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METAL WINDOW CONSTRUCTION

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Fig. 1

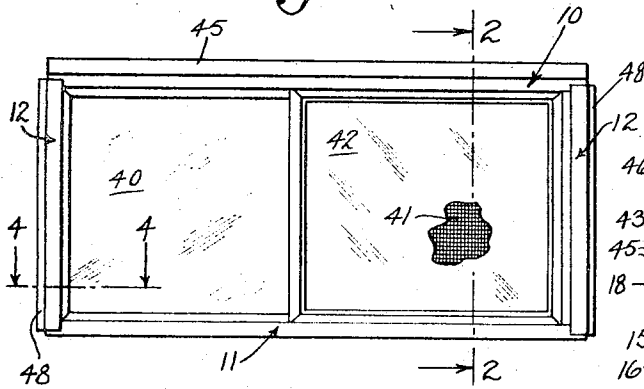


Fig. 2

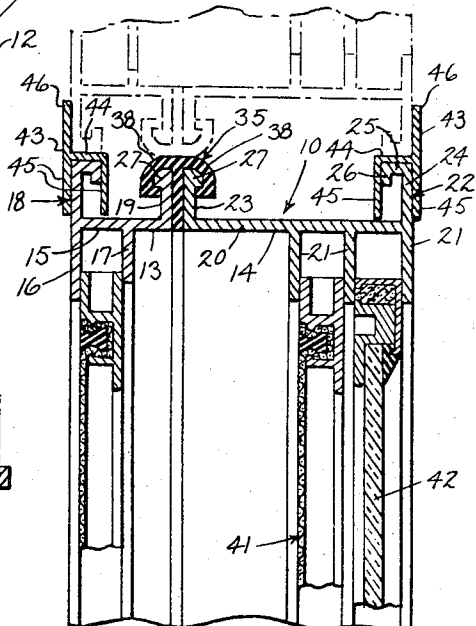


Fig. 3

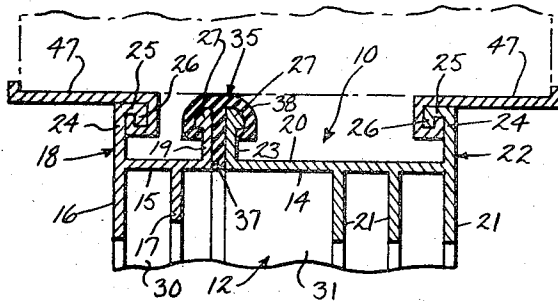


Fig. 4

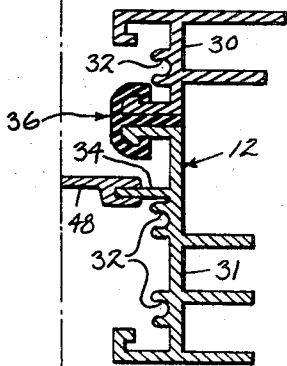
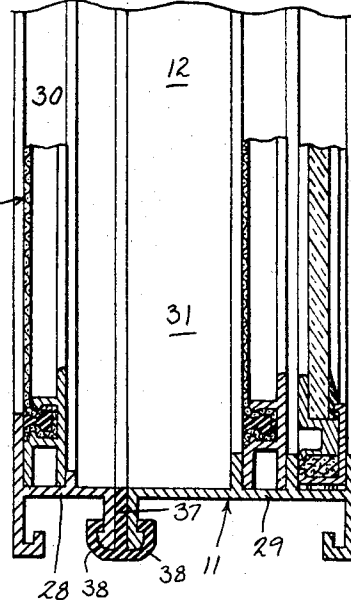
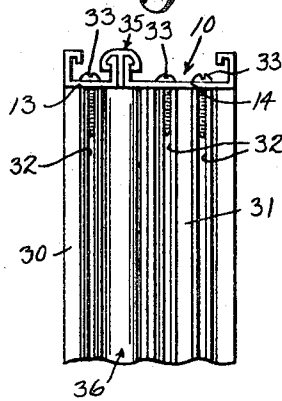


Fig. 5



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1

2

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ABSTRACT OF THE DISCLOSURE

A window frame is formed of separate exterior and interior extruded metal frame members. The frame members include web portions that terminate in laterally spaced inner edges with retaining flanges extending outwardly from such inner edges. The retaining flanges each have a lip that projects laterally away from the gap between the inner edges. A generally T-shaped rigid non-metallic insulating member extends into the gap, between the retaining flanges, and around the lips to both hold the frame members together and to insulate the interior frame member from the exterior frame member. The frame members are also formed with mounting flanges projecting from the web portions and can interlock with molding members which span the thickness of a wall into which the window frame is to be mounted. Such mounting flanges also accept stacking brackets that receive the mounting flanges of a like window frame for stacking of the frames.

This invention relates to a metal window construction, and particularly to a window frame formed of separate exterior and interior frame members that are laterally separated and held together by a rigid non-metallic insulating member.

A problem that has long plagued the manufacturers and users of metal windows is the conduction of heat and cold by the metal frame from the exterior to the interior of the frame. The most severe problem exists when the interior of the window frame becomes cold because of low outdoor temperatures thereby causing moisture in the air in the building to condense on the interior of the frame. This problem is particularly severe in aluminum window frames because of the high thermal conductivity of aluminum. Attempts have been made in the past to alleviate this problem by insulating the exterior portions of the window frame from the interior portions thereof. This has resulted in the suggestion that the exterior and interior portions of the window frame be separated by an insulating material having low thermal conductivity properties.

However, many of the suggested solutions have been self-defeating because metal screws, bolts or other metal fasteners have been used to join together the exterior and interior portions of the frame. The continuous metal-to-metal contact which results is less than that present in metal windows without an insulating medium but it is still sufficient to, in large measure, negate the advantages achieved by the insulating medium.

Further improvement can be achieved by employing the insulating medium as the means by which the exterior and interior portions of the frame are held together. Previous attempts in this direction have provided sufficient restraint when the window frame is installed but have not, however, provided sufficient rigidity of structure for the demands of shipment and installation of the frames.

Summary of the invention

The invention comprises a window frame formed of spaced exterior and interior metal frame members each formed of enclosed sides connected at corners of the frame member with the sides including web portions that ter-

minate in laterally spaced confronting inner edges; a retaining flange extends perpendicularly outwardly from the inner edge of the web portion of each frame member about the periphery thereof, such retaining flanges are laterally spaced apart to define a gap and each retaining flange terminates in a lip that projects laterally from the retaining flange in a direction away from the gap, such lips each include an underside that overlies and is spaced from a respective web portion; and a rigid non-metallic insulating member constituting the sole connection between the frame members has a generally T-shaped cross section with an upright barrier wall that fills the gap and space between the inner edges and arms that fit over the outer edges of the retaining flanges and are bent to fit over and under the lips and terminate against sides of the retaining flanges away from such gap.

The invention also resides in the provision of a mounting flange at the outer edge of the web portions, each of the mounting flanges comprising a closure portion extending perpendicular to the web portion, a seat portion extending perpendicular from the outer edge of the closure portion toward the respective retaining flange, and a locking portion spaced from and parallel to the closure portion and directed toward a respective web portion; together with molding members each mounted on a mounting flange and being so formed as to interlock therewith, and a pair of such molding members mounted on the mounting flanges of one of the sides of the frame cooperating to span the thickness of a wall into which the window frame is to be mounted.

It is a principal object of this invention to provide an improved window frame formed of exterior and interior metal frame members which are separated by and held rigidly together by an insulating member.

It is another object of this invention to provide such a window frame in which the insulating member securely grips protruding flanges of the exterior and interior frame members along the entire periphery of the window frame.

It is a further object of this invention to provide such a window frame in which the insulating member is disposed between the exterior and interior frame members and is the sole connection therebetween, thereby eliminating all continuous metal-to-metal contact between the exterior and interior of the window frame.

It is also an object of this invention to provide such a window frame which includes outwardly directed mounting flanges on its sides that are adapted to interlock with molding members which can span the thickness of the wall into which the window frame is mounted and which, alternately, mount stacking brackets that receive the mounting flanges of a like window frame for stacking of the frames.

It is still another object of this invention to provide such a window frame which can accept slider window sections.

The foregoing and other objects and advantages of this invention will appear in the description which follows. In the description reference is made to the accompanying drawing which forms a part hereof, and in which there is shown a preferred embodiment of the invention. It will be apparent to those skilled in the art that structural changes can be made in the embodiment described without departing from the scope of the invention.

In the drawing:

FIG. 1 is a view in elevation of a slider type window unit incorporating the invention;

FIG. 2 is a view in vertical section taken in the plane of the line 2-2 of FIG. 1;

FIG. 3 is a partial view in vertical section similar to FIG. 2 but showing an alternate molding mounted on the window unit;

FIG. 4 is a view in horizontal section taken in the plane of the line 4—4 of FIG. 1; and

FIG. 5 is an end view in elevation of a portion of the window unit of FIG. 1.

Referring now to the drawing, the invention is shown embodied in a slider type window unit which is applicable for use in basement walls and as such could be mounted in glass or concrete blocks forming the foundation walls. The window frame includes sides defining a window frame formed of an upper jamb 10, a similar lower sill 11, and identical side jambs 12 which are secured at the corners of the window between the upper jamb 10 and the lower sill 11.

Each of the jambs 10 and 12 and the sill 11 are formed of separate exterior and interior extruded metal sections. For example, the upper jamb 10 is formed of an exterior frame section 13 and an interior frame section 14 spaced laterally from the exterior section 13. The exterior section 13 is preferably an extruded section of aluminum, or other metal, and includes: a planar web portion 15; spaced first and second track partitions 16 and 17 extending perpendicular to the web portion 15 inwardly of the window frame; a mounting flange 18 projecting outwardly of the window frame from the outer edge of the web portion 15; and a retaining flange 19 projecting outwardly of the window frame from an inner edge of the web portion 15.

The interior section 14 is generally similar to the exterior section 13 although it has a wider web portion 20. The web portions 15 and 20 lie in a common plane with their inner edges laterally spaced apart. The interior section 14 is likewise extruded and is formed with: three spaced track partitions 21 projecting inwardly of the window frame; a mounting flange 22 projecting outwardly of the window frame at the outer edge of the web portion 20; and a retaining flange 23 projecting outwardly of the window frame from the inner edge of the web portion 20.

Each of the mounting flanges 18 and 22 is comprised of a closure portion 24 extending perpendicular to a respective web portion, a seating portion 25 spaced outwardly from the respective web portion and extending perpendicular to the closure portion 24 in a direction toward its respective retaining flange 19 or 23, and a locking portion 26 extending perpendicular to the seating portion 25 toward the respective web portion.

Each of the retaining flanges 19 and 23 extends perpendicular to the respective web portion and has a planar inner surface that confronts the like surface of the other retaining flange and is parallel thereto. Such inner surfaces of the retaining flanges 19 and 23 together with the inner edges of the web portions 15 and 20, respectively, define a gap between the exterior and interior sections 13 and 14. The retaining flanges 19 and 23 each terminate outwardly in a lip 27 that protrudes in a direction away from the gap and which includes an underside that overlies and is spaced from the respective web portion.

The lower sill 11 is also formed of an extruded metal exterior section 28 and an extruded metal interior section 29. The exterior section 28 and the interior section 29 are identical to the exterior and interior sections 13 and 14 of the upper jamb 10 except for the height of the track partitions 16, 17 and 21 which is required for permitting installation and removal of slider window sections, as will hereinafter appear.

The side jambs 12 are identical to each other and each is formed of an exterior extruded metal section 30 and an interior extruded metal section 31. The exterior and interior sections 30 and 31 of the side jambs 12 are identical to the exterior and interior sections 13 and 14 of the upper jamb 10, except for the difference in height of track partitions and also except for the addition of screw channels. That is, integral arcuate screw channels 32 are formed along the lengths of the exterior

and interior sections 30 and 31 outwardly of the window. The exterior and interior sections 30 and 31 of the side jambs 12 are secured to the corresponding exterior and interior sections of the upper jamb 10 and lower sill 11 in the manner shown in FIG. 5 wherein self-tapping screws 33 are received in holes in the sections of upper jamb 10 and lower sill 11 and are threadedly received in the channels 32 of the side jambs 12. Each of the interior sections 31 of the side jambs 12 also has an outwardly projecting adapter flange 34 disposed substantially centrally of the width of the side jamb 12.

It will be seen that the exterior sections 13, 28 and 30 of the sides of the window frame form a connected exterior frame member and that the interior sections 14, 29 and 31 form a connected interior frame member. The exterior and interior frame members thereby formed are spaced laterally from each other and have their inner edge and retaining flanges lying in common, spaced planes so that a continuous gap is provided between the frame members.

The exterior and interior frame members are held in such spaced relationship and are joined together by elongated rigid, non-metallic insulating members 35 along the upper jamb 10 and lower sill 11 and by like insulating members 36 along the side jambs 12. The insulating members 35 and 36 are each generally T-shaped in cross section with an upright barrier wall 37 filling the gap between the frame members and extending to the window opening defined by the inwardly directed surfaces of the web portions. Each insulating member 35 and 36 also has arms 38 that extend over the outer edges of the retaining flanges, around and beneath the lips thereof to engage the undersides of the lips, and terminate against the outer surfaces of the retaining flanges. The insulating members 35 and 36 combine to completely ring the window frame. The insulating members 35 and 36 may be secured to the exterior and interior sections either by sliding an insulating member on from one end or by pushing the insulating member between the retaining flanges and over the lips thereof.

The insulating members 35 and 36 engage the cooperating retaining flanges and prevent relative movement of the exterior and interior frame members in any direction. The substantial area of contact between the insulating members and the retaining flanges also contributes to holding together the frame members because of the restraint from frictional forces which results.

The insulating members 35 and 36 can be formed of a variety of non-metallic materials. They must exhibit sufficient stiffness and rigidity to prevent all but negligible relative displacement of the frame members but some flexibility can be tolerated because of the novel configuration of the insulating members and cooperating retaining flanges. Obviously, the material employed must also exhibit low thermal conductivity. Filled and unfilled synthetic resins and natural rubbers can be used. Good results have been obtained by using a high impact rigid vinyl having a coefficient of thermal conductivity of 4.5×10^{-4} cal./sec./sq. cm./° C. cm.

The formed window frame is shown adapted to accept slider window sections which may include an outer screen section 39 slidably received between the track partitions of the exterior frame member, an inner pane section 40 occupying half of the window frame opening and between the inner pair of track partitions of the interior frame member, an inner screen section 41 occupying the other half with the inner pane section 40, and an additional half pane section 42 in the outer pair of track partitions and adapted to slide to cover the inner screen section 41. Each of the window sections are of known construction, the details of which are not important to the present invention. They are each adapted to be removed by lifting upwardly within the track formed by the track partitions and swinging the sections outwardly over the track partitions of the lower sill 11.

5

The window frame is ideally adapted for the use of attachments which increase its versatility. The mounting flanges 18 and 22, for example, are adapted to receive an elongated chair-shaped stacking member 43 with a seat 44 that rests on the seating portion 25 of the mounting flange and with legs 45 that straddle the mounting flange. The back 46 of the stacking member 43 is disposed adjacent the outer edge of the window frame. A second window frame can then be stacked on top of the window unit (as shown in dotted lines in FIG. 2) with the mounting flanges of the second window between the backs 46 of stacking members 43 and resting on the seats 44.

Alternately, the mounting flanges can receive elongated molding members 47 having locking edges formed similar to the mounting flanges and which interlock therewith. The molding members 47 extend laterally of the window frame and are adapted to span the width of a glass or concrete block wall in which the window frame is mounted (see FIG. 3). The locking edges of the molding members 47 can be formed in an open condition to facilitate its mounting and then pinched shut when in place.

The addition of a small elongated chair-shaped mortar spacer 48 to each adapted flange 34 of the side jambs 12 properly spaces the window frame in the wall opening for mortaring of the exterior and interior of the window frame into the wall opening.

The window frame according to this invention embodies the advantages of metal window construction without the disadvantages of the conduction heat and cold through the metal frame. The exterior and interior frame sections are completely insulated from each other and no continuous metal-to-metal contact exists between the exterior and interior of the window frame. However, the exterior and interior frame members are joined together into an integral unit by the insulating members and the complete window unit may be handled for shipment and for installation without danger of separation of the frame members.

I claim:

1. A window frame comprising: an exterior metal frame member; an interior metal frame member spaced laterally from said exterior frame member; said frame members being each formed of enclosed sides connected at corners of the frame member, said sides including web portions that define an opening inwardly of said frame, said web portions of said frame members terminating in laterally spaced confronting inner edges; a retaining flange extending perpendicularly outwardly of said frame from said inner edge of said web portions of each of said frame members about the periphery thereof, said retaining flanges being laterally spaced apart to define a gap

6

therebetween, said retaining flanges each terminating outwardly of said frame in a lip that projects laterally from the retaining flange in a direction away from said gap, and said lips each include an underside that overlies and is spaced from a respective web portion; and a rigid non-metallic elongated insulating member disposed about the entire periphery of said window frame and constituting the sole connection between said frame members to prevent relative displacement of said frame members and substantially preventing the exchange of heat and cold between said frame members, said insulating member having a generally T-shaped cross section including an upright barrier wall that fills said gap and the space between said inner edges to said opening, and arms that fit over the outer edges of said retaining flanges and are bent to fit over said lips and under said undersides thereof and terminate against sides of said retaining flanges away from said gap.

2. A window frame in accordance with claim 1 wherein said web portions have elongated mounting flanges at their outer edges that project outwardly of the window frame, each of said mounting flanges comprising a closure portion extending perpendicular to said web portion, a seating portion extending perpendicular from the outer edge of said closure portion toward the respective retaining flange, and a locking portion extending from the edge of said seating portion, said locking portion being spaced from and parallel to said closure portion and directed toward a respective web portion; together with molding members each mounted on a mounting flange and interlock therewith, said molding members each having a locking edge including a portion disposed between said closure portion and said locking portion of a respective mounting flange and a portion extending around said closure portion and over said seating portion of such mounting flange, said molding members each extending laterally outwardly of said window frame, and a pair of said molding members mounted on the mounting flanges of one of said sides of said frame cooperating to span the thickness of a wall into which said window frame is to be mounted.

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