

April 1, 1941.

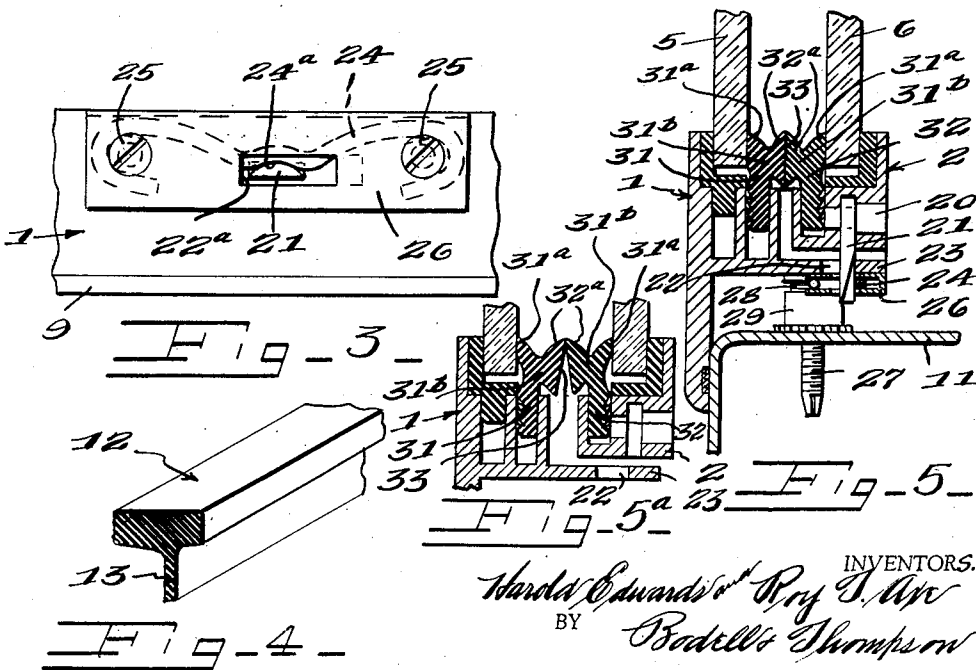
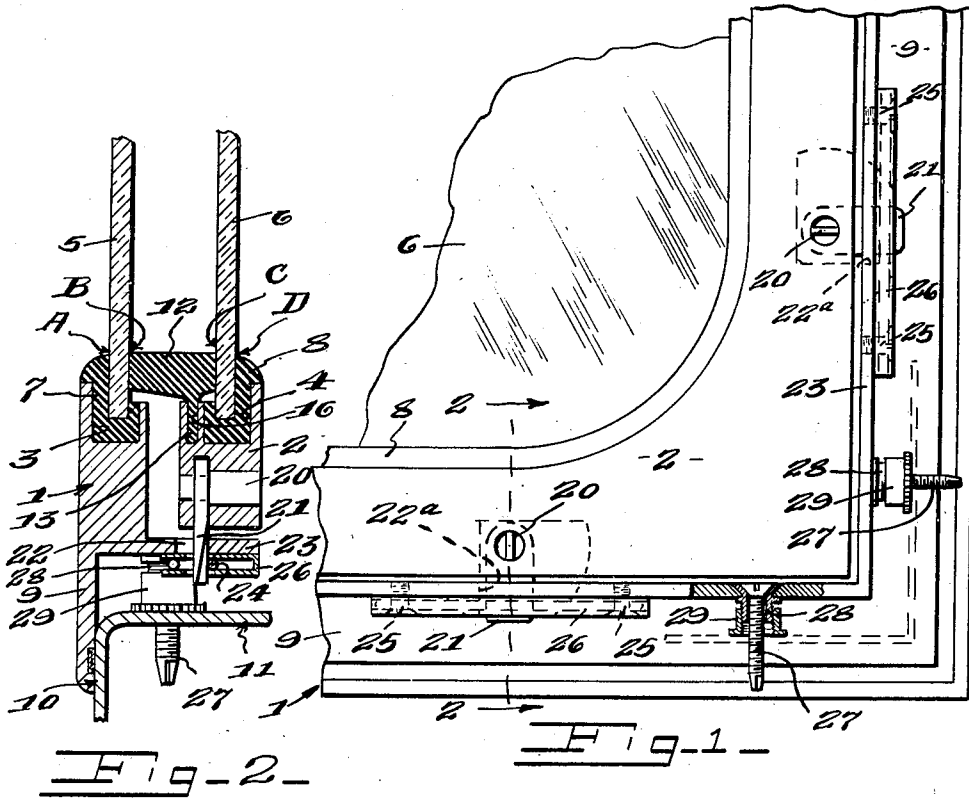
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2,236,812

DOUBLE WINDOW CONSTRUCTION

Filed Jan. 31, 1939

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

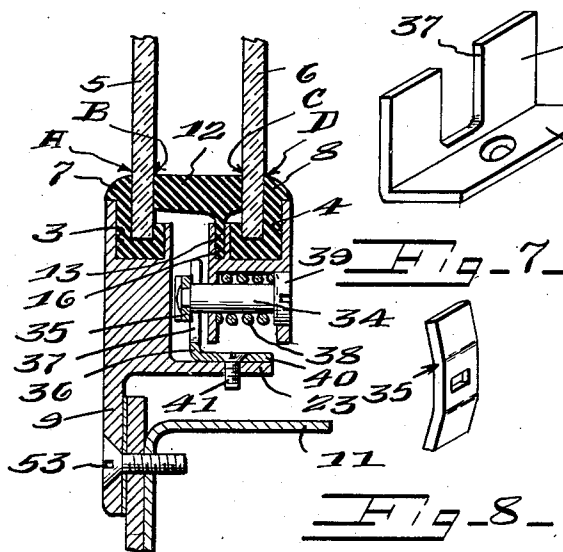


Fig. 6-

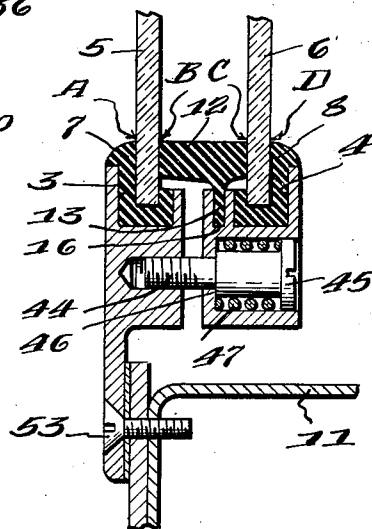


Fig. 9-

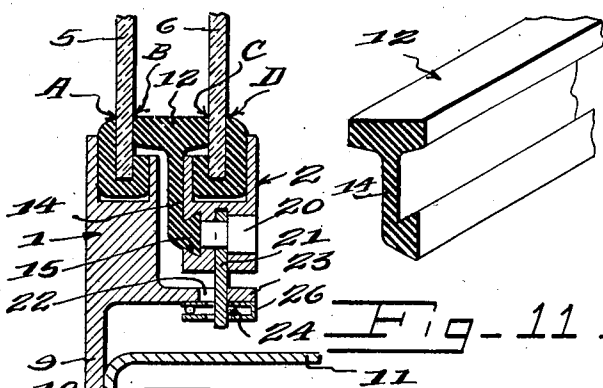


Fig. 10-

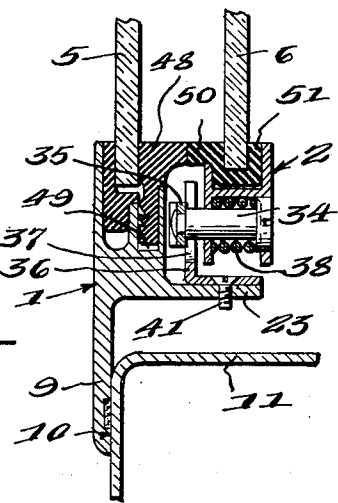


Fig. 12-

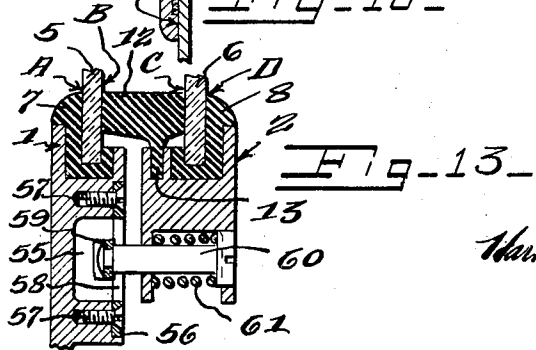


Fig. 13-

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UNITED STATES PATENT OFFICE

2,236,812

DOUBLE WINDOW CONSTRUCTION

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Application January 31, 1939, Serial No. 253,832

9 Claims. (Cl. 189—64)

This invention relates to double window constructions for use in air-conditioned enclosures, where it is necessary to keep the moisture in the space between the glass panels free of moisture or constant as to moisture content, or to prevent interchange of air between this space and the outside air, and particularly interchange of air between said space and the inside of an enclosure, as the inside of a railway car or bus, because usually the air inside of the car or bus is warmer, and hence contains a greater moisture content than the outside atmosphere. The maintaining of the air in its original condition, as to moisture content, in the space between the glass panels avoids clouding of the glass panels and keeps the inner surfaces of the glass clean over a long indefinite period.

The invention has for its object a window structure consisting of two independent sash opposed to each other and a compressible resilient spacer between the margins of the glass panels, which spacer is carried by and is self-contained with one of the sash, in contradistinction to being divided or to portions thereof being carried by both sash, with means for clamping the sash together to compress the spacer.

It further has for its object a resilient follow-up mechanism acting to press one sash toward the other, in addition to the clamping means employed to clamp the sash toward each other, in order to automatically take up and tighten the spacer, if it develops a permanent set in a compressed condition, and hence to maintain the seal between the glass panels against interchange of air between said space and the surrounding atmosphere.

It also has for its object a resilient compressible mounting, including spacing means for the glass panels, which, when the sash are clamped one toward the other, compensates for variations in glass panels, as variations in thickness of the glass panels and other irregularities, and also for irregularities in the mounting means or spacers themselves, so that under the influence of the follow-up mechanism, tight seals are maintained between the glass panels and their compressible resilient mountings.

It further has for its object a window construction for compensating for misalignments and variations and irregularities in the window opening and relieving the sash of strain of the fastening members or screws tending to distort the sash, if unduly tight, where the fastening members extend in a direction edgewise of the sash and thread into or clamp into the window frame.

Other objects appear throughout the specification.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a fragmentary elevation, partly in section, of a window structure embodying this invention.

Figure 2 is a sectional view on line 2—2, Figure 1.

Figure 3 is a fragmentary edge view of the sash illustrating the follow-up spring means shown in Figures 1 and 2.

Figure 4 is a fragmentary isometric view of the compressible resilient spacer between the glass panels in Figure 1.

Figure 5 is a view similar to Figure 2 with slightly modified form of the window construction with respect to the spacing means.

Figure 5^a is a fragmentary sectional view similar to Figure 5 illustrating the action of the spacers in compensating for irregularities in the glass panels and in the spacers, the sash being shown in their position preliminary to being clamped together.

Figure 6 is a view similar to Figure 1 of a modified form of the means for clamping the sash toward each other.

Figures 7 and 8 are detail views of the clamping means shown in Figure 6.

Figure 9 is a view similar to Figure 2 illustrating a slightly modified form of the clamping means from that shown in Figure 6.

Figure 10 is a view similar to Figure 1 illustrating a different form of spacing means.

Figure 11 is an isometric detail view of the spacer shown in Figure 10.

Figure 12 is a view similar to Figure 6 of a different form of spacer means from that shown in Figure 6.

Figure 13 is a fragmentary sectional view illustrating another modification of the means for compressing the sash toward each other.

1 and 2 designate, respectively, opposing sash, each of which is formed with an inwardly facing channel, as 3, 4, into which extends the margins of glass panels 5, 6.

7 and 8 designate cushioning and sealing means in each of the channels in which the margins of the glass panels are seated. The cushioning means, shown in Figure 2, are U-shaped in

general form in cross-section with the outer flanges of the U formation lapping the outer portions of the glass panels 5, 6 outside of the channel. Also, the outer side flanges of the channels 3, 4 are wider than the inner flanges. The sash 1 on the outer side of the car body or other enclosure is formed with a circumferential flange 9 which laps the margin of the car body or the outer side of the window frame, as at 10.

11 designates the frame of the car body defining the window opening. 12 designates the spacer between the margins of the glass panels, this spacer being of compressible resilient material, as rubber. It is carried by one of the sash as a unit therewith. The spacer is here shown as carried by the inner sash 2 and as formed with a flange 13 which interlocks with one of the sash, as the sash 2. The sash 2 is formed with a groove in which the flange 13 interlocks. Substantially the same spacer is shown in Figures 6 and 9.

In Figure 10, the spacer 12 is formed with a flange 14 which extends between the sash 1, 2 and interlocks at 15 in a groove in the side of the sash 2 opposed to the sash 1.

In Figure 1, the flange 13 of the spacer fits into a groove 16 opening through the sash 2 and parallel to the glass receiving channel 4.

In Figure 10, the flange 13 extends between the sash 1, 2 and is secured to the sash 2, so that the spacer is carried by the sash 2. The spacer 12 engages at its side edges directly with the margins of the glass panels 5, 6 in transverse alinement with the outer edge portions of the wider flanges of the cushioning and sealing means 7 and 8. Hence, when the sash 1, 2 are clamped together, a tight seal is formed at A, B, C and D, and the thrust of the spacer on the glass panels is against the wider flanges of the channels 3, 4. Thus, shearing action on the glass panels 5, 6 is avoided.

The means for clamping the sash 1, 2 toward each other comprises cam means having a resilient follow-up movement which automatically presses the sash 1, 2 toward each other, or the sash 2 toward the sash 1 to maintain pressure between the spacer 12 and the margins of the glass panels, if the spacer loses its compression initially brought about by the clamping means.

In Figure 1, the clamping means comprises rocking members or shafts 20 extending transversely at intervals through the sash 2 and having buttons or cams 21 extending edgewise through a slot in the sash 2 and movable into slots 22 in a flange 23 provided on the sash 1. The flange 23 extends crosswise of the edge of the sash 2 and the slots 22 extend in a direction lengthwise of the flange 23. When the sash 2 is placed in juxtaposition to the sash 1, and the members 20 given a one-quarter turn, the cams 21 interlock with the slots 22 of the flange 23. In order to provide a follow-up movement, when the spacer 12 becomes permanently compressed, spring means is provided acting in opposite directions on the sash 1, 2 and coacting with the cam parts. As seen in Figures 1, 2 and 3, this spring means consists of a bow spring 24 anchored at its ends at 25 to the flange 23 on the outer side thereof and extending into the same along one side of the slot 22, so that when the cam 21 is turned into the slot 22, it engages and compresses the intermediate part of the bow spring 24, and hence the bow spring exerts a continuous pressure on the cam 21 tending to press the sash 2 toward the sash 1 and take up any looseness that may develop by reason of the permanent compression or set of the spacer 12. The spring 24 is located in

a suitable casing 26 secured on the outer face of the flange 23, it being secured thereto by the screws 25 to which the bow spring is anchored. The bow spring 24 is formed with an intermediate deflected portion 24^a forming a seat for the cam 21 when the cam is in its fully operated position. The snapping of the cam into this depression notifies the operator when the cam has been turned to its operative position. The overturning or overrunning of the cam beyond its operative position out of the depression is limited by the end wall 22^a of the slot (Figure 3). The slots 22 and springs 24 are spaced at suitable intervals around the sash 1 or the flange 23 thereof.

The sash 1 is secured in the window opening, as by screws 27 extending through the flange 23 in a direction edgewise of the sash and threading into the window frame 11. The window openings or window frames 11 are not uniform, but are subject to variations and misalignments, and in order to avoid warping of the flange 23, adjustable spacing means is provided for relieving these flanges of clamping strain of the screws 27. The spacing means is adjustable to conform to the misalignments and the irregularities in the window opening or frame 11.

This adjustable spacing means, as here shown, consists of hollow threaded members or studs 28 seated in the holes in the flange 23 for the screws 27, and a hollow nut or sleeve 29 threading on the hollow stem or member 28. The screw 27 extends through the hollow member and the nut 29 and threads into the window frame 11. The screw is of such nature as to bore and tap the hole, as the screw is being driven. Obviously, the sleeve or nut 27 may be adjusted relatively to the hollow members or studs 28 and the flange, so as to conform to irregularities in the window openings, so that the screw 27 may be tightened without straining the flange 23.

In Figure 5, the sash is shown as formed with a different form of spacer. In Figure 5, the spacer includes two glazing strip portions 31 and 32 carried by the sash 1, 2 and abutting against each other at 33 when the sash are compressed toward each other. This construction permits the glass panels to be removed from each sash without taking the sash apart, that is, without removing one of the sash members, as the top rail.

The means for mounting the sash and clamping the sash toward each other in the construction shown in Figure 5 is substantially the same as that shown in Figures 1, 2 and 3.

The rubber mountings for the glass panels are liable to vary slightly in thickness throughout their length, so that their side surfaces are somewhat irregular, as they are usually formed of extruded rubber. Also, the glass panels vary in thickness, although all are supposed to be the same thickness, and also there are surface irregularities in the glass panels. In order to keep the space between the glass panels tight under these conditions and maintain the tightness under all conditions, the glazing strip portions 31 and 32 are formed to compensate for the variations so that they compress tightly against the glass panels and against each other under the influence of the means for clamping the sash toward each other and the follow-up means, that is, under the influence of the cams, as 21, and springs, as 24. In Figures 5 and 5^a, each of the glazing strip portions 31 and 32 is formed with a curved head portion 31^a for pressing against the adjacent glass panel and under the clamping action flattening against the margin

of the glass panel, so as to make a broad surface contact with the glass panel, when the sash are clamped toward each other, and each glazing strip portion 31 and 32 is also formed with a head portion 32^a joined to the head 31^a by a neck 31^b, so that the head 32^a has a sort of rocking compensating action, when the sash are clamped toward each other, and the heads 32^a compress against each other, so as to get and maintain a broad surface contact between the abutting surfaces of the heads 32^a, as seen in Figure 5. During the clamping action of the sash together by means of cams 21, these glazing strip portions 31, 32 compress from the position shown in Figure 5^a to that shown in Figure 5, getting a broad surface contact with each other at the abutting faces of the heads 32^a and a broad surface contact between the heads 31^a and the glass panels, all as seen in Figure 5. The glazing strip portions thus have a compensating action for compensating for variations and irregularities in the glass panels and in themselves, under the influence of the clamping means, as the cams 21 and the follow-up means, as the springs 24, so that the space between the glass panels is tightly sealed both when upon initial installation and upon subsequent removal and replacement of one sash for any purpose. Sometimes a sash is removed for washing the windows or for any other purpose, and sometimes the movable sash is hinged with an elongated hinge-slot, as shown in application of Edward F. Chaffee and Roy T. Axe, Serial No. 239,102, filed November 5, 1938. Oftentimes, when open, it is desirable to place in the space between the glass panels a dehydrating material, as activated alumina, for taking out any moisture that may be in the air that enters between the glass panels, while the sash is being replaced.

In the construction shown in Figure 6, the spacing means is substantially the same as that shown in Figure 2, but the means for clamping the sash toward each other is a slightly different form of cam means from that shown in Figure 2. The clamping means shown in Figure 6 comprises rocking members 34 extending transversely through the sash 2 and having cross arms, buttons or cams 35 at their inner ends and keeper plates 36 supported by the sash 1 and extending between the sash 1, 2 and having slots 37 therein through which the cams 35 may be pushed when aligned therewith and with which the cams interlock when given a partial turn out of alignment with the slot 37. Compression springs 38 encircle the members 34 and thrust at their opposite ends against the sash 2 and the head 39 of the operating members 34. The springs are located in suitable recesses in the sash 2. The keeper plates 36 are here shown as provided with angularly extending base flanges 40 seated on the flange 23 of the sash 1. The keeper plates are secured to the flange 23, as by screws 41.

In Figure 9, the clamping means are shown as screws 44 located in transverse recesses in the sash 2 and threading into the sash 1, each screw having an enlargement adjacent its head 45, which enlargement provides a shoulder at 46 for thrusting against the bottom of the recess through which the screw extends and a spring 47 corresponding to the spring 24, or the spring 38 (Figure 6) thrusting against the bottom of the recess and the head of the screws. This arrangement causes the spring 47 to be tensioned a predetermined amount when the screw 45 is threading into the sash and prevents over-com-

pression of the spring 47 by reason of the shoulder 46 engaging the bottom of the recess in which the screw is located. Thus, if the spacer 12 should become set in compressed condition, the spring 47 automatically takes up any looseness that would otherwise develop between the spacer 12 and the margins of the glass panels 5, 6.

In Figure 12, a spacer of somewhat similar nature to that shown in Figure 5, is provided with a clamping means similar to that shown in Figure 6. In Figure 12, the spacer consists of a removable glazing strip portion 48 suitably interlocking in the groove 49 in the sash 1 and a laterally extending flange or lip 50 on the channel-shaped cushioning means or sheet 51 in which the glass panel 6 of the sash 2 is seated. In this form of the invention, the spacer sections 48 and 50 are compressed by the clamping means which clamp the sash toward each other and the compression automatically taken up by the spring of the clamping means.

In the window construction shown in Figures 6 and 9, the sash 1 is secured to the car body by screws, as 53, extending transversely through the flange 9 and into the car body.

In the forms shown in Figures 10 and 12, the sash is secured to the window frame in the same manner as shown in Figures 2 and 5.

In the window construction shown in Figure 13, the sash 1 and 2 are clamped directly together by a fastening means substantially like that shown in Figures 6, 7 and 8 with the exception that one of the sash, as the sash 1, is formed with a recess having a slotted entrance for receiving the cam of the clamping means. As here shown, the sash 1 is formed with cylindrical bores or recesses as 55 (Figure 13) opening through the side of the sash toward the sash 2 and the recesses are covered by a plate 56 set into a counterbore in the sash 1, 2 as to lie flush with the face of the sash 1, the plate being secured in position, as by screws 57. This plate is formed with a slot 58 similar to the slot 37 (Figure 7) for receiving a cam or button 59 similar to the cam 35 (Figures 6 and 8) and mounted on rocking members 60, corresponding to the rocking members 34 (Figure 6). These rocking members and the cams are pressed axially by springs 61, corresponding to the springs 38 (Figure 6) in one direction to provide the follow-up action of the spacers.

By this arrangement, the sash 1 and 2 are clamped directly together, so that the space between the glass panels may be comparatively narrow. This is a desideratum, one of the reasons being that the air within the small space maintains its original condition longer than the air in a larger space.

In any form of the invention, a tight seal is maintained between the spacer and the margins of the glass panels, by reason of the fact that the sash 2 is clamped toward the sash 1 and the follow-up spring serves to maintain the tight engagement of the spacer and the margins of the glass panels, if and when the spacer develops a permanent set, after being compressed, and also during variations in outside atmospheric pressure and the air in the space between the glass panels.

What we claim is:

1. In a double window construction including parallel, spaced, glazed sash sections, compressible resilient sealing means within the space between the panes of glass adjacent the interior margins thereof to seal the panes of glass there-

at, means including a plurality of spaced clamping elements fixedly attached to one of the sash sections and connecting with the other sash section to effect uniform clamping together of the sash sections and spring means carried by one of said sections and coacting with said clamping elements to thereby uniformly compress and effect sealing of the said sealing means and to constantly automatically thereafter maintain such uniform sealed relationship.

2. In a double window construction including parallel, spaced, glazed sash sections, each having means for resiliently receiving the margins of a glass panel, compressible resilient sealing means within the space between the panes of glass adjacent the interior margins thereof to seal the panes of glass thereat, means including a plurality of spaced clamping elements fixedly attached to one of said sash sections and connecting with the other sash section to effect uniform clamping together of the sash sections, said clamping means including spring means to uniformly compress and effect sealing of said sealing means and to constantly automatically thereafter maintain such sealed relationship.

3. In a double window construction including parallel, spaced, glazed sash sections each having means for resiliently receiving the margins of a glass panel, compressible, resilient sealing means within the space between the panes of glass adjacent the interior margins thereof to seal the panes of glass thereat, means including a plurality of spaced clamping elements fixedly attached to one of said sash sections and connecting with the other sash section to effect uniform clamping together of the sash sections, said clamping means including follow-up mechanism which includes spring means to uniformly compress and effect sealing of said sealing means and to constantly thereafter maintain such sealed relationship.

4. In a double window construction including parallel, spaced, glazed sash sections, compressible resilient sealing means within the space between the panes of glass adjacent the interior margins thereof to seal the panes of glass thereat, means including a plurality of spaced clamping elements fixedly attached to one of the sash sections and connecting with the other sash section to effect uniform clamping together of the sash sections, a flange on one of the sash sections provided with a plurality of spaced slots and a spring along one side of each of the said slots constituting one part of said clamping means, a plurality of spaced movable cam members carried by the other of said sections and in alignment with said slots and constituting the other part of said clamping means so that when the cam members are moved into said slots and contact the said springs the sealing means is uniformly compressed thereby effecting sealing of said sealing means and constantly automatically thereafter maintaining such sealed relationship.

5. In a double window construction including opposed, parallel, spaced apart sash sections, each having means for receiving the margins of a glass panel, a compressible resilient sealing means arranged adjacent the interior margins of each of the said panels to seal the said panels thereat and to hold the sash apart, one of the said sash sections being formed with a flange which extends across the edge of the other sash, said flange being formed with a plurality of lengthwise spaced slots therein, a plurality of spaced clamping means fixedly attached to the other

sash and in alignment with said slots, each clamping means including a cam which is movable into and out of said slots to effect uniform clamping together of the two sash sections, and a plurality of bowed springs carried by the said flange and extending into and lengthwise of one side of each of said slots to coact with the cams moved into the said slots to thereby uniformly compress and effect sealing of the said sealing means and to constantly automatically thereafter maintain such uniform sealed relationship.

6. A double window construction including opposed, parallel, spaced apart sash sections, each having means for receiving the margins of a glass panel, a compressible resilient sealing and spacing means positioned and held between the sash adjacent the margins of each panel to seal the said panel margins thereat, one of the sash sections having a part opposed to the other sash and formed with a plurality of spaced slots, a plurality of spaced clamping means, one for each slot, including rocking cams on the latter sash movable into the slots, and resilient parts carried by the former sash, each extending into and lengthwise of one side of one of the slots in position to coact with the cam, said resilient parts constituting follow-up means to automatically and uniformly urge the sash toward each other, and thereby uniformly compress and effect sealing of the said sealing means and to constantly automatically thereafter maintain such uniform sealed relationship.

7. A double window construction including opposed parallel spaced apart sash sections, each having means for receiving the margins of a glass panel, a compressible resilient sealing means positioned within the space between and adjacent the interior margins of each of said panels to seal and hold the sash spaced apart, one of the sash sections being provided with a plurality of spaced apart members each of which members is provided with a slot therein and the other sash being formed with a plurality of axially movable clamping members extending transversely therethrough and fixedly associated therewith and being also movable about an axis and each having a cam in alignment with and for passing through the said slots upon the said axial movement and for interlocking with the walls of the slot upon a partial rotary movement, and spring means concentric with each of said clamping members to thereby uniformly compress and effect sealing of the said sealing means and to constantly automatically thereafter maintain such sealed relationship.

8. A double window construction including opposed parallel spaced apart sash sections, each having means for receiving the margins of a glass panel, a compressible resilient sealing means positioned within the space between and adjacent the interior margins of each of said panels to seal and hold the sash spaced apart, one of the sash sections being provided with a plurality of spaced right angular keeper plates each of which has a slot in one angular portion thereof and the other angular portion being attached to said sash section and the other sash being formed with a plurality of axially movable clamping members each of which members has a spring concentrically associated therewith and which clamping members extend transversely therethrough and are fixedly associated therewith and being also movable about an axis and each having a cam in alignment with and for passing through the said slots upon the axial movement and for interlocking with the walls of the slot

upon a partial rotary movement, to thereby uniformly compress and effect sealing of the said sealing means and to constantly automatically thereafter maintain such sealed relationship.

9. A double window construction including opposed parallel spaced apart sash sections, each having means for receiving the margins of a glass panel, a compressible resilient sealing means positioned within the space between and adjacent the interior margins of each of said panels to seal and hold the sash spaced apart, one of the sash sections being provided with a plurality of spaced apart right angularly shaped keeper plates, each having one angle portion thereof attached to one sash section and provided with

5 a slot in its unattached portion, and the other sash being provided with a plurality of axially movable spring-pressed clamping members extending transversely therethrough and fixedly associated therewith and being also movable about an axis and each having a cam in alignment with and for passing through the said slots upon the said axial movement and for interlocking with the walls of the slot upon a partial rotary movement, to thereby uniformly compress and effect sealing of the said sealing means and to constantly automatically thereafter maintain such sealed relationship.

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