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COMBINED AWNING TYPE WINDOW AND SUPPORTING AND OPERATING HARDWARE THEREFOR

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This invention relates to suspension and operating hardware particularly adapted for use with awning type windows, such as the windows disclosed in my co-pending application entitled Window Construction, filed October 20, 1948, S. N. 55,471.

It has long been a problem in awning type casement windows to provide efficient, durable and yet inexpensive hardware for supporting and operating the individual sash members while at the same time permitting satisfactory screening of the windows.

It is an object of my present invention to provide novel and improved hardware for supporting and operating an awning type window and adapted to carry and permit easy operation of the individual sash of said window, while permitting use of a stationary screen across the inside of the entire window.

It is another object to provide supporting and operating hardware particularly adapted to cooperate with my overlapped awning type window construction, disclosed in my above identified co-pending application, to permit individual and independent operation of each sash of the window.

More specifically it is an object to provide sash supporting hardware adapted to be mounted on the upright members of a window frame on each side of a sash, and including a pair of pivotally interconnected toggle arms for carrying each side of said sash, and each sash including operating hardware connected to one of the toggle arms on at least one side of said sash to permit said sash to be controllably swung into adjusted position.

It is a further object to provide locking means working in combination with said operating hardware to draw in and securely lock the side of the sash not controlled by said operating hardware.

It is still a further object to provide operating hardware adapted to be connected to one of the toggle arms of the supporting hardware, and including a link with a bell-crank lever arrangement for controllably positioning said toggle arm and the sash connected thereto.

It is still another object to provide a worm and pinion operating mechanism adapted to controllably vary the position of each individual window sash and having a retractable operating handle.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views, and in which;

Fig. 1 is an outside elevational view of three of my awning type sash, mounted in a single frame to form a single window unit for a building;

Fig. 2 is an inside elevational view of the window shown in Fig. 1;

Fig. 3 is a transverse vertical sectional view, taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary horizontal sectional view taken substantially along the line 4—4 of Fig. 5, and showing one form of sash-operating hardware;

Fig. 5 is a fragmentary vertical sectional view taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary horizontal sectional view taken substantially along the line 6—6 of Fig. 5, and showing an alternative form of sash-operating hardware;

Fig. 7 is a fragmentary vertical sectional view taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a fragmentary vertical sectional view showing in detail the hollow, worm-driving member illustrated in Figs. 6 and 7;

Fig. 9 is a front elevational view of the parts shown in Fig. 8;

Fig. 10 is a fragmentary horizontal sectional view taken substantially along the line 10—10 of Fig. 11, and showing my sash locking mechanism;

Fig. 11 is a fragmentary vertical sectional view taken substantially along the line 11—11 of Fig. 10;

Fig. 12 is a fragmentary inside elevational view showing the locking mechanism illustrated in Figs. 10 and 11;

Fig. 13 is a side elevational view showing in partially open position the sash supporting hardware with which my operating hardware is adapted to operate;

Fig. 14 is a front elevational view showing the hardware illustrated in Fig. 13, and

Fig. 15 is a top plan view of the supporting hardware illustrated in Figs. 13 and 14.

As illustrated in the accompanying drawings, I provide a window unit in the form of a plurality of awning type sash mounted in a casing or frame, which is installed in a building. A fragmentary portion of a building side wall is best shown in Figs. 1 and 2, and is designated as an entirety by the numeral 17. The outer wall 17 is covered with shingles which have a relatively narrow overlap presenting a very wide, visible portion of the shingle, as best shown in Fig. 1. The frame or casing 18 is securedly fixed in the wall 17, and suitable molding trim surrounds the same on the outside as well as the inside. The trim on the outside is designated by the numeral 18a, and the trim or molding on the inside is designated by the numeral 18b. Each sash is designated as an entirety by the letter S, and has upper and lower rails 16a and 16b respectively, and a pair of side rails 16c and 16d respectively. The sash illustrated have only single glazing, but could be double glazed as shown in my above identified co-pending application.

The sash supporting hardware units designated as an entirety by the letter H, and illustrated in Figs. 13, 14 and 15, consist in an elongated mounting strip 19, having the cross-sectional shape shown in Fig. 15, forming a track 19a. A slide 20 is mounted in the track 19a, as best shown in Fig. 15, and is free to slide up and down therein with provision for frictionally retaining the same in any set position. A sash supporting toggle arm 21 has its upper end pivotally connected to slide 20 as by pivot pin 22, and a bracing toggle arm 23 has its upper end pivotally connected at the lower portion of supporting arm 21 as by the pivot pin 24, and its lower end pivotally connected at the lower portion of mounting member 19 by the pivot pin 25. In the form of the invention shown, three window sash S are provided and the side stiles 16c and 16d are respectively provided on the sash supporting toggle arms 21 of a pair of supporting hardware units H which arms above described are respectively recessed into said stiles, with the upper ends of the stiles adjacent the upper ends of the supporting arms 21 and slides 20. The mounting member 19 is securely attached to the upstanding member of frame 19 as by driving screws into said frame through the apertures 19a provided in mounting member 19. In closed position the toggle arms 21 and 23 are substantially aligned with.
each other, as well as being substantially aligned with the mounting strip 19. The mounting strip is disposed at a close inclination on the slide frame members, as best shown in Fig. 3, and the window sash are also sloped at similar inclination when in closed position.

In the form shown, the side stiles 16c and 16d of the sash 5 are completely concealed from the inside and a bumper strip 26 is secured to the side portions of frame 18. The bumper strip is inclined to engage the inner marginal edge portion of the stiles 16c and 16d when the sash are in closed position, and a slot is provided between the bumper strip 26 and the adjacent portion of frame 18 on each side of each of the sash members to permit installation of the operating and locking hardware. In Figs. 4 and 5, one form of operating hardware is illustrated and is designated by the letter A. In form A a link 27 is pivotally connected by a removable pin 28 to the bracing toggle arm 23 at a point disposed in slightly spaced relation above the pivot 25. It is an oscillating actuating member which, in this form of my invention, consists in a bell crank 29 pivoted on a pin 30, which is anchored to a suitable casing member 31 which, in turn, is fixed in one of the slots in the casing. The operating crank arm 29a of the bell crank 29 is pivotally connected to the inner end of a tangent bar 32 by a shifting pin 33. A gripping arm 34 is pivotally connected at the free end portion of the lever arm 29b of the bell crank 29 and permits easy operation thereof. In the form shown, the lever arm 29b is somewhat longer than the crank arm 29a to facilitate easy operation of the mechanism.

In form B another alternative form of operating mechanism designated by the letter B. In form B a link 34 interconnects an intermediate portion of the bracing toggle arm 23 and a point on the periphery of the oscillating actuating member which, in this form, consists in a pinion gear 35. A removable pivot pin 36 is provided at the outer connection of link 34 and a shifting pivot pin 37 is provided at the inner end thereof. The pinion 35 is journaled on a shaft 38, which is mounted in a suitable casing 39, which is fixed to the window casing 18. A worm 40 is formed on a hollow shaft 40b and is intermeshed with the teeth of the pinion 35 and has a pair of longitudinally disposed diametrically opposed keyways 40a internally formed in the hollow shaft 40b. An operating handle 41 is pivotally mounted on a pin 42, which is slidable arranged in the keyways 40a; the outer end portions of the keyways 40a are located in close cooperation with the worm 40c. A pair of operating slots 43 are formed across the end of the hollow shaft 40b, and one is adapted to receive the elongated operating lever of crank 41 when in operative position as shown in Fig. 7, and the other is adapted to receive the gripping handle 41a, when said handle 41 is retracted telescopically into the hollow shaft 40b.

It should be noted that the operating mechanisms, forms A and B, are designed for cooperation with only one of the two supporting hardware units H, which carry each of the sash members and, therefore, it is necessary to provide a sealing and locking device for the other side of each of the sash. This device is illustrated in Figs. 10, 11 and 12 and includes an operating handle 44 pivotally mounted in a suitable casing 45 by the pivot pin 46. An elongated latch hook 47 has a downwardly curved rear portion which is pivotally connected to the handle member 44 as by a pivot pin 48 disposed eccentrically of the pivot pin 46. The forward end portion of hook 47 has a retaining shoulder 47a and an inclined camming shoulder 47b formed at an intermediate portion of the lower edge portion of hook 47. A camming pin 49 is fixed to the casing 45 adjacent the forward end of camming shoulder 47b when said hook member 47 is in its fully retracted locking position, and a retaining pin 50 is fixed to the window sash in a hook receiving recess formed therein.

The following is a description of the operation of my improved supporting and operating hardware as used in combination with my overlapped awning type window construction:

Each of the sash members has its own supporting, operating and locking hardware, and when the window is closed against the bumper strip 26, the crank 29a of form A of the invention is swung into over-center position 32 disposed slightly below a straight line drawn through the pivot pins 28 and 30 to draw the sash stile at that side of the window tightly against the bumper strip. The other stile of each sash is securely held against the bumper strip by the hook 47. To open the sash the hook 47 is released by swinging upwardly on the handle 44 to project said hook member forwardly whereby the camming shoulder 47b operates against the camming pin 49 to raise the locking shoulder 47a above the retaining pin 50. By pulling outwardly on the handle 33 the crank arm 29a is oscillated on its pin 30 to project the link 27 outwardly and swing the toggle arms 23 and 21 outwardly and shift the slide 20 and the upper corners of the sash downwardly along the mounting strip 19. As best shown in Fig. 3, the inner edge of the top rails of the sash members are rounded off at the corners thereof to permit clearance of the bumpers when they are swung outwardly into open position. Also, the inner edge of the lower sash rails are rounded off to provide clearance for the underlying upper rail of the sash disposed immediately therebelow when it is desired to open the lower sash without opening the upper sash member. When the sash is swung outwardly to about 45°, the crank arm 29a is swung over into the dotted position of Fig. 5 and the lever arm 29b is swung up into the upper dotted position in substantially straight line relation to the lower closed position.

In form B of the invention, the crank handle 41 can be retracted into the tubular shaft 40b as shown by the dotted position of Fig. 8 to almost fully conceal the same, and when it is desired to open the window said handle is merely pulled out and swung over into one of the slots 42 to turn the worm 40 and the intermeshed pinion 35 to project the link 34 and toggle arms 21 and 23 outwardly, as described above. The locking hook 47 on the other side of each sash is the same for both form A and form B of the invention.

It will be seen that I have provided extremely simple, highly efficient, operating hardware adapted to be used in combination with the overlapped awning type windows and the supporting hardware shown herein whereby each sash may be individually and independently operated. The removable pins 28 and 36 may be taken out of the respective apertures to permit the sash to be manually swung into extreme open position to facilitate cleaning thereof from the inside. As brought out in my above identified co-pending application, this type of awning window is extremely easy to weatherstrip and the improved hardware mechanism herein disclosed permits easy operation thereof without removal of the screens which must, of necessity, cover the inside of the window and may be fixedly mounted to the frame 18.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. Supporting and operating hardware for awning type windows, the hardware for each window sash having in combination a pair of sash supporting units adapted to be respectively mounted on the sides of a window frame in laterally opposed relation one to the other; each unit comprising a manpower adapted to be secured to a side frame member and constructed to form an upstanding guiding track, a sliding element normally mounted at one end of said track and shiftable thereon,
a pair of toggle arms disposed longitudinally of said mounting member when in normal retracted position, one of said toggle arms being pivotally connected with said sliding element and the other being pivotally mounted for oscillation on a fixed axis, the other end portions of said toggle arms being pivotally interconnected, one of said toggle arms being adapted to be attached in fixed relation to one side stile of the window sash to carry the same; a similar unit adapted to similarly support the other side of said sash, an operating link pivotally connected at its outer end to an intermediate portion of one of said toggle arms of at least one of said sash supporting units, an oscillatably actuating member adapted to be pivotally connected to a side of a window frame for rotative movement on a fixed axis, a shiftable pivot pin disposed in spaced relation to said fixed pivotal axis of the oscillating member and interconnecting said oscillating member and the inner end of said link, and actuating mechanism connected with said oscillating member to produce rotative movement thereof to shift said pivot pin and link outwardly and inwardly to open and close said window sash by adjustably swinging said toggle arms.

2. The structure set forth in claim 1 and said oscillating member constituting a toothed pinion with said pivot pin eccentrically mounted thereon and said actuating mechanism consisting in a worm gear meshed with said pinion and journaled in said side frame member to produce rotative movement of said pinion when said worm gear is rotated, and said worm gear being adapted to receive a crank member for rotating the same.

3. The structure set forth in claim 1 and said oscillating member constituting a bell crank mounted for swinging movement on a fixed axis, the arms of said bell crank forming an operating handle and an actuating crank arm, and said pivot pin interconnecting the outer portion of said crank arm with the inner end of said link to produce shifting movement of the pivot pin and link when the operating arm is oscillated on its fixed axis.

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