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(54) A rack assembly

(57) The present invention relates to a rack assembly comprising

- at least one standard (10) with a plurality of slots (16) at regular distances from each other in height direction of the standard (10),
- at least one cross bar (711) provided for being suspended in the slots (16) of the at least one standard (10)
- the cross bar (711) comprising a first (1) and a second (1') connecting element which are removably interconnectable to each other,
- the first (1), respectively second (1'), connecting element being provided with a first, respectively second suspending element for engaging with the slots (16) of the standard,

The first suspending element (40, 42) is provided to be mounted in the slots (16) in a first direction parallel to the height direction of the standard (10), and the second suspending element (40', 42') is provided to be mounted in the slots (16) in a second direction opposite the first direction.

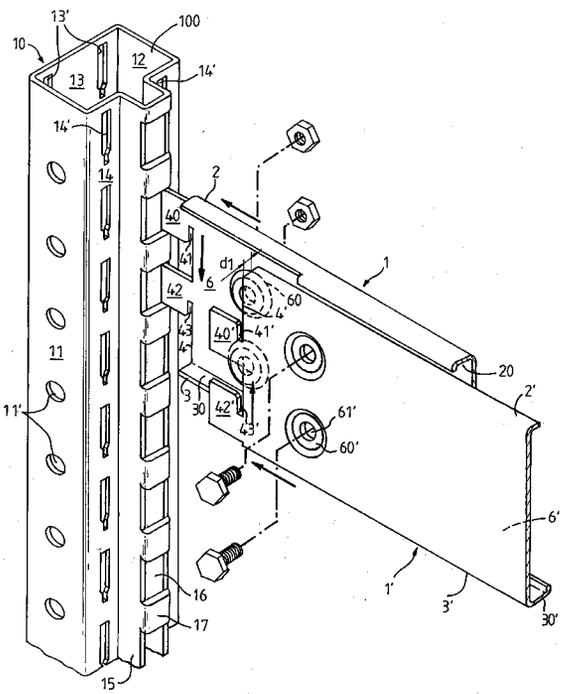

Fig. 1

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Description

[0001] The present invention relates to a rack assembly, and to a standard and a connecting element as parts of such a rack assembly.

[0002] Such a rack assembly is known from US-A-4.317.523. In the rack assembly disclosed in US-A-4.317.523, each time two standards are interconnected by a plurality of cross bars. Each cross bar comprises a first and a second connecting element which are removably connectable to each other. Thereto, the upper and lower edges of the first and second connecting elements comprise complementary means provided to engage with each other. The first and second connecting element comprise hooks near their ends for hooking in subsequent slots of a first and second standard. The assembly of the cross bar is done as follows. Firstly, the first connecting element is suspended in the first and second standard. This is done by inserting the hooks of the first connecting element in subsequent slots of the first and second standard and subsequently moving the first connecting element downwardly until the upper edge of the first connecting element is at a first height with respect to the lower end of the standards. Then, the second connecting element is suspended in the first and second standard. This is done by inserting the hooks of the second connecting element in subsequent slots of the first and second standard and subsequently moving the second connecting element downwardly until the upper edge of the second connecting element is at a second height with respect to the lower end of the standards which is substantially equal to the first height. Hereby, the complementary means provided in the upper and lower edges of the first and second connecting elements engage with each other such that the first and second connecting element interfit with each other.

[0003] The rack assembly of US-A-4.317.523 has the disadvantage that the rigidity of the connection of the first and second connecting elements with the standards is still limited.

[0004] The present invention aims at providing an alternative rack assembly, with which the rigidity of the connection between the first and second connecting element forming the cross bar and the standard may be improved.

[0005] This is achieved with a rack assembly showing the technical features of the characterising part of the first claim.

[0006] According to the invention, the first, respectively second, connecting element is provided with a first, respectively second suspending element for engaging with the slots of the standard. The first suspending element is provided to be mounted in the slots in a first direction parallel to the height direction of the standard. The second suspending element is provided to be mounted in the slots in a second direction opposite the first direction.

[0007] An analysis of the rigidity problem of the prior art rack assembly has shown that it is caused by the fact that the hooks of both the first and second connecting element are provided to be mounted in the same, i.e. downward, direction in the slots of the standard. As a result, there is a risk that the two connecting elements are unintentionally moved upwards, which may cause the elements to be disconnected from each other and/or the vertical standards.

[0008] In the rack assembly of the invention, the interconnectable first and second connecting elements are mounted in the standard in opposite directions. Since their interconnection fixes them to each other and dismounting them from the standard requires a movement in two opposite directions, the one connecting element impedes the dismounting of the other and vice versa. As a result, the rigidity of the connection of the first and second connecting element with the standard may be improved. Such an improved rigid connection may not only provide an improved strength of the cross bar, but may also contribute to an improved overall stability of the rack assembly of the present invention.

[0009] In a preferred embodiment of the rack assembly of the present invention, the first connecting element comprises an upper edge for engaging around an upper edge of the second connecting element, and the second connecting element has a lower edge for engaging around a lower edge of the first connecting element. Due to this composite engaging action, a further improvement of the rigidity of the connection between the cross bar and the standard may be obtained. Furthermore, the first and second connecting element will form a closed assembly, which is an advantage from an aesthetical point of view.

[0010] In another preferred embodiment of the rack assembly of the present invention, the first and second connecting element comprise means for clamping the first and second elements in the slots in cross direction of the standard. Preferably, these clamping means comprise at least one protrusion provided on side faces of the first and second connecting element, whereby the at least one protrusion of the first connecting element is provided to lie against the at least one protrusion of the second connecting element. Due to the presence of these protrusions, the first and second first connecting elements are pushed apart, such that the first and second connecting elements are clamped in cross direction of the standard. Thereby, the rigidity of the connection between the cross bar and the standard, and thus the overall stability/rigidity of the rack assembly, may be further improved.

[0011] The invention is further elucidated by means of the following figures and description of the figures.

[0012] Figure 1 shows the suspending of an embodiment of the first and second connecting elements, as parts of the rack assembly of the present invention, in an embodiment of a standard as a part of the rack assembly of the present invention.

[0013] Figure 2 is a perspective view to the first and

second connecting element of figure 1 in the connected state.

[0014] Figure 3 is a perspective view to an embodiment of the rack assembly of the present invention comprising a plurality of cross bars and standards.

[0015] Figure 4 is a perspective view to another embodiment of the rack assembly of the present invention.

[0016] Figure 5 is a perspective view to still another embodiment of the rack assembly of the present invention.

[0017] In figure 1, the suspending of a first 1 and second 1' connecting element in first slots 16 of a standard 10 is shown.

[0018] The first 1 and second 1' connecting elements shown in figure 1 each comprise an upper edge 2, 2' and a lower edge 3, 3' opposite the upper edge 2, and a first side edge 4, 4' and a second side edge 5, 5' (not shown) opposite the first side edge 4, 4' connecting the upper 2, 2' and lower 3, 3' edge. The first 1 and second 1' connecting elements have a substantially rectangular shape, but may have also any other shape and may for instance have a trapezoidal shape. The first and second connecting elements shown in figure 1 both have substantially the same shape. Alternatively, they may have a different shape: for example, the first connecting element may have a rectangular shape, while the second connecting element may have a trapezoidal shape.

[0019] The first 1, respectively second 1' connecting element is provided with a first 40, 42 respectively second 40', 42' suspending element for engaging with the first slots 16 of the standard 10. As shown in figure 1, the first 40, 42 respectively second 40', 42' suspending element is provided in the first side edge 4, respectively 4'. The first 1, respectively second 1' connecting element shown in figure 1 further comprise a third 50, 52 respectively fourth 50', 52' suspending element for engaging with the first slots 16' of a second standard 10' (not shown) in the second side edge 5, respectively 5' (not shown) opposite the first side edge 4, respectively 4'. In the first 1, respectively second 1' connecting element shown in figure 1, the first and third suspending element, respectively the second and fourth suspending element, are designed in a similar way (see below). It is however also possible that the first and third suspending element of the first connecting element are designed in a different way, and that the second and fourth suspending element of the second connecting element are designed in a different way. It is also possible that the first 1 and second 1' connecting elements only comprise the first 40, 42 respectively second 40', 42' suspending elements. For example, the suspending of the first and second connecting element in the second standard may be achieved with different means.

[0020] As shown in figure 1, the first and second suspending elements engage with the first slots 16 provided in a protruding part 15 extending over substantially the entire height of the standard 10 (see also below). These first slots 16 may however also be provided in one of the side faces 11-14 (see below). Similarly, the third 50, 51, 52, 53 and fourth 50', 51', 52', 53' suspending elements engage with the first slots 16' provided in a protruding part 15 extending over substantially the entire height of the second standard 10' (not shown).

[0021] In the first connecting element 1 shown in figure 1, the first suspending element comprises a first hook 40 with a first notch 41 and a second hook 42 with a second notch 43, whereas the third suspending element comprises a third hook 50 with a third notch 51 and a fourth hook 52 with a fourth notch 53. The first 40, respectively third 50 hook and the second 42, respectively fourth 52 hook lie below each other in the direction of the upper edge 2 towards the lower edge 3. Similarly, in the second connecting element 1' shown in figure 1, the second suspending element comprises a fifth hook 40' with a fifth notch 41' and a sixth hook 42' with a sixth notch 43', whereas the fourth suspending element comprises a seventh hook 50' with a seventh notch 51' and a eight hook 52' with a eight notch 53'. The fifth 40', respectively seventh 50' hook and the sixth 42', respectively eight 52' hook lie below each other in the direction of the upper edge 2' towards the lower edge 3'. It is however also possible that the first and second suspending element each comprise only one hook, or more than two hooks. Moreover, the first, second, third and fourth suspending element may be designed in any other way known to the person skilled in the art.

[0022] When the first connecting element 1 is suspended in the first and second (not shown) standards 10, the first 40 and second 42 hook of the first suspending element hook behind parts 17 of the first standard 10 in between the first slots 16 of the first standard 10, whereas the third 50 and fourth 52 hook of the third suspending element hook behind parts 17' of the second standard 10' in between the first slots 16' of the second standard 10' (not shown). Thereby, these parts 17 of the first standard 10 are partly received in the first 41 and second 43 notches, and the parts 17' of the second standard 10' are received in the third 51 and fourth 53 notches. Similarly, when the second connecting element 1' is suspended in the first and second (not shown) standard 10, the fifth 40' and sixth 42' hook of the third suspending element hook behind parts 17 separating the first slots 16 of the first standard 10, whereas the seventh 50' and eight 52' hook of the fourth suspending element hook behind parts 17' separating the first slots 16' of the second standard 10' (not shown). Thereby, these parts 17' of the first standard 10 are partly received in the fifth 41' and sixth 43' notches, and the parts 17 of the second standard 10' are received in the seventh 51' and eight 53' notches.

[0023] The first suspending element of the first connecting element is provided to be mounted in the slots of the standard in a first direction parallel to the height direction of the standard, while the second suspending element of the second connecting element is provided to be mounted in the slots in a second direction opposite

the first direction. As can be seen from figure 1, the first 40 and second hooks 42 of the first suspending element are directed towards the lower edge 3 of the first suspending element 1, whereas the fifth 40' and sixth 42' hooks of the second suspending element are directed towards the upper edge 2' of the second connecting element 1'.

[0024] The third suspending element of the first connecting element is provided to be mounted in the slots of the second standard in a third direction parallel to the height direction of the standard, while the fourth suspending element of the second connecting element is provided to be mounted in the slots in a fourth direction opposite the third direction. The third 50 and fourth 52 hooks of the third suspending element (not shown) of the first connecting element shown in figure 1 are directed towards the lower edge 3 of the first connecting element 1, whereas the seventh 50' and eight 52' hooks of the fourth suspending element (not shown) of the second connecting element ' shown in figure 1 are directed towards the upper edge 2' of the second connecting element 1' (not shown).

[0025] Thus, for suspending the first connecting element 1 in the first and second (not shown) standard 10, the first 40 and second 42 hook of the first suspending element 1 are mounted in downward direction in subsequent first slots 16 in height direction of the first standard 10, and the third 50 and fourth 52 hook of the third suspending element are mounted in downward direction in subsequent first slots 16' in the second standard 10', substantially parallel to the first standard 10, as shown in figure 1. In other words, the first connecting element 1 is moved downwardly until the upper edge 2 of the first connecting element 1 is at a first height H1 with respect to the lower edge of the standards. Hereby, the first hook 40 engages with a first slot 16 of the first standard 10 in height direction immediately above the first slot 16 of the first standard 10 with which the second hook 42 engages, and the third hook 50 engages with a first slot 16 in height direction immediately above the first slot 16 with which the fourth hook 52 engages. The first 40, respectively third 50 hook may however also engage with slots in height direction of the first, respectively second standard not immediately above the slots with which the second 42, respectively fourth 52 hook engage.

[0026] For suspending the second connecting element in the same first and second standard, the fifth 40' and sixth 42' hook of the second suspending element are mounted in upward direction in subsequent first slots 16 in height direction of the first standard 10, and the seventh 50' and eight 52' hook of the fourth suspending element are mounted in upward direction in subsequent first slots 16' in the second standard 10', as can be seen from figure 1. In other words, the second connecting element 1' is moved downwardly until the upper edge 2' of the second connecting element 1' is at a second height H2 with respect to the lower edge of the standards. This second height H2 is substantially equal to the height H1. Hereby, the fifth hook 40' engages with a first slot 16 of the first standard 10 of in height direction above the first slot 16 with which the sixth hook 42' engages, and the seventh hook 50' engages with a first slot 16' of the second standard 10' in height direction above the first slot 16' with which the eight hook 52' engages. The fifth 40', respectively seventh 50' hook may however also engage with slots in height direction of the first, respectively second standard not immediately above the slots with which the sixth 42', respectively eight 52' hook engage.

[0027] The subsequent first slots 16 of the first standard 10 in which the first and second connecting elements are suspended are at substantially the same height as the corresponding subsequent first slots 16' of the second standard 10' in which the first and second connecting elements are suspended (not shown). In this way, the first and second connecting elements form a stabile horizontal connection between the first and second standards. It is however also possible that the first and second connecting elements are inclined with respect to the first and second standard. The opposite mounting of the first and second connecting elements in slots of a standard results in a rigid connection between the first and second connecting element and a standard.

[0028] Since in figure 1, the first and second standards are substantially parallel to each other (not shown), and since the first and third suspending element of the first connecting element 1 are designed in a similar way, the downward direction in which the first suspending is mounted in the slots of the first standard is substantially parallel to the downward direction in which the third suspending element is mounted in the slots of the second standard. Similarly, since the second and fourth suspending element of the second connecting element 1' are designed in a similar way, the downward direction in which the second suspending is mounted in the slots of the first standard is substantially parallel to the downward direction in which the fourth suspending element is mounted in the slots of the second standard.

[0029] As can be seen from figures 1 and 2, the first 40, respectively second 42 hook of the first suspending element of the first connecting element 1 engages with a first slot 16 in height direction immediately above the first slot 16 with which the fifth 40', respectively sixth 42' hook of the second suspending element of the second connecting element 1' engages. As a result, since the first 40 and second 42 hook of the first connecting element 1 are directed in the opposite direction as compared to the fifth 40' and sixth 42' hook of the second connecting element 1', the first hook 40 of the first connecting element 1 and the fifth hook 40' of the second connecting element 1' hook behind the same part 17 of the standard, and the second hook 42 of the first connecting element 1 and the sixth hook 42' of the second connecting element 1' hook behind the same part 17 of the standard immediately below the part 17 behind

which the first 40 and fifth 40' hooks hook. Or, in other words, the part 17 of the standard 10 separating the subsequent first slots 16 behind which the first 40 and fifth 40' hooks hook, is received at its top edge in the first notch 41 of the first hook 40 of the first connecting element, and at its bottom edge in the fifth notch 41' of the fifth hook 40' of the second connecting element 1'. Similarly, the part 17' of the first standard 10 separating the first slots 16 behind which the second 42 and sixth 42' hooks hook, is received at its top in the second notch 43 of the second hook 42 of the first connecting element 1, and at its bottom in the sixth notch 43' of the sixth hook 42' of the second connecting element 1'. Alternatively, the first hook 40, respectively second hook 42 of the first connecting element 1 may engage with a first slot 16 in height direction not immediately above the first slot 16 with which the fifth hook 40', respectively sixth hook 42' of the second connecting element 1' engages. It is also possible that the first hook 40, respectively second hook 42 of the first connecting element 11 engages with a first slot 16 in height direction *below* the first slot 16 with which the fifth hook 40', respectively sixth hook 42' of the second connecting element 1' engages, or that the first hook 40, respectively second hook 42 of the first connecting element 11 engages with the same first slot 16 as the one with which the fifth hook 40', respectively sixth hook 42' of the second connecting element 1' engages. The hooks of the third and fourth suspending element of the first, respectively second connecting element are designed in a similar way.

[0030] When the first and second connecting elements are assembled to form a cross bar 711, as shown in figure 2, the first and second connecting elements are interconnected to each other. For disassembling the cross bar again, this interconnection between the first and second connecting elements can be disrupted.

[0031] This removable interconnection of the first and second connecting elements may be done by any suitable means known to the man skilled in the art. In the embodiment of the first and second connecting elements shown in figure 1-2, the first connecting element 1 comprises an upper edge 2 for engaging around an upper edge 2' of the second connecting element 1', and the second connecting element 1' comprises a lower edge 3' for engaging around a lower edge 3 of the first connecting element 1. As can be seen from figure 1, the upper 2, respectively 2' and lower 3, respectively 3' edges of the first, respectively second connecting elements are provided with flanges 20, respectively 20' and 30, respectively 30' bent over a substantially right angle with respect to the side face 6, respectively 6' of the first, respectively second connecting element and which extend in the direction of the facing side face 7', 6 of the second, respectively first connecting element. The flange 20 provided on the upper edge 2 of the first connecting element 1 is over at least a part of its length bend downwardly so as to form a pocket for engaging around the upper edge 2' of second connecting element 1', as can be seen from figure 2. Similarly, the flange 30 provided on the lower edge 3 of the second connecting element 1' is over at least a part of its length bent downwardly so as to form a pocket for engaging around the lower edge 3 of first connecting element 1, as can also be seen from figure 2.

[0032] The first 1 and second 1' connecting element comprise means for clamping the first and second elements in the slots in cross direction of the standard. The clamping means comprise at least one protrusion 60, respectively 60' provided on the side faces 6, respectively 6' of the first, respectively second connecting elements facing each other. The at least one protrusion 60 of the first connecting element 1 is provided to lie against the at least one protrusion 60' of the second connecting element 1'. In figure 1, two protrusions 60, respectively 60' are provided at a distance from and on a line substantially parallel to the first side edge 4, respectively 4'. At a distance from and on a line substantially parallel to the second side edge 5, respectively 5', also two protrusions 60, respectively 60' are provided. It is however also possible that only one, or more than two protrusions 60, 60' are present. These protrusions 60, respectively 60' are in the shape of a circle and are formed by locally pressing the material of the first 1, respectively second 1' connecting element over a distance d_1 in the direction towards the facing second 1', respectively first 1 connecting element. In the connected state when the first and second connecting element are suspended in the slots, as shown in figure 2, the corresponding protrusions 60 and 60' of the first and second connecting element lie against each other (not visible in figure 2). As a result, the first and second connecting element are slightly pushed apart and are clamped in the first slots 16 in cross direction of the standard 10, thereby further contributing to the rigidity of the connection between the standard and the first and second connecting element.

[0033] As can be seen from figure 1, the protrusions 60, 60' are provided with a central hole 61, 61'. The central hole 61, 61' extends throughout the entire thickness of the first 1, respectively second 1' connecting element. In the connected state of the first and second connecting element, the holes 61, 61' of opposite protrusions 60, 60' are in line and are provided for receiving a bolt or screw or any other suitable connecting means. As a result, the first 1 and second 1' connecting elements are additionally fastened to each other by introducing a bolt or screw or other fastening means in the corresponding openings 61, 61' of opposite protrusions 60, 60', as can be seen from figure 2.

[0034] The standard 10 shown in figures 1-2 as a part of the rack assembly of the present invention comprises a first side face 11 and an opposite second side face 12 parallel with the first side face 11, and a third side face 13 and an opposite fourth side face 14 parallel with the third side face 13. The first 11, second 12, third 13 and fourth 14 side face form a closed profile of the standard 10 and enclose a central space 100 extending in longi-

tudinal direction of the standard 10 over the entire length of the standard 10. Due to the closed structure of the standard 10, the standard has an improved rigidity in comparison with an open standard. Due to this larger rigidity, the standard is provided to carry a heavier load. Alternatively, the standard 10 may have an open structure.

[0035] In figures 1 and 2, the fourth side face 14 of the standard is provided with a protruding part 15 in the middle of the fourth side face 14 in transverse direction thereof. The protruding part 15 extends over substantially the entire length of the fourth side face 14. It is however also possible that the protruding part 15 is not in the middle of the fourth side face 14 in transverse direction thereof. The protruding part 15 preferably has a U-shaped profile, but may have also any other shape, and may have for instance a circumference in the shape of a semicircle. The presence of this protruding part 15 is not critical to the invention and may also be absent. In the latter case, the standard may have a general rectangular cross section formed by the first 11, second 12, third 13 and fourth 14 side face at right angles from each other.

[0036] The protruding part 15 is provided with a plurality of first slots 16 at substantially regular distances from each other in height direction of the standard 10. These first slots 16 are provided for receiving the first and second suspending elements of the first and second connecting elements (see above). Thereby, the first and second connecting element may connect the standard 10 with a further standard 10. When the protruding part 15 is lacking from the standard 10, it is possible that a plurality of first slots 16 is provided in the fourth side face 14 in the middle thereof in transverse direction of the fourth side face 14.

[0037] In the standard 10 shown in figures 1 and 2, the fourth side face 14 is on both sides of the protruding part 15 provided with a plurality of second slots 14' at substantially regular distances from each other in height direction of the standard 10. The third side face 13 opposite the fourth side face 14 is provided with two parallel rows of third slots 13", of which the shape and position corresponds with the two rows of second slots 14' in the fourth side face 14. These second 14' and third 13' slots are provided for removably receiving suspending elements of further cross bars 713 (see figure 3), namely horizontal shelves 713 for connecting two standards 10 in width direction of the rack assembly of the present invention (see below). These second 14 and third 14' slots may however also be lacking from the standard 10.

[0038] In the standard 10 shown in figure 1, the first side face 11 and/or the second side face 12 of the standard 1 is/are provided with a plurality of fourth slots 11', 12' at substantially regular distances from each other in height direction of the standard 10. These fourth slots 11', 12' alternate with the second 14' and third 14' slots. These fourth slots 11', 12' are provided for removably receiving locking pins or other suitable connecting means which secure the second cross bars 713 and prevent them from being removed unintentionally from the standards 10. These fourth slots 11', 12' may however also lack from the standard 10.

[0039] The rack assembly 70 shown in figure 3 comprises a storage part 71 and a display part 72 removably connectable to each other.

[0040] At the four corners of the storage part 71, each time an upright standing vertical standard 10, 10', as shown in figure 2, extending in height direction of the rack assembly 70 is provided.

[0041] In depth direction of the rack assembly 70 shown in figure 3, each time two vertical standards 10, 10' are connected to each other by means of the horizontal cross bar 711 comprising a first 1 and second 1' connecting element removably fastened to each other (see above). The connection of two standards 10 by means of the first 1 and second 1' connecting elements was described with reference to figure 1 above. In the rack assembly 70 shown in figure 3, each time two vertical standards 10, 10' are connected to each other in depth direction of the rack assembly 70 by means of three horizontal cross bars 711 at a distance from each other in height direction of the standard 10, 10'. The lowest cross bar 711 is at a height h1 with respect to the bottom ends of the vertical standards 10, 10'. The upper cross bar 711 is provided at a height corresponding to the upper ends of the vertical standards 10, 10'.

[0042] In the rack assembly 70 shown in figure 3, each time between subsequent horizontal cross bars 711, a diagonal cross bar 712 is provided for further connecting two vertical standards 10, 10' already connected by these horizontal cross bars 711. The diagonal cross bar 712 is connected at its upper, respectively lower end, together with the screw or bolt or other connecting means throughout the central openings 61, 61' in opposite protrusions 60, 60' of the upper respectively lower horizontal cross bars 711. In this way, the diagonal cross bar 712 thus forms a connection between the upper and the lower horizontal cross bar 711. It is however also possible to clamp the diagonal cross bar 712 with its upper end in a first slot 16 of a standard 10 immediately above the first slots 16 in which the horizontal cross bar 711 is suspended, and with its lower end in a first slot 16 of a further standard 10 immediately above the first slots 16 in which the horizontal cross bar 711 is suspended. In this way, the diagonal cross bar 712 forms a connection between two vertical standards 10. These diagonal bars 712 may however lack from the rack assembly 70, the more since, due to the improved rigidity of the connection between the standard and the first and second connecting elements forming the horizontal cross bar 711, a stabile connection between two standards 10 may be obtained without the additional presence of such diagonal bars 712 between two standards 10.

[0043] Since a diagonal bar 712 is each time present

between two horizontal cross bars 711, and since the lower cross bar 711 is provided at a height h1 with respect to the lower end of the vertical standards 10, there is no diagonal bar 712 present below this height h1. As a consequence, below this height h1 it is possible to stack products between different rack assemblies positioned against each other in width direction of the rack assembly of the present invention without interruption. Further, since the rack assembly 70 shown in figure 1 comprises standards as shown in figure 2 having a closed profile, and since the closed profile provides an improved rigidity to the standard 10 as compared to an open profile, this standard may carry an increased load. As a consequence, the height h1 may be larger as compared to racks in which standards with an open profile are used.

[0044] In width direction of the rack assembly 70 shown in figure 3, two vertical standards 10, 10' are at the level of the cross bars 711 connected by means of further cross bars 713, namely horizontal shelves 713. The connection of the horizontal cross bars 713 to the standards 10 was described with reference to figure 2. In figure 3, two standards 10, 10' are each time connected to each other in width direction of the rack assembly 70 by three horizontal shelves 713 at distances from each other in height direction of the standard 10. The lower horizontal shelve 713 is at substantially the same height h1 with respect to the lower end of the standard 10, 10'.

[0045] In the rack assembly 70 shown in figure 3, two opposite parallel horizontal shelves 713 in depth direction of the rack assembly 70 are connected to each other by a plurality of parallel horizontal shelves 714 perpendicular to the horizontal shelves 713. As a result, two opposite horizontal shelves 713 together with horizontal shelves 714 connecting the horizontal shelves form a carrier. A horizontal bottom can be positioned on these shelves 714 for stacking products thereon. Alternatively, the products may be stacked directly on the shelves 714.

[0046] The display part 72 shown in figure 3 is constructed in such a way that it can be combined with and connected to the storage part 71 in a simple way, and such that it has substantially the same length in width direction of the rack assembly 70 as the storage part 71. Thereto, the intermediate standards 722 of the display part 72 are provided with a plurality of slots 722' at regular distances from each other in height direction of the intermediate standard 722 which are substantially identical to the slots 16, 16' provided in the standards 10, 10'. As a result, different rack assemblies 70 can be positioned against each other in width direction of the rack assembly 70 without interruption of the back panels 723 and shelves 724 of the display part 72. This has the advantage that it is possible to stack products between different rack assemblies 70 positioned against each other in width direction of the rack assembly of the present invention without interruption. Further, the shelf supporting elements 725 supporting the shelves 724 of the display part 72 can be suspended either in the standards 10, 10' or in the intermediate standard 722, or can be suspended in both the standard 10, 10', thereby interconnecting the standard 10 and the central standard 10.

[0047] Furthermore, the display part 72 is removably connectable to the storage part 71. As shown in figure 3, the display part 72 is removably connectable to the storage part 71 by means of a slidable clamp 721 which is connected in the intermediate standard 722 of the display part 72 and which is clamped on the lower horizontal cross bar 711. In the clamp, one or more holes may be provided which are in line with on or more holes provided in the first and second connecting element forming the horizontal cross bar (not shown) for receiving a bolt or screw or any other fastening means there through. Due to the thus removably connectable intermediate standard 722, the rack assembly 70 is given an additional stability, both in width as well as in depth direction of the rack assembly 70. Thus, a stabile connection between the storage 71 and display part 72 is obtained.

[0048] The rack assembly 70 shown in figure 4 only comprises the storage part 71 which was described with reference to figure 3.

[0049] The rack assembly shown in figure 4 comprises a storage part 71 which was described with reference to figure 3 and a display part 72 removably connectable to the storage part 71.

Claims

1. A rack assembly (70) comprising

- at least one standard (10) with a plurality of slots (16) at regular distances from each other in height direction of the standard (10),
- at least one cross bar (711) provided for being suspended in the slots (16) of the at least one standard (10)
- the cross bar (711) comprising a first (1) and a second (1') connecting element which are removably interconnectable to each other,
- the first (1), respectively second (1'), connecting element being provided with a first, respectively second suspending element for engaging with the slots (16) of the standard,

characterized in that
the first suspending element (40) is provided to be mounted in the slots (16) in a first direction parallel to the height direction of the standard (10), the second suspending element (40') is provided to be mounted in the slots (16) in a second direction opposite the first direction.

2. The rack assembly (70) according to claim 1, **characterised in that**

- the first connecting element (1) comprises an upper edge (2) for engaging around an upper edge (2') of the second connecting element (1'),
- the second connecting element (1') has a lower edge (3') for engaging around a lower edge (3') of the first connecting element (1).

3. The rack assembly (70) according to claim 1 or 2, **characterised in that**

- the first suspending element comprises at least one hook (40) for engaging with the slots (16) of the standard (10), the at least one hook (40) of the first suspending element being directed towards the lower edge (3) of the first connecting element (1),
- the second suspending element comprises at least one hook (40') for engaging with the slots (16) of the standard (10), the at least one hook (40') of the second suspending element being directed towards the upper edge (2') of the second connecting element (1').

4. The rack assembly (70) according to any one of claims 1-3, **characterized in that**

- the first connecting element (1) comprises a third suspending element (50) for engaging with slots (16') of a second standard (10'), the third suspending element (50) being located on the opposite side of the first connecting element (1) with respect to the first suspending element (40),
- the second connecting element (1') comprises a fourth suspending element (50') for engaging with the slots (16') of the second standard (10'), the fourth suspending element being located on the opposite side of the second connecting element (1') with respect to the second suspending element (40'),
- the third suspending element (50) being provided to be mounted in the slots (16') in a third direction parallel to the height direction of the second standard (10'), the fourth suspending element (50') being provided to be mounted in the slots (16') in a fourth direction opposite the third direction.

5. The rack assembly (70) according to any one of claims 1-4, **characterised in that** the first connecting element (1) has substantially the same shape as the second connecting element (1').

6. The rack assembly (70) according to any one of claims 1-5, **characterised in that** the first (1) and second (1') connecting elements comprise means for clamping (60, 60') the first (1) and second (2') connecting elements in the slots (16) in cross direction of the standard (10).

7. The rack assembly (70) according to claim 6, **characterised in that** the clamping means comprise at least one protrusion (60, 60') provided on side faces (6, 6') of the first (1) and second (1') connecting element, the at least one protrusion (60) of the first connecting element (1) being provided to lie against the at least one protrusion (60') of the second connecting element (1').

8. The rack assembly (70) according to claim 7, **characterized in that** the at least one protrusion (60) of the first connecting element (1) and the at least one protrusion (60') of the second connecting element (1') are provided with a hole (61, 61') extending throughout the width of the first (1) and second (1') connecting element, the holes (61, 61') in the opposite protrusions (60, 60') of the first (1) and second (1') connecting element in the connected state being in line with each other and being provided for receiving a fastening means there through for removably fastening the first (1) and second (1') connecting element.

9. The rack assembly (70) according to any one of the preceding claims 1-8, **characterized in that** the rack assembly (70) comprises a storage part (71) having a first length in width direction of the rack assembly (70), the storage part (71) comprising

- a first and second pair of standards (10, 10') as specified in claim 1,
- a plurality of cross bars (711) as specified in the previous claims 1-8,
- at least one carrier for mounting on the standards (10, 10') at the level of the cross bars (711),

in that the rack assembly (70) further comprises a display part (72) having a second length in width direction of the rack assembly (70) being substantially the same as the first length of the storage part (71), the display part (72) being removably connectable to the storage part (71), the display part (72) comprising

- a pair of intermediate standards (722) removably connectable to the cross bars (711) in such a way that each intermediate standard (722) extends in between the first or second pair of standards (10, 10'),
- each intermediate standard (722) being provided with a plurality of slots (722') at regular distances from each other in height direction of the intermediate standard (722'), the slots (722') being substantially the same as the slots (16, 16') in the standards (10, 10') of the storage part (71), the slots (722') being provided for sus-

pending at least one shelf supporting element (725).

10. A standard (10, 10') as a part of the rack assembly (70) according to any one of the preceding claims 1-9.

11. An intermediate standard (722) a part of the rack assembly (70) according to claim 9.

12. A first (1) and second (1') connecting element as a part of the rack assembly according to any one of the preceding claims 1-9.

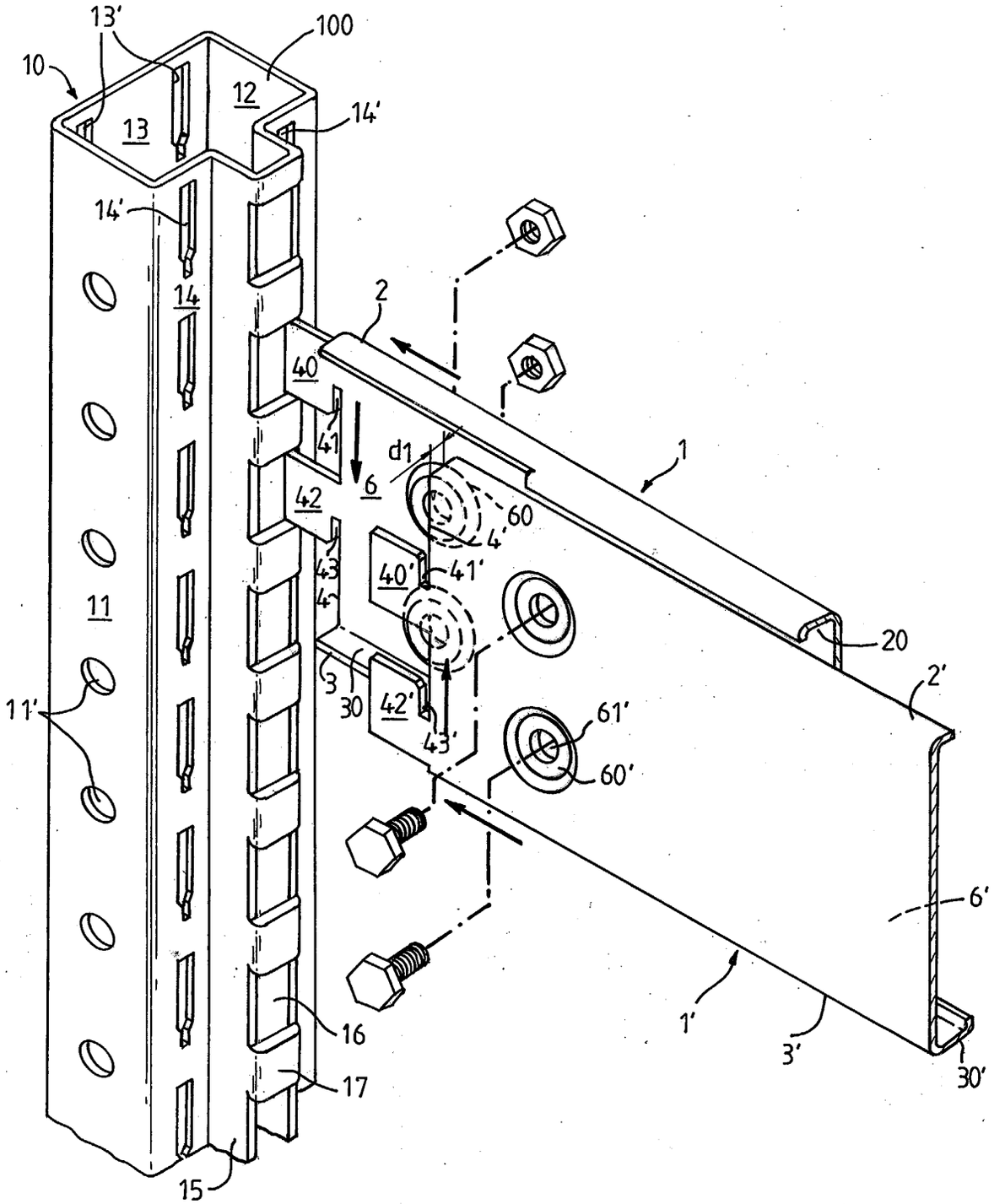
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Fig. 1

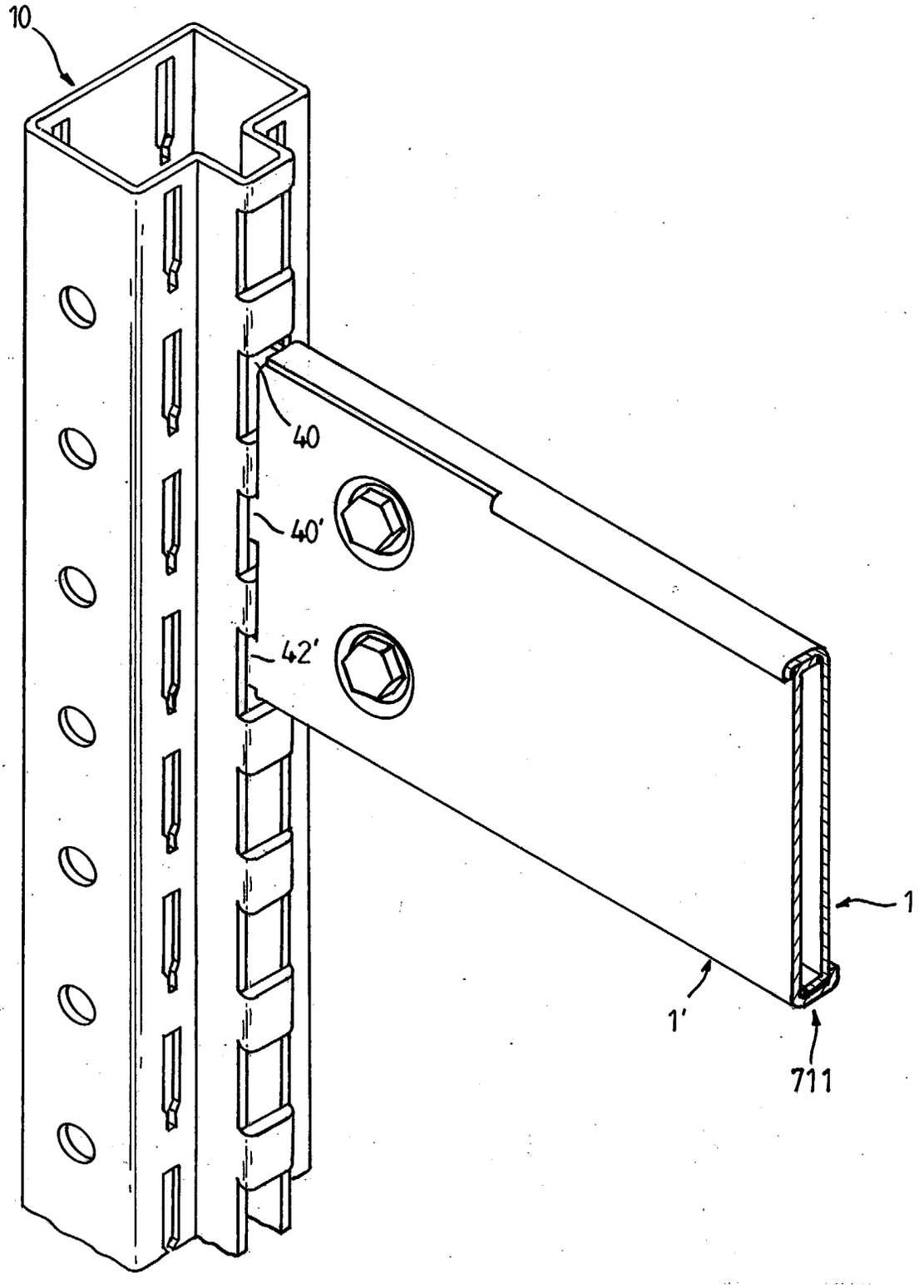

Fig. 2

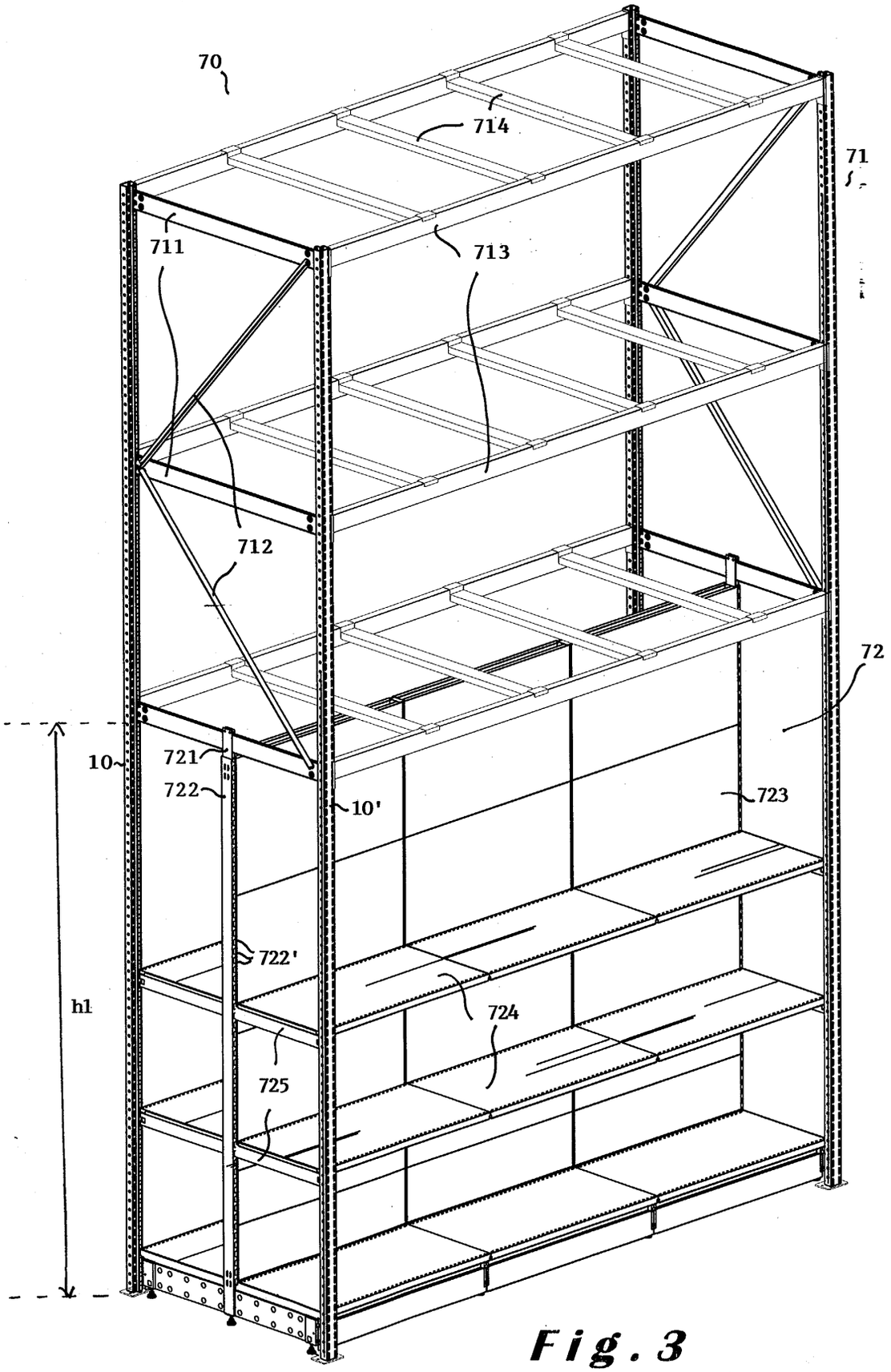

Fig. 3

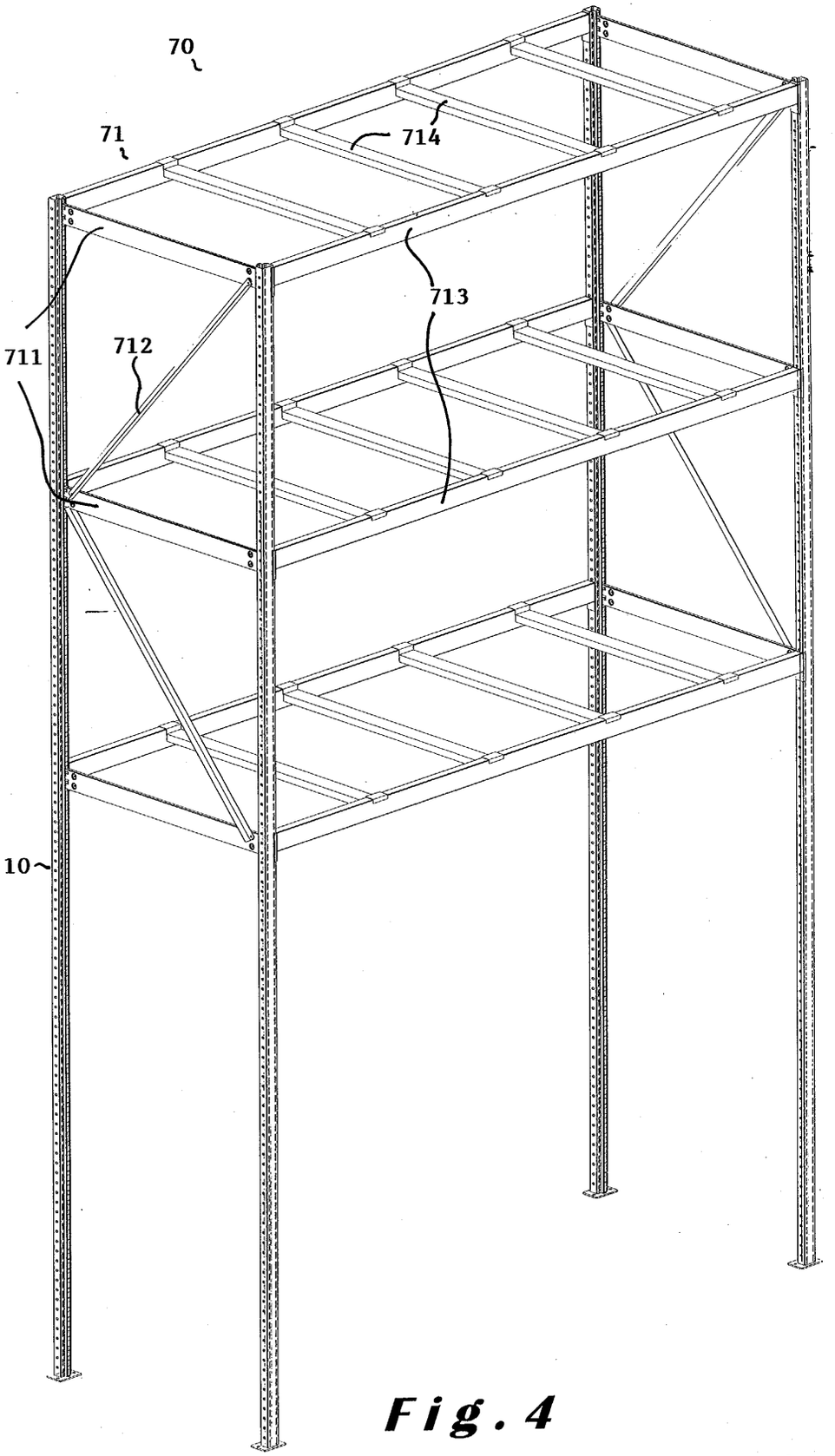

Fig. 4

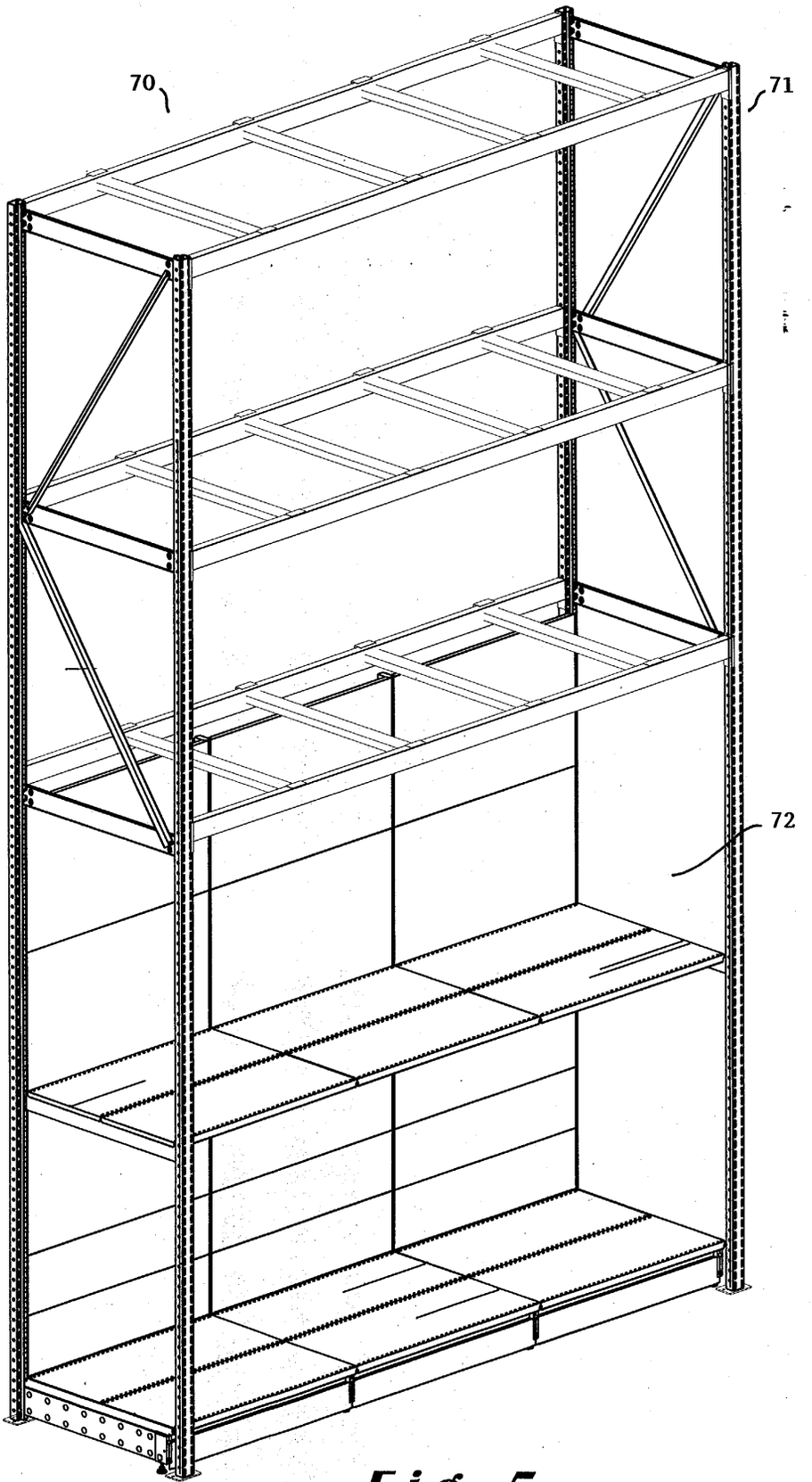

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 44 7160

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 September 2003	Ottesen, R

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