtainable.

[0012] The German patent application DE 1.288.266 lastly shows an alternative solution wherein the uprights present a groove obtained frontally and having a section shaped essentially as a "U" in whose bottom are obtained the slots wherein the corresponding tongues present on the brackets are inserted. The front wall of the uprights also presents a plurality of rectangular holes able to house hooks obtained on the brackets. In this case as well the brackets thus present two rows of elements for connection to the uprights which allow to limit the length of the bracket while increasing the number of tongues. The upright thus presents a series of large frontal openings which greatly weaken its structure.

[0013] This solution too thus does not allow to eliminate the deformations to the uprights due to overloads of the structure caused, for instance, by lack of skill on the part of the personnel. Note that such deformations are very dangerous because possible structural collapses of the upright may remain invisible being partly obscured by the brackets which encompass the uprights almost entirely.

[0014] Object of the present invention therefore is to eliminate the drawbacks of the prior art mentioned above.

[0015] The invention, as it is characterised by the claims that follow, solves the problem of providing a modular structure for metal shelves or the like that is extremely strong and stable and can be constructed in a rational and economical manner.

[0016] An additional object is to prevent possible plastic deformations undergone by the brackets, caused for instance by anomalous overstresses to the structure, from giving rise to structural damages to the uprights.

[0017] A further object of the present invention is to provide for the construction of structures wherein the connection of the stringers to the uprights employs extremely compact and resilient brackets which allow to construct ample raised floors or ample load bearing structures.

[0018] Moreover, an object of the invention is to reduce the costs of modular structures thanks to the use of uprights presenting a cross section that is extremely easy to realise.

[0019] From a constructive standpoint the modular structure for metal shelves or the like, constituting the subject of the present invention, is characterised in the use of stringers having brackets with squared "J" cross section and presenting two rows of tongues set side by side which are inserted respectively, into a row of slots obtained on the bottom of a groove of the upright and into a row of pockets open upwards positioned on the sides of the uprights. Between the brackets and the uprights are positioned additional couplings able to stiffen their mutual connection in order to prevent the relative rotation between the bracket and the upright as an effect

of the stresses transmitted to the bracket. Specifically they are small protuberances positioned frontally on the uprights and able to interact with corresponding openings obtained on the brackets.

[0020] Thanks to this particular realisation it is thus possible to obtain an extremely simple and economical modular structure, which absolves in a safe and very compact manner the task of supporting even very heavy loads. Moreover, in case of over stresses, the plastic deformations endured are limited to the brackets, which are easily replaced, and do not involve the uprights.

[0021] Additional advantages and characteristics of the present invention shall be made clearer in the detailed description that follows, made with reference to the accompanying drawings, which show an embodiment provided purely by way of non limiting example, wherein:

Figure 1 shows a perspective view of a modular structure constructed according to the present invention;

Figure 2 shows a front view of the upright whereto a bracket is associated;

Figure 3 shows a cross section made through the upright and the bracket as per Figure 2;

Figure 4 shows a front view of a bracket;

Figure 5 shows a side view of the bracket as per Figure 4;

Figure 6 shows a top view of the bracket as per Figure 4.

[0022] With reference to the figures of the accompanying drawings, the number 1 indicates a modular structure usable for the construction of base lattices which can be employed for building shelves, raised floors or the like.

[0023] The modular structure 1 comprises a plurality of vertical sides 2 connected to each other by horizontal stringers 3. Each of the sides 2 essentially comprises a pair of uprights 4 connected to each other by crosspieces 5.

[0024] Each upright 4 presents, as can be clearly seen in Figure 3, a symmetrical section comprising a front wall 6 wherefrom two substantially plane side walls 7 depart. The front wall 6 presents a central groove 8 shaped substantially in the manner of a "U" which comprises, in particular, two short side walls 10 and a bottom wall 9 within which are obtained two rows of first slots 11 which are distributed, at uniform intervals, along the entire height of the upright 4.

[0025] Each of the two side walls 7 presents pocket projections 12, open upwards, which develop parallel to the axis of the upright 4. Such pockets 12 are obtained by means of two short horizontal cuts overlaid with local deformation of the metal of the upright 4, in order to limit the weakening of the section. Note that in this way no material is removed and thus there are no scraps, to the advantage of the rigidity of the upright 4.

[0026] The first slots 11 are accessible frontally, i.e. from the front of the upright 4.

[0027] The modular structure 4 further comprises brackets 14 (see Figures 4, 5 and 6) whose section is shaped in the manner of a squared "J" and which are formed by two opposite walls, respectively a short one 15 and a long one 16 joined together by a central junction wall 18. Each bracket 14 presents first latching tongues 19 positioned on the short wall 15 and second latching tongues 20 obtained on the long wall 16. The first tongues 19 are shaped substantially in the manner of a hook oriented downwards, as can clearly be seen in Figure 5. The second tongues 20 essentially comprise narrow strips of metal facing downwards, of an essentially rectangular shape, with rounded edges to facilitate insertion into the pockets 12.

[0028] The two opposite walls 15, 16 are slightly spread apart from each other to ease assembly and to ensure perfect contact between the inner surface of the bracket 14 and the outer surface of the upright 4 which also presents a similar angle.

[0029] Each of the uprights 4 presents two rows of rounded protuberances 21, obtained on the front wall 6, which, if seen from the side, have the shape of a knee. They are obtained by means of two small cuts, vertical and parallel to each other with subsequent local deformation of the metal of the upright 4. As has already been seen for the pocket projections 12 in this case as well the rigidity of the upright 4 is practically not affected and the structural weakening endured by the upright 4 is minimal.

[0030] The bracket 14 presents instead a series of parallelogram shaped openings 22 able to house the rounded protuberances 21.

[0031] The coupling that is obtained in this manner allows to transmit forces acting in the plane of the central junction wall 18 and due to the rotation of the brackets with respect to the upright 4. This rotation-impeding coupling does not, instead, allow to transmit forces that exit the plane of the central wall 18. Essentially it is possible to transmit solely side forces due, for instance, to the bending moment generated by the load on the stringers 3. By appropriately modifying the shape of the knee projections 21, for example by squaring the rounded knee shape, it is obviously possible to transmit not only side forces but also vertical forces such as, for instance, the weight force, thus coming to the aid of the first and second tongues 19 and 20.

[0032] The presence of this rotation-impeding coupling is of fundamental importance because in its absence the brackets 14 would tend to open, i.e. spreading apart the two walls 15 and 16 opposite to each other, due to flexing by the stringers whereto they are rigidly connected.

[0033] To make the bracket 14 adhere correctly to the uprights 4 it is possible to tilt the openings 22 slightly, as can be clearly seen in Figure 4, in such a way as to generate a slight lateral translation of the bracket 14 towards

the axis of the upright 4 during insertion of the bracket 14. In this way the long side wall 16 of the bracket 14 is tightly pressed against the vertical side 7 of the upright 4 and it is thus possible to exploit also the action of the force of friction thereby generated.

[0034] Assembly is obtained by inserting the brackets 14 frontally into the upright 4 in such a way that the first latching tongues 19 position themselves in front of the slots 11 and that the second latching tongues 19 are positioned directly above the side pocket projections 12. In this position also the protuberances 21 are set in front of the openings 22. The operator therefore has to perform no auxiliary operation to centre the openings 22 or the pocket openings 12, since they are automatically centred by virtue of the greater length of the first tongues 19 with respect to the height of the protuberances 21. The first tongues 19 are inserted first into the respective slots 11 and from this moment on they autonomously guide the subsequent insertion phase of the second tongues 20 into the pockets 12.

[0035] The bracket 14 mounted on the upright 4 is shown in Figure 2 and 3.

[0036] Note in particular that the bearing surface of the bracket 14 is perfectly counter-shaped with respect to the outer surface of the upright 4.

[0037] The vertical section of the knee protuberances 21 is rounded and it presents no sharp edges, to make easier a possible subsequent disassembly of the brackets 14.

[0038] The presence of the second latching tongues 20 allows greatly to limit the height of the bracket 14 since the tongues transmit part of the loads generated by the forces imparted on the stringers 3. Moreover, since the bracket 14 encompasses the upright 4 on three sides and two of these are securely fastened to the upright by the first and second tongues 19, 20 inserted in the respective housings, the coupling is extremely effective, strong and able greatly to limit also the possibility of relative rotation between the bracket 14 and the upright 4.

[0039] The coupling between the protuberances 21 and the openings 22 needs a minimum side play not to exceed what is indispensable to guarantee the assembly of the brackets 14. An excessive play could vanish the rotation-impeding function, or at least limit its effectiveness since in this case the deformation endured by the bracket 14 before the side edge of the protuberance 21 bears against the side edge of the opening 22, could become plastic, i.e. irreversible. The correct operation of such coupling is thus obtained only if the deformation which may be required to make it function in all its effectiveness (which is had when at least a good part of the side edge of the protuberance bears on the edge of the opening) is limited to being a slight elastic, i.e. reversible, deformation.

[0040] The upright 4 and the brackets 14 thus shaped are extremely simple and economical to produce, do not require special tooling for their manufacture and are also

quite resilient to shocks whereto the components of the modular structure 1 are subjected during the transport or assembly phases. Moreover the frontal accessibility of the slots allows to assemble the crosspieces in the usual ways i.e. inserting the brackets onto the uprights 5 latching them from the front by means of a simple translation movement of the stringers, without requiring any additional auxiliary rotation movement or the like.

[0041] Compared to the uprights of the prior art, the uprights present only few openings and their structure is thus stronger than that of the brackets applied thereto. In this way any over stresses transmitted by the horizontal stringers lead to the plastic deformation of the brackets, but leave the uprights unaltered.

[0042] The times required to assemble the structure constructed according to the present invention are shorter than those necessary to mount the modular structures of the prior art since the side walls of the bracket, spread slightly apart, facilitate the insertion of the bracket onto the upright. For this same reason also the second tongues present the front edge (i.e. the one oriented towards the front wall of the upright) slightly inclined so as to enter without force into the side pocket projections.

[0043] The structure thus realised therefore allows to reach the proposed objects in an extremely simple and economical way.

[0044] Obviously the invention can be subject to numerous other practical and applicative modifications of the constructive details, without thereby departing from the scope of the inventive idea claimed below.

Claims

1. Modular structure for metal shelves or the like, comprising:

- at least one upright (4) essentially vertical presenting a front wall (6) wherefrom two side walls (7) depart, within said front wall (6) being obtained a longitudinal groove (8) on whose bottom is positioned a plurality of slots (11) spaced and aligned to each other;
- at least one bracket (14) presenting a bearing surface that is counter shaped with respect to a portion of the outer surface of the upright (4), presenting first latching tongues (19) able to insert into said slots (11) of said front wall (6), to couple removably the bracket (14) to said upright (4);

characterised in that said side walls (7) present a plurality of pocket projections (12), open upwards, spaced and aligned to each other, able to house second latching tongues (20) positioned on the brackets (14).

2. Modular structure according to claim 1, **characterised in that** said front wall (6) further presents a plurality of protuberances (21), spaced and aligned to each other, able to be inserted into openings (22) obtained on the brackets (14) to prevent rotation movements of the bracket (14) in the plane of the front wall (6).

3. Modular structure according to claim 2, **characterised in that** said protuberances (21) essentially comprise a small deformation shaped as a knee, obtained on the front wall (6) of the uprights (4).

4. Modular structure according to claim 3, **characterised in that** said openings (22) obtained on the brackets (14) have a parallelogram shape with the longer axis set essentially according to the longitudinal axis of the bracket (14).

5. Modular structure according to claim 1, **characterised in that** the cross section of the bracket (14) is shaped in the manner of a squared "J" to enclose the upright (4) along three sides.

6. Modular structure according to claim 5, **characterised in that** the bracket (14) presents two opposite walls, respectively a short one (15) and a long one (16), which are spread slightly apart from each other.

7. Modular structure according to claim 6, **characterised in that** said first latching tongues (19) are obtained on the short wall (15) and said second latching tongues (20) are obtained on the long wall (16).

8. Modular structure according to claim 3, **characterised in that** said openings (22) obtained on the brackets (14) have parallelogram shape with the longer axis set slightly inclined with respect to the longitudinal axis of the bracket (14).

9. Modular structure according to claim 3, **characterised in that** the pocket projections (12) and the protuberances (21) of the upright (4) are obtained by means of local cuts and deformation without removing any material.

Patentansprüche

1. Modulare Struktur für Metallregale oder dergleichen, enthaltend:

- wenigstens einen im wesentlichen vertikalen Ständer (4), der eine Frontfläche (6) aufweist, von welcher aus sich zwei Seitenflächen (7) erstrecken, wobei in die genannte Frontfläche eine Rinne (8) eingearbeitet ist, an deren unteren

rem Teil in einem Abstand voneinander und zueinander ausgerichtet eine Anzahl von Schlitz-
zen (11) angeordnet sind;

- wenigstens einen Bügel (14), eine Trägerfläche aufweisend, die entsprechend zu einem Abschnitt der äusseren Oberfläche des Ständers (4) gegengeformt ist, und erste Einrastungen (19) aufweisend, in der Lage, in die genannten Schlitz-
ze (11) der genannten Frontfläche (6) eingeschoben zu werden, um den Bügel (14) lösbar mit dem genannten Ständer (4) zu verbinden;

dadurch gekennzeichnet, dass die genannten Seitenflächen (7) oben offene Aufnahmever-
sprünge (12) aufweisen, in einem Abstand voneinander angeordnet und zueinander ausgerichtet und in der Lage, zweite, an den Bügeln (14) angeordnete Ein-
rastungen (20) aufzunehmen.

2. Modulare Struktur nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die genannte Frontfläche (6) ausserdem eine Anzahl von Ausstülpungen (21) aufweist, in einem Abstand voneinander angeordnet und zueinander ausgerichtet und in der Lage, in Öffnungen (22) eingeschoben zu werden, die an den Bügeln (14) vorhanden sind, um Drehbewegungen der Bügel (14) auf der Ebene der Frontfläche (6) zu verhindern.

3. Modulare Struktur nach Patentanspruch 2, **dadurch gekennzeichnet, dass** die genannten Ausstülpungen (21) im wesentlichen eine kleine, als Knie ausgebildete Verformung enthalten, die an der Frontfläche (6) der Ständer (4) erhalten ist.

4. Modulare Struktur nach Patentanspruch 3, **dadurch gekennzeichnet, dass** die genannten, an den Bügeln (14) erhaltenen Öffnungen (22) die Form eines Parallelogramms haben, und zwar mit der längeren Achse im wesentlichen übereinstimmend zu der Längsachse des Bügels (14) ausgerichtet.

5. Modulare Struktur nach Patentanspruch 1, **dadurch gekennzeichnet, dass** der Querschnitt des Bügels (14) in Form eines quadratischen "J" ausgebildet ist, um den Ständer (4) entlang von drei Seiten einzuschliessen.

6. Modulare Struktur nach Patentanspruch 5, **dadurch gekennzeichnet, dass** der Bügel (14) zwei sich gegenüberliegende Wände aufweist, jeweils eine kurze (15) und eine lange (16), welche leicht voneinander abgespreizt sind.

7. Modulare Struktur nach Patentanspruch 6, **dadurch gekennzeichnet, dass** die genannten er-

sten Einrastungen (19) an der kurzen Wand (15) und die genannten zweiten Einrastungen (20) an der langen Wand (16) erhalten sind.

8. Modulare Struktur nach Patentanspruch 3, **dadurch gekennzeichnet, dass** die genannten, an den Bügeln (14) erhaltenen Öffnungen (22) die Form eines Parallelogramms haben, und zwar mit der längeren Achse leicht geneigt im Verhältnis zu der Längsachse des Bügels (14).

9. Modulare Struktur nach Patentanspruch 3, **dadurch gekennzeichnet, dass** die Aufnahmever-
sprünge (12) und die Ausstülpungen (21) des Ständers (4) mit Hilfe von lokalen Schnitten und Verformungen erhalten sind, ohne irgendwelches Material abzutragen.

20 Revendications

1. Une structure modulaire pour des étagères en métal ou similaire, comprenant:

- au moins un montant (4) essentiellement vertical présentant une paroi frontale (6) de laquelle partent deux parois latérales (7), et dans laquelle est formée une rainure longitudinale (8) sur la base de laquelle sont positionnées une pluralité de fentes (11) espacées et alignées entre elles;
- au moins un tasseau (14) présentant une surface de support contre-formée par rapport à une portion de la surface externe du montant (4), présentant une première languette de verrouillage (19) pouvant s'insérer dans ladite fente (11) de ladite paroi frontale (6), pour accoupler de manière amovible le tasseau (14) audit montant (4);

caractérisée en ce que lesdites parois latérales (7) présentent une pluralité de saillies en forme de poche (12), ouvertes vers le haut, espacées et alignées entre elles, pouvant loger des secondes languettes de verrouillage (20) positionnées sur les tasseaux (14).

2. Une structure modulaire selon la revendication 1, **caractérisée en ce que** ladite paroi frontale (6) présente de plus une pluralité de protubérances (21), espacées et alignées entre elles, pouvant être insérées dans des ouvertures (22) obtenues sur les tasseaux (14) pour prévenir les mouvements de rotation de ces derniers dans le plan de la paroi frontale (6).

3. Une structure modulaire selon la revendication 2, **caractérisée en ce que** lesdites protubérances

(21) comprennent essentiellement une petite déformation en forme de genou, obtenue sur la paroi frontale (6) des montants (4).

4. Une structure modulaire selon la revendication 3, **caractérisée en ce que** lesdites ouvertures (22) obtenues sur les tasseaux (14) ont une forme de parallélogramme dont l'axe longitudinal est disposé essentiellement selon l'axe longitudinal du tasseau (14). 5
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5. Une structure modulaire selon la revendication 1, **caractérisée en ce que** la section transversale du tasseau (14) est conformée à la manière d'un "J" carré pour enfermer le montant (4) le long de trois côtés. 15
6. Une structure modulaire selon la revendication 5, **caractérisée en ce que** le tasseau (14) présente deux parois opposées, respectivement une paroi courte (15) et une paroi longue (16), qui s'étendent à une légère distance l'une de l'autre. 20
7. Une structure modulaire selon la revendication 6, **caractérisée en ce que** lesdites premières languettes de verrouillage (19) sont obtenues sur la paroi courte (15) et lesdites secondes languettes de verrouillage (20) sont obtenues sur la paroi longue (16). 25
30
8. Une structure modulaire selon la revendication 3, **caractérisée en ce que** lesdites ouvertures (22) obtenues sur les tasseaux (14) ont une forme de parallélogramme avec l'axe le plus long disposé légèrement incliné par rapport à l'axe longitudinal du tasseau (14). 35
9. Une structure modulaire selon la revendication 3, **caractérisée en ce que** les saillies en forme de poche (12) et les protubérances (21) du montant (4) sont obtenues au moyen d'entailles locales et déformation sans élimination de matériau. 40
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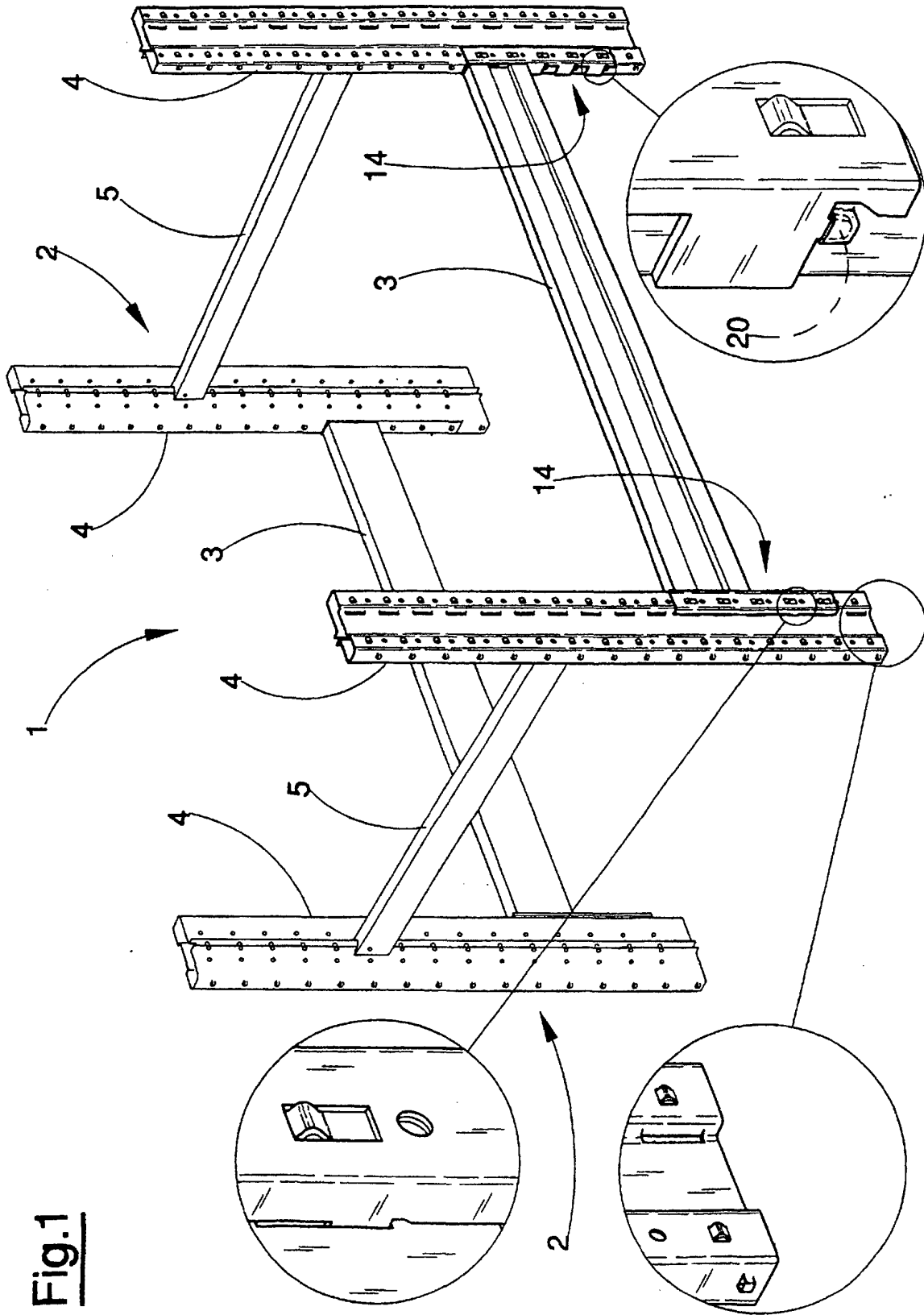


Fig. 1

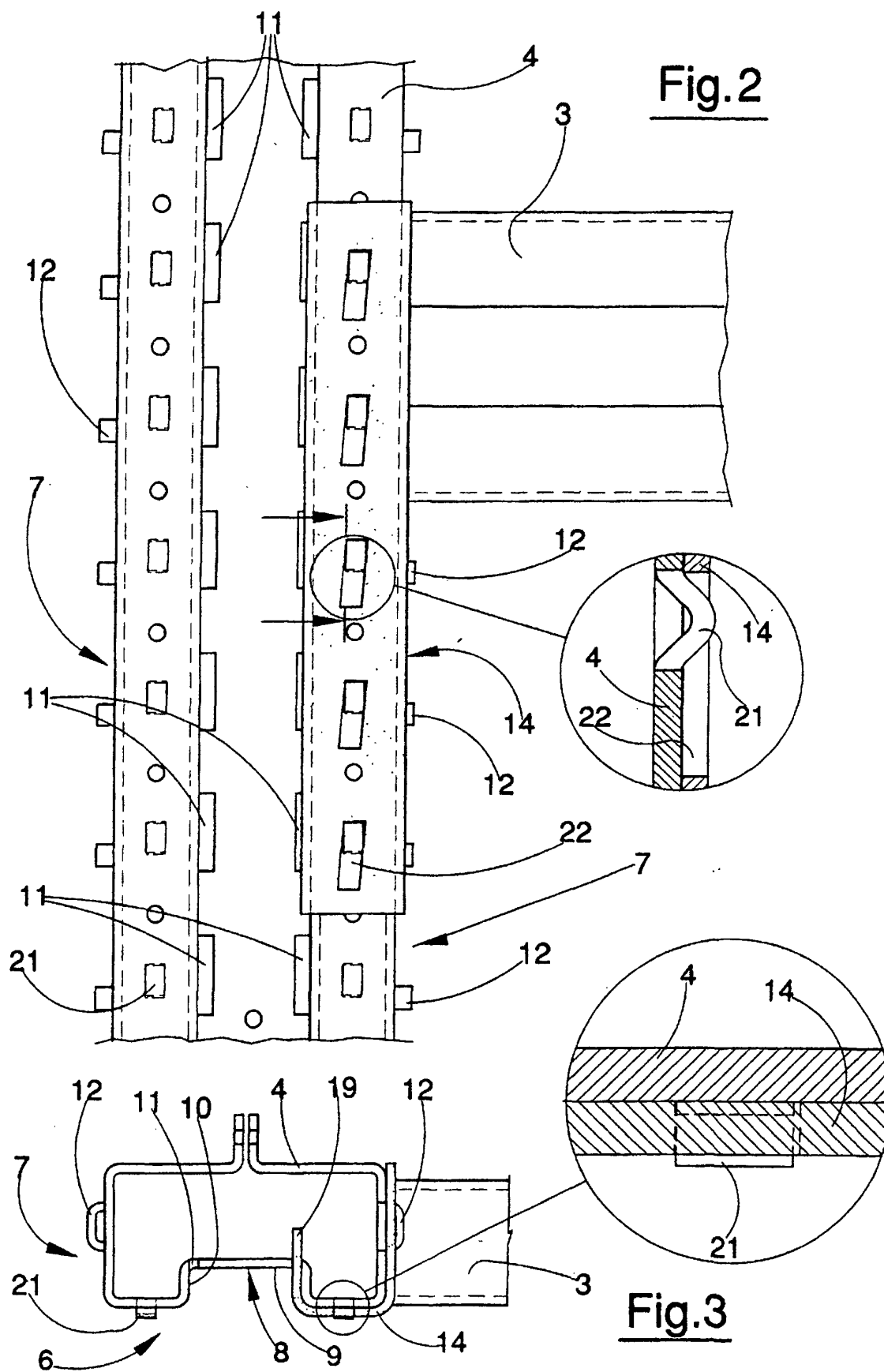


Fig. 4

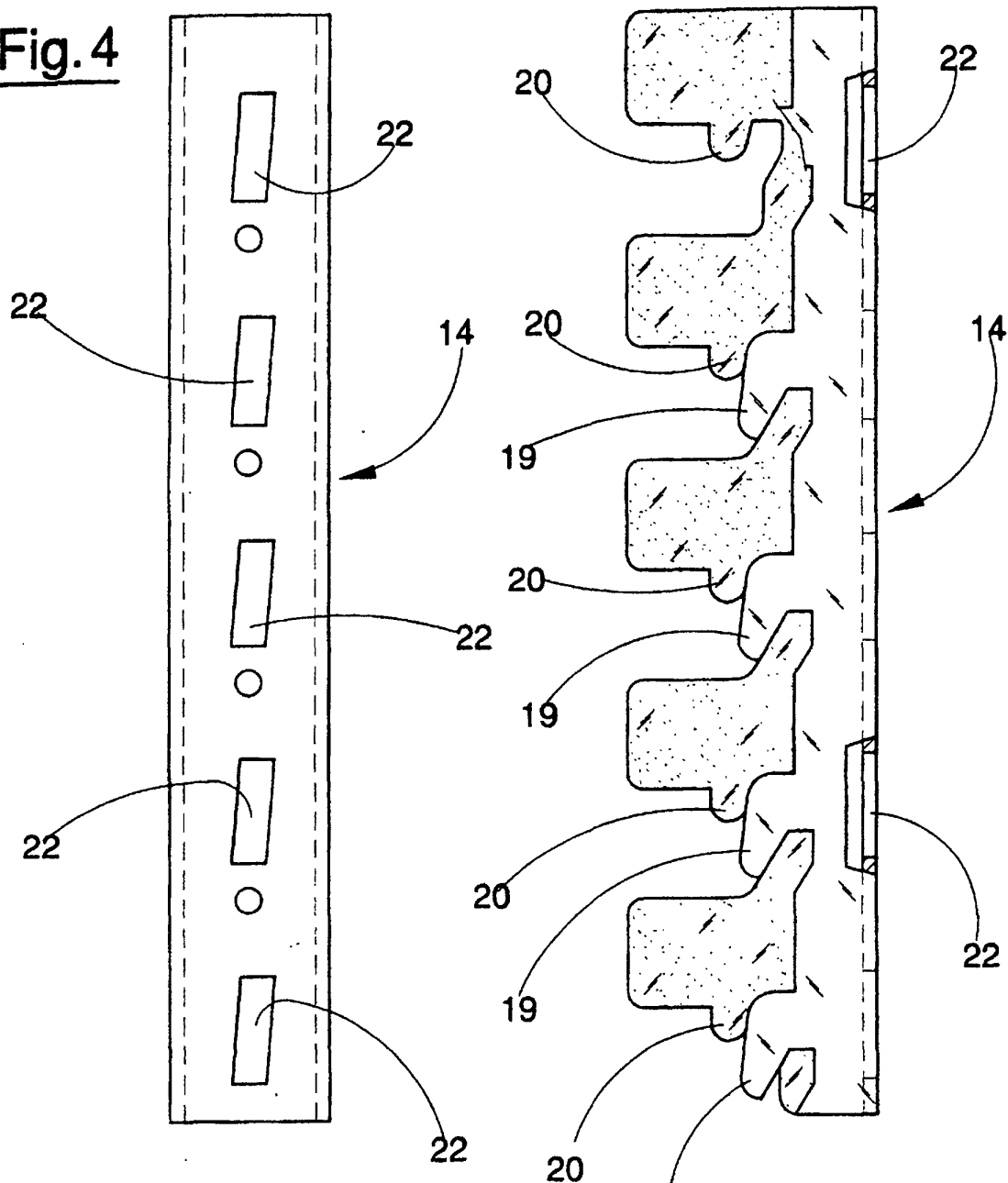


Fig. 5

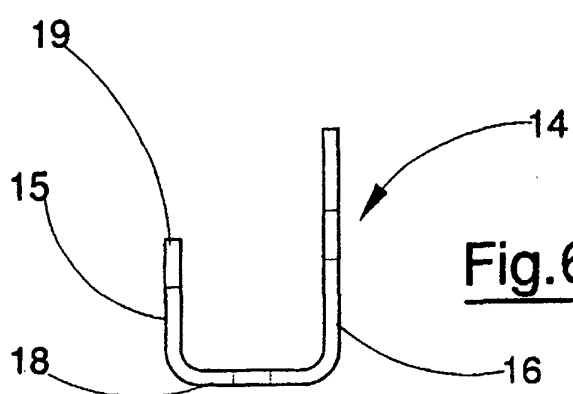


Fig. 6