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E. CLERK

2,570,523

WINDOW

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3 Sheets-Sheet 1

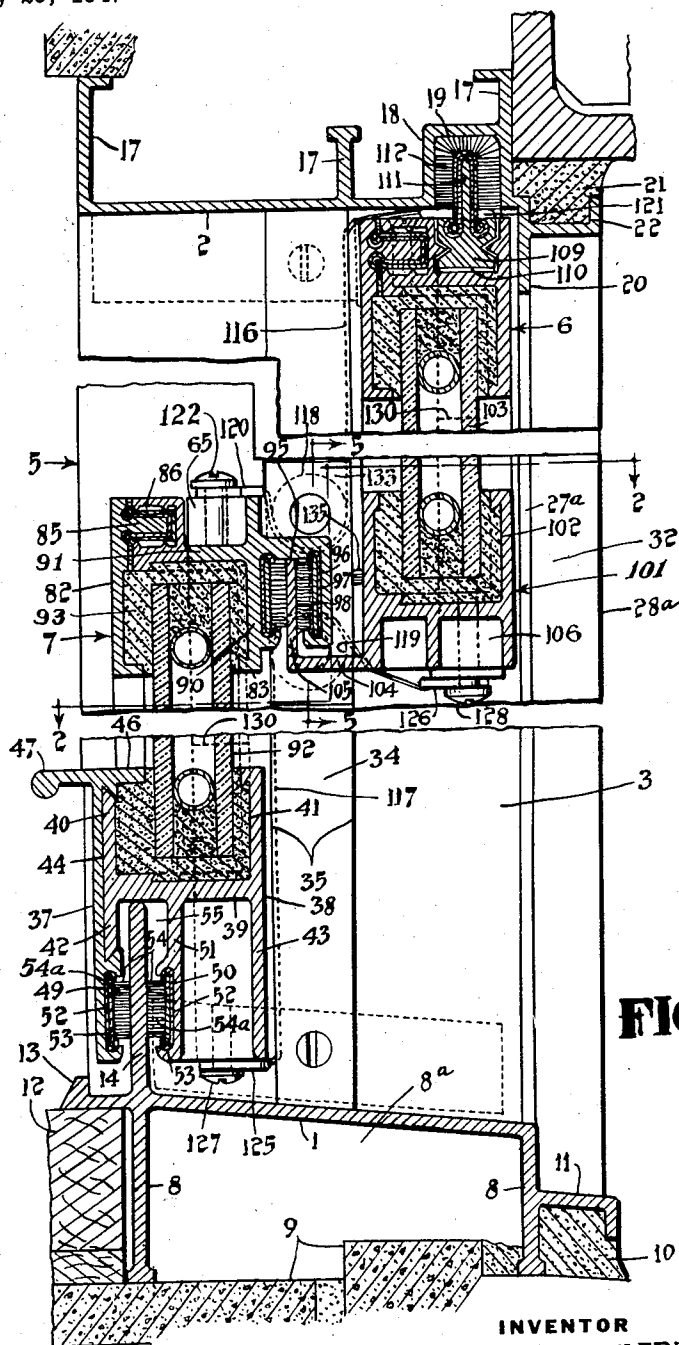


FIG. 1

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3 Sheets-Sheet 2

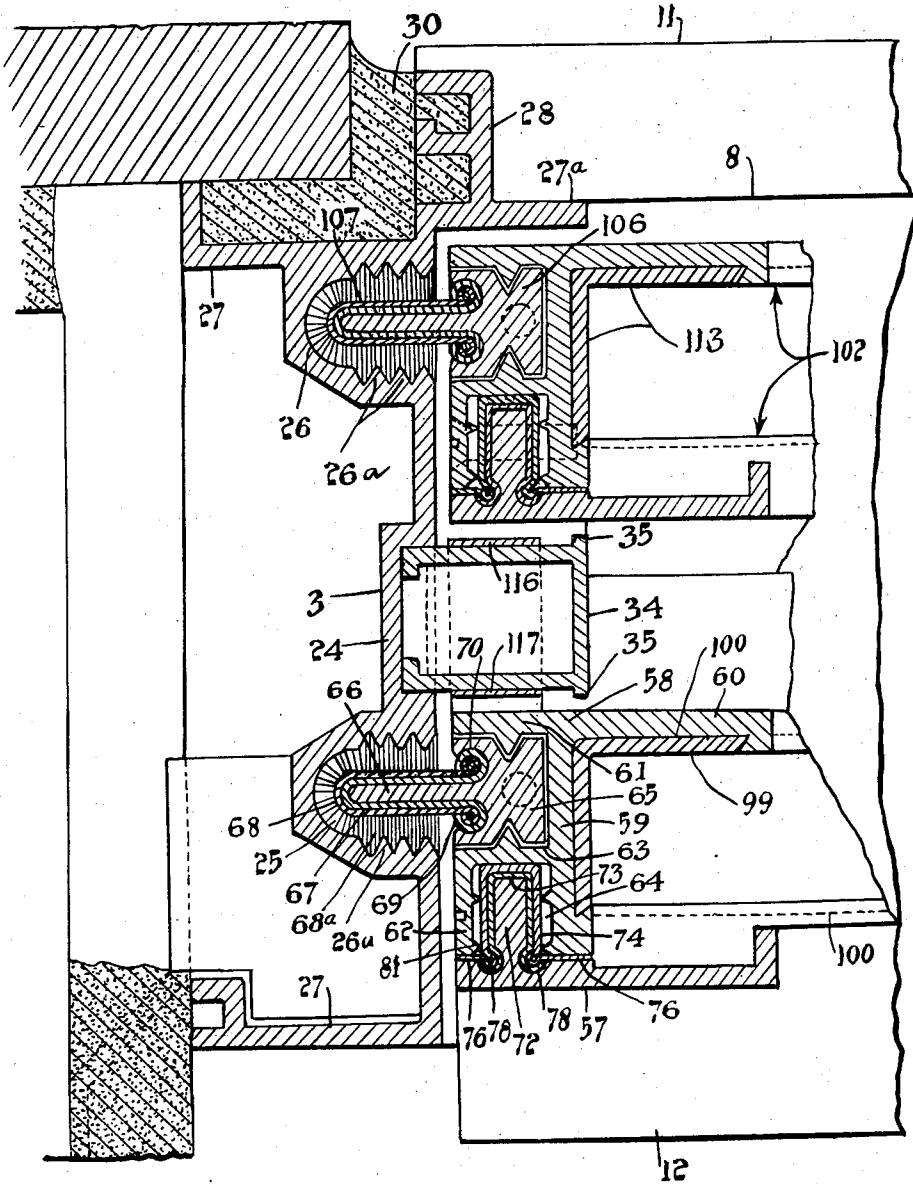


FIG. 2

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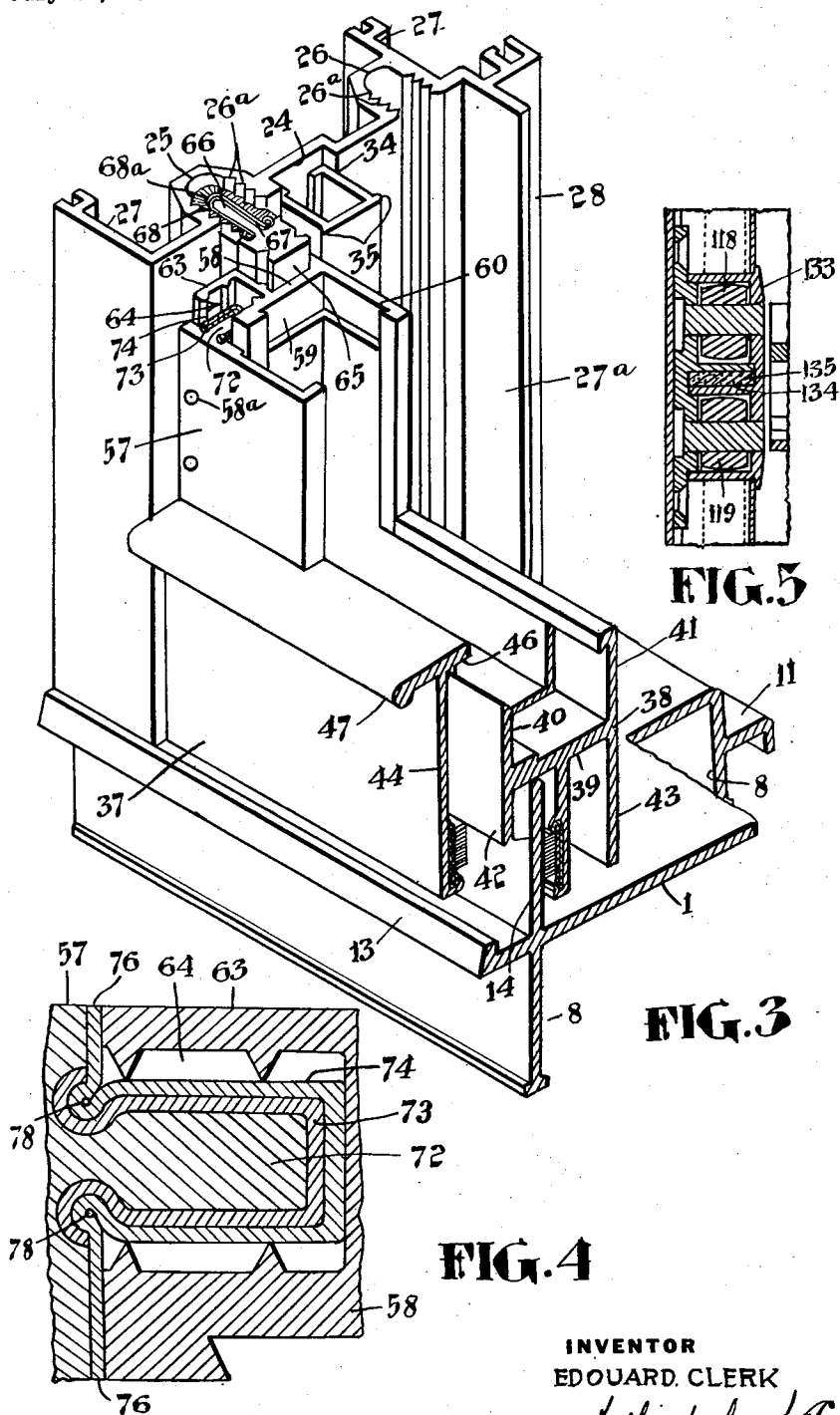
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3. Sheets-Sheet 3



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WINDOW

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3 Claims. (Cl. 189—65)

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This invention relates to improvements in windows of the sliding sash type.

One object of this invention is the provision of an insulated all-metal window in which thermal transmission from the inside to the outside is substantially reduced by a novel arrangement of weatherstripping between the sashes and the sash frame and between complementary sections of the component rails of the sashes themselves.

Another object of the invention is to provide a window of the sliding sash type in which the sashes are guided by weatherstripping elements projecting from the side rails of the sashes into vertical recesses in the jambs of the window frame and are interconnected so that the sashes balance each other and may be operated in unison by raising and lowering the lower sash.

Another object of the invention is the provision of a window of the sliding sash type in which the side rails of each sash are provided with removable weatherstripping elements working in the recesses provided in the side jambs of the window frame and in which the upper and lower ends of the weatherstripping elements carried by the lower sash are connected to the corresponding ends of the weatherstripping elements of the upper sash by flexible connections which are trained around pulleys carried by the side jambs of the window frame so that each sash is counterbalanced by the companion sash.

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 a vertical sectional view of a window construction embodying my invention;

Fig. 2 is a horizontal section taken substantially along the section line 2—2 of Fig. 1.

Fig. 3 is an enlarged perspective view of a lower corner portion of the frame and lower sash shown in the preceding figures.

Fig. 4 is an enlarged detail view showing a portion of the side rail construction of the lower sash.

Fig. 5 is a sectional view along the line 5—5 of Fig. 1.

Referring more particularly to the drawings, 5 designates a metal sash frame equipped with upper and lower sliding sashes 6 and 7.

The sill 1, head 2, and jambs 3, of window frame 5 are preferably made of aluminum. Sill 1 is supported in place by downwardly extending legs 8 resting on the wall structure 9 at the bottom of the window opening. A pocket for

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the reception of a caulking compound 10 is formed by the outdoor sill leg 8 and a flange 11 extending outwardly from said leg. The downwardly opening sill recess or pocket 8a formed by supporting legs 8 may also be filled with a suitable caulking compound. The inner edge of sill 1 overlies a wooden sill member 12 and is formed with an upwardly projecting lip 13. A sash-engaging leg 14 extends upwardly from sill 1 at a short distance from lip 13.

Head 2 of window frame 5 is formed with upwardly projecting legs 17 butted against the wall structure at the top of the window opening. The recesses or pockets formed by and between the legs 17 may be filled with a suitable caulking compound. At the outdoor side of the window frame, the head 2 is provided with an upwardly offset portion 18 affording a downwardly opening recess 19. The outer side wall of recess 19 is continued downwardly to provide a flange 20. A pocket for the reception of a caulking compound 21 is formed by a flange 22 projecting outwardly from flange 20.

Each jamb 3 of window frame 5 is formed with a central vertically extending parting-strip recess 24 (Figs. 2 and 3) flanked by vertically extending weatherstrip receiving recesses 25 and 26 having their side walls serrated as indicated at 26a. Each jamb 3 is also formed with leg extensions 27 which are butted against the wall structure at the adjacent side of the window opening and form a pocket that may be filled with a suitable caulking compound. At the outdoor side of the window the outer wall of each jamb recess 26 is continued inwardly to form a flange 27a in line with the head flange 20 and that portion of the outer sill leg 8 which extends above the sill flange 11. A flange 28 extends outwardly from the jamb flange 27a and forms a pocket which is filled with a caulking compound 30.

As clearly shown in Fig. 1, the outdoor side of window frame 5 presents a recess 32 having its bottom wall formed by outer sill legs 8, head flange 20 and jamb flanges 27a and having its side walls formed by the flanges 11, 22 and 28. Recess 32 is adapted to receive therein a screen or storm sash.

Metal parting strips 34 are fitted in the parting-strip recesses 24 of the window frame jambs 3. The inner corner portions of each parting-strip are formed with laterally projecting beads 35.

The bottom rail of lower sash 7 (Fig. 1) is made in two parts comprising a facing section 37 secured to the indoor side of a main section 38.

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The main rail section 38 comprises a web 39 provided with upwardly projecting marginal legs 40 and 41 and downwardly projecting marginal legs 42 and 43. The flanges 40 and 42 at the indoor side of main rail section 38 are fitted in a groove 44 in facing section 37. The upper edge of facing section 37 is formed with oppositely directed flange 46 and 47. The flange 46 overhangs a glazing channel formed by the web 39 and upwardly projecting legs 40 and 41 of rail section 38. The remaining flange 47 of rail section 37 provides a hand grip for raising and lowering the lower sash. The lower portion of facing section 37 is formed with a weatherstrip-receiving groove 49 opposed to a similar groove 50 in a leg member 51 extending downwardly from an intermediate portion of the web 39 of main rail section 38. A metallic weatherstrip holder 52 is slidably fitted in each of the grooves 49 and 50 and carries a non-metallic weatherstrip 54 provided with a relatively thick nap 54a opposed to the nap of the companion weatherstrip. The side edges of each weatherstrip holder 52 are folded inwardly into clamping engagement with the marginal edges of the associated weatherstrip and are slidably accommodated in recesses provided in the side walls of the groove in which the holder is fitted. The downwardly directed legs 42 and 51 of rail section 38 form, with the lower portion of facing section 37, a downwardly opening pocket 55 in which the upwardly projecting leg 14 of frame sill 1 is received when the lower sash 7 is in its lowermost position. When leg 14 extends into pocket 55 its indoor and outdoor sides are engaged by the napped surfaces 54a of the weatherstrips 54.

Each side rail of lower sash 7 comprises a facing section 57 (Fig. 2) secured to the indoor side of a main section 58 by screws 58a. The main section 58 comprises a web 59, having an inwardly directed flange 60 at the outdoor edge thereof. Web 59 is provided with additional flanges 61 and 62 defining a weatherstrip groove 63 opening toward the adjacent jamb 3 and a groove 64 opening toward the indoor side of the window. A weatherstrip holder 65 is slidably fitted in groove 63 and is provided with a tongue 66 projecting into the weatherstrip recess 25 of the adjacent window frame jamb 3. A U-shaped metal plate 67 is fitted over tongue 66 and carries a weatherstrip 68 having a relatively heavy nap 68a in which the ridges of the serrated side walls of recess 25 are embedded to give an efficient weatherstripping effect. Weatherstrip 67 is folded to embrace the folded edges and sides of plate 67 and is provided with cord-reinforced or beaded edges over which the side edges of plate 67 are rolled as indicated at 69. The rolled edges of plate 67 are held in grooves 70 provided in weatherstrip holder 65 at the base of tongue 66. The facing section 57 of the side sill of each lower sash is provided with a tongue 72 extending into the groove 64 of main side rail section 58. A U-shaped metal weatherstrip holder 73 is fitted on tongue 72 and carries a weatherstrip 74. Weatherstrip 74 is folded over holder 72 and has its side edges turned outwardly to provide flaps 76 which are interposed between main rail section 58 and facing section 57 to reduce direct metal-to-metal contact between said sections. Intermediate portions of weatherstrip 74 are folded around and secured to cords 78 to provide substantially cylindrical anchoring portions which are held in groove provided in facing section 57 at the base of tongue 72. Ridges 81 projecting

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inwardly from the side walls of groove 64 engage weatherstrip 74 to give an efficient weatherstripping effect. A portion of the side rail facing section 57 is opposed to the flange 60 of main rail section 59 to provide a side rail continuation of the glazing channel formed by the flanges 40 and 41 of the bottom sash rail.

The top rail of the lower sash comprises a facing section 82 (Fig. 1) and a main section 83 which are substantial duplicates of the facing and main sections of the side rails. Facing section 82 is provided with a tongue 85 extending into groove 86 of main section 83 and equipped with a weatherstrip holder and weatherstrip corresponding to the previously mentioned holder 73 and weatherstrip 74. A flange 90 extends downwardly from the outdoor edge of the web 91 of the main top rail section 83 and is opposed to a portion of the facing section 82 to complete the glazing channel in which a glazing unit 92, preferably of the multi-pane type, is secured by a suitable caulking compound 93.

At the outdoor side of glazing unit 92 the top rail of lower sash 7 is formed with a downwardly opening pocket 95. The side walls of pocket 95 are formed with inwardly facing grooves 96 in which are fitted weatherstrip holders 97 equipped with weatherstrips 98. The holders 97 and weatherstrips 98 are duplicates of the previously described holders 52 and weatherstrips 54 applied to the bottom rail of the lower sash.

The main top and bottom rail sections of the lower sash are secured to the main side rail section by corner angles 99 which are fitted in grooves 100 and welded or otherwise secured in place.

The bottom rail 101 of upper sash 6 is made in one piece and is formed with a glazing channel 102 in which is fitted the lower edge of a multi-pane glazing unit 103. A flange 104 extends inwardly from rail 101 and terminates in an upwardly directed tongue 105. When the two sashes are positioned as shown in Fig. 1, the bottom rail tongue 105 of the upper sash is received in the top rail pocket 95 of the lower sash and is engaged by the weatherstrips 98.

The side and top rails of the upper sash are shown as duplicates of the corresponding rails of the lower sash and therefore need not be described in detail. In this connection it is deemed sufficient to point out that the side rails of the upper sash are fitted with weatherstrip holders 106 and weatherstrips 107 (Fig. 2) corresponding to the previously mentioned holders 65 and weatherstrips 67 carried by the side rails of the lower sash. The weatherstrips 107 of the upper sash work in the weatherstrip recesses 25 of the adjacent window frame jambs 3.

A weatherstrip holder 109 (Fig. 1) is fitted in an upwardly facing groove 110 in the top rail of the upper sash and has a tongue 111 which extends upwardly into the head recess 19 of the window frame and carries a weatherstrip 112 corresponding to the previously mentioned weatherstrips shown at 67 and 107. The component rails of the upper sash are secured together by corner angles 113 corresponding to the corner angles 99 of the lower sash.

The sashes 6 and 7 are connected together at each side of the window frame by upper and lower flexible metal bands 116 and 117, which are trained around upper and lower pulleys 118 and 119 located within the width of the parting strip 34.

Each upper band 116 is provided with terminal

anchoring loops 120 and 121. The loop 120 of bands 116 are anchored by screws 122 to the upper ends of the weatherstrip holders 65 mounted in the side rails of the lower sash. The remaining loops 121 of bands 116 are similarly anchored to the upper ends of the weatherstrip holders 106 mounted in the side rails of the upper sash.

The lower bands 117 are provided at one end with anchoring loops 125 and at the other end with anchoring loops 126. The loops 125 are anchored by screws 127 to the lower ends of the weatherstrip holders 65 of the lower sash and the loops 126 are anchored by screws 128 to the lower ends of the weatherstrip holders 106 of the upper sash. The bands 116 and 117 travel close to the sides of the parting strips 37 and are substantially concealed by the parting strip corner beads 35.

As indicated in Fig. 1 by dotted line 130, each of the lower sash weatherstripping units comprising holder 65, plates 67 and weatherstrip 68, is preferably divided horizontally into upper and lower sections. This facilitates placement and removal of said units since it permits the upper section to be inserted and removed from the top of the sash and the lower section to be inserted and removed from the bottom of the sash. Similarly, each of the corresponding weatherstripping units carried by the side rails of the upper sash may be likewise divided into upper and lower sections.

An important feature of the window described herein is that the sashes may be manipulated to give any desired degree of direct or indirect ventilation. For example, if the lower sash is raised approximately one inch from its lowermost position, the upper sash will be moved downwardly a corresponding distance through the agency of the sash connecting bands 116 and 117 and the meeting rails of the two sashes will move apart a distance of approximately two inches. The sashes are designed so that the two inch separation of the meeting rails withdraws the bottom rail tongue 105 of upper sash 6 from the downwardly opening top rail pocket 95 of lower sash 7 and thus permits indirect ventilation or aeration to take place at the gap between the meeting rails of the sashes, while the sash-engaging leg 14 of frame sill 1 is still engaged by the weatherstrips 54 in the bottom rail groove 49 of lower sash 7 to prevent direct ventilation between the frame sill and the lower sash. When the meeting rails of the two sashes are separated a distance of two inches the top rail weatherstrip 112 of the upper sash will be lowered to a position where it is just blocking the mouth of the recess 19 in the head of the window frame. A slight further raising of the lower sash will therefore further lower the top rail weatherstrip 112 of the upper sash to permit ventilation between the top rail of the upper sash and the head of the window frame, as well as between the meeting rails of the two sashes while the sill leg 14 of the window frame is still extending a sufficient distance into the bottom rail groove 49 of the lower sash to prevent ventilation between the lower sash and the sill of the window frame. If the lower sash is now raised a further distance ventilation will also take place between the lower sash and the sill of the window frame. The maximum degree of ventilation is obtained when the sashes are shifted to a position where the top and bottom rails of the lower sash lie directly opposite the corresponding rails of the upper sash. In this position of the sashes the area of daylight

opening as measured from the sill of the window frame to the bottom rails of the sashes or as measured from the head of the window frame to the top rails of the sashes is equal in height to only a quarter the total height of the window opening bounded by the window frame as compared with ordinary sashes in which the sashes may be positioned opposite to each other to give an area opening which is equal in height to half the height of the total window opening bounded by the window frame. It will thus be seen that the danger of a person falling out of my improved window when the sashes are positioned directly opposite each other to give the maximum area of ventilation is correspondingly reduced. Further safety is provided by reason of the fact that through the agency of the connecting bands 167 and 117 both sashes may be opened from the inside of the room by a person grasping the handgrip 47 and raising the lower sash.

Another advantage of the window described herein is that the guiding effect afforded by the weatherstrips which extend from the side rails of each sash into the grooves provided in the jamb of the window frame makes it possible to eliminate the parting strips 34 wherever such elimination is desirable or necessary.

Another advantage of the window described herein is that it provides for easy and convenient removal and replacement of the sashes. When it is desired to remove one of the sashes this is easily accomplished by removing the screws anchoring the sash connecting bands to the upper and lower ends of the horizontally divided weatherstrip holders mounted in the side rails of the sash. The upper and lower sections of the weatherstrip holder are then removed from the groove in the side rail of the sash by sliding the upper section upwardly and the lower section downwardly.

The pulleys 118 and 119 at each side of the window are journaled in a pulley block 133 (Figs. 1 and 5) which is fastened to the side jamb of the window frame so that it constitutes a section of the parting strip at that side of the window. Each pulley block 133 is provided with a transverse passage 134 in which a sealing strip 135 is held with the ends of the sealing strip projecting beyond the sides of the pulley block and bearing against the adjacent side rails of the upper and lower sashes. This arrangement minimizes leakage of air between the side rails of the sashes and the parting strips.

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. A window assembly comprising a window frame, upper and lower sashes slidable in said frame, each side rail of each sash being provided with a vertical groove extending the full length of said rail and opposed to a vertical sash guiding channel formed in the adjacent jamb of the window frame, sash guiding strips fitted in the grooves of each sash and provided with sash guiding projections slidably fitted in the opposing sash guiding channels of the window frame, each strip and its sash guiding projection being divided horizontally into upper and lower sections to facilitate removal and insertion of said strips, a pair of upper and lower pulleys secured to an intermediate portion of each jamb of the win-

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down frame, a pair of upper and lower flexible elements, the upper flexible elements being trained around the upper pulleys located at the opposite sides of the window frame and having corresponding ends thereof anchored to the upper extremities of the upper sections of the sash guiding strips carried by the upper sash, the remaining extremities of said upper flexible elements being anchored to the upper extremities of the upper sections of the sash guiding strips carried by the lower sash, the lower flexible elements being trained around the lower pulleys located at opposite sides of the window frame and having corresponding ends thereof secured to the lower extremities of the sash guiding strips carried by the upper sash, the remaining ends of the said lower flexible elements being secured to the lower extremities of the sash guiding strips carried by the lower sash frame.

2. A window assembly comprising a window frame, upper and lower sashes slidable in said frame, sash guiding strips removably fitted in grooves provided in the side rails of each sash, said sash guiding strips being provided with sash guiding projections slidably fitted in vertical guide channels formed in the jambs of the window frame, a pair of upper and lower pulleys secured to an intermediate portion of each jamb of the window frame, a pair of upper flexible elements trained around the upper pulleys located at opposite sides of the window frame, a pair of lower flexible elements trained around the lower pulleys located at opposite sides of the window frame, the upper pair of flexible elements having corresponding ends thereof anchored to the upper

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extremities of the sash guiding strips carried by the upper sash and having the remaining ends thereof anchored to the upper extremities of the sash guiding strips carried by the lower sash, the lower pair of flexible elements having corresponding ends thereof anchored to the lower extremities of the sash guiding strips carried by the upper sash and having their remaining ends anchored to the lower extremities of the sash guiding strips carried by the lower sash.

3. A window assembly as set forth in claim 2 in which the sash guiding projection of each sash guiding strip comprises a relatively thin tongue-like member covered by weatherstripping material engaging the defining walls of the sash guiding channel in which said projection is slidably fitted.

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