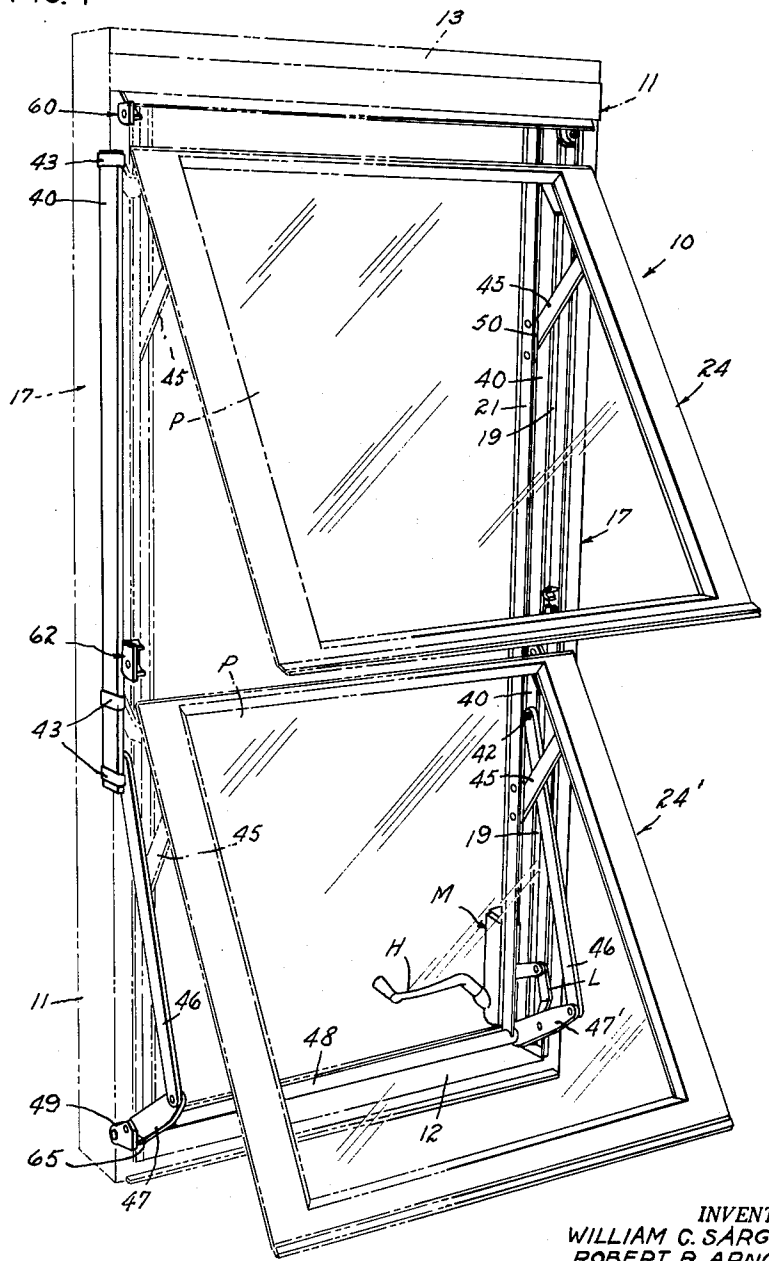
Aug. 3, 1965 W. C. SARGENT ETAL 3,197,818

AWNING WINDOW

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FIG. 1



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AWNING WINDOW

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FIG. 2

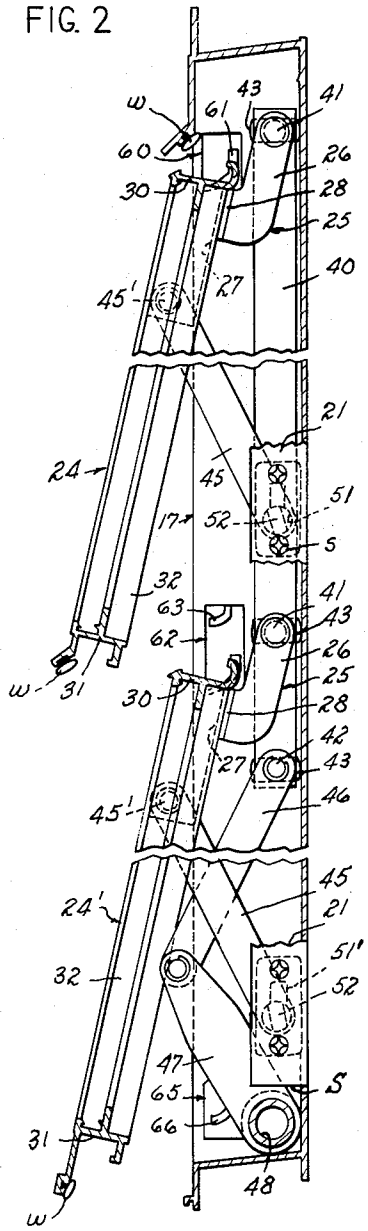
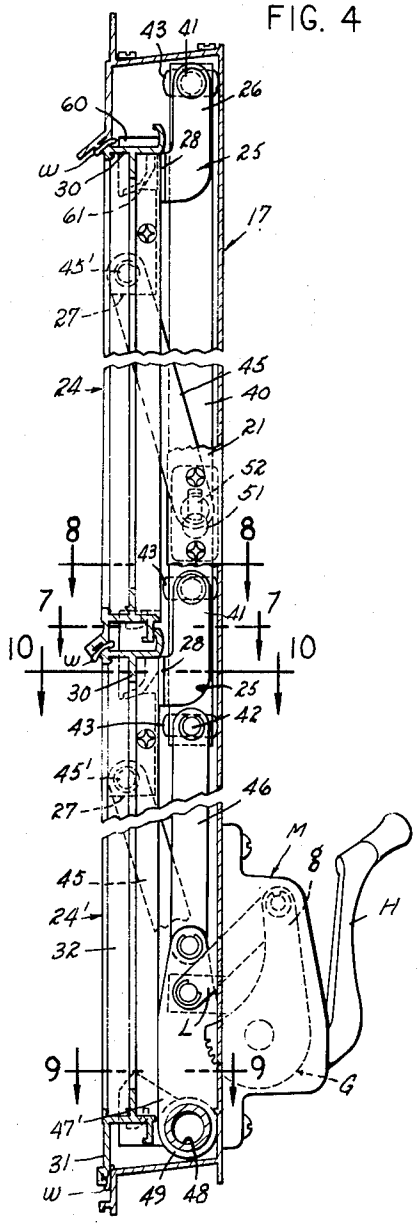


FIG. 4



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AWNING WINDOW

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FIG. 3

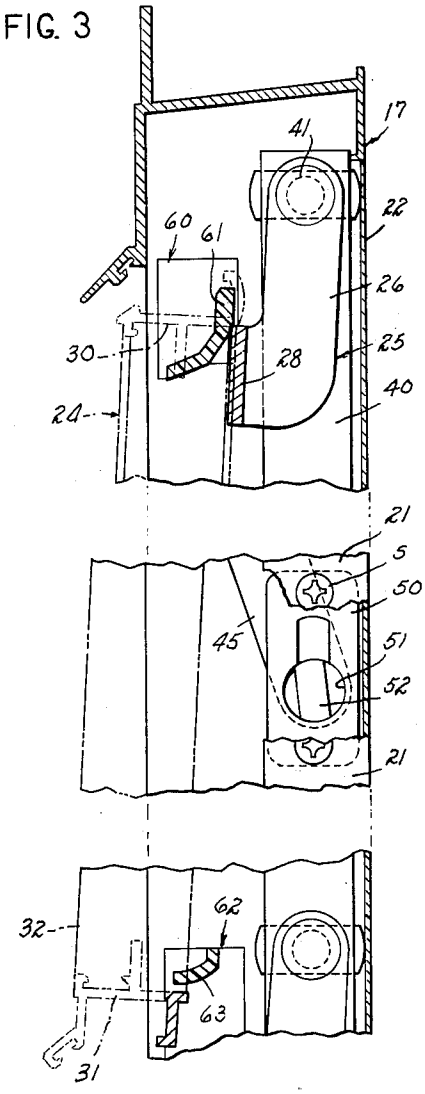


FIG. 5

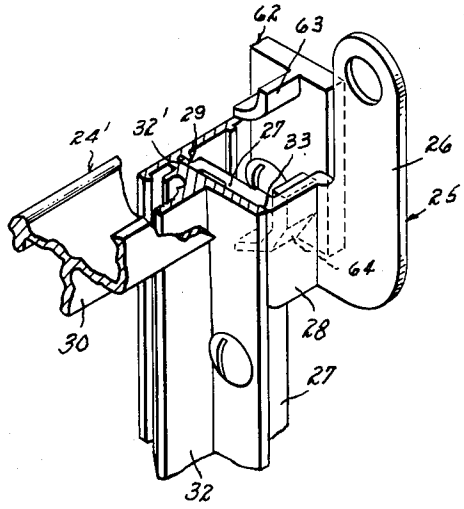
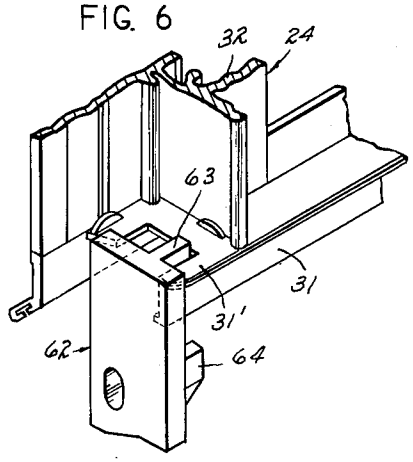


FIG. 6



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FIG. 7

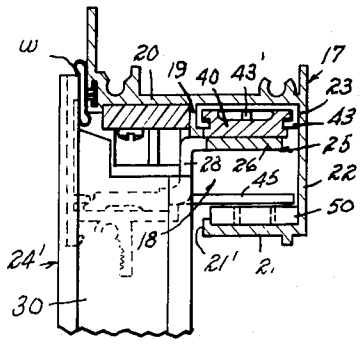


FIG. 8

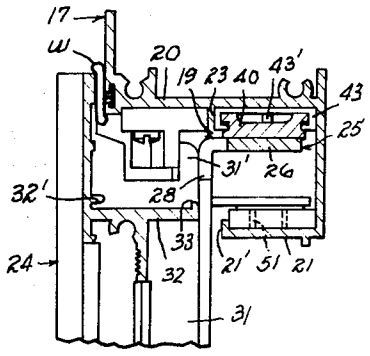


FIG. 9

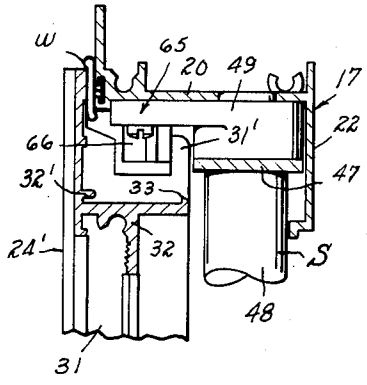
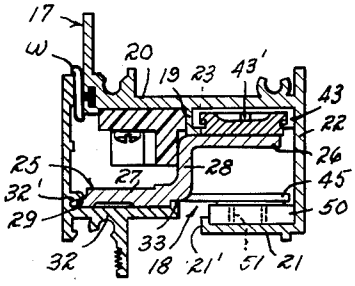


FIG. 10



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United States Patent Office 3,197,818 Patented Aug. 3, 1965

3,197,818

AWNING WINDOW

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Filed Sept. 23, 1960, Ser. No. 57,918
6 Claims. (Cl. 20—42)

The present invention relates to improvements in awning windows and more particularly to guiding and locking means for the sashes thereof.

It is an object of the invention to provide a novel awning window structure in which the window sash is automatically and positively guided within the frame structure during the final closing movements thereof independently of gravity or slack forces and is automatically locked in its closed position.

It is a further object to provide such an awning window in which the guiding and locking structures are so arranged as to result in an exceptionally smooth and accurate sash closing operation.

Included in the objects of the invention is the provision of such an awning window in which sash structures are arranged for facile and quick assembly and installation.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application which will be indicated in the appended claims.

In the drawings:

FIG. 1 is a perspective view, partially in phantom, of a double sash awning window in accordance with a preferred embodiment of the present invention;

FIG. 2 is a sectional view, partially broken away, and taken substantially along the longitudinal center line of the awning window of FIG. 1, and showing the sashes in an open position;

FIG. 3 is an enlarged vertical sectional view, partially broken away, similar to FIG. 2 and showing portions of the sashes in phantom and approaching the closed position;

FIG. 4 is a vertical sectional view similar to FIGS. 2 and 3 with the sashes in their closed-locked position and showing portions of the sash operating mechanism;

FIG. 5 is an enlarged perspective view, partially broken away, showing a rear view of an upper corner construction of the lower sashes of FIG. 1;

FIG. 6 is an enlarged perspective view partially broken away and showing a rear view of a lower corner construction of the upper sash of FIG. 1;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 4;

FIG. 8 is a sectional view taken along the line 8—8 of FIG. 4;

FIG. 9 is a sectional view taken along the line 9—9 of FIG. 4; and

FIG. 10 is a sectional view taken along the line 10—10 of FIG. 4.

Although the invention is applicable to single sash structures as well as to those employing multiple sashes, for purposes of illustration, a double sash awning window **10** is shown in the figures in which like indicating numerals denote like parts on either side of the frame structure **11**. As seen in the figures, the frame **11** is adapted at its outer edges to be secured within a wall opening, or the like, and defines a window opening between a sill **12** and a header **13** connected at their ends by a pair of horizontally spaced and vertically extending jambs **17**. An upper sash **24** and a lower sash **24'**, both of which are provided with the usual glass pane P, shown only in

FIG. 1, are dimensioned to close the window opening when vertically oriented therein, are each pivotally supported within the frame **11** at their upper ends, and on both sides thereof, upon a pair of vertically slidable actuator bars **40** via pair of horizontally oriented pivot pins **41** (FIGS. 2–4) supporting a pair of sash pivot hinges **25** at their upper ends, and which in turn extend from the sashes **24**, **24'**.

Each of the sashes **24**, **24'** are provided with further pivotal support intermediate their upper and lower ends by a pair of balance arms **45**, the upper ends of which are pivotally connected to the lower ends of the pivot hinges **25**, the lower ends of which are pivotally supported by the jambs **17**, and which are so arranged that when the actuator bars **40** lift and lower the sashes **24**, **24'** in a manner to be described, the balance arms **45** will force rotation of the sashes **24**, **24'**, via the pivot hinges **25**, in a vertical plane about the pins **41**.

To support the actuator bars **40** for vertical sliding movement, the rear portion of each jamb **17**, as best seen in FIGS. 7–10, is of hollow construction, generally box-shaped in cross section, and each having a vertical opening **18** at its forward side to accommodate the vertical movements of the pivot hinges **25** which extend through the opening **18** to their connection to the bars **30**. The opening **18** is defined at its outer edge by a small inwardly, then rearwardly projecting L shaped portion **19** extending from the outer vertical wall **20** of the jamb **17**, intermediate the ends thereof. (For clarity, the L shaped portions **19** have been deleted in FIGS. 2–4.) The inner edge of the opening **18** is formed by the forward outturned edge **21'** of the inner vertical wall **21** of the jamb **17**. The L shaped portion **19**, together with the rear portion of the outer vertical wall **20** and the rear vertical wall **22** of the jamb **17**, form an inwardly facing vertical groove **23**.

As best seen in FIGS. 2–4, the actuator bars **40** are supported at their lower ends within their respective grooves **23** by the upper ends of a pair of connecting links **46** via a pair of horizontally disposed pivot pins **42**. The connecting links **46** are in turn pivotally connected at their lower ends to the ends of a pair of crank arms **47**, **47'** extending from their secured positions at the ends of a transverse torque shaft **48** which extends from jamb to jamb, where its ends are rotatably supported by a pair of shaft bearings **49** secured to the rear portions of the jamb outer vertical walls **20**, the inner vertical walls **21** being slotted as at S in FIGS. 2 and 9 to accommodate the shaft ends. One of the crank arms **47'** (FIGS. 1 and 4) is pivotally connected, intermediate its ends to the actuator link L of the window operating mechanism M for rotating the crank arms **47**, **47'** about the axis of the torque shaft **48** via the inward and outward movement of the actuator arm *g* of the operating gear G, which is in turn rotated via a gear connection, not shown, by the handle H of the sash operating mechanism M.

Each bar **40** is mounted within the groove **23** by three guide blocks **43** clipped onto the outer sides of each bar **40** and which are provided with forwardly and rearwardly projecting lateral ends for bearing against the inner surfaces of the L shaped portion **19** and rear vertical wall **22**. The blocks **43** are vertically spaced along the bars **40** adjacent the receiving apertures for the pivot pins **41** and **42** which mount the sashes **24**, **24'** and the connecting link **46**. A center boss **43'** (FIGS. 7, 8 and 10) projects inwardly from the guide blocks **43** and bears against the pins **41**, **42** to provide supporting stability at these points. The blocks **43** are preferably fabricated of a sturdy nylon material to provide good sliding contact between the lateral ends of the blocks **43** and the inner surfaces of the groove **23**.

The two pairs of sash pivot hinges **25** which mount the

sashes 24, 24' are, as previously stated, pivotally supported at their upper ends or ears 26 by the pins 42 at the upper ends and lower portions of the actuator bars 40, as seen in FIGS. 1–4, and at their lower ends or sash securing legs 27, which are spaced inwardly and downwardly with respect to the ears 26, by the pins 45', pivotally connecting the balance arms 45 extending from the jambs 17. Extending along the forward edge of the securing leg 27 and on the inner side thereof is a lip 29, as best seen in FIG. 5, the function of which is to assist in the installation and securing of the sashes 24, 24' as will be discussed. The ear 26 and leg 27 of each hinge 25 extend forwardly and rearwardly with respect to the frame 11 and are connected at their lower and upper ends, respectively, by a transversely oriented shoulder which forms a sash guide or cam follower and lock portion 28 which preferably extends in a plane common with the rearmost surface of its supported sashes 24, 24'.

As best seen in FIGS. 2–4, and particularly in FIG. 3, where the inner wall 21 of the jamb 17 is cut away in the area of the balance arm inner end, the pivtal connection of the inner end of each balance arm 45 is accommodated by a balance block 50 secured by screws to the inner vertical wall 21 within the hollow rear portion of the jamb 17. Each of these blocks 50 is formed with a vertically oriented and inverted keyhole aperture 51 which includes a lower circularly shaped portion and an upper straight portion 51'. A horizontally oriented pivot pin 52 is secured at the inner end of each balance arm 45, and is formed with flattened sides and rounded ends. The pin 52 is received within the keyhole aperture 51 of the block 50 and is arranged so that the rounded ends of the pin 52 will rotate within the circularly shaped portion of the keyhole 51 during the vertical movements of the operating bars 40 and the rotation of the sashes 24, 24' and pivot hinges 25 about the pins 41.

The pin 52 and block 50 are so disposed that when the balance arm 45 is positioned by the vertical or closed posture of the window sashes 24, 24' the flattened sides of the pin 52 will align with the straight portion or slot 51' of the inverted keyhole 51. Further movement of the actuator bars 40 upwardly will cause the pin 52 to be lifted within the straight portion 51' of the inverted keyhole (FIG. 4) to thereby restrain rotation of the pin 52 and the consequent opening of the sashes 24, 24'. As will be explained, the sashes 24, 24' are cammed and guided into a true vertical disposition during the final closing movements thereof to insure alignment of the pin 52 and slot portion of the keyhole aperture 51 and to position the sash for locking.

Each sash 24, 24' comprises an upper rail 30 and a lower rail 31 connected at their ends by stiles 32, and are particularly adapted for facile mounting upon the pivot hinges 25. To this end, and as best seen in FIGS. 5 and 10, each sash stile 32 is preferably formed at its forward edge with a rearwardly facing groove 32' dimensioned to receive the lip 29 formed on the forward edge of the pivot hinge securing leg 27. The rear edge of the sash stile 32 is flanged outwardly, as at 33, to restrain the rear edge of the pivot hinge securing leg 27. As best seen in FIG. 7, the sash upper rail 30 extends at its ends to overlie the upper edges of the sash stiles 32 and to provide overlying ledges for supporting the sashes 24, 24' at the upper edges of the securing legs 27 prior to securing the same together.

The arrangement, then, at the upper ends of each sashes 24, 24' is such that by placing one end of the upper rail 30 to overlie and contact the upper edge of the pivot hinge securing leg 27, the lip 29 may be engaged within the groove 32' and the sashes 24, 24' rotated rearwardly thereabout to dispose the outturned rear edge 33 of the sash stile 32 in back of the rear edge of the leg 27. The hinge 25 and sash stile 32 on the other side of the sashes 24, 24' are engaged as lip 29 and groove 32' engage each other as shown in FIGURE 10, and pressure on the rear edge of the hinge leg 27 will snap it in front of the outturned rear edge 33 of the sash stile 32. The hinge 25 and sashes 24, 24' are thereby prepositioned and may be secured by a screw *s* without the necessity of manual alignment of the elements.

The outer ends of each of the sash lower rails 31 are formed with outwardly extending lock portions 31'. These lock portions 31' and the guide or cam follower and lock portions 28 of the pivot hinges 25 cooperate with vertically spaced cam or guide and lock means generally designated 60, 62 and 65 provided on the forward portion of the outer vertical wall 20 of each frame jamb 17, to cam, guide and lock the sashes 24, 24' within the frame structure during the final closing movements thereof.

The guide and lock means on each jamb are preferably fabricated of a sturdy nylon material and comprise an upper cam and lock piece 60, an intermediate cam and lock piece 62 and a lower lock piece 65, each of which is secured to the frame jamb outer wall 20 by means of screws *s* shown only in FIGS. 7–10. The upper lock piece 60 provides an inwardly extending projection 61 of distorted U-shape in cross section, and facing generally forwardly. As shown in FIG. 3, the rear surface of the inclined portion of projection 61 functions to urge the top edge of cam follower portion 28 into the window opening during final closing movement to insure proper positioning of the sash in the plane of the window opening. The rear surface of the upper leg of the projection 61 extends vertically and is disposed so that upon continued closing movement the sash 24 is guided in a vertical plane by engagement between the vertical upper leg of the projection 61 and the guide portion 28. This camming of the sash 24 inwardly and the vertical guiding thereof assures true sash-frame vertical alignment for the final lifting movement of the sash 24 without slack or dependence on gravity. Additionally, when the sash is fully closed, the guide portion 28 of the hinge 25 is locked behind the projection 61 as shown in FIG. 4 and such rearward positioning of the sash portion 28 with respect to the vertical upper leg of projection 61 is insured by the camming and guiding of the sash as described.

The upper end of the intermediate lock piece 62 (FIGS. 5 and 6) provides a generally J-shaped projection 63. The downwardly rounded horizontal leg of the projection 63 acts as a stop-guide to prevent the lock portion 31' of the upper sash lower rail 31 from traveling forwardly of the vertical leg of the projection 63 which is disposed to forwardly overlie the lock portion 31' of the upper sash lower rail 31 in pressure contact therewith when the sash 24 is raised in its vertical path during the final closing movements thereof and thereby to restrain the same against outward movement.

The lower sash 24' is cammed inwardly and guided in the same manner as sash 24 by the cam follower or guide portion 28 such that when the lower sash is fully closed, the portion 28 of the hinge 25 is locked behind projection 64 as best shown in FIG. 5. The lower lock piece 65 is provided with a generally J-shaped projection 66 identical with projection 63 of the intermediate lock piece 62 as shown in FIGS. 2, 4 and 6, which projection 66 cooperates with lock portion 31' of the lower sash rail to lock the lower end of the sash as shown in FIGS. 4 and 9 when the sash is vertically raised to its final closed position. The lower lock piece 65 is preferably formed integrally with bearing 49 of the torque shaft 48 as best shown in FIG. 9.

Inward movement of the lower end of the sash 24' past the closed position (FIG. 4) is restrained by pressure contact between the sash sill 31 with the frame sill 12. Similarly, inward movement of the lower end of the upper sash member 24 is restrained by pressure contact between the sill 31 and the upper rail 30 of the lower sash 24'. Suitable weather stripping W (FIGS. 2,4, and 7–10 only) is provided at these pressure points as well as be-

tween the head 30 of the upper sash 24 and the head 13 of the frame and between the frame jambs 17 and sashes 24, 24' at the sides thereof.

The operation of the frame and such arrangement shown will be described with reference to FIGS. 2,3 and 4. In FIG. 2, the windows are in their open position and unaffected by the guiding and securing means on the frame 11. In FIG. 3, as the sashes 24, 24' approach their closed position via the raising of the actuator bar 40 to lift the upper end of the sashes and via the inward movement of the upper ends of the balance arms 45, the guiding portion 28 of each pivot hinge 25 comes in contact with the rear guiding surfaces of the projections 61, 64 of the upper and intermediate lock pieces 60, 62, respectively, and are cammed thereby into a vertical plane. The flattened sides of the pins 52 secured to the lower ends of the balance arms 45 are positively aligned with the vertical slot of the keyhole 51. When the sashes 24, 24' become vertically disposed in the vertical position, the sashes are pulled upwardly into the locked position of FIG. 4 via the final closing movements of the torque shaft 48, crank arms 47, 47', connecting links 46 and actuator bars 40. The lock portions 31' of the sash lower rails 31 and the guide portions 28 of the pivot hinges 25 are drawn directly behind the vertically extending surfaces of the projections 63, 66 and 61, 64, respectively, of the lock pieces 60, 62 and 65. At the same time, the balance arm pin 52 is lifted into the straight slot portion 51' of the keyhole aperture 51 of the balance block 50.

In this vertical and lifted disposition, restrained as they are by the now vertical posture of the crank arms 47, 47' and connecting links 46 and by the balance arm pivot pin 52 within the slot of the key aperture 51 and by the pressure contact between the hinges 25, and lock portions 61 and 64 and between sash lock portions 31, 31' and lock projections 63 and 66, respectively, the sashes are positively secured in their closed position.

The present invention, then, provides an awning window in which the interaction and engagement of the sash and frame complementary guiding means effects a guiding function during the final closing movements of the sashes to dispose the sashes in the plane of the frame where they are further guided to a locked position by the overlying relationships of the various guide and locking surfaces. The guiding function of the various structures permits a further locking element, which mounts the balance arm of the sash member to the frame jamb and is permitted limited rectilinear movement in the plane of the frame, to dispose the balance arm mounting elements in a nonrotatable position whereby the sash members are secured against opening movements. The guiding and locking structures are positioned and arranged so that the camming and locking operations are smooth and accurate and assist in a sash closing performance which is independent of gravity and slack forces. Furthermore, the sash structures, including their hinges, are adapted to permit very easy and swift on the site sash installation.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departure from the spirit and scope of the invention, the scope of which is defined in the appended claims.

We claim:

1. An awning window comprising a frame including a pair of spaced parallel jambs and defining a window opening, an actuator bar supported on one jamb for slidable movement, means for moving said actuator bar longitudinally along said jamb, a sash dimensioned to close said window opening, said sash being pivotally connected adjacent one end thereof to said actuator bar, a balance arm, means pivotally connecting the opposite ends of said balance arm to said sash and one of said jambs, respectively, means associated with said balance arm providing rectilinear movement of said sash relative to said jambs when said sash is positioned in closed position, cooperating cam and cam follower means on said sash and one of said jambs, said cam having a portion extending generally transversely of the jamb and inclined toward the pivotal connection of the sash to the actuator bar, said cam and cam follower means being engageable prior to closing of said sash to force said sash into the window-closing position upon movement of said actuator bar in one direction, and lock means on one of said jambs engageable with said sash upon rectilinear movement thereof in the closed position through further movement of said actuator bar in said one direction.

2. An awning window comprising a frame including a pair of spaced parallel jambs and defining a window opening, an actuator bar supported on one jamb for slidable movement, means for moving the actuator bar longitudinally along said jamb, a sash dimensioned to close the window opening from one side thereof, means pivotally connecting the sash adjacent one end thereof to the actuator bar, a balance arm, means pivotally connecting the opposite ends of the balance arm to the sash and one of the jambs, respectively, means associated with the balance arm providing rectilinear movement of the sash relative to the jambs when the sash is positionted in closed position, a stationary cam fixed to one of the jambs and projecting into the window opening, said cam having a camming surface configured such that it extends generally transversely of the jamb, and having a portion inclined toward the pivotal connection of the sash to the actuator bar, a cam follower means on the sash and engageable with the stationary cam prior to actual closing of the sash to force the sash into the window-closing position upon movement of the actuator bar in one direction, lock means on one of the jambs engageable with a portion of the sash upon rectilinear movement thereof in the closed position through further movement of the actuator bar in said one direction, and said sash portion being movable between the lock means and the other side of the window opening when the sash is forced into the window opening for positioning said sash portion for engagement with the lock means upon said further movement of the actuator bar.

3. An awning window comprising a frame including a pair of parallel spaced jambs defining a window opening, an actuator bar supported on each jamb for slidable movement, means for moving the actuator bars longitudinally along the jambs, a sash dimensioned to close the window opening, a pair of hinges pivotally connecting one end of the sash to the actuator bars, respectively, a balance arm, means pivotally connecting the opposite ends of the balance arm to the sash and one of the jambs, respectively, means associated with the balance arm providing rectilinear movement of the sash relative to the jambs when the sash is in closed position, a cam mounted to one of the jambs, a cam follower means formed by a portion of one of the hinges, said cam and cam follower means being engageable during closing movement of the sash to force the sash into the window-closing position upon movement of the actuator bars in one direction, and lock means on one of the jambs engageable with a portion of one of the hinges upon rectilinear movement of the sash while in closed position through further movement of the actuator bars in said one direction.

4. An awning window comprising a frame including a pair of spaced parallel jambs and defining a window opening, and actuator bar supported on each jamb for slidable movement, means for moving the actuator bars longitudinally along the jambs, a sash dimensioned to close the window opening, said sash being pivotally connected adjacent one end thereof to the actuator bars, a balance arm, means pivotally connecting the opposite ends of the balance arm to the sash and one of said jambs, respectively, means associated with the balance arm providing rectilinear movement of the sash relative to the

jambs when the sash is positioned in closed position, cooperating cam and cam follower means on the sash and jambs engageable during closing movement of the sash to force the sash into the window-closing position upon movement of the actuator bars in one direction, and a plurality of locking devices positioned on the jambs to engage the opposite ends of the sash upon rectilinear movement thereof in the closed position through further movement of the actuator bars in said one direction.

5. An awning window comprising a frame including a pair of spaced parallel jambs and defining a window opening, an actuator bar supported on one jamb for slidable movement, means for moving the actuator bar longitudinally along said jamb, a sash dimensioned to close the window opening, said sash being pivotally connected adjacent one end thereof to the actuator bar, a balance arm having one end pivotally connected to the sash, means pivotally connecting the other end of the balance arm to one of the jambs and providing rectilinear movement of the sash relative to the jamb only when the sash is in closed position. cooperating cam and cam follower means on the sash and one of the jambs positioned adjacent the top and bottom of the sash and engageable during closing movement of the sash to force the sash into the window-closing position upon movement of the actuator bar in one direction, and lock means on one of the jambs engageable with the sash upon rectilinear movement thereof in the closed position through further movement of the actuator bar in said one direction.

6. The awning window as set forth in claim 5 wherein said lock means is a portion of said cam means extending parallel to the jamb.

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