April 24, 1956 A. T. KUNKEL 2,742,690

METHOD OF CORNER CONSTRUCTION

Filed March 31, 1955

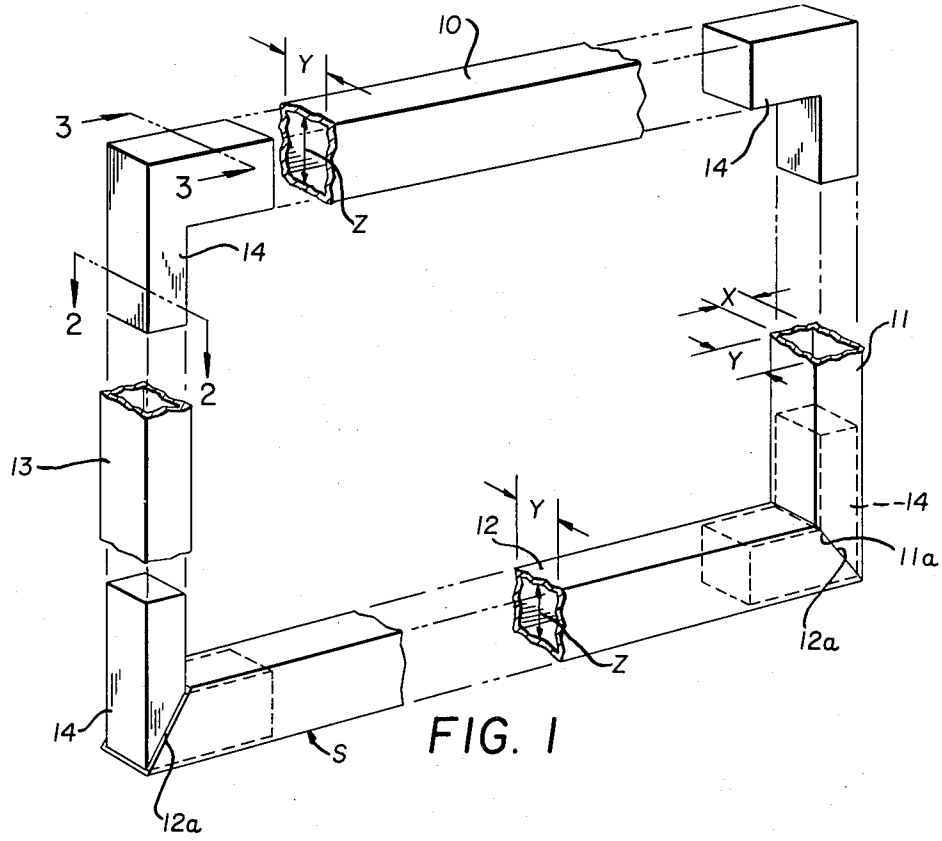



FIG. 1

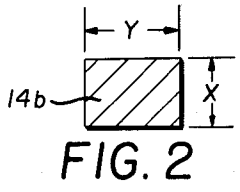



FIG. 2

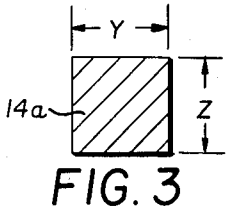



FIG. 3

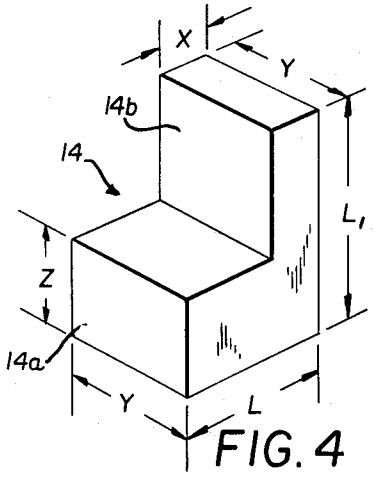



FIG. 4

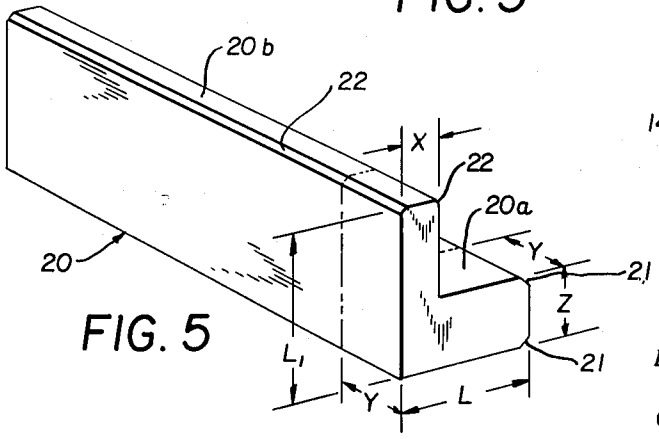



FIG. 5

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United States Patent Office 2,742,690 Patented Apr. 24, 1956



2,742,690

# METHOD OF CORNER CONSTRUCTION

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Application March 31, 1955, Serial No. 498,315

2 Claims. (Cl. 29—417)

This invention relates to sash construction, and in particular, relates to an improved method of producing storm, screen, and window sash that possesses concealed reinforcing in the corners thereof.

In the manufacture of sashes in the past, particular difficulty has been encountered relative to the manner of joining the respective side members together to make up the rectangular unit that defines the sash member. In the construction of wooden sashes, for example, it has been customary in the past to employ mitered corners that are reinforced by steel or other rigid reinforcing members of various types.

With the advent of aluminum and other types of metal sash, the method of corner construction remained substantially the same, with mitered corners being reinforced at their respective points of juncture with steel or other structural supports that were welded or otherwise secured in place, to retain the respective frame members in their right angle condition with respect to each other. In the great majority of applications of metallic sash construction, the frame members take the form of flat, thin wall extrusions, shaped as angles or other formed configurations, to add rigidity to this relatively light type of material. Because of the thin wall section of the stock material employed, it has been difficult to obtain a strong welded corner joint that would wishstand the wear incident to normal usage. Additionally, where welding has been employed in such cases to secure the frames with respect to each other at the corners, it has been found that the appearance of the welding marks on the exterior surface of the sash is detrimental to the sale of the ultimate product. As a result of the aforementioned difficulties, the manufacturers of metallic sash, and particularly aluminum sash, have been forced, in the majority of cases, to resort to the use of concealed reinforcing members having gripping or locking means of intricate, and accordingly expensive, design.

Heretofore, it has not been considered practical to employ hollow extrusions as frame members, due to the increased cost of the same over the usual flat formed extrusions. However, in addition to providing a stronger corner joint in the manner to be taught by this inventor, the same are advantageous in that they provide a point of support for a second pane of glass, that is known as a "storm window."

Recently, research in the field of sash construction has been directed toward the use of certain non-metallic extrusions as sash frame members because of the insulation properties of the same. While initial developments in this direction have indicated that such sash is highly desirable because of the aforementioned insulation properties, it has been found as a practical matter, that sufficient corner reinforcing cannot be incorporated at the present time into such sash because of the previously discussed difficulties encountered in the joining of thin wall corner sections.

Accordingly, it is one object of this invention to provide an improved method of reinforcing corners of sash,



that can be employed with equal utility in metallic or non-metalic sash members.

It is a further object of this invention to provide a method of reinforcing the corners of sash without the use of welding, brazing or soldering.

It is a still further object of this invention to provide a method of reinforcing sash corners that is characterized by the use of internal reinforcing supports of simplified design and construction.

It is a still further object of this invention to provide a method of reinforcing the corner construction of non-metallic sash units in a simple and highly efficient manner.

These and other objects of the invention will become more apparent upon a reading of the following brief specification, considered and interpreted in the light of the accompanying drawings.

Of the drawings:

Figure 1 is a perspective view, partly broken away and in section, illustrating schematically a window sash constructed in accordance with the improved method of this invention.

Figure 2 is a section of a typical reinforcing insert taken on the lines 2—2 of Figure 1.

Figure 3 is a view taken on the lines 3—3 of Figure 1.

Figure 4 is a perspective view illustrating one improved insert for corner reinforcement.

Figure 5 is a perspective view illustrating the extrusion from which the reinforcing inserts are obtained.

In order to best understand the preferred method of practicing the invention for constructing a sash unit having reinforced corners, attention is directed to Figure 1 of the drawings, wherein a sash S is schematically illustrated in perspective view.

The sash S includes a plurality of frame members **10**, **11**, **12** and **13**, that are joined together at their respective ends by reinforcing inserts **14**, **14** to define a rectangular unit; the arrangement being such that one said insert **14** is positioned interiorly of the point of juncture between each set of adjoining frame members, in a manner to be described.

To this end, each frame member, **10**, **11**, **12** and **13** is shown as being of elongated, rectangular configuration, so as to define a hollow body capable of being extruded in known manner. Considering first the member **11**, the same is, for the purposes of this specification, assumed to be equal to the cross-sectional dimensions of the frame member **13**; while the frame member **10**, although different in cross-sectional dimension from the frame members **11** and **13**, is similar to the cross-sectional dimensions of the frame member **12**. Accordingly, the frame members **10** and **12** will hereinafter be referred to as the top and bottom frame members, respectively; while the frame members **11** and **13** will hereinafter be designated as side frame members.

Considering first the side frame members **11** and **13**, it will be noted that each of the same has the interior thereof defined by an internal rectangular cavity of width X and depth Y (see Figure 1); while the top and bottom members **10** and **12** each have a vertical height Z, as well as a horizontal depth Y that is equal in dimension to the dimension Y of the members **11** and **13**. In this manner, the four side members **10**, **11**, **12** and **13**, while possessing the same depth, as defined by the dimension Y, are characterized by the fact that the top and bottom frame members have a vertical height (dimension Z) that is greater in dimension than the width dimension (dimension X) of the side frame members **11** and **13**.

Referring now to Figures 4 and 5 of the drawings, it will be seen that each insert **14** is of L-shaped configuration so as to define leg members **14***a*, **14***b* of substantially equal length, with the leg **14***a* having a cross-sectional height corresponding to the dimension Z of the top and

bottom frames **10** and **12**; while the width thereof corresponds to the dimension Y. By like token, the cross-sectional width of the leg **14***b* is shown as being the same as the dimension X of the side frame members **11** and **13**; while the width thereof is equal to the width of the leg **14***a*, namely, width Y above described.

In this manner, the leg **14***b* can be fitted interiorly of either side frame member **11** or **13**; while the leg **14***a* can be similarly fitted into either open axial end of the frame members **10** or **12**.

As best shown in Figure 5 of the drawings, the individual inserts **14**, **14** are obtained by first providing an L-shaped extrusion that is generally designated as **20**. This extrusion **20** has the dimensions of the respective legs **20***a*, **20***b* thereof corresponding respectively to the dimensions of the legs **14***a* and **14***b* of the individual insert **14**; and accordingly, when it is desired to produce a given number of inserts, it is merely necessary to mark a length longitudinally of the extrusion **20** corresponding in length to the dimension Y, and remove, as by sawing or cutting, a segment of the extrusion **20**. Upon removal, this segment will have the approximate dimensions shown in Figure 4 of the drawings; with the result that the same can be positioned interiorly of adjacent frame members in a manner to be described.

In this regard, it is to be understood that all of the members **10**, **11**, **12** and **13** are shown as having mitered edge portions **11***a*, **12***a*, **13***a* and **14***a*, respectively, that permit the joining of these members together at right angles, as shown in Figure 1 of the drawings.

In use of the improved process for building a window sash of the form shown in Figure 1, for example, the user first determines the size of top, bottom and side frame members that will be employed as component elements of the sash unit. With the exterior size of these respective frames determined, the manufacturer next determines the vertical height (dimension Z) of the internal cavity in the top and bottom rail members **10** and **12**, for example. Additionally, at this time the horizontal width (dimension X) of the internal cavity in the side frame members **11** and **13** is determined in like manner; it being understood that the depth of all four members **10**, **11**, **12** and **13**, as represented by the dimension Y, will be the same, it being standard practice to make the depth of all four frame members the same in one unit of sash construction.

With the above dimensions in mind, the user may design and subsequently produce an L-shaped extrusion of considerable longitudinal length. The height and width respectively, of the leg members **20***a* and **20***b* can be determined by consideration of the dimensions Z and X, respectively, with the dimension Z determining the height of the leg **20***a*, while the dimension X determines the width of the leg **20***b* (see Figure 5). The dimensions L and $L_1$ indicated the length of projection interiorly of the frame members upon insertion, and are, of course, optional and may or may not, as desired, be equal. Upon obtaining an extrusion made to the dimensions previously determined, the user may then sever successive lengths represented by the dimension Y from the extrusion **20**, to thus obtain a three-dimensional corner insert **14** that will be capable of being snugly and firmly received interiorly of adjoining frame members.

After the frame members have been provided with the appropriate miters **10***a*, **11***a*, **12***a* and **13***a* on the axial ends thereof to permit right angle abutment with an adjoining frame member, the user may then insert the leg **14***a* of an insert **14** into one axial end of the frame member **10**, by matching up the dimensions Z and Y of the leg **14***a*, with the dimensions Z and Y of frame **10**, and then inserting the leg **14***a* into the open end of the frame **10** to a depth L. This procedure will be repeated on the opposite axial end of the frame member **10** with a second insert **14**, with the result that the frame member **10** will have two inserts **14**, **14** firmly positioned interiorly of the opposed axial ends thereof. At this point,



the frame member **13** may be positioned over the projecting leg **14***b* of the insert **14** that is carried by frame **10**, while the frame member **11** may similarly be positioned over the leg **14***b* of the insert **14** that is carried in the opposite end of the frame member **10**. At this point, the legs **14***a*, **14***a* of two additional inserts **14**, **14** may be positioned interiorly of the opposed ends of the frame member **12**, as previously described, and with the inserts thus assembled interiorly of the opposed ends of the frame member **12**, this sub-assembly may then be positioned interiorly of the free ends of the frame members **11** and **13**, with the result that the entire unit is now assembled.

It will be understood that in each of the preceding sub-assemblies each insert **14** is moved to its full depth of penetration with the respective frame member attached thereto, with the result that the mitered edges of the frame members will abut with each other to completely conceal the reinforcing inserts **14**, **14** while defining a rectangular unit having an aesthetic external appearance.

It will be noted that by using a pre-engineered insert, a snug fit will be obtained between the inserts and the frame members that the same interconnect, and accordingly, the overall sash unit, when assembled will be rigid and not susceptible to being affected by the application of torsional or other forces. It will be further noted that the close tolerance or fit that exists between the inserts and the frame members, operates to provide an overall sash unit possessing the inherent rigidity of the individual inserts, with the result that the overall sash will be characterized by exceptional rigidity.

It is apparent that deviations in the tolerance of the window frame members **10**, **11**, **12** and **13** could be compensated for by chamfering the legs **20***a* and **20***b*, as at **21**, **22**, respectively (see Figure 5) to thus enable the inserts to be forced into the frames in the event the frames are slightly undersized. As an alternate solution, either leg of the extrusion could, if desired, be tapered in cross-section to achieve a similar result.

It will also be seen that in the event that the windows of different dimensions are to be made, it would be a simple matter to re-design the height and width dimensions of the leg members defining the extrusion **20** so that a new extrusion could be simply and efficiently provided without the replacement of expensive dies, molds and other equipment of this nature.

In the preceding specfication, the frame members have not been limited in the disclosure to being of metallic or non-metallic material, it being apparent that either metallic or non-metallic material could be used with equal result, due to the fact that the material of the frame members, when connected through the medium of the rigid reinforcing inserts, assumes the overall rigidity of the insert members per se. Similarly, the material and shape of the reinforcing inserts could be varied, within limits, to meet changing requirements in known manner.

By like token, the method of this invention is not limited to use with the preferred hollow rectangular member previously shown and described, it being apparent that the method could be employed with any type frame member. Additionally, it is to be understood that the method of this invention is not limited to use in sash construction, it being apparent that the method could be utilized for reinforcing other types of corner construction without the exercise of invention.

Accordingly, modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A method of sash construction, comprising the steps of; determining the internal cross-sectional dimensions of adjoining hollow members; extruding an L-shaped member having the thickness of the respective leg portions thereof approximating the coplanar height and width

dimensions of said adjoining frame members; severing a length of said extruded member into an insert piece having its severed length dimension corresponding to the cross sectional coplanar depth dimension of said adjoining hollow member; roughening the planar surfaces of said insert created by said severing action; inserting one said frame member over the appropriate free edge of said leg member of said severed insert; inserting the other said frame member over the free edge of said remaining leg of said insert; and moving said frame members axially of said leg members into abutting relationship with each other.

2. A method of sash construction, comprising the steps of; determining the internal cross-sectional dimensions of adjoining hollow frame members; extruding an L-shaped member having the thickness of the respective leg portions thereof approximating the coplanar height and width dimensions of said adjoining frame members; severing a length of said extruded member into an insert



piece having its severed length dimension corresponding to the cross-sectional coplanar depth dimension of said adjoining hollow members; relieving a sharp corner of at least one leg portion at the free edge thereof, whereby the free end dimensions of said relieved leg portion are reduced; inserting one said frame member over the appropriate free edge of said leg of said severed insert; inserting the other said frame member over the free edge of said remaining leg member of said insert; and moving said frame members axially of said leg members into abutting relationship with each other.

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