March 15, 1949. H. A. KAUFMANN 2,464,514

METHOD OF CORNER CONSTRUCTION

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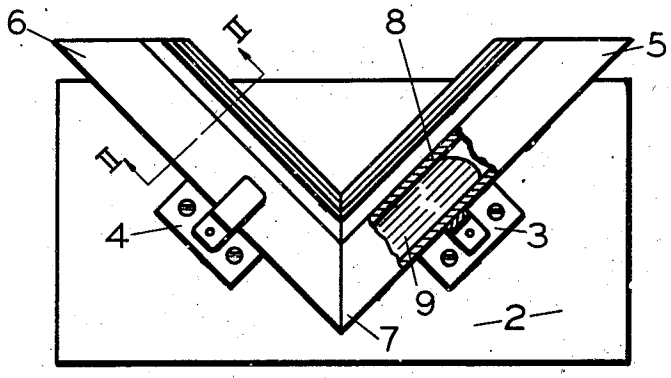


FIG. 1

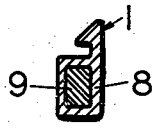


FIG. 2

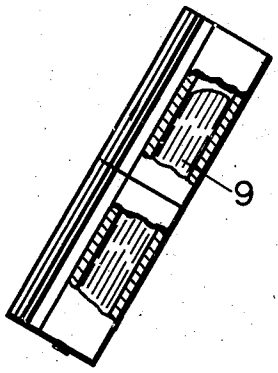


FIG. 6

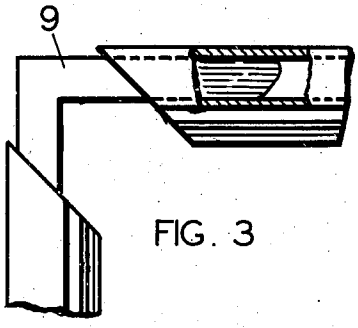


FIG. 3

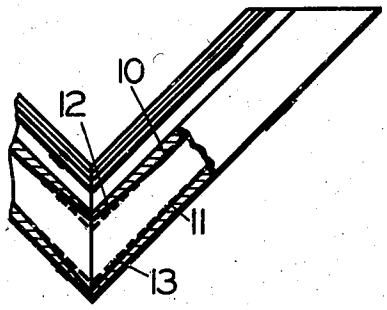


FIG. 4

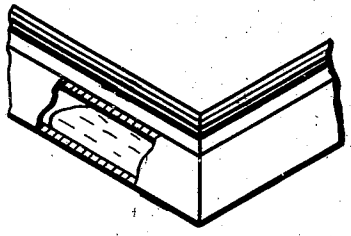


FIG. 5

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METHOD OF CORNER CONSTRUCTION

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2 Claims. (Cl. 29—148)

1

This invention refers to interconnecting or aligning means, and a method of forming same, for a construction including a pair of abutting members, and it refers particularly to such means and method for screen or window sash construction.

In providing means for fastening together abuting members such as window and screen sash elements, there is presented a large number of problems. Primarily, of course, it is essential that the elements being held together are held firmly against movement with respect to each other. It is also desirable, particularly in window and screen sash construction, that the holding means be contained internally within the sash elements, in order not to mar or interrupt the smoothness of the external appearance of the sash elements. It is also desirable that the fastening means be capable of economical fabrication and rapid and easy installation.

These problems have in the trade been met in a variety of ways, of which a general type is the provision of a connecting member made from sheet stock internally engaging hollow abutting sash elements. This general approach is used both for corner constructions and for the connection of separate elements placed lineally together, as sometimes happens where, for one reason or another, the sash along one side of a window or screen panel is made of more than one piece. A variety of ways have been proposed for holding these connecting members in position, which ways include positive holding by screws, bolts or by embossings. Examples of these constructions are illustrated in my Patents Nos. 2,291,726 and 2,292,273.

These and other known constructions, however, are not entirely satisfactory because they usually present an unsightly appearance due to the embossings or screws used to hold the corner element in place, and because their holding is not sufficiently positive to prevent at least a small amount of relative movement between the abutting elements. Since even a very small amount of such relative movement is sufficient to provide a large degree of flexibility in a construction such as a sash, it is desirable to reduce such relative movement to its absolute minimum.

Further, the fabrication of the corner elements and the sash members by independent processes often creates a slight amount of size variation and/or discrepancy which, even though small, is sufficient to permit a large amount of undesirable flexibility in the finished sash. It is further desirable in some instances to use extruded sash

2

sections, and these are particularly difficult to handle with the usual type of plate or angle corner elements. Where die cast connecting members are used, the precise fitting of the contacting parts is difficult, if not impossible. General experience shows that hollow or formed sections, whether extruded or rolled nearly always have at least slight variations that can never be universally fitted by corner members made from a given diecasting die. These dies are expensive and cannot be easily or rapidly varied or corrected to meet changing conditions of construction or variations in dimensions. Hence, there is desired a method by which the connecting members are constantly varied appropriately to variations in the sections with which they are to be used and a perfect fit is thereby always assured.

To avoid this fitting problem it has been proposed, and sometimes practiced, to weld abutting corners and ends together. While this does effect a bond, it is not only expensive but the heat of the welding operation in many cases injures or destroys the crystalline characteristics of the metal being used. Particularly with sections which are heat-treated to a particular desirable degree of hardness and stiffness, the heat of the welding operation destroys the effects of the heat-treating and requires that the parts be rehardened. This, of course, imparts further expense to the entire fabrication procedure.

Welding is further expensive in that when the operation is completed there is a certain amount of work required to clean up, polish and sometimes grind a corner to give it a good appearance. Particularly, if the sections have external grooves or channels, these will be distorted and/or partly filled by the welding procedure and must be ground out in order to restore the sections comprising the corner to their original appearance. All of this is time consuming and accordingly expensive.

It is therefore desirable that there be provided means and a method particularly adaptable to hollow extruded sections for binding their abutting ends firmly together, whether they be corners or otherwise, which will hold the parts firmly which can be made quickly and cheaply, which will be applicable to aluminum sections if desired, but not limited thereto, and when so used will not destroy the effects of the heat treating of the aluminum and which will not discolor the corner or disfigure it by the presence of positive fastening means such as screws or embossings.

Accordingly, the principal object of my invention is to provide a method, and specific means

for practicing same, for binding together abutting elements of a metal sash.

A further object of my invention is to provide a method, and means for practicing the same, for binding abutting elements together which will do so firmly and which will reduce play between said elements to a minimum.

A further object of my invention is to provide a method, and means for practicing same, for binding abutting elements together as aforesaid which can be effected rapidly and cheaply.

A further object of my invention is to provide a method, and means for practicing same, for binding said elements together as aforesaid which will be applicable, though not limited, to an extruded section made from aluminum, or aluminum alloy.

A further object of my invention is to provide a method, and means for practicing same, for binding metal sash elements together as aforesaid which will not alter the crystalline characteristics of adjacent portions of the sash elements.

A further object of my invention is to provide a method, and means for practicing same, for binding sash elements together as aforesaid which is free from all things which might disfigure or otherwise affect the external appearance of the sash section.

Other objects and purposes of my invention will be apparent to those who are acquainted with processes and equipment of this sort upon an examination of the accompanying drawings and reading of the following specifications. In the drawings:

Fig. 1 represents a side, partially broken view of means used in preparing a sash holding element.

Fig. 2 is a section taken on line II—II of Fig. 1.

Fig. 3 is a partially broken view showing a corner construction wherein the holding element is partially inserted into the sash members.

Fig. 4 illustrates in partial section similar to Fig. 1 a modification of my method.

Fig. 5 illustrates in partial section similar to Fig. 1 a different application of my method.

Fig. 6 illustrates in partial section similar to Fig. 1 a further application of my method.

In effecting the objects and purposes above outlined I have, after a large amount of experimentation, discovered a satisfactory procedure which, in addition to solving the screen construction, is capable of wide applicability to a variety of other similar problems. Since my method is best understood with reference to a particular situation and to particular apparatus for practicing the method, attention is directed to the accompanying drawings and to the specific examples of my process therein illustrated.

Looking first at Figs. 1, 2 and 3, it is desirable to bond the corners of a screen sash comprising elements having the cross-section generally indicated at 1 in Fig. 2, which elements, for the purposes of this example, may be assumed to be of an extruded aluminum alloy having a melting point of approximately 1,025° F. There will first be provided a plate 2 having a pair of suitably placed clamps 3 and 4. A pair of mold sections 5 and 6 are cut from the same stock as will be used for the finished screen sash. These may usually, but not necessarily, be taken from scrap, such as cut-off ends which are too short for use as sash members. These sections are suitably mitered and placed together at 7 to form a duplicate of the desired corner. Here a right angular corner is contemplated, but it will be evident that a corner of any other angle or even lineal abutment (Figs. 5 and 6) may be provided by slight modification of the procedure described following.

The sections 5 and 6 are placed under the clamps 3 and 4, held as shown and suitably preheated. There is then provided a quantity of metal which will melt at a temperature substantially lower than the melting point of the metal comprising the sections which are to be bonded together and from which the mold sections 5 and 6 are taken. This metal when cooled and hardened should preferably also be somewhat softer than the metal comprising the sections which are to be bonded together. However, this latter, while advantageous in securing rapid and accurate subsequent assembly, is not essential. For this purpose any conventional diecasting metal will be suitable. By way of example I have found particularly advantageous a zinc alloy known to the trade as "Kirksite" which is manufactured by Morris P. Kirk and Son, Inc. of Los Angeles, California, and which melts at about 715° F. This metal is heated sufficiently to place it in a fluid state at a temperature somewhat over its melting point, in the case of "Kirksite" from 800° F. to 850° F. and is then held at such temperature for use. A predetermined amount of such metal is poured into the opening 8 within the sections 5 and 6 sufficient to fill both of said sections a selected distance from their respective abutting ends. The metal immediately flows to fill both sections to a substantially constant level and thus provides an exact duplicate of the space 8 within the sections 5 and 6 for the selected distance from the abutting ends. The meniscus of the liquid metal will, when it is hardened provide a convenient rounding of each end of the corner angle casting. By replacing the sections 5 and 6 frequently with scrap from the current production run, the corner element 9 thereby formed will always conform exactly to the particular size and shape of the opening within the sash sections being used at any given time. Although extruded metal sections will normally be held within close size tolerances, this method of forming the corner connecting member will provide for even the variations and idiosyncrasies which do sometimes occur.

As soon as the casting metal is set, which will be a matter of only a few moments, the backing plate 2 is engaged by suitable tongs or hooks and the entire assembly shown in Fig. 1 is cooled in any convenient manner, such as by dipping into cold water. The mold sections 5 and 6 are then dumped onto a table where they are pulled apart and the corner member 9 separated from them. The mold sections may then be placed back in their original position on the plate 2 and the mold is ready to repeat the cycle.

It should be noted that since the mold section is pre-heated, the casting will form at a size slightly greater than the interior opening of the sections when cold. Whenever on cooling the casting will contract at about the same rate as the mold, it need not be ejected until the mold is substantially cooled. The finished and completely cooled casting will in such case be of such size as to be able to enter the central opening of a sash section identical with the mold and it will make an exceedingly tight fit therein.

It will often be desirable in the interest of assuring a completely tight fit between the corner angle casting and the sash sections, and particularly so when the casting metal used contracts at a slightly greater rate than the metal of the members used for a mold, to enlarge slightly,

by any convenient means such as with a file, the internal opening within said section. In this way the mold can be made slightly oversize so that the finished and cooled corner casting will be of correct size for an extremely tight fit.

It will also often be desirable to apply a few strokes of a file to the interior of the scraps of sash section used as molds in such a manner as to create a slight taper at the interior of each part of the mold, as illustrated in somewhat exaggerated form in Fig. 4 wherein the surfaces 10 and 11 represent the interior walls diverging slightly from the position of the original walls which are indicated by the dotted lines 12 and 13. In this way the corner casting will be slightly tapered and thus will more easily enter into the central opening of the sash sections. This diverging of the walls near the respectively abutting ends of the mold sections will also normally provide the slight oversize mentioned above as desirable.

Where one side of the central opening within the sash member is open, as in the W type sections used in the constructions shown in my above named patents, this same process may still be used by inserting into the open side a suitable guard or dam and thus converting a part of the internal space for casting purposes into a closed hollow chamber similar to the section shown in Fig. 2. The process may similarly be applied where the opening is not a central opening as such but is only a recess, especially an undercut recess, along the sides of the members being fastened.

In assembling a screen or window sash it will be found that these corner members can ordinarily be pushed by hand a part of their length into the central opening of the sash, and then will need to be struck a few blows with a hammer to force them in the rest of the way. This will be especially true if the castings have been provided with a slight taper as mentioned above. This will insure their being absolutely tight so that the corner is not likely to come apart accidentally nor will it ordinarily have any play.

By selecting the casting metal to be substantially softer than the metal of the sash sections it will be evident that the slightly oversized portion of the corner casting will yield and conform to the shape and size of the central opening within the sash section. While it is obvious that such conforming cannot involve any great changes in shape or size of the corner casting there will still be sufficient to permit a slightly oversized corner member to be inserted and driven tightly into place without scraping, tearing or damaging in any way the parts of the sash sections and particularly the walls of the opening therein.

If a material is used for the corner casting which is harder than the material from which the sash sections are made, there will still be secured a mutual adjustment to assure a tight and rigid fit. However, in this case the material yielding will be the sash section material and, while it may be permitted in some instances, it will normally be less desirable than if the yielding is done by the material comprising the connecting member.

It will be understood that the casting material must melt and become fully liquid in a temperature range substantially below the melting or even the softening point of the metal comprising the molds in order to avoid any tendency for the corner member to stick within the mold

sections. In the above given example the sash sections are taken to be made from aluminum melting at approximately 1,025° F. and there is employed for the casting metal an alloy melting at approximately 715° F. Any other materials and respectively appropriate temperatures will be suitable providing only the above stated conditions are satisfied. For example if the sash sections were made of steel the casting material could, if desirable for other reasons, be selected from groups of alloys such as the bronzes and/or the brasses having somewhat higher melting points.

It is obvious that with corner members made in this way the process of assembling window sash sections will be extremely fast, and that the time, equipment and labor ordinarily involved in setting screws, effecting embossings or engaging other positive holding means, will be entirely eliminated. It will also be found that this method of fastening corners will produce a frame of extreme rigidity and durability.

It is evident that this process of joining abutting members can be applied to a wide variety of circumstances. Specific examples can be found in the automobile and airplane fields where tubular or recessed elements are widely used and wherein these elements often must be fastened together at a wide range of different angles. This may be expensive or awkward to hold together by plates or bars which are formed by other processes. My process also has widespread use in temporary and/or experimental construction in that it provides a quick, accurate and reliable method of forming odd shaped corners and avoids the special and time consuming work otherwise incident thereto. By this method it is little, if any, more expensive to construct a storm window for example, for an octagon window than it is to construct a storm window for a conventional rectangular window, whereas under previously known methods of construction the cost of fitting an octagon window frame was much greater than the cost of correspondingly fitting a rectangular frame.

Where this method of preparing corner members is used for connections of such a wide angle, including a straight line (Fig. 6) that the material will not collect itself into the corner by gravity as in the situation above described, it will be necessary to rearrange the mold in some other manner to provide a proper position for setting of the poured material, such as plugging one end and pouring from the other end. This, however, will be apparent by ordinary casting practice and need not be discussed here.

This process is also applicable to uses other than the fabrication of strictly joining elements. For example, in certain phases of automobile construction such members will be useful for aligning elements which are otherwise fastened. The procedure, however, is the same.

Other variations and modifications will be apparent to those acquainted with processes and equipment of this sort but all will be within the scope of the following claims except as expressly limited thereby.

I claim:

1. The process of fabricating a window sash corner comprising: utilizing for said window sash aluminum sash sections having an opening therein; utilizing as a corner member mold a pair of sections cut from the same stock as the sections from which the sash is to be made, arranging said mold sections to form a duplicate of the

intended corner and heating a zinc alloy melting at approximately 715° F. to a temperature between about 800° and about 850° F. and while at said temperature pouring same into said mold and then cooling same to form a corner member casting; removing said casting from the mold sections and inserting it into the corresponding openings of a pair of said sash sections.

2. The method of fabricating a plurality of constructions each having a corner, which process method comprises: utilizing for the elements of said construction tubular sections having an internal opening therein, cutting from a current run of such construction sections a pair of samples thereof, arranging said samples to form a duplicate of the intended corner and pouring thereinto a predetermined amount of liquid molding material and then solidifying same to form a corner member casting, removing said casting from the mold sections and inserting it into the respective internal openings of a pair of construction sections to be abutted to form a corner, discarding used samples and cutting from the then current supply of constructional stock new samples to utilize as mold sections with sufficient frequency to maintain close conformity in size between said castings and the constructional

sections being used at any given time in spite of variations occurring from time to time in the internal dimensions of said tubular constructional sections.

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