Feb. 21, 1961 D. K. MINICK 2,972,396

WINDOW OR DOOR SASH CORNER CONSTRUCTION

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Fig 1.

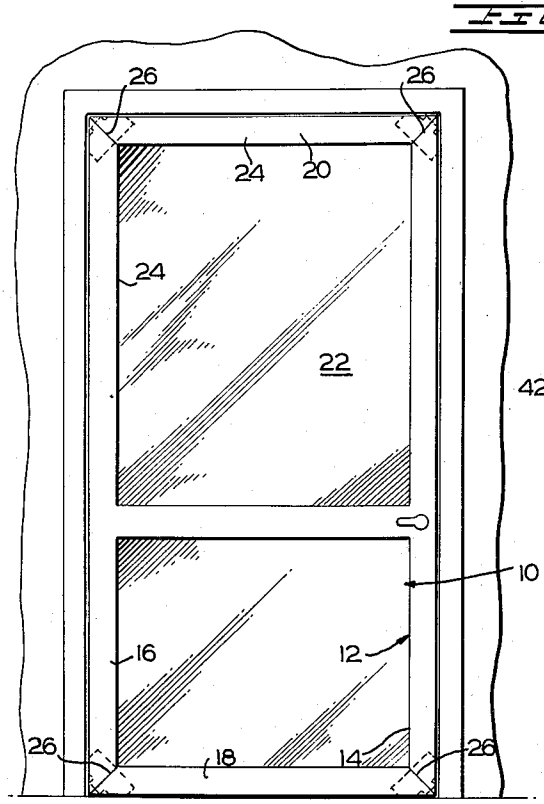


Fig 2.

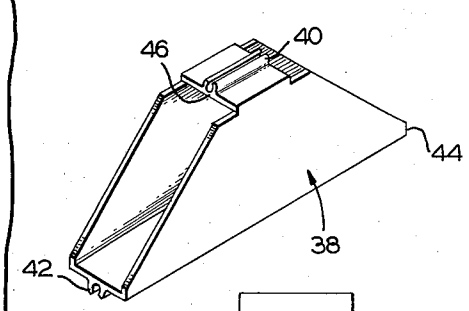
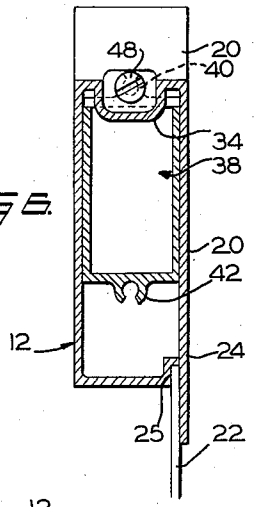


Fig 6.



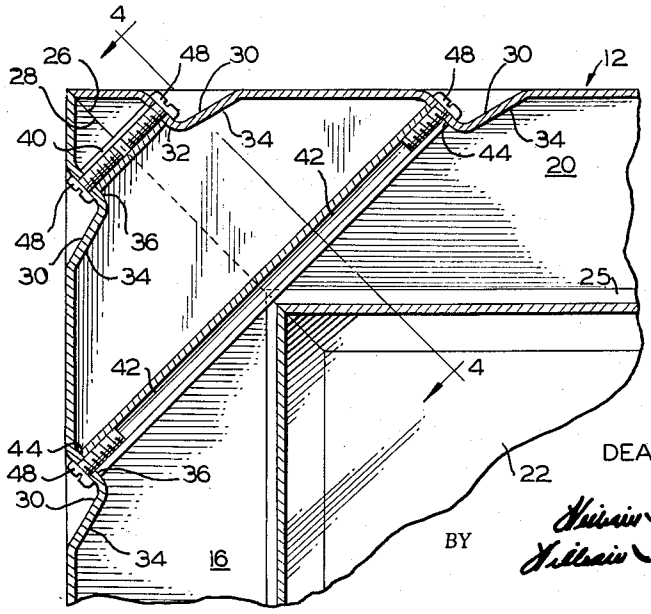


Fig 5.

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FIG 3.

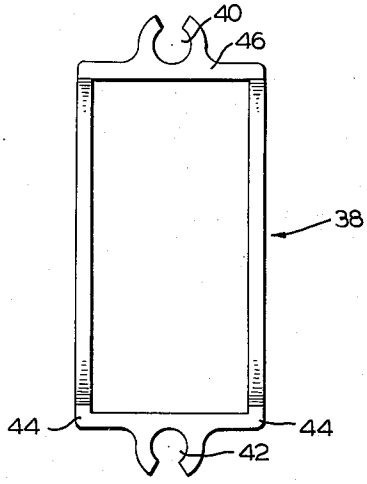
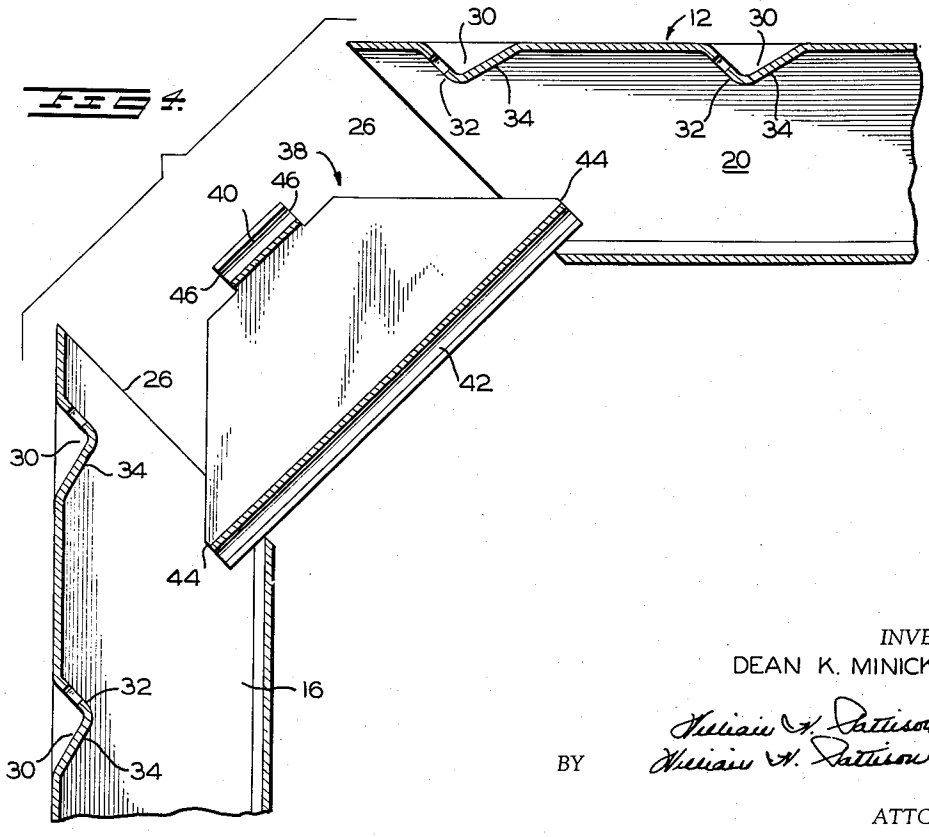


FIG 4.



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WINDOW OR DOOR SASH CORNER CONSTRUCTION

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8 Claims. (Cl. 189—36)

This invention relates to doors and windows and more particularly and specifically to new and improved sash frame constructions for doors and windows. The instant invention more especially relates to corner attachments for the right angular components of door and window sash frames.

For purposes of clarity and understanding in the following discussions and descriptive disclosures, the terms "frame," "frames" and "framing components" are intended to define and identify those structural elements constituting the elongated members extending about a door or window sash as distinguished from the usual "frame" within which a door or window sash conventionally cooperates as a closure member. At the same time, the term "sash" as hereinafter used conjunctively with door-and-window is intended to identify and define, generically, a closure member for a door or window opening including the framing components and panels, glazed or otherwise, constituting such closure members. It is immaterial to the construction of this invention whether the closure members are hinged, pivoted or slidably mounted in the openings which they close.

Heretofore, in the fabrication and assembly of doors and windows having extruded, tubular sash frame components, it has been the practice to utilize complex and costly manufacturing techniques in the interconnection of right angular sash frame components at the corner intersections of the frame. The complex and costly techniques resorted to in the prior art have been necessitated by the requirement that there be a tight, rigid joint at sash frame corners, which are usually mitered fits, which would withstand twisting stresses and torques set up in the doors and windows, in addition to resisting the usual tensional and compressive forces set up both vertically and horizontally in door and window sashes.

Further, the typical prior art gusset utilized in fabrication of door and window frame components has embodied plural offset screw fastenings acting in shear for the purpose of tensioning or pre-stressing the mitered corner joint.

It is, therefore, a general object of the present invention to provide a new and improved corner attachment for the frame components of door and window sashes which securely and rigidly lock and retain the angularly disposed components together in proper relationship.

An object of this invention is the provision of a corner gusset for securing door and window frame components in mitered joints which embodies the use of plural screw fastener members arranged in direct opposition and at right angles to the line of the mitered joint which provides for optimum resistance to joint separation.

It is also an object of this invention to provide a novel and improved corner fastening for the angularly disposed frame components of door and window sashes which is of extremely low cost both as to structural components as well as in utilization in the assembly or fabrication of the door or window sash.

Another object of this invention resides in the provision of a novel and improved corner fastening for tubular door and window sash frame components which is disposed entirely within the confines of the tubular components thereby eliminating any visual change in the normal appearance of the door or window sash.

A further object of this invention is the provision of a novel and improved gusset member for fastening angularly disposed door and window sash frame corners which is readily and inexpensively manufactured from an elongated one-piece extrusion formed by cutting said extrusion into longitudinal segments each of which constitutes one such gusset member.

Still further and additional objects and advantages of the instant invention will become more readily apparent to those skilled in the art when the following description is read in the light of the accompanying drawings.

In the accompanying drawings and the herein following detailed disclosure, the sash frame corner fastening constituting the principal concepts of the present invention is described in structural combination and association with a door sash frame for purposes of clarity and illustration. However, it is not intended that this invention be limited to this specific combination since it is fully contemplated that the novel features, structural and functional, of the present invention may be equally adaptable to window sash frames, sliding, hinged or otherwise hung, and in certain instances to the frames for openings for doors and windows where they are fabricated from tubular metallic components.

The nature of the present invention may be stated in general terms as relating to a corner fastening means for the angularly disposed components of door and window sash frames which consists of a tubular metallic extrusion of rectangular cross-sectional configuration having arcuate screw channels externally of two opposed sides thereof and extending longitudinally therealong, said extruded tube being cut transversely to form a substantially trapezoidal gusset, said gusset being interposed in the angle defined by the two sash frame components at a corner joint of said frame, and said frame components being drilled to receive screws aligned with the screw channels disposed diagonally between the sash frame components.

Referring now to the accompanying drawings in which like numerals designate similar parts throughout the several views:

Fig. 1 is a front elevation of a door constructed in accordance with the present invention.

Fig. 2 is a perspective illustration of the improved corner gusset.

Fig. 3 is an end elevation of the gusset shown in Fig. 2.

Fig. 4 is a vertical section through a partially assembled frame corner.

Fig. 5 is a view like Fig. 4 of a completed corner assembly.

Fig. 6 is a section taken on line 6—6, Fig. 5.

With particular reference to the appended drawings, 10 generally designates a door hinged to close a usual framed door opening. The door 10 consists of a sash frame 12, composed of two vertical components 14 and 16, a sill component 18 and a top rail or head component 20, receiving one or more panels 22 which may be glazed, wood or metallic.

Each of the vertical and horizontal components 14 through 20, of the door sash frame, consists of an elongated section of extruded, metallic tube 24 of rectangular cross-sectional configuration and provided with an extended side portion on one face thereof defining a glazing or panel receiving channel 25 along one longitudinal face thereof. Each frame component is of like configuration and each is cut at a 45° angle, as at 26, at each end to permit the flush angular abutment, as at

28, of adjacent ends of the vertical and horizontal components at the corners of the sash frame. The outermost edge face of each sash frame component of the door, remote to the panel insert 22, is provided with a pair of angular depressions 30, one pair adjacent each end of the component. The depressions 30 of each pair of depressions are located in alignment longitudinally of the face of the frame component edge in which they are formed with one depression closely spaced from one end of the component and the other depression of the pair spaced from the first away from the adjacent end of the component.

Each of the depressions 30 in each of the components of the sash frame is formed by angularly upsetting the face of the extruded tubular component inwardly so as to provide a dimple defined longitudinally of the component by angular wall portions 32 and 34 intersecting at the base of the dimple. That agnular wall portion 32 of each depression, which is located nearest the adjacent end of the sash frame component, lies at a 45° angle relative to the flat surface of the component edge in which it is formed. The resultant angle of the second face portion 34 of each depression in such an upsetting operation will approximate 30° from the plane of the edge surface in which the dimple or depression is formed. The 45° inclined face of each depression, disposed toward the adjacent end of the frame member, is provided with a screw opening 36 substantially centrally thereof and opening therethrough at right angles to the plane surface of that inclined wall portion of the depression.

By the foregoing structure the depression 30 of each pair thereof in each frame component presents screw openings the axes of which are parallel and at a 45° inclination to the plane surface of the edge of the frame component in which the dimples are formed and perpendicular to the angular line defining the adjacent end of the frame component.

Associated with a door sash frame, the components of which are constructed in accordance with the above-described structure, is a plurality of corner gussets for securing the ends of adjacent frame components at the points of their angular abutment at the frame corners. One such gusset 38 is associated with each corner joint of the door sash frame.

Each of the corner fastening gussets 38 is formed from an extruded member of rectangular, tubular configuration in cross section with arcuate screw channels 40 and 42 formed longitudinally of two opposed faces thereof externally of the tube.

In elevation, each gusset 38 consists of a generally isosceles trapezoidal section cut from the extruded member, the non-parallel sides of which cut across the tubular extruded member between the opposed screw channel supporting faces thereof. Thus, each gusset consists of a pair of spaced parallel plates of like isosceles trapezoidal configuration with the corresponding parallel sides thereof being interconnected by the screw channel supporting faces of the tubular member from which the gusset is formed.

After the isosceles trapezoidal gusset is cut from the tubular member the vertex portions at each end of the greater parallel side are cut away perpendicularly to that parallel side through the depth of the screw channel 42 contiguous with that side of the gusset, as at 44, and each end of the screw channel 40 is cut away, as at 46, perpendicularly to the lesser parallel side of the gusset to define the screw channel 40 centrally of that side and of an overall length determined by the location of the sash frame component depressions 30 in the frame edge.

In utilization of a gusset 38 to secure two sash frame components at a corner joint of the frame, the gusset is located within the tubular area defined within the butted, mitered ends of the frame components. The gusset 38 is first positioned with one non-parallel side disposed toward and adjacent to the dimpled face of one frame component with the ends of the screw channels 40 and 42 adjacent that side being in registry with the two screw openings 36 in the paired depressions 30 therein. Sheet metal screws 48 are then threaded through the openings 36 into the screw channels drawing the flush ends of the channels up tight against the angular walls 32 of the depressions 30 and the gusset edge tight against the inner face of the frame component edge intermediate the depressions 30.

After the gusset is tightly secured to the inner face of one of the frame components as described, the second frame component is positioned with its angular end in aligned abutment with the first frame component thereby enclosing the gusset within the tubular confines of the frame defined by said components. Such positioning of the second frame component will bring the screw openings 36 in the depressions 30 adjacent the butted end thereof into registry with the second ends of the two screw channels 40 and 42 of the gusset 36. Then, threaded insertion of sheet metal screws 48 through the screw openings 36 and into the screw channels 40 and 42 will tightly draw up the second frame component against the second non-parallel side of the gusset 38 tightly securing this second frame component in a mitered corner joint with the first frame component to which the gusset was first secured.

In accordance with the above described corner connection for the frame components of door and window sashes a rigid, non-yielding joint connection is provided between the several vertical and horizontal members forming the sash frame. The utilization of a plurality of fastening screws in paired opposition between butted frame components provides for a rigid connection which will completely resist twisting torques and stresses within the sash and will securely maintain the joint against tensional and compressive forces normal in such frame constructions.

Accordingly, a new and highly improved corner connector for door and window frames has been provided which serves to accomplish all of the new and useful results above attributed thereto and to satisfy those objects and advantages above set forth.

In the foregoing description certain terms have been used for brevity and clearness of understanding, but no unnecessary limitations are to be implied beyond the requirements of the prior art and the hereinafter appended claims which are intended to be broadly construed.

I claim:

1. A fastener for angularly disposed structural members consisting of a pair of like trapezoidal shaped plates in spaced coincidence, the corresponding parallel sides of said plates being interconnected by perpendicular side members forming a trapezoidal gusset of tubular cross-sectional configuration, and screw channels formed longitudinally of said side members.

2. A fastener construction as defined in claim 1 wherein said spaced plates are of isosceles trapezoidal configuration.

3. A construction as defined in claim 1 for right angularly disposed structural members wherein said plates are of isosceles trapezoidal configuration with the base angles each being 45°

4. In a door or window construction, the combination with a pair of tubular framing components having adjacent ends abutting in angular relation to each other, the outermost faces of each frame component having corresponding paired screw openings at spaced points therein opening therethrough in axial opposition, of a trapezoidal gusset having screw channels longitudinally of the parallel sides thereof adapted to align respectively between the corresponding opposed screw openings in each frame component.

5. A gusset of the type defined in claim 4 wherein the trapezoidal configuration of said gusset is isosceles.

6. In a door or window construction, the combination with a pair of tubular framing components having adjacent ends abutting in mitered perpendicular relation to each other and extending along respective adjacent sides of a frame from a corner thereof, the outermost faces in each frame component having corresponding paired screw openings at spaced points therein opening therethrough in axial opposition, of a trapezoidal gusset having screw channels longitudinally of the parallel sides thereof adapted to align respectively between the corresponding opposed screw openings in each frame component.

7. A gusset of the type defined in claim 6 wherein the trapezoidal configuration of said gusset is isosceles with the base angles thereof each being of 45°.

8. In combination with a pair of tubular framing components disposed in perpendicular relationship and having adjacent ends butted in a mitered joint, a trapezoidal gusset disposed in the angle defined between the components, screw means interconnecting each frame component with the gusset, and the screw means associated with the frame components being aligned in axial opposition and at right angles to the line of the mitered joint.

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