

SPECIFICATION

A right-angled frame joint

5 The present invention relates to a right-angled frame joint joining two bars or, more particularly, for jointing a transverse bar with a vertical bar at a free end thereof in a substantially perpendicular disposition to each other.

10 In the fabrication of doors and windows, there may often be a need for jointing two bars in a substantially perpendicular disposition to each other to form the frames of a door or window. In particular, a vertical bar is jointed at its free end with a transverse bar, for example, to provide a mullion spanned between the top rail and the bottom rail of the frame of a window, the bars being, for example, made of aluminium extruded with various cross sections.

20 The simplest structure for jointing such bars with each other is constructed by use of L-shaped connector plates, the legs of each of the L-shaped plates being fastened to the transverse bar or the vertical bar by means of screws or other suitable fastening means. The problem in such a structure is that sufficient strength cannot be ensured in the connection of the bars, and the work of assembly is sometimes troublesome.

30 According to the present invention there is provided a right-angled frame joint in which a vertical bar is jointed to a transverse bar at the free end of the vertical bar in a substantially perpendicular disposition to each other, the transverse bar having a continuous channel on the upper or lower surface running in the longitudinal direction thereof, each of the inner side surfaces of the channel being provided with a flange running in the longitudinal direction of the transverse bar, the vertical bar being placed in a substantially perpendicular disposition to the transverse bar, and at least one L-shaped connector plate, 40 the horizontal leg and the upright leg thereof being fastened to the transverse bar and the vertical bar, respectively, the horizontal leg being provided with integral gripper means on each of two lateral edges respectively facing the inner side surfaces of the channel of the transverse bar, each of the gripper means gripping the flange provided on the respective one of the inner side surfaces of the channel of the transverse bar.

50 The present invention will be described by way of example with reference to the accompanying drawings, wherein:-

Fig. 1 is a perspective view showing the joint part of a preferred structure partially as cut;

Fig. 2 is a perspective view showing an L-shaped connector plate;

Fig. 3 is a horizontal cross sectional view of the preferred structure at the joint part;

Fig. 4 is a cross sectional view of the structure along the line IV - IV in Fig. 3; and

60 Fig. 5 is a cross sectional view of the structure along the line V - V in Fig. 3.

In Figs. 1, 3, 4 and 5, a transverse bar 1 is made of, for example, aluminium fabricated by extrusion and has a cross section as shown formed basically with a bottom 1a and two side walls 1b, 1b to be provided

with a channel 4 surrounded by them. It is of course optional that the transverse bar 1 is a solid bar instead of having a cross section as shown in the figures so long as a channel 4 is provided with the bottom surface and the side surfaces.

70 The side walls 1b, 1b are each provided with a flange 5 protruding from the inner surface of the side wall 1b toward the channel 4. Although there is no absolute necessity that the flange 5 extends over the whole length of the transverse bar 1, it is preferred that the flange 5 has a continuous length extending over the whole length of the bar 1 itself from the standpoint of easiness in extrusion moulding as well as from the standpoint of imparting an increased mechanical strength to the bar 1. The height of the flange 5 from the bottom surface 1a of the transverse bar is also not crucial but it is preferably a few millimeters or so leaving room for the nibs of the under-described gripper means of the L-shaped connector plate to enter.

85 The figures are depicted assuming that the transverse bar 1 serves as a bottom rail of a window frame but the top rail of the frame may also be formed in the same manner as in the figures though upside down.

90 The vertical bar 2 is placed in a substantially perpendicular disposition to the transverse bar 1. The cross section of the vertical bar is not crucial and may be so formed as to be used as a mullion in a window frame with grooves 13 for glazing. The free end of the vertical bar 2 may be of any desired shape insofar as it can rest stably on the upper ends 1c of the transverse bar 1, but it is preferable that the lower end of the centre portion of the vertical bar 2 is shaped such that the free end can be inserted into the channel 4 of the transverse bar 1 in contact with the peripheries of the upper ends 1c, 1c and the flanges 5, 5 in order to increase the security of the jointing of the bars 1 and 2 with the side portions of the vertical bar 2 being capable of resting stably on the upper ends 1c, 1c of the transverse bar 1.

100 The L-shaped connector plate 3 is provided with gripper means 8 on each of the lateral edges of its horizontal, lower leg facing the inner side surfaces of the channel 4 of the transverse bar 1. A variety of designs may be possible for the gripper means 8 but, most conveniently, the end portions are each cut into several portions 8a, 8b to a certain depth from the periphery and the alternate portions 8a are deformed by being raised as shown in Figs. 1 and 2 so that the flange 5 of the transverse bar 1 is gripped by being pinched between the raised portions 8a and the neighbouring portions 8b which enter the space between the flange 5 and the surface of the bottom 1a of the transverse bar 1.

110 The horizontal, lower leg 6 of the L-shaped connector plate 3 is provided with an internally screw-threaded hole 10 through which a screw bolt 9 is screwed against the bottom 1a of the transverse bar 1 so that the leg 6 is pushed upwardly, whereby the portions 8b are tightly pressed against the lower surface of the flange 5 firmly fixing the L-shaped connector plate 3 to the transverse bar 1.

125 On the other hand, the upright leg 7 of the L-shaped connector plate 3 is provided with an

oblong hole 12 through which a screw 11 is inserted into an internally screw-threaded hole provided in the vertical bar 2, whereby the L-shaped connector plate 3 is fastened to the vertical bar 2. The hole 12 is shaped in a form of a slot extending in the longitudinal direction of the vertical bar 2 so that exact adjustment of the relative jointing disposition of the bar 2 and the connector plate 3 can be facilitated.

The fastening of the transverse bar 1 to the vertical bar 2 is further strengthened by providing two such L-shaped connector plates 3, one at each side of the vertical bar 2, as shown in Fig. 5.

In the assembly work of the window frame, the desired number of the L-shaped connector plates 3 are first inserted into the channel 4 of the transverse bar 1 by sliding them along the flanges 5, 5 engaged between the portions 8a, 8b and the vertical bar 2 is sandwiched between the upright legs 7, 7 of a pair of the L-shaped connector plates 3, 3 to be temporarily fastened with screws 11, 11. Thereafter, the thus fastened vertical bar 2 is moved horizontally along the transverse bar 1 to the exact position where the mullion is to be installed and each of the L-shaped connector plates 3, 3 is fastened to the bottom 1a of the transverse bar 1 with screws 9, 9 through the holes 10, 10, followed by permanent fastening of the vertical bar 2 to the L-shaped connector plates 3, 3 with exact adjustment of the height thereof relative to the transverse bar 1 with the screws 11, 11 through the holes 12, 12.

As is understood from the above description, great advantages are obtained with the inventive structure of jointing bars in that no skillfulness is required in the jointing work of the frames with even shortened time for the work in comparison with the conventional jointing structures. In addition, a sufficient accuracy can easily be ensured in the relative disposition of the transverse and vertical bars owing to the possibility of fine adjustment carried out in the work of assembly of the frames.

CLAIMS

1. A right-angled frame joint in which a vertical bar is jointed to a transverse bar at the free end of the vertical bar in a substantially perpendicular disposition to each other, the transverse bar having a continuous channel on the upper or lower surface running in the longitudinal direction thereof, each of the inner side surfaces of the channel being provided with a flange running in the longitudinal direction of the transverse bar, the vertical bar being placed in a substantially perpendicular disposition to the transverse bar, and at least one L-shaped connector plate, the horizontal leg and the upright leg thereof being fastened to the transverse bar and the vertical bar, respectively, the horizontal leg being provided with integral gripper means on each of two lateral edges respectively facing the inner side surfaces of the channel of the transverse bar, each of the gripper means gripping the flange provided on the respective one of the inner side surfaces of the channel of the transverse bar.

2. A joint as claimed in claim 1 wherein the horizontal leg of the L-shaped connector plate is provided with an internally screw-threaded hole through which a screw bolt is inserted against the bottom

surface of the channel so that the horizontal leg is pushed upwardly, whereby the gripper means are tightly pressed against the lower surfaces of the flanges.

3. A joint as claimed in claim 1 or 2 wherein the L-shaped connector plate is provided, in the upright leg thereof, with an oblong hole through which a screw is inserted into an internally screw-threaded hole provided in the vertical bar, whereby the L-shaped connector plate and the vertical bar are fastened to each other.

4. A joint as claimed in claim 1, 2 or 3 wherein two said L-shaped connector plates are provided, one at one side of the vertical bar and the other at the other side of the vertical bar, the L-shaped connector plates being fastened to the vertical bar and the transverse bar.

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