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"A METHOD FOR PRODUCING A RAILING OR THE LIKE"

The present invention relates to a method for producing a railing or the like which comprises a horizontal bar and a vertical bar which are to be connected to each other.

In the prior art, interconnection of the horizontal bar and the vertical bar has been achieved generally by welding or screw-fastening. However, in the case of welding, a careful operation by a skilled worker is required in order to obtain enough strength to assure adequate safety from the resulting railings. The cost of assembly of railings using welding must inevitably be high because the wages of such a skilled worker are correspondingly high. In addition, by depending on a welding operation, the materials available for the horizontal and vertical bars must be limited to weldable materials. On the other hand, in the case of screw-fastening, although skilled workers are not required, there occurs a different problem that the vertical bar tends to become loose or to fall off as a result of eventual screw-loosening. Furthermore, especially in the case of a window lattice, screw-fastening is disadvantageous for the prevention of crimes, because the vertical bar may be easily detached. For solving the above problems, it is required to add preventive measures against screw-loosening. Therefore, assembling or

connecting work becomes more troublesome, and it is not easy to increase the assembling efficiency.

It is a principle object of the present invention to provide a manufacturing method which does not depend on any handwork of the skilled worker, such as a welder, and in which the strong and safe, assembly of the horizontal bar with the vertical bar can be achieved efficiently.

In accordance with the present invention, there is provided a method for producing a railing or the like which includes at least one horizontal bar and one vertical bar provided with a longitudinal rib on its outer surface, the method comprising forming a first, outer protusion on the vertical bar by cutting off a portion at each end of the rib of the vertical bar, inserting an end portion of the vertical bar, from which the rib end portion has been removed, into a hole formed on a vertical-bar-connecting part of the horizontal bar, forming a second, inner protusion on the said end portion of the vertical bar by plastic working such as swelling, rib-forming and bending operations, and pressing or pinching the vertical-bar-connecting part of the horizontal bar between the inner protrusion and the outer protrusion constituted by the remaining portion of the rib so as to interconnect the horizontal bar and the vertical bar.

The invention is described further hereinafter, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic perspective view illustrating the vertical bar part of one embodiment of the present invention using a longitudinally ribbed pipe as a vertical bar of a railing;

5 Fig. 2 is a vertical sectional view of a lower part of the railing in which the vertical bar has not yet been connected to a horizontal bar;

10 Fig. 3 is a vertical sectional view of the lower part of the railing in which the horizontal bar and the vertical bar are already interconnected;

Fig. 4 is a vertical sectional view of a lower part of a further embodiment of the railing constructed in accordance with the present invention in which a horizontal bar and a vertical bar have not yet been
15 interconnected by the connecting press device; and

Fig. 5 is a vertical sectional view of the lower part of the railing of Fig. 4 in which the horizontal bar and the vertical bar are already interconnected.

In the embodiments shown in the drawings, a
20 vertical bar 4 is constituted by a pipe having a plurality of longitudinal ribs 24. Holes 3 formed on a vertical-bar-connecting part 2 of a horizontal bar 1 conform to the shape of the vertical bar body without the ribs 24. End portions 24a of the ribs 24 are cut
25 off by a suitable means as shown in Fig. 1. The remaining portion 24b of each rib 24 engages the outer surface 2a of the vertical bar connecting part 2 at its end face 24c. Thus, the remaining portions 24b of the ribs 24 constitute

the outer protrusion of the present invention.

As shown in Fig. 2, a body casing 6 of a connecting device is fitted into the end portion of the vertical bar 4 which is inserted into the horizontal bar 1. When an operating rod 7 is driven in the direction of the arrow in Fig. 2 by an oil hydraulic machine or the like while restraining by a suitable means the vertical bar 4 and the body casing 6 against any movement, core pieces 9 are pushed towards a side wall 11 of the casing 6 as a result of the cooperative action of a cam surface 8 on the operating rod 7 and cam surfaces 10 on the core pieces 9. By this means, a protruding part 12 on each core piece 9 projects out of a respective lateral hole 13 in the side wall 11 and a side wall of the vertical bar 4 is pressed outwardly, so that there is formed an enlarged or ribbed portion 27 of angled section, while leaving an adequate length up to the end face of the bar 4.

The enlarged portion 27 constitutes the inner protrusion of the present invention, and pinches or fastens the vertical bar connecting part 2 between itself and the remaining portions 24b of the ribs 24, so that the vertical bar 4 may not be withdrawn or moved.

In the embodiment shown in Figs. 4 and 5, a movable die member 25 having a tapered surface 26 is fitted into an end portion 4a of the vertical bar 4. The end portion 4a is arranged to be bent-outwardly by

the tapered surface 26 so as to form a flanged portion 28 when the die member 25 is driven in the direction of the arrow in Fig. 4 while both the vertical bar 4 and the horizontal bar 1 are held stationary by a suitable means. The flanged portion 27 constitutes the inner protrusion of the present invention.

The outer protrusion is not one that is obtained by plastic working such as shear spinning, heading, drawing, and stretch-drawing which necessarily weakens the structure of the protrusion and the vertical bar body. The outer protrusion of the present embodiment is constituted by the remaining body portions 24b of the ribs 24 formed on the vertical bar 4 obtained by cutting off the end portions 24a of the ribs 24. The present outer protrusion is superior in structural strength in comparison with such protrusions as are formed by plastic working.

Furthermore, because both the enlarged portion 27 and the flanged portion 28 constituting the inner protrusion are formed on a part of the vertical bar 4 to which the above mentioned plastic working by press machines is not done, the inner protrusion of the present embodiment is superior in structural strength in comparison with such protrusions as are formed on the part of the vertical bar which is weakened as a result of the plastic working.

In this way, since each of the inner and outer protrusions is formed without weakening their structures

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and the vertical bar, the strength of the connection between the horizontal and vertical bars is considerably increased. Furthermore, because the portions 24b of the ribs 24 acts as a reinforcing member for the vertical bar 4, it is easy to provide a railing or the like which is of superior structural strength.

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CLAIMS

1. A method for producing a railing or the like which includes at least one horizontal bar and one vertical bar provided with a longitudinal rib on its outer surface, the method comprising forming a first, outer protrusion on the vertical bar by cutting off a portion at each end of the rib of the vertical bar, inserting an end portion of the vertical bar, from which the rib end portion has been removed, into a hole formed on a vertical-bar-
connecting part of the horizontal bar, forming a second, inner protrusion on the said end portion of the vertical bar by plastic working such as swelling, rib-forming and bending operations, and pressing or pinching the vertical-bar connecting part of the horizontal bar between the inner protrusion and the outer protrusion constituted by the remaining portion of the rib so as to interconnect the horizontal bar and the vertical bar.

2. A railing or the like when formed by the method of claim 1.

3. A method for producing a railing or the like, substantially as hereinbefore described with reference to the accompanying drawings.

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