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2,918,153

FRAME CONSTRUCTION

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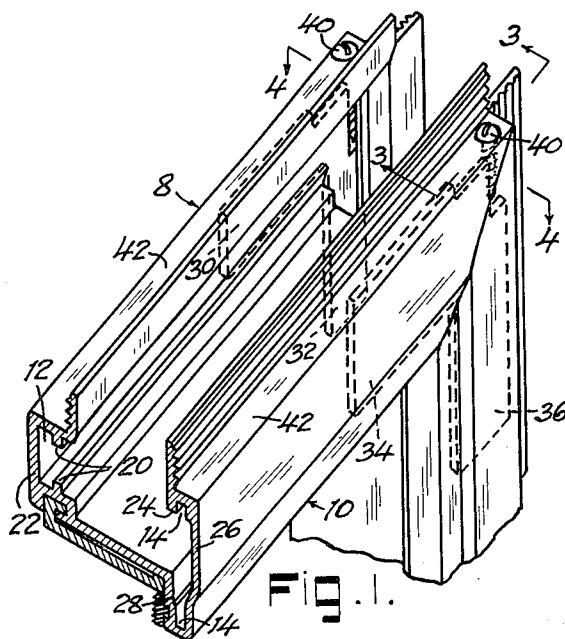


Fig. 1.

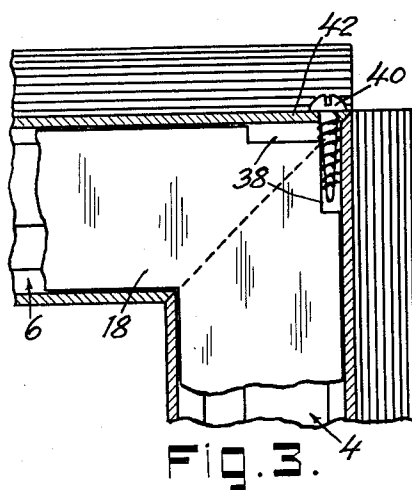


Fig. 3.

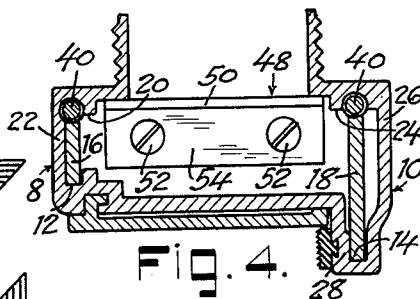


Fig. 4.

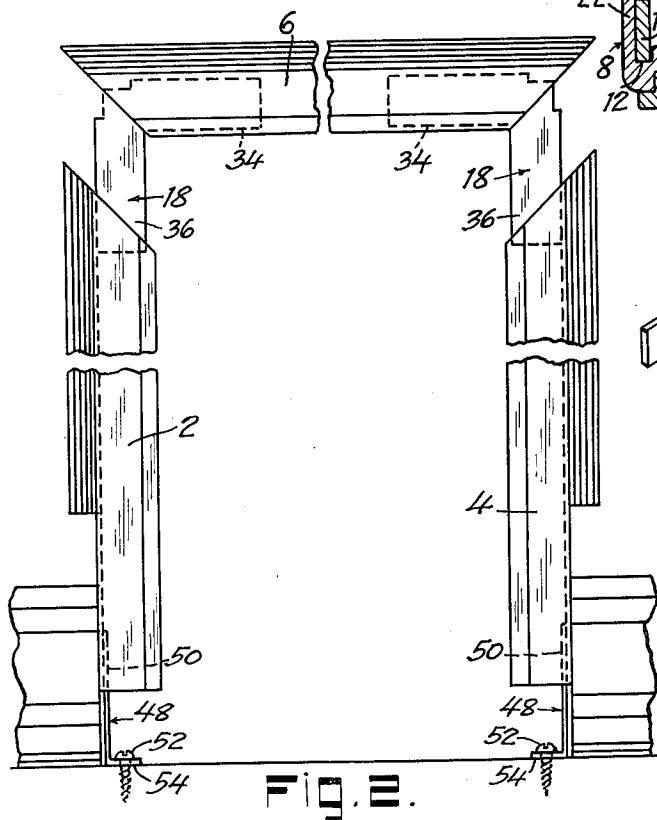


Fig. 2.

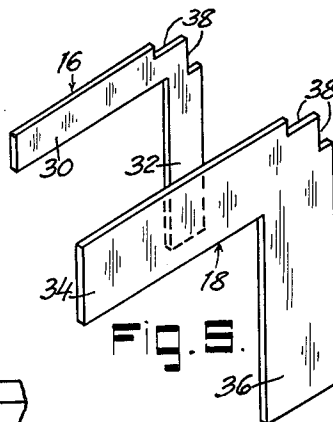


Fig. 5.

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FRAME CONSTRUCTION

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3 Claims. (Cl. 189—36)

This invention relates to door and window frames and is directed particularly to assemblies wherein the frame is formed of extruded metal members.

In forming door or window frames it is usual to miter the members at the corners. However, it is then somewhat difficult to secure the members together in a manner which serves to hold them rigidly in place. This problem presents increased difficulties when the stiles and header or sill of a frame are formed of metal members such as extruded metal strips, since such members are generally relatively thin and do not present portions through which the usual diagonally extending fastening means can be readily passed.

In accordance with the present invention these limitations and objections inherent in metal frame constructions of the prior art are overcome and means are provided which serve to secure metal members rigidly together at the corners of the assembly.

These advantages are preferably attained by providing the members with angle plates which lie in planes parallel to the face of the frame and have arms that extend lengthwise of the members they engage so as to hold the members in place in right angular relation to each other. In the preferred form of the invention the extruded metal members are formed with slots or recesses into which the arms of the angle plates are inserted so that the edges of the angle plates are confined and held against transverse bending or deformation. In this way the full strength of the material in a direction parallel to the plane of the angle plate is used in opposing displacement or relative movement of the members to which the angle plates are applied. Furthermore, provision may be made for fixing the angle plates in place with respect to the frame members so that movement of the members with respect to the plates is prevented and a rigid assembly provided.

One of the objects of the invention is to simplify the constructions employed in door and window frames.

Another object of the invention is to provide metal door and window frames with improved means for securing the elements of the frame together at the corners.

A specific object of the invention is to provide door and window frames which are formed of extruded metal strips and are rigidly secured together at the corners by angle plates lying in planes parallel to the face of the frame.

These and other objects and features of the present invention will be apparent from the following description thereof wherein reference is made to the figures of the accompanying drawing.

In the drawing:

Fig. 1 is a perspective illustrating the corner portion of a typical frame embodying the present invention;

Fig. 2 is a front elevation illustrating the manner in which the elements of Fig. 1 may be assembled in forming a frame;

Fig. 3 is a sectional view of the construction shown in Fig. 1 taken on the line 3—3 thereof;

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Fig. 4 is a sectional view of the construction shown in Fig. 1 taken on the line 4—4 thereof; and

Fig. 5 is a perspective illustrating the angle plates employed in the construction shown in Figs. 1 to 4.

In that form of the invention chosen for purposes of illustration in the drawing, the frame is composed of stiles 2 and 4 and a header 6 which are formed of extruded metal members which are mitered at the ends and positioned to form the corner of a frame such as a door frame, window frame or the like. The inner face of the frame is indicated at 8 and the outer face of the frame is indicated at 10.

Each of the members 2, 4 and 6 may be formed of extruded aluminum or other metal and as shown in Figs. 1 and 4, the members are generally U-shaped in cross section and of the general type disclosed in our copending applications Serial No. 367,804, now abandoned and Serial No. 638,269. Each strip is formed on its interior with slots indicated at 12 and 14 for receiving the arms of angle plates 16 and 18. The slot 12 is formed by the complementary grooves between the ribs 20 and the adjacent inner wall 22 of the extrusion. In a similar way, the slot 14 is formed by the groove between the rib 24 and the wall 26 and the complementary groove between the wall 26 and the inner surface 28 of the extrusion.

The header and stiles are preferably formed of identical extruded metal members and may be produced by cutting a length of the extruded material into sections and mitering the ends of each length. When such sections are positioned as shown in Fig. 1 to form the corner of a frame, the slots 12 and 14 in the members are brought into registry with each other.

The angle plate 16 is in the form of a flat L-shaped piece of metal of such width and thickness that the right angularly extending arms 30 and 32 thereof will fit snugly within the registering slots 12 in the stile 2 and header 6, respectively. The angle plate 18 is similarly formed of a flat L-shaped piece of metal having arms 34 and 36 adapted to fit snugly within the registering slots 14 in the stile 2 and header 6, respectively.

The angle plates may thus be assembled with the stiles and header in such a way that they lie in planes parallel to the inner and outer faces 8 and 10 of the frame. The grooves in the extruded members which cooperate to define the slots 12 and 14 receive the edges of the angle plates and serve to confine and hold the edges preventing the plates from bending under stress. The full strength of the material in a direction parallel to the plane of the angle plates is thus available to oppose spreading or angular movement of the stiles with respect to the header. In this way a rigid and integral connection is provided which positively prevents relative movement of the stiles and header at the corners of the assembly.

In the preferred form of the invention, the angle plates are provided with recesses or cut out portions 38 in the edges of the angle plate adjacent the outer corner thereof. These recesses are positioned to cooperate with the grooves which form the slots 12 and 14 so as to provide a cavity into which a screw or other element may be inserted as shown in Figs. 1, 3 and 4. A screw 40 or any other suitable means such as a bolt, pin or wedging element may then be passed through an opening in the shoulders 42 of the stile or header in line with the cavity thus formed. The screw, when inserted, serves to force the leg 36 of the angle plate to the left as seen in Fig. 3 whereby the mitered upper end of the stile 4 is moved inward against the adjacent mitered end of the header 6 to bring the ends into contact and close any crack or space which might otherwise exist therebetween. Furthermore, by using a screw 40 having a root diameter not substantially exceeding the width of the slots 12 and

14 but having a thread diameter which does exceed the width of the slots, the threads will be caused to cut into the sides of the slots and into the edge of the angle plate in a manner to draw the header downward against the stile and establish a positive bearing connection between all three elements as shown in Fig. 3 even though the angle plates may fit loosely within the slots in the extruded metal members.

In the form of the invention illustrated, the arms of the angle plate 16 are narrower and shorter than the arms of the angle plate 18. However, the arms may be of the same size and will, in any event, be of such form as to be capable of being fitted into the slots 12 and 14 so as to hold the members of the frame in fixed relative positions upon assembly thereof.

If desired the angle plates may fit within the slots in the metal members so as to have a forced or driven fit or the ends of the arms on the angle plates may be slightly tapered so as to facilitate the insertion thereof into the slots 12 and 14 and to insure rigid engagement thereof with the metal members such as the stiles and header on application thereof to these members.

The assembly of the header 6 with the stiles 2 and 4 may be effected as shown in Fig. 2. For this purpose the arms 30 and 34 of the angle plates 16 and 18 are inserted into the slots 12 and 14, respectively, at the opposite ends of the header 6. When thus assembled, the header with its angle plates may be moved vertically into engagement with the stiles 2 and 4 of the frame by inserting the legs 32 and 36 of the angle plates carried by the header into the corresponding slots 12 and 14 in the vertically positioned stiles 2 and 4 of the frame. When the angle plates and header have thus been fitted to the stiles of the frame, the members will be securely held together so as to prevent displacement or relative movement thereof. However, in order to eliminate any possibility of movement or play due to looseness of the arms of the angle plates within the slots, a hole may be drilled in the shoulder 42 of either the head or stile in line with the slot in the other member of the assembly. The screw 40 is then inserted and tightened in place so as to draw the mitered ends of the members together and wedge the angle plate against the sides of the slots in both members. In this way a rigid and positive connection is provided between the elements. Moreover, if the screw 40 is of such size that the threads thereon cut into the metal of which the extruded member and angle are formed as shown in Fig. 4, the assembly will possess rigidity comparable with that of an integral door frame.

The lower ends of the stiles 2 and 4 may be held in fixed positions by any suitable means. When the assembly is formed with four sides composed of similar extruded metal members, as in a window frame, the sill may be connected to the lower ends of the stiles by means of angle plates in the same manner as when securing the header to the stiles. When the frame has three sides, as in a door, the lower ends of the stiles may be secured in fixed positions by anchor plates 48 or any other suitable means. The anchor plates 48 are formed with upstanding flanges 50 which bear against surfaces of the door frame in a manner to hold the stiles 2 and 4 in fixed positions, whereas the base portion 54 of each anchor plate can be secured to the floor by screws, nails or the like 52 so as to hold the lower end of each stile in fixed position and in properly spaced relation.

Of course other bolts, screws or other fastening elements may be passed through the front and rear faces of the stiles and header or at other points to engage tie plates if desired, but the use of such other fastening means is not generally necessary or desirable.

The arrangement and combination of elements provided can be used in producing door frames, window frames or any other type of framing construction and permits ready assembly of the elements into a firm, rigid

construction while using extruded metal members in forming the frame.

While one particular form and type of metal extrusion has been shown in the drawing for the purpose of indicating a typical application of the invention, it will be understood that the cross sectional form of the extrusions or metal members can be varied considerably to provide any desired number and arrangement of slots for receiving angle plates. By providing two angle plates at each corner of the frame and positioning these plates adjacent the opposite faces of the frame, the assembly not only prevents relative angular movement of the members at the corners, but further prevents displacement of the members transversely with respect to the frame. However, if desired a single angle plate may be used at each corner or the extruded members may be formed to receive, three, four or any number and size of angle plates desired. In any event angular movement of the header, stiles or other members cannot take place without actual deformation of the angle plates, whereas such deformation is substantially impossible by reason of the confining of the edges or sides of the angle plates within the slots therefor. An integral formation is thus provided at the corners so as to utilize the full strength of the metal of which the corner plates are formed.

Thus the invention is capable of various variations and changes for embodiment in substantially any type of framing or structural assembly including roofs, trusses and other corner constructions or intersections wherein metal members are arranged at angles to each other.

While the invention has been shown and described above with particular reference to preferred embodiments thereof, it should be understood that the particular construction chosen for this purpose is intended to be illustrative only and is not intended to limit the scope of the invention.

We claim:

1. A frame comprising two extruded metal members mitered at their ends and positioned to form a corner of the frame, said members having registering slots therein extending lengthwise of the members and lying in a plane parallel to a face of the frame, an angle plate having arms extending at right angles to each other located in said slots and serving to hold the members in fixed relative positions and a wedging member extending through an opening in one of said members and between the outer edge of the angle plate and an inner surface of the other member and serving to urge the mitered ends of said members into engagement.

2. A frame comprising two extruded metal members mitered at their ends and positioned to form a corner of the frame, said members having registering slots therein extending lengthwise of the members and lying in a plane parallel to a face of the frame, an angle plate having arms extending at right angles to each other located in said slots and serving to hold the members in fixed relative positions, the angle plate having a recess in the outer corner thereof cooperating with the slot in one of said members to form a screw receiving cavity, and a screw extending through the other member and into said cavity with the threads on the screw cutting into the sides of the slot and the edge of the angle plate and serving to hold the members and angle plate in positive engagement with each other.

3. A frame comprising two extruded metal members of generally U-shaped cross section, said members being mitered at the ends and positioned to form a corner of the frame, each of said members having two spaced slots formed therein and extending lengthwise of the members on the interior thereof parallel to a face of the frame, the slots in one of said members registering with the corresponding slots in the other of said members, an L-shaped angle plate located in each of the slots of said members and extending about said corners forming an integral con-

nection between said members holding them in fixed relative positions, the angle plates having recesses in the outer corners thereof cooperating with the slot in one of said members to form a screw receiving cavity, and a screw extending through the other member and into said cavity with the threads on the screw cutting into the sides of the slot and the edges of the angle plates and serving to hold the members and angle plates in positive engagement with each other.

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