(54) **Arrangement of a shelf and a rack system and method for manufacturing a shelf for a rack system**

Arrangement d’une étagère et d’un système de rangement et méthode de fabrication d’une étagère pour un système de rangement

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(56) References cited:
- EP-A- 0 478 902
- CA-A- 1 190 190
- DE-C- 4 211 001
- US-A- 3 691 966
- US-A- 3 874 511
- US-A- 4 269 318

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Description

[0001] On the one hand, the invention relates to an arrangement of a shelf and a rack system, the shelf comprising a storage surface and at least one corner forming assembly element directed downwards, the assembly element being an integral part of the shelf and the assembly element being formed by two lips, bent over and overlapping each other at least partly. On the other hand, the invention relates to a method for manufacturing a shelf of such an arrangement.

[0002] Until now, various rack systems are known comprising at least one corner forming assembly element directed downwards. Thus, for instance in US 4,607,576 a device is described for fitting a panel in a panel support in a substantially horizontal position. The panel support comprises fitting surfaces situated substantially at right angles opposite one another, each fitting surface being provided with a receiving element open towards the top. The panel itself is provided with a corner flange directed downwards, comprising first and second tongue parts being provided directly in the flange in order to fit downwards into the first and second receiving elements of the panel support during assembling the device. Because the tongue parts fit into the receiving parts, there is both a clamping side to side and a clamping front to back of the tongue parts in order to obtain an extremely tight fit of the tongue parts in their respective receiving parts.

In EP 0 752 223 a coupling device is described for lightly loaded shelves, provided with raised edges to which the shelves directly connected. The device has a male component directly made or attached to the shelf or a raised edge and which is formed by a support, at least one part being attached to the element from which it extends and carried out in an inclined manner. The support has a transverse dimension, narrowing in the direction for being inserted into a corresponding and complementarily formed female component, moulded directly onto the complementary component of the shelves or onto an element attached to it.

[0003] In GB 2 260 480 a detached shelf system is considered, comprising four supporting elements, supporting a number of rectangular shelves. A corner part is attached to each corner of each shelf which is provided with pins fitting into corresponding keyhole-shaped openings, provided in the supporting elements, thus enabling the shelf to be fixed into the supporting element.

[0004] The disadvantage of these known implementations is that additional operations are required to mould assembly elements of the shelf in order to attach the shelf in the supporting elements of the rack system.

[0005] Furthermore, in GB 1 512 268 a shelf is described, where the shelf is provided with a flange consisting of a first part directed downwards, a second part lying against the inner side of the first part and furthermore is situated closely against an edge part of the bottom of the shelf. In the shelf and in the flange, holes may be provided in order to attach the supporting means of the rack system.

[0006] The disadvantage of such a rack system is that the assembly elements for installing the shelf in the supporting means of the rack system are carried out in a very complicated manner and quite some material is required to mould such installing elements. Furthermore, there are problems as to the sturdiness of such a rack system.

[0007] In DE 42 11 001 a shelf for a rack system is considered, comprising a flat supporting surface, and on each side, each time a hollow stiffening profile of a substantially rectangular section, extending downwards. The horizontal wall of this stiffening profile changes into the supporting surface, and on the transverse side a cross-stiffening, directed downwards is applied at an angle of 90° opposite the supporting surface. In their corner areas, the lower side of the stiffening profile and the cross stiffening are provided with a recess. In the corner area, the outer vertical longitudinal side of the stiffening profile is bent over inwards through an angle of 90°, against an outer lip, attached adjacent to the cross stiffening. Furthermore, in the corner area, the inner vertical sidewall of the stiffening profile is bent over through an angle of 90° over an inner lip, which is attached adjacent to the outer lip.

[0008] This system also has the drawback that the assembly elements for installing the shelf in the supporting means of the rack system is carried out in a complicated manner and a large amount of material is required to mould such assembly elements.

In EP 0 478 902 which claims priority over DE 42 11 001 a similar system is described as in this patent document, but first an opening has been provided in the corner area, serving to receive a support for the shelf, applied to the longitudinal or cross stiffening, and secondly the shelf is made of a piece of originally flat steel plate.

[0010] In US 4,269,318 a shelf of sheet metal is described, which may be manufactured without any welding. The shelf is made of one piece. Furthermore first lips are provided at each corner, which extend laterally from each side of the sidewall. These lips are of the same width as the side or end walls and are bent inwards in order to extend substantially at right angles to the side walls and to lie against the end walls. These first lips are situated on the inner side of the end walls. On the side and end walls co-operating assembly elements are provided at each corner of the shelf in order to mechanically fix the shelf to the support of the shelves.

[0011] Even, although the shelf has been made of one single piece of steel plate, the assembly elements for the rack system are yet carried out in a complicated manner.

[0012] A further disadvantage of all the above-mentioned state-of-the-art documents referred to is that the shelf systems require much space when transported.

[0013] The purpose of the invention is, on the one hand, to provide for an arrangement of a shelf and a rack system not having the disadvantages mentioned above.

[0014] On the one hand, this purpose is obtained by
providing an arrangement of a shelf and a rack system, the shelf comprising a storage surface and at least one corner forming assembly element directed downwards, the assembly element constituting an integral part of the shelf, and the assembly element being constituted by two lips bent over and overlapping one another at least partly, but the said bent lips being inserted into a corresponding assembly element being provided in a support of the rack system.

[0015] Such an arrangement of a shelf and a rack system has the following advantages:

- the shelves may be stacked together during transport as a matter of fact, the same goes for the supporting profiles for these shelves);
- by making use of the two strengthened bent lips as assembly elements to be inserted into a support of the rack system, a simple, but sturdy rack system is provided (the two bent lips move into an assembly element, which is provided in a support of the rack system).

[0016] In a specific embodiment of an arrangement according to the invention, the storage surface has been provided with at least one edge folded double and directed downwards.

[0017] This has the advantage that the storage surface of the shelf will be additionally strengthened.

[0018] In a preferred embodiment of an arrangement according to the invention, at least one free edge of the shelf has been folded over, in such a manner that a supporting edge is formed, the folded part being in contact with the bottom surface of the storage surface of the shelf.

[0019] This has the advantage that the strength of the storage surface of the shelf is increased, because of which more material can be placed on the shelf.

[0020] By combining these last two characteristics, a very strong shelf may be obtained although much less sheet material is required.

[0021] In a particular preferred embodiment of an arrangement according to the invention, the shelf is folded from one pre-cut steel plate.

[0022] On the other hand, the purpose of the invention is to provide a method for manufacturing a shelf of an arrangement of a shelf and a rack system in which a shelf is provided not showing the drawbacks mentioned above.

[0023] This purpose is obtained by providing a method for manufacturing a shelf for an arrangement of a shelf and a rack system as described above, the sheet being folded to form a shelf by means of rolling.

[0024] In order to further clarify the characteristics of this invention and in order to indicate its additional advantages and particulars, now a more detailed description will follow of an arrangement carried out according to the present invention.

[0025] In this description by means of reference numbers, reference is made to the attached drawings, of which:

- Figure 1 is a perspective top view of one corner of a first embodiment of a shelf for a rack system according to the invention which rests upon the storage surface;
- Figure 2 is a perspective front view of the corner of the shelf as represented in figure 1;
- Figure 3 is a top view of a part of the sheet cut out in order to form the corner of a shelf as shown in figures 1 and 2;
- Figure 4 is a perspective top view of one corner of a second embodiment of a shelf for a rack system according to the invention, which rests upon the storage surface;
- Figure 5 is a perspective front view of the corner of the shelf as represented in figure 4;
- Figure 6 is a top view of a part of the shelf cut out in order to form the corner of a shelf as shown in figures 4 and 5;

In the figures the folding lines of the shelf are indicated by dot and dash lines. The storage surface of the shelf is indicated by hatching.

[0026] A shelf (1) for a rack system according to the invention consists of one sheet (2), which has been pre-cut, as partly represented in the figures 3 and 6. The sheet (2) cut out is folded, after which a shelf is obtained having a rectangular form, comprising a storage surface (3) and four corner forming assembly elements (4) directed downwards, as represented in the figures 1, 2, 4 and 5. Each corner forming assembly element (4) may be inserted into a corresponding assembly element, which has been provided in a support (not represented) of the rack system. Each corner forming assembly (4) is composed of two lips forming an integral part of the shelf.

[0027] In a first embodiment of a shelf for a rack system according to the invention, as represented in the figures 1 up to and including 3, each corner forming assembly element (4) is composed of two lips, namely a first lip (5) and a second lip (6), the second lip consisting of two parts (6a,6b). The second part (6b) of the second lip (6) should be folded over around the first lip (5) and will overlap this first lip (5) entirely or partly, because of which a sturdy assembly element (4) is obtained in order to be able to install the shelf (1) in the support of the rack system. The free edges (7) of the shelf (1) are folded over such that a supporting edge will be formed the folded part (as represented in figure 1) being in contact with the bottom surface or the storage surface (3) of the shelf (1).

[0028] In a second embodiment of a shelf for a rack system according to the invention, as represented in the figures 4 up to and including 6, the shelf (1) is provided with an edge (12) folded double and directed downwards, and each corner forming assembly element (4) is composed of two lips, namely a first lip (10), provided extending from a first part (12a) of the edge (12) folded double and directed downwards, and a second lip (11) forming an integral part of the second part (12b) of the edge (12) folded double and directed downwards. Between this first
part (12a) and the first lip (10) and the second part (12b) and the second lip (11), a groove (13) is provided in order to be able to install each corner forming assembly element (4) in the support of the rack system. The free edges (14) provided on the edge (12) of the shelf (1) folded double and directed downwards are folded in such a manner that a supporting edge is formed, the part folded over as represented in figure 4 being in contact with the bottom surface of the storage surface (3) of the shelf (1).

[0029] Such a shelf for a rack system therefore has the advantage that:

- a thinner sheet may be used having at least the same capacity;
- no corners or additional assembly means have to be provided, because of which no extra auxiliary means are required (for instance: preventing that additional corners have to be added by welding);
- such a rack system may be easily packed and assembled;
- there are no sharp edges;
- the shelf may be manufactured in one single operation.

[0030] Therefore, in the method for manufacturing a shelf (1) for a rack system, one sheet (2) is cut out, the parts to be folded over and in being already provided, as may be seen in the figures 3 and 6. In each corner, this sheet (2) is folded, at least partly, according to the two corner forming folding lines (20, 21) in order to obtain a shelf (1) with a corner forming assembly element (4) and directed downwards. In order to form this corner forming assembly element (4) directed downwards, each time, two lips (5 and 6, 10 and 11) are provided in each corner of the sheet (2), a corner forming assembly element (4) being formed by folding, which may be applied to a corresponding assembly element in a support of the rack system (not represented in the figure). Furthermore stiffenings of the edge of the shelf (1) are provided:

- in a first embodiment, as represented in the figures 1 up to and including 3, the free edge (7) of the shelf (1) is folded over in order to form a supporting edge, the part folded over being in contact with the bottom surface of the storage surface (3) of the shelf (1);
- in a second embodiment, as represented in the figures 4 up to and including 6, an edge (12) folded double and directed downwards is provided, the free edge (14) being folded over in order to form a supporting edge, the part folded over being in contact with the bottom surface of the storage surface (3) of the shelf (1).

[0031] In order to fold the sheet (2) into the final shelf (1) the sheet may be folded automatically, but preferably it is rolled by means of rollers. Folding by means of rollers may occur at higher speeds.

[0032] The lips (5, 6 and 10, 11) overlapping one another partly or entirely are sometimes welded together or clinched together (pushed into one another) for greater sturdiness.

[0033] Applying such a method has the advantage that:

- only one operation is required to manufacture such a shelf (1);
- no additional auxiliary means are required (for instance: adding additional corners by welding).

Claims

1. Arrangement of a shelf and a rack system, the shelf (1) comprising a storage surface (3) and at least one corner forming assembly element (4) directed downwards, the assembly element (4) being an integral part of the shelf and the assembly element (4) being formed by two lips (5 and 6, 10 and 11) being bent over and overlapping each other at least partly, characterized in that the two lips (5 and 6, 10 and 11), which have been bent over, are inserted into a corresponding assembly element provided in a support of the rack system.

2. Arrangement according to claim 1, characterized in that the storage surface (3) is provided with at least one edge (12) folded double and directed downwards.

3. Arrangement according to claim 1 or 2, characterized in that at least one free edge (7, 14) of the shelf (1) is folded over, in such a manner that a supporting edge is formed, the part folded over being in contact with the bottom surface of the storage surface (3) of the shelf (1).

4. Arrangement according to anyone of the preceding claims, characterized in that the shelf (1) is folded from one pre-cut sheet (2).

5. Method for manufacturing a shelf (1) for an arrangement according to anyone of the preceding claims, characterized in that the shelf (1) is folded by means of rolling.

Patentansprüche

1. Anordnung eines Fachbodens und eines Regalsystems, wobei der Fachboden (1) eine Ablagefläche (3) und wenigstens ein eine Ecke bildendes Montageelement (4), welches nach unten gerichtet ist, umfasst und wobei das Montageelement (4) einen integralen Bestandteil des Fachbodens bildet, und das Montageelement (4) aus zwei Lippen (5 und 6, 10 und 11) gebildet ist, welche umgebogen sind und einan-
1. Arrangement d’une étagère et d’un système de rangement, l’étagère (1) comprenant une surface de stockage (3) et au moins un élément d’assemblage formant un coin (4) orienté vers le bas, l’élément d’assemblage (4) faisant partie intégrante de l’étagère, et l’élément d’assemblage étant formé par deux lèvres (5 et 6, 10 et 11) qui sont repliées et qui se chevauchent l’une l’autre au moins partiellement, caractérisé en ce que les deux lèvres (5 et 6, 10 et 11), qui ont été repliées, sont insérées dans un élément d’assemblage correspondant qui est disposé dans un support du système de rangement.

2. Arrangement selon la revendication 1, caractérisé en ce que la surface de stockage (3) présente au moins un bord (12) plié deux fois et orienté vers le bas.

3. Arrangement selon la revendication 1 ou 2, caractérisé en ce qu’au moins un bord libre (7, 14) de l’étagère (1) est replié, de telle sorte qu’un bord de support soit formé, la partie repliée étant en contact avec la surface inférieure de la surface de stockage (3) de l’étagère (1).

4. Arrangement selon l’une quelconque des revendica-
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4607576 A [0002]
- GB 1512268 A [0005]
- DE 4211001 A [0007] [0009]
- EP 0478902 A [0009]