METAL FRAME CONSTRUCTIONS
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The present invention relates to metal constructions, particularly framing of all kinds including window frames, door frames and the like, and more particularly to a metal window sash frame. This application is a continuation-in-part of abandoned application Serial No. 224,507, filed May 4, 1951.

A general object of the invention is the provision of extruded metal framing members incorporating novel and advantageous means facilitating rapid assembly of such members, one to another, by the use of standard and readily available threaded connectors. Another object of the invention is the provision of extruded metal framing members having one or more pairs of spaced parallel flanges projecting from a surface thereof and adapted to receive between the flanges of each pair, the shank of a threaded connector, said flanges extending longitudinally of the member, whereby said member may be connected to another member abutting the end of the first member at right angles, by means of one or more threaded connectors extending through the second member and into threaded engagement between the flanges of each pair formed on the first member, the threaded connectors being simply inserted through holes drilled in the second member and screwed into engagement between the flanges of the first member. This simple and inexpensive mode of connecting such extruded metal framing members has been found to have great merit and widespread application.

Another object of the invention is the provision of a sash window comprising a rectangular frame made up of four detachably connected metal members, which may be shipped in disassembled condition and readily and quickly assembled and glazed on the job, and without the use of any special tools.

Another object is the provision of a sash of the character described, wherein the connection between the several members making up the sash frame is such that they may readily be loosened, if necessary or desired, to permit removal of the moulding strip in order to enable replacement of a broken pane, or for any other purpose.

Other and further objects, features and advantages will be apparent from the description which follows, read in connection with the accompanying drawings in which:

Figure 1 is a front elevational view of a sash constructed according to the invention, with a portion of one lower corner broken away;

Figure 2 is a side elevation of the frame, on a slightly enlarged scale;

Figure 3 is a section on line 3—3 of Figure 1;

Figure 4 is a section on line 4—4 of Figure 3;

Figure 5 is a section on line 5—5 of Figure 1;

Figure 6 is a detailed perspective view, on an enlarged scale, of one corner of the frame in disassembled condition;

Figure 7 is a plan view of a sash frame according to the invention, provided with spacing clips, and mounted in a window frame;

Figure 8 is a partial vertical section on line 8—8 of Figure 7;

Figure 9 is a detailed perspective view of one of the spacing clips;

Figure 10 is a perspective view of an extruded framing member of general application; and

Figure 11 is a plan view of a joint between two framing members, said joint making use of a feature of the present invention.

In order to facilitate an understanding of the invention, reference is made to the embodiments thereof shown in the accompanying drawings and detailed descriptive language is employed. It will nevertheless be understood that no limitation of the invention is thereby intended and that various changes and alterations are contemplated such as would ordinarily occur to one skilled in the art to which the invention relates.

Referring to Figure 1 the sash comprises generally a top member 10, bottom member 11, side members 12 and 13, pane of glass 14 and moulding strip 15, which is preferably of resilient, weather-resistant material such as neoprene or the like. The top member 10 is shown in end elevation in Figure 2 and in vertical section in Figure 5 and comprises an extruded tubular member of rectangular section having, if desired, an overhang 16 formed along its upper, outer edge, the overhang 16 having also a dependent flange 17. However, the overhang 16 and depending flange 17 are matters of preference and are not essential to the invention.

The bottom member 11 comprises, likewise, an extruded shape of generally rectangular cross-section, the bottom web 18, however, being discontinuous. That is to say, the bottom surface of the member 11 comprises opposite, intertwined longitudinal flanges 18' spaced apart by an elongated opening or slot, and preferably the side walls 19 of the member 11 are provided with opposite inwardly extending flanges 20 spaced slightly above the flanges 18' to provide, with the latter, grooves for the reception of the edges of a resilient sealing strip 21 which may be inserted in place by simple means.

The side members 12 and 13 of the frame are also extruded metal shapes, generally U-shaped in section as best seen in Figure 3, disposed with their open sides outwardly of the frame. Internally of the U-shaped section, each side member is provided with spaced longitudinal flanges 22, formed during the extrusion of the members, which provide therebetween a groove for the reception of fastening members or connectors as hereinafter described. On the inner side of each of the four members making up the sash frame there is provided a longitudinally and inwardly extending glass-engaging flange 23 and, spaced therefrom by substantially the full thickness of the frame member, a corresponding, though shorter flange 24. Each of the flanges 23, 24 is turned inwardly toward a median plane therebetween, the flange 23 so as to present an edge 25 to engage the glass of the pane 14 and the flange 24 so as to present an edge 26 for engaging the resilient moulding strip 15.

The moulding strip 15 extends entirely around the inner periphery of the sash frame, and is formed with a base portion 28 which seats against the inner sides of the four frame members, and an upstanding flange portion 29 of substantially equal width to the flange 23. The glass pane 14 is adapted to be gripped within the base portion 28 of the moulding strip 15 throughout its entire length and to be resiliently pressed, by the flange portion 29, against the edges 25 of the flanges 23. The pane, therefore, is retained in a firm yet resilient manner, and is less susceptible to breakage through vibration or the like than if mounted in the usual manner.

The entire assembly is securely held together by means of threaded connectors which may be of the nail screw
3. type as illustrated at 30, Figure 2, or may be threaded throughout their length as the connector indicated at 31, Figure 2. Such connectors are inserted through drilled holes in the top and bottom members, respectively, and are grooved between the flanges 22 formed internally of the side members 12 and 13, and are adapted to form their own threads in the said flanges 22 so as to be firmly but detachably retained therein.

The moulding strip 15 is of such dimensions as to be under the same degree, when in a fully assembled relationship to the respective frame members. Therefore, for ease of installation, it is essential that the several members be connected in such a manner as to be partially or entirely releasable, and this is accomplished by the type of connection just described. If, for example, the sash is shipped in knocked-down condition and is assembled and glazed on the job, the four frame members are first tightly fastened together in the manner described, then the glass is put in place against the edges 25 of the flanges 23, and the moulding strip 15 then inserted in place with the aid of any suitable tool. When this is done the moulding strip 15 is compressed to a sufficient extent to firmly grip the pane 14 and to be, itself, tightly retained between the flanges 23 and 24. This may be done without the use of any tools except a screwdriver.

If the pane 14 is broken and it is desired to replace the same, it is only necessary to pry out the moulding strip 15, which may be easily removed permitting replacement of the pane 14, after which the moulding strip 15 is re-inserted in place as before.

The heads of the connectors 30 and 31 are readily accessible, the head 32 of connector 30 being disposed outside of the member 10 and the head 33 of connector 31 being accessible through the slot between the flanges 18 of bottom member 11, the resilient sealing strip 35 first being removed.

As will be seen, the top and bottom members extend for the full width of the frame, the side members 12 and 13 extending between opposed surfaces at the ends of the top and bottom members. The inwardly projecting flanges 23 and 24 of each member are mitered at their ends, as required by reason of the bevelled or inclined shape of the flanges. By reason of the fact that each of the frame members is provided with square ends, mitered joints not being used, a considerable saving of metal is effected, and as seen, the several members are connected by the simplest and most economical means.

The same means, namely, the nail screws 30 or screws 31 (Figure 2) may be used to secure spacing clips 35 at either end of the upper surface of the top member 10, as seen in Figure 7, and spacing clips 26 within the ends of the bottom member 11 (Figure 8), which spacing clips are provided with elongated apertures 35', 36' so that they may be adjusted laterally according to the width of the window frame or other opening in which the sash is to be mounted. Additional elongated apertures 35" are provided in order to insure registry with the apertures 37 and 38 provided in the top and bottom members respectively, for accommodation of the operating and balancing mechanism (not shown).

The provision of spacing clips 35 and 36 likewise provides a convenient method of mounting and demounting the sash in the window frame, since when the corresponding clips on either side of the sash frame are adjusted to their innermost positions, the sash may be readily inserted or removed from the opening between the lands or flanges of the window frame, while when the spacing clips 35 and 36 are adjusted outwardly, the sash will be retained in the grooves between the lands of the window frame. The spacing clip may be adjusted to such position as will provide the best sliding engagement between the sash frame and window frame, eliminate rattles, etc.

From the foregoing description it will be apparent that a simple, economical and advantageous sash frame is provided by the present invention.

Figures 10 and 11 illustrate the application of the present invention to the connection of extruded metal framing members generally, that is, whenever two such framing members are to be connected at right angles at a squared end of one of the members. The type of construction under consideration is suitable for window frames, door frames, and other joints in the framing of a building.

Figure 10 depicts a channel member 40 formed with parallel opposite flanges 41 connected by a web 42, the flanges 41 being provided with a spaced series of grooves 43, if desired, for nailing or decorative purposes. The upper or inner surface of the web 42 is provided with two pairs of spaced parallel flanges 44 projecting therefrom, the flanges 44 extending longitudinally of the member 40, the flanges of each pair being curved toward each other near their respective bases and distal edges so that the space between the flanges of each pair is partially enclosed and is partly-cylindrical in section.

Figure 11 illustrates a joint formed between the member 40 and an abutting member 45 which, purely for purposes of illustration, is shown as another channel section comprising parallel flanges 46 and an intermediate connecting web 47. In this instance, the flanges 46 are provided with spaced or somewhat different form from the grooves 43, also for nailing or decorative purposes. Before effecting the joint illustrated in Figure 11, the members 40 and 45 are sawed or otherwise cut to length and the web 47 of member 45 is provided with drilled apertures 48 in alignment with the space between the flanges 44 of each pair provided on the member 40. The members 40 and 45 are then abutted in the desired relation and threaded connecting members 50 are inserted through the apertures 49 and screwed into engagement between the flanges 44 of each pair formed on the member 40. The same means, namely, the nail screws 30 or screws 31 (Figure 2) may be used for forming extruded members such as the member 40 is such that the threaded connecting members 50 may readily be screwed into the specified relationship by the use of suitable tools, yet will maintain a firm engagement between the respective members. Preferably, the pairs of flanges 44, extend from end to end of the members 40, so that the latter may be cut to any desired length without destroying their capacity for ready connection by the means described.

It will be apparent that a large variety of shapes, suited for all of the various types of framing employed in building construction, may be extruded with one or more pairs of flanges 44 formed integrally therewith, and will thus be adapted for quick and facile connection to other members extending at right angles thereto, such other members being either extruded metal members or otherwise. In employing the type of joint described, it is immaterial whether the pairs of flanges 44 are provided on horizontal members or on vertical members.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In framing construction, a corner joint comprising an extruded metal member having spaced parallel connector-engaging flanges projecting from a surface thereof and adapted to receive therebetween the shank of a threaded connector, said flanges extending longitudinally of said member, a second metal member abutting an end of said first member at right angles, and a threaded connector extending through said second member at an angle, said connector-engaging flanges projecting from a surface thereof each pair being adapted to receive therebetween the shank of a threaded connector, said flanges
extending longitudinally of said member, a second metal member abutting an end of said first member at right angles, and a threaded connector extending through said second member in substantial parallelism with the longitudinal dimension of said flanges and into threaded engagement with and between said flanges of each said pair on said first member.

3. A metal window sash comprising a horizontal top member, a horizontal bottom member, parallel vertical side members extending between said top and bottom members, said side members being of U-section with their open sides disposed outwardly, each said side member having spaced longitudinal flanges projecting inwardly from the base of the U-section and adapted to receive therebetween the shank of a threaded connector, said top, bottom and side members having square ends, and means adjustably connecting said top and bottom members, respectively, to said side members, to form a rectangular frame, said last means comprising threaded connectors extending through said top and bottom members, respectively, in substantial parallelism with the longitudinal dimension of said flanges of said side members and into threaded engagement with and between said flanges.

4. A device according to claim 1, said threaded connectors comprising, each, a sharpened unthreaded outer shank portion and a threaded inner shank portion.

5. As an article of manufacture, an extruded metal framing member comprising flanges and a connecting web, said web having spaced parallel connector-engaging flanges projecting from a surface thereof at points lying between said first-mentioned flanges and in the same direction, and adapted to receive therebetween the shank of a threaded connector, all of said flanges extending longitudinally of said member, said connector-engaging flanges being inclined toward each other at their distal edges to partially enclose the space therebetween.

6. As an article of manufacture, an extruded metal framing member comprising flanges and a connecting web, said web having spaced parallel connector-engaging flanges projecting from a surface thereof at points lying between said first-mentioned flanges and in the same direction, and adapted to receive therebetween the shank of a threaded connector, all of said flanges extending longitudinally of said member, the inner surfaces of said connector-engaging flanges being curved toward each other at their bases and at their distal edges, the space therebetween being approximately semi-cylindrical.

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