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(54) **Device for interlocking complementary pairs of components of sets of shelves made of metal plate**

(57) A device for interlocking complementary pairs of upright components (11) of sets of shelves (12) made of metal plate, wherein each component is of the type having portions to be joined which lie on two mutually perpendicular planes, the device comprising a pair of straight elongated wing-shaped male elements (17), one on each of the perpendicular planes, which are arranged at an angle and converge with respect to the intersection line of the planes of arrangement and protruding from a respective first component (11a), and a pair of female elements (18) which are at least partially slotted, have a shape and arrangement which are complementary to said male elements (17), and are provided on a second component (11b). Coupling occurs by resting one component on the other by means of the portions to be coupled, aligning the pairs of male (17) and female (18) elements, and by then mutually sliding them to achieve interlocking.

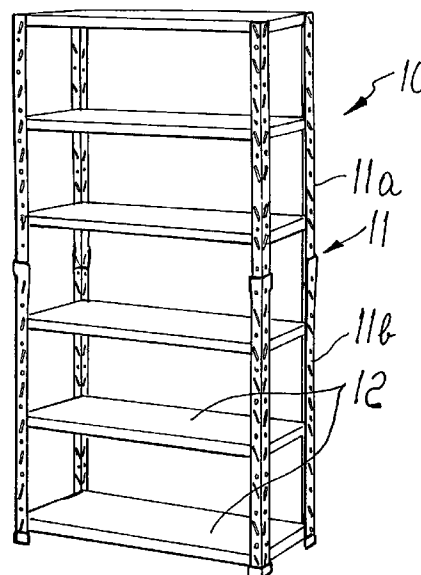


Fig. 1

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Description

The present invention relates to a device for interlocking complementary pairs of components of sets of shelves made of metal plate.

So-called "light" sets of shelves made of metal are currently widespread, which can be assembled at the point of use and can be used both in the industrial or commercial field and in houses.

These sets of shelves are mostly used to support ornaments, books, tools and other items.

These light sets of shelves are substantially constituted by uprights which are optionally reinforced by cross-members and whereon the shelves are fixed at various elevations.

The shelves and the uprights are coupled mainly by means of bolts through facing holes of the components.

Assembly, and accordingly disassembly, are therefore somewhat troublesome and time-consuming.

Moreover, the coupling is hardly ever rigid enough to make the structure become self-supporting, and therefore it is often necessary to provide safety anchoring to the wall, for example through hollow wall fasteners.

In other commercially available sets of shelves, the coupling between the shelves and the uprights is performed by interlocking tabs formed on the shelves at the vertical regions of their edges and holes formed on the uprights.

The tabs are formed by blanking and bending and cantilever out downwards from a region which is arranged horizontally and where they are joined to the shelf and enter the holes of the upright, straddling said holes and thus resting on their lower edges.

The tabs are therefore subjected, during use, to considerable shearing stresses which considerably limit their overall load-bearing capacity.

Moreover, particularly in this case, the structure is not particularly rigid and therefore self-supporting; it is therefore necessary to provide, particularly at the sides, cross-members for joining pairs of uprights.

This of course increases the number of components of the set of shelves and therefore their costs.

A principal aim of the present invention is to provide a device for interlocking complementary pairs of components of sets of shelves made of metal plate, which eliminates the above described drawbacks of conventional devices, particularly aiming at considerable ease of assembly and disassembly and improving mechanical strength so as to make the structure become self-supporting.

Within the scope of this aim, a consequent primary object of the present invention is to provide a coupling device which is competitive in terms of costs and production times with respect to conventional coupling devices.

Another important object of the present invention is to provide a device which maintains the interlock over time without changes.

Another object is to provide a coupling device which can be easily adapted to the various existing sets of shelves.

Another object is to provide a device which can be manufactured with conventional equipment and facilities.

This aim, these objects, and others which will become apparent hereinafter are achieved by a device for interlocking complementary pairs of upright components of sets of shelves made of metal plate, each component being of the type having portions to be joined which lie on two mutually perpendicular planes, said device being characterized in that it comprises:

-- a pair of straight elongated wing-shaped male elements, one on each of said perpendicular planes, arranged at an angle and converging with respect to the intersection line of the planes of arrangement and protruding from a respective first component;

-- a pair of female elements which are at least partially slotted, have a shape and arrangement which are complementary to said male elements, and are provided on a second component;

coupling occurring by resting one component on the other by means of said portions to be coupled, aligning the pairs of male and female elements, and then mutually sliding them to achieve interlocking.

Further characteristics and advantages of the present invention will become apparent from the following detailed description of an embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of a set of shelves with joining devices according to the present invention;

figure 2 is a transverse sectional view of the set of shelves in a region for coupling the upright to a shelf;

figure 3 is an exploded sectional view of the coupling elements of figure 2;

figure 4 is a partially sectional side view of the region of mutual coupling between the elements of figure 2;

figure 5 is a front view of a portion of an upright;

figure 6 is a front view of two uprights, coupled by means of the device according to the present invention.

With reference to the above figures, a set of shelves made of metal plate is generally designated by the reference numeral 10 and comprises, in the case being considered, four composite uprights 11 and a set of shelves 12 coupled thereto.

In particular, each upright 11 is formed by two elements 11a and 11b which are aligned and interlocked

by coupling devices according to the present invention.

The uprights 11 conveniently have an L-shaped cross-section and have, at the folding edge and at their outer edges, shaped portions, designated by the reference numerals 13 and 14 respectively, which form longitudinal reinforcement ridges.

The shelves 12 are instead constituted by a rectangular metal plate wherein the longitudinal edges 15a and the transverse edges 15b are folded down so as to form a C-shaped profile.

Longitudinal vertical regions 16a and transverse vertical regions 16b are thus formed on said edges, and the uprights 11 are coupled to the shelves 12 at said vertical regions, in the corner portions.

Then the uprights 11 are rested against the shelves 12, or viceversa, since the portions to be coupled are arranged on two mutually perpendicular planes, particularly the vertical regions 16a and 16b of the edges 15 of the shelves 12 and wings 11c and 11d of the uprights 11.

Each coupling device according to the present invention comprises two male elements, each designated by the reference numeral 17, which are shaped like an elongated straight wing, one male element being provided in each one of the wings 11c and 11d of an upright.

Of course, each upright 11 has a plurality of pairs of male elements 17 conveniently spaced from each other in order to allow to choose the level of each shelf from the ground.

The male elements 17 of each pair, formed by blanking and bending the metal plate, are arranged at an angle and converge downwards with respect to the intersection line of the planes of arrangement corresponding to the planes formed by the wings 11c and 11d and are coupled thereto along their length and therefore cantilever out laterally.

Correspondingly, the coupling device comprises two slotted female elements 18 shaped and arranged complementarily to the male elements 17 and provided on each shelf 12.

Each one of the female elements 18 has a portion 18a on the corresponding vertical flat region 16a or 16b of the edge 15 and a portion 18b on the longitudinal or transverse horizontal flat region 19a or 19b of said edge 15.

The portions 18a have an edge 20a converging downwards and meant to interact, by resting contact, with the male element 17, whilst the portions 18b have an edge 20b lying at right angles to the bisecting line of the angle between the wings 11c and 11d of the uprights 11.

Interlocking occurs by resting the corner of the shelf 12 against the upright 11 so that the female elements 18 are arranged above the male elements 17 and by then sliding them mutually to achieve interlocking.

The inclination and convergence of the pairs of male and female elements 17 and 18 induce force components, designated by the arrows of figure 2, directed

towards the corner of the upright 11 and of the shelf 12.

This of course is produced both by interlocking and by resting on the shelf 12 weights caused by the material which is placed thereon, and of course benefits the overall rigidity of the assembly and self-locking when loaded.

Figure 6 shows that the coupling of the components 11a and 11b of each upright 11 is also provided by means of devices composed, like the previous ones, of male elements, now designated by the reference numeral 117, and female elements, now designated by the reference numeral 118.

In this case, the female elements 118 are only partially slotted and do not have the horizontal portion, since coupling occurs end-to-end.

Of course, in order to achieve aligned interlock the component 11b provided with the male elements 117 has a flared end 21.

In practice it has been observed that the intended aim and objects of the present invention have been achieved.

As mentioned earlier, two male and female couplings in fact cooperate in each coupling device, and starting from the assumption that the components are coupled to each other by resting one against the other and that the elements of the pairs are arranged at an angle and converge downwards, an interlock is achieved wherein the components are pushed even more towards each other towards the corner region, at the same time achieving a self-locking, which increases when loaded.

A structure is obtain which is particularly rigid and self-supporting without the cooperation of elements other than the interlocks.

The structure is so rigid that it does not require cross-members for connecting the various uprights.

In practice it has been observed that the intended aim and objects of the present invention have been achieved.

The present invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may also be replaced with other technically equivalent elements.

In practice, the materials employed, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device for interlocking complementary pairs of upright components of sets of shelves made of

metal plate, each component being of the type having portions to be joined which lie on two mutually perpendicular planes, said device being characterized in that it comprises:

- a pair of straight elongated wing-shaped male elements, one on each of said perpendicular planes, arranged at an angle and converging with respect to the intersection line of the planes of arrangement and protruding from a respective first component;
 - a pair of female elements which are at least partially slotted, have a shape and arrangement which are complementary to said male elements, and are provided on a second component;
- coupling occurring by resting one component on the other by means of said portions to be coupled, aligning the pairs of male and female elements, and then mutually sliding them to achieve interlocking.

2. A device according to claim 1, characterized in that said male elements of each pair are arranged at an angle and converge downwards with respect to the intersection line of the planes of arrangement corresponding to the planes formed by the wings of an upright having an L-shaped cross-section.
3. A device according to claim 1, characterized in that said male elements are coupled to the component wherefrom they protrude along their length and therefore cantilever out laterally.
4. A device according to claim 1, characterized in that in the coupling between an upright and a shelf of a set of shelves, said male elements are provided as sets of pairs on uprights having an L-shaped cross-section, one element of a pair for each wing, or in the corresponding corner regions of the vertical portions of the edges of the shelf, said female elements being provided complementarily to said male elements on said shelf or as sets of pairs on said wings of said upright.
5. A device according to claim 1, characterized in that in the mutual end-to-end coupling of two parts composing an upright having an L-shaped cross-section, said male elements are provided in pairs, one for each wing of the L-shaped cross-section of a first upright component, and said female elements are provided complementarily in the other upright component.
6. A device according to claim 1, characterized in that said female elements have, when provided on shelves wherein the perimetric edge is folded downwards in a C-like shape, a portion on the corresponding vertical flat region of the edge and a

portion on the horizontal flat region, each one of the portions of the vertical regions of each pair of female elements having an edge for interacting, by resting contact, with the corresponding male element, said pair of female elements converging downwards, whilst the horizontally arranged portions have an edge which is at right angles to the bisecting line of the corresponding corner of the upper surface of the shelf.

