

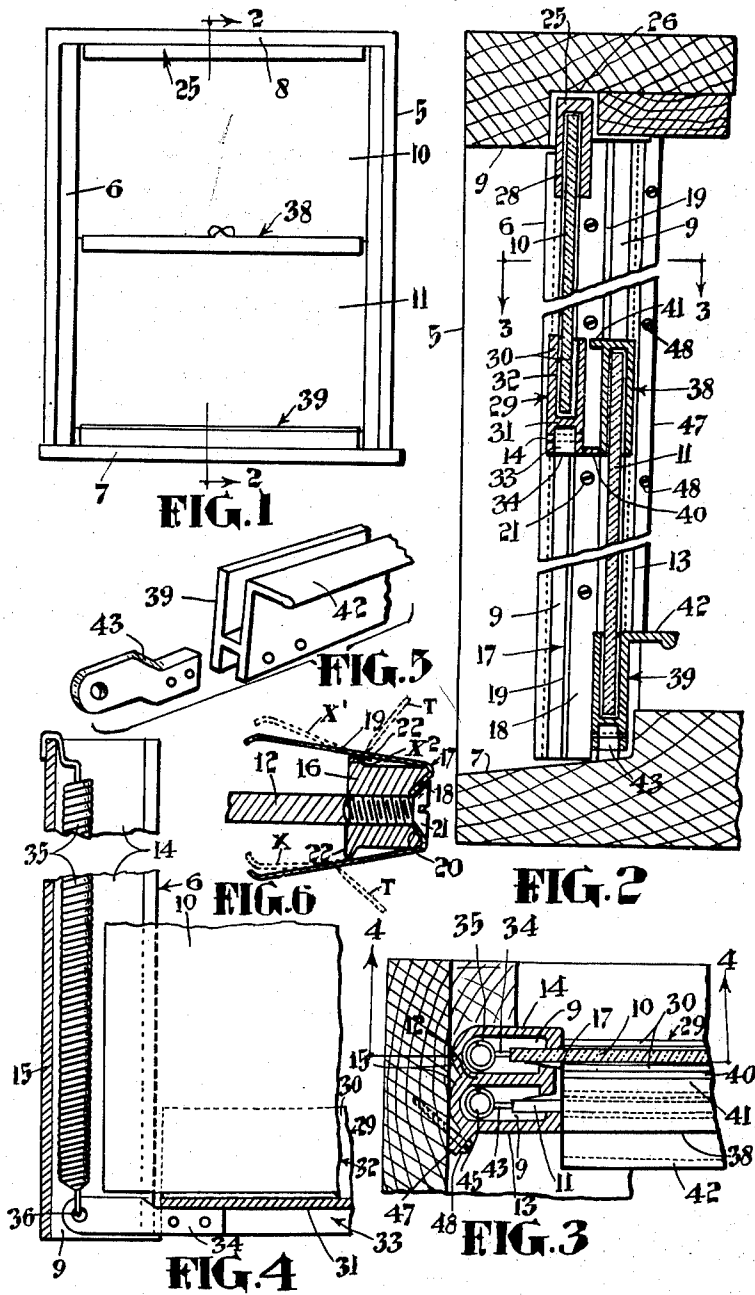
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WINDOW

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WINDOW

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This invention relates to improvements in windows.

More particularly, the invention is concerned with window installations of the so-called frameless-sash type in which bare glazing side portions of the upper and lower glazing panels are slidably fitted in guideways afforded by stationary panel guides attached to the sides of the window frame. In this type of window installation the glazing panes are provided with top and bottom rails which terminate in spaced relation to the side edges of the panels and which are of such length that their ends closely approach the panel guides in which the panels slide. The guideways in which the panels slide are separated from each other by a dividing wall carrying a weatherstripping element engaging both glazing panels. A pair of balancing springs are connected between the glazing panels and each panel guide and are housed in separate spring receiving channels formed in the panel guide at opposite sides of the guideways in which the panels slide.

Frameless-sash window installations of the type described herein have various well known advantages including a desirable reduction in size resulting from elimination of the usual sash side rails and window frame partitioning strips and the fitting of the side portions of the glazing panels in guideways afforded by channel guides attached to the sides of the window frame.

One object of the present invention is the provision of an improved frameless-sash window installation of the character described embodying means for quickly and precisely adjusting the friction between the glazing panels and the weatherstrip element so that perfect balance in all positions can be quickly and precisely obtained between the upward pull of the springs and the retaining friction of the weatherstrip element to the end that the glazing panels will remain in any position to which they have been shifted and will require only light fingertip pressure to shift them to a different position.

Another object of the invention is the provision of improved means for housing and anchoring the balancing springs so that said springs are not exposed to accumulation of foreign bodies or ice as occurs in the conventional assembly in which the springs are arranged in an exposed manner within spring retaining channels located outside of the glazing panel guideways.

A further object of the invention is to effect, in a window installation of the character de-

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scribed, a further substantial reduction in size that is particularly advantageous in adapting such window installation to double window and various other types of installation.

Other objects, advantages and characteristic features of the invention will be more readily understood from the following detailed description of the preferred embodiment shown in the accompanying drawings, in which:

Fig. 1 is an elevational view of a sashless window installation embodying my invention.

Fig. 2 is a vertical sectional view taken substantially along the section line 2—2 of Fig. 1.

Fig. 3 is a fragmentary transverse sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken substantially along the section line 4—4 of Fig. 3.

Fig. 5 is an exploded view showing the bottom rail of the lower glazing panel and the spring anchoring lug which is associated with said rail.

Fig. 6 is an enlarged sectional detail view showing the mounting of a weatherstripping element associated with the dividing wall separating the guideways of each panel guide.

Referring more particularly to the drawings, 5 designates a window frame which may be made of wood, metal or any other suitable material and may be of any suitable design. A panel guide 6 is secured to each side of the window frame and extends from the sill 7 to the head 8.

While the panel guides 6 may be made of any suitable material, they are here shown as metal members which are preferably formed by extrusion. Each panel guide 6 is formed with inner and outer grooves or guideways 9 in which the side edges of the inner and outer transparent glazing panels 10 and 11 are slidably fitted as shown in Figs. 3 and 4. The inner sides of guideways 9 are formed by a common dividing wall or web 12 located between and in spaced relation to inner and outer walls or the webs 13 and 14 which form the outer sides of the guideways. The webs 12, 13 and 14 are integrally joined together by a wall structure 15 which forms the bottom walls of guideways 9. The free vertical edge of the central web or wall 12 which is interposed between the glazing panels 10 and 11 is enlarged to provide a widened portion or head 16 (Fig. 6) which projects laterally beyond the sides of the remaining portion of said wall or web. The enlarged head 16 is straddled by a weatherstripping element 17 including a central portion 18 and side portions 19. The weatherstripping element 17 is made

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of flexible metal and has its central portion 18 curved to fit in a concave depression 20 provided in the inner edge of head 16, said curved central portion of the weatherstripping element being secured in said depression by a fastening screw 21 or other suitable fastening means. The sides 19 of weatherstripping element 17 extend over and beyond the sides of the head 16 and bear against fulcrum ribs 22 provided at the outer side corners of said head. These side portions 19 of the weatherstripping element bear against the inner sides of the glazing panels 10 and 11 as shown to advantage in Fig. 3.

Cases arise where, after installation of the frameless-sash window assembly described herein, it is desirable to decrease the frictional resistance between the weatherstripping element and the glazing panels in order to obtain, in all positions of the glazing panels, perfect balance between the upward pull of the balancing springs and the retaining friction of the weatherstripping element. This requires a decrease in the projection of the panel-engaging side portion 19 of the weatherstripping element 17 and may be accomplished by bending the whole or any desired portion of the length of each side portion 19 inwardly to the dotted line position indicated at X, using the fulcrum ribs 22 as fulcrum surfaces against which the said side portions of the weatherstripping element projecting beyond said fulcrum ribs are bent toward each other.

Where the proper balancing of the frictional resistance between the weatherstripping and the glazing panel against the upward pull of the balancing springs requires an increase in such frictional resistance, this may be accomplished by bending the sides 19 of the weatherstripping element outwardly to the shape indicated by the dotted lines X'. In this case the side portions 19 of the weatherstripping element which extend from the central portions of the weatherstripping element to the ribs 22 are forced inwardly against the sides of the head as indicated at X², thereby causing the side portions of the weatherstrip which extend beyond the ribs 22 to be deflected outwardly to the said dotted line position X'.

The aforesaid bending of the side portions of the weatherstripping element to vary the frictional resistance between the weatherstripping element and the glazing panels may be accomplished with the use of a simple hand tool such as that shown by dotted lines in Fig. 6 and identified by the reference character T. When the tool T is used for decreasing the frictional resistance of the weatherstrip against the glazing panels the working edge of the tool is forced against each side of the weatherstrip as illustrated in the lower portion of Fig. 6. When used for increasing the frictional resistance between the weatherstrip and the glazing panels the tool T is forced against each side 19 of the weatherstripping element as illustrated in the upper portion of Fig. 6. The tool T is preferably one having a chisel type of blade with rounded working edges.

A top rail member 25 is fitted and secured to the upper edge of the outer glazing panel 10 and is received in a groove 26 in the window frame head 9 when panel 10 is in its fully raised position. The top rail 25 terminates short of the side edges of panel 10 but is made long enough so that its opposite ends are disposed relatively close to the panel guides 6. The top rail 25 is provided with downwardly opening groove 28 in which the upper edge of panel 10 is adhesively

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or otherwise secured. A bottom rail 29 is fitted on and secured to the lower edge of panel 10. The bottom rail 29 comprises inner and outer walls 30 having intermediate portions thereof joined by a horizontal connecting web 31 which forms the bottom wall of an upwardly facing groove 32 in which the lower edge of panel 10 is cemented. Web 31 also forms the top wall of a groove 33 in which a pair of spring anchoring lugs 34 are secured so that the outer ends of these lugs project beyond the ends of said bottom rail and into the outer panel guideways 9 in which panel 10 slides. A pair of balancing springs 35 are arranged in said outer guideways 9 between the bottom walls of said guideways and the opposing side edges of panel 10. The lower ends of springs 35 are anchored to the outer ends of lugs 34 as indicated at 36 and the upper ends of the springs are hooked over the upper ends of the wall structure 15 of the panel guide 6 as shown in Fig. 4.

From the foregoing it will be seen that the balancing springs 35 are housed and anchored so that they are not exposed to accumulation of foreign bodies or ice. This is an important advantage over conventional frameless-sash installations in which the balancing springs are so exposed by locating them in open retaining channels located at opposite sides of the guideways in which the panels slide. In the conventional installation the presence of foreign bodies or ice to which the springs are exposed or the wedging of a damaged spring may cause the free part of the spring to become permanently damaged and useless by being stretched beyond the elastic limit when the glazing panel is next operated. Furthermore, in the conventional assembly any friction between the moving springs and their retaining channels may cause a rapid vibrating of the springs resulting in the setting up of an objectionable humming noise. All these disadvantages are substantially eliminated when the springs are housed and anchored in the improved manner described herein.

The inner panel 11 is provided with top and bottom rails 38 and 39 corresponding to the top and bottom rails previously described. The bottom rail 29 of panel 10 and the top rail 38 of panel 11 are provided with meeting flanges 40 and 41.

The bottom rail 39 of panel 11 is provided, at its upper inner edge with an inwardly directed lifting flange 42. The bottom rail 39 is also provided with lugs 43 which correspond to the previously mentioned lugs 34 and extend into the inner panel guideways 9 beneath the lower edge of panel 11. Balancing springs 45 are arranged in the inner guideways 9 and are connected to panel 11 and panel guide 6 in the manner previously described in connection with balancing springs 35.

At the inner side of the window each panel guide 6 is provided with an attaching flange 47 through which fastening screws 48 are passed into the adjacent side of the window frame to secure the panel guide in place.

From the foregoing it will be seen that I have provided an improved frameless-sash window installation wherein the increasing pull of the springs 35 as they are extended downwardly can be readily counteracted by regulating the effective pressure of the weatherstripping element on the glazing panels so that such pressure will be at its lightest at the top of the glazing panel guides and at its heaviest at the bottom of said guides.

It will also be seen that this variation of weatherstrip pressure can be adjusted by the mechanic with simple hand tools at the time of final window adjustment and can be similarly adjusted during the life of the window should any of the conditions change.

The present invention also provides a frameless-sash window installation in which the method of housing and anchoring the springs within the guideways protects the adjusted balance of the glazing panels from being interfered with by any variation of the spring pull due to exposure of the springs to accumulation of foreign bodies or ice that occurs in conventional installations.

The present invention also provides for noiseless operation since the springs are housed in the guideways free from rubbing interference.

It will also be seen that the present invention considerably reduces the width of the side guideways to the minimum size which is of substantial advantage in using the invention in double window and other types of window installations.

Having thus described the nature of my invention and a preferred embodiment thereof, it will be understood that various modifications may be resorted to within the scope and spirit of the invention as defined by the appended claims.

I claim:

1. In a window installation of the character described, a window frame, panel guides arranged at opposite sides of said window frame, each panel guide being provided with outer, inner and intermediate walls constituting the side walls of inner and outer vertically extending guideways, said walls being spaced apart at their inner edges and joined together at their outer edges by a wall structure constituting the bottom walls of said guideways, said intermediate wall being formed with a relatively thick inner edge portion projecting laterally beyond opposite sides of the remaining thinner portion of said intermediate wall and presenting laterally projecting fulcrum ribs at its outer corners, a weatherstripping element secured to and straddling said head with side portions of the weatherstripping element bearing against and extending on both sides of said ribs and outwardly beyond said ribs and into said guideways, inner and outer glazing panels slidably fitted in the inner and outer guideways of said panel guides in sliding contact with side portions of said weatherstripping element whereby the distance between side portions can be varied along the length of said weatherstripping by application of pressure on said weatherstripping adjacent the outer side of said rib to decrease said distance, and on the inner side of said rib to

increase said distance, so that the effective pressure of the weatherstripping varies at different points along its length to counterbalance varying forces acting on said panels.

2. A window installation of the character described comprising a window frame, panel guides arranged at opposite sides of said window frame, each panel guide being provided with a plurality of vertically extending guideways having their inner sides formed by a common dividing wall, a plurality of glazing panels each having bare side portions thereof slidably fitted in opposing guideways of said panel guides with the side edges of said panels spaced a substantial distance from the bottom walls of said guideways in opposing relation to said bottom walls, helical balancing springs arranged between the bottom walls of the guideways and the side edges of the panels fitted in said guideways, said springs being completely contained in said guideways having their upper ends anchored to the upper portions of the panel guides and their lower ends anchored to the lower portions of the panels, a sheet metal weatherstripping element secured to and straddling the free edge of the dividing wall of each panel guide with side portions of the weatherstripping element bearing against the glazing panels, said strip being bent so that the distance between said side portions, when unrestricted by said glazing panels, increases along the length of said weatherstripping in a direction away from the point of anchoring said spring to said guides, whereby the effective pressure varies at different points along the length of the weatherstripping element so that, in any position to which the glazing panels are moved in the guideways, the friction between the glazing panels and the weatherstripping element is just sufficient to hold the panels in said position against the upward pull of the springs and to thereby ensure that the glazing panels will remain in any position to which they have been shifted and will require only light pressure to shift them to a different position.

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