

A Connector

The invention relates to a connector for connecting two hollow members in end to end relationship.

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Conventional hollow metal frames for windows, doors or similar types of frames are formed from hollow metal members, typically four, which are connected at their respective ends using threaded screws, to form the frame.

10 However, assembling the frame by connecting the hollow members together using screws is labour intensive.

Therefore, recently, connectors have been developed in which the connector comprises two arms adapted to be secured together. One arm is inserted into
15 each adjacent end of two hollow members while the arms are loosely secured to each other. After insertion of the arms and securing to the frame, the connection between the arms is tightened to draw the adjacent ends of the hollow members together to form a corner joint.

20 In this type of connector, each arm includes a spring loaded plate which is inserted into the arm and locks the arm to the respective hollow member by engaging in an aperture formed in a side wall of the hollow member.

While such connectors are relatively easy to use to assemble a hollow metal
25 frame, the assembly of the connector itself, is labour intensive, as it requires a

spring to be depressed within the arm while the plate, which is to be biased by the spring, is slid sideways into a locating recess in the arm. In addition, these conventional connectors have the disadvantage that the spring loaded plates face outwards so that they are releasably secured to the side wall of the hollow member which forms the external wall of the assembled frame, and this is aesthetically not desirable.

In accordance with a first aspect of the present invention, a connector for connecting two hollow members in end to end relationship comprises two arm members, securing means to secure the arm members to each other, each arm member having a recess therein, and a biasing member and a lock member located within the recess, the lock member being retained by the recess within the recess, against the action of the biasing member; the lock member and the recess being adapted such that the lock member may be inserted into the recess in a direction opposed to the action of the biasing member.

Preferably, when the two hollow members are connected by the connector, the longitudinal axes of the two hollow members are at an angle to each other.

Typically, each arm member comprises retaining flanges that partially define the recess, and retain the lock member within the recess.

Preferably, one flange is wider than the other flange. Typically, one flange is closer to the securing means than the other flange, and the flange closer to the securing means is wider than the other flange. Preferably, the opening of the

recess, the width of the flanges and the width of the lock member is such that when one edge of the lock member is inserted into the recess adjacent the wider flange, the opposite edge of the lock member may pass through the opening into the recess, and when the opposite edge of the lock member is in a position such that the lock member is moved in a direction away from the wider flange, both edges of the lock member are retained in the recess by the respective flange.

In accordance with a second aspect of the present invention, a connector for connecting two hollow members in end to end relationship so that the longitudinal axes of the two hollow members are at an angle to each other, the connector comprising two arm members, securing means to secure the arm members to each other, each arm member including a recess, and a lock member and a biasing member located within the recess, the lock member being retained within the recess by the recess against the action of the biasing member, wherein the biasing directions of the lock members are towards each other.

Preferably, the connector is adapted to releasably connect the two hollow members.

Preferably, the biasing member comprises a helical spring.

Typically, the first and the second aspects of the invention are combined in the same connector.

Typically, the two hollow members are elongate hollow members

Preferably, the connector is for connecting two elongate hollow members together to form part of a frame. Typically, the elongate hollow members may
5 be metal and the frame may be, for example, a window or door frame.

Preferably, the longitudinal axes of the two elongate hollow members are substantially perpendicular to each other when the two elongate hollow members are connected by the connector.

10 An example of a connector in accordance with the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view through two hollow members of a metal window frame secured together by a connector; and

15 Figure 2 is an exploded perspective view of the connector with springs omitted for clarity.

Figures 1 and 2 show a first hollow metal member 1 and a second hollow metal member 2 which are secured together using a connector 3. Typically, the two
20 hollow metal members form two sides of a frame, such as a metal window frame. The connector 3 includes a first member 4 and a second member 5. The first and second members 4, 5 are adapted to be secured together at ends 6, 7 respectively. To facilitate this the end 7 is provided with a countersunk hole adapted to receive a countersunk bolt 8 and the end 6 is provided with a
25 threaded hole with which the bolt 8 threadably engages to secure the ends 6, 7

(and therefore, the members 4, 5) together, as shown in Figure 1. Opposite the ends 6, 7 of each member 4, 5 are recessed ends 9, 10 respectively. Each recessed end 9, 10 has a recess 11 formed therein. The recesses 11 have an opening 12 defined by flanges 13, 14. Within each of the recesses 11 is located
5 a helical spring 15 and a lock member 16, which is biased by the spring 15 to the position shown in Figure 1. The lock members 16 have a locking formation 17 which may be formed, for example, by half punching out a central section of the lock member 16. It should be noted that the lock members 16 are orientated in the recesses 11 such that the edge 18 is directed towards the
10 securing ends 6, 7 of the members 4, 5.

As shown in Figures 1 and 2, the flanges 14 are longer than the flanges 13. This permits the lock member 16 to be relatively easily inserted into the recess 11 by first inserting edge 19 of the lock member 16 below the flange 14. This
15 permits opposite edge 20 of the lock member 16 to pass through the opening 12 into the recess 11 and to then locate under flange 13. The length of the flanges 14, 13 are chosen such that when the edge 20 is positioned as far as possible under flange 13, edge 19 is still retained in the recess 11 by the flange
14.

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In use, the hollow members 1, 2 which are to be secured together are formed with respective apertures 21, 22 and the hollow member 2 is provided with an access aperture 23. The connector 3 is assembled by inserting the helical spring 15 centrally into the recess 11 and then inserting the flange 19 of the lock
25 member 16 under the recess 14. The edge 20 is then pressed down, against

the action of the spring 15 to insert edge 20 through the opening 12 and into the recess 11, so that the edge 20 locates under the flange 13. Next, the bolt 8 is inserted through the countersunk hole in the end 7 and threaded into the threaded hole in the end 6 such that the members 4, 5 are only very loosely
 5 secured to each other by the bolt 8. The end 9 of the member 4 is then inserted into the hollow frame member 1 until the locking formation 17 engages with the aperture 21 in the hollow member 1. The member 5 is then inserted into hollow member 2 until the locking formation 17 on the lock member 16 on the member 5 engages with the aperture 22 in the lock member 2. In this position, the
 10 hollow members 1, 2 are loosely secured together via the connector 3 and an appropriate tool, such as a screw driver or allen key is inserted through the access aperture 23 to engage with the formation in the head of the bolt 8 and the bolt 8 tightened.

15 The other two hollow members (not shown) which form the finished window frame are then connected to the other ends of the hollow members 1, 2 using two more connectors 3 and the adjacent ends of the other two members are then connected together using a fourth connector 3. Typically, the final tightening of the bolts 8 in all the connectors 3 is only done after all adjacent
 20 ends of the four hollow members have been loosely connected together using connectors 3.

As the bolt 8 is tightened, the ends 6, 7 are drawn together, which pulls the members 4, 5 together. This in turn causes edge 18 to pull against the edge of
 25 the aperture 21 in the hollow member 1 and to pull the member 1 towards the

hollow member 2. Similarly, the edge 18 butts against the edge of the aperture 22 in the hollow member 2 to pull the hollow member 2 towards the hollow member 1.

5 Therefore, as bolt 8 is tightened, the hollow members 1, 2 are pulled together so that they are tightly coupled and secured to each other via the connector 3. The other three connectors are all tightened in a similar manner to form the finished frames.

10 It should be noted that in the finished frame, the locking plates 16 and the apertures 21, 22 are on the inside of the frame. Hence, when a rubber seal and glass is inserted into the frame, the locking plates 16 and the apertures 21, 22 are hidden from view.

15 It is also possible that a suitably modified connector could be used to connect together hollow members at an angle other than 90^0 , for example, to form a frame with three, five, six or more sides. Similarly, it is not essential that all the hollow members are connected together at the same angle.

20 Advantages of the invention are that it enables the lock members 16 to be relatively easily inserted into the recesses 11 by pushing the lock members 16 into the recesses 11 through the opening 12 against the biasing action of the helical springs 15. In addition, the lock members engage with the hollow members on the inside side wall of the finished frame, so that they can be
25 hidden by the material mounted within the frame.

CLAIMS

1. A connector for connecting two hollow members in end to end relationship, the connector comprising two arm members, securing means to
5 secure the arm members to each other, each arm member having a recess therein, and a biasing member and a lock member located within the recess, the lock member being retained by the recess within the recess, against the action of the biasing member; the lock member and the recess being adapted such that the lock member may be inserted into the recess in a direction
10 opposed to the action of the biasing member.
2. A connector according to claim 1, wherein the longitudinal axes of the two hollow members are at an angle to each other when the two hollow members are connected by the connector.
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3. A connector according to claim 1 or claim 2, wherein each arm member comprises retaining flanges that partially define the recess and retain the lock member within the recess.
- 20 4. A connector according to claim 3, wherein one flange is wider than the other flange.
5. A connector according to claim 4, wherein one flange is closer to the securing means than the other flange, and the flange closer to the securing
25 means is wider than the other flange.



6. A connector according to claim 4 or claim 5, wherein the opening of the recess, the width of the flanges and the width of the lock member is such that when one edge of the lock member is inserted into the recess adjacent the wider flange, the opposite edge of the lock member may pass through the opening into the recess, and when the opposite edge of the lock member is in a position such that the lock member is moved in a direction away from the wider flange, both edges of the lock member are retained in the recess by the respective flange.
7. A connector for connecting two hollow members in end to end relationship so that the longitudinal axes of the two hollow members are at an angle to each other, the connector comprising two arm members, securing means to secure the arm members to each other, each arm member including a recess, and a lock member and a biasing member located within the recess, the lock member being retained within the recess by the recess against the action of the biasing member, wherein the biasing directions of the lock members are towards each other.
8. A connector according to any of claims 1 to 6, and further comprising the features of claim 7.
9. A connector according to any of the preceding claims, wherein the connector is adapted to releasably connect the two hollow members.



10. A connector according to any of the preceding claims, wherein the two hollow members are elongate hollow members.

11. A frame comprising at least three connectors according to any of the
5 preceding claims and at least three elongate hollow members, the number of elongate hollow members being equal to the number of connectors, and the elongate hollow members being connected together in end to end relationship such that the longitudinal axes of two adjacent elongate hollow members are at an angle to each other and the connected elongate hollow members forming the
10 frame.

12. A frame according to claim 11, wherein there are four connectors and four elongate hollow members, and the frame is rectangular.

15 13. A frame according to claim 11 or claim 12, wherein the frame is a frame for a window.