July 9, 1957 L. TOTH 2,798,578

WEATHER TIGHT WINDOW CONSTRUCTION

Filed Nov. 22, 1954 2 Sheets-Sheet 1

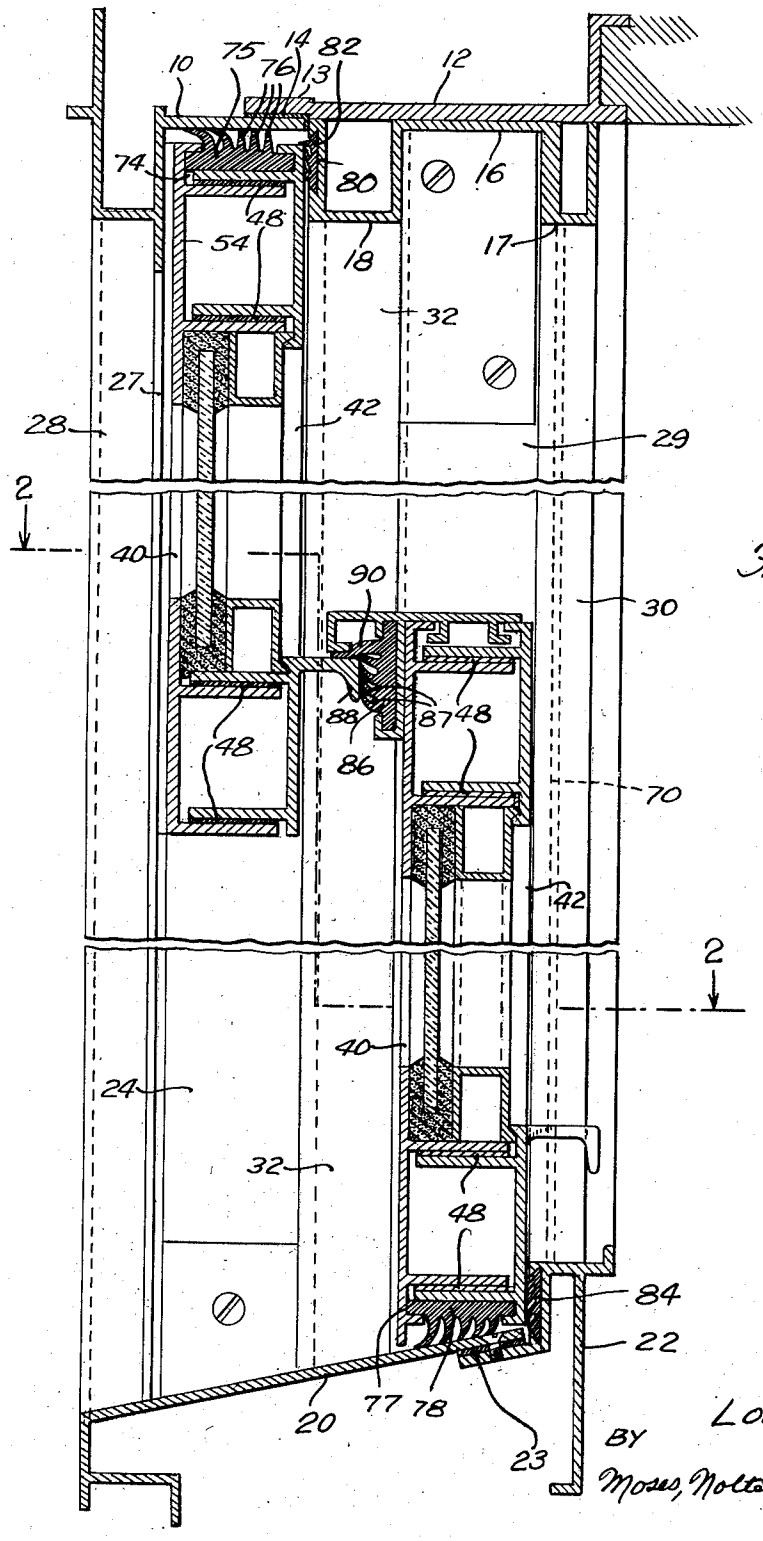


Fig. 1

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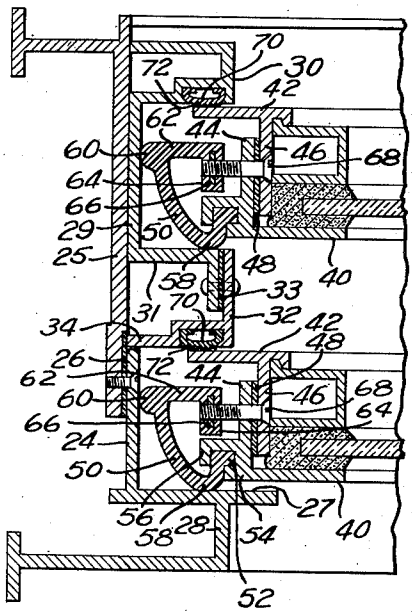


Fig. 2.

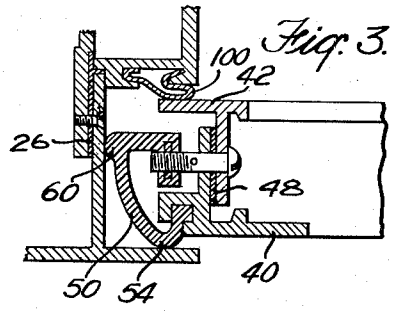


Fig. 3.

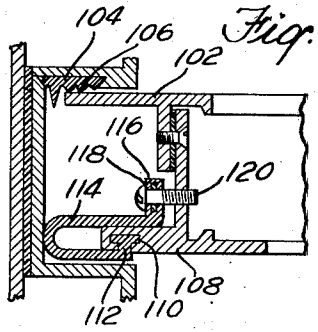


Fig. 4.

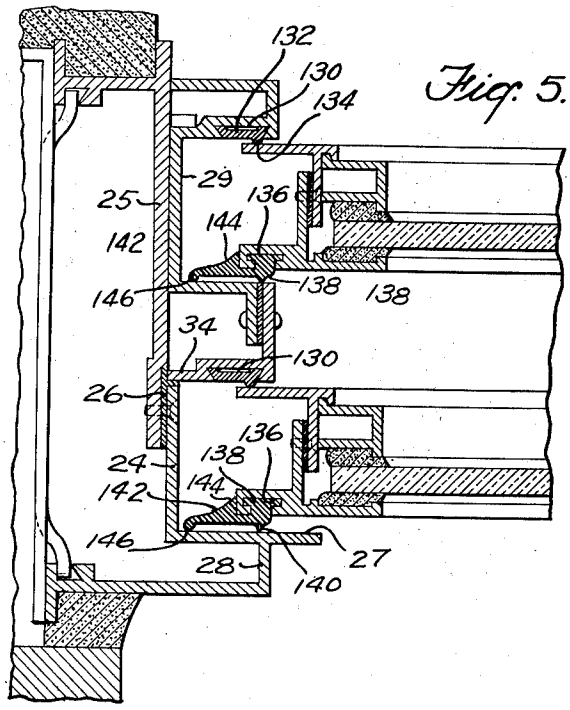


Fig. 5.

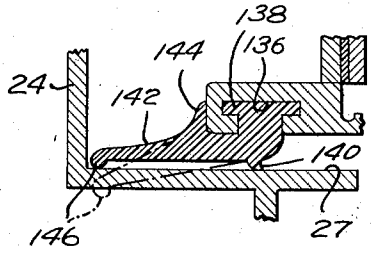


Fig. 6.

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WEATHER TIGHT WINDOW CONSTRUCTION

Louis Toth, Bridgeport, Conn.

Application November 22, 1954, Serial No. 470,287

6 Claims. (Cl. 189—65)

This application is a continuation in part of my application, Serial No. 748,218, filed May 15, 1947, which is now Patent No. 2,711,232, patented June 21, 1955.

This invention relates to window construction and particularly to windows having frames and sashes wholly of metal or of metal combined with plastic. Features of the invention, however, are applicable to frames and sashes made of any materials.

The invention is especially applicable to sliding or double hung windows, and a principal object of the invention is to provide a sliding sash construction in which the sash is guided in its sliding movement by means of plastic members which, while allowing free sliding movement, space the sash walls from direct contact with the jamb channels. The plastic members act as weather stripping to seal the window construction against leakage, they prevent binding due to warping or deformation of the sash or frame; prevent rattling, and, in case of metal sash and frame constructions to which the invention is particularly applicable, have an important heat insulating function.

The present invention is directed particularly to a construction in which the sash carries a plastic member on one side thereof which performs the guiding, spacing and weather sealing functions at that side whereas at the other side of the jamb channel a fixed plastic strip is mounted for spacing the sash away from direct metal to metal contact with the channel wall. This construction is particularly applicable to windows of the larger sizes, where the thickness of the sash, that is, the distance between one side thereof and the other, is considerable. For smaller sizes of sashes, where the sash is relatively thin, a single plastic sealing and insulating member enclosing the edge of the sash, as covered in my application of which this is a continuation in part, is entirely satisfactory, but in larger sizes it is frequently desirable to use a construction where the plastic member does not extend across the whole thickness of the sash.

A further object of the invention is to provide sealing and guiding members of the character described which may be readily adjusted so as to regulate the tightness of the fit between the weather strip members and the frame channels. This enables satisfactory action to be obtained at all times and permits the rigid parts of the sash and the frame to be made with wide tolerance, accurate fitting of such parts being unnecessary.

Another object of the invention is to provide flexible guiding and sealing members having the characteristics referred to above, and formed of a plastic or rubber-like material, preferably synthetic plastic such as vinyl plastic. Such plastics are preferred to compounds including natural rubber, as they are more durable and less subject to deterioration due to time or the elements, and also have a lesser coefficient of friction than compounds containing substantial amounts of natural rubber. The use of vinyl plastic therefore provides a sash which will slide much more readily than constructions using natural rubber sealing members. Natural rubber may be used under some

circumstances, but is considered inferior to synthetic compounds for the reasons stated.

Another object of the invention is to provide sash and frame constructions in which free passage of heat from the inside to the outside of the window and sash is prevented. This is accomplished by the use of the plastic weather stripping construction described which prevents metal to metal contact between the sash and the frame channel walls and by making one side of the frame or of the sash of a material having heat insulated qualities, such, for example, as plastic, or, if both sides of the frame and sash are made of metal by providing an insulating layer between the sides which will prevent free heat transfer.

In the case of a double hung window the top rail of the lower sash is also preferably provided with a plastic strip which prevents metal to metal contact between such rail and the header of the frame, and the bottom rail of the lower sash is provided with a plastic strip which prevents direct contact between such rail and the sill. A plastic weather stripping member is also preferably provided at the meeting rails so that there is no metal to metal contact between such rails. Thus the sashes may be regarded as completely supported by plastic elements and with no direct metallic contact between the sashes and frame.

Free heat transfer between the inside and outside portions of metal frames and sashes has been a serious objection to the use of metal windows because, under certain relative conditions of temperature and humidity between the inside and outside, condensation may be caused on the inside which may injure the interior finish of the room and be otherwise objectionable.

In the accompanying drawing in which I have shown certain preferred embodiments of the invention:

Figure 1 is a central vertical section of a double hung window embodying the invention;

Figure 2 is a transverse section through one of the jambs and portions of the upper and lower sashes taken on line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view of part of a jamb and sash illustrating a modification;

Figure 4 is a similar view showing another modified construction;

Figure 5 is a transverse sectional view similar to Figure 2 showing another modified construction;

Figure 6 is a fragmentary sectional view on a larger scale illustrating one of the sealing strips of the form shown in Fig. 5, the form of plastic strip before being positioned in the jamb channel being generally indicated by dotted lines.

Referring to the drawings in detail, the window shown in Figures 1 and 2 comprises a frame having a header member which is of metal and comprises an outer section **10** and an inner section **12**, the latter having a flange **13** which encloses the margin of the section **10** and is spaced therefrom by a layer of heat insulation, such as asbestos or the like **14**. Removably attached to this section **12** is a channel member **16** providing an inner stop bead **17** and a parting strip **18**. The frame also has a main sill member **20** and an inner sill member **22**, these members also being separated by a layer of insulation **23**. The frame jambs also comprise outer members **24** and inner members **25** separated by insulation **26**. In the double hung construction shown, the jambs are provided with a pair of channels for the sashes. The outer wall of the outer channel designated **27**, is formed by the outer stop bead **28** which is a part of member **24**. Removably secured to the member **25** is a channel member **29** which includes an inner stop bead **30** and a parting strip flange **31**. The rest of the parting strip is formed by an L-shaped member **32** which is attached to the flange **31** but separated from direct metallic contact therewith by a layer

of insulation 33. The edge 34 of the member 32 bears on the insulation 26. Free transfer of heat through the metal of the frame from the inside to the outside of the frame is prevented by the layers of insulation.

In the form of invention shown in Figures 1 and 2 the sashes comprise outer side portions 40 and inner side portions 42. These portions are provided with overlapping flanges 44 and 46 respectively, separated by layers of insulation 48, so that free transfer of heat from the inside to the outside members of the sash is prevented. One member of the sash, shown in this instance as the outside member, is provided at its edge with a plastic guiding and sealing strip 50 which is formed at one margin with a bead portion 52 fitting in a channel formed in the sash between a flange portion 54 of the channel wall and a hooked shaped flange 56. The plastic member extends from the bead 52 laterally over the margin of the flange portion 54 outwardly beyond the face of the sash so as to form a rib 58 which bears against the frame channel wall and is of sufficient thickness and body to effectively space the face of the sash from the channel wall so as to prevent direct metal to metal contact between the two at any pressure to which the sash is likely to be subjected in use. The plastic strip then extends in a curved formation to a rib 60 adapted to engage the bottom of the frame channel. Finally, the plastic member extends in the form of a leg portion 62 towards the side rail of the sash, this leg terminating in a transverse flange 64. Preferably this flange is molded to hold a metal plate 66 which has tapped holes therein to receive adjusting screws 68. Adjustment of these screws permits the plastic member to be deformed sufficiently to secure the desired degree of pressure between the ribs 58 and 60 and the channel wall and bottom so as to effectively seal the contacts, prevent rattling, and at the same time permit the desired freedom of movement for easy sliding.

The inner face of the sash, in this instance the member 42, bears against a flexible plastic strip 70 mounted in a channel in the opposite side wall of the jamb channel from that engaged by the rib 58. As shown one of these strips is mounted in a channel in the inner stop bead 30 and the other member 70 is mounted in a channel in the side of the parting strip member 32. The strips 70 are perferably formed of plastic in arch formation and the grooves which receive these strips are of dove-tail shape so as to retain the strips in position. The strips 70 are also preferably provided with ribbed surfaces 72 so as to improve the weather sealing and at the same time engage the sash surfaces with multiple line contact so as to permit easy sliding.

The top rail of the upper sash is formed with a channel 74 in which is mounted an elastic plastic strip 75 shown as formed with bendable sealing ribs 76 which limit the upward movement of the sash and prevent it from coming into direct metal to metal contact with the header of the frame. Similarly the bottom rail of the lower sash is provided with a channel 77 in which fits a plastic strip 78 spacing the bottom rail from the sill. Preferably, as shown in Fig. 1, the side wall of the header channel for the upper sash is also provided with a recess 80 in which is mounted plastic sealing and insulating strip 82 and the sill may also be provided with a plastic insulating strip 84.

Figure 1 also shows a meeting rail construction in which there is no metal to metal contact between the meeting rails of the inner and outer sashes. Weather sealing and insulation are secured by providing a plastic strip 86 in a channel on one meeting rail engaging a flange 88 on the other meeting rail. The strip 86 is preferably provided with a series of bendable ribs 87, which may be of varying lengths if desired, these ribs providing good sealing without offering too much resistance to closing of the window. The upper rib 90 is preferably long enough to be tripped and squeezed between flanges on the meeting rails. This improves the seal and prevents metal to metal contact between the flanges.

In the construction shown it will be seen that the sashes are held completely out of metal to metal contact with the frame channel at the side, top and bottom, so that there is no direct transfer of heat through a direct metal path from the sash to the frame. If the sashes are also formed of two insulated parts, a further insulating effect is secured and this effect is still greater if the frame is formed of two insulated parts. It will be understood, however, that the insulating of both sashes and frame is not in all cases essential, but is used only where the maximum insulating effect is desired.

Figure 3 shows a slightly modified channel construction in which the sash is the same as that shown in Fig. 2. In place of the plastic strip member 70 mounted in the channel in the jamb channel wall, a bent spring strip of metal, plastic or other suitable material 100 is utilised. This, if made of metal, is slightly less effective as a heat insulating member than the strip 70, but seals the window against the weather. The use of the strip 70 is preferred.

Figure 4 shows another modified form of sash and jamb channel in which the sash part 102 engages a plastic strip 104 having a series of ribs 106 of varying heights. The other sash part 108 has a dove-tail shaped recess 110 therein which receives a T-headed bead 112 on the end of a reversely curved flexible plastic sealing and insulating strip 114. The latter is formed in a loop, the outer side of which spaces the sash from the channel wall. The inner leg of the loop is provided with an L-head 116 in which there is a metal plate 118 through a hole in which passes a screw 120 screwing into a tapped hole in the sash member. This permits adjustment of the sealing strip, and as the head of the screw 120 is in a position where it will be exposed upon removal of the sash from the jamb channel, the adjustment may be readily changed.

Figs. 5 and 6 show another modification of the invention in which the jamb construction is similar to that shown in Fig. 2, the inner walls of the parting strip and inner stop bead are shown as provided with dove-tail grooves 130, in which are mounted inverted channel shaped sealing strips 132 preferably of vinyl plastic, each of these being provided near one edge thereof with the bearing bead or rib 134 adapted to engage the inner wall of the adjacent sash. This form of plastic member gives firm support for the sash wall, at the same time engaging the wall with a substantially line contact so that friction is reduced to a minimum. The outer member of each sash is provided with an undercut channel 136 in which fits a T-headed body 138 of a plastic strip which has a bearing bead or rib 140 engaging the adjacent jamb channel wall, this bead or rib being immediately above the body 138 so that it is in a position to resist considerable pressure and effectually prevent the wall of the sash coming into metal to metal contact with the jamb channel wall. This plastic strip also has an outwardly projecting flange portion 142 which has a base or shoulder 144 bearing on the outer edge surface of the sash member and at its outer end tapers into a narrower part carrying a bearing bead or rib 146 adapted to engage the wall of the jamb channel with a yielding but sealing engagement.

The outer edge of the flange portion 142 may also engage the bottom of the jamb channel, so that if the sash shifts in that direction it will limit such shifting movement. The plastic member may be preformed in such shape that an elastic bearing pressure is exerted between the bead or rib 146 and the jamb channel. This is indicated in Fig. 6, where the dotted lines are intended to show the original form of the member before it is inserted in the jamb channel.

While certain preferred embodiments of the invention have been illustrated and described in detail, it is to be understood that changes may be made therein and the invention embodied in other structures. It is not, therefore, the intention to limit the patent to the specific con-

struction illustrated, but to cover the invention broadly in whatever form its principles may be utilized.

I claim:

1. In a sliding window, a metal frame including jambs having channels therein, one side wall of each channel having a recess therein, a longitudinally extending elastic plastic guide strip of low heat conductivity mounted in said recess, and a sash mounted in said frame, said metal sash having yielding elastic jamb engaging strips of low heat conductivity mounted on the stiles thereof, said strips having bearing surfaces adapted to engage the bottoms of the jamb channels, and having lateral bearing surfaces extending laterally beyond the plane of the side of the sash opposite to the side of the sash facing the elastic strips mounted in the recess in the jamb channel side walls, all of said elastic strips having broad based bearing ribs thereon of sufficient thickness and body to effectively space the faces of the sash from direct contact with the channel walls under all normal operating conditions.

2. In a sliding window, a metal frame including jambs having channels therein, one side wall of each channel having a recess therein, a longitudinally extending elastic guide strip of low heat conductivity mounted in said recess, said strip having a hollow channelled formation and having an outwardly projecting resilient bearing rib and a metal sash mounted in said frame, said sash having yielding elastic jamb engaging strips of low heat conductivity mounted on the stiles thereof, said strips having bearing surfaces adapted to engage the bottoms of the jamb channels and having lateral bearing surfaces extending laterally beyond the plane of the side of the sash opposite to the side of the sash facing the elastic strips mounted in the recess in the jamb channel side walls said bearing surfaces being formed on broad based ribs of sufficient thickness and body to effectively space the faces of the sash from direct contact with the channel walls under all normal operating conditions.

3. In a sliding window, a metal frame including jambs having channels therein, and a metal sash mounted to slide in said frame, the sash stiles and channel walls having interengaging formations permitting the sash to slide longitudinally and yield laterally with respect to the jamb channels, the interengaging formations between at least one face of a stile and the adjacent channel wall comprising a yielding elastic plastic strip of low heat conductivity attached to the stile and extending throughout the length thereof, and engaging the bottom and one side wall of the channel, said elastic plastic strip presenting a narrow bearing surface projecting beyond the face of the sash for contact with the wall of the channel, the portion of the strip carrying said narrow bearing surface being of sufficient thickness and body as to positively space the face of the sash from the channel wall and effectively prevent direct contact between the two, and adjustable means mounted on the stile and strip for deforming the elastic strip so as to vary the closeness of the engagement of said formations in the jamb channels, a wall of the jamb channel opposite to that engaged by the elastic plastic strip attached to the stile having a channel therein, and a ribbed elastic plastic strip of low heat conductivity mounted in said channel to engage the adjacent sash wall and act as a weather seal, while holding the sash wall out of direct metal to metal contact with the jamb channel wall.

4. In a double hung sliding window, a frame having metal jamb channels, sill and header, and upper and lower sashes mounted to slide therein, said sashes being constructed mainly of metal and provided with means for preventing free transmission of heat through the metal between the inside and outside thereof, said sashes having stiles extending part way within the jamb channels, said stiles being narrower than the channels, and elastic plastic guide, sealing and heat insulating strips sealing adjacent surfaces of the sash and jamb channel walls against the weather, and spacing the respective walls from

direct metal to metal contact, while permitting free sliding movement of the sashes in the jamb channels, portions of said strips having broad based ribs presenting surfaces of small area relative to the dimensions of the strip forming bearing surfaces for engagement with the complementary channel or sash part, the elastic plastic formations providing such bearing surfaces being of sufficient thickness and body to effectively prevent direct contact between the channel walls and sash during normal operation of the window, the top rail of the upper sash and the bottom rail of the lower sash each having a plastic sealing strip extending across the same, said sealing strips serving to seal the joints at the header and sill respectively, and prevent direct contact between the sash rails and the frame elements at such points, whereby metal to metal contact between any part of the sashes and frame is prevented at all times.

5. In a double hung sliding window, a frame having metal jamb channels, sill and header, and upper and lower sashes mounted to slide therein, said sashes being constructed mainly of metal and provided with means for preventing free transmission of heat through the metal between the inside and outside thereof, said sashes having stiles extending part way within the jamb channels, said stiles being narrower than the channels, and elastic plastic guide, sealing and heating insulating strips sealing adjacent surfaces of the sash and jamb channel walls against the weather, and spacing the respective walls from direct metal to metal contact, while permitting free sliding movement of the sashes in the jamb channels, portions of said strips having broad based ribs presenting surfaces of small area relative to the dimensions of the strip forming bearing surfaces for engagement with the complementary channel or sash part, the elastic plastic formations providing such bearing surfaces being of sufficient thickness and body to effectively prevent direct contact between the channel walls and sash during normal operation of the window, the top rail of the upper sash and the bottom rail of the lower sash each having a plastic sealing strip extending across the same, said sealing strips serving to seal the joints at the header and sill respectively, and prevent direct contact between the sash rails and the frame elements at such points, whereby metal to metal contact between any part of the sashes and frame is prevented at all times, the meeting rail of one sash having a channel therein and a flexible ribbed plastic sealing strip mounted in said channel and engaging a flange on the meeting rail of the other sash and preventing metal to metal contact between said meeting rails.

6. In a double hung sliding window, a frame constructed mainly of metal and having an outer wall portion and an inner wall portion and having thermo insulating non-metallic material separating said portions, said frame having metal jamb channels therein, at least one of which is of unitary metallic construction providing an all metal path between the inner and outer channel walls, said frame members including metallic sill and header members and upper and lower sashes mounted to slide therein, said sashes being constructed mainly of metal and provided with means for preventing free transmission of heat through the metal between the inside and outside of the sashes, said sashes having stiles extending part way within the jamb channels, said stiles being narrower than the channels, and elastic plastic guide, sealing and heat insulating strips sealing adjacent surfaces of the sash and jamb channel walls against the weather, and spacing the respective walls from direct metal to metal contact, while permitting free sliding movement of the sashes in the jamb channels, portions of said strips having broad based ribs presenting surfaces of small area relative to the dimensions of the strip, forming bearing surfaces for engagement with the complementary channel or sash part, the elastic plastic formations providing such bearing surfaces being of sufficient thickness and body to effectively prevent direct contact between the

channel walls and sash during normal operation of the window, the top rail of the upper sash and the bottom rail of the lower sash each having a plastic sealing and heat insulating strip extending across the same, said sealing strips serving to seal the joints at the header and sill respectively, and prevent direct metal to metal contact between the sash rails and the frame elements at such points, whereby metal to metal contact between any part of the sashes and frame is prevented at all times, the meeting rail of one sash having a channel therein and a flexible plastic sealing and heat insulating strip mounted in said channel and engaging a surface on the meeting rail of the other sash and preventing metal to metal contact between said meeting rails.

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