

Nov. 29, 1927.

F. L. MICHAELS

1,650,640

WINDOW

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2 Sheets-Sheet 1

Fig. 1.

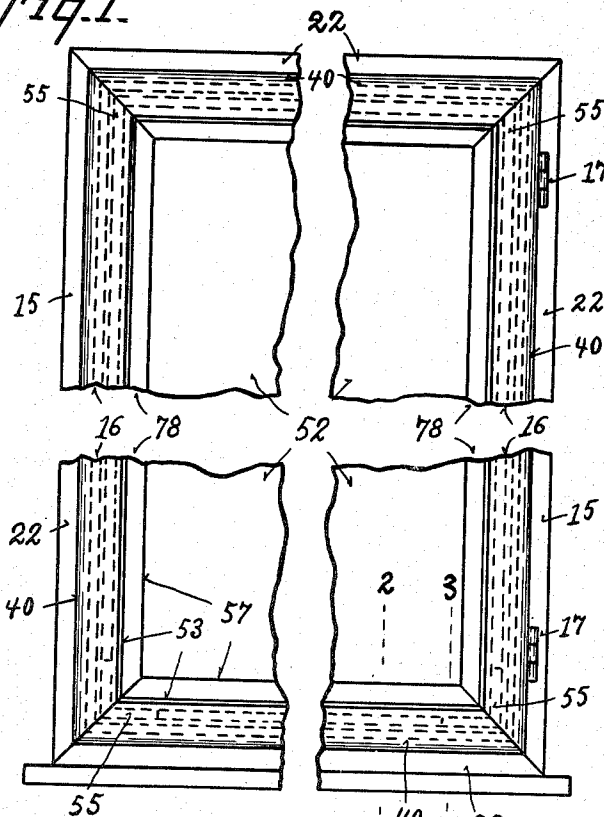


Fig. 2.

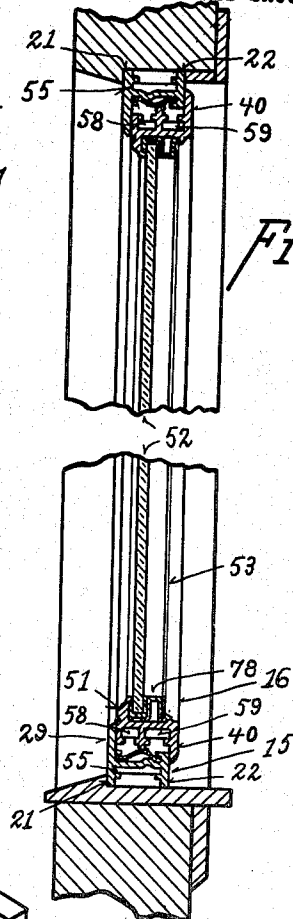


Fig. 3.

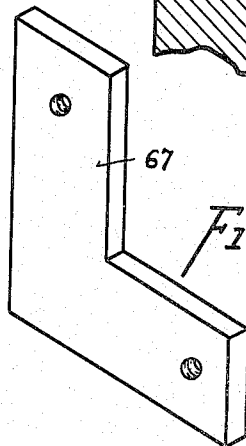
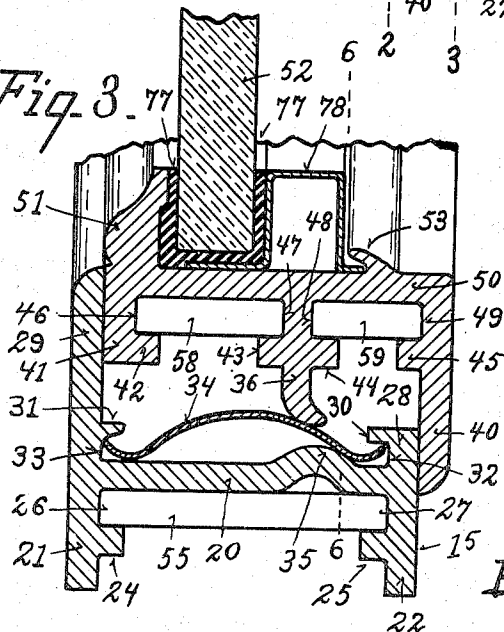


Fig. 4.

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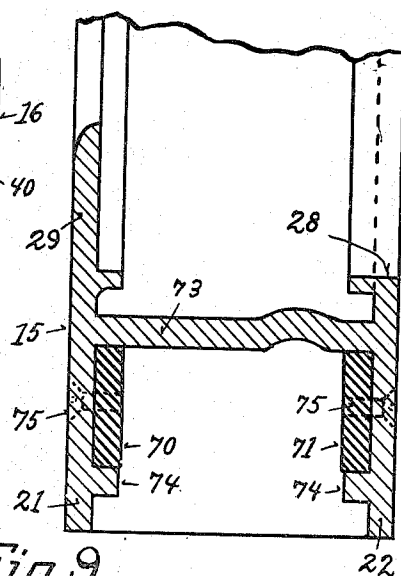
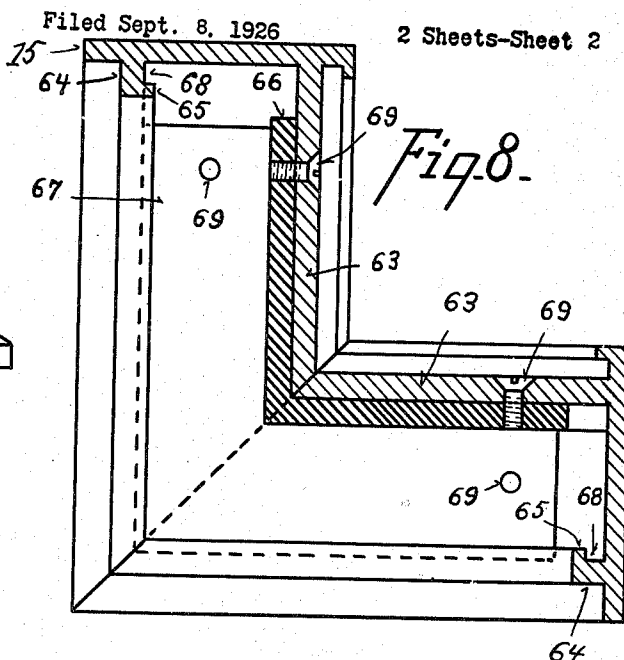
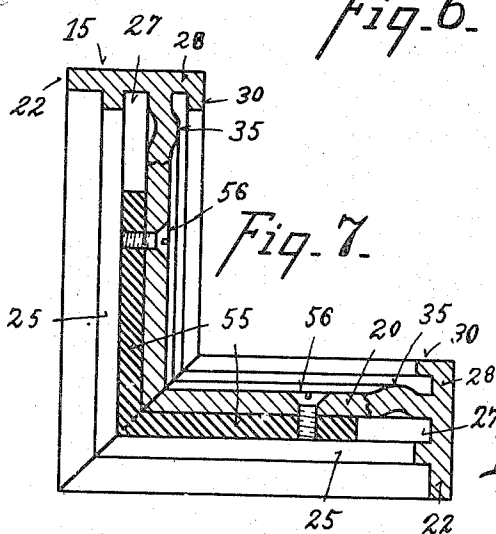
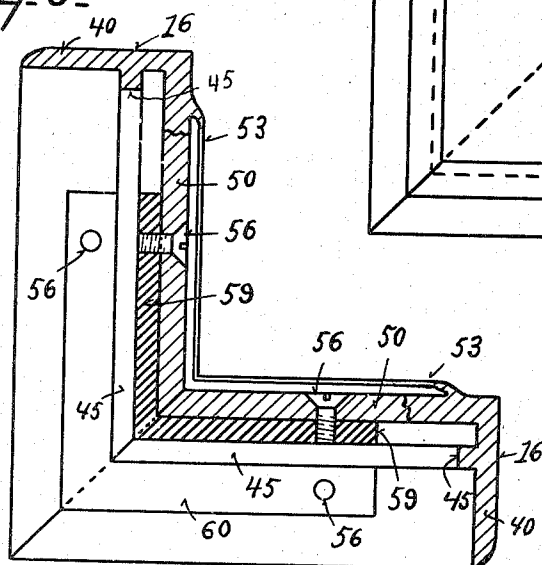
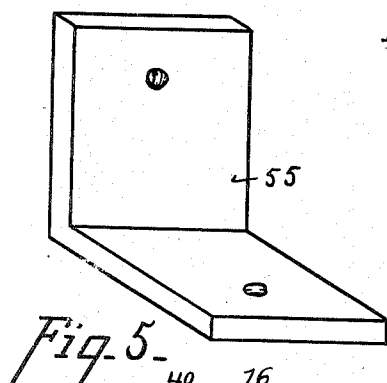
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WINDOW

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2 Sheets-Sheet 2



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1,650,640

UNITED STATES PATENT OFFICE.

FRANK L. MICHAELS, OF COVINGTON, KENTUCKY.

WINDOW.

Application filed September 8, 1926. Serial No. 134,271.

My invention relates to improvements in metal windows. One of its objects is to provide an improved metal window frame and sash structure. Another object is to provide a window frame and sash structure adapted to be built up from extruded metal forms or bars by cutting and mitering the same. Another object is to provide improved means to firmly and rigidly connect the frame and sash sections together, at their mitered joints. Another object is to provide improved extruded metal bars especially adapted to the construction of window frames and sashes. Another object is to provide improved means to exclude wind and water. Another object is to provide improved means to detachably secure the glazed panel or panels in place relative to sash frame. My invention also comprises certain details of form and arrangement and combination of components, all of which will be fully set forth in the description of the accompanying drawings in which

Fig. 1— is a plan of a window frame and sash embodying my improvements.

Fig. 2— is a vertical section through the same taken on line 2—2 of Fig. 1.

Fig. 3— is an enlarged sectional detail taken on line 3—3 of Fig. 1.

Fig. 4— is a perspective view of a metal angle plate adapted to be employed to secure the frame members together at their mitered joints.

Fig. 5— is a perspective view of another angle plate adapted to be employed by itself or in conjunction with an angle plate of the type shown in Fig. 4, for securing the frame members together at their mitered joints.

Fig. 6— is a sectional detail taken on line 6—6 of Fig. 3 through one of the miter joints of the window sash.

Fig. 7— is a similar view taken on line 7—7 of Fig. 3 through one of the miter joints of the window frame.

Fig. 8— is a view similar to Fig. 7 illustrating a modification thereof.

Fig. 9— is a section through the window frame similar to that shown in Fig. 3, and illustrating a modification thereof.

The accompanying drawings illustrate the preferred embodiments of my invention in Figs. 1 to 7 of which 15 represents the window frame and 16 the window sash, which may be either of the casement type in which the sash is attached to the frame by means of hinges 17 and opens inwardly or of the slid-

ing type in which one or more sash members are arranged to slide vertically in ways or guides on the frame. In the drawings I have illustrated the casement type of frame and sash.

One of the prime objects of my invention is to provide forms or structural bars from which the top, bottom and sides of the frame and sash may be formed by cutting and mitering sections of said structural bars to form the rectangular frame and sash members and which structural bars lend themselves to and facilitate firmly uniting their ends together at their mitered joints and staying and rendering said joints and completed frames and sashes firm, rigid, permanent and reliable, and which also facilitate accuracy and quantity production and uniformity of said structural bars.

The structural bars substantially as shown of the desired cross section having finished plane faces, plane faces parallel to each other, and plane faces meeting at right angles are adapted to be produced in quantity and with accuracy of dimensions and finished surfaces by a process of extrusion, whereby the metal is forced under heavy pressure through dies. The structural bars from which the window frames are formed are preferably of a general H or I-beam type, to provide a maximum of strength and resistance to transverse strain. On the outer side of the cross bar 20 of the I-beam, the free arms 21 and 22 are provided with inwardly directed ribs 24 and 25 formed integral with and extending lengthwise, leaving intervening recesses 26 and 27. At the opposite side of the cross bar 20 the free arm 28 is shorter than the free arm 29, thereby providing for the sash to make two independent face to face contacts with the frame one with the side of arm 28 and the other with the side of arm 29, and together tending to doubly exclude wind and weather. The arms 28 and 29 are preferably provided with inwardly turned ribs 30 and 31 providing recesses 32 and 33 intermediate of the cross bar 20 and the ribs 30 and 31, which receive and hold in place the opposite edges of a weather strip or strip of resilient sheet metal 34, which is curved transversely of its length and sprung into place, and which also bears yieldingly upon a rib or fulcrum 35 extending inwardly from the cross bar 20. The strips 34 are readily detachable and replaceable.

When the sash is closed the intermediate portion of the weatherstrip 34 is yieldingly engaged by a rib or arm 36 extending outwardly from the sash, and which further serves to exclude wind and moisture.

The structural bars from which the sash frames are constructed are provided with plane faced arms 40 and 41 which close against corresponding plane faced members 28 and 29 upon the window frame. The sash bars are also provided with a plurality of inwardly directed ribs, for instance 42, 43, 44, and 45, with spaces 46, 47, 48, and 49 intervening between said ribs and the cross bar 50 of the sash bar. Upon the opposite side of the cross bar 50 from the arms 40 and 41 is a projection 51 outside of the window pane 52, and preferably a relatively smaller rib 53 inside of the window pane.

In order to render these structural forms available and practical for the construction of window frames and sash frames, it is important to be able to secure the meeting ends of the structural bars where they are mitered together, with accuracy, and with a more than usual degree of firmness and rigidity, in order that the frames may be accurate in the first place, and retain their accuracy through long periods of use under the strains to which window frames and sashes are normally subjected and so that the plane meeting faces of all the members of the window frames and sash frames may meet to exclude the weather and may continue to do so. To accomplish this purpose I provide angle plates 55 substantially as shown in Fig. 5 which are of sufficient width to occupy practically all of the space between the side arms or walls 21 and 22 of the window frame, see Fig. 3 and of sufficient thickness to fit tightly into and occupy practically all of the spaces intermediate of the cross bar, 20 and the inwardly directed ribs 24 and 25, see Fig. 7. These angle plates 55 may be introduced endwise into the recesses in the meeting ends of the adjacent structural bars or frame sections as the window frames are assembled. After the frames have been assembled, I preferably secure the angle plates 55 in place by two or more countersunk screws 56, and if desired the angle plates 55 may then be sweated, brazed or soldered in position without material injury to the surface of the window frame.

The sash frames, see Fig. 6, are united in a similar manner employing two angle plates 58 and 59, similar to the angle plate 55, but of less width. The plate enters and fits tightly into the space between the arm 41 and the arm 36 and also fits tightly into the spaces between the cross bar 50 and the inwardly directed ribs 42 and 43. The angle plate 59 fits tightly between the arm 36 and the arm 40 and also tightly into the spaces

intermediate of the cross bar 50 and the inwardly directed ribs 44 and 45. The angle plates 58 and 59 may be secured by screws or by brazing or soldering, or both substantially as described for securing the angle plates 55 in place.

As a further means of increasing the rigidity of the sash frames, I have shown in Fig. 6 an angle plate 60 of the general type shown in Fig. 4 attached in place outside of the inwardly directed ribs 42 or 45 or both of them. Where the arm 36 is omitted, only one angle plate is employed in place of the two angle plates 58 and 59 to lock the corners of the window sash frames.

In the modification shown in Fig. 8 which is adapted to the construction of large and heavy window frames and sashes, I have shown structural bars having a cross bar 63 corresponding to the cross bar 20 or 50 of Fig. 3, and an inwardly directed rib 64 having an overhanging ledge 65, and spaced a relatively greater distance from the cross bar 63. An angle plate 66 of the general type shown in Fig. 5 is employed jointly with one or with two angle plates 67 of the general type shown in Fig. 4 so arranged that the inner edge of the angle plate 67 is in contact with the outer face of the angle plate 66 near one edge, or if two plates 67 are employed engaging near both edges of plate 66. The outer edge of the angle plate 67 is locked into the channel 68 formed by the rib 64 and its ledge 65. Both the angle plate 66 and the angle plate 67 are held in place by screws 69 and may be brazed or soldered into place if desired.

In the modification Fig. 9, I have shown two angle plates 70 and 71 of the general type shown in Fig. 4 which are interposed between a cross bar 73 at one edge and an inwardly directed rib 74 at the other edge, and held in place by screws 75, and which are also adapted to be brazed or soldered in place.

The structural bars are adapted to be produced from bronze or similar metal or alloy adapted to resist corrosion for long periods of time, and to be produced with accuracy, and in quantity.

In order to secure the pane or panes of glass in place, I have preferably provided a relatively soft and flexible member 77 of rubber or felt which is interposed between the metal of the sash frame and the edge of the pane, and a channel shaped strip of resilient sheet metal 78 one edge of which is placed between the edge of the pane and the sash frame while the opposite edge of said strip is engaged beneath the edge of the rib 53 to yieldingly and detachably hold the pane of glass in place relative to the sash frame, there being a strip 78 along each side of the pane.

The apparatus herein shown and described

is capable of considerable modification within the scope of the claims without departing from the spirit of my invention.

What I claim is:

- 5 1. A frame comprising a series of frame members to form the ends and sides of a hollow frame each having a channeled recess of substantially uniform cross-section endwise thereof and adapted to engage opposite
10 faces of angle plates employed to lock said frame members together at their meeting ends to form a hollow rectangular frame, and a plurality of angle plates adapted to enter endwise and closely fit said recesses
15 and to be assembled with and united to said frame members to constitute a rigid hollow frame.
2. A frame adapted for use as a window frame or sash frame comprising a series of
20 frame members of substantially uniform cross-section adapted to form the ends and sides of a hollow frame and each provided with a plurality of inwardly directed ribs forming with the wall of said frame mem-
25 bers recesses adapted to embrace corner connecting members upon opposite faces, and a series of angular corner connecting members adapted to be assembled by inserting the
30 ends of said corner connecting members endwise into the interengaging recesses of said frame members.
3. A hollow frame structure comprising a plurality of angular metal corner connecting members, and a plurality of metal channel-
35 bar sections of substantially uniform cross-section adapted to form the ends and sides of a hollow frame, said channel-bar sections being provided with inwardly directed longitudinal ribs forming longitudinal re-
40 cesses to receive said corner connecting members endwise and to closely embrace the edges of said corner connecting members.
4. A hollow frame structure comprising a plurality of angular metal corner connecting
45 members, and a plurality of extruded metal channel-bar sections each provided with inwardly directed longitudinal ribs forming longitudinal recesses to receive said corner
50 connecting members telescopically and to closely embrace the edges of said corner connecting members.
5. A structural bar adapted to the construction of window and sash frames comprising a channel-bar of extruded metal hav-
55 ing inwardly directed longitudinal ribs forming longitudinal recesses adapted to telescopically engage with metal angular corner connecting members to firmly unite sections of said structural bar into hollow
60 frames.
6. A structural bar adapted to the construction of window and sash frames comprising an I-bar of extruded metal having inwardly directed longitudinal ribs forming longitudinal recesses adapted to telescopi-
65 cally engage with metal corner connecting members to unite sections of said structural bar into hollow frames.
7. A structural bar adapted to the construction of window and sash frames comprising a channel bar of extruded metal having inwardly directed longitudinal ribs forming longitudinal recesses adapted to telescopically engage with metal corner connecting members to unite mitered sections of
75 said structural bar into hollow frames.
8. A structural bar adapted to the construction of window and sash frames comprising an I-bar of extruded metal having its free arms on one side of relatively different lengths and having inwardly directed longitudinal ribs forming longitudinal re-
80 cesses adapted to telescopically engage with metal corner connecting members to firmly unite sections of said structural bar into
85 hollow frames.
9. A casement window comprising in combination with a window sash, a window frame composed of mitered I-bar sections of extruded metal having the free arms upon
90 one side of said I-bar sections of relatively different lengths to thereby independently and simultaneously engage independent ledges upon the window sash and having inwardly directed longitudinal ribs forming
95 longitudinal recesses adapted to be telescopically engaged by corner connecting members to unite said mitered sections into a hollow frame.
10. A structural bar adapted to the construction of window frames comprising a
100 channeled bar having inwardly directed longitudinal ribs at opposite edges of said channel bar adapted to engage over the opposite edges of a resilient channel shaped
105 metal weatherstrip section to retain said weatherstrip section in position relative to said channel bar, and a longitudinal intermediate rib on said channel bar in position to engage a portion of the channeled face of
110 said weatherstrip intermediate of its edges and to form a fulcrum over which said weatherstrip is adapted to be resiliently strained by engagement of the window sash therewith.
11. A structural bar adapted to the construction of window sash frames comprising a channel-bar of extruded metal having a longitudinal ledge along the face of the channel-bar adapted to support one side of
115 a pane of glass, and being provided inside of its channel arms with inwardly directed longitudinal ribs forming longitudinal recesses adapted to telescopically engage with metal corner connecting members to unite
125 sections of said structural bar into hollow sash frames.
12. In combination with a metal frame member and a metal sash member, one of which is provided with recesses in pairs to
130

continuously engage opposite edges of a weatherstrip and the other with a projecting rib to engage an intermediate section of a weatherstrip, a weatherstrip of resilient material adapted to resiliently and continuously engage the recesses of one of said window members with its opposite edges and when the window sash is in closed position to be resiliently and continuously engaged at an intermediate portion of its width by the projecting rib of the opposite window member.

13. In combination with a metal frame member and a metal sash member, one of which is provided with recesses in pairs to continuously engage opposite edges of a weatherstrip and a fulcrum member to continuously engage one side of the weatherstrip

at an intermediate portion of its width and the other of which window members is provided with a projecting rib to continuously engage an intermediate portion of the opposite face of the weatherstrip, a weatherstrip of resilient material adapted to resiliently and continuously engage the recesses and fulcrum member of one of said window members with its opposite edges and an intermediate portion and when the window sash is closed to be resiliently and continuously engaged on its opposite face at an intermediate portion of its width by the projecting rib of the opposite window member.

In testimony whereof I have affixed my signature.

FRANK L. MICHAELS.