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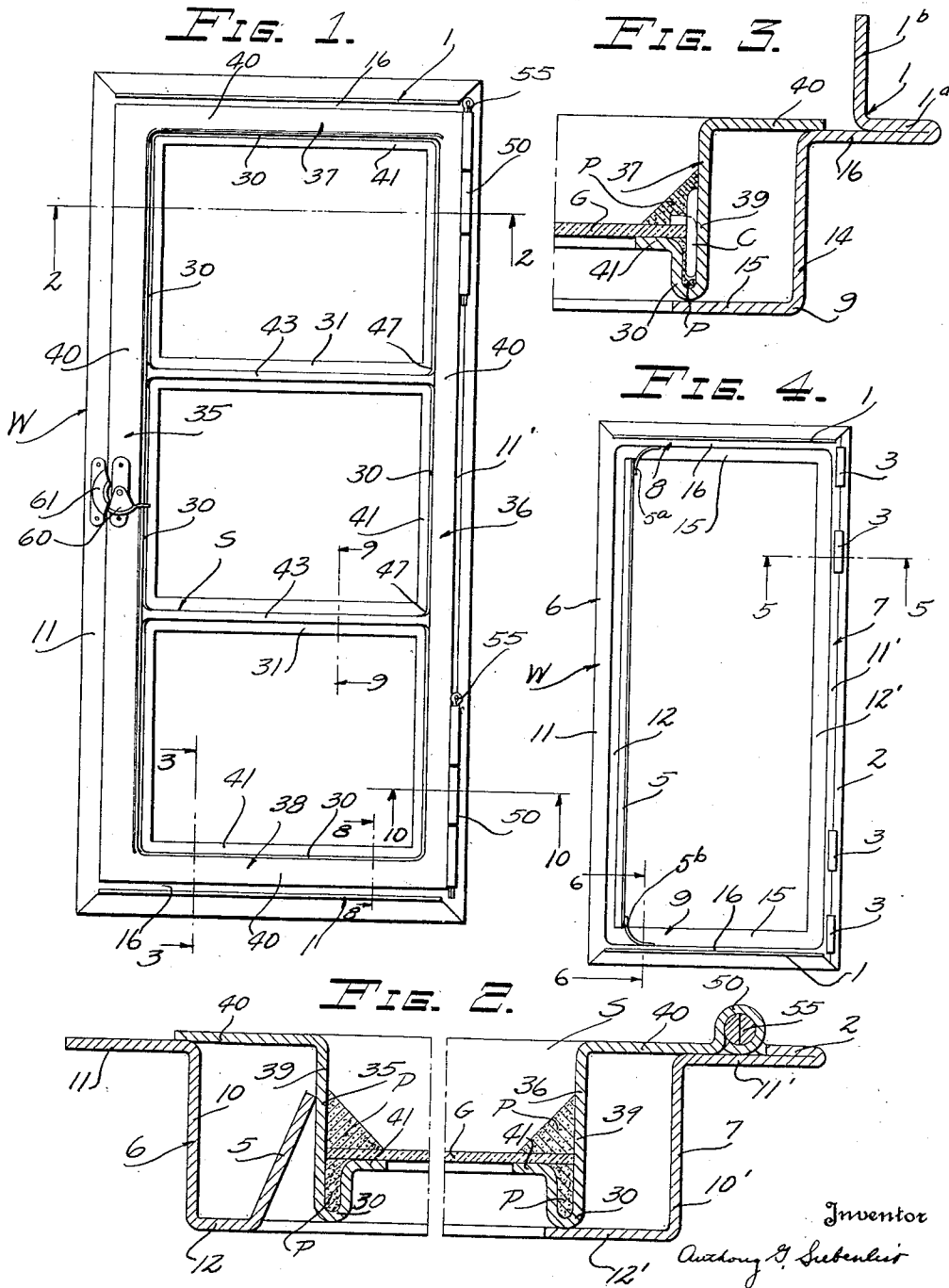
A. G. SIEBENLIST

1,864,559

METAL WINDOW STRUCTURE

Original Filed April 30, 1928

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

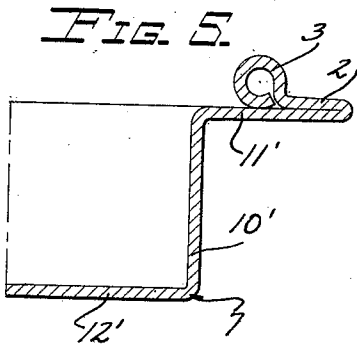
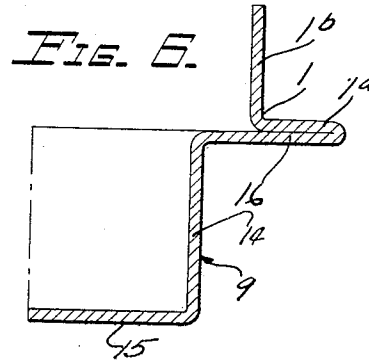


FIG. 8.

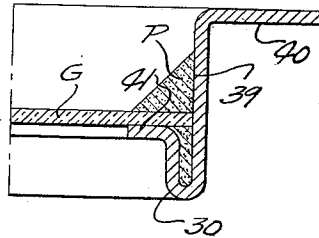
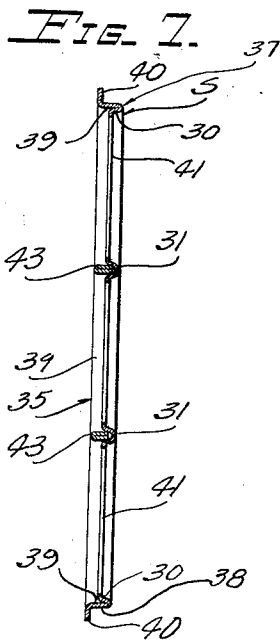


FIG. 9.

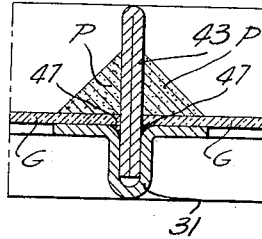
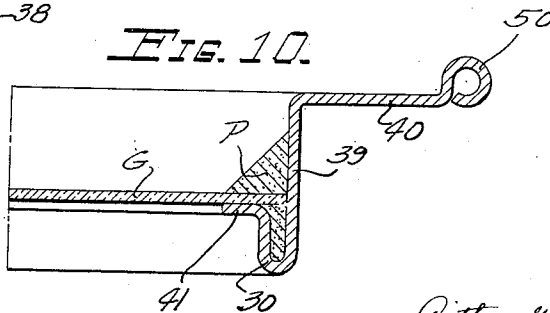


FIG. 10.



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UNITED STATES PATENT OFFICE

ANTHONY G. SIEBENLIST, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MILCOR STEEL COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE

METAL WINDOW STRUCTURE

Original application filed April 30, 1928, Serial No. 274,122. Divided and this application filed July 1, 1929. Serial No. 374,994.

This invention relates to sheet metal window structures and in general aims to provide a sheet metal window structure which is of simple and lightweight construction and yet strong and durable as well as stiff and rigid; which, in use, is easily opened and closed and yet in closed position provides a weathertight construction; and which is easy and comparatively inexpensive to manufacture. The present application is a division of my copending application for metal window structure and method of making the same, filed April 30, 1928, Serial Number 274,122.

One of the principal objects of the invention resides in the manner of constructing the sash and window frames whereby the problem of production is simplified and the resulting construction, while of light weight, is so stiff, strong and rigid as not to be liable to be racked or strained in use.

In general these features and objects are obtained by forming the window frame of a single piece of metal, the major structural elements of the window frame being shaped and formed by a drawing or cupping operation which fashions these elements from the metal of the one piece blank in such manner as to produce a structure of marked strength and rigidity. Following the cupping operation, the outside edges of the blank are trimmed or cut to form the edges of the frame and to outline the stock subsequently shaped to constitute the appurtenances of the window frame, such as hinges, strengthening or reinforcing plates, stiffening wings, and the like. After this a portion of the blank within the confines of the frame members is cut away to provide the frame opening and to complete the shaping of the frame members and at least one of the margins of the window opening is shaped to provide a water shedding weather strip.

The same generic features are to be found in the construction of the sash frame, the major elements of the sash frame, being of a single piece sheet metal construction, cupped or drawn to shape, and having integral therewith the structure providing seats for the window glass employed and the

supports or bases for the mullion strips. Along its outside edges, the sash frame has its appurtenances integrally formed therewith.

The structural elements of both frames are of cupped formation and have angularly disposed frame members of continuous or integral construction and each frame member so formed has a body portion provided with edge flanges, the flanges of the side frame members affording hinge rails and latch rails and all of the frame members having their body portions and flanges designed to interfit and engage in the assembly to provide weather excluding members. Further, the hinge ears, reinforcing plates, stiffening wings, and weather stripping are all integral with the frame members. Thus, the window frame and all its appurtenances are constituted of one piece of metal and the sash frame is also of one piece construction except for the two mullion or finishing strips which are applied and welded in position on the bases provided therefor and formed integral with the sash frame.

Due to the angular formation of the frame members, to their integral construction and to their cupped or drawn formation which not only upsets but also flanges the metal, as well as to the integral bracing and stiffening means provided, the final construction, while of light weight, is exceptionally stiff and rigid so that the frames in use properly interfit when closed and yet may be easily opened and will not rack or become distorted.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, and in which:

Figure 1 is a plan view showing the complete assembly of a window and sash frame embodying the present invention;

Figure 2 is a fragmentary view in transverse section taken on line 2—2 of Figure 1;

Figure 3 is a fragmentary view in longi-

tudinal section taken on line 3—3 of Figure 1;

Figure 4 is a plan view of the complete window frame, the sash frame being removed for the sake of illustration;

Figure 5 is a sectional view taken on line 5—5 of Figure 4;

Figure 6 is a similar view taken on line 6—6 of Figure 4;

Figure 7 is a view showing the sash frame in central longitudinal section; and

Figures 8, 9 and 10 are detail views of the sash frames taken in the plane of lines 8—8, 9—9, and 10—10, respectively, of Figure 1, but showing only the sash frame, the associated portions of the window frame being omitted.

The window frame and the sash frame embodying the present invention are each constructed from a single piece of metal in accordance with the method fully described and claimed in my copending application above referred to, and reference is made to such application for a full disclosure of the method of producing these frames. It is to be understood, however, that the present invention is not restricted to this particular method of producing these frames although preferably the frames are produced by the novel method referred to.

Referring more particularly to Figures 1 to 6, inclusive, it will be seen that the window frame W, embodying the present invention, is of rectangular form and comprises side frame members 6 and 7 and end frame members 8 and 9 all constituted of a single piece of metal so that these several frame members are one continuous integral construction, the frame members being stamped or drawn from a single piece of metal which is afterwards trimmed or cut to the outline shown. The side and end frame members all have body portions and oppositely directed edge flanges and as shown in Figure 2 the side frame member 6 has a body portion 10, an outwardly directed edge flange 11 and an inwardly directed edge flange 12 on which a weather strip 5 is integrally formed. The side frame member 7 (see Figures 2 and 5) also has a body portion 10', and outwardly directed edge flange 11', and an inwardly directed edge flange 12'.

As shown in Figures 3 and 6, the end frame members are of similar construction and each includes a body portion 14, an inwardly directed edge flange 15 and an outwardly directed edge flange 16 on which a stiffening rib designated generally at 1 is integrally formed.

Each stiffening rib 1 has a section 1^a bent down flush against the outwardly directed edge flange 16 and also has a section 1^b extending at right angles to the section 1^a as shown in Figure 3. The wing 1 not only has a stiffening and reinforcing function but

its outwardly directed section 1^b affords a gauge or stop operable when the window is put into place in the building to indicate and limit the extent to which the structure of the building is built around or over the ends of the window frame.

The weather strip 5 which is integral with the inwardly directed edge flange 12 is bumped up or extended at an angle to the flange 12, as clearly shown in Figure 2. If desired, the ends of the weather strip 5 may be connected to the body portions 14 of the end members 8 and 9 by short, appropriately curved connecting pieces 5^a and 5^b spot welded to the ends of the weather strip 5 and to the body portions 14 of the end members whereby to provide a complete weather repellent stripping or structure along the bottom or lower side of the window. The pieces 5^a and 5^b are constituted of the scrap resulting from the formation of the window frame from a single piece.

The outwardly directed edge flange 11' of the side member 7 is employed as a hinge rail and in order to stiffen and strengthen it and better adapt it to perform this function a hinge rail stiffening plate 2 is integrally formed with and bent down flush against the edge flange 11'. Integral with the stiffening plate 2 are hinge ears 3 rolled to the form shown in Figure 5 in which portions of the ears engage the underlying outwardly directed flange 11'.

The sash frame designated generally at S is also drawn or cupped from a single piece of metal which is appropriately trimmed and shaped. As shown in Figures 1 and 7 to 10, inclusive, the sash frame S consists of side frame members 35 and 36 and end frame members 37 and 38, all constituted of a continuous and integral piece of metal and each having a body portion 39, an outwardly directed edge flange 40, and a crimp or channel 30 around its inner margin, each crimp or channel having an inwardly directed edge flange 41. In addition, there are integral cross members constituted by the flanged channels or crimps 31 (see Figure 7 and 9), which brace and stiffen the side members 35 and 36 of the sash frame and which provide channels or sockets for the reception of doubled mullion strips 43, the mullion strips 43 being inserted in the channels 31 and spot welded thereto as indicated at 47 (see Figures 1 and 9). The flanges 41 of the inner marginal channels or crimps 30 and the flanges of the cross channels 31 afford seats to which glazing is applied and secured by putty or other suitable means. The structure of the sash frame is completed by bending or rolling extensions formed on the outwardly directed edge flange 40 of the side frame member 36 to provide the hinge ears 50 (see Figures 1, 2 and 10).

The assembled window frame and sash

frame is shown in Figures 1, 2 and 3. As illustrated in these Figures the hinge ears 3 and 50 are brought into registration and pivotally secured together by hinge pins 55 preferably in the form of heavy cotter pins of resilient metal which may be readily inserted or removed but which are releasably held in position when inserted by virtue of their frictional engagement with the hinge ears. This mounting permits the sash frame to be swung into the window frame as shown in Figures 1 and 2 at which time the outwardly directed flanges 40 of the sash frame members fit flush against and overlap the outwardly directed flanges 11, 11' and 16 of the window frame; the body portions 39 of the frame members of the sash frame project into the opening of the window frame; and the crimps or channels 30 formed around the inner marginal edge of the sash frame bear against the inwardly directed flanges 14 of the end frame members 8 and 9 and against the inwardly directed flange 12' of the side member 7 of the window frame, thus providing a weather tight joint entirely around the frames at the inner side and a second weather tight joint entirely around one side member and two end members at the outside of the frame. A weather tight joint is also provided between the lower side member 6 of the window frame and the lower side member 35 of the sash frame but is constituted by the weather stripping 5 which is angled inwardly and upwardly toward the body portion 39 of the side member 35 of the sash frame so as to throw rain or water, that may drip down or be blown in against the frames, out to the exterior.

The glazing G, applied to the seats afforded by the flanges 41 of the channels or crimps 30, is secured in position by spring glazing clips C and putty P and the putty which is forced into the channels 30 provides a cushion for the glazing.

A latch 60 may be provided on the inside of the frame member 35 to coact with a keeper 61 fixed on the frame member 6, as shown in Figure 1.

The invention claimed is:

1. An all metal window frame comprising side frame members and end frame members constituted of a single piece of metal, one side frame member having its marginal portion doubled back upon itself and formed with integral lugs shaped to provide hinge ears.

2. An all metal window frame comprising side frame members and end frame members constituted of a single piece of metal, each frame member including a body portion and oppositely extending edge flanges, one flange of the side member being angled to provide a weather repellant strip.

3. An all metal window frame comprising side frame members and end frame members constituted of a single piece of metal, each

frame member including a body portion and oppositely extending edge flanges, each end frame member having one of its flanges doubled upon itself and formed with a stiffening wing.

4. A one-piece metal sash frame comprising continuous side and end frame members, each including a body portion having an outwardly directed flange along one edge adapted to overlap a window frame, said body portion having a crimp along its other edge provided with an inset flange affording a window glass seat.

5. A one-piece metal sash frame comprising continuous side and end frame members, each including a body portion having an outwardly directed flange along one edge adapted to overlap a window frame, said body portion having a crimp along its other edge provided with an inset flange affording a window glass seat, and integral cross members of channel form adapted to provide mullion supports, said cross members being flanged to provide window glass seats.

6. A one-piece metal sash frame comprising continuous frame members, said frame members having crimps around their inner margins providing window glass seats and stiffening and strengthening the frame windows, and integral cross members crimped to provide window glass seats and mullion supports.

7. A one-piece metal sash frame comprising continuous frame members and integral cross members and mullion strips applied to the cross members.

8. A one-piece metal sash frame comprising continuous frame members and integral cross members, said cross members having channels adapted to receive mullion strips.

9. A one-piece metal sash frame comprising continuous frame members and integral cross members, said cross members having channels adapted to receive mullion strips, said cross members also having flanges providing window glass seats.

10. In combination a window frame including frame members, each frame member comprising a body portion, an outwardly directed flange along one edge, an inwardly directed weather stripping flange along the other edge, and a sash frame including frame members having body portions formed with outwardly directed flanges along their outer edges designed to overlap the outwardly directed flanges of the window frame, the inner edges of the body portions of the sash frame members being cooperable with the weather stripping flange of the window frame to provide a weather tight relation between said frames.

11. In combination, a window frame including side and end frame members each having a body portion and oppositely directed edge flanges, and a sash frame including side and end frame members each having the

body portion formed with an outwardly directed edge flange, the body portions of the sash and window frame members interfitting in the assembly with the outwardly directed

5 flanges overlapping and with the sash frame having weather tight engagement to the inwardly directed flanges of the window frame.

12. In combination, a window frame including side and end frame members each

10 having a body portion and oppositely directed edge flanges, and a sash frame including side and end frame members each having the body portion formed with an outwardly directed edge flange, the body portions of the

15 sash and window frame members interfitting in the assembly with the outwardly directed flanges overlapping and with the sash frame having weather tight engagement to the inwardly directed flanges of the window frame,

20 one of the inwardly directed flanges of the window frame having an inclined weather repellant strip adapted to have substantially weather tight engagement with the body portion of one of the side members of the sash

25 frame, the inner edges of the other side member and end members of the sash frame having weather tight engagement with inwardly directed edge flanges of the window frame when the sash frame and window frame are

30 interfitted in closed relation.

13. A one piece all metal sash frame comprising continuous side and end frame members, each frame member having a channel integral with an inner edge thereof, said channels having inset flanges forming window

35 glass seats, the channels being adapted to receive putty or the like operable to provide a cushion for the glass.

14. In combination, a metal window frame

40 including continuous frame members, each frame member having a body portion formed with an integral flat outwardly directed flange along one edge and an integral flat inwardly directed flange along its other edge,

45 and a sash frame interfitted with the window frame and having a flat outwardly directed marginal flange adapted to fit flush against the flat outwardly directed flanges of the window frame and having its inner edge formed

50 to have weather tight engagement with flat inwardly directed flanges of the window frame.

In witness whereof, I hereto affix my signature.

55 ANTHONY G. SIEBENLIST.