April 19, 1938. C. M. VERHAGEN 2,114,617

JOINT CONSTRUCTION

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Fig. 1

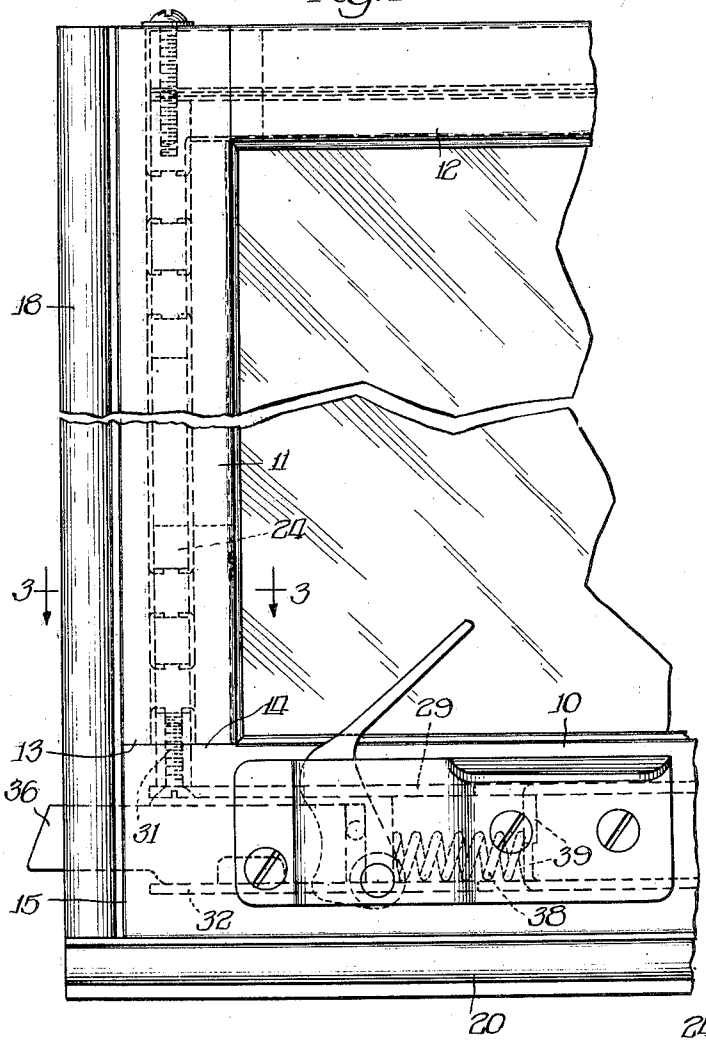


Fig. 2

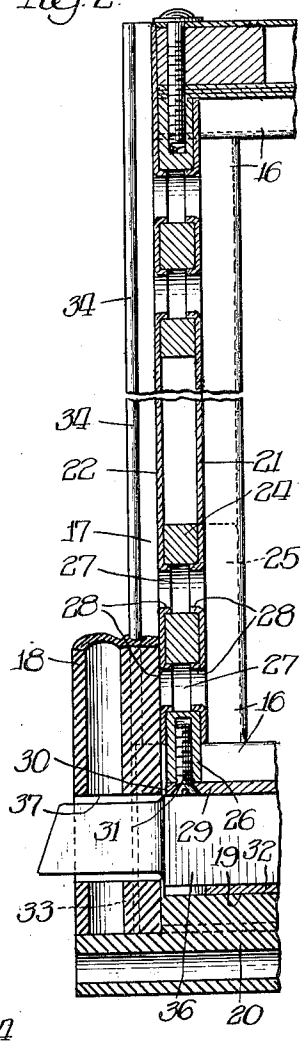


Fig. 3

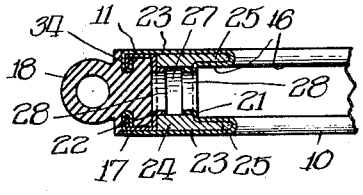
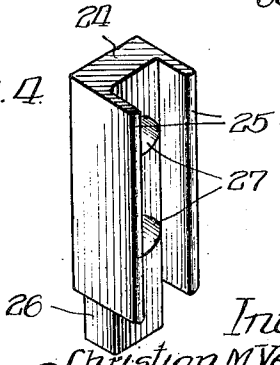


Fig. 4



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Fig. 5.

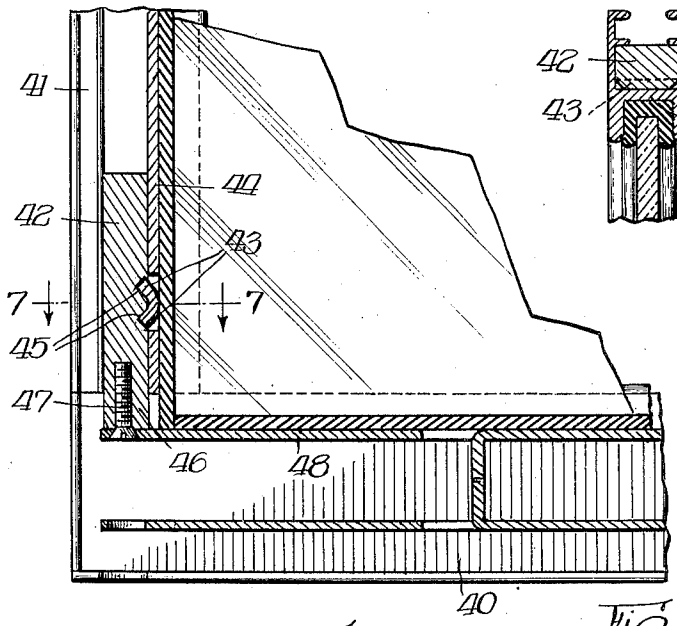


Fig. 7.

Fig. 6.

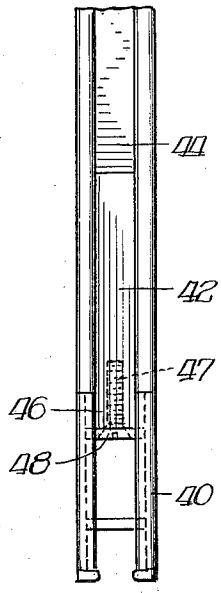


Fig. 8.

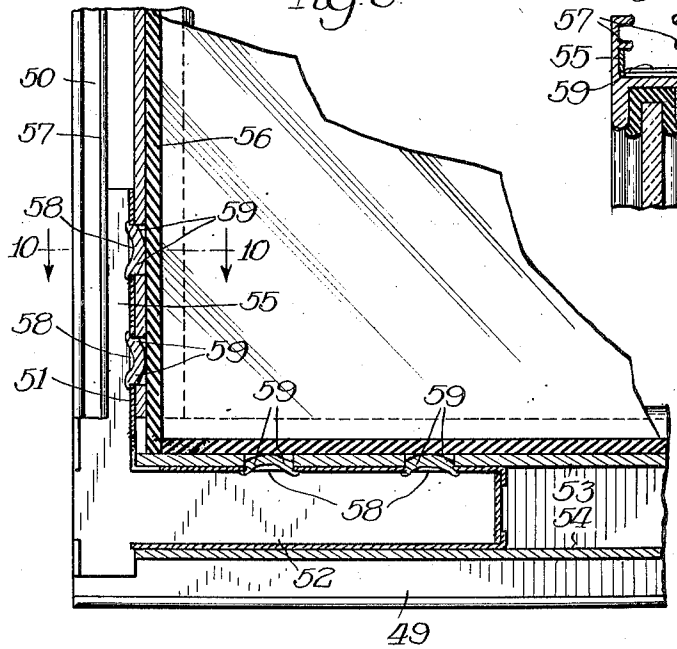
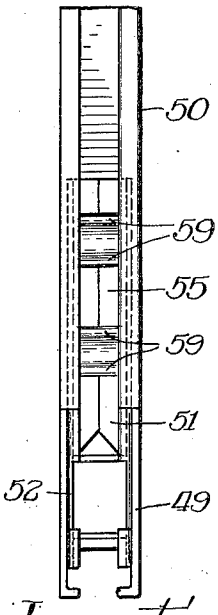


Fig. 10.

Fig. 9.



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Fig. 11.

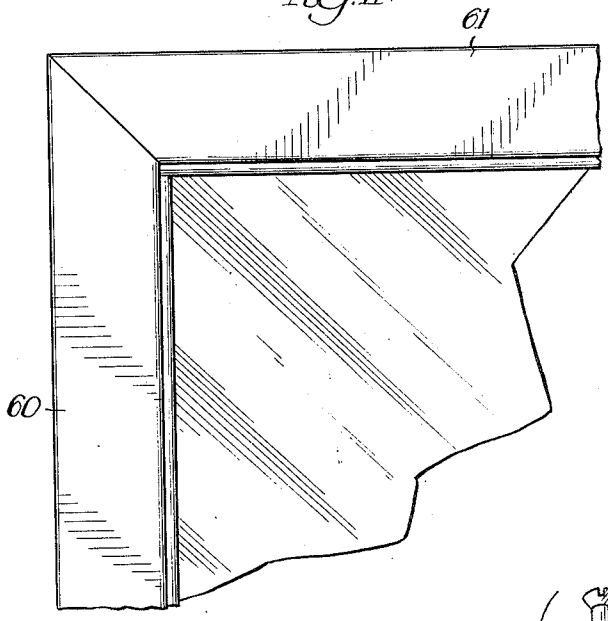


Fig. 12.

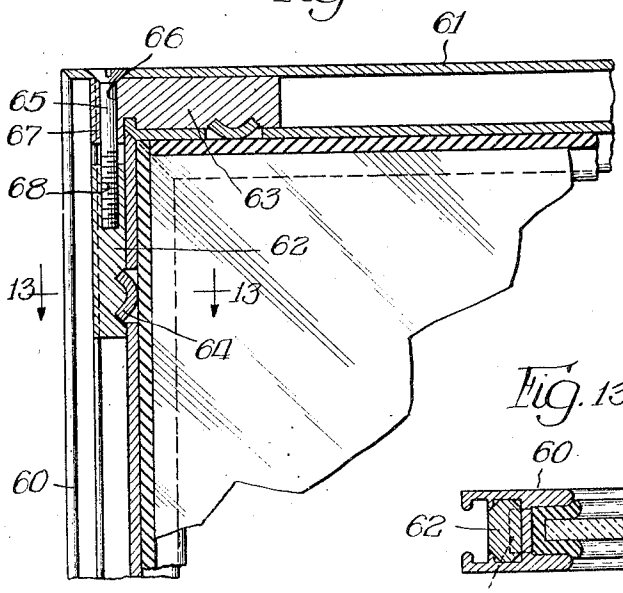
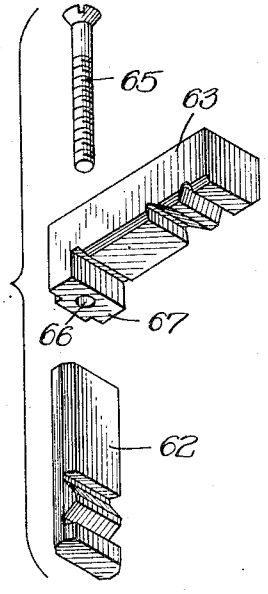


Fig. 13.

Fig. 14.



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UNITED STATES PATENT OFFICE

2,114,617

JOINT CONSTRUCTION

Christian M. Verhagen, Elkhart, Ind., assignor to The Adlake Company, Chicago, Ill., a corporation of Illinois

Application January 25, 1936, Serial No. 60,801

8 Claims. (Cl. 189—76)

In the manufacture of aluminum sash and doors it is difficult to produce a satisfactory corner joint because of the nature of the metal, and this is particularly true where some of the rail members are made of sheet aluminum. The use of screws or rivets will render such a joint rigid, but their appearance is objectionable and they have a tendency to draw in the surrounding metal unevenly, with consequent irregularities along the line of the joint.

In my earlier filed application, Serial No. 51,046, a welded corner joint is shown which will overcome these objections, and satisfactory joints can be produced in accordance with the disclosure in that application except when an electro-chemical or so-called "alumelite" or "anodic" finish is used. When either of these finishes is used, discoloration will take place at the weld due to the difference in the metal in the welding rod and the heat which must necessarily be applied to the joint to produce the weld.

When a mechanical joint, on the other hand, is made with other metals in connection with aluminum sash and door constructions, an electrolytic action will take place between the different metals and cause corrosion to both the aluminum members and the foreign metal parts.

A somewhat similar problem has heretofore been experienced in making up sheet metal sash with a chrome plate finish. In the past the method of making a solid corner has ordinarily consisted of mitering the sash rails, placing a sheet metal reinforcement in the mitered ends and soldering the assembly. In soldering such joints the solder does not always seal the joints perfectly but leaves pores. In the process of chrome plating gases formed in the hollow rail sections cause a so-called spitting effect through these pores or open joints, preventing an even deposit of chromium around the joint area, which from an appearance standpoint is quite objectionable. The locked or mechanical corner construction which forms the subject matter of the present invention overcomes this objection as the rails can be plated individually and assembled and locked after the plating.

The object of this invention is to provide means for obtaining a rigid joint between aluminum rail members without the use of screws, rivets or other visible connecting devices, and also without the use of attaching parts made from metals other than aluminum.

Other more specific objects and advantages of the invention will be apparent to those skilled in the art upon a full understanding of the new corner joint construction.

A few embodiments of the invention are presented herein for the purpose of exemplification, but it will of course be appreciated that the invention is susceptible of being embodied in other structurally modified forms coming equally within the scope of the appended claims.

In the accompanying drawings:

Fig. 1 is a fragmentary face view of one side of an aluminum sash which has been made up in accordance with the invention;

Fig. 2 is a vertical section through the center of the sash with some parts broken away and other parts removed for clearness;

Fig. 3 is a horizontal section, taken on the line 3—3 of Fig. 1;

Fig. 4 is a perspective view of the coupling block which is secured within the lower end of the side rail of the sash;

Fig. 5 is a vertical section through a lower sash corner which embodies another form of the invention;

Fig. 6 is an edge view of the sash corner shown in Fig. 5;

Fig. 7 is a horizontal section, taken on the line 7—7 of Fig. 5;

Figs. 8, 9 and 10 are views, corresponding to Figs. 5, 6 and 7, of another embodiment of the invention;

Fig. 11 is a fragmentary face view of an upper sash corner which embodies still another form of the invention;

Fig. 12 is a vertical section through the sash corner shown in Fig. 11;

Fig. 13 is a horizontal section, taken on the line 13—13 of Fig. 12; and

Fig. 14 is a perspective view of the attaching means shown in Fig. 12.

The sash which is illustrated in Figs. 1 to 4 inclusive is made up of an extruded aluminum bottom rail 10, a sheet aluminum side rail 11 and a sheet aluminum top rail 12. The lower end 13 of the side rail 11 is cut at right angles to fit against the upper edge 14 of the bottom rail 10 flush with the end 15 of the latter. A glazing groove 16 is formed in all of the rails along their inner edges, and additional grooves are formed in the side and bottom rails opposite the groove 16, a groove 17 being provided in the upper edge of the side rail 11 for the reception of a rubber bearing strip 18 and a groove 19 being provided in the lower edge of the bottom rail 10 for the reception of a rubber sealing strip 20.

The side rail 11 is hollow between the bottom

21 of the groove 16 and the bottom 22 of the groove 17, and the space between the same and the side walls 23 of the rail is rectangular in cross section except for narrow openings between the side walls and the sides of the groove 16. A closely fitting solid block 24 of aluminum, provided with side flanges 25, is pressed up into this space at the lower end of the side rail 11, to a point where the lower end 26 of the block projects below the lower end of the side rail for a distance equal to the depth of the groove 16 in the upper edge of the bottom rail 10. The projecting end 26 of the block is reduced in width to fit snugly between the sides of the groove 16 in the bottom rail. The block 24 is provided with two or more circular apertures 27 which extend through the block from one face to the other and open against the bottoms of the grooves 16 and 17. The metal of the bottoms 21 and 22 in opposition to the apertures 27 is stamped into the ends of the apertures in the shape of tightly fitting tubular formations 28. These formations lock the block 24 securely within the lower end of the side rail.

The bottom 29 of the groove 16 in the bottom rail, which is comparatively thick and substantial, is provided with an aperture 30 beneath the lower end of the block 24, and a screw 31 is positioned in the aperture 30. The screw 31 extends upwardly into a threaded hole in the lower end of the block 24 and clamps the side rail tightly down on the end of the bottom rail. The end of the web 29 which constitutes the bottom of the groove 16 in the bottom rail is cut back from the end of the rail, as is also the end of a second underlying web 32 in the rail, whereby to provide a groove down the end of the bottom rail as an extension of the groove 17 in the outer edge of the side rail. The extreme end edges of the bottom rail are flanged inwardly at 33 to provide continuations of inturned flanges 34 at the sides of the groove 17 in the side rail, which flanges hold the rubber bearing strip 18 against displacement.

The space in the bottom rail 10 between the horizontally extending webs 29 and 32 provides a guideway 35 for a slidably mounted latching bolt 36 which projects from the end of the bottom rail through an opening 37 in the rubber bearing strip 18. The bolt is projected by a coil spring 38 which is located behind the same in the guideway. The spring 38 is held compressed against the rear end of the bolt by a pair of ears 39 which are struck into the guideway from the webs 29 and 32.

In the embodiment of the invention which is illustrated in Figs. 5 to 7 inclusive an extruded aluminum bottom rail 40, similar to the bottom rail in the first described embodiment, is connected with an extruded, as distinguished from sheet metal, side rail 41. A coupling block 42 is positioned in the lower end of the side rail 41 and is held rigidly in place by means of lips 43 which are forced from the bottom 44 of the glazing groove in the side rail into correspondingly shaped pockets 45 in the opposed face of the block. Only two of the lips 43 are shown but more of them can be employed if desired. The lower projecting end 46 of the block 42 is disposed in the glazing groove of the bottom rail 40 and is engaged by a screw 47 which extends upwardly through the upper web 48 in the bottom rail.

In the embodiment which is shown in Figs. 9 to 10 inclusive a corner joint of more permanent character is provided between an extruded bottom rail 49 and an extruded side rail 40. In this embodiment the connection is established by an L-shaped metal stamping 51, which is preferably made of sheet steel. This stamping has a horizontally extending hollow leg 52 of generally rectangular cross section which fits snugly within the open end of the bottom rail between the upper and lower webs 53 and 54, and a vertically extending hollow leg 55 of U-shaped cross section which fits snugly within the lower end of the side rail between the bottom 56 of the glazing groove and two small ribs 57 on the inside of the side rail. The portions of the legs 52 and 55 which engage with the portions 53 and 56, respectively, of the bottom and side rails are provided with rectangular apertures 58, and lips 59 from the rail portions 53 and 56 are struck into these apertures and upset into press-fit engagement with the same. The engagement of the lips 59 with the edges of the apertures furnishes a strong, rigid connection between the rail members.

In the embodiment which is illustrated in Figs. 11 to 14 inclusive, an extruded side rail 60 is detachably connected with an extruded top rail 61 by the use of blocks 62 and 63, which blocks are on the order of the previously described block shown in Fig. 5. The block 62 is held fast within the upper end of the side rail 60 by means of struck-in lips 64 in the bottom of the glazing groove in the side rail, and the block 63 is similarly secured within the adjoining end of the top rail 61. In this particular embodiment, the meeting ends of the two rails are mitered, and a screw 65 is employed to draw the mitered ends tightly together. The screw passes downwardly through a hole 66 in a portion 67 of the block 63 which projects partially into the upper end of the side rail, and the lower threaded end of the screw engages within a threaded socket 68 which is located in the upper end of the block 62.

While the invention has been herein illustrated and described as used in connection with a sash, it will of course be appreciated that the same is equally applicable to doors, panels and other like structures.

I claim:

1. In joint construction, the combination with a hollow metal rail which has a groove in one edge thereof, of a metal insert which is positioned in one end of the rail in tightly fitting engagement with the same, said insert being provided with a recess behind the bottom of the groove in the rail, and said bottom having a portion thereof offset into the recess in press-fit engagement with the surface of the latter, whereby to secure the rail and insert against relative movement.

2. In sash construction, the combination with a hollow metal side rail having a glazing groove at its inner edge, and a metal block which is positioned in the lower end of the rail and secured to the bottom of the glazing groove, of a hollow metal bottom rail having a glazing groove at its upper edge into which the lower end of the block projects, and a screw which extends upwardly through an aperture in the bottom of the glazing groove in the bottom rail and is threaded into the lower projecting end of the block.

3. In joint construction, the combination with a hollow metal rail, of a metal insert which is positioned in one end of the rail in tightly fitting engagement with the same, said insert being provided with a circular aperture which extends from one face of the insert to the other, and the walls of the rail overlying the ends of the aper-

ture being provided with tubular portions which extend into the aperture in press-fit engagement with the edges of the latter, whereby to secure the rail and insert against relative movement.

4. In sash construction, the combination with a hollow metal rail which has a glazing groove in the inner edge thereof, of a metal insert which is positioned in one end of the rail in tightly fitting engagement with the same, said insert being provided with a circular aperture which extends from one face of the insert to the other behind the bottom of the groove in the rail, and said bottom and the opposite wall of the rail being provided with tubular portions which extend into the ends of the aperture in press-fit engagement with the edges of the latter, whereby to secure the rail and insert against relative movement.

5. In sash construction, the combination with an extruded aluminum bottom rail having upper and lower horizontally extending webs within the same, of a locking bolt slidably located in the guideway formed between the webs, a coil spring behind the bolt for projecting the latter, and tongues on the webs turned into the guideway behind the spring for holding the same compressed against the bolt.

6. In sash construction, the combination with a hollow metal rail provided with grooves in its inner and outer edges, of a metal insert which is positioned in one end of the rail in tightly fitting engagement with the same, said insert being provided with recesses behind the bottoms of both grooves in the rail, and said bottoms having portions thereof offset into the recesses in press-fit engagement with the surfaces of the latter, whereby to secure the rail and insert against relative movement.

7. In sash construction, the combination with a hollow metal side rail which has a groove with inturned flanges in the outer edge of the rail, of a hollow metal bottom rail on one end of which the lower end of the side rail is secured, the open end of the bottom rail beneath the side rail being cut back in to form a downward continuation of the groove in the edge of the side rail, and the edges of the bottom rail at the end of the latter being inturned to provide flanges in register with the flanges on the side rail.

8. In joint construction, the combination with a hollow metal rail having smoothly surfaced front and back surfaces, of a metal coupling block positioned in one end of the rail, said block fitting snugly in the rail with its sides against the inner sides of the front and back walls of the rail and being provided in one of its edges with a pocket, and said rail being provided in the wall thereof opposite the pocket with an integral struck-in portion in press-fit engagement with the recessed portion of the block.

CHRISTIAN M. VERHAGEN.