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E. J. ZAHNER ET AL

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FRAME AND STRENGTHENING MEMBER THEREFOR

Filed June 24, 1930

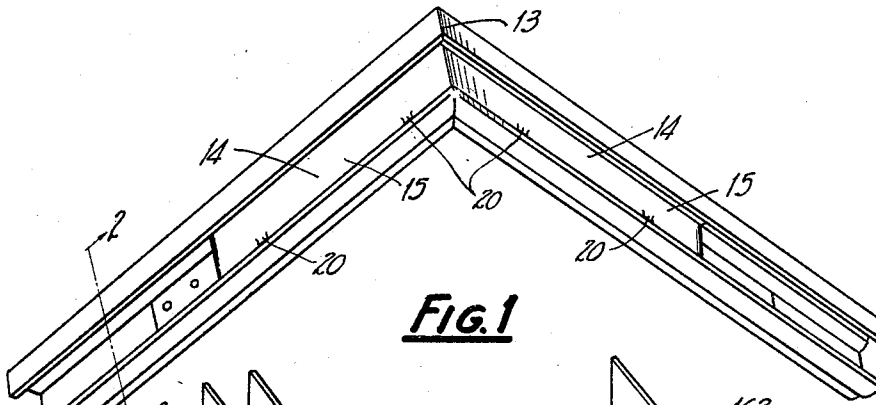


Fig. 1

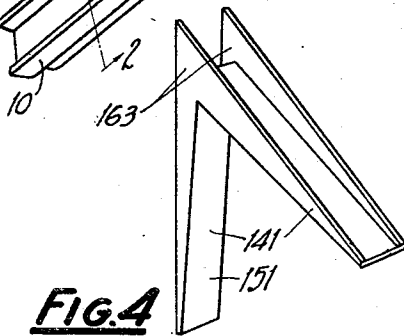


Fig. 4

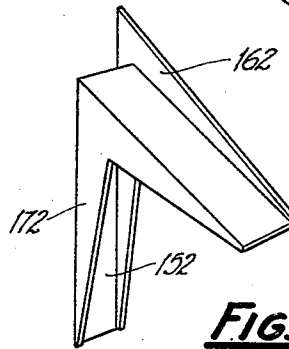


Fig. 5

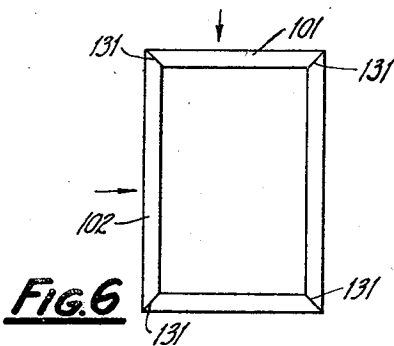


Fig. 6

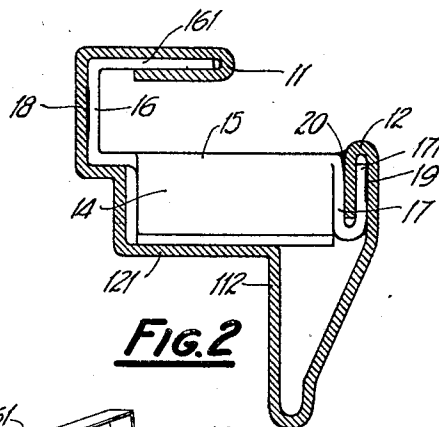


Fig. 2

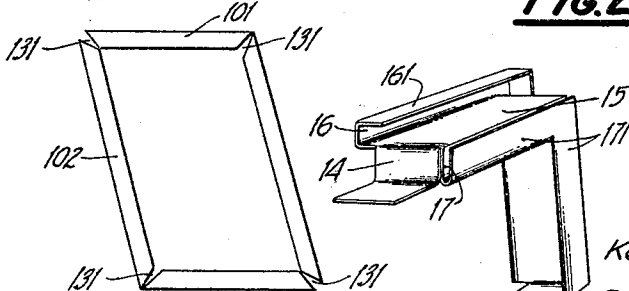


Fig. 7

Fig. 3

INVENTORS
Edward J. Zahner
Kenneth G. Reynolds
By
Cuddeback & Ward
ATTORNEYS

UNITED STATES PATENT OFFICE

EDWARD J. ZAHNER, OF LA PORTE, INDIANA, AND KENNETH G. REYNOLDS, OF ALBANY,
NEW YORK

FRAME AND STRENGTHENING MEMBER THEREFOR

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Our invention more particularly relates to a sheet metal frame of light construction, the sides of which form a miter, and a strengthening member or bracket constructed and
5 arranged to reinforce the corner of the frame about the miter.

In constructing an open rectangular frame, such as may be suitable for a window sash or frame, or a door frame, considerable difficulty is experienced in designing a structure which is substantially rigid and capable of resisting distortive stresses arising from settlement and other causes affecting the structure of which the window or door
15 is merely a part.

Speaking generally, only a triangular frame, pin-connected at the angles, is structurally rigid and cannot be distorted except by bending or breaking one of the sides of the triangle, whereas a pin-connected unit of four sides or elements of fixed length may be built rectangular but may readily be distorted to form any parallelogram without bending or breaking one of the sides.

Window sashes, and window and door frames are, of course, not pin connected at the corners but they are generally rectangular in outline and cannot be resolved into triangular units because of the impracticability of inserting a diagonal member extending between opposite corners. The sides of such frames and sashes usually meet in a miter, and the strength at the miter alone provides the only resistance to distortion.

Where the stiles and rails of a door frame, for example, are of substantial size, the problem of corner bracing presents no great difficulty, but when the stiles and rails are of extremely light material, such as sections formed from thin metal sheets or strips, merely welding such sections along the miters does not form a satisfactory structure. Neither is it satisfactory to provide at the corners either an angle brace in which the
45 two sides of the brace lie in the same plane or in which the two sides lie in rectangularly disposed planes. To attain the best results and assure structural stability and resistance to distortion in all directions the corners of
50 the frame should be reinforced by angular

elements of such shape or configuration that they tend substantially to resist distortion by tension or compression rather than by mere bending.

We accomplish this desired end by the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawings in which—

Fig. 1 is a fragmentary perspective view showing one corner of a frame embodying our invention and the strengthening member applied thereto;

Fig. 2 is a cross section taken through the frame and the bracket member in the plane 2—2 of Fig. 1;

Fig. 3 is a perspective view of the bracket or strengthening member;

Fig. 4 is a modified form of the bracket member;

Fig. 5 is a still further modification of a bracket member;

Fig. 6 diagrammatically illustrates a complete frame, the sides of which meet in a miter, and without the bracket member of our invention applied thereto; and

Fig. 7 is a diagrammatic view illustrating the manner in which the frame is distorted when a force is applied to the same in a direction tending to collapse the frame.

Like reference characters indicate like parts throughout the drawings.

Referring now to the drawings in which we have illustrated certain preferred embodiments of our invention, 10 is a metallic frame formed of comparatively thin, rolled, sheet metal. In Fig. 2 we have illustrated one form of a sheet metal frame, the edges of which are folded back as at 11 and 12 and spaced from the main body of the frame. In the embodiment of our invention illustrated, the frame is intended as a sash for a window and is formed with an angle portion, the sides of which are indicated at 112 and 121; the window pane being received against the side, 112.

The sides of the frame meet in a miter, as at 13, the two meeting edges of the frame preferably being welded together. The bracket or strengthening member is indicated

at 14 and preferably comprises a plate portion, 15, provided with at least one marginal flange, 16, and preferably a marginal flange, 17, at the other edge of the plate.

5 The two sides of the bracket member which are disposed at the corner of the frame extend generally parallel to the sides of the frame, and the bracket member is preferably integral throughout. The planes of the
10 flanges, 16 and 17, are arranged at an angle and preferably at a right angle to the plane of the miter so that when the flanges are secured to the frame, the bracket member forms in effect a beam or gusset having portions which resist by tension and compression
15 the distortion or collapsing of the frame. The flange, 16, is secured to the frame by welding, as at 18. Preferably, also, the plate, 15, is welded to the frame as at 20.

20 Preferably, the edges of the bracket member are also provided with additional flanges at their extreme ends as at 161 and 171 which are received in the spaces between folds, 11 and 12, respectively, and the main body of
25 the frame, the flange, 171, preferably being welded to the frame as at 19.

In the embodiment of our invention illustrated in Fig. 4 the bracket member, 141, comprises an angular plate, 151, and two
30 plain outwardly extending marginal flanges, 163. Obviously the strengthening bracket illustrated in Fig. 4 could be applied to a frame having a different contour in cross section from that illustrated in Fig. 2.

35 In Fig. 5 we have illustrated a still further modification of our invention in which the angular plate, 152, is provided with an outwardly extending flange, 162, and an inwardly extending flange, 172. The strengthening bracket illustrated in Fig. 5 could also
40 be applied to a different form of a frame from that illustrated in Fig. 1.

A frame, the sides of which meet in a miter as illustrated in Fig. 6, is comparatively weak
45 when formed of relatively thin sheet metal in connection with which our invention is particularly useful and particularly when the edges of the frame meeting in the miter are welded together. When, for example, forces
50 are applied to the two sides, 101 and 102, of the frame as illustrated in Fig. 6, these forces tend to collapse the frame, causing the miters, 131, to open outwardly as illustrated in the upper left and lower right hand corners and
55 to open inwardly as illustrated in the upper right hand and lower left hand corners. The flanges on the bracket or strengthening member embodying our invention, the planes of which are preferably located substantially
60 at right angles to the plane of the miter, act as beams or gusset plates having portions which resist by tension or compression the tendency of the frame to become distorted, the flanges being placed under tension in one
65 case and under compression in the second. We

are thereby enabled to form the frame of comparatively thin sheet metal and at the same time make the frame sufficiently strong to resist any forces to which it is ordinarily subjected.

In assembling the frame and bracket, one side of the frame is slid over one side of the bracket, and the other side of the frame is then slid over the other side of the bracket and the two edges of the frame are then
75 welded together at the meeting edges which form a miter.

It will, of course, be understood that the sheet metal may be made of any suitable corrosion resistant material. It will likewise
80 be understood that the open space shown in the frame between the two folded edges may be closed by a second plate which interfits between the folds at 11 and 12 and the body portion of the frame and in the portion of
85 the frame where the bracket is not located.

Hence, while we have described our invention in its preferred embodiment it is to be understood that the words which we have used are words of description rather than of
90 limitation, and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of our invention in its broader aspects.

What we claim is—

1. In combination, a frame formed of sheet metal the sides of which are bent in cross section and meet at an angle to form a miter, and an angular metallic member formed of sheet metal, the two sides of which extend
100 generally parallel to the sides of said frame, said metallic member comprising a plate and two marginal flanges extending along both portions of said member and in opposite direction from said plate, the planes of said
105 flanges extending at an angle to the plane of said miter, said flanges being secured to the sides of said frame.

2. In combination, a frame formed of sheet metal the sides of which are bent in cross section and meet at an angle to form a miter, the margins of said frame being folded back and forming spaces between the folds and the body portion of the frame, and an angular metallic member the two sides of which extend
110 generally parallel to the sides of said frame, said metallic member comprising a plate and a marginal flange extending along both portions of said member, the plane of said flanges extending at an angle to the plane
115 of said miter, and the edges of said flanges being provided with portions recessed within the spaces between the respective folds at the edges of the frame and the body portion thereof, said flanges being secured to the sides
120 of said frame.

3. In combination, a frame formed of sheet metal the sides of which are bent in cross section and meet at an angle to form a miter, and an angular metallic member formed of
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sheet metal the two sides of which extend generally parallel to the sides of said frame, said metallic member comprising a plate and two marginal flanges extending along both portions of said member and in opposite directions from said plate, the planes of said flanges extending at right angles to the plane of said miter, said flanges being secured to the sides of said frame

EDWARD J. ZAHNER.
KENNETH G. REYNOLDS.