Feb. 1, 1955 L. TOTH 2,701,041

WINDOWPANE RETAINER

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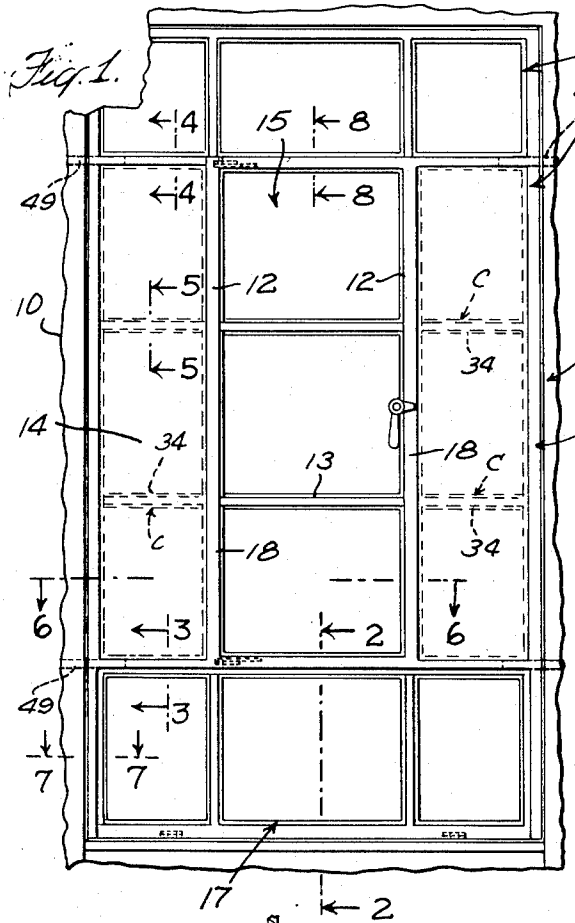


Fig. 1.

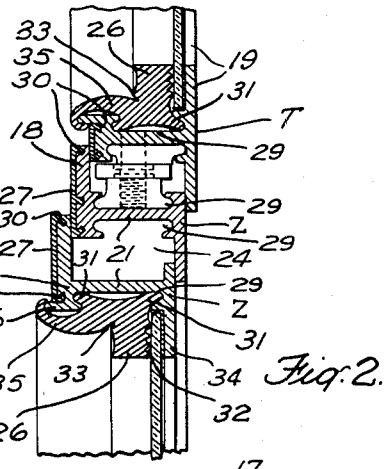
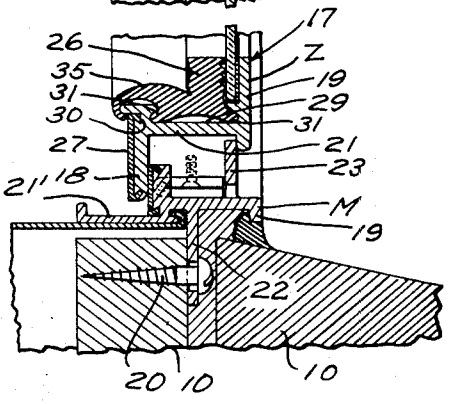


Fig. 2.



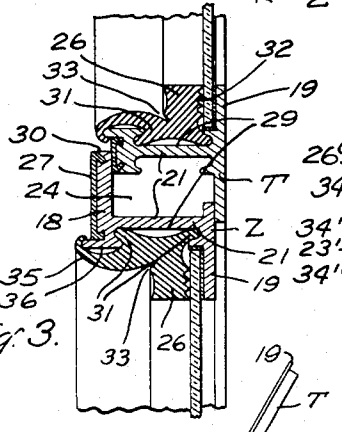


Fig. 3.

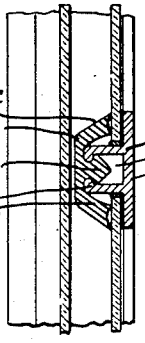


Fig. 5.

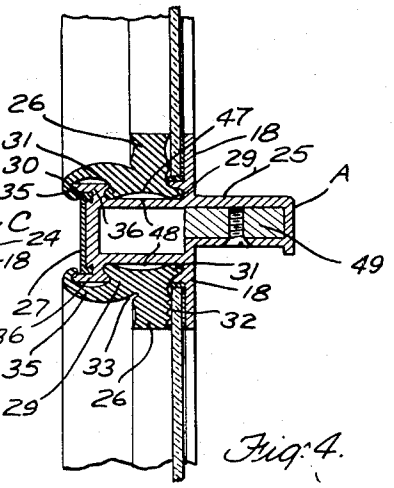


Fig. 4.

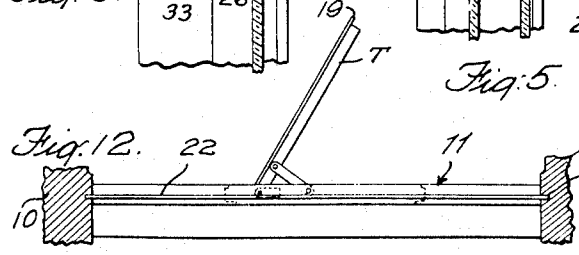


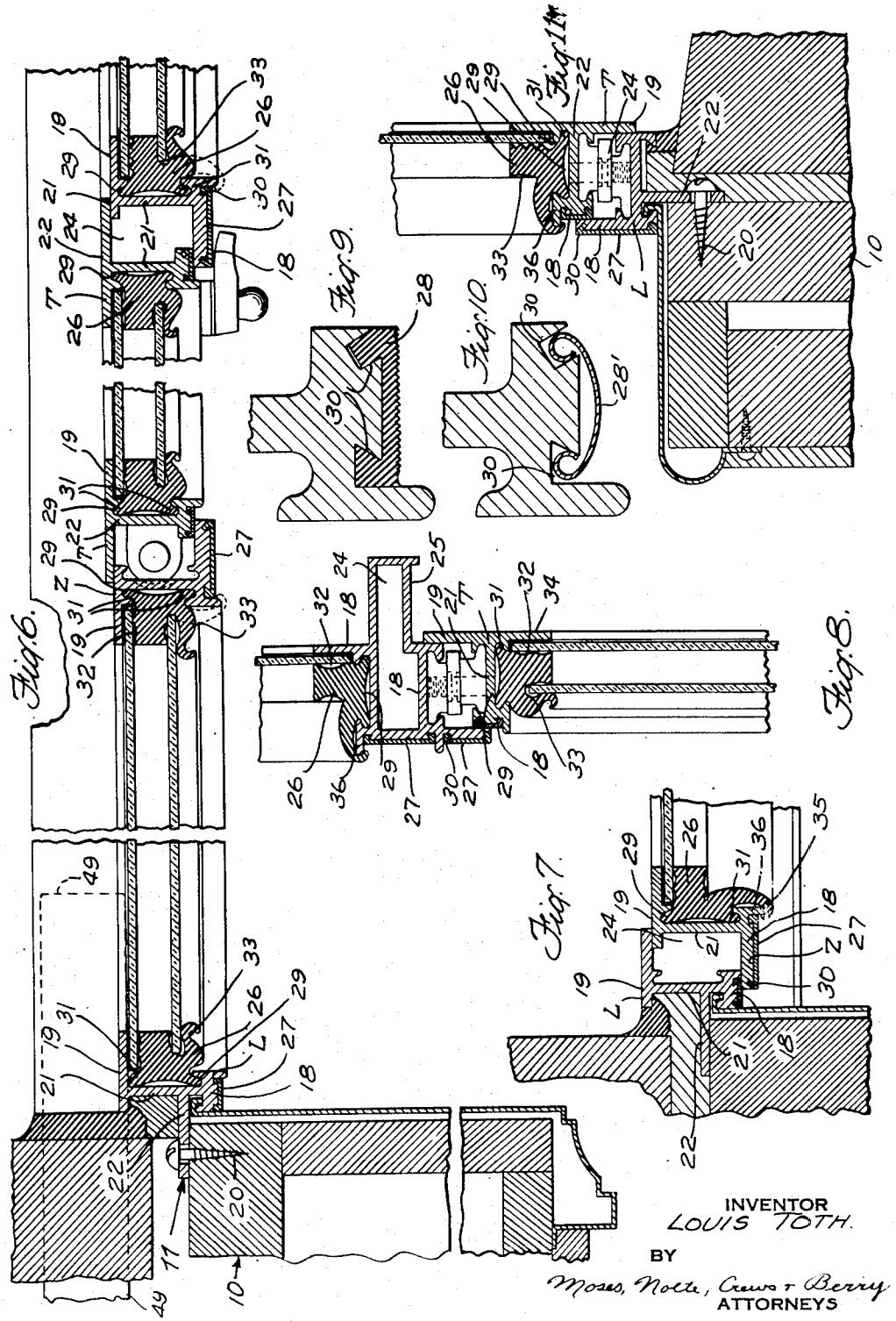
Fig. 12.

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WINDOWPANE RETAINER

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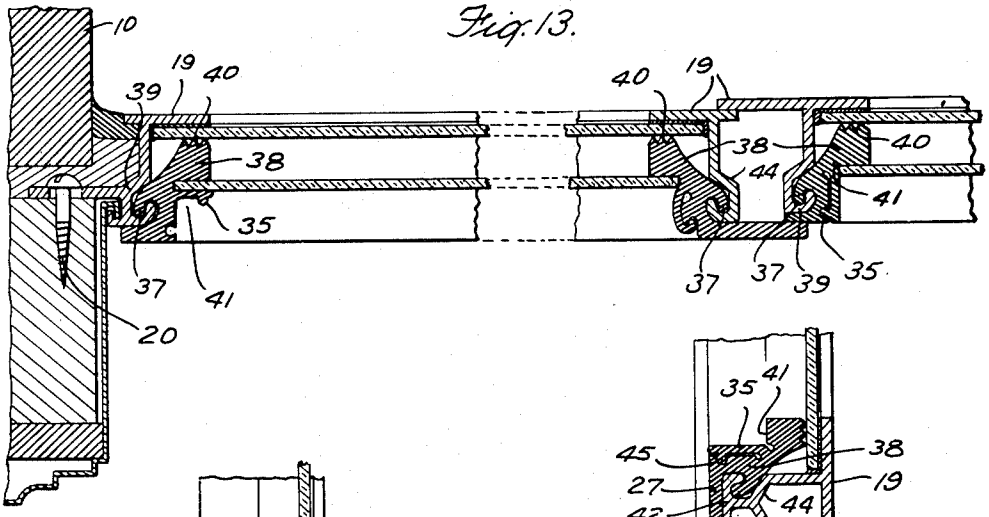
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WINDOWPANE RETAINER

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Fig. 13.



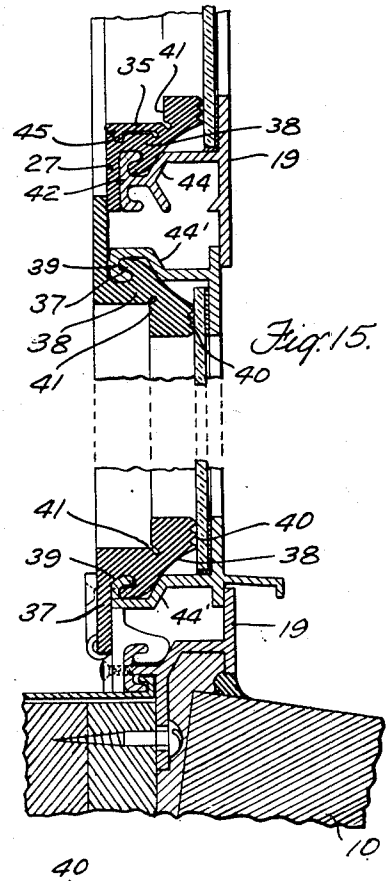


Fig. 15.

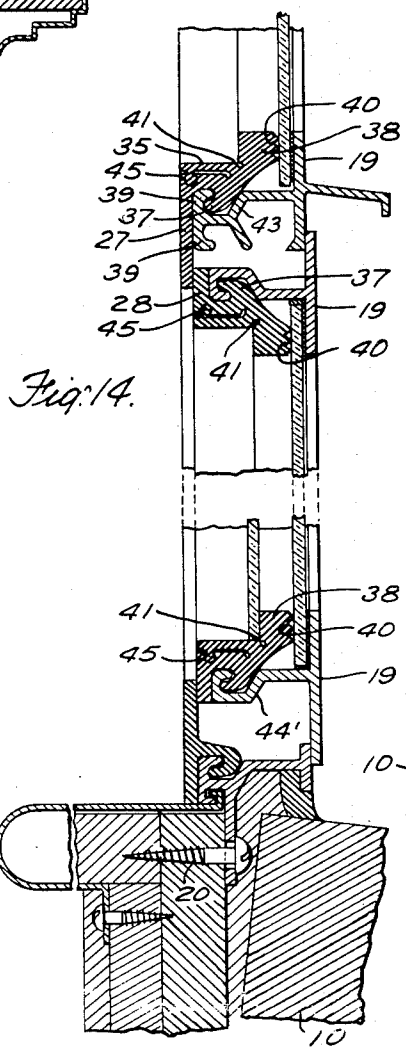


Fig. 14.

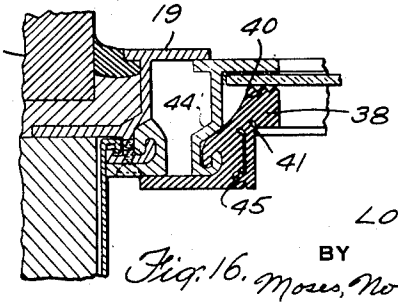


Fig. 16.

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2,701,041

WINDOWPANE RETAINER

Louis Toth, Flushing, N. Y.

Application November 8, 1945, Serial No. 627,379

7 Claims. (Cl. 189—78)

This invention relates to windows of either casement, sliding or double hung type, but has particular reference to improvements in manufacture and design adapted to facilitate economy and convenience in production and installation of casement windows. Certain features have applicability in sliding sash or other types of windows.

An object of the invention is to provide windows adapted to promote thermal insulation between the atmospheres ambient to the window exterior and interior; and consequently to enable installation of a plurality of parallel glass or other translucent window panes in spaced relationship in and throughout each window frame whenever, as in air conditioned rooms, it is desirable to maintain a dead air space of low thermal conductivity between such inner and outer panes.

Another feature is the provision of means whereby the emplacement of window panes in their frames is accomplished through the instrumentality of glazing strips of resilient material which may be molded or extruded in the configuration requisite for that purpose.

A further object is to facilitate insertion or replacement of a window pane or panes, either temporarily, as for cleaning the panes, or for considerable periods of time, without the use of putty or similar caulking material which hardens by aging.

Still another object is to eliminate or reduce condensation of moisture upon the frame or panes of the window, and to that end, to coat the inside of the window frame when it is of metallic construction with strips of plastic or other material which has low thermal conductivity, which, at the same time, can be changeably or permanently colored to match the decorative scheme of the room interiors.

Other objects and advantages of the invention will hereafter appear.

In the drawings forming a part of this specification,

Figure 1 is a fragmentary view in front elevation of a portion of a building wall having a window frame comprising two swinging sashes mounted in it, and which structure embodies one form of the invention;

Figure 2 is a fragmentary, vertical sectional view taken on the line 2—2 of Fig. 1, looking in the direction of the arrows, the view being broken away intermediate its ends for compactness of illustration;

Figure 3 is a fragmentary, vertical, sectional view taken on the line 3—3 of Fig. 1, looking in the direction of the arrows;

Figure 4 is a fragmentary, vertical, sectional view taken on the line 4—4 of Fig. 1, looking in the direction of the arrows;

Figure 5 is a fragmentary, vertical, sectional view, taken on the line 5—5 of Fig. 1, looking in the direction of the arrows;

Figure 6 is a fragmentary, horizontal, sectional view, taken on the line 6—6 of Fig. 1, looking in the direction of the arrows, the view being broken away intermediate its ends for compactness of illustration;

Figure 7 is a fragmentary, horizontal, sectional view on the line 7—7 of Fig. 1, looking in the direction of the arrows;

Figure 8 is a fragmentary, vertical, sectional view, taken on the line 8—8 of Fig. 1, looking in the direction of the arrows;

Figure 9 is an enlarged detail in sectional view of a facing strip as applied to frame, sash or division bar;

Figure 10 is a sectional view of a modification of the detail of Fig. 9, showing a metal type of facing strip;

Figure 11 is a fragmentary vertical view showing a section of the base of the window on line 2—2 of Fig. 1 in a modification which omits the lower swinging transom sash;

Figure 12 is a detail in sectional view of the slide shoe and hinge of the upper swinging sashes; and

Figures 13 to 16 inclusive are cross-sectional views of parts of windows utilizing modified forms of extruded metal bars, and modified forms of glazing strips which also incorporate facing members.

In Fig. 1 the building wall **10** is shown as having mounted therein an outer window frame **11** which is subdivided by sash and division bars **12** and **13** into side panels **14**, a central panel **15**, an upper and lower panels **16** and **17**, the latter being a swinging transom. Both the outer and the inner frames are composed of metal bars, which may be made by extrusion, having various shapes but some characteristics in common. For convenience of reference and comparison these various bars will hereinafter be designated by capital letters, i. e. by **A, B, C, D, L, T, Z**, etc. Some of the bars resemble the letter **T**, when viewed in cross section, and accordingly will be designated by that letter. Others are shaped somewhat like the letter **Z** and will be so designated. Another bar is much like the letter **L**, but with some modifications. Several other shapes of bars bear hardly any resemblance to letters, but will nevertheless be designated, arbitrarily, by a capital letter, e. g. **A, B, C**, etc.

All of these various shapes comprise an inner flange, designated by **18** in each shape, an outer flange **19**, and a web **21** which connects the inner and outer flanges in all the various shapes. Some have flanges projecting from the web **21** intermediate the inner and outer flanges, which intermediate flanges will be numbered **22** or **23**. Most of the shapes include longitudinal grooves lengthwise of the bars, some of which are dovetail in cross-section and run lengthwise of the web either on one or both sides; they are numbered **29** in all figures. Other longitudinal grooves extend along the exposed faces of the inner flanges or their faces which form parting surfaces, requiring weather strips, with other bars framing movable, swingable panels of the window. These grooves are numbered **30**. Most of the variously shaped bars, when assembled as shown in the drawings, form hollow channels between themselves which are numbered **24**.

The vertical bars of the outer window frame **11** are shown at **L** in Figs. 6 and 7, and a modified form at **M** in Fig. 2. These may be termed anchor bars, for they are provided with intermediate flange **22** between inner and outer flanges **18** and **19** extending, however, from the web **21** in a direction opposite to that of the terminal flanges. Holes are provided in flange **22** to receive screws **20** which fasten and anchor the **L** bars to the building wall in which intermediate flange **22** is imbedded, as shown in Figs. 6 and 11. Bar **M** of Fig. 2 differs from the other **L** bars in having the intermediate flange **22** projecting from web **21** at a point nearer the longer flange of bar **M** instead of nearer the shorter flange, as in the **L** bar.

In the **L** bars, a dovetail retaining groove **29** extends along the web **21** on the side opposite to flange **22**, and is designed and shaped to receive and retain a pliable glazing strip **26** having a dovetail shaped tongue **31** which can be forced into grooves **29** by temporary deformation of the pliable strip **26**. The glazing strips may be molded from any suitable pliable material, such as natural or synthetic rubbers, polyvinyl plastics, etc. Their shape, in cross-section, may be like the member **26** in Fig. 6. The form and function of these strips will be later described in detail. The **L** bars also have grooves **30** for the reception and retention of strips **27** of plastic or other thermally non-conducting material, the nature and function of which will also later be explained in detail.

The lower, horizontal window bar of the outside frame is that shown at **M** in Fig. 2, where it constitutes the sill of the window. Bar **M** resembles no letter in its cross-section, but may be characterized as a bar having a web **21** from each side of which projects either an inner or outer terminal flange **18** and **19** and an intermediate flange **22** and **23**. An off-set extension of the web, indicated by **21'** forms the inner sill of the metal frame. Bar **M**, like

the anchor bar L, has a hole for screw 20 to anchor the M bar to the building.

Another form of construction of the metal bars is that illustrated in cross-section, for example in Figs. 2, 3 and 6, which consists of inner and outer flanges 18 and 19 joined by a web 21 so as to make a bar having the approximate shape of the letter Z. This Z bar may also be provided with a dovetailed groove 29 on one or both sides of the web, for reception of the dovetail tongue 31 of the glazing strip 26. This Z-shaped bar may also be provided with inclining grooves or hooked indentations 30 on the surface of the inner flange designed for the reception and retention of the tongued facing strips 27 of plastic or similar non-conductive material, for the purposes later explained. The Z-bar 21 may also be provided with a hook-like projection 36 over which the lip 35 of the glazing strip is hooked, as in Fig. 3, during the period when an inner glass pane is being placed in the glazing strip. In some cases it will be desirable also to provide a second set 30 of hooked indentations in the Z bar to receive a rubber or other yielding weatherstrip at any parting surface of the window. Such strips also form facing strips for the parting surfaces which may be used to carry out the decorative effect of the facing strips 27.

A fourth form of window bar is that shown at T in Figs. 2, 3, 6, 8 and 11, a cross-section of which resembles the letter T. This T bar may have a longer outer flange and a shorter inner flange, joined by a web 21 as in the former bars, and longitudinal dovetail grooves 29 may be provided at either one or both sides of the web for the reception of tongues 31 of a glazing strip 26, as before described, or of sliding hinges on the opposite side of the web, as in Figs. 2 and 8. The face of the shorter inner flange may also be provided with hooked indentations 30 for the reception either of a facing strip of plastic 27, or of a soft yielding material such as rubber or felt weatherstrips in those cases where the surface of the inner flange serves as a parting surface. A hook-like projection 36 for engaging the hooked lip 35 of the glazing strip 26 during insertion of the inner pane is also provided, as shown in the illustrations, e. g. Fig. 2.

Fig. 5 shows still another form of window bar designated by C, which differs somewhat from those previously described, and which is used in those sections of the window frame such as that shown along the line 5—5 of Fig. 1 where it may be desirable to have the inner pane twice the length of the outer panes. As seen in Fig. 5, this bar 23 consists of an outer flange 18 with two inwardly projecting prongs 23' shaped like the letter J, so disposed that the hooked portions of the J's face one another. This arrangement provides an anchorage for the reception and retention in channel 24 of a second form of flexible glazing strip 34 having a bead 34' which is inserted between the two prongs 23' and having, furthermore, two projecting lips 34'' and 26c which press against the outer panes of the window and hold them in place against the outer flange of the bar, all as illustrated in Fig. 5. It will be noted that this arrangement permits use of a long inner pane which spans the rubber glazing strip, as shown in Fig. 5.

At certain sections of the window it is desirable to have greater strength in the window frame than at others, for example along the lines 4—4 and 8—8 of Fig. 1. I therefore provide reinforcing bars such as those illustrated in Figs. 4 and 8 of the drawings. They consist essentially of a generally rectangular shaped bar A with a generally rectangular shaped channel 24 therein, and with two flanges 18 in alignment projecting from the two longer sides of the rectangle. These two projecting flanges serve as the outer flange of the window frame for the retention between them and the plastic glazing strip 26 of the outer pane of glass, as shown in either Fig. 4 or 8. The portion of the rectangular bar structure extending from the flanges 18 to the inner face of the bar may be provided with the usual dovetail groove 29 for the reception and retention of the tongue of the glazing strip 26. The inner exposed face of the bar may be provided with hooked indentations to receive the tongues of facing strips 27 of plastic, as and for the purpose hereinafter described. One or two hooked projections 36, as seen in Fig. 4, may be provided for the detention of the flexible lip 35 of the glazing strip during the emplacement of the inner pane in the window, as will later be described. Greater strength may be imparted to the window by inserting a short bar of steel or iron in the rectangular channel of the A bar, as illustrated at 49 in Figs. 1, 4 and 6. This bar, as is indicated in Figs 1 and 6 need only be long enough to extend from the outer ends of rectangular channel 29 into the wall to anchor the frame securely thereto. A steel bar 8 inches or 10 inches long at each side of the frame would suffice for this purpose.

It will be understood that various suitable combinations of the different window bars described herein can be made, and that I do not restrict myself to the precise combinations of A, C, T, Z, L or other bars shown in the drawings.

All of these metal bars, which may conveniently be made of extruded bronze or aluminum, being L, Z or T shaped generally, are light in weight but nevertheless strong. The economies and convenience in production and assembly of windows having high thermal insulating properties, in accordance with the object of this invention, are, furthermore, attained by the construction features now to be described.

Use of putty to set and hold the window panes in place in the window frames has been eliminated by this invention. I fasten and hold the panes securely in place by use of resilient glazing strips molded from rubber or a suitable flexible plastic, such as the co-polymer polyvinyl chloride-acetate, which has the requisite strength, flexibility, permanence, etc. to meet the requirements. The glazing strip of this or a like material may have a cross-section such as that shown at 26 in Fig. 6 where it is provided with a dovetail tongue 31 adapted to enter dovetail grooves such as those at 29 in the bars of the frames, when the tongue of strips 26 is temporarily deformed and then forced into the groove.

As shown in most of the drawings, the shapes of the dovetails in the groove 29 and in the strip 26 differ in that the tongue 31 of strip 26 is dished or cupped as at 47 in Fig. 4, instead of flat as is the opposing surface 48 of the groove. This configuration imparts a firmer seating of the tongue 31 in its groove and may even cause it to cling to the groove by providing a vacuum cup and suction effect. These strips are formed, moreover, with recessed portions 32 and 33, either one or both of which is adapted to receive the edges of a glass window pane and secure it in place after the glazing strips have been forced into grooves 29 of the window bars. The recesses may also be dished, as at 32 in Figs. 6 and 8, with a like result.

If two panes disposed in parallel relationship to form a double pane are desired, i. e. so as to reduce thermal convection in either winter or summer, then the outer pane is secured in place between the outer flange 19 of the window bar and the recessed portion 32 of the glazing strip 26; the inner pane is held in place in proper spaced relationship in recess 33 of strip 26. To facilitate insertion of the inner pane, the hooked lip portion 35 of strip 26 is bent inwardly and may be held in place, temporarily, by hooking it over the projection 36 as shown in Figs. 2, 3, 4, 7 and 11. The inner pane can also be removed, temporarily, for cleaning purposes by hooking lip 35 over projection 36 when desired.

It will be understood that the outer pane may be inserted in the frame so as to abut against outer flange 19 of the bar, and the resilient glazing strips can then be inserted, by forcible pressure of tongues 31 into grooves 29, followed, if desired, by emplacement of an inner pane in recesses 33 of strips 26.

Joining of strips 26 to the inner edges of the window bars is effected by temporary deformation of tongues 31 and their forcible pressure into grooves 29 which extend along the inner edges of the webs joining the flanges of the window bars. These grooves may be dovetailed or have any other shape suitable to join the flexible strips firmly to the bars.

The inner exposed surfaces of any of the bars when they are made of metal and have high thermal conductivity therefore, may be so formed, moreover, as to facilitate attachment thereto of facing strips 27 of plastic or other coating material. These strips are designed both to reduce thermal conductivity and to provide a decorative effect on the inner window frame. They are therefore suitably colored for that purpose. Strips 27 may be affixed to the inner surfaces of the bars by insertion of their tongues into grooves such as those at 30, or may be glued to the inner flanges. A heavy coating of a liquid non-conductor, which solidifies on drying may also be sprayed on the exposed inner surfaces of the bars. The coating or strips thus promote thermal insulation, reduce or preclude condensation, or sweating

of moisture on the bars whenever the metal portion thereof is at a lower temperature than the dew point temperature of the air of the room, and provide a permanent decorative facing which will not chip or peel off, as would paint or other coatings which blister by moisture condensation, or rapid changes in temperature.

Figs. 9 and 10 show, on an enlarged scale, the manner in which pliable weather strips of rubber or felt **28** or, alternately, strips **28'** (Fig. 10) of stainless steel, are mortised into other sets of grooves **30** in the parting faces of the swinging panels or transoms of the window to waterproof them. This feature is included also in other figures of the drawings at the proper locations. It will be observed that the surface of the rubber or felt weather strips **28** of Fig. 9 is finely serrated. This feature imparts a velvety surface to the pliable material with the result that contact and forcible pressure thereon, of the frame of the metal member which effects a closure, insures a tight and waterproof seal along the edge of the swinging sash.

Because of the tubular nature of the window bars when they are assembled, the hinges, pivots, or other hardware of the frame can be concealed within the channels of the frame, instead of being external thereto as in prior constructions. Damage during transportation by deformation of protruding parts is thereby avoided. The construction of the window is such that it can be assembled in the factory, although emplacement of the glazing strips and of the window panes can also be effected in the field when desired. It will be noted that because of the pliable nature of the glazing strips disclosed by this invention, expansion and contraction of the frame and/or of the glazing thereof, will be automatically compensated for without injury to the parts of the frame or diminution of its water and weatherproof character.

As shown in Figs. 13 to 16, I may use a modified form of joint between the window bars and glazing strips. In this construction I substitute a projection **37** shaped somewhat like the letter J for the dovetail tongue of the pliable strip **38**, and also impart a J shape to the complementary groove **39** in the inner edge of the window bar. Because of its pliable nature the J shaped tongue can be forced to enter and then seat in the J shaped groove.

The recesses in the strips for the reception of the edges of the window panes can be shaped, of course, much the same as those already described with minor modifications such as those shown at **40** and **41** to adapt this alternate construction to modified shapes of window bars. In such modifications I may substitute for the inner flanges of the bars previously described an anchor-shaped hooked termination to the inner edge of the web of the bars, so as to produce a structure like those illustrated at **42** in Figs. 14 and 15. The J shaped tongue **37** of the glazing strip **38** will, of course, enter and hook into the J shaped grooves **39** formed by the arms and flukes of the anchor **42**, when pressure is applied to force such entry.

The anchor-like termination may be joined to the inner edge of the web, at one end of the stock of the anchor, as at **43** in Fig. 14, and **44** in Figs. 15 and 16, or a single J-shaped retaining groove may be provided at the inner edge of the web, as is shown for example at **44'** in Figs. 13 to 16. The facing strips **27** and weatherstrips **28** may be integral parts of glazing strip **38**, as is shown in Figures 14 and 15, and the lip **35** of pliable glazing strip **38** may be bent inwardly and held in place by the snap strips arrangement at **45**.

In Fig. 13 the lip **35** of the glazing strip **38** at the left of the figure is in its normal position to hold an inner pane of glass in place. In all other portions of Figs. 13 to 16 lip **35** is bent and snapped open for reception or removal of an inner pane.

While I have herein illustrated and described in detail certain preferred forms of my invention, it is to be understood that changes may be made therein without departing from the spirit of my invention. The entire window frame, the sash and all division bars may thus be constructed of wood instead of metal, and the window may be of the double hung, sliding sash type, instead of the casement type, without material change in the character of the grooves and tongues of the window bars or of the glazing or facing strips. I accordingly do not limit myself to the specific constructions illustrated, but intend to cover my invention broadly by the following claims, in whatever form its principles may be embodied.

I claim:

1. In combination in a window adapted to promote thermal insulation in openings in external walls of buildings, a frame including sash and division bars having longitudinal dovetailed grooves, thermal non-conducting, resilient glazing strips having longitudinal recesses and tongues, said tongues being inserted by temporary deformation thereof into the grooves of said bars, thereby joining said strips and bars, and inner and outer window panes, one of said panes having its edges inserted into recesses in said strips and the other pane having its edge inserted into recesses formed between parts of the glazing strips and parts of the sash, thereby retaining said panes in spaced relation so as to enclose a dead air space between said panes, and thermal non-conducting strips of material covering exposed surfaces of said bars, so as to lessen thermal conductivity therethrough.

2. In combination in a casement window adapted to promote thermal insulation in openings in external walls of buildings, a frame including sash and division bars having longitudinal dovetailed grooves, thermal non-conducting, resilient glazing strips having longitudinal recesses and tongues, said tongues being inserted by temporary deformation thereof into the grooves of said bars, thereby joining said strips and bars, inner and outer window panes, one of said panes having its edges inserted into recesses in said strips and the other pane having its edge inserted into recesses formed between parts of the glazing strips and parts of the sash, thereby retaining said panes in spaced relation so as to enclose a dead air space between said panes, thermal non-conducting strips of material covering exposed surfaces of said bars, so as to lessen thermal conductivity therethrough, and resilient weather strips covering contact surfaces of swinging sections of said window.

3. In a window frame in combination, a metal bar having inner and outer flanges connected by a web perpendicular thereto, a dovetailed groove extending longitudinally of a side of said web and a glazing strip of pliable material having a dovetailed tongue inserted in said groove, said glazing strip having a body cooperating with a part of said frame bar to engage and position a window pane, said glazing strip having a hooked resilient lip forming a part thereof said lip normally extending along side of said body portion to cooperate therewith so as to form a groove for holding the second window pane, said lip being bendable to a position in which said second pane may be removed or inserted, and a flange projecting from one of the flanges of the metal bar for engagement with the hook on the lip of said glazing strip when said lip is bent to said second position.

4. In combination, in a window adapted to promote thermal insulation in openings in external walls of buildings, a frame including metal sash and division bars having longitudinal dovetailed grooves therein and having window pane seats on the sides of said bars towards the outside of the building, thermal insulating glazing strips of resilient plastic material having base tongues extending longitudinally thereof and inserted by temporary deformation into the grooves of said bars thereby joining said strips and bars, said glazing strips having body portions coacting with the pane seats of said bars for retaining window panes therebetween, and plastic thermal insulating coverings for the exposed surfaces of said bars at the inside of the building, said coverings including in part at least portions of said glazing strips, said coverings for said bar surfaces serving to lessen the conductivity through said bars to prevent or decrease condensation on said bars interiorly of the building.

5. A glazing strip adapted to removably secure a plurality of panes in a window frame comprising a strip of resilient plastic material having a deformable dovetailed tongue on the outer side thereof adapted to be forced into and cling to a dovetailed groove in a window bar, said strip having a body projecting inwardly from said dovetailed formation, one side of said body being formed to engage a window pane, said strip also including a resilient lip extending inward from said dovetailed formation along side of the opposite face of said body so as to form a groove for receiving the edge of a second pane, said lip having sufficient resiliency when laterally unsupported to

retain said second pane, but being temporarily bendable to a retracted position permitting insertion or removal of said second pane without removal of the glazing strip from the window bar, the free edge of said resilient lip being provided with a holding formation and a formation on the window for engagement with said holding formation, said formations when engaged holding said lip in said retracted position.

6. In a window frame in combination, a metal bar having inner and outer flanges connected by a T-shaped web perpendicular thereto, a dovetailed groove extending longitudinally of a side of said web and a glazing strip of pliable material having a dovetailed tongue inserted in said groove, said glazing strip having a body cooperating with a part of said frame bar to engage and position a window pane, said glazing strip having a resilient lip forming a part thereof, said lip normally extending along side of said body portion to cooperate therewith so as to form a groove for holding the second window pane, said lip being bendable to a position in which said second pane may be removed or inserted, and a flange projecting from one of the flanges of the metal bar for engagement with the hook on the lip of said glazing strip, when said lip is bent to said second position.

7. In a window frame in combination, a metal bar having inner and outer flanges connected by a Z-shaped web perpendicular thereto, a dovetailed groove extending longitudinally of a side of said web and a glazing strip of pliable material having a dovetailed tongue inserted in said groove, said glazing strip having a body cooperating with a part of said frame bar to engage and position a window pane, said glazing strip having a resilient lip forming a part thereof, said lip normally extending along side of said body portion to cooperate therewith so as to form a groove for holding the second window pane, said lip being bendable to a position in which said second pane may be removed or inserted, and a flange projecting from one of the flanges of the metal bar for engagement with the hook on the lip of said glazing strip, when said lip is bent to said second position.

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