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AWNING TYPE WINDOW STRUCTURE WITH OPERATING AND LOCKING MECHANISMS THEREFOR

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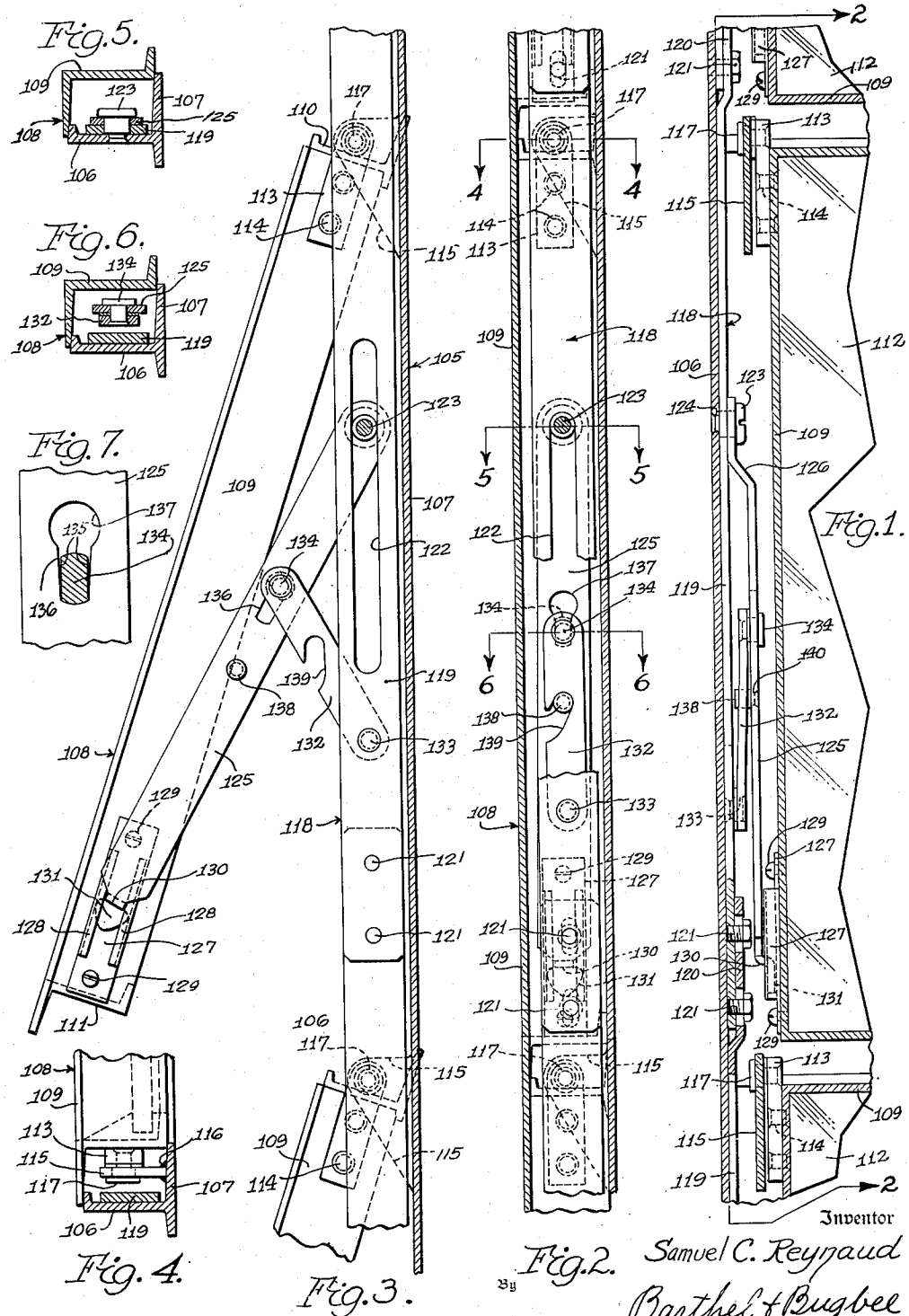


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Inventor

Samuel C. Reynaud

By Barthel & Bugbee

Attorneys

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AWNING TYPE WINDOW STRUCTURE WITH OPERATING AND LOCKING MECHANISMS THEREFOR

Samuel C. Reynaud, Detroit, Mich.

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3 Claims. (Cl. 189—69)

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The present invention relates to window structures of the awning or vertically swinging type, and more particularly to an operating mechanism therefor.

The primary object of the invention is to provide a window structure having vertically swinging sash members arranged to swing about horizontally disposed hinge pins so as to permit the window sashes to be moved to various positions of adjustment, and to provide an operating mechanism therefor so constructed as to render the operation of said sash member possible with considerable ease and facility.

Another object of the invention is to provide a window structure of the above-mentioned type and an operating mechanism therefor connected to the sash members at one side of the window frame in such a manner as to produce a mechanical advantage and permit the vertically swinging windows to be raised and lowered or moved to various positions of adjustment with slight effort on the part of the operator.

Another object of the invention is to provide a window structure including a series of vertically swinging sash members which are slightly canted so that when the operating mechanism at one side of the window is controlled to move the window sashes to a closed position, the edge opposite the operating mechanism thereof will engage the window frame and be caused to tightly seat thereagainst.

Another object of the invention is to provide a window structure including a series of vertically swinging sash members adapted to be swung to and fro by means of a slide bar and connecting linkage arranged so that the sash will be automatically locked in its closed position when the slide bar has been moved in a direction to swing the sash members to their closed position.

Another object of the invention is to provide a window structure including a window frame having a series of sash members pivoted thereto to swing vertically and to provide on one side of said window structure suitable operating mechanism for raising and lowering the window sashes and on the other side of the window structure a locking mechanism to latch the free edge of the sash members in a closed position. The operating and locking mechanism is independently controlled at each side of the window structure.

Another object of the invention is to provide a window structure including a window frame having a series of vertically swinging sash members which are adapted to be controlled by a slide bar at one side of the window frame having suitable linkage connecting the slide bars and sash members so that the sash members may be moved to and fro in unison, and movement of the slide bar in one of its directions of movement will cause a slight outward thrust to be imparted to the window sashes thereby assisting in the initial opening thereof.

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Another object of the invention is to provide a window structure having a frame member adapted to be inserted in an opening in a building or the like for accommodating a series of vertically swinging sash members having operating mechanism therefor at one side of the window frame connected to the sash members by suitable linkage arranged for exerting an inward thrust on the sash members when the operating bar is moved in a direction to close said sash members, whereby the final movement of the operating bar will tightly draw the sash members into the window frame and lock the same against unauthorized opening.

Figure 1 is a fragmentary plan view of the invention showing portions thereof in section to illustrate the operating linkage at one side of the window frame;

Figure 2 is a vertical cross-sectional view taken on line 2—2 of Figure 1, looking in the direction of the arrows and showing the manner in which the operating linkage is arranged between the window sash and frame structure;

Figure 3 is a vertical cross-sectional view similar to Figure 2 showing one of the sash members in its partly opened position and the manner in which the linkage is arranged to exert an outward and upward force on the free swinging end of the sash members;

Figure 4 is a horizontal cross-sectional view taken on line 4—4 of Figure 2 looking in the direction of the arrows and showing the manner in which the sash members are pivotally attached to the side rails of the window frame;

Figure 5 is a horizontal cross-sectional view taken on line 5—5 of Figure 2 looking in the direction of the arrows and showing the manner in which the window operating linkage and operating bars are pivoted and slidably connected to the window frame respectively;

Figure 6 is a horizontal cross-sectional view taken on line 6—6 of Figure 2 looking in the direction of the arrows and showing the slide connection between the linkage and slide bar to facilitate the initial outward movement of the sash frame during opening and final closing or seating of the sash frame during movement of

the slide bar in the direction of closing movement;

Figure 7 is an enlarged fragmentary detailed view of the pivot pin employed for connecting the window linkage to the slide bar connecting link to permit relative movement between said slide bar connecting link and window linkage during the opening and closing movement of the slide bar.

Referring to the drawings in detail, Figures 1 to 7 inclusive show one form of the invention as applied to a rectangular window frame generally designated 105 of channel or Z-bar formation in cross-section, including side frame members 106 having flanges 107, and the sash frame members or bars 106 are connected at their tops and bottom by horizontal cross rails (not shown).

A series of window sashes are adapted to be supported by the rectangular window frame 105 and are generally designated 108. The window sashes 108 are arranged in superposed relation one above the other to swing vertically on horizontal pivots to facilitate the opening and closing thereof.

Each of the window sashes 108 is formed of side rail portions 109 connected at the top and bottom by horizontal rails 110 and 111 respectively. The side, top and bottom rails are formed of suitable bar members of Z or channel section welded together at their ends or otherwise suitably fastened, and are adapted to support glass panel members 112.

Secured to the upper portion of the sash side rails 109 at each side of the window sash is a hinge bracket 113 which is fastened in place by rivets or the like 114. A hinge plate 115 is welded as at 116 to the flange 107 of the side rails 106 (Figure 4) and said hinge bracket 115 is provided with a suitable opening adapted to register with an opening in the upper end of the hinge bar 115 for receiving a hinge pin 117. In this manner, the sash members 108 are hinged at their upper ends to the window frame 105 to swing vertically on the horizontal pivot pins 117.

In order to operate the window sashes 108 in unison, a slide bar generally designated 118 is slidably connected to the web portion of the side rail 106 by suitable pin and slot connections and it is to be noted that the slide bar 118 is composed of bar sections 119 having offset overlapping end portions 120 for being connected together by screws or the like as at 121. Each of the slide bar sections 119 is provided with an elongated slot 122 which is adapted to be guided upon a guide screw 123 threaded in a suitable opening 124 in the web portion of the side rail 106.

Anchored to the screw pins 123 is an operating lever 125 which is provided with an offset portion 126 so that the free end of the operating lever may be slidably connected to the side bars 109 of the window sash 108. The slidable connection for accomplishing the above, includes a slide guide comprising a base portion 127 having upwardly and inwardly extending flanges 128. The base plate 127 is fixed in place by suitable screws or the like 129. The extreme free end of the pivoted operating lever 125 is bent or offset as at 130 to provide a slightly rounded guide portion 131 adapted to be received between the inwardly extending flanges 128 and be slidably guided therein.

The pivoted operating levers 125 are adapted to be connected to the slide bar 118 by means of linkage 132, one end of which is pivoted to the side bar by means of a pivot pin 133 while the opposite end is provided with a pivot pin 134 having flattened side portions 135. The pivot pin 134 is anchored to the end of the linkage 132 in such a manner as to be rigidly secured thereto, and as shown in Figure 1, the pin 134 is riveted in place. The pivot pin 134 is adapted to operate in a keyhole slot 136 formed in the operating lever 125 so that after the slide bar 118 has been moved upwardly a slight amount to disengage a pair of mutually engaging cam surfaces, the same will be received in the circular portion 137 of the keyhole slot 136 so as to permit free relative movement of the pivot pin 134 with respect to the pivoted operating lever 125. Secured to the pivoted operating lever 125 adjacent the keyhole slot 136 is a cam pin 138 which is adapted to be received in an obliquely extending slot 139 formed in the link 132 substantially intermediate the ends thereof. The cam pin 138 is rigidly affixed to the operating lever 125 by being riveted thereto as at 140.

Suitable operating mechanism may be provided for the slide bar 118, such as a conventional rack and pinion drive, and it is to be understood that the sash frames 108 are slightly distorted or canted so as to permit the operating slide bar 118 and sash connecting linkage to move the opposite edge of the window sash into engagement with the window frame 105 prior to the engagement of the flanges of said sash member 108 on the side adjacent the operating mechanism. It is intended to provide a locking bar on the side of the window sash 108 opposite the operating mechanism, so that the projections thereon will engage the keeper members carried by the lower swinging end of the side sash rails 109. An operator for controlling the slide bar may also be incorporated in the window frame structure to securely lock the swinging sash member 108 in position when closed.

Operation

It will be assumed that the window sashes 108 are in their fully closed position, and that the locking means on the sides thereof opposite the operating mechanism is in its latched position. The operating mechanism will assume the position shown in Figures 1 and 2 and by releasing the locking mechanism on the opposite side of the window sash, the slide bar 118 may be raised or elevated by means of the control therefor such as the conventional rack and gearing mentioned above. During the initial upward movement of the slide bar 118, the square sided pivot pin 134 will travel upwardly toward the round portion 137 of the keyhole slot 136, so that the mutually engaging cam surfaces 138 and 139, upon continued travel of the slide bar 118, will exert an outward force on the sash members 108 and cause the same to swing about the hinge pins 117 as shown in Figure 3. As this occurs, the pivot points 123, 133 and 134 (which, it is to be noted, are in line—Figure 2) will be moved off-center by the outward exertion created by the mutually engaging cam surfaces 138 and 139 so as to break the pivot points and throw the same off dead-center to thereby permit the sash members 108 to be raised to various positions of adjustment. The slide bar 118 will be held in its adjusted position by the manual control mechanism including the rack and pinion connection and the sash members 108 may be retained in their predetermined opened position.

When the slide bar 118 is moved downwardly

in a direction to close the sashes 108 and swing the same horizontally about their hinge pins 117, the links 132 swing the operating levers 125 inwardly until the flat-sided pin 134 is in registry with the elongated portion of the keyhole slot 136. As this occurs, the cam pin 138 will be received in the obliquely arranged cam slot 139 in the links 132 so that continued downward movement of the slide bar 118 will cause the mutually engaging cam surfaces of the slot and pin to exert an inward force or pressure on the sash members 108 and swing the same inwardly against the window frame 105. As mentioned above, the opposite side of the window sash 108 will have engaged the window frame 105 prior to the exertion of the final closing force imparted to the operating mechanism side of the window sash. As the flattened pivot pin 134 travels downwardly in the elongated portion of the keyhole slot 136, the window sash will be locked at the operating mechanism side thereof against outward swinging movement, and by manipulating the locking mechanism at the opposite side of the window sash 108, the entire sash members will be securely locked at each side thereof to the window frame 105.

The uppermost vertically swinging sash member 108 in the window frame 105 is adapted to be provided with a hinge connection so as to permit the uppermost sash member to be swung to a position to facilitate swinging of the sash panel member 112.

In certain window constructions, it may be desired to provide an operating mechanism at each side of the window frame, and in this event, the window operating structure mentioned above may be duplicated at each side thereof with operating gears connected by a horizontally extending torsion bar so that operation of one of said gears 76 by means of a control handle will cause rotation of both gears and the operation of the sash operating bar at each side of the window frame.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred embodiments of the same and that various changes may be made in the shape, size and arrangement of parts without departing from the spirit of the invention or the scope of the subjoined claims.

What I claim is:

1. A window structure comprising a window frame having side and end members, a sash member hingedly connected to said side members, a slide bar reciprocably connected to one of said side members, an operating link having one of its ends pivoted to said slide bar and its other end slidably connected to the sash member, link means pivotally connecting the operating link with said slide bar, mutually engaging pin and slot means on said link means and operating link for exerting an initial opening movement of said sash member, mutually engaging locking surfaces on the pivotal connection between the link means and operating link, and means for operating said slide bar.

2. A window structure comprising a window frame having side and end members, a sash member hingedly connected to said side members, a slide bar reciprocably connected to one of said side members, an operating link having one of its ends pivoted to said slide bar and its other end slidably connected to the sash member, link means pivotally connecting the operating link with said slide bar, mutually engaging pin and slot means on said link means and operating link for exerting an initial opening movement on said sash member, mutually engaging locking surfaces on the pivotal connection between the link means and operating link, and means for operating said slide bar, said sash member being canted slightly from its normal plane so that one side thereof will engage the window frame prior to the engagement of the other side.

3. A window structure comprising a window frame having side and end members, a sash member hingedly connected to said side members, a slide bar reciprocably connected to one of said side members, an operating link having one of its ends pivoted to said slide bar and its other end slidably connected to the sash member, link means pivotally connecting the operating link with said slide bar, mutually engaging pin and slot means on said link means and operating link for exerting an initial opening movement on said sash member, mutually engaging locking surfaces on the pivotal connection between the link means and operating link, and means for operating said slide bar, said mutually engaging locking surfaces including a pin and keyhole slot connection whereby said pin will travel into the reduced portion of said keyhole slot upon downward movement of said slide bar and lock said sash member in a closed position.

SAMUEL C. REYNAUD.

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