

[54] WINDOW ASSEMBLY

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New York, N.Y. 10021[22] Filed: **May 24, 1974**[21] Appl. No.: **473,011**[52] U.S. Cl. **49/143, 49/50, 49/394**[51] Int. Cl. **E06b 3/32**[58] Field of Search 49/128, 130, 142, 143,
49/209, 394, 401, 411, 50; 52/207[56] **References Cited****UNITED STATES PATENTS**

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Primary Examiner—Philip C. Kannan*Attorney, Agent, or Firm*—Natter & Natter, Esqs.[57] **ABSTRACT**

A tri-panel window assembly having a laterally mov-

able center window panel and two opposed swingable side window panels mounted in vertical alignment within a stationary window frame. The center panel is suspended from an overhead track and is displaceable toward either end of the window frame when a respective independently pivotable side panel has been swung into an outwardly open position. The movement of the center panel provides an open space for emergency egress and ingress and facilities access to the outer side of the window glass for cleaning. A safety bar housed in each of two mullions, which form part of the window frame extending vertically and offset interiorly on either side of the center panel, is automatically released by movement of a corresponding side panel and descends into a horizontal position between the two mullions. A locking arrangement mounted to the mullion secures the side panels which interlock with the center panel whereby a band of insulation packing around the panels is compressively held against the stationary frame to form a thermal and vapor barrier.

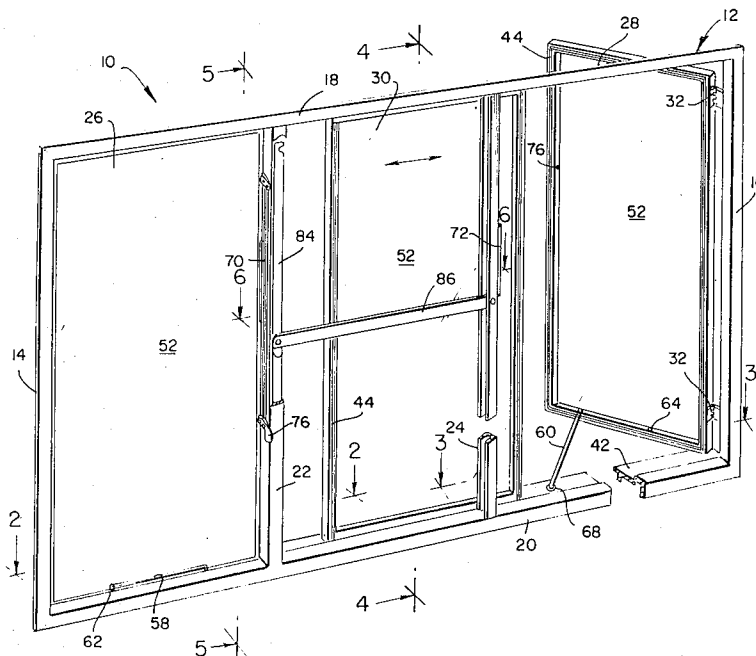
10 Claims, 7 Drawing Figures

FIG. 1

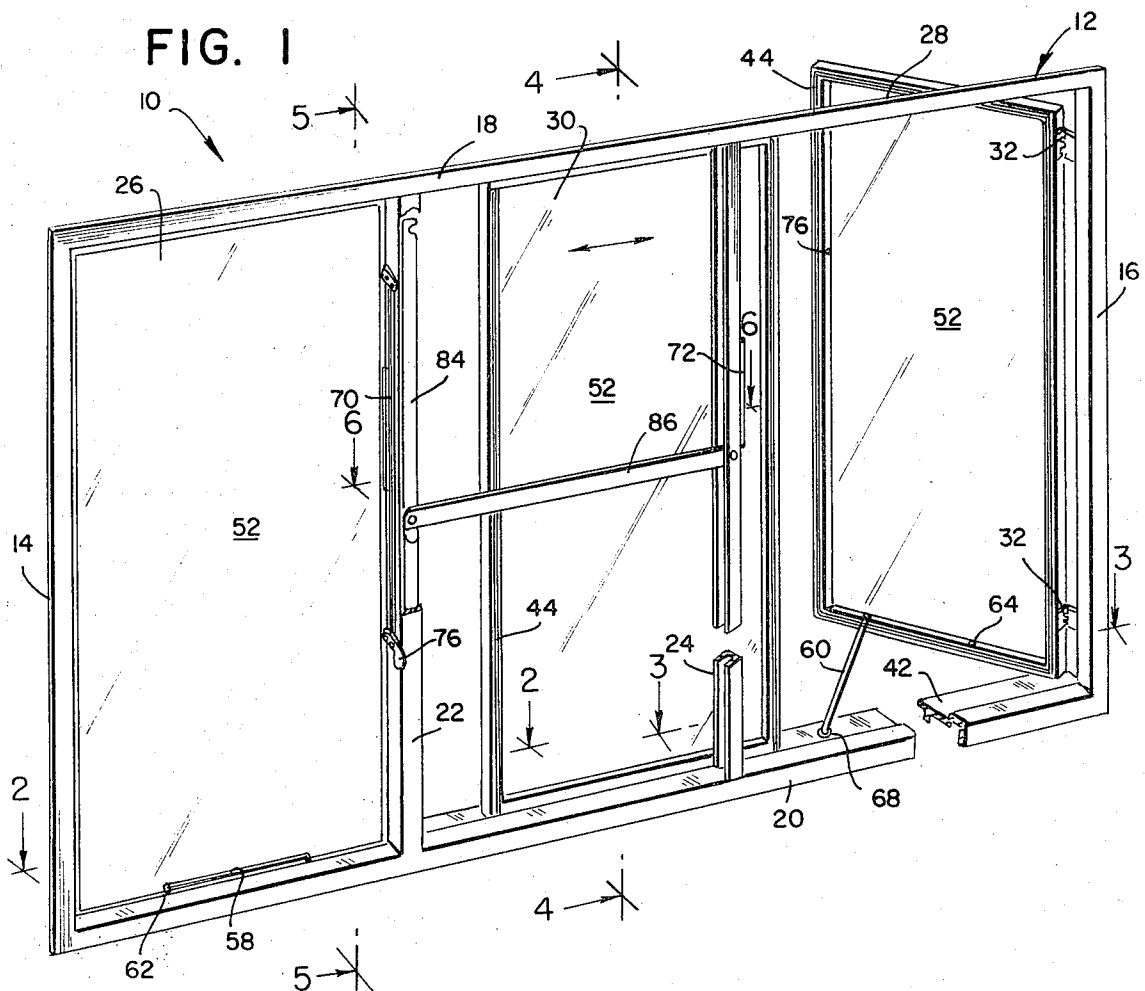


FIG. 2

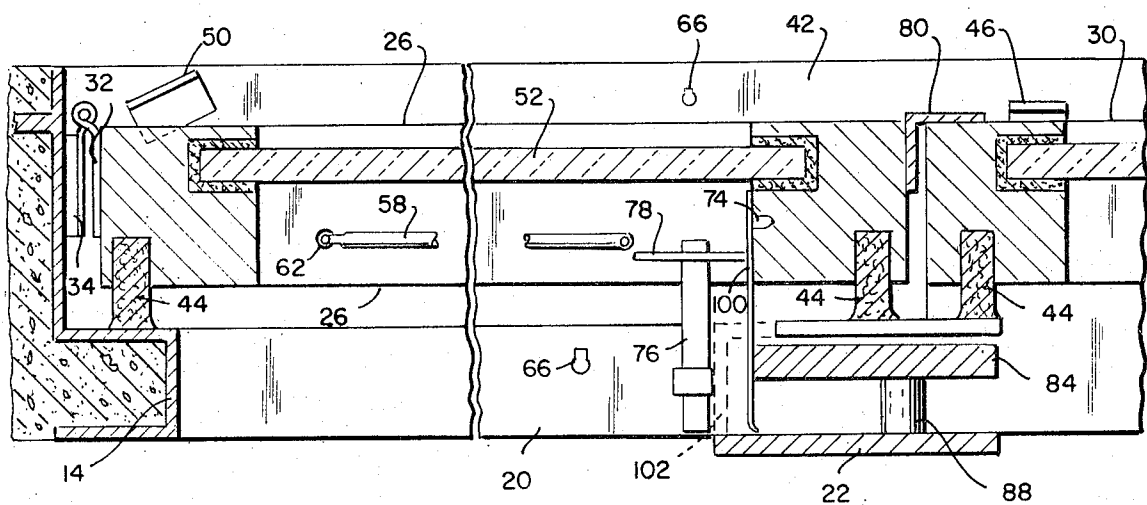


FIG. 4

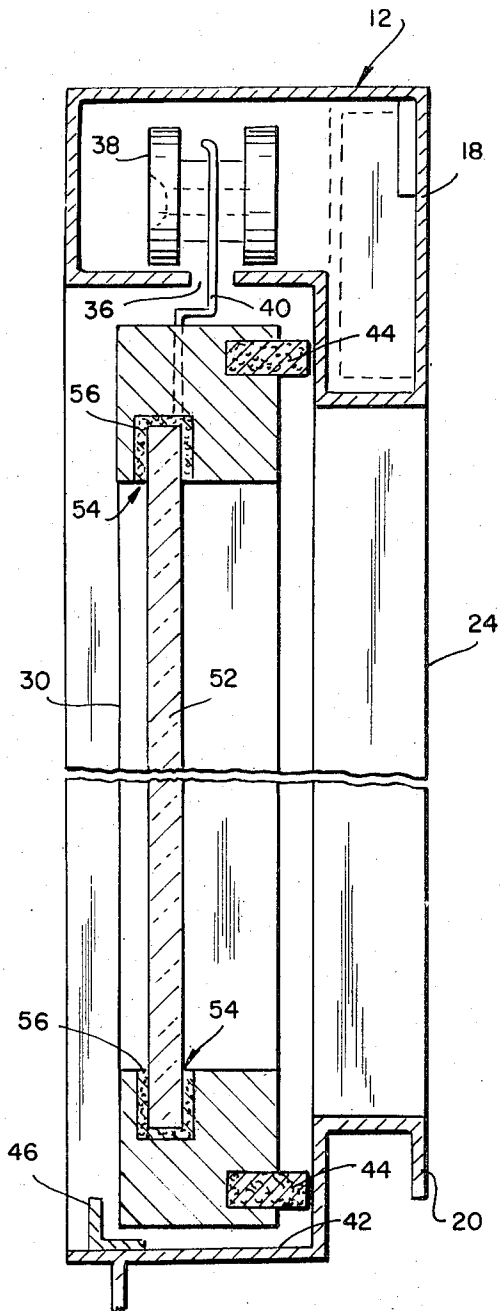
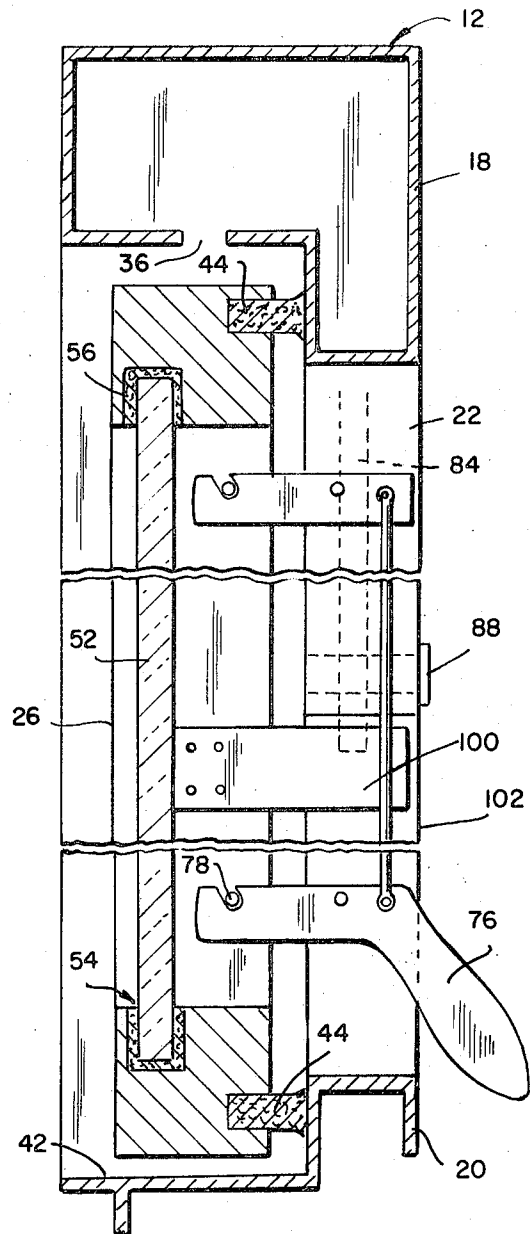


FIG. 5



WINDOW ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to closures and especially to a fenestration device or window assembly.

The invention is further directed to a window assembly having plural window panels mounted for diverse movement.

In particular, this invention concerns a window assembly having three window sashes with two of the sashes being mounted for independent pivotal movement and a third sash being laterally movably therebetween in either of two directions.

DESCRIPTION OF THE PRIOR ART

The plural window closures of the prior art, which included movable components, generally utilize either sashes which were slidable on separate tracks or employ swingable windows. The previously used slidable sash windows move either horizontally or vertically and have been found to be rather inefficient in providing a thermal and vapor barrier. This is because the ribbons of insulation material or weather stripping placed on these window sashes frequently becomes worn or deteriorated through frictional contact with the track within which the sash is mounted. Also, continuous rubbing at the interface between adjacent sashes as the sashes by-pass each other further abrades the insulation material. As a result, these window sashes have been commonly found to develop water and air leaks as well as being noisy and subject to rattles and vibrations. A reason for these difficulties lies in the fact that, because they are track mounted, an effective compression seal can not be applied between the window sash and stationary frame when the window sashes are in the closed position. A further disadvantage results from the fact that the tracks or guides in which these window sashes slide frequently become sticky or tacky or swell due to moisture. Also, obstructions such as snow or ice prevent or hinder sliding movement of the sash.

Although conventional casement type windows employ swingable panels, these windows do not have the added features described in connection with this improved window assembly. For example, access to the weather side of these windows is difficult and cumbersome. Additionally, the currently available swingable windows do not incorporate laterally displaceable panels or safety barriers.

The window assembly of the present invention overcomes many of the disadvantages and deficiencies of the windows described in the prior art while supplying the construction industry with an economically feasible window closure readily adaptable for many types of buildings.

The instant window assembly has been designed to provide an improved weather seal, to facilitate access for cleaning, to provide emergency ingress and egress, and to incorporate safety features previously unavailable. Accordingly, the window assembly encompasses a combination of swingable and laterally movable window sashes mounted in vertical alignment and utilizes an overhead track in the window frame whereby the center sash does not by-pass the swingable sash but rather occupies the same space after the swingable sash has been displaced to an outwardly open position. Con-

sequently, wiping contact of insulation packing or weather stripping and resultant deformation and deterioration are minimized. In this connection, a band of resilient insulation packing is placed peripherally around the inside of each of the window sashes. A locking arrangement for securing the sashes is adapted to compressively hold the resilient insulation material in contact with the stationary frame member. Additionally, conductive heat loss is controlled by providing insulation surrounding the glass pane or "light" where it is mounted within the window sash.

Another advantage of this invention is that the center sash is suspended from an overhead track, as opposed to being slidably mounted in a lower track, and thus is not subject to obstructions in a lower track which would impede sliding movement.

A further advantage incorporated into the window assembly includes the safety bar or guard barrier which is designed to automatically descend to a horizontal position across the center opening when a side sash has been swung open.

It is also a feature of this invention that operating mechanisms have been included to position the side sash in various open or ventilating positions.

SUMMARY OF THE INVENTION

Briefly, the invention involves a plural closure window assembly for a wall opening. A substantially rectangular stationary frame member surrounding the wall opening is designed to support three window panels or sashes, with each sash being adapted for diverse movement. Two opposed end or side sashes are each pivotally secured to an upright or jamb portion of the stationary frame so that each can be swung outwardly in a respective clockwise or counterclockwise direction. A center sash is suspended from an overhead track such that the center and two side sashes are substantially in the same vertical plane when they are in the closed position, however the center panel is optionally movable toward either side of the stationary frame after the respective side sash has been swung outwardly to the open position. When the center sash is moved, the open span, formerly occupied by the center panel, provides access to the window sashes for cleaning and emergency egress or ingress.

An important feature of the invention relates to the automatically operating safety bar which is activated by the pivotal movement of either side sash. Companion safety bars are housed in mullions which form part of the stationary frame, interiorly and on either side of the center sash. Each of the side sashes contains a projecting retainer member which holds the safety bar in the stored position. Upon pivotal movement of the side sash, the retainer is withdrawn and releases the safety bar so that it is free to descend in a vertical plane to a horizontal position across the center opening between the two mullions.

Another feature of the present invention relates to the locking mechanism wherein a latch is pivotally mounted on the mullion and is adapted for engaging the side sash and pulling it toward the stationary frame to compress the resilient band of insulation packing and achieve a tight seal. The side window sash is movable with an operating handle, one end of which is securable to the sill for holding the sash in a fixed open position. Alternatively, an optional stay rod mounted to the mullion may be attached to the sash to hold it in a

partially open or ventilating position. The stay rod extends across the guide and thus prevents lateral movement of the center panel. When the side sash is in the fully open position, and has swung to its maximum displacement, a stop, provided along the outer sill, limits the swinging movement. The center window sash is prevented from contacting the side sash by a resilient bumper or cushion plate in the lower portion of the guide.

It is an object of the instant invention to provide a plural closure having window sashes adapted for diverse movements.

Specifically, it is an object of this invention to provide a tri-panel window assembly wherein two opposed side window sashes are attached for swinging movement and a center window sash is mounted for lateral movement.

It is a further object of the present invention to provide a window assembly having improved vapor and thermal barriers wherein a compressive seal is achieved by a resilient band of insulation packing on a movable sash at the interface with a stationary frame.

Another object of this invention is to provide window assembly wherein the outer or weather side of the window pane can be cleaned from inside of the building through an open span provided by lateral movement of the center sash.

An additional object of this invention is to provide a window assembly wherein a safety bar is automatically interposed adjacent the center sash when the said window sash is swung open.

Another object of the present invention is to provide a window assembly wherein thermal conductivity transmitted between the interior and exterior environment through the sash is minimized.

The above and other objects, features and advantages of the present invention will be apparent in the following description of the preferred embodiment when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings in which are shown some of the possible embodiments of the invention:

FIG. 1 is an isometric view of the window assembly of this invention including sections broken out and shows a right side sash in the fully open position, the left side sash in the closed and locked position, and the center sash partially moved to the right with the safety bar, housed in the right mullion, descended to a horizontal disposed position;

FIG. 2 is a sectional view to an enlarged scale taken substantially along line 2—2 of FIG. 1 with the sashes closed and shows the resilient insulation packing surrounding the inside of the window sashes including a safety bar stored with a mullion and a safety bar retainer tongue extending from the sash;

FIG. 3 is a sectional view to an enlarged scale taken substantially along line 3—3 of FIG. 1 and shows the side sash in an open position and the center sash laterally displaced;

FIG. 4 is a sectional view to an enlarged scale taken substantially along lines 4—4 of FIG. 1 and shows the center sash suspended from an overhead track of the frame member and mounted on rollers for lateral movement;

FIG. 5 is a sectional view to an enlarged scale, taken substantially along line 5—5 of FIG. 1 and shows the side sash in a closed and locked position forming a compressive seal between the resilient band of insulation packing and the stationary frame; the safety bar retainer is shown extending into the mullion and securing the safety bar in a vertical position housed within the channel shaped mullion;

FIG. 6 is a sectional view to an enlarged scale, taken through the mullions along line 6—6 of FIG. 1, and shows the two mullions with one safety bar interposed in a horizontal operational position and the other housed in a vertical position;

FIG. 7 is an auxiliary sectional view to an enlarged scale, taken substantially along line 7—7 of FIG. 6, and shows the descended safety bar seated on a pin or transverse shaft within the mullion and the housed safety bar in the vertical position being held by the retainer extending from the side sash and cut-away portion of the mullion for receiving the retainer.

DETAILED DESCRIPTION OF THE INVENTION

Referring now in detail to the drawings, the reference numeral 10 denotes generally a window assembly constructed in accordance with this invention. The window assembly 10 is comprised of a stationary frame member 12 which borders a wall opening and is permanently affixed to the wall. The frame 12 is generally rectangular in shape having two parallel opposed upright vertical sections or jambs 14, 16, an upper horizontal section or lintel 18, and a lower horizontal section or sill 20. A pair of vertical narrow channel-shaped sections or mullions 22, 24 form part of the frame 12 and are disposed between the lintel 18 and sill 20 with opposed channel openings facing each other.

The frame member 12 is preferably fabricated from extruded aluminum, being light in weight and having structural rigidity and economy; however, stainless steel or like materials may also be utilized.

The window assembly 10, as illustrated in FIG. 1, includes two side window panels or sashes 26, 28 and a center panel or sash 30. Each of the side sashes 26, 28 is pivotally affixed to the respective window jambs 14, 16 by a plurality of double leaf hinges 32 or equivalent hardware. As shown in FIGS. 2 and 3, a filler member 34 is placed between the jambs 14, 16 and the hinges 32 so that the vertical edge of the side sash 26, 28 will lie flush against jambs 14, 16 when in the closed position.

Although a preferred embodiment of the invention is illustrated as having three sashes 26, 28, 30, the window assembly 10 is equally adaptable for use with two sashes, one being swingable and the other being slidable or laterally movable; such application should be readily apparent from the following description of the invention.

The center sash 30 is suspended from an overhead track 36 formed in the lintel 18 and extending between the two jambs 14, 16. It should be noted that the three sashes 26, 28, 30, when closed, will lie substantially in the same vertical plane. A conveyor mechanism 38 is housed within the lintel 18 and may include a chain, belt or, as illustrated, a plurality of wheels or rollers, preferably fabricated of durable hard rubber or nylon. A hanger member 40, carried by the conveyor 38, is attachable to and supports the center sash 30 for lateral movement in the vertical plane. The lower portion of

the center sash 30 clears a ledge 42 formed in the sill 20. A plurality of spaced guides 46, are affixed to the outer ledge 42 between the mullions 22, 24, and prevent the lower portion of the sash 30 from swinging outwardly. Although the guides 46 do not extend along the ledge 42 adjacent the side sashes 26, 28, at least one guide 46 will contact and restrain the center sash 30 even after it has been laterally moved to its maximum displacement. It should be mentioned, that the guides 46 are so positioned to provide a clearance width greater than the thickness of the center sash 30 to reduce rubbing contact.

A continuous relatively wide band of resilient insulation packing or weather stripping 44, preferably made of compressible Neoprene or rubber composition, is secured peripherally and within a pocket formed on the inner face of center sash 30. In a similar manner, the insulation packing 44 is secured to the side sashes 26, 28. During opening or closing of the sashes 26, 28, 30, the insulation packing 44 is relatively free of wiping contact, especially since there is no by-pass of the side sashes 26, 28 by the center sash; therefore, frictional contact between the insulation material 44 and adjacent surfaces is minimized. In this regard, it should also be observed that obstructions, such as dirt, ice, snow or other foreign matter, present on ledge 42, will not readily impede lateral movement because the center sash 30 does not rest or slide on the bottom of ledge 42; additionally, a slight pitch is provided to ledge 42 for drainage and run-off.

The swingable side sashes 26, 28 are disposed in vertical alignment with the center sash 30 and slightly above the ledge 42 so that the bottom of the sash 26, 28 will clear the ledge 42. Thus, when the swingable side sashes 26, 28 are swung outwardly, the center sash 30 will be displaceable into the area previously occupied by the side sashes 26, 28. The limit of lateral displacement of the center sash 30 toward either of the side sashes 26, 28, is determined by a bumper or cushion plate 48 which is fixedly positioned on ledge 42. In this connection, the maximum swingable displacement of the side sashes 26, 28 is likewise limited to about 30° from the closed position; accordingly, a stop member 50 is affixed to the ledge 42 which arrests the movement.

The sashes 26, 28, 30 are glazed or fitted with a pane or "light" of transparent glass 52 which is secured within a groove 54. A pliable sealer 56 substance such as "Everseal" or other bituminous material placed around the edges of the glass pane 52 is designed to expand as it hardens. Shims or moulding may also be used in conjunction with the sealer 56. In contrast to conventional putty or calking, the sealer 56 provides substantial insulation qualities to reduce thermal transference from opposite sides of the glass pane 52 through adjacent sections of the sashes.

The movement of the side sash 26, 28 is controlled by an operating handle 58, 60 which is pinned at one end to the sash 26, 28 to permit universal motion. The outer end of the handle 58, 60 is keyed for reception in a recess 62, 64 when the sash is in a closed position. The side window sash 26, 28 is swingable to an open position by a "push-pull" manipulation of the operating handle 58, 60 and by the subsequent securement of the keyed end in a respective slot 66, 68 formed in the ledge 42. Additionally, as an optional feature, a stay rod 70, 72 is mounted to the mullion 22, 24 and is ex-

tensible across the ledge 42 for engagement within a locking slot 74, 76 in the side sash 26, 28 to secure the sash in an intermediate open or ventilating position. It should be noted that the center sash 30 can not be laterally moved in the direction of the open sash because of interference with the stay rod 70, 72, thus avoiding possible damaging contact between the sashes and a potential safety hazard.

The window sashes 26, 28, 30 are lockable in vertical alignment by a latch 76 mounted on the mullion 22, which engages a catch 78 on the side sash 26. A latch (not shown) on mullion 24 similarly engages a catch on side sash 28. The side sashes 26, 28 have an overlapping flange 80, 82 which interlocks with the edges of the center sash 26 so that all three sashes 26, 28, 30 are simultaneously urged against the stationary frame 12. It should thus be apparent that, upon locking the side sashes, the continuous band of insulation packing 44 on the inner face of all three sashes is compressed to form a tight seal impervious to thermal or vapor passage.

A particularly important improvement of the present window assembly 10 relates to safety features which have been incorporated and which substantially reduces any danger presented when the center sash 30 has been moved to either side leaving an open center span. A pair of protective guards or safety bars 84, 86 automatically descend, upon opening of either side sash 26, 28 from a vertical position within respective mullions 22, 24 to a horizontal position across the open span between the mullions 22, 24. Each of the safety bars 84, 86 is rotatably mounted on a pin 88, 90 in respective mullions 22, 24 such that, when the safety bar is housed in the vertical storage position within the mullions 22, 24, the pivot point is offset from line passing through the center of gravity of the bar and there is a gravitational force vector tending to rotate the bar into the horizontal operational position. The movement of the bar, however, can also be accomplished by spring or other resilient urging devices. As illustrated in FIG. 7, a free end of the safety bar 86 has a recess 92 which seats on the pin 88 in the companion mullion 22. The safety bar 86 may be manually returned to the vertical position and is held within the mullion 24 by a retainer 94 which is affixed to and projects from the side window sash 28. A portion of the side and back wall of the channel-shaped mullion 24 is cut out at 96 to allow the retainer 94 to enter and withdraw from the mullion 24 upon closing or opening of the side sash 28. The retainer 94 contacts a tail segment 98 of the safety bar 86 and thereby prevents its rotation into the horizontal position. When the side sash 28 is opened, however, the retainer 94 is withdrawn to release the safety bar 86 which then automatically descends into the horizontal position and the tail segment 98 may be extendible through the cut-out section 96. The safety bar 84 operates in a similar manner and is released by a retainer 100 projecting from sash 26 which enters a cut out portion 102 of mullion 22 to contact a tail segment 104. The retainer 94, 100 is preferably comprised of a tongue of phosphorus bronze material having the necessary rigidity to hold the safety bar 84, 86 within the mullion 22, 24, yet is flexible enough to provide the requisite spring action and resiliency as when entering or being withdrawn from the mullion 22, 24. The invention also contemplates the introduction of a "damper" to control the descent or fall of the safety bar. It is also apparent that spring urging means can be incorporated

for retaining or releasing the barrier from the mullion and, additionally, cushioning material can be incorporated for softening contact between the safety bar and the shaft upon which the bar is seated.

The above cited embodiment is intended as exemplary; and while it has described the invention with a specific implementation thereof, other modifications and various changes might be made in the embodiment as so set forth and will be apparent to those skilled in the art. It should, therefore, be understood that all material described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, there is claimed as new and desired to be secured by Letters Patent:

1. A plural closure window assembly for a wall opening adapted for providing ventilation and access to the weather side of the window assembly, comprising a rectangular frame member securable along a margin of the wall opening and including at least two sash members, a first sash member being mounted for lateral movement within the frame member, a second sash member being pivotally attached along one vertical side of the frame member, sealing means for effecting a vapor and thermal barrier at the interface between the sash members and the frame member, the second sash being swingable from an initially closed position in a substantially coincident vertical plane with the first sash member to an outwardly open position, the first sash member being selectively displaceable within the vertical plane into the space previously occupied by the closed second sash member to thereby define an open span for providing access exteriorly of the wall and further including safety means for forming a protective barrier across the open span, said safety means being deployable upon movement of the second sash member.

2. A plural closure window assembly as claimed in claim 1 comprised of three sash members, the third sash member being pivotally attached along the other vertical side of the frame member and being swingable in a direction counter to the rotation of the second sash member, from an initially closed position in a substantially coincident vertical plane with the second sash member to an outwardly open position, the first center sash member being selectively displaceable laterally within the vertical plane optionally toward either side of the frame member into the space previously occupied by either of the closed second or third sash members to thereby define an open span for providing access exteriorly of the wall.

3. A plural closure window assembly as claimed in claim 2 further including two mullions positioned vertically within the frame member, the mullions being spaced at the juncture between the first sash and the two pivotal sashes and parallel to the plane of the sashes, the safety means comprising at least one elongated barrier member descendable from a vertical storage position within the mullion to a horizontal position between the two mullions to provide a protective barrier across the open span.

4. A plural closure window assembly as claimed in

claim 3 further including safety barrier release means comprising retainer means on the pivotal sash adapted for cooperative engagement with the barrier member within the mullion for retention in the vertical storage position, said retainer means being disengaged by the swingable movement of the pivotal sash to automatically release the barrier member for deployment between the two mullions.

5. A plural closure window assembly as claimed in claim 4 wherein the safety barrier mounted within the mullion is urged from the vertical storage position toward the horizontal operational position, and the retainer means includes a resilient tongue projecting from the pivotal sash and adapted to extend through an opening in the mullion to engage a portion of the safety barrier when the pivotal sash is closed, said barrier being released upon withdrawal of the tongue as the swingable sash is opened.

6. A plural closure window assembly as claimed in claim 4 wherein each mullion has a companion elongated barrier member, the barrier members being rotatably mounted on a pin within the mullion and being independently releasable by the respective retainer member and descendable into horizontal deployment wherein the barrier defines therein a recess at one end engageable on a pin within the corresponding mullion upon which the companion elongated barrier member is mounted.

7. A plural closure window assembly as claimed in claim 2 including an overhead track in the frame member, conveyor means within the track for suspending the first sash for lateral movement, guide means on the lower horizontal portion of the frame member for restraining outward movement of the first sash and providing a clearance width greater than the thickness of the first sash, wherein frictional contact at the interface between the frame member and the sealing means on the lateral movable sash is minimized.

8. A plural closure window assembly as claimed in claim 1 wherein the sealing means includes a continuous band of resilient insulation packing placed interiorly around the inner face of the sashes, further including locking means on the frame member for releasably engaging the pivotal sashes, and interlocking means on the pivotal sashes for cooperative engagement of the center sash to simultaneously compress the insulation packing on the sashes against the frame member to form a weathertight seal.

9. A plural closure window assembly as claimed in claim 3 further including an operating handle on the pivotal sash for opening and closing the sash and for retaining the sash in an open position whereby the center sash is laterally movable, and further including stop means for limiting maximum swingable displacement of the pivotal sash and abutment means for limiting maximum lateral movement of the center sash.

10. A plural closure window assembly as claimed in claim 9 further including a stay means for holding the pivotal window in a fixed open position and for preventing lateral movement of the center sash.

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