

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 690 686 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

10.06.1998 Bulletin 1998/24

(21) Application number: **94906417.4**

(22) Date of filing: **21.12.1993**

(51) Int. Cl.⁶: **A47B 47/00**, A47B 57/08

(86) International application number:
PCT/SE93/01092

(87) International publication number:
WO 94/17692 (18.08.1994 Gazette 1994/19)

(54) **A COMBINATION SHELVING UNIT**

ZUSAMMENSTELLBARE REGALEINHEIT

UNITE D'ETAGERE MODULAIRE

(84) Designated Contracting States:
BE DE DK FR GB IT NL

(30) Priority: **09.02.1993 SE 9300412**

(43) Date of publication of application:
10.01.1996 Bulletin 1996/02

(73) Proprietor: **WELAND AB**
S-333 31 Smalandsstenar (SE)

(72) Inventor: **WELANDSSON, Jonas**
S-333 30 Smalandsstenar (SE)

(74) Representative:
Wallengren, Yngvar
Patentbyran Y Wallengren AB
Box 116
331 21 Värnamo (SE)

(56) References cited:

EP-A- 0 357 817	WO-A-89/00824
DE-A- 2 428 976	US-A- 1 681 218
US-A- 4 233 912	

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 690 686 B1

Description

TECHNICAL FIELD

The present invention relates to a combination shelving unit as described in the opening part of claim 1.

BACKGROUND ART

Combination shelving units of any number of various designs and constructions are known in the art, and certain may function satisfactorily, while others less so. The posts which support the shelves are often interconnected in such a manner that modular units similar to ladders or steps are created. For interconnection between posts, steps and shelves, respectively, use has been made of a multiplicity of different designs and constructions with assembly fittings.

Generally speaking, a feature common to prior art shelving designs and constructions is a relatively poor degree of stability in the width or lateral direction of the shelving unit, so that, as a result, either a back panel or a cross strut is required to stabilize the shelving unit. Furthermore, the assembly fittings which are employed for interconnecting shelves, posts and steps, respectively, have proved to be complex, fragile or loose so that the total construction fails to achieve requisite levels of mechanical strength or stability.

Further, EP 357 817 discloses a wooden shelving unit having separate vertical posts fastened to front and rear edge surfaces of shelves. To promote stability the posts have recesses receiving edge portions of the shelves. The shelves consists of transversely extending rods, the end portions thereof being received in the recesses, and longitudinally extending ribs on top of the rods. The rods are connected to the post by means of screws.

WO 89/00824 discloses a similar shelving unit where the surfaces facing one another on the shelves and the post have serrations. Draw bars are provided for connecting the posts and the shelves. The draw bars extend between adjacent front and rear posts.

DE-A-2 428 976 also discloses a shelving unit having separate posts arranged at front and rear sides of the unit. The posts have under cut recesses for receiving front and rear edge portions of the shelves. The posts are connected to one another by transversely extending connection members opposite end portions thereof being received in the under cut recesses of the posts.

PROBLEM STRUCTURE

The present invention has for its object to realise a combination shelving unit of the type mentioned by way of introduction, this unit being designed in such a manner that it achieves large load-carrying capacity, and satisfactory stability in both the lateral and depth direc-

tions without the employment of cross struts, back panels or similar reinforcement. The present invention also has for its object to realise a combination shelving unit which is capable of being produced using extremely simple and economical means, which, in the dismantled state, may be packed down to extremely compact dimensions, and which is easy to assemble. Finally, the present invention also has for its object to realise a combination shelving unit which, in respect of its final configuration, is extremely versatile and flexible.

SOLUTION

The objects forming the basis of the present invention will be attained if the combination shelving unit disclosed by way of introduction is characterized in that the transverse grid bars are pressure absorbing elements for taking up the forces exerted by the connecting devices in the transverse direction of the shelves and that each shelf has a frame extending along its longitudinal sides and consisting of an upright flat profile and that further upright flat profiles extend in the longitudinal direction of each shelf.

Further advantages will be attained if the subject matter of the present invention is also given one or more of the characterizing features as set forth in appended claims 2 to 10.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will not be described in greater detail hereinbelow, with particular reference to the accompanying drawings. In the accompanying drawings:

- fig 1 is a vertical front elevation of a combination shelving unit according to the present invention;
- Fig. 2 shows a part of the combination shelving unit of Fig. 1, seen in a direction towards the end wall of the combination unit;
- Fig. 3 is a horizontal partial cross section through a post included in the combination shelving unit, approximately according to the section marking A in Fig. 2; and
- Fig. 4 is a partial cross section through a shelf approximately according to the section marking B - B in Fig. 3.

DESCRIPTION OF PREFERRED EMBODIMENT

In Fig. 1, reference numeral 1 relates to a floor or a substrate on which the combination shelving unit rests. The combination shelving unit comprises a number of

shelves 2 and 3, the shelf designated 3 being of shorter length than the shelves 2. The shelves 2 and 3 are supported by a number of substantially vertical posts 4 which are disposed along the front and rear sides of the combination shelving unit. The posts 4 are disposed in pairs, in which one such pair of posts consists of one post on the front side of the combination shelving unit and one post on its rear side. The distance between closely adjacent pairs of the posts, seen in the longitudinal direction of the shelves 2 and 3, respectively, may be varied optionally and may, thus, be adjusted steplessly, but some practical modular dimension might appropriately be selected, for example depending upon the manufacturing lengths of the shelves.

Fig. 1 also shows connecting devices 5 which are disposed to realise the pairwise interconnection of the posts 4 and also to realise a load-transferring communication between the shelves 2 and 3 and the posts 4. Preferably, the connecting devices are disposed in positions adjacent the shelves, either on their upper sides or their undersides.

Further, the combination shelving unit illustrated in Fig. 1 has no stabilizing back panel or cross strut, given that such rigidifying elements are superfluous to requirements.

It will further be apparent from Fig. 1 that the lengths of the shelves are such that they at least span the distance between closely adjacent pairs of posts. Thus, the least suitable length for a shelf is but insignificantly larger than the distance between the outwardly facing surfaces of two closely adjacent posts. Preferably however, the shelves may be of such length that, undivided, they span the distance between the mutually most distally located posts in a combination shelving unit. However, the shelves 2 and 3 ideally display end portions 6 which slightly extend beyond the adjacent post 4.

Fig. 2 shows the combination shelving unit seen from one end, and it will be apparent that the posts 4 in each pair are provided, on their mutually facing sides, with recesses 7 in which are accommodated edge portions of the shelf 2. The longitudinal direction of the recesses 7 is parallel with the longitudinal direction of the shelves 2 and 3 and is, thereby, horizontally oriented.

The recesses 7 cover the entire width of the mutually facing sides of the posts 4 so that one post may thereby be slid to optional position along the entire length of a shelf. The design of the recesses 7 is substantially complementary to the contour of the edge portions of the shelves 2 and 3 and, preferably, the fit between the recesses and the above-mentioned edge portions is tight. Possibly, the recesses 7 may be slightly conical inwardly so that a certain engagement is created between the edges of the recesses and the edge portions of the shelves when the combination shelving unit is assembled.

It will further be apparent from Fig. 2 that the con-

necting devices 5 include ties 8 which, in the there illustrated embodiment, are placed closely beneath the shelf 2. Naturally, these ties may also be placed on the upper side of the shelves, but also between the shelves at greater distance therefrom than is shown in the Figure. In addition, the ties are provided, at their ends, with clamping devices 9, preferably in the form of nuts which, on tightening towards one another, draw the posts 4 in a pair of posts towards one another.

Possibly, the one end of the ties may be permanently secured in its associated post or have some other type of anchorage device interiorly in the profile of the post, for example in the form of a hook, lug or the like. The essential feature is only the above-described clamping action which is realised by the clamping devices 9 or the nuts.

Given that the recesses 7 are of quite considerable length (at least the same length as the thickness of the shelf in the vertical direction but preferably at least twice as large), a highly torsionally rigid jointing will be achieved, when the shelves are pressed into the recesses of the posts, which thus prevents movement in the combination shelving unit in the longitudinal direction of the shelves. The wider the posts 4 (and consequently the longer the recesses 7), the greater will be this torsion-transfer capacity between the posts and the shelves 2 and, as a result, the combination shelving unit will also be more stable the greater the width of the posts.

The above-described jointing of the posts 4 with the shelves 2 under the action of large forces exercised by the ties 8 and the nuts 9 entails that the shelves 2 and 3 will be subjected to correspondingly large compression forces. It is, therefore, crucial that the edge portions of the shelves or the shelves as a whole cannot be compressed together, since, in such an event, a slack and tottering structure would be the outcome. In order to prevent such deformations in the shelves, the shelves are provided with pressure-absorbing elements which, between the side edges of the shelves (front and rear edges), transfer the above-considered compression forces. By employing such pressure-absorbing elements, the shelves 2 and 3 can, at least in this direction of loading, be considered as substantially rigid and unyielding. In that the ties 8 are loaded with tensile stress and, in addition, are of relatively great length, a certain elastic deformation in the ties can be permitted or even be desirable, for which reason there is no risk that the nuts 9 might possibly come loose as a result of vibrations or the like. Hence, the ties 8 can be considered as realising a certain spring force with slight extension and considerable resilience.

Fig. 3 shows a horizontal partial section through a post 4 and a portion of a shelf 2.

The shelf 2 has an outer frame 10 which extends along the longitudinal sides of the shelf, and also its short ends, and which consists of an upright flat profile. In the longitudinal direction of the shelf, there extend

additional upright flat profiles 11 which are included as load carrying components in the latticework from which the shelves are produced.

Transversely of the direction of the longitudinal sides of the frame 10 and the flat profiles 11 extending substantially parallel therewith, there extend transversely directed grid bars 12 which are substantially parallel with the longitudinal direction of the ties 8 so that these grid bars 12 constitute the pressure-absorbing devices in the shelves 2. In that the grid bars 12 are disposed transversely of the longitudinal direction of the shelves, and preferably with uniform distribution spacing which may amount to between one and three times the vertical extent of one shelf, there is always the possibility that at least one such grid bar 12 (and consequently one pressure-absorbing element) may be placed in the region of one pair of posts 4.

The grid bars 12 are placed at the upper edges of the frame 10 and the flat profiles 11 so that the shelves 2 and 3 will thereby obtain a substantially smooth load carrying surface.

The cross sectional configuration of the post 4 illustrated in Fig. 3 may be described as C- or U-shaped with two substantially parallel shanks 13 and an arched web portion 14. The shanks 13 are provided with the above-considered recesses 7 so that the edge portions of the shelves 2 and 3 may thereby be accommodated in the recesses in the above-outlined manner.

With the above-disclosed cross sectional configuration, the posts 4 have an open cross section with the openings turned to face in towards one another on the posts in each pair. This implies that vertical partitions between mutually superposed shelves can be placed on the shelf with vertical edge portions accommodated interiorly in the open cross section of the posts 4.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

According to the invention, it is not necessary that the posts 4 display the above-described cross section, but the cross section may be more V-shaped so that thereby the post, on hard tightening of the tie 8 and the nut 9, may possibly contribute in the cohesive spring force in that the profile of the post is, as a result of the spring action, opened somewhat so that both shanks of the post facing towards the shelf will be distanced further apart from one another.

Other profile forms for the posts 4 are also conceivable and, for example, use may be made of square, rectangular, circular or oval tubular profiles, I-profiles or the like. The only requirement is that the profile must be of such configuration as to permit the arrangement of the horizontal recesses 7 provided for accommodating the edge portions of the shelves, and that these recesses are of requisite length in the longitudinal direction of the shelves.

If a combination shelving unit is constructed according to the present invention in which at least one

but preferably two (ideally the uppermost and lowermost) shelves are given a length so as to span the distance between the most distally located pairs of posts, it may be possible to make certain of the shelves included in the combination shelving unit so short that a jointing of the shelves may take place in the region of any pair of posts.

Claims

1. A combination shelving unit comprising a number of mutually superposed shelves (2, 3) which are carried by a number of pairs of substantially vertical posts (4), said posts being provided at the front and rear edges of the shelves and the sides of the posts facing the shelves having recesses (7) receiving edge portions of the shelves; connecting devices (5), mutually interconnecting the posts of each pair, the connecting devices being provided for clamping, towards one another and into abutment against opposing edge portions of the shelves, the posts included in each pair thereof, the shelves being made from a lattice material having a plurality longitudinal and transverse grid bars (11, 12), **characterized** in that the transverse grid bars (12) are pressure absorbing elements for taking up the forces exerted by the connecting devices (5) in the transverse direction of the shelves (2, 3) and that each shelf (2, 3) has a frame (10) extending along its longitudinal sides and consisting of an upright flat profile and that further upright flat profiles (11) extend in the longitudinal direction of each shelf (2).
2. A combination shelving unit as claimed in claim 1, **characterized** in that the transverse grid bars (12) are provided preferably with uniform distribution spacing transversely of the longitudinal direction of the shelves (2, 3), the spacing being 1-3 times the vertical thickness of a shelf.
3. A combination shelving unit as claimed in claim 1 or 2, **characterized** in that the transverse grid bars (12) are located at the upper edges of the frame (10) and flat profiles (11) whereby the shelves (2, 3) have a substantially flat load carrying surface.
4. A combination shelving unit as claimed in any one of claims 1-3, **characterized** in that the connecting devices (5) are located adjacent the shelves (2, 3), above or below them.
5. The combination shelving unit as claimed in any one of the preceding claims, **characterized** in that the recesses (7) in the posts (4) are of a configuration which is substantially complementary to the contour of the edge regions of the shelves (2, 3); and that the fit of the shelves in said recesses is tight.

6. The combination shelving unit as claimed in any one of claims 1 to 5, **characterized** in that the recesses (7) extend throughout the entire width of the post (4); and that this is at least as large as the thickness of the shelf (2, 3) in the vertical direction, preferably at least twice as large. 5
7. The combination shelving unit as claimed in any one of claims 1 to 6, **characterized** in that the posts (4) are of C- or U-shaped in cross section, with the openings facing towards one another within each pair of posts; and that there is disposed, between the posts in at least one pair thereof, at least one substantially vertical partition, the edge portions thereof extending into the cross section of the posts open towards one another. 10 15
8. The combination shelving unit as claimed in any one of claims 1 to 7, **characterized** in that the shelves (2, 3) are of a length which at least spans the distance between closely adjacent pairs of posts (4). 20
9. The combination shelving unit as claimed in any one of claims 1 to 8, **characterized** in that at least two shelves (2, 3), preferably the uppermost and the lowermost, are of a length so as to span, unjointed, the distance between the most distally located pairs of posts (4). 25 30
10. The combination shelving unit as claimed in any one of claims 1 to 9, **characterized** in that said connecting devices (5) consists of ties (8) which, via nut arrangements (9) disposed in the posts (4) or engaging therewith, are disposed to draw the posts (4) included in each pair towards one another; and that said ties are, apart from the shelves (2, 3), the sole force transmitting or carrying connections between the posts (4) in each pair. 35 40

Patentansprüche

1. Kombinier-Regaleinheit mit:

einer Anzahl von gegenseitig übereinander angeordneten Regalböden (2,3), welche von einer Anzahl von Paaren von im wesentlichen vertikalen Stützen (4) getragen sind, wobei die Stützen an den vorderen und hinteren Kanten der Regalböden vorgesehen sind und die den Regalböden zugewandten Seiten der Stützen Aussparungen (7) aufweisen, welche Kantenabschnitte der Regalböden aufnehmen; Verbindungsvorrichtungen (5), welche die Stützen jedes Paares miteinander verbinden, wobei die Verbindungsvorrichtungen zum Festklemmen der Stützen, die jedes Paar umfaßt, in Richtung aufeinander zu und in Anlage an 45 50 55

gegenüberliegende Kantenabschnitte der Regalböden vorgesehen sind, wobei die Regalböden aus einem Gittermaterial mit einer Mehrzahl von in Längsrichtung und Querrichtung verlaufenden Gitterstangen (11,12) gebildet sind, dadurch gekennzeichnet, daß die querverlaufenden Gitterstangen (12) druckaufnehmende Elemente sind zur Aufnahme der Kräfte, die von den Verbindungsvorrichtungen (5) in Querrichtung der Regalböden (2, 3) ausgeübt werden, und daß jeder Regalboden (2,3) einen Rahmen (10) hat, der sich entlang seiner Längsseiten erstreckt und aus einem aufrechten flachen Profil besteht und daß sich weitere aufrechte flache Profile (11) in Längsrichtung jedes Regalbodens (2) erstrecken.

2. Kombinier-Regaleinheit nach Anspruch 1, dadurch gekennzeichnet, daß die querverlaufenden Gitterstangen (12) vorzugsweise einen gleichmäßig verteilten Abstand quer zur Längsrichtung der Regalböden (2,3) aufweisen, wobei der Abstand ein bis drei mal so groß ist wie die vertikale Dicke eines Regalbodens.
3. Kombinier-Regaleinheit nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die querverlaufenden Gitterstangen (12) an den oberen Kanten des Rahmens (10) und der flachen Profile (11) angeordnet sind, wodurch die Regalböden (2,3) eine im wesentlichen flache Lasttragfläche haben.
4. Kombinier-Regaleinheit nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Verbindungseinrichtungen (5) benachbart zu den Regalböden (2,3) über oder unter diesen angeordnet sind.
5. Kombinier-Regaleinheit nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Aussparungen (7) in den Stützen (4) so gestaltet sind, daß sie im wesentlichen komplementär zu der Außenlinie der Kantenbereiche der Regalböden (2,3) sind und daß der Sitz der Regalböden in den Aussparungen fest ist.
6. Kombinier-Regaleinheit nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß die Aussparungen (7) sich über die gesamte Breite der Stütze (4) erstrecken; und daß diese mindestens so groß ist wie die Dicke des Regalbodens (2,3) in vertikaler Richtung, vorzugsweise mindestens doppelt so groß.
7. Kombinier-Regaleinheit nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Stützen (4) einen C- oder U-förmigen Querschnitt haben, wobei die Öffnungen jedes Stützenpaares sich ein-

ander gegenüberliegen; und daß bei mindestens einem Paar von ihnen zwischen den Stützen mindestens eine im wesentlichen vertikale Teilung vorgesehen ist, deren Kantenabschnitte sich in den Querschnitt der zueinander geöffneten Stützen erstrecken.

8. Kombinier-Regaleinheit nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß die Regalböden (2,3) eine Länge haben, die sich mindestens über den Abstand zwischen dicht benachbarten Stützenpaaren (4) erstreckt.
9. Kombinier-Regaleinheit nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß mindestens zwei Regalböden (2,3), vorzugsweise der oberste und der unterste, eine Länge haben, derart, daß sie, nicht verbunden, den Abstand zwischen den am weitesten voneinander entfernt angeordneten Paaren von Stützen (4) überspannen.
10. Kombinier-Regaleinheit nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß die Verbindungsvorrichtungen (5) aus Verbindungsteilen (8) bestehen, welche über in den Stützen (4) angeordnete oder mit diesen in Eingriff stehende Schraubenmutter-Anordnungen (9) so ausgebildet sind, daß sie die Stützen (4), welche in jedem Paar enthalten sind, in Richtung aufeinander zu ziehen; und daß die Verbindungsvorrichtungen außer den Regalböden (2,3) die einzigen Kraft übertragenden oder stützenden Verbindungen zwischen den Stützen (4) in jedem Paar sind.

Revendications

1. Rayonnage combiné comprenant une pluralité d'étagères mutuellement superposées (2,3) qui sont portées par une pluralité de paires de montants sensiblement verticaux (4), lesdits montants étant prévus à l'endroit des bords avant et arrière des étagères, et les côtés des montants en regard des étagères comportant des évidements (7) de réception de parties de bord des étagères ; des dispositifs de connexion (5) interconnectant mutuellement les montants de chaque paire, les dispositifs de connexion étant prévus pour serrer, l'un vers l'autre et en butée contre les parties de bord opposées des étagères, les montants inclus dans chaque paire de montants, les étagères étant fabriquées en une matière en treillis ayant une pluralité de barreaux de grille longitudinaux et transversaux (11,12), caractérisé en ce que les barreaux de grille transversaux (12) sont des éléments d'absorption de pression pour supporter les forces exercées par les dispositifs de connexion (5) dans la direction transversale des étagères (2,3), et en ce que chaque étagère (2, 3) comprend un cadre

(10) s'étendant le long de ses côtés longitudinaux et consistant en un profilé plat vertical, et d'autres profilés plats verticaux (11) s'étendent dans la direction longitudinale de chaque étagère (2,3).

2. Rayonnage combiné suivant la revendication 1, caractérisé en ce que les barreaux de grille transversaux (12) sont prévus de préférence à un espacement uniformément réparti, transversalement à la direction longitudinale des étagères (2,3), l'espacement étant de 1 à 3 fois l'épaisseur verticale d'une étagère.
3. Rayonnage combiné suivant la revendication 1 ou 2, caractérisé en ce que les barreaux de grille transversaux (12) sont placés au niveau des bords supérieurs du cadre (10) et des profilés plats (11), de sorte que les étagères (2,3) présentent une surface de portée de charge sensiblement plane.
4. Rayonnage combiné suivant une quelconque des revendications 1 à 3, caractérisé en ce que les dispositifs de connexion (5) sont placés de façon adjacente aux étagères (2,3), au-dessus ou au-dessous de celles-ci.
5. Rayonnage combiné suivant une quelconque des revendications précédentes, caractérisé en ce que les évidements (7) des montants (4) ont une configuration qui est sensiblement complémentaire du contour des régions de bord des étagères (2,3) et en ce que l'ajustement des étagères dans lesdits évidements est serré.
6. Rayonnage combiné suivant une quelconque des revendications 1 à 5, caractérisé en ce que les évidements (7) s'étendent sur toute la largeur du montant (4) et ils sont au moins aussi grands que l'épaisseur de l'étagère (2,3) dans la direction verticale, et de préférence au moins deux fois plus grands.
7. Rayonnage combiné suivant une quelconque des revendications 1 à 6, caractérisé en ce que les montants (4) ont une section transversale en forme de C ou de U, les ouvertures étant en regard l'une de l'autre dans chaque paire de montants ; et en ce qu'il est prévu, entre les montants dans au moins une paire de montants, au moins une cloison sensiblement verticale dont les parties de bord pénètrent dans la section transversale des montants ouverts l'un vers l'autre.
8. Rayonnage combiné suivant une quelconque des revendications 1 à 7, caractérisé en ce que les étagères (2,3) ont une longueur qui couvre au moins la distance entre des paires de montants (4) immédiatement adjacentes.

9. Rayonnage combiné suivant une quelconque des revendications 1 à 8, caractérisé en ce qu'au moins deux étagères (2,3), de préférence la plus haute et la plus basse, ont une longueur telle qu'elles couvrent, sans joint, la distance entre les paires de montants (4) situées les plus distalement. 5
10. Rayonnage combiné suivant une quelconque des revendications 1 à 9, caractérisé en ce que lesdits dispositifs de connexion (5) sont constitués par des tirants (8) qui sont agencés, via des systèmes d'écrou (9) placés dans les montants (4) ou en prise avec ceux-ci, de manière à tirer l'un vers l'autre les montants (4) de chaque paire ; et en ce que les dits tirants sont, en dehors des étagères (2,3), les seules connexions de transmission ou de portée de force entre les montants (4) de chaque paire. 10 15

20

25

30

35

40

45

50

55

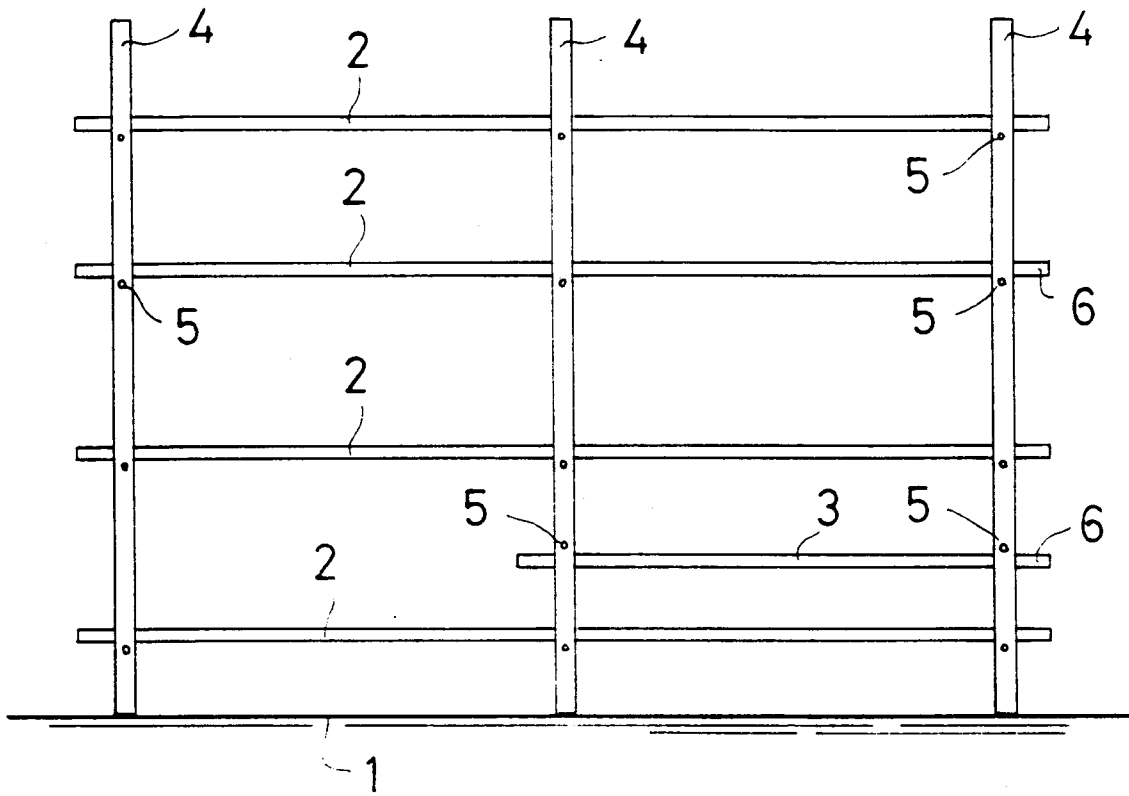


Fig 1

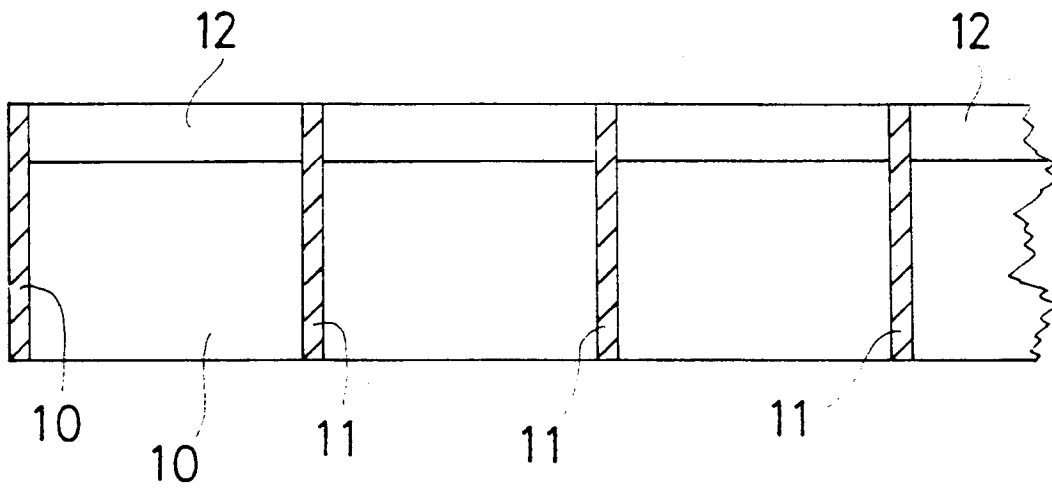


Fig 4

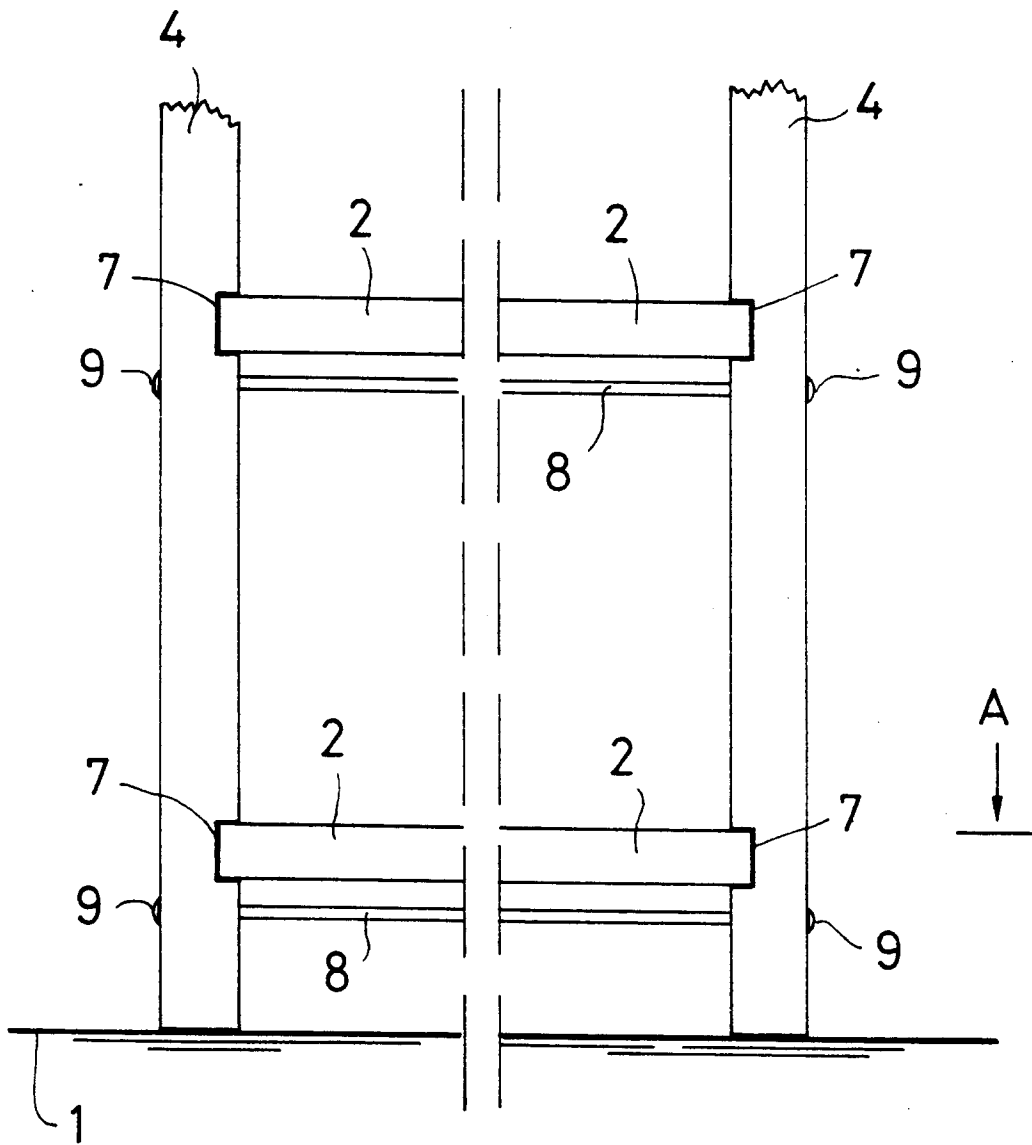


Fig 2

