Oct. 16, 1956 E. F. WILEY 2,766,491

OPERATING MECHANISM FOR MULTI-VENT WINDOWS

Filed Dec. 23, 1953 4 Sheets-Sheet 1

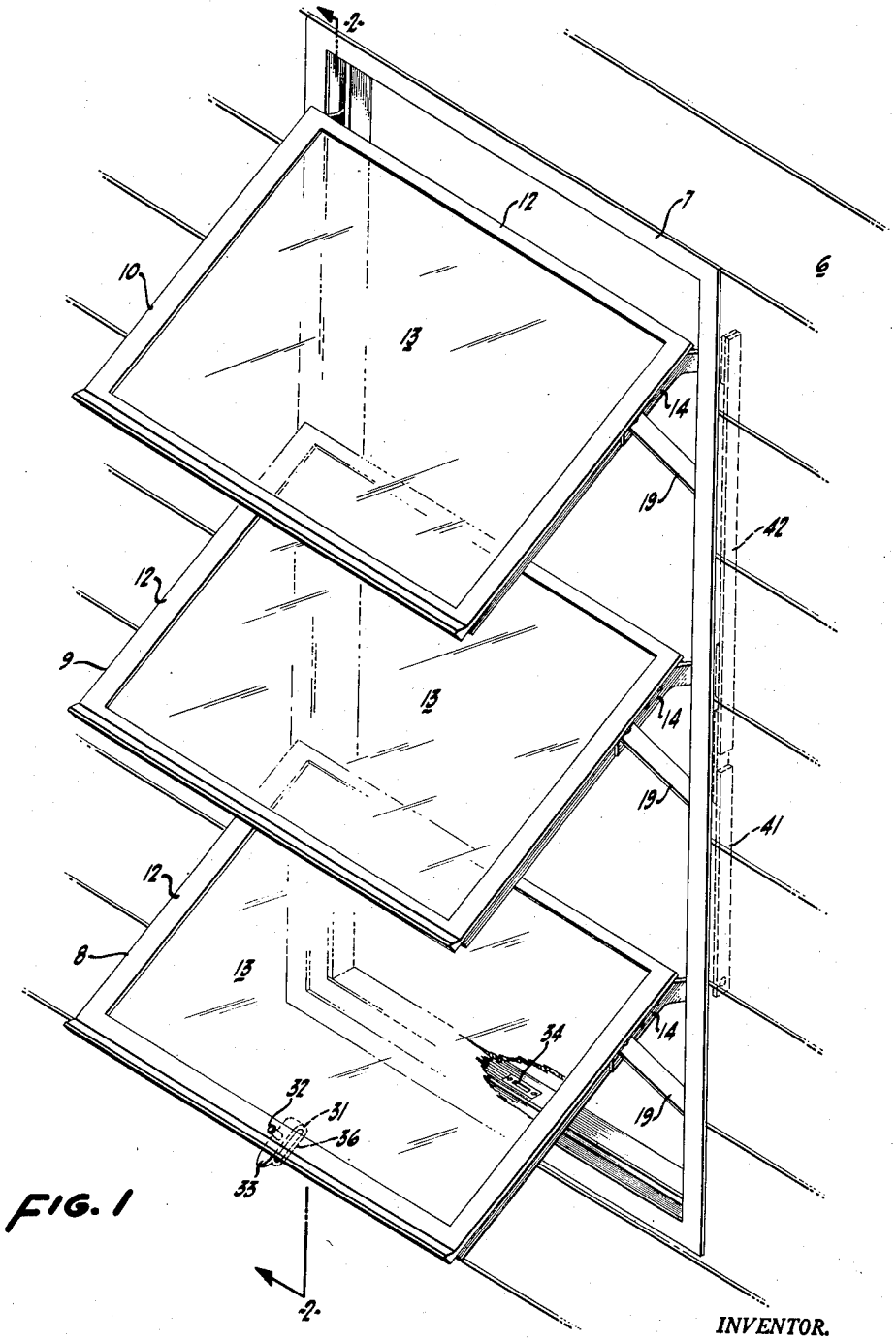


FIG. 1

INVENTOR.
ESMOND F. WILEY
BY
ATTORNEY

Oct. 16, 1956 E. F. WILEY 2,766,491

OPERATING MECHANISM FOR MULTI-VENT WINDOWS

Filed Dec. 23, 1953 4 Sheets-Sheet 2

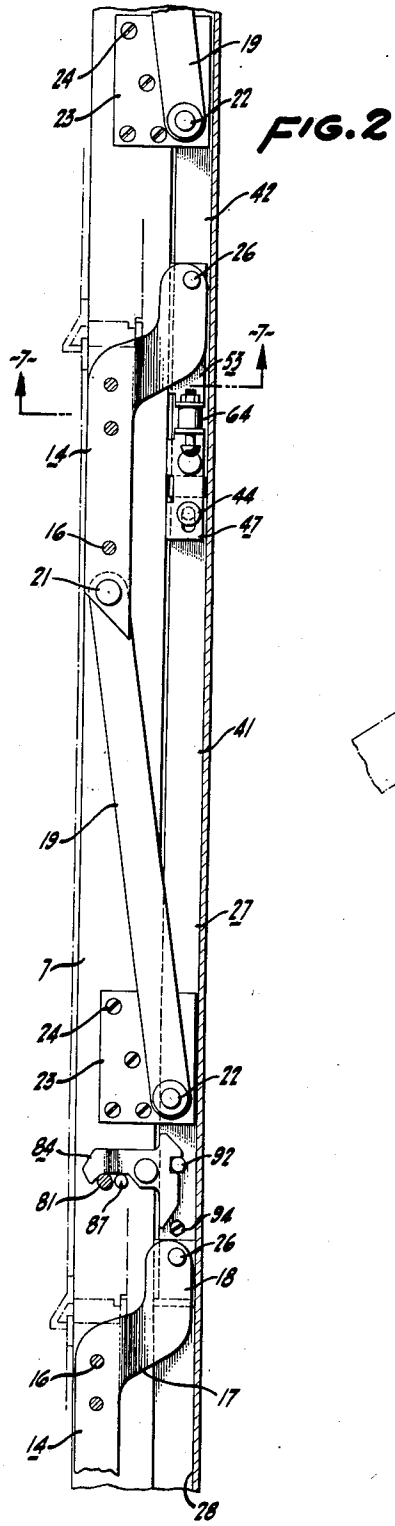


FIG. 2

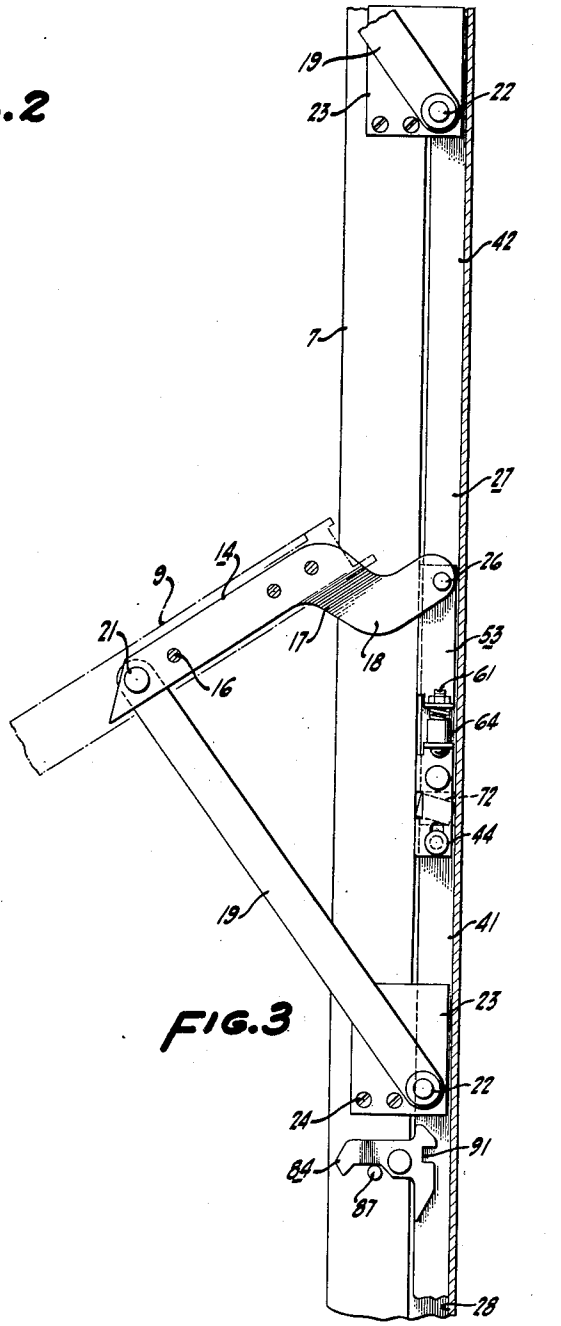


FIG. 3

INVENTOR.
ESMOND F. WILEY

BY Clarence Lothrop

ATTORNEY

Oct. 16, 1956 E. F. WILEY 2,766,491

OPERATING MECHANISM FOR MULTI-VENT WINDOWS

Filed Dec. 23, 1953 4 Sheets-Sheet 3

FIG. 4

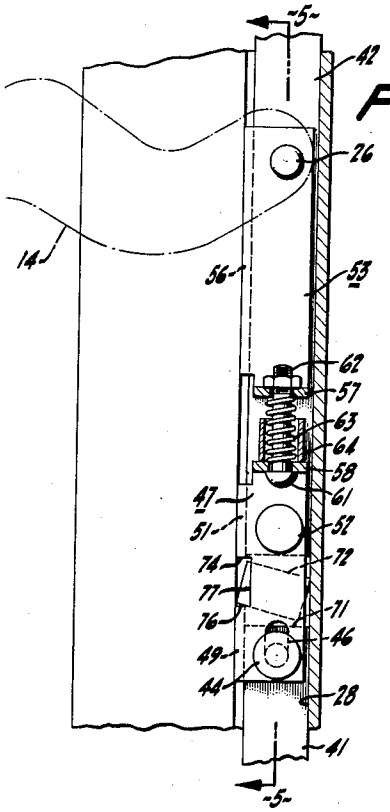


FIG. 5

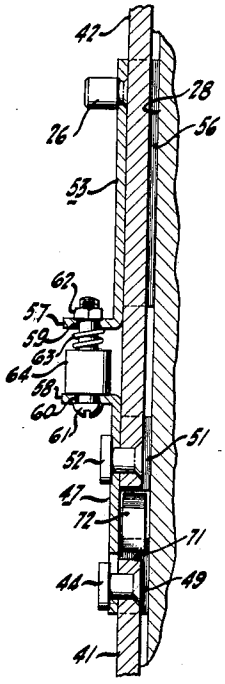


FIG. 6

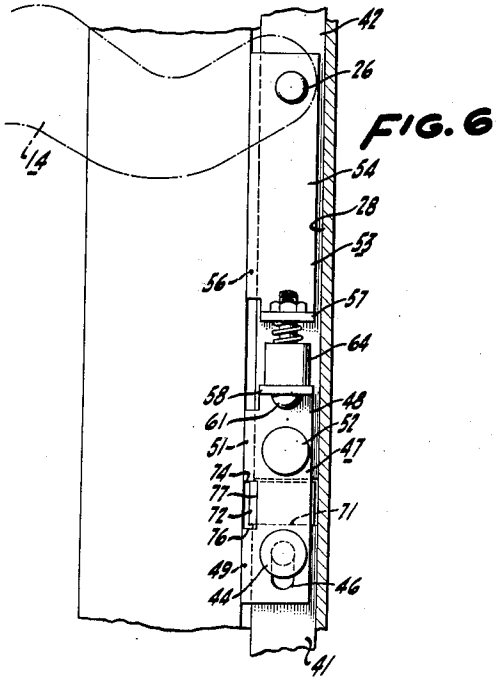
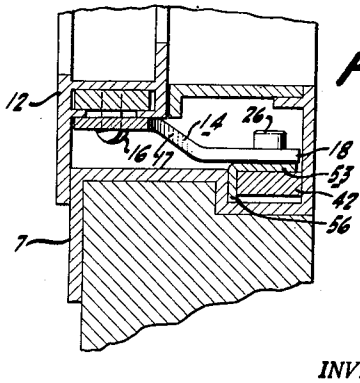


FIG. 7



INVENTOR.
ESMOND F. WILEY

BY Marcus Lothrop

ATTORNEY

Oct. 16, 1956 E. F. WILEY 2,766,491

OPERATING MECHANISM FOR MULTI-VENT WINDOWS

Filed Dec. 23, 1953 4 Sheets-Sheet 4

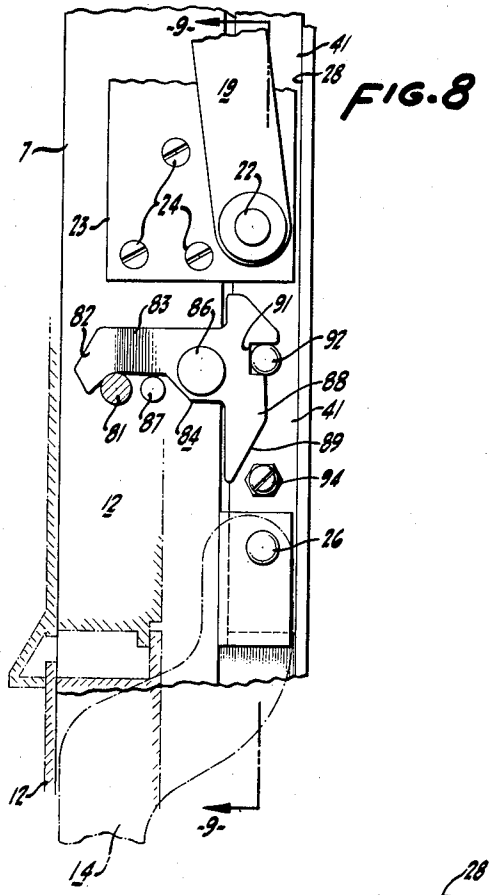


FIG. 8

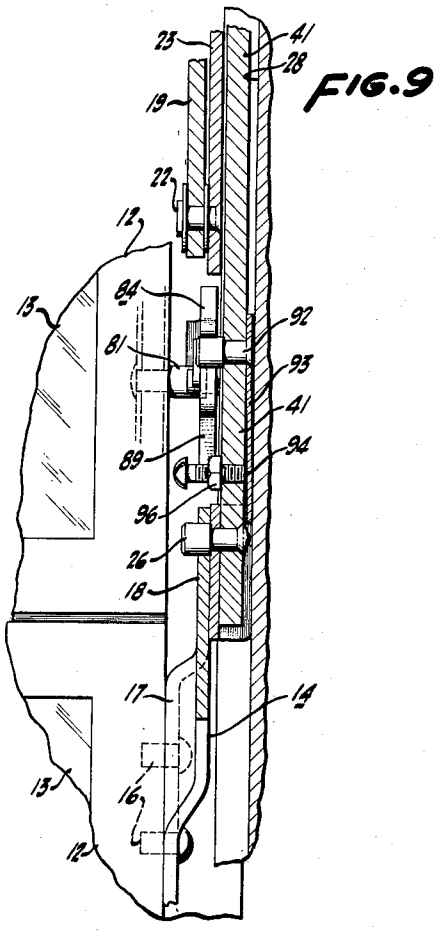


FIG. 9

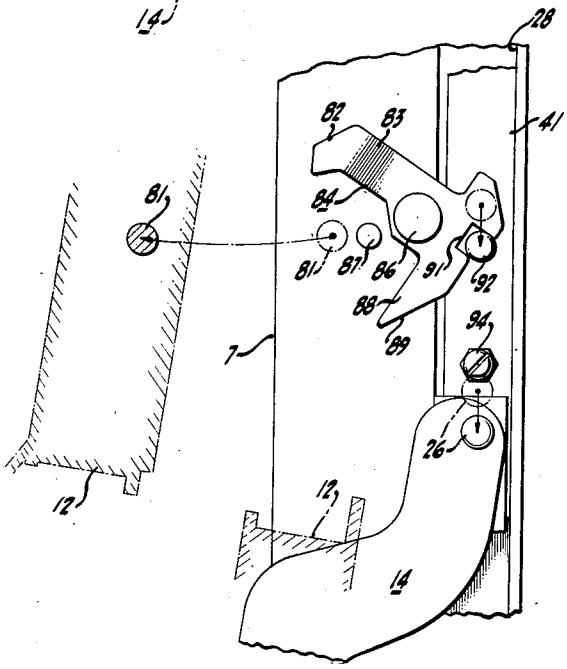


FIG. 10

INVENTOR.
ESMOND F. WILEY
BY Warren Lothrop
ATTORNEY

United States Patent Office 2,766,491 Patented Oct. 16, 1956

2,766,491

OPERATING MECHANISM FOR MULTI-VENT WINDOWS

Esmond F. Wiley, Orinda, Calif.

Application December 23, 1953, Serial No. 400,011

8 Claims. (Cl. 20—42)

My invention relates to windows including a plurality of vents or panels of the general type shown in my prior Patents No. 2,158,714, issued May 16, 1939, and No. 2,232,297, issued February 18, 1941. In wood construction, a panel is usually referred to as a sash and in metal construction as a vent. Functionally, the devices are substantially identical and the term "vent" is used herein as substantially equivalent to the term "sash." Windows of this kind include a plurality of vents usually superposed with the lower vent being movable manually or by power between closed and open position and having mechanism so that the movement of the lower vent is effective to produce a similar movement in the remaining, upper vents. The precise number of vents in a window is not material as it varies in practice between two and four or more. Also, it is not essential that the lower vent be the one which does the controlling, although that is the usual circumstance.

While various mechanisms are available for interconnecting the various vents in a multi-vent window for the desired simultaneous or even sequential operation, it occurs in some installations, particularly in Pacific islands where wind velocities achieve high values, that something other than the ordinary operating mechanism must be provided. It is desirable to retain the feature of controlling a multi-vent window by the operation of one of the vents serving as a control vent, yet, in addition, it is desirable to have a lock not only for the control vent itself but also for each of the additional vents so that when the window is closed it is firmly secured against dislodgment, either by unauthorized persons or by high wind velocities in either direction, that is, either toward the window from outside or toward the window from inside. It is also highly desirable to provide a multi-vent window in which the various vents are positionable at the option of the user, not only in closed position and in fully opened position, but also in any intermediate position, with assurance that despite disturbing forces, such as high winds, the various vents will remain in the position selected but without hindrance to the normal movement of the vents by the operator.

It is therefore an object of my invention to provide a multi-vent window operating mechanism effective to produce the usual results of such mechanisms and with the additional function of holding the vents in closed position and in intermediate position against even relatively large disturbing forces.

Another object of my invention is to provide in general an improved operating mechanism for multi-vent windows.

Another object of the invention is to provide a means for locking all of the vents of a multi-vent window when they are in closed position without requiring auxiliary effort on the part of the operator.

A still further object of my invention is to provide an operating mechanism for multi-vent windows in which the open or partially open vents are held in any selected position despite relatively large dislodging forces.

A still further object of my invention is to provide an operating mechanism for multi-vent windows which has additional functions over those normally found but which fits in the space normally available for the operating mechanism.

A still further object of the invention is to provide an operating mechanism for multi-vent windows effective on windows of only two vents and by mere duplication also effective upon windows of more vents.

A still further object of the invention is to provide an operating mechanism for multi-vent windows in which minor inaccuracies in manufacture and installation or which evolve through wear or use do not adversely affect the intended operation of the structure.

Other objects, together with the foregoing, are attained in the embodiment of the invention described in the accompanying description and illustrated in the accompanying drawings, in which:

Figure 1 is a perspective of a multi-vent window provided with an operating mechanism in accordance with my invention showing the vents in open position.

Figure 2 is a cross section on a vertical transverse plane indicated by the line 2—2 of Figure 1, the vents being closed and parts of the figure being broken away to reduce its size.

Figure 3 is a view similar to Figure 2 but showing a vent in partly open position.

Figure 4 is an enlarged detail showing part of the structure of Figures 2 and 3 in a jamming or holding position, a part of the figure being in cross section.

Figure 5 is a cross section, the plane of which is indicated by the line 5—5 of Figure 4.

Figure 6 is a view similar to Figure 4 but showing the parts in an unjammed relationship.

Figure 7 is a cross section, the planes of which are indicated by the lines 7—7 of Figure 2, the section being a view from below of part of the structure on the opposite side of the frame from that illustrated in Figure 2.

Figure 8 is an enlarged detail of part of the latch structure in latched or locked position.

Figure 9 is a cross section, the plane of which is indicated by the line 9—9 of Figure 8.

Figure 10 is a view similar to Figure 8 but showing the latching mechanism in an unlatched position.

As illustrated herein, there is shown an installation in a building 6 having a window frame 7 or base of the customary rectangular configuration including the usual jambs and of a size and shape to accommodate three window vents 8, 9 and 10. The lower vent 8 is considered as a control vent, whereas the upper two vents 9 and 10 are follower vents. The installation can as well include any number of vents from two up and need not be installed in a vertical relationship, although that is the customary one and is the relative location utiilzed for relationship of parts in the claims.

Each of the vents 8, 9 and 10 is substantially identical with the others and hence a description of one applies equally to the others. Each vent includes a frame or sash 12 having a glass pane 13 or similar closure mounted in it in the customary way. On the opposite sides of each of the vents appropriate supporting structures are provided and since these are the same on one side as on the other, except in some instances for reverse symmetry, a description of the parts on one side applies equally to those on the other. Secured to the sash 12 at an appropriate location is a metal hinge bar 14 having one portion extending along the sash and secured thereto by any appropriate fastening means 16 and having an offset portion 17 terminating in an ear 18.

Since the hinge bar 14 forms a convenient fastening point, although any other point on the sash 12 is per-

missible, there is secured thereto an arm 19 comprising a strap, usually of metal, which is connected by a pivot 21 at its upper end to the hinge bar 14 and is connected by a pivot 22 at its lower end to a plate 23 held by suitable fastenings 24 onto the window frame or base 7. Preferably, all of the parts of the operating mechanism are of non-corrodible material, such as stainless steel, aluminum, plastic, and the like, and are appropriately provided with washers and anti-friction members, not specifically described, in order that the working of the parts under severe climatic conditions will not be adversely affected.

To complete the mounting of the vents, the ears 18 are secured by suitable pivot pins 26 to the various sections of a travel bar, generally designated 27, which operates in a straight path in a vertical direction within a guide channel or groove 28 formed in the base or frame 7. The guide 28 is somewhat wider than the major portion of the travel bar, yet serves to hold and confine the bar to a rectilinear lifting and lowering movement. That being so, any movement of one of the vents 8, 9 or 10 serves to produce an equivalent movement of the other vents, the individual vents at their tops moving downwardly and slightly outwardly while at their bottoms they move outwardly and upwardly from closed toward open position. This is the type of movement which is customarily employed in multi-vent windows. Since the lowermost vent 8 is the control vent, it is preferably provided with a swing lock 31 mounted on the sash 12 by a pivot connection 32. A tongue 33 on the lock is engageable with a lock box 34 in the lower central part of the base or frame 7 when the window is closed. The lock 31 has a hand portion 36 so that the lower vent 8 can readily be moved between open and closed and any intermediate position.

In accordance with my invention, I provide means for permitting free opening and closing movement of the variout vents by the operator but of jamming or holding or securing the various vents in any intermediate position between fully open and fully closed positions against random dislodgment. For that reason, the travel bar 27 is not a single continuous piece but is rather made up of a plurality of superposed sections 41 and 42 of similar nature and provided with a lost-motion connection to the adjacent section. As especially shown in Figures 4, 5 and 6, for example, the travel bar section 41 adjacent its upper end is provided with a projecting headed pin 44 which extends through an elongated slot 46 in a lower slider fixture 47 overlying the travel bar. The fixture 47 is preferably a metal sheet 48 having a planar surface with spaced flanged edges 49 and 51 aligned to ride in the guide 28 alongside the travel bar sections 41 and 42. The lower slider fixture 47 is secured by a rivet 52 to the lower end of the travel bar section 42 so that the travel bar section 42 and the lower slider fixture 47 operate in unison, whereas the fixture 47 and the travel bar section 41 operate in unison only when the pin 44 is at either of the extreme ends of the slot 46. Otherwise, there is lost-motion, to the extent of the looseness in the slot, so that the travel bar section 41 can move upwardly, from the position shown in Figure 4 to the position shown in Figure 6, without moving the lower slider fixture.

While motion is transmitted from the lower slider fixture 47 to the hinge arm 14 in accordance with the movement of the slider bar, there is preferably provided a cushion of adjustable nature to take care of any discrepancies in motion due to manufacture, installation or use. In a fashion similar to the lower fixture 47, there is furnished an upper slider fixture 53 comprising a metal plate 54 carrying the pivot pin 26 and having a marginal flange 56 operating in the guide 28 like the flanges 49 and 51. Struck out from the plate 54 is a lug 57 exactly matching a similar lug 58 outstanding from the plate 48.

The lugs 57 and 58 are pierced by aligned apertures 59 and 60 through which a machine screw passes, being retained in adjusted position by a nut 62 peened in place after setting. A helical spring 63 surrounds the machine screw and urges the lugs apart. The relative approaching movement of the lugs 57 and 58 is limited by a metal sleeve 64 encompassing the spring 63 and serving as a stop. The space between the end of the sleeve and the adjacent lug 57 is available for yielding movement to take care of various motion discrepancies. In effect, therefore, the pivot pin 26 is related to the travel bar pin 44 to provide substantially a uniform movement with the exception of the free lost-motion connection due to the slot 46 and with the exception of the yielding lost-motion available between the lug 57 and the stop 64. Thus, movement of the travel bar, considered as a whole or in its various sections, produces uniform movement of a partially yielding nature but with some lost-motion in the mechanism.

Advantage is taken of the lost-motion interconnection to provide a jamming or holding structure for retaining the various vents in their selected positions.

For this reason, as especially illustrated in Figures 4, 5 and 6, the upper end of each of the travel bar sections, such as 41 and 42, is cut off in a transverse, horizontal plane to provide an upper face 71 on which a jam block 72 can rest by gravity. The jam block is a rectangular piece of metal of slightly less width than the width of the guide 27 and is firm and not readily deformed. In one position of the parts, as shown in Figure 6, the jam block 72 rests by gravity on the face 71 of the subjacent travel bar section, and has a slight clearance with the lower end of the portion of the travel bar next above, the clearance being provided since the lower slider fixture 47 rests upon the pin 44. However, a portion of the jam block 72 is disposed between end walls 74 and 76 defining part of a notch 77 cut in the lever slider fixture 47. The height of the notch is such with respect to the height of the slot 46 and with respect to the fastening point of the rivet 52 as to assure that the end wall 74 rests upon the jam block 72 in the position of the parts shown in Figure 6.

When the parts are in another position, as shown in Figure 4, with the lower slider fixture 47 lifted relative to the subjacent section of the slider bar, the end wall 76 rides against one end of the jam block 72 and twists or cocks it into a position so that the diagonally opposite corners of the jam block are adjacent the side walls of the guide 28. Then, any force tending to rotate the hinge bar 14 about the pivot pin 26 in a counterclockwise direction, as seen in Figure 4, produces a lifting force on the slider parts 53 and 47 which tends to lift the end wall 76 even more firmly against the jam block 72 and tends to press the upper, right-hand corner of the jam block even more tightly into firm frictional engagement with the side wall of the guide 28. The block 72 acts as a jamming holder to prevent any downward movement of the hinge bar 14 due to an outside force. Thus, if the window vent is in open position, a gust of wind tending to slam the window shut is ineffective since the vent cannot, of itself, be moved toward closed position while the block 72 is jammed.

This arrangement, however, does not interfere with further opening or closure of the vents by operation of the control vent 8. When the control vent is moved manually or by power toward closed position, the effect of its hinge bar 14 is to lift the lower portion 41 of the travel bar. That lifting movement does not produce a simultaneous movement of the adjacent, lower slider portion 47 due to the lost-motion connection of the pin 44 and the slot 46. Rather, the rising travel bar section 41 engages first with the lower right-hand corner of the jam block 72 and rotates it counterclockwise, as seen in the figures, until it is again in a crosswise position, as shown in Figure 6. In that position of the jam block,

both of its sides are free of the sides of the guide **28**. Finally, the bottom of the slot **46** abuts the pin **44** so that, in effect, the travel bar section **41** and the slider sections **47** and **53** are in effect one unit and serve to move the pivot pin **26** and so rotate the hinge bar **14** into closed position.

If the window vents are closed and the travel bar section **41** is moved by opening of the control vent **8** to open the superposed vents, then the travel bar portion **41** is lowered and the pin **44** travels to the bottom of the slot **46**. During this time, the weight of the jam block **72** causes it to rest firmly upon the upper face **71** of the travel bar portion so that the block **72** does not cock or twist in its guide but merely travels downwardly with complete freedom. If the jam block is temporarily stuck in the guide **28**, it is promptly dislodged by the end wall **74** and is slightly rotated into a free position. With the pin **44** at the end of its travel, the slider portions **47** and **53** can continue to be lowered and the hinge bar **14** rotates to open the window the desired amount. There is thus provided a scheme for jamming or holding the various vents in any selected open position which does not, however, interfere in anywise with the opening of the vents or the closing of the vents by manipulation of the control vent **8**.

Additionally, I provide means for locking the individual vents in closed position. That structure is particularly illustrated, to an enlarged scale, in Figures 8, 9 and 10. Since all of the latching devices are similar and are duplicated on opposite sides of the individual vents, a description of one of them applies equally to the others. A latching pin **81** is firmly fixed at a convenient point in the window sash **12** for engagement by the contoured nose **82** of a lever **83** forming part of a latch, generally designated **84**. The latch is mounted on the base or frame **7** by a latch pin **86** affording free pivotal rotation of the latch. The pin **86** is so located that the lever portion **83** is heavier than the remainder of the latch and hence its weight normally tends to cause counterclockwise rotation of the latch **84**. When the pin **81** is not present to serve as a support, the lever **83** rests against a stop pin **87** projecting from the frame **7** for that purpose. When the latch **84** is in the position shown in Figure 8, the inter-engagement between the contoured nose **82** and the pin **81** is sufficient to prevent opening of the vent by force upon the vent itself.

The latch **84** is extended to provide a depending portion **88** having an edge **89** of a cam contour merging with a notch **91**. The notch is of a size conveniently to encompass an actuating or locking pin **92** projecting from the adjacent section **42**, for example, of the travel bar. When the lower vent **8** is in closed position, the travel bar sections are in their uppermost locations and the pin **92** resides in the location shown in Figure 8 with the latch pin **81** restrained. When the control vent **8** is moved toward open position, the initial downward movement of the travel bar section **41** lowers the pin **92** and in so lowering, the pin cams against the boundaries of the notch **91**, especially as shown in Figure 10, and rotates the latch **84** so that the lever **83** and the nose **82** lift out of contact with the latching pin **81** and the window vent is then free for continued opening movement. The relationship of the parts is such that the motion of the travel bar initially is sufficient to lift the latch lever **83** before substantial force is given to the vent to open it.

As the travel bar continues to lower for further opening movement of the window, the pin **92** rides out of the notch **91** and rides over the cam edge **89** into a much lower position. As soon as the pin **92** is free of the latch, the latch pivots by gravity and rests against the pin **87**. Upon closure of the windows, the travel bar section **41** and the pin **92** rise until the pin first contacts the latch contour **89** and in so doing rotates the latch clockwise to lift the lever **83** off of the stop pin **87** and into a location somewhat comparable to that shown in Figure 10.

As the latch is so lifted, the vent swings into closed position with the latching pin **81** underlying the contoured nose **82**. Because of the resilient lost motion due to the springs **63**, the travel bar continues to rise slightly after the vent is closed. This final lifting movement of the pin **92** causes it to enter into the notch **91** so that the latch can follow by gravity or, if it tends to stick, the pin **92** cams against the upper boundary of the notch and positively rotates the latch lever **83** into a position, as shown in Figure 8, with the latching pin **81** appropriately confined and the window vent firmly latched. With this structure, the upper vents are always latched shut whenever the lower control vent **8** is closed and if, in that position of the control vent, the lock **31** is also actuated, then the entire window is firmly secured.

While the movement of the parts is relatively free and easy and is normally attended by only a small amount of friction in the moving parts (in itself sufficient to retain many of the parts against rattling or undue random movement) the friction values vary from time to time and hence, preferably, I provide means for adjustably establishing the amount of friction in the parts. As shown particularly in Figure 9, one or more of the travel bar sections **41** and **42**, being somewhat lesser in depth than the guide **28**, is provided on its side adjacent the bottom of the guide with a friction shoe **93**. This, preferably, takes the form of a leaf spring pierced at one end to be secured against the travel bar section by the riveted end of the latch locking pin **92**. The other end of the leaf spring friction shoe **93** is pressed with a variable force against the bottom of the guide **28** by means of an adjusting screw **94** passing through the travel bar section and locked in position by a nut **96**. By appropriately turning and locking the screw **94**, there is provided an appropriate amount of friction between the travel bar section and the stationary frame guide and hence the precise resistance to movement of the operating mechanism can be set or established to suit the user and the surrounding operating conditions.

In accordance with my invention, therefore, I have provided an operating mechanism for multi-vent windows in which all of the vents are controlled in accordance with the position of the control vent, in which all of the vents are provided with latch locks in closed position, in which the friction of the mechanism can be set at a desired value, and in which external forces tending to close the open vents are resisted by a jamming mechanism so that the position of the vents is, even so, maintained, yet in which the opening and closing movement of the vents is readily effectuated always under the control of the control vent.

What is claimed is:

1. An operating mechanism for multi-vent windows comprising a base, a straight guide on said base, a travel bar slidable in said guide, a hinge bar adapted to be secured to a vent, a pivot mounting for said hinge bar on said travel bar, an arm, means for pivoting said arm to said base and to said hinge bar, a latch pin on said vent, a latch, means for pivotally mounting said latch on said base in a position to engage and disengage said latch pin, and a locking pin on said travel bar engageable with said latch for pivoting said latch upon movement of said travel bar.

2. An operating mechanism for multi-vent windows comprising a base, a straight guide on said base, a travel bar slidable in said guide, a hinge bar adapted to be secured to a vent, a pivot mounting for said hinge bar on said travel bar, an arm, means for pivoting said arm to said base and to said hinge bar, a latch pin on said vent, a latch, means for pivotally mounting said latch on said base in a position to engage and disengage said latch pin, and a locking pin on said travel bar having a lost-motion connection with said latch for pivoting said latch simultaneously with a portion of the movement of said travel bar.

3. An operating mechanism for multi-vent windows

comprising a base, a straight guide on said base, a travel bar slidable in said guide, a vent, a hinge bar adapted to be secured to said vent, a pivot mounting for said hinge bar on said travel bar, an arm, means for pivoting said arm to said base and to said hinge bar, a latch pin on said vent, a latch, means for pivotally mounting said latch on said base, a first lever arm included in said latch and adapted to hook over said latch pin in closed position of said vent, a stop pin on said base in the path of said first lever arm, a second lever arm included in said latch and having a cam portion merging with a notch, and a locking pin on said travel bar engageable with said cam portion and said notch.

4. An operating mechanism for multi-vent windows comprising a base, a hinge bar adapted to be secured to a vent, an arm, means for pivoting said arm to said base and to said hinge bar, a straight guide on said base, a travel bar slidable in said guide and having a transverse upper face, a slider overlying said travel bar and slidable in said guide, means for pivotally connecting said hinge bar and said slider, a lost-motion connection between said slider and said travel bar, a jam block in said guide and adapted to rest on said face, and means on said slider for lifting one end of said jam block from said face.

5. An operating mechanism for multi-vent windows comprising a base, a hinge bar adapted to be secured to a vent, an arm, means for pivoting said arm to said base and to said hinge bar, a straight guide on said base, a travel bar slidable in said guide, a slider overlying said travel bar and slidable in said guide, means for pivotally connecting said hinge bar and said slider, a lost-motion connection between said slider and said travel bar, and means operated by said lost-motion connection for preventing motion of said slider in said guide in one direction.

6. An operating mechanism for multi-vent windows comprising a base, a hinge bar adapted to be secured to a vent, an arm, means for pivoting said arm to said base and to said hinge bar, a guide on said base, a travel bar slidable in said guide, a slider slidable in said guide, means for pivotally connecting said hinge bar and said slider, means for jamming said slider in said guide, and means depending upon relative movement of said slider and said travel bar for preventing said jamming of said slider in said guide.

7. An operating mechanism for multi-vent windows comprising a base, a hinge bar adapted to be secured to a vent, an arm, means for pivoting said arm to said base and to said hinge bar, a guide on said base, a travel bar slidable in said guide, a slider slidable in said guide, means for pivotally connecting said hinge bar and said slider, means for preventing movement of said slider in said guide in one direction, and means operated by said travel bar for blocking the operation of said preventing means.

8. An operating mechanism for multi-sash window structure comprising a pair of jambs, a pair of hinge bars adapted to be secured to a window sash, a pair of arms, means for pivoting one of said arms to one of said jambs and to one of said hinge bars, means for pivoting the other of said arms to the other of said jambs and to the other of said hinge bars, a pair of guides disposed one on said one of said jambs and the other on said other of said jambs, a pair of travel bars, one of said travel bars being slidable in said one of said guides and the other of said travel bars being slidable in said other of said guides, a pair of sliders, one of said sliders being slidable in said one of said guides and the other of said sliders being slidable in said other of said guides, means for pivotally connecting said one of said hinge bars to said one of said slides, means for pivotally connecting said other of said hinge bars to said other of said sliders, a pair of jam blocks, one of said jam blocks being disposed in said one of said guides for movement between a first position jamming said one of said sliders in said one of said guides and a second position freely slidable in said one of said guides, the other of said jam blocks being disposed in said other of said guides for movement between a first position jamming said other of said sliders in said other of said guides and a second position freely slidable in said other of said guides, means depending upon relative movement of said one slider and said one travel bar for holding said one of said pair blocks in said second position, and means depending upon relative movement of said other slider and said other travel bar for holding said other of said pair blocks in said second position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,598,619	Strand	May 27, 1952
2,661,506	Tracy	Dec. 8, 1953