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A CABINET, A BRACKET FOR A CABINET AND A METHOD OF CONNECTION OF THE BRACKET WITH A FRAME

Technical Field

The present invention relates to a bracket for releasable connection with a frame, and particularly relates to a cabinet assembled using the bracket and a method that simplifies connection of the bracket with the frame.

Background

A cabinet for storing items such as test and monitoring instruments typically comprises a frame having horizontally oriented brackets connected with the frame. The frame comprises vertically disposed posts. Each bracket is usually provided at either end with circular, through-holes without an internal thread, while the frame is provided with threaded holes at intervals along the length of each post. In this way, each bracket may be secured to a post at either end of the bracket using screws. Alternative connectors such as nuts and bolts may be used, in which case the holes in the frame need not be threaded. The size of the holes in the brackets and the frame correspond with the size of the connectors that are indicated for assembly.

During assembly, as shown in FIG. 1A, a bracket 10 needs to be supported at a level where a hole 12 in the bracket 10 is aligned with a corresponding hole 14 in the frame 16 at a desired height so that connectors 18 may be passed through both holes 12, 14 to secure the bracket 10 to the frame 16. Supporting the bracket by hand while trying to



align the holes in the bracket and the frame is cumbersome and especially difficult if the bracket is a heavy one.

To make the process easier, as shown in FIG. 1B, a hook 20 may be provided at each end of the bracket 10 for hanging the bracket 10 onto a special slot 22 provided in the frame 16. The hook 20 and the slot 22 are disposed on the bracket 10 and the frame 16 respectively such that the holes 12, 14 in the bracket 10 and the frame 16 are automatically aligned for easy assembly. Although the difficulty of supporting the bracket 10 while trying to align the holes 12, 14 is removed, fabricating the hook 20 in the bracket 10 and the slot 22 in the frame 16 increases the overall cost of production of the cabinet.

Summary

The invention aims to provide a new and useful bracket for connection with a frame that simplifies assembly of a cabinet while keeping costs down.

In general terms, the present invention proposes that the bracket comprises a through-hole configured at each end, the through-hole comprising at least a wide portion for receiving a head of a connector element (e.g. a screw or bolt) attached to the frame, and at least a narrow portion, whereby the head of the connector element can be passed through the wide portion of the hole, and the narrow portion then moved over a shaft of the connector element for easy placement and support of the bracket with respect to the frame prior to securing the bracket to the frame.

Preferably, as in the prior art brackets, the bracket is substantially symmetrical about a first mirror plane at a centre of the bracket and transverse to the length of the bracket. Preferably, the bracket also has a second mirror plane extending along the length direction of the bracket so that the bracket is rotationally symmetrical about a rotational axis at an intersection of the first and second mirror planes, so that during connection of the bracket to the frame, no step of correctly orienting the bracket with respect to the frame is required. One way to achieve this is to arrange for there to be multiple said holes at each end of the bracket, symmetrically arranged relative to the second mirror plane extending along the length direction of the bracket. Alternatively, there may be only a single hole at each end of the bracket, but that hole may be shaped so that there are multiple narrow portion arranged about the wide portion which lies on the second mirror plane.

According to a first aspect, there is provided a cabinet for easy assembly of the cabinet. The cabinet comprises a frame having posts to each of which connector elements may be attached, and a bracket having a first through-hole configuration at a first end of the bracket and a second through-hole configuration at a second end of the bracket, each through-hole configuration comprising at least one through-hole having at least one narrow portion and at least one wide portion. The at least one narrow portion is for engaging a shaft of a connector element attached to the frame, and the at least one wide portion is for clearing a head of the connector element. The first and second through-hole configurations are mirror symmetrical with each other about a first mirror plane transverse to the length direction of the bracket. The through-hole configurations are

also mirror symmetrical about a second mirror plane parallel to the length direction of the bracket.

According to a second aspect, there is provided a method of releasably connecting a bracket to a frame having posts to each of which connector elements may be attached. The method comprises attaching a first connector element to a first post; passing a head of the first connector element through a wide portion of a first through-hole configuration at a first end of the bracket; fitting a first narrow portion of the first through-hole configuration over a shaft of the first connector element; tightening a second connector element to the bracket and the first post through a second narrow portion of the first through-hole configuration; and tightening the first connector element to the bracket and the first post. The first through-hole configuration and a second through-hole configuration at a second end of the bracket are mirror symmetrical with each other about a first mirror plane transverse to the length direction of the bracket, and said through-hole configurations are mirror symmetrical about a second mirror plane parallel to the length direction of the bracket.

According to a third aspect, there is provided an elongate bracket for releasable connection with a frame of the kind having posts to each of which connector elements are attached. The bracket comprises a first through-hole configuration at a first end of the bracket and a second through-hole configuration at a second end of the bracket, each through-hole configuration comprising at least one through-hole having at least one narrow portion and at least one wide portion. The at least one narrow portion is for engaging a shaft of a connector element attached to the frame, and the at least one wide

portion is for clearing a head of the connector element. The first and second through-hole configurations are mirror symmetrical with each other about a first mirror plane transverse to the length direction of the bracket, and said through-hole configurations are mirror symmetrical about a second mirror plane parallel to the length direction of the bracket.

Brief Description of the Drawings

In order that the present invention may be fully understood and readily put into practical effect, an embodiment of the invention will now be described by way of non-limitative example, the description being with reference to the accompanying illustrative drawings, in which:

FIG. 1A is a schematic representation of a first prior art bracket and frame;

FIG. 1B is a schematic representation of a second prior art bracket and frame;

FIG. 2 is a schematic representation of a first exemplary embodiment of a bracket;

FIG. 3 is a close-up schematic representation of a first exemplary through-hole configuration in the first embodiment of the invention;

FIGS. 4A to 4D are a schematic representation of an assembly process of the exemplary embodiment of FIG. 2;

FIG. 5 is a close-up schematic representation of a second exemplary through-hole configuration; and

FIG. 6 is a schematic perspective representation of an exemplary embodiment of a cabinet.

Detailed Description of the Preferred Embodiments

FIGS. 2 to 6 show exemplary embodiments of the invention as will now be described.

Referring to FIG. 2, the bracket 30 of a first embodiment includes a main body which is generally planar (i.e. laminar) and is depicted looking towards this plane (i.e. with the plane parallel to the paper). The bracket may contain one or more further elements (not shown) which do not lie in this plane. The bracket 30 is shown to be symmetrical about a first mirror plane 200 of the bracket 30, and also symmetrical about a second mirror plane 100 of the bracket 30. The mirror planes 100, 200 are parallel to the direction into that page, so that each is represented in Fig. 2 by a corresponding dashed line.

At either end 32 of the bracket 30 is a through-hole configuration 34 for easy placement and support of the bracket 30 with respect to the frame prior to securing the bracket 30 to the frame with connector elements such as screws. Each through-hole configuration 34 is symmetrically disposed to either side of a respective hole axis 300. The hole axis 300 is preferably perpendicular to the mirror plane 100 of the bracket 30.

The through-hole configuration 34 as shown in FIG. 3 comprises two through-holes 37, 39. Each through-hole 37 comprises one wide portion 51 and one narrow portion 41. The through-holes 37 and 39 are preferably oriented such that the two narrow portions 41, 42 are further away from the mirror plane 100 than the wide portions 51, 52.

In all instances, the size of the narrow portions 41, 42 is such that a head of a connector element (e.g. a screw or a bolt indicated for assembling the bracket 30 with the frame)

may not pass through the narrow portions 41, 42. However, the narrow portions 41, 42 are sized to allow a shaft of the connector element (e.g. the threaded portion of a screw or the shaft of a bolt) to pass through for securing the bracket 30 to the frame. The size of the wide portion 51, 52 is such that the head of a connector element may clear the wide portion 51, 52. The purpose of having at least one wide portion 51 will be explained with reference to FIGS. 4A to 4D.

As shown in FIG. 4A, during assembly, a first screw 17 is screwed partly into a threaded hole 13 in a post of the frame 16. The bracket 30 is then brought towards the frame 16 such that an upper wide portion 51 of the through-hole configuration 34 is fitted over the screw 17. Because of the size of the wide portion 51, the bracket 30 clears the head of the screw 17 completely and comes into contact with the frame 16 as shown in FIG. 4B. The bracket 30 is then pushed down as indicated by the arrow in FIG. 4C such that an upper one of the two narrow portions 41 comes to fit over the threaded portion of the screw 17. Concurrently, a lower one of the two narrow portions 42 becomes aligned with another threaded hole 14 on the frame 16. The bracket 30 is thus partially supported by the first screw 17 in an aligned position as shown in FIG. 4C. A second screw 18 is then passed through the narrow portion 42 and tightened into the threaded hole 14 as shown in FIG. 4D. The first screw 17 is also tightened, thus completing the connection of the bracket 30 with the frame 16.

The assembly process as shown in FIGS. 4A to 4D may be performed for a first end 32 of the bracket 30. The second end 32 of the bracket 30 may then be secured to a second post simply by passing and tightening two screws 17, 18 through the narrow portions 41

and 42 (in the second end 32) that are already aligned with threaded holes 14 in the second post.

Alternatively, the assembly process as shown in FIGS. 4A to 4D may be performed concurrently for both ends 32 of the bracket 30. When performed concurrently, the bracket 30 is entirely supported by two first screws 17 (one on a frame at each end 32 of the bracket 30) prior to further securing with two second screws 18 and tightening of all the screws 17, 18.

The wide portion 51 of each through-hole configuration 34 thus allows each through-hole configuration 34 to act as a slot on the bracket 30 for easy hanging of the bracket 30 onto a hook embodied by the first screw 17. This provides the advantage of supporting the bracket while also aligning the holes on the bracket and the frame. At the same time, it eliminates the cost of fabricating hooks on the bracket or providing a modified frame having additional slots to accommodate hooks on the brackets.

Alternatively, in a second embodiment, each through-hole configuration 34 may comprise only one through hole 36 having a wide portion 51 and two narrow portions 41, 42, as shown in FIG. 5. This is ideal for small brackets where there may not be enough space on the end 32 to accommodate two through-holes without significantly weakening the bracket. In this embodiment, the wide portion 51 is disposed between the two narrow portions 41, 42.

In each of the two embodiments, having mirror symmetry about both planes 100, 200 (which implies also being 180° rotationally symmetrical about a rotational axis which extends into the page at the linear intersection of the two mirror planes 100, 200) allows the bracket 30 to be non-directional so that no step of having to correctly orient the bracket 30 with respect to a frame (not shown) is required during assembly (i.e., the bracket may be rotated by 180° about the rotational axis, and still be connectable to the frame), saving time and avoiding a possibility of wrong assembly.

FIG. 6 shows an exemplary frame 60 of a cabinet assembled with a plurality of brackets 30 according to the invention. The frame 60 comprises four vertical corner posts 16-1, 16-2, 16-3 (hidden) and 16-4. The plurality of brackets 30 are connected horizontally to two posts each (16-1 and 16-2 or 16-3 and 16-4), as described above. The frame includes a bottom panel 62 and a top panel 64. The top panel may be provided with a plurality of rings 68 for easy transportation and/or securing of the cabinet. Two vertically disposed supporting columns 66 may be provided as shown. The supporting columns 66 are connected to a number of the plurality of brackets 30 and also to the bottom 62 and top 64 panels. Shelves, walls, doors, windows and other appropriate fittings (not shown) may be added to the frame 50 to complete the cabinet as required.

Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations or modifications in details of design or construction may be made without departing from the present invention. For example, where the through-hole configuration 34 comprises two through-holes 37, 39 as shown in FIG. 4, the through-

holes 37 and 39 may be alternatively oriented such that the wide portions 51 and 52 are further away from the mirror plane 100 than the two narrow portions 41 and 42. Also, the frames need not have threaded holes if nuts and bolts are used in place of screws as the connector elements.

Claims

1. A cabinet for easy assembly of the cabinet, the cabinet comprising:
 - a frame having posts to each of which connector elements may be attached;
 - a bracket having a first through-hole configuration at a first end of the bracket and a second through-hole configuration at a second end of the bracket, each through-hole configuration comprising at least one through-hole having at least one narrow portion and at least one wide portion;
 - wherein the at least one narrow portion is for engaging a shaft of a connector element attached to the frame, and the at least one wide portion is for clearing a head of the connector element; and
 - wherein the first and second through-hole configurations are mirror symmetrical with each other about a first mirror plane transverse to the length direction of the bracket, and said through-hole configurations are mirror symmetrical about a second mirror plane parallel to the length direction of the bracket.
2. The cabinet of claim 1, wherein each of the through-hole configurations is symmetrically disposed to either side of a respective hole axis, the hole axis being perpendicular to the length direction of the bracket.
3. The cabinet of claim 1 or 2, wherein each through-hole configuration comprises one through-hole, the one through-hole comprising the wide portion disposed between two said narrow portions.

4. The cabinet of claim 1 or 2, wherein each through-hole configuration comprises two through-holes, each through-hole comprising one said wide portion and one said narrow portion.

5. The cabinet of claim 4, wherein each through-hole is oriented such that the narrow portion is further away from the second mirror plane than the wide portion.

6. A method of releasably connecting a bracket to a frame having posts to each of which connector elements may be attached, the method comprising:

attaching a first connector element to a first post;

passing a head of the first connector element through a wide portion of a first through-hole configuration at a first end of the bracket;

fitting a first narrow portion of the first through-hole configuration over a shaft of the first connector element;

tightening a second connector element to the bracket and the first post through a second narrow portion of the first through-hole configuration; and

tightening the first connector element to the bracket and the first post;

wherein the first through-hole configuration and a second through-hole configuration at a second end of the bracket are mirror symmetrical with each other about a first mirror plane transverse to the length direction of the bracket, and said through-hole configurations are mirror symmetrical about a second mirror plane parallel to the length direction of the bracket.

7. The method of claim 6, further comprising:

attaching a third connector element to a second post prior to passing the head of the first connector element through the wide portion of the first through-hole configuration;

passing a head of the third connector element through a wide portion of the second through-hole configuration while passing the head of the first connector element through the wide portion of the first through-hole configuration;

fitting a first narrow portion of the second through-hole configuration over a shaft of the third connector element while fitting the first narrow portion of the first through-hole configuration over the shaft of the first connector element;

tightening a fourth connector element to the bracket and the second post through a second narrow portion of the second through-hole configuration after tightening the second connector element to the bracket and the first post; and

tightening the third connector element to the bracket and the second post after tightening the first connector element to the bracket and the first post.

8. An elongate bracket for releasable connection with a frame of the kind having posts to each of which connector elements are attached, the bracket comprising:

a first through-hole configuration at a first end of the bracket and a second through-hole configuration at a second end of the bracket, each through-hole configuration comprising at least one through-hole having at least one narrow portion and at least one wide portion;

wherein the at least one narrow portion is for engaging a shaft of a connector element attached to the frame, and the at least one wide portion is for clearing a head of the connector element; and

wherein the first and second through-hole configurations are mirror symmetrical with each other about a first mirror plane transverse to the length direction of the bracket, and said through-hole configurations are mirror symmetrical about a second mirror plane parallel to the length direction of the bracket.

9. The bracket of claim 8, wherein each of the through-hole configurations is symmetrically disposed to either side of a respective hole axis, the hole axis being perpendicular to the length direction of the bracket.

10. The bracket of claim 8 or 9, wherein each through-hole configuration comprises one through-hole, the one through-hole comprising the wide portion disposed between two said narrow portions.

11. The bracket of claim 8 or 9, wherein each through-hole configuration comprises two through-holes, each through-hole comprising one said wide portion and one said narrow portion.

12. The bracket of claim 11, wherein each through-hole is oriented such that the narrow portion is further away from the second mirror plane than the wide portion.