

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 84106481.9

51 Int. Cl.⁴: **A 47 B 57/56**
A 47 B 47/02

22 Date of filing: 06.06.84

30 Priority: 23.06.83 IT 2177283

43 Date of publication of application:
13.02.85 Bulletin 85/7

84 Designated Contracting States:
AT BE CH DE FR GB LI LU NL SE

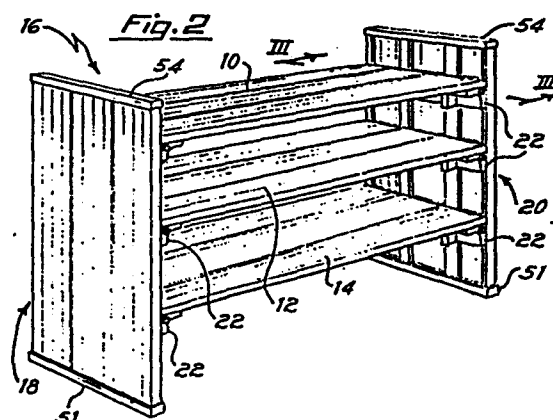
71 Applicant: **Briosi, Antonello**
Viale del Lavoro 3
I-38086 Rovereto (Trento)(IT)

72 Inventor: **Briosi, Antonello**
Viale del Lavoro 3
I-38086 Rovereto (Trento)(IT)

74 Representative: **Lecce, Giovanni**
Dott. Giovanni Lecce & C. S.r.l. Via G. Negri 10
I-20123 Milano(IT)

54 **Method for the formation of metallic structures, in particular shelving, and metallic structures so formed.**

57 Method for the formation of metallic structures, in particular shelving, and metallic structures so formed. Method for the formation of metallic structures, in particular shelving (16) consisting in the use of modular elements (M) obtained using the same sheet metal, having numerous projections which form the so-called undercut and arranged horizontally and vertically to form both the shelves (10) (12) and (14) and the up-rights (18) and (20), and to fix the shelves to the corresponding up-rights using angular fixing elements (22), elastically deformable and formed by two wings adhering to the shelf and to the adjacent up-right respectively and having cavities inside which the projections of the modular elements are inserted. A tension rod, arranged along the full length of the fixing element tightens and fixes the projections inside the corresponding cavities.



METHOD FOR THE FORMATION OF METALLIC STRUCTURES, IN
PARTICULAR SHELVING, AND METALLIC STRUCTURES SO FORMED.

This invention refers to a method for the formation of
metallic structures, in particular shelving and to metallic
5 structures so formed.

As it is known, shelving is made up of a series of over-
lying parallel surfaces fixed to up-rights, or to side members.
As a function of the use to which the shelves and the up-rights
are destined, they are generally made using sheet metal of
10 various thicknesses.

This makes it necessary to avail of sheet metal of various
thicknesses. Furthermore, since the structure of the up-
rights is different from that of the shelves, two different
operations are necessary to make them. In addition, the up-
15 rights must be subjected to successive working to form the
holes for the fixture of the shelves, which naturally effects
the cost of the finished product.

The purpose of this invention is to overcome the drawbacks
described above.

20 More in particular, the purpose of this invention is to provide
a method for the formation of metallic structures where the up-
rights and the shelves may be made using the same sheet metal
and the up-rights not requiring holes to fix the shelves.

It has now been found by the applicant that these and other
25 purposes are achieved by a method which consists of making

the metallic structure using modular elements obtained from one type of sheet metal, with several folds, or projections that achieve the so-called undercut and arranged horizontally and vertically so as to form both the shelves and the up-
5 rights and by fixing the said shelves to the up-rights using elastically deformable angular fixing elements, preferably at 90° and with cavities geometrically coherent with the said projections into which the projections of the modular elements forming the shelf and the adjacent up-right are
10 inserted; each projection being tightened in the corresponding cavity using a tension rod, positioned along the entire length of the angular fixing element.

The essential feature of the invention is the working of the starting material, generally sheet metal of a relatively
15 small thickness, to obtain obviously in different positions, both the shelves and the up-rights of the shelving in its complete three dimensional structure using the same components. More in particular, the shelving consists of elements properly definable as " modular " since it is made using portions of
20 worked metallic material, having the pre-selected dimensions to form both the shelves and the up-rights, naturally depending on the fact that the worked elements are arranged essentially in a horizontal, or vertical position respectively.

The " modularity " does not imply dimensional limitations,
25 but above all concerns the repeatability of certain dimensions.

For example, the shelves may be made with the longitudinal dimensions compatible with the capacity of the room in which the shelving must be fitted; similarly the up-rights will be limited in their height to similar requirements of the vertical space.

The angular fixing elements, arranged where the connections between the shelves and up-rights are made preferably have tension rods, which pass through these elements, suitably drilled for the purpose, to tighten the angular elements themselves about the projections formed by the working of the starting sheet metal , or material.

These projections are preferably in a dove-tail arrangement, but may have a different geometry, for example "T" shape, or however in the most convenient geometric form to satisfy the primary requirement of shelving, i.e. capable of withstanding even considerable weights and loads. This requirement is mainly of interest in the case of shelving principally for industrial use, for example in the formation of shelving for the orderly arrangement of mechanical spare parts, or tools and other articles.

These angular fixing elements include geometrically coherent cavities in their sections perpendicular to the shelves and/or to the up-rights with the said dove-tail type projections so that tightening of the said angular elements leads to clamping of the latter in the desired position, or positions

along the shelf and/or associated up-right.

Furthermore, the worked modular elements with dove-tail type projections, where they serve as a shelf and/or up-right respectively, have folds, the edges of which are
5 rounded off in a " curl " to make the different elements easier to manipulate during the assembly and the positioning of the shelving.

The angular fixing elements may be made of plastic and their cross-section has a geometry that permits their elastic
10 deformation under the effect of tightening of the above mentioned tension rods, suitably completed with threads and nuts.

To assist the elastic deformation of the angular elements, their structure may have lightening. In addition, the holes
15 pre-arranged in the angular elements for the passage of the tension rods are positioned and arranged so as not to intercept the projections of the shelves and/or up-rights, inserted in the cavities of the said angular elements respectively. It is obvious that the method subject of this invention elimin-
20 ates the present need to use up-rights, generally drilled in a supporting side-member arrangement for the shelves and other well known limitations in the sectorial art.

The modular elements, destined to form the up-rights may have plastic terminal edgings on their lower and upper ends to
25 form supporting bases on the floor, in particular on flooring

requiring some attention and a terminal edging respectively which may, without damage, for example contrast the ceiling of the room in which the shelving has to be installed.

The shelving, according to the invention, may be used both
5 in the industrial field and in furnishing, furniture and similar sectors, for example, with shelving produced according to the method of this invention, it will be possible to make three-dimensional structures for libraries and furniture in general complete with any desired number of shelves, arranged
10 as required in the various cases. Whereas, for the production of shelving for mainly industrial use the surface of the metallic structure may be that of the starting material (zinc, or galvanised sheet metal), for shelving mainly destined as furnishing articles, furniture, or other items the surfaces
15 of the metallic structure may be coloured, covered with various materials, wall papered and other arrangements, everything in accordance with architectonic requirements and/or convenience and environmental furnishing schemes.

These and other more specific features of shelving made using the assembly method according to the invention, may be
20 better understood from the following detailed description with reference to the figures that illustrate only one specific embodiment provided for an exemplificative, illustrative, but non-limitative purpose in which:

25 fig.1 represents the perspective view of a modular element;

fig.2 is a perspective-isometric view of possible shelving obtainable according to the invention, made using several modular elements of fig.1, fixed using angular elements which are also characteristic of the invention;

5 fig.3 is the schematic view of a cross-section of the shelving of fig.2 with parts partially in cross-section, in the plane and in the direction indicated by III-III in fig.2;

fig.4 is the schematic view of a cross-section, with fragmentary parts removed, in the plane and in the direction

10 indicated by IV-IV in fig.3;

figure 5 is a schematic front view of an angular element, in the direction indicated by V in fig.3;

fig.6 is a schematic view of the angular element of figure 5 in cross-section in the plane and in the direction indicat-

15 ed by VII-VII in fig.3

Fig.1 illustrates a modular metallic element M, having a relatively small thickness with projections, undercuts and marginal features, that may be indifferently used to form both the shelves and the up-rights of shelving.

20 Fig.2 illustrates shelving as an example, but not specifically for industrial applications, that may be used to store spare parts and other products, or articles that in general are metallic and have considerable weight.

Therefore, a primary requirement of shelving for the uses
25 indicated, or equivalent, is that of having considerable

mechanical resistance and load-bearing capacity, despite the fact that the shelving is made using several elements M of sheet metal with a relatively small thickness, for example in the region of one millimetre, or even less, ir-
5 respective of the nature of the material used which may be sheet metal, iron steel, zinc or other material, as is, or protected by painting, galvanising, etc.

The shelving illustrated in fig.2, indicated overall by 16 is made up of several modular elements M and includes for ex-
10 ample, but not necessarily, three shelves 10,12 and 14.

The shelving 16, to support the said shelves 10,12 and 14, includes at least two " up-rights" individually indicated by 18 and 20, which support the ends of the shelves using the characteristic angular elements each one of which is indic-
15 ated by 22.

These angular elements 22 are preferably produced from poly-
meric material, although the relative component material is not critical, provided it has sufficient mechanical resist-
ance and a certain elastic deformability (for the reasons
20 detailed hereunder).

The said angular elements 22 are arranged and occupy the three-dimensional space defined between the up-rights and the shelves. More precisely, the angular elements 22 in-
clude two " wings " 24 and 26 (figs.5 and 6) the first of
25 these wings virtually identifying themselves with shelf 10

that rests on them while the second wings oppose the adjacent up-right 20;

The angular elements 22 have lightnings 28 and cavities 30 made in correspondence with the wings 24 and 26. The cavities
5 30 form a female portion capable of receiving coherent male portions, or projections 32 with a "dove-tail" cross-section, or other structure capable of forming "undercut" which the up-rights 18, 20 and the shelves 10, 12 and 14 have.

In addition the angular elements 22 have louvres 34 in corres-
10 pondence with each cavity 30 which gives a certain elastic deformability on compression, in a longitudinal direction with respect to the edge of the angular element itself.

The elastic deformation is exploited to clamp both the pro-
jections 32 of the shelves 10, 12 and 14 and of the up-rights
15 18 and 20 and to block the said projections inside the cavities 30 of the said angular elements.

To achieve this elastic deformability, the angular elements 22 are compression stressed by tightening the tension rods 36 that have a widened head 38 on their ends and at least
20 one nut 40 respectively. The tension rods 36 are arranged inside holes 42 made longitudinally along the longer dimension of the angular elements 22.

The said tension rods 36 are pre-arranged so as not to intersect the projections 32 of the shelves 10, 12 and 14 and of
25 the up-rights that are positioned inside the cavities 30 of

the angular elements.

As has already been mentioned, with the use of angular elements 22, as described and represented above, or equivalent it is found possible to use the modular elements M
5 indifferently both as shelves, or as up-rights to form shelving.

These modular elements M may be produced by working a flat metallic material, or reduced to conditions of substantial flatness with the described critical characteristics (pro-
10 jections), for example by straightening sheet metal supplied in rolls.

The edges of the worked sheet metal products have preferably " curl " type corner radii 50 (figures 3 and 4) to eliminate " sharpness " from the said edges and permit easier handling
15 ing of the materials; the said curled parts 50 are in turn inserted inside seats 52 foreseen in the " wings " 24, 26 of the angular elements 22.

The modular elements 18 and 20 which have structural upright functions are completed at their lower and/or upper
20 ends with terminal edging 51 and 54 respectively to form resting bases on the floor and where necessary and compatible to oppose the ceiling of the room in which the shelving is installed.

To make the shelving, the modular elements M are cut to the
25 desired size and arranged in a horizontal and vertical position

to form the shelves and the up-rights. The angular fixing elements 22 are arranged at the crossing points between the shelves and the up-rights and beneath the surface of the shelves, so that the projections both of the shelves and
5 of the up-rights are inserted in the corresponding cavities 30 of the angular element 22. By turning the head 38 of the tension rod 36 the angular fixing element is tightened 22 so that the projections 32 both of the shelves and of the up-rights remain tightened and clamped inside the respective
10 cavities 30.

In the practical embodiment of this invention various modifications, variations and changes may be made within the spirit of this invention and without falling outside its scope.

CLAIMS

1. Method for the formation of metallic structures, in particular of shelving, wherein it consists of using modular elements obtained from the same sheet metal, having numerous folds, or projections which achieve the so-called undercut and arranged horizontally and vertically to form both the shelves and the up-rights and by using elastically deformable angular fixing elements, preferably at 90°, having cavities to fix the said shelves, geometrically coherent with the said projections inside which the projections of each modular element forming the up-right and the shelf are inserted; each projection being tightened and fixed in the corresponding cavity using a tension rod arranged along the full length of the fixing element.
2. Method, according to claim 1, wherein the projections have a dove-tail shape.
3. Method, according to claim 1, wherein the projections are Tee shape.
4. Method, according to any-one of the previous claims, wherein the angular fixing elements are plastic and have lightnings.
5. Method, according to anyone of the previous claims, wherein the angular fixing elements include two wings that cooperate with the shelf and with the adjacent up-right respectively.
6. Method, according to anyone of the previous claims, wherein the angular fixing elements have louvres in correspondence with each cavity.

- 7 Method, according to any-one of the previous claims, where -
in the tightening tension rods are arranged inside holes
made longitudinally along the full length of the angular elements.
8. Method, according to anyone of the previous claims, wherein
the edges of the shelves and of the up-rights are rounded in a
curled manner and inserted inside corresponding seats of the
angular elements.
9. Method, according to any-one of the previous claims, where-
in the modular elements that serve as up-rights have their ends
covered with terminal edgings.
10. Metallic structure, in particular shelving, formed from
a series of overlying shelves fixed to up-rights by fixing
elements, wherein the shelves and the up-rights are modular ,
made using the same sheet metal and have numerous folds, or
projections which form the so-called undercut and the fixing
elements are angular, preferably at 90°, elastically deform-
able and formed by two wings having cavities geometrically
coherent with the said projections and inside which the pro-
jections of the modular elements forming the shelf and the
adjacent up-right are inserted, a tension rod to tighten and
to fix all the projections in the respective cavities.

1/2

0132559

Fig. 2

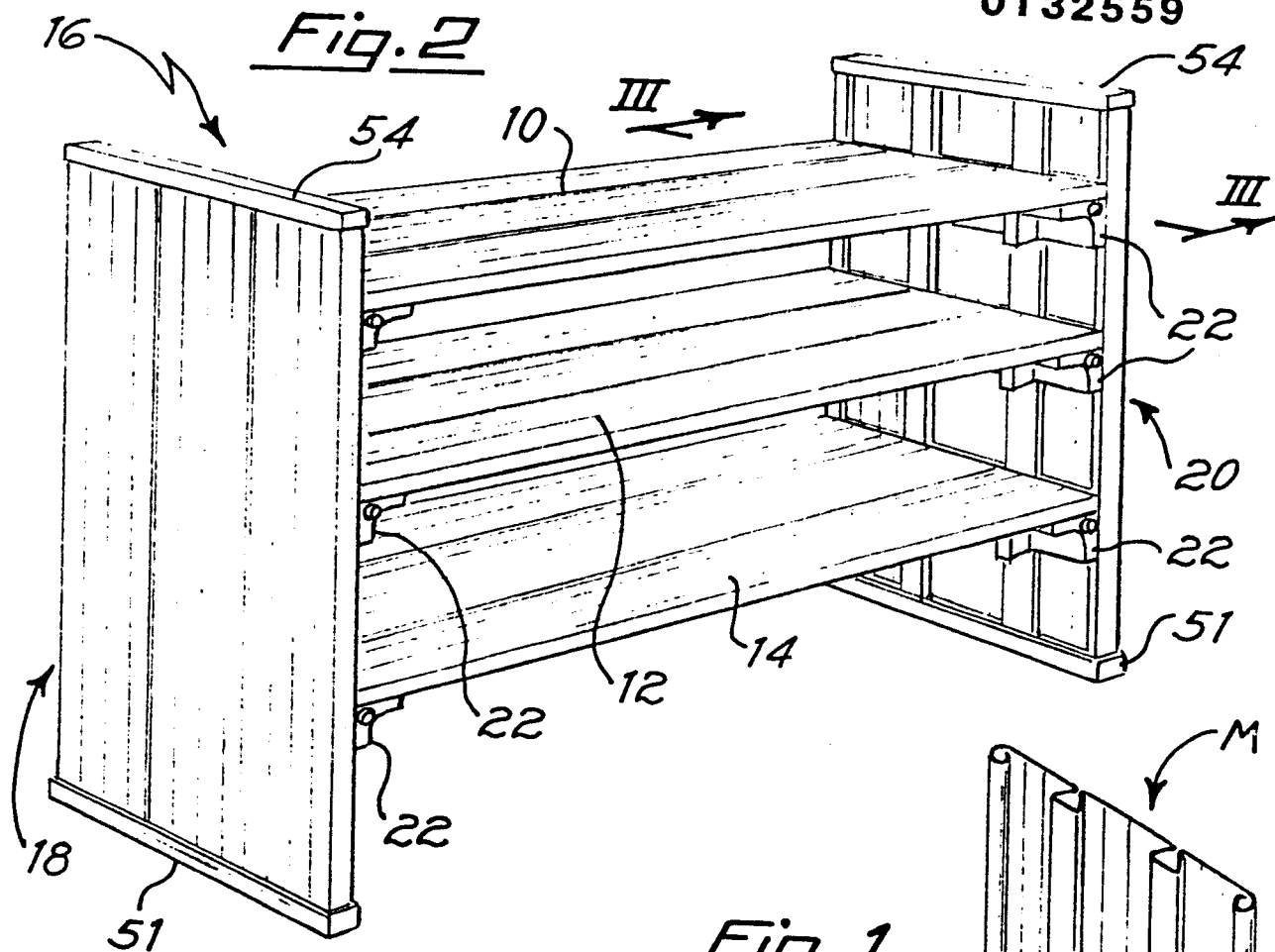


Fig. 1

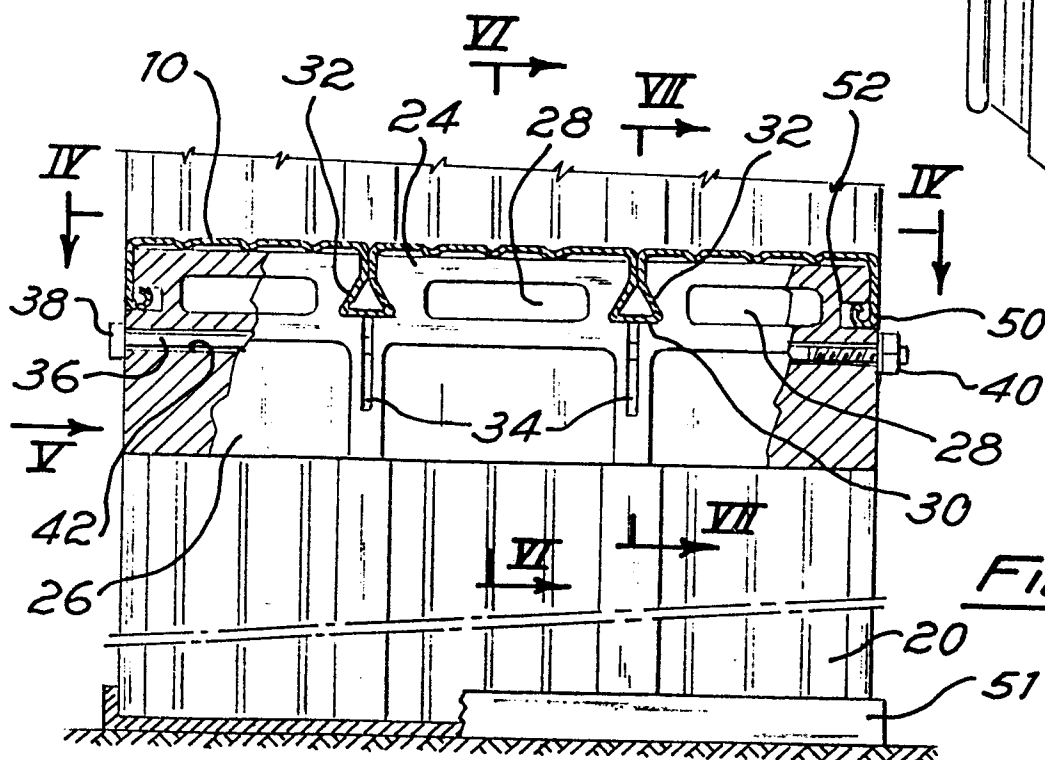


Fig. 3

