

PATENT SPECIFICATION (11)

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(54) JOINTING ASSEMBLY

(71) I, ANTHONY CHARLES WORRALLO, of 15 Sprott Road, Auckland 5, New Zealand, British Subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to joining devices.

According to the present invention there is provided a jointing device comprising first and second elements and a pair of arms, the first element including two spaced apart portions which together define a slot, and each arm having two opposed, elongate faces with a transverse groove in one of said faces adjacent one end thereof which grooves receive said portions when the arms are located in said slot with the other of said opposed faces thereof in juxtaposed relationship, the distance between the bottom surface of said grooves of said arms being greater than the width of said slot between said portions before insertion of the arms therein so that said arms hold said portions apart, said one end of each arm being bounded by an end surface which merges with said other face, terminates at said one face, and is shaped to enable said arms to roll one on the other between a position in which said other surfaces are in juxtaposed relationship and a position in which said end surfaces are in engagement with said arms diverging from said one end, said arms being inserted into and removed from said slot while this diverging relationship, and said second element forming a clip to prevent said arms moving to said diverging relationship under the influence of the force exerted on said arms by said portions as said first element tends to return to said undeformed condition.

To prevent said portions interfering with the arms when the arms are to be moved from their back-to-back relationship to their diverging condition, each groove is bounded by said bottom surface and two further surfaces which intersect said one face, that one of said further surfaces which is closest to said one end being normal to said one face and the other of said fur-

ther surfaces being oblique to said one face whereby the mouth of each groove is wider than its base. The other of said further surfaces can intersect said one face at 45°.

The arms can further include a generally vee-shaped further transverse groove in each of said one faces, that bounding face of each of these grooves which is furthest from said one end of the arm being oblique to said one face. Additionally, a transverse, half-round groove can be provided in each of said other faces, said half round grooves registering to form a hole when said other faces are juxtaposed.

Each end surface preferably has a spiral like form and comprises a first curved portion of relatively small radius, the first curved portion intersecting said one face, a second curved portion of relatively large radius merging with said other face, and a flat portion between the curved portions and merging therewith.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing in which:—

Figure 1 diagrammatically illustrates a jointing device during assembly;

Figure 2 is a plan view showing the jointing device in its assembled condition;

Figure 3 is a pictorial view showing a further jointing device during assembly; and

Figure 4 is a top plan view showing the device of Figure 3 in its assembled condition.

Referring firstly to Figures 1 and 2, the jointing device illustrated comprises a pair of arms 10, an element 12 providing a lipped channel, and a clip 14. Each arm 10 is a short section of aluminium extrusion and has a flat inner face 16 and a flat outer face 18. At the end thereof remote from the element 12 each outer face 18 is joined to the respective inner face 16 by means of a radiused face 20, the face 20 being a "quarter round".

A semi-circular groove 22 is formed in each face 16 at a point which is spaced from the intersection between the faces 16 and 20 by a distance which is equal to approxi-

mately one quarter of the length of the arm. A vee-shaped groove 24 is provided in each of the outer faces 18, the grooves 24 being approximately midway between the ends of the arms. The faces of the grooves 24 meet the faces 18 at 45° angles.

Locating grooves 26 are provided adjacent the inner end of each arm 10. Each groove 26 has a bottom surface 28 which is parallel to the faces 16 and 18. The remaining surfaces which bound the grooves 26 are referenced 30 and 32. The surfaces 30 is at 90° with respect to the face 18 and the bottom surface 28 whereas the surface 32 slopes at an angle of approximately 45° with respect to the surface 28 and the face 18. Thus the mouth of the groove is wider than its base.

Radiussed surfaces 34 and 36 of each arm merge with opposite edges of a short, flat, angled face 38 and, respectively, merge with the flat face 16 and intersect the face 18. The face 38 is angled at 45° with respect to the faces 16 and 18 and the radiussed surface 36 is a quarter round. Each face 38 with the surfaces 34 and 36 on each side thereof constitutes an end rolling surface of the respective arm.

The element 12 comprises two flanges 40 which are joined by a web 42. The flanges 40 extend beyond the web 42 and, at their outer extremities, carry lips 44 which are directed towards one another and define an elongate slot. A channel 46 is constituted by the web 42 and those portions of the flanges 40 which project beyond the web. It will be understood that the part of the element 12 which has not been shown can be a mirror image of that illustrated.

Certain dimensions of the element 12 in relation to dimensions of the arms 10 are of significance. Thus the dimension of each surface 28, measured between its intersections with the surfaces 30 and 32, is equal to the thickness of the lips 44. Additionally, the distance from each surface 28 to the face 16 of the respective arm is greater than half the distance between the opposed surfaces of the lips 44.

The clip 14 in its simplest form (see Figure 1) is a downwardly open channel having an upper web 48 and two depending flanges 50.

To assemble the jointing device, the two arms 10 are inserted into the channel 46 through the slot defined by the lips 44. One way of doing this is to place the faces 38 in contact with one another which means that the arms 10 are then approximately at right angles to one another. In this condition the distance between the point on one arm at which the surface 30 intersects the face 18 and the corresponding point on the other arm is less than the width of the slot of the channel 46 measured between the lips

44. The arms are then presented to the slot so that inner end portions of the arms 10 enter the channel 46.

Pressure is then exerted on the free outer ends of the arms 10 so that the faces 16 are brought together. During this movement said end surfaces roll on one another. As the arms move towards a parallel, face-to-face condition the bottom surfaces 28 act on the lips 44 thereby distorting the channel 46 slightly by urging the lips 44 apart. As will be understood from the description above, the distance between the two surfaces 28, in the condition of the arms illustrated in Figure 2, is greater than the width of said slot between the lips 44.

To maintain the arms 10 in the condition illustrated in Figure 2, the clip 14 is placed over the arms, the flanges 50 resisting any tendency of the arms to move back towards the position shown in Figure 1. Because the channel 46 has been distorted there is inherently a tendency for the inner ends of the arms 10 to be forced together which, if not restrained, would result in the arms moving back towards the position shown in Figure 1.

The surfaces 30 and 32 now lie inwardly and outwardly of the lips 44 and thus the arms 10 cannot be pushed further into the channel 46 or pulled out of the channel.

The web 48 of the clip 14 has a hole (not shown) therein which, by suitably positioning the clip 14 with respect to the arms 10, can be brought into alignment with the hole which is now defined by the co-operating grooves 22 (Figure 2). A screw, nail, pin or other fastening element can then be passed through the aligned holes so as positively to locate the clip 14 in position with respect to the arms 10.

Two further holes 52 (see Figure 2) can be provided in the flanges 50 of the clip 14, these initially being aligned with those inclined faces of the vee-grooves 24 which are furthest from the element 12. Self tapping screws S entered in the holes 52, by co-operating with said inclined faces, serve to displace the clip 14 firmly into engagement with the outer faces of the lips 44.

The clip 14 described can be placed over the arms 10 from above or pushed onto the juxtaposed arms 10 from the free ends of the arms.

Turning now to Figures 3 and 4, these illustrate a jointing device in which an element 12.1 of the same form as the element 12 of Figure 1 is used to hold the arms 10 in the position in which the faces 16 are in engagement one with the other. The inner ends of the arms 10 are engaged with one of the channels 46 of a post 54 which includes a central core 56 and a plurality of radial arms 58. The arms 58 terminate in flanges 60 which in turn have lips 62 along their

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free edges. These lips are equivalent to the lips 44 of Figures 1 and 2.

The protrusions 64 formed on the inner faces of the flanges 40 below the web 42 rest on the upper faces of the arms 10. A screw hole 66 is shown in Figure 4, this being aligned with the hole constituted by the grooves 22 when the element 12 is in position.

The frictional engagement between the arms 10 and the lips 44 or 62 prevents movement of the arms 10 with respect to the element 12 or post 54.

An advantage of the structure described is that vertical or horizontal joints can be added to a frame structure without the necessity of disassembling any existing joints. Where the clip 14 or element 12.1 extends horizontally it may support shelving, and if it extends vertically it may form a foot for the frame structure or part of a column. It will be understood that by appropriately shaping the clip 14 or element 12.1 it can be arranged to lie in an inclined position.

WHAT I CLAIM IS:—

1. A jointing device comprising first and second elements and a pair of arms, the first element including two spaced apart portions which together define a slot, and each arm having two opposed, elongate faces with a transverse groove in one of said faces adjacent one end thereof which grooves receive said portions when the arms are located in said slot with the other of said opposed faces thereof in juxtaposed relationship, the distance between the bottom surface of said grooves of said arms being greater than the width of said slot between said portions before insertion of the arms therein so that said arms hold said portions apart, said one end of each arm being bounded by an end surface which merges with said other face, terminates at said one face, and is shaped to enable said arms to roll one on the other between a position in which said other surfaces are in juxtaposed relationship and a position in which said end surfaces are in engagement with said arms diverging from said one end, said arms being inserted into and removed from said slot while in this diverging relationship, and said second element forming a clip to prevent said arms moving to said diverging relationship under the influence of the force exerted on said arms by said

portions as said first element tends to return to said undeformed condition.

2. A device as claimed in claim 1, wherein said first element includes two flanges, said portions being lips extending along the free edge of said flanges.

3. A device as claimed in claim 1 or 2, wherein each groove is bounded by said bottom surface and two further surfaces which intersect said one face, that one of said further surfaces which is closest to said one end being normal to said one face and the other of said further surfaces being oblique to said one face whereby the mouth of each groove is wider than its base.

4. A device as claimed in claim 3, wherein said other of the further surfaces intersects said one face at 45°.

5. A device as claimed in any preceding claim and including a generally vee-shaped further transverse groove in each of said one faces, that bounding face of each of these grooves which is furthest from said one end of the arm being oblique to said one face.

6. A device as claimed in claim 5, wherein said second element has holes therein which register with the oblique bounding faces.

7. A device as claimed in any preceding claim and including a transverse, half-round groove in each of said other faces, said half-round grooves registering to form a hole when said other faces are juxtaposed.

8. A device as claimed in claim 7, wherein said second element has a hole therein which is axially aligned with the hole formed by said two half round grooves.

9. A device as claimed in any preceding claim, wherein each end surface comprises a first curved portion of relatively small radius, the first curved portion intersecting said one face, a second curved portion of relatively large radius merging with said other face, and a flat portion between the curved portions and merging therewith.

10. A jointing device substantially as hereinbefore described with reference to Figures 1 and 2 or Figures 3 and 4 of the accompanying drawings.

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portions as said first element tends to return to said undeformed condition.

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5. A device as claimed in any preceding claim and including a generally vee-shaped further transverse groove in each of said one faces, that bounding face of each of these grooves which is furthest from said one end of the arm being oblique to said one face.

6. A device as claimed in claim 5, wherein said second element has holes therein which register with the oblique bounding faces.

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8. A device as claimed in claim 7, wherein said second element has a hole therein which is axially aligned with the hole formed by said two half round grooves.

9. A device as claimed in any preceding claim, wherein each end surface comprises a first curved portion of relatively small radius, the first curved portion intersecting said one face, a second curved portion of relatively large radius merging with said other face, and a flat portion between the curved portions and merging therewith.

10. A jointing device substantially as hereinbefore described with reference to Figures 1 and 2 or Figures 3 and 4 of the accompanying drawings.

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