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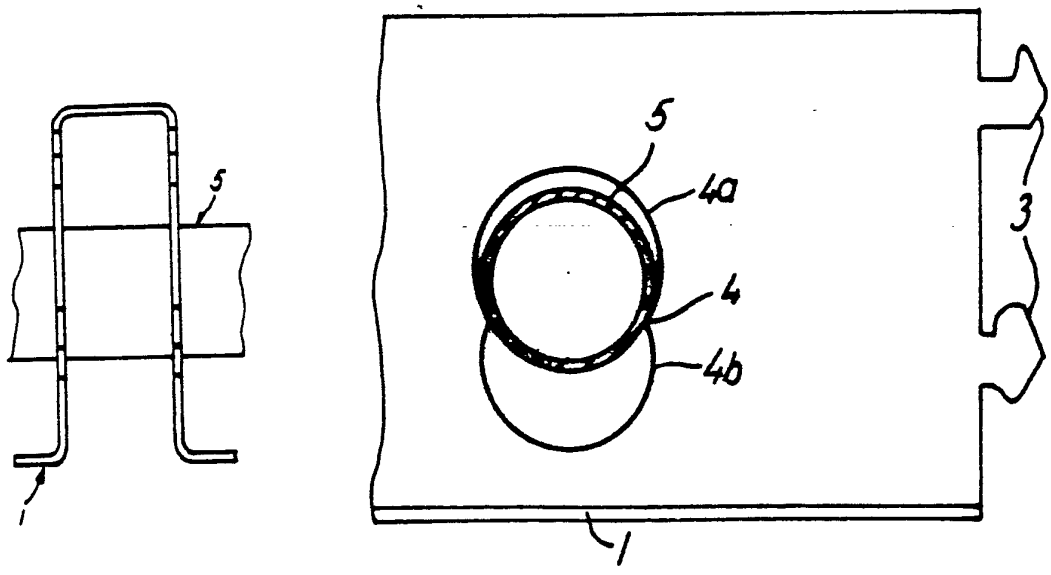
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(54) Title: AN ASSEMBLY OF PREFERABLY ELONGATED PARALLEL MEMBERS



(57) Abstract

An assembly of preferably elongated parallel members, e.g. parallel transverse members (1) in a frame structure, where two or more members are mutually connected via one or more rods serving as coupling means and extending in their transverse direction. With a view to a simplified assembling which may be carried out on the site of use, there is provided in each member, e.g. each transverse member (1), at least one hole (4) in the form of two intercommunicating hole parts (4a, 4b), one (4a) of which has a diameter that is larger than the diameter of a preferably tubular rod (5) extending through said holes (4), while the second hole (4b) is adapted to receive said rod with a tight fit.

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An Assembly of Preferably Elongated Members.

This invention relates to an assembly of preferably elongated parallel members, e.g. parallel transverse members in a frame structure, where two or more members are assembled via one or more rods serving as coupling means and extending in their transverse direction.

Frame structures are known which are constituted by two or more parallel beams or side members which at their ends are connected with beams or transverse members extending in their transverse direction. The transverse and the longitudinal members or beams extending in the transverse and longitudinal direction of the frame make together the frame sufficiently stable and rigid.

In such frame structures, which may for instance be used in carriages for mobile shelves in storage and archives systems the longitudinal and transverse beams or longitudinal and transverse members have hitherto been connected with each other by welding which necessitates prefabrication in factory resulting in troublesome and comparatively expensive conveyance of large individual modules. Moreover, skilled labour is required in the production.

It is also known to connect the longitudinal and transverse beams by means of bolts so that the assembling may be carried out on the site of use. The assembling is, however, time consuming and implies detailed instruction and directions for mounting. Moreover, there is the risk that the assembly works loose in the course of time, for instance due to dynamic stress.

Also assemblies by means of special fixtures or clips may be carried out on the site of use, but for that purpose special mounting equipment and skilled personnel is required, and such assemblies are therefore

also preferably carried out in factory with the said resulting problems of conveyance.

The present invention has for its purpose to provide a coupling or assembling technique providing for an inexpensive frame structure, in which the individual parts of the frame may be connected or assembled with each other on the site of use by unskilled personnel without the use of special tools, and in which the completed frame structure nevertheless presents a strong and durable stiffness.

In this respect an assembly of the type mentioned by way of introduction is according to the invention characterized in that there is provided in each member, e.g. each transverse member, at least one hole in the form of two intercommunicating hole parts, one of which has a diameter that is a little larger than the diameter of a preferably tubular rod extending through said holes, while the second hole part is adapted to receive said rod with a tight and/or resilient fit.

When assembling the structure the parallel members, e.g. parallel transverse members, are positioned at determined mutual distance and are possibly secured at such positions by means of spacers which need no particular strength, following which the preferably tubular rods serving as coupling means are inserted in the portion of the holes having a large diameter. When the rods have been passed through the holes in both or all transverse members, they are, e.g. by hammer blows, pressed into the portion of the holes having a small diameter, thereby securing the individual members in relation to each other, and the structure is completed.

The coupling rods make the structure sufficiently rigid transversely of the longitudinal direction of the side members, thereby rendering either the longitudinal or transverse members of the prior structures superfluous. The side members thus rendered superfluous may,

if desired, be replaced by comparatively slight panels, for instance constituted by the above mentioned spacers.

As it will be recognized, the assembly according to the invention may be easily accomplished on the site of use, it is simple and quick to carry out and there is, practically spoken, no risks of failure, even without particular directions for mounting.

It should be mentioned that Danish patent No. 131,355 discloses a grid with longitudinal and transverse rods extending perpendicular to each other, slots having an oblique or curved bottom and a protuberance formed above said bottom and projecting into the slot being formed in the longitudinal rods, while slots are provided in the transverse rods, said slots having for instance a depth corresponding to about half the height of said transverse rods. When the transverse rods are assembled with the longitudinal rods in that the slots are put into engagement with each other, the protuberances in the slots of the longitudinal rods penetrate the material in those parts of the transverse rods positioned in alignment with their slots, and by continuing pressing the transverse rods into the slots of the longitudinal rods the slots in the material of the transverse rods formed by the protuberances provided in the slots of the longitudinal rods are closed, so that the transverse rods are securely fastened - but also permanently - to the longitudinal rods. It is not possible to disconnect the assembly without damaging the rods.

However, an assembly according to the invention may easily be disconnected, e.g. by a hammer blow, if it is desired to disconnect the assembly, e.g. by altering or rebuilding a frame structure.

In the assembly according to the invention only an elastic deformation is actually effected and not as in the known grid assembly a plastic deformation of the members forming part of the assembly.

As mentioned above the particular assembling technique according to the present invention is inter alia considerably advantageeously applicable in connection with carriages for mobile shelves in storage and archives systems and an embodiment of the invention particularly advantageous for that special purpose is characterized in that at least two parallel transverse members are connected at their ends with spacers, that at least one hole in the form of two intercommunicating, preferably partially circular hole parts with different diameters is provided in each transverse member, and that a preferably tubular rod projects through said holes, the diameter of said rod being smaller than the diameter of the largest hole parts and equal to or a little larger than the diameter of the smallest hole parts.

The invention will now be explained in detail, as an example on the basis of an embodiment of a chassis frame for a carriage for mobile shelves in a storage or archives system illustrated in the drawings, in which

Fig. 1 illustrates the opening phase of the assembling of a frame for a carriage for a mobile shelf,

Fig. 2 illustrates the completed assembly,

Fig. 3 illustrates on a larger scale a transverse member or beam with releasably inserted connecting rod or tube,

Fig. 4 is an illustration corresponding to Fig. 3 but with the coupling rod or tube in the locking position, and

Fig. 5 is a schematical illustration of an alternative embodiment of the invention.

Fig. 1 shows three parallel beams or transverse members 1 adapted to form part of the supporting frame of a carriage for a mobile shelf arrangement.

The transverse members 1 are positioned at the desired mutual distance c/c and they may be fixed at

this point by means of panels 2 secured on hook means 3, see Figs 3 and 4, and serving as spacers.

Two holes 4 are, as exemplified, provided in each transverse member 1 and their form is best illustrated in Figs. 3 and 4, from which it appears that each hole consists in a hole part 4a having a diameter a little larger than the diameter of a coupling tube 5 inserted in the hole 4a and a hole part 4b in which the tube 5 matches with a tight and/or resilient fit. The hole part 4b may have a diameter equal to or a little smaller than the diameter of the tube 5 and for instance 1 to 2 mm smaller than the diameter of the hole part 4a.

When the transverse members 1 are positioned as illustrated in Fig. 1 the tubes 5 are passed through the hole parts 4a with large diameter of the holes 4 on to the position illustrated in Fig. 2 in which the tubes 5 protrude through all holes, in the example three holes. The tubes 5 are subsequently radially subjected to stress, for instance by hammer blows, so as to be pressed past the constriction between the hole parts 4a and 4b due to material resiliency of the tube and into the hole parts 4b as illustrated in Figs 2 and 4. The structure is then locked and the frame is completed.

The tubes 5 make the completed frame sufficiently stiff in the frame plane and beams or side members extending transversely of the transverse members 1 may be renounced. The most outlying holes, not further specified, in the transverse members 1 are adapted to receive shafts, not shown, for wheels.

In the illustrated example and in the above exemplied embodiment the connecting rods 5 are shown as tubes with a circular cross-section, but it will be recognized that the invention may as well and quite analogously be realized with rods of other profile shape,

as well as the holes 4, i.e. the hole parts 4a and 4b may have other shapes than the illustrated one, where the hole parts 4a and 4b are partially circular.

An example of an alternative embodiment is outlined in Fig. 5 where a connecting rod 5' in the form of a square tube, that might also be a solid rod as in the embodiment according to Figs 1 to 4, cooperates with a hole 4' constituted by a partially circular hole part 4a' and a hole part 4b' communicating therewith and shaped as a partially square part adapted to receive the rod 5' with a tight and/or elastic fit.

PATENT CLAIMS

1. An assembly of preferably elongated parallel members, e.g. parallel transverse members (1) in a frame structure, where two or more members are mutually assembled via one or more rods serving as coupling means and extending in their transverse direction, characterized in that there is provided in each member, e.g. each transverse member (1), at least one hole (4) in the form of two intercommunicating hole parts (4a, 4b), one of which (4a) has a diameter that is a little larger than the diameter of a preferably tubular rod (5) extending through said holes (4), while the second hole part (4b) is adapted to receive said rod with a tight and/or resilient fit.

2. An assembly as claimed in claim 1 in a carriage for a mobile shelves arrangement, in particular a mobile shelves arrangement in a storage and archives system, characterized in that at least two parallel transverse members (1) are connected at their ends by spacers (2), that at least one hole (4) in the form of two intercommunicating, preferably partially circular hole parts (4a, 4b) with different diameters is provided in each transverse member (1), and that a preferably tubular rod (5) projects through said holes (4), the diameter of said rod being smaller than the diameter of the largest hole parts (4a) and equal to or a little larger than the diameter of the smallest hole parts (4b).

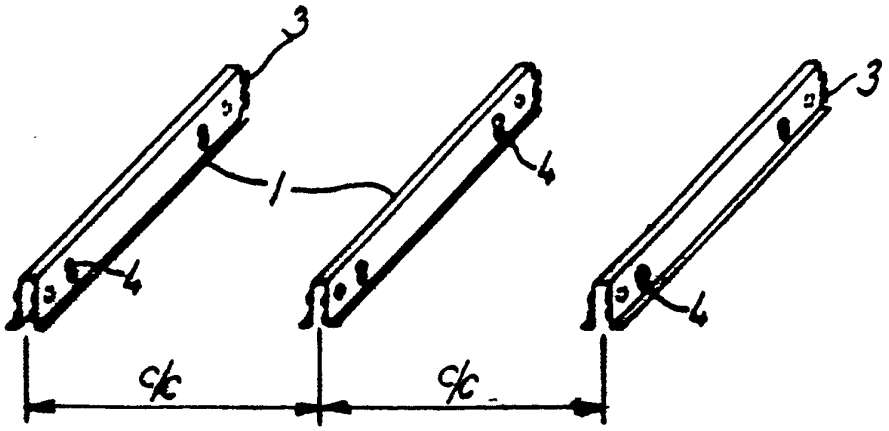


FIG. 1

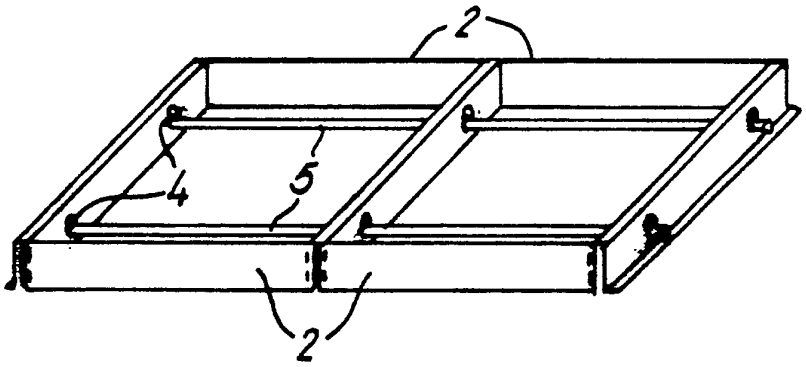


FIG. 2

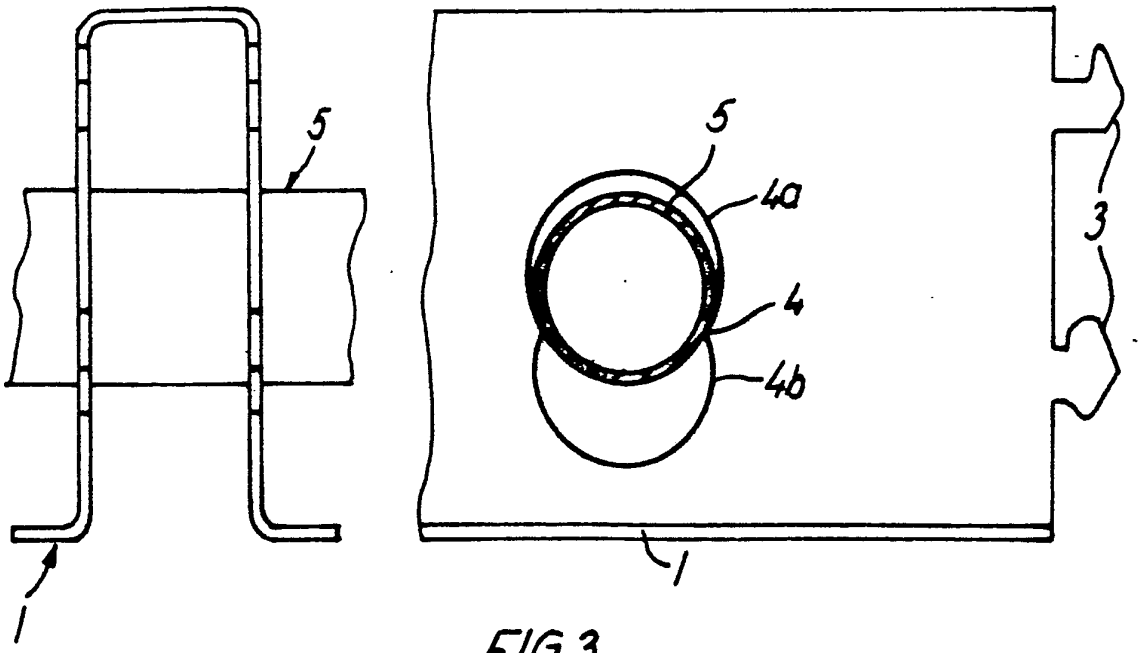


FIG.3

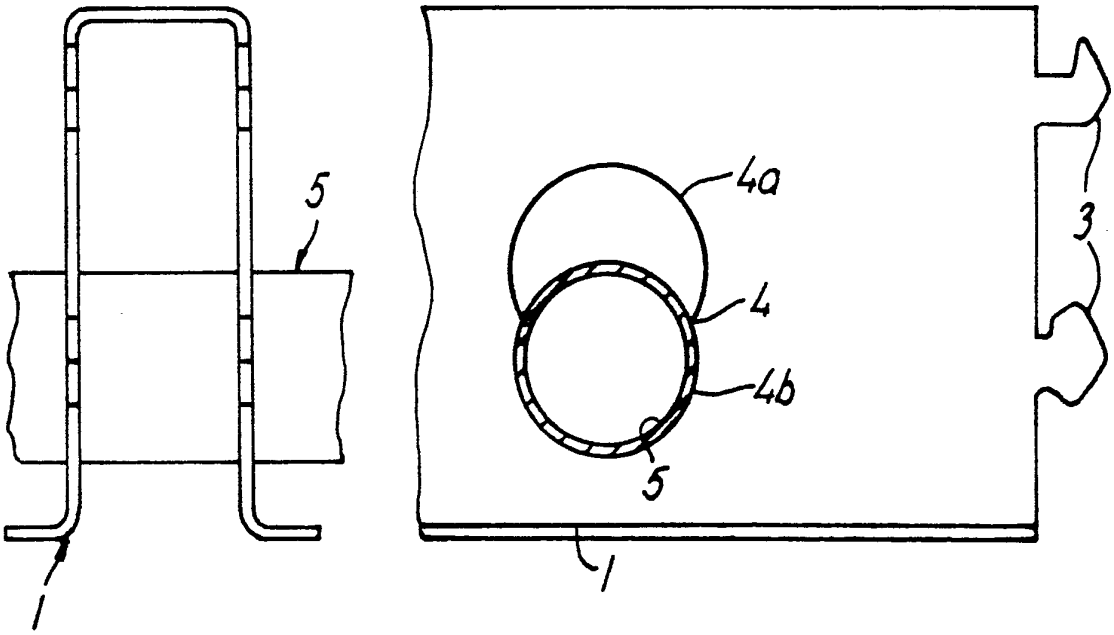


FIG.4

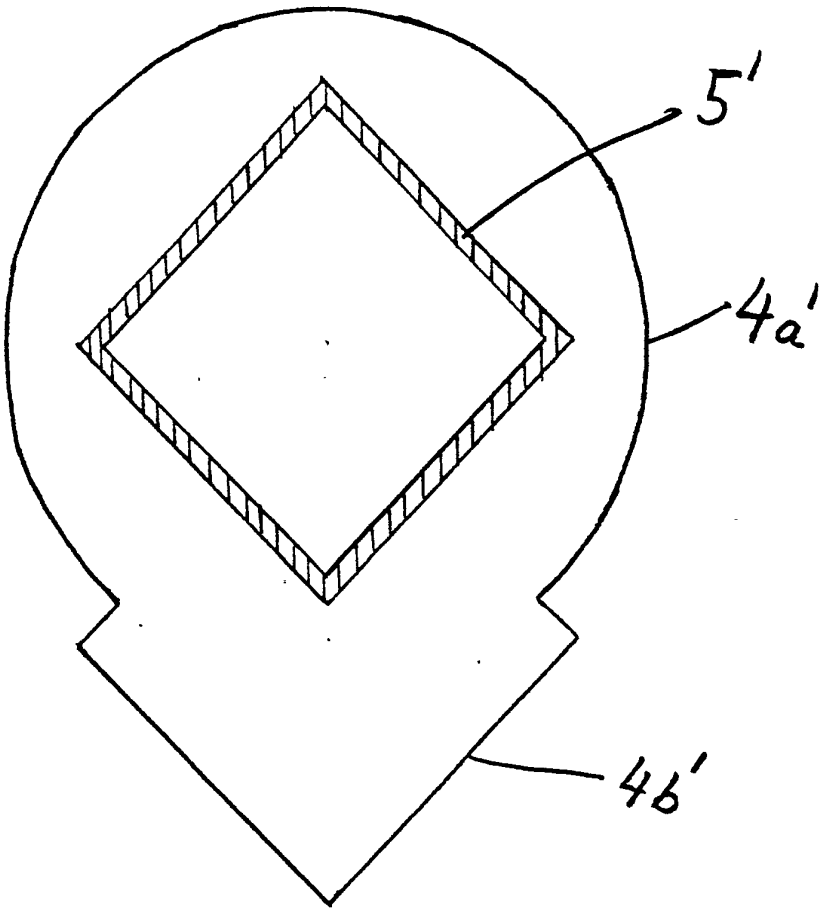


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No PCT/DK87/00003

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC [4]

F 16 B 12/42, A 47 B 53/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	A 47 B 47/00-/03, /05, 53/02; F 16 B 2/24, 7/04, 12/08, /34, /38-52
US Cl	211: 162, 182; 312: 198-201, 263-265; .../...

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	FR, A, 767 289 (BOURGARIT & C:IE) 13 July 1934	1
Y	FR, A5, 2 151 236 (FLANDIN BLETY) 13 April 1973	1
A	EP, A1, 0 010 529 (AB ELECTROLUX) 30 April 1980	2
A	US, A, 4 421 265 (TANIWAKI) 20 December 1983	2

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
1987-04-27	1987 -04- 29
International Searching Authority	**Signature of Authorized Officer**
Swedish Patent Office	Leif Vingård

Form PCT/ISA/210 (second sheet) (January 1985)

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II Fields Searched (cont)

403: 186, 187, 190, 230, 240-243

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers....., because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

Claim 2 does not relate to an improvement in the co-operation between the tubular rod (5) and the hole (4) in the characterizing portion of claim 1.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☒ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.