March 17, 1959 H. GRABOVE 2,877,841

MULTIPLE UNIT CLOSURE DEVICE

Filed Nov. 18, 1957 4 Sheets-Sheet 1

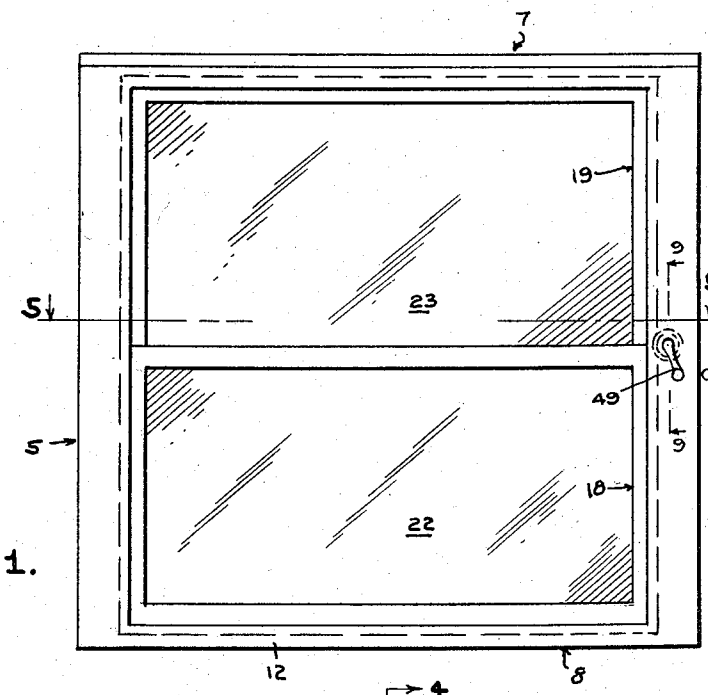


FIG. 1.

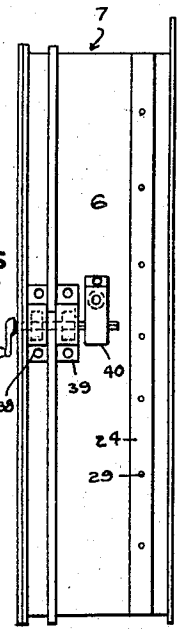


FIG. 3.

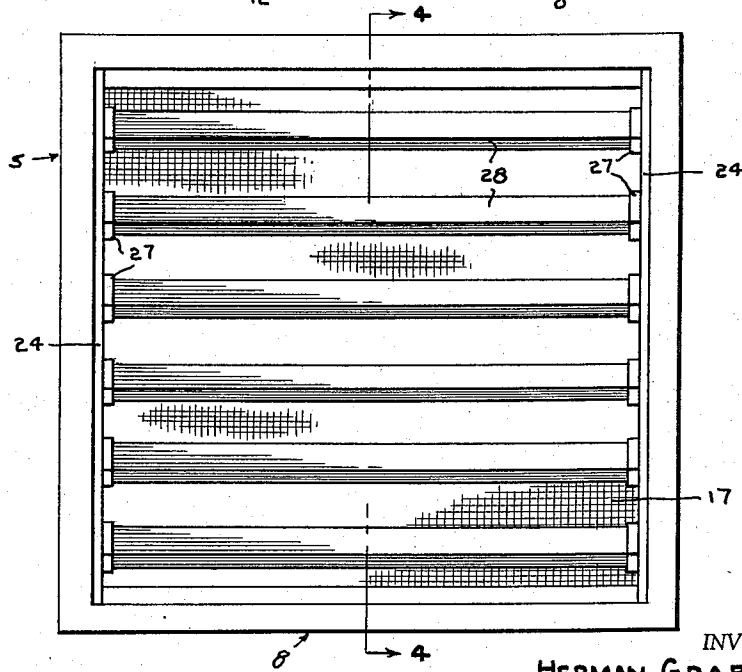


FIG. 2.

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MULTIPLE UNIT CLOSURE DEVICE

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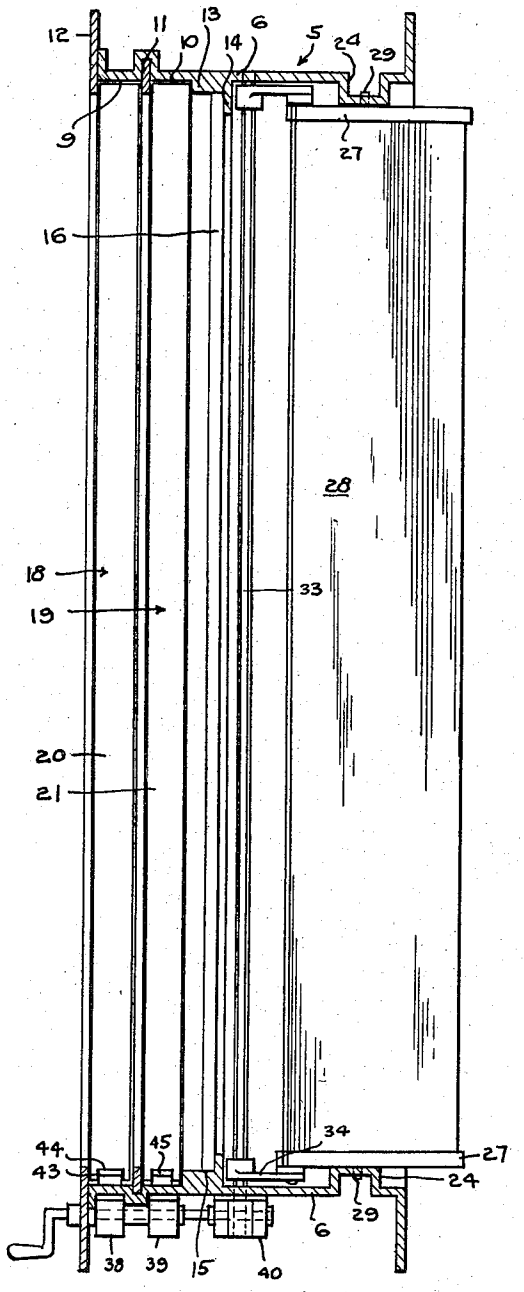


Fig. 5.

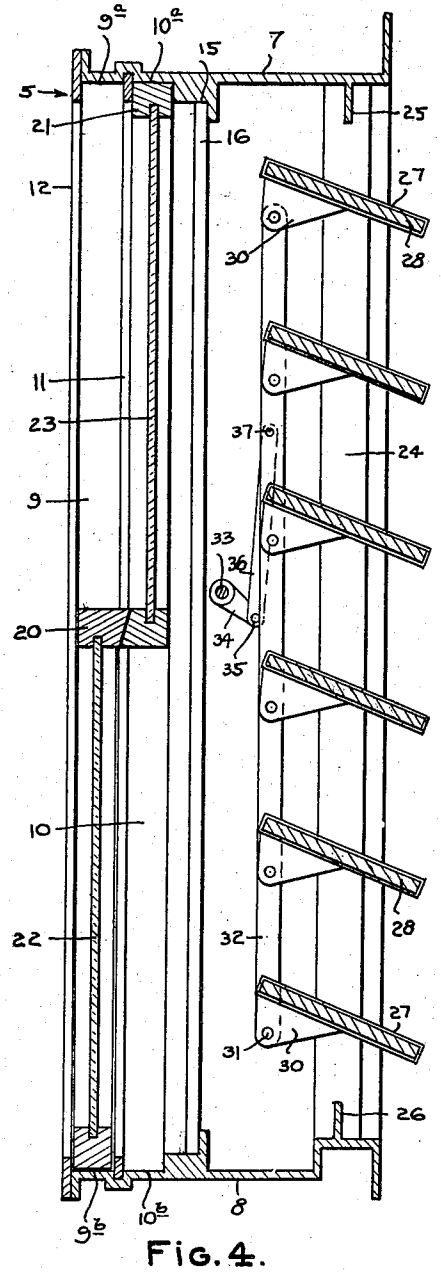


Fig. 4.

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MULTIPLE UNIT CLOSURE DEVICE

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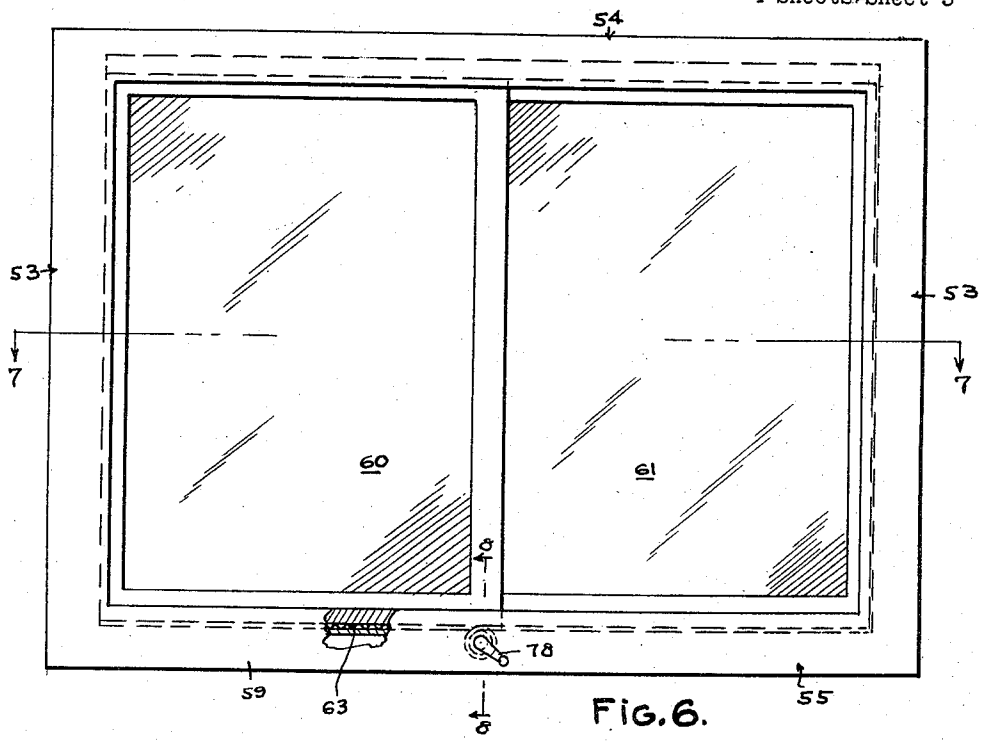


FIG. 6.

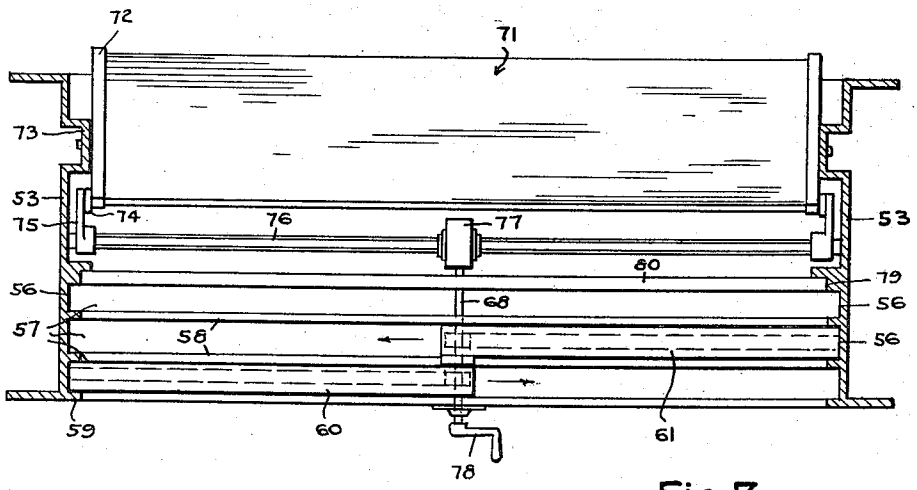


FIG. 7.

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MULTIPLE UNIT CLOSURE DEVICE

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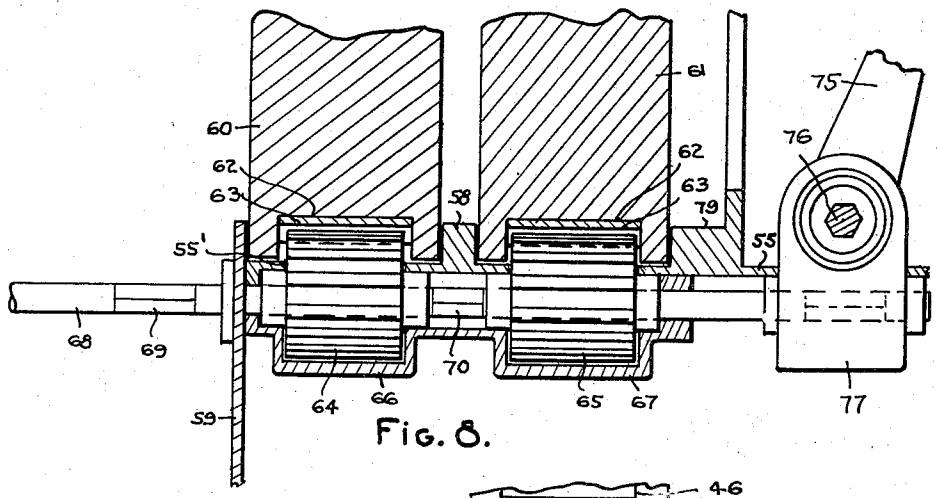


Fig. 8.

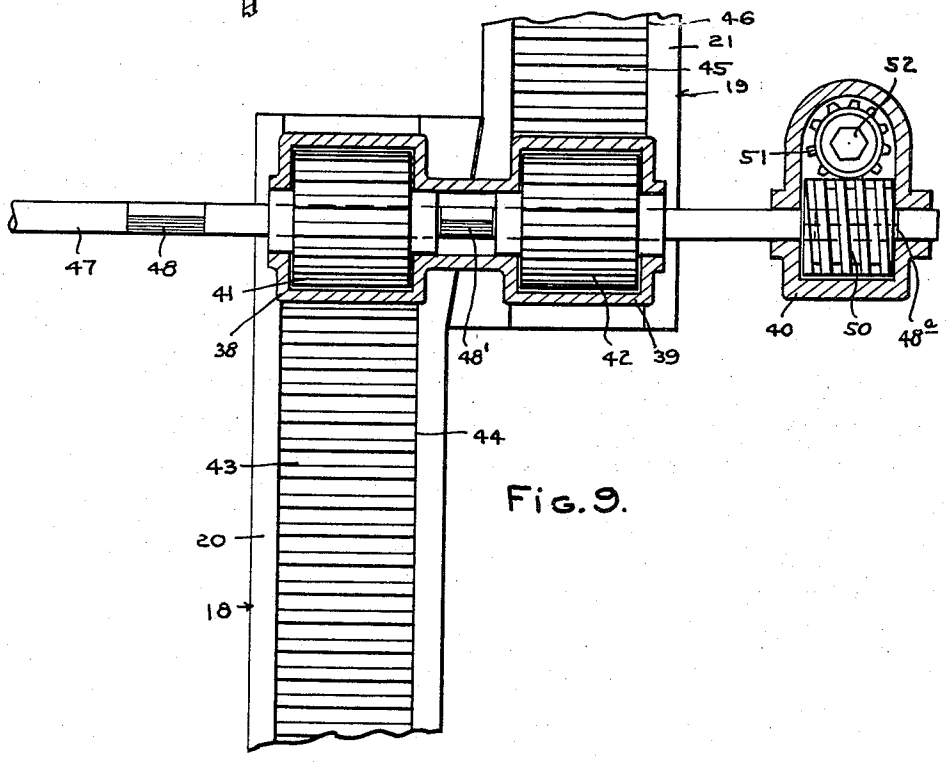


Fig. 9.

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2,877,841

MULTIPLE UNIT CLOSURE DEVICE

Herman Grabove, Miami Beach, Fla.

Application November 18, 1957, Serial No. 697,276

6 Claims. (Cl. 160—91)

This invention relates to closure devices and has particular reference to a multiple window unit having controlled slidable panels upon one side and horizontally pivoted louvres upon the opposite side and with an insect screen disposed between the panels and the louvres.

An object of the invention is to provide a rigid open frame having slidable vents at one side, a plurality of louvre slats upon the opposite sides and an insect screen that spans the opening of the frame intermediate the sliding panels and the louvres and with a single operator means whereby the panels and the louvres may be individually controlled to and from an open position.

Window devices heretofore employed comprise either the double-hung windows, horizontally sliding windows or a plurality of simultaneously opening and closing louvres, each constituting a closure for a frame opening and it is now contemplated that the several units may be embodied within a single frame for controlling ventilation and light to any desirable degree and it is also contemplated that a single mechanical operator shall be employed to actuate either of the sliding panels or the louvres and whereby a single panel may be actuated to a predetermined open position without effecting the other panel or, the panels may be shifted to a full overlapping position within the limits of the frame after which, the louvres may be actuated to any degree of opening for controlling the passage of air or light and with an intermediate insect screen being mounted within a frame and whereby to prevent the passage of insects to a building when either or both of the panels and the louvres are in open position.

The invention further embodies a preferably extruded metallic frame that is provided with guide channels for the sliding movement of either a double-hung window or a horizontally sliding window and with the group of louvre devices being horizontally pivoted within the frame preferably upon the outer side that are movable to and from a closed position as will be determined in accordance with the control of air flow or the entry of light. The louvres, not only serve to function as light and air control means, but also functions as a protective means for the usually glass paneled inner window devices, such being highly desirable in the presence of exceptionally high winds and for this purpose the louvres may be formed of wood, metal or plastic having a high degree of resistance to breakage under the impact of flying objects such as are experienced in exceptional storm conditions.

Novel features of construction and operation of the device will be more clearly apparent during the course of the following description, reference being had to the accompanying drawings wherein has been illustrated the preferred forms of the device and wherein like characters of reference are employed to denote like parts throughout the several figures.

In the drawings:

Figure 1 is an inner side elevation of a window constructed in accordance with the invention,

Figure 2 is an outer side elevation thereof,

Figure 3 is an end elevation of the device,

Figure 4 is an enlarged substantially vertical section, taken on line 4—4 of Figure 2,

Figure 5 is a horizontal section taken substantially on line 5—5 of Figure 1,

Figure 6 is an inner side elevation of a modified form of the device,

Figure 7 is a horizontal section taken substantially on line 7—7 of Figure 6,

Figure 8 is a greatly enlarged horizontal section, taken substantially on line 8—8 of Figure 6, and

Figure 9 is a view partly in section and partly in elevation illustrating actuating mechanism for the first form of the invention and taken substantially on line 9—9 of Figure 1, parts being omitted for sake of clearance.

Referring specifically to the drawings and particularly to Figures 1, 2, 3, 4, 5 and 9, the numeral 5 designates a preferably metallic extruded frame embodying vertical parallel jamb members 6 that are connected by a header 7 and a sill 8. While the frame is preferably extruded from light weight material, such as aluminum, it will of course be understood that the frame may be fabricated from wood or other desirable materials. Each of the jamb members 6 adjacent their inner sides are provided with guide channels 9 and 10, separated by a parting strip 11. The channel 9 is closed upon its outer side by a facia plate 12. The inner channel 10 at its inner side is defined by an enlargement 13, having an inwardly projecting flange extension 14, forming a seat 15.

The header and sill 7 and 8 are shaped substantially identical to the jamb member 6 to constitute the upper and lower channels 9*a*, 10*a*, 9*b* and 10*b*, and with the several channels being identical throughout the inner circumference of the frame. The header and sill 7 and 8 also correspond in shape with respect to the enlargement 13 and the flange 14 to form a continuation of the seat 15 throughout the circumference of the frame. Detachably supported upon the seat 15, is a frame 16 having a section of insect screening 17 attached thereto. The screen frame 16 and the screen 17 are of conventional construction and require no detailed illustration or description.

Vertically slidable within the channels 9 and 10 are a pair of panels 18 and 19, here illustrated as being conventional double-hung window devices that embodies the usual frames 20 and 21, wherein is mounted preferably transparent glass sheets 22 and 23. The panels 18 and 19 have their meeting rails beveled in a customary manner and whereby the windows are substantially sealed against the passage of air when in the fully closed position. The panels 18 and 19 are shiftable in a vertical plane individually to and from overlapping position, either with the panel 18 in an upper position or with the panel 19 in a lower position or to dispose the panels in a partially shifted relation in respect to each other so as to provide upper and lower openings, such being customary in the well known double-hung windows. Means are provided for mechanically actuating the panels 18 and 19 as will be hereinafter described.

Each of the jamb members 6 adjacent their forward sides are provided with inwardly arranged raised ribs 24 while the header 7 and the sill 8 is provided with stop flanges 25 and 26. Supported upon the ribs 24 are a plurality of equidistantly spaced end clips 27, carrying slats or panels 28. The clips at each side of the frame are identical in construction and carry pivot pins 29 that engage within suitable apertures in the rib 24. Each of the clips are provided with preferably integral crank arms 30 that have pivotal connection at 31 to a common operator bar 32 at each side of the window. Spanning the width of the frame and having pivotal connection

within the jambs 6, is a shaft 33, carrying at its opposite extremities, cranks 34. The cranks 34 are pivotally connected at 35 to links 36 and with the links being pivotally connected at the opposite ends to the operator bars 32, as at 37. It will thus be apparent, that when the shaft 33 is rotated, the several slats will be shifted to and from an overlapping relation with respect to each other and with the upper and lower slat having weathering contact with the flanges 25 and 26 when in the fully closed and overlapping position. The slats 28 may be formed of wood, metal, plastic or any other desirable material and may function as an air control means and also as a light control means. It will be seen, that the screen 16 is disposed between the panels 18 and 19 and the shutters 28 and in a position where the panels 22 and 23 may be cleaned with a minimum of effort and without the necessity of removing the screen. Heretofore, the screen has been mounted upon the inner face of the frame and has required its removal before the user may clean the windows.

It is contemplated that a single operator shall be employed to actuate either one of the panels 18 and 19 separately or to operate the several closure slats and such means, see particularly Figure 9 embodies gear housings 38, 39 and 40. The housings 38 and 39 may be integrally formed and serve to house pinions 41 and 42. The pinion 41 extends through one jamb member 6 to engage a rack bar 43, that is seated within a groove 44 formed within the vertical edge of the panel 18. The pinion 42 likewise extends through a jamb 6 and engages a rack 45 that is seated within a vertical groove 46 formed within the vertical edge of the panel 19. A suitable operator shaft 47 extends through the pinions 41 and 42 and the shaft is provided at spaced apart points with squared portions 48 that alternately engage corresponding axial apertures formed within the pinions 41 and 42 and whereby to impart a driving action to the pinions individually. The shaft 47 at its inner end is provided with a suitable operating crank 49 and whereby the operator may select and control the operation of either of the panels 18 and 19. The shaft 47 is extended beyond the pinion 42 to engage a worm 50. The shaft 47 likewise engages the worm 50 in a manner similar to that already described with respect to the pinions 41 and 42. The worm 50 engages a worm wheel 51 that receives the preferably hexagonal end portion 52 of the cross-shaft 33. It will be apparent that when the operator shoves the shaft 47 inwardly, he may first engage the worm 50 for actuating the several slats 28 to and from a closed position. Should be desire to actuate the panel 19 to a lowered position, the shaft 47 is shoved inwardly so that its squared portion disengages the worm 50 and a squared portion 48' engages the pinion 42, in which position the shaft may be rotated free of driving connection with the pinion 41 and the worm 50, causing the panel 19 to be lowered or raised as the case may be. Should the operator wish to raise the lower panel 18, the shaft 47 is forced inwardly a distance that causes the squared portion 48 to engage the pinion 41, while the square portion 48' passes beyond the pinion 42, and the squared portion 48*a* projects beyond the housing 40, thus disconnecting the shaft from the pinion 42 and the worm 50 and creating a drive for the pinion 41 and, through the medium of the crank 49 the panel 18 may be raised or lowered as the case may be. It should be understood of course that other forms of operators may be employed for the individual operation of each of the panels 18 and 19 or the closure slats 28 but, it has been found desirable to have a single operator capable of controlling each of the units. It may be found desirable that the panels 18 and 19 be provided with any conventional balance mechanism whereby to hold them in an adjusted position when either of the pinions 41 and 42 are disengaged from the shaft 47. Also, should a conventional geared operator be employed only for the slats 28, the window panels 18 and 19 may be actuated manually in a customary manner. It is believed, that the operation of this form of the invention will be entirely apparent, since the device embodies a conventional double-hung window, a plurality of closure slats and a conventional insect screen disposed therebetween and with the entire assembly being contained within a single frame and capable of functioning in a novel manner heretofore requiring separate closure elements and separate frames. The device provides a very desirable arrangement of window structure having the benefits of an air and light control shutter, with the insect screen being supported in a novel manner making it possible to have access to the double-hung window at all times.

Referring now to Figures 6, 7 and 8, there has been provided an open frame that embodies jambs 53, a header 54 and a sill 55. The jambs, the header and the sill are preferably extruded from aluminum and are connected together in any conventional manner. The jambs 53 are provided with spaced apart grooves 56 that have mating engagement with horizontal grooves 57 formed in the header and the sill. The grooves 57 are separated by parting ribs 58 and a forward flange 59 carried by the face of the frame, thus forming inner circumferential grooves entirely around the forward portion of the frame. Slidable in a horizontal manner within the grooves 57, are a pair of window panels 60 and 61. The panels have overlapping engagement at the central portion of the window and are individually slidable to and from a closure forming position. Each of the lower frame members 60 and 61 are grooved at 62 for the reception of rack bars 63. The rack bars extend for the full length of the panels 60 and 61. The means for shifting the panels 60 and 61 along the grooves 57, comprises pinions 64 and 65, that are rotatable in housing 66 and 67. The pinions 64 and 65 project upwardly through openings 55' in the sill 55, and have engagement with the racks 63. The pinions 64 and 65 are apertured axially for the sliding reception of an operator shaft 68. The shaft 68 is provided with squared portions 69 and 70 that are adapted to engage squared openings of the pinions 64 and 65 and whereby the pinions may be actuated individually by shoving the shaft 68 forwardly to engage either the squared portion 70 or the squared portion 69 into its respective pinion 64 and 65. Thus, either one of the window panels 60 or 61 can be shifted to and from closed position with a minimum of effort.

Also mounted within the forward part of the frame, is a slatted closure device illustrated as a whole by the numeral 71. The closure device 71 is similar in all respects to the slats 28 in the first form of the invention and embodies the end clips 72 that are pivotally supported upon the ribs 73 of the jamb members 53. Operator bars 74 and crank means 75, carried by a hexagonal shaft 76, serve to shift the closure device 71 to and from a closed position for controlling both light and air to the panels 60 and 61. The means for rotating the shaft 76 comprises a conventional geared operator 77. The geared operator 77 is engaged by the forward and preferably squared end of the shaft 68, similar to the first form of the invention and as illustrated in Figure 9. The connection of the shaft 68 with the geared operator 77 is similar in all respects to that previously described. In this form of the invention, the shaft 68 passes through the forward central portion of the sill member 59, while the operator mechanism of the first form of the invention was located substantially midway of the height of the window and at one side. It will thus be apparent, that the operator mechanism embodying the shaft 68 is conveniently located and carries a winding handle 78 through the medium of which the shaft may be shoved inwardly or outwardly to engage the respective pinions 64 and 65 or the geared operator 77. It will thus be apparent, that the window can be easily controlled by a single operator to shift either of the panels 60 and 61

or to shift the slatted closure device 71 and thus control to a fine degree the passage of air and light through the frame. The lower edges of the panel 60 and 61 may be provided with any desirable antifriction means, should this be necessary, but in metallic window structures, it is believed that the friction between the panels 60 and 61 and the bottoms of the grooves 57 will be negligible. As in the first form of the invention, the frame has been extruded to form an inwardly directed seat 79 for the reception of a frame 80 that carries an insect screening of conventional construction.

It is to be understood that the invention is not limited to the precise construction shown, but that changes are contemplated as readily fall within the spirit of the invention as shall be determined by the scope of the subjoined claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A window device of the character described that comprises an open rigid frame for mounting engagement in a wall opening, the window frame supporting first and second closure devices, the first closure device being a pair of glazed sliding panels that are shiftable in the frame to and from an overlapping position and to and from a position to fully close the opening of the frame, the second closure device being a plurality of horizontally pivoted slats that are shiftable to and from an overlapping relation to each other and to and from a full closure for the opening of the frame, the first and second closure devices being operable in the frame in spaced apart relation, means for actuating the closure devices independently of each other and from a single operator device and, an insect screen disposed in spanning relation to the frame and between and parallel to the closure devices.

2. The structure according to claim 1, wherein the frame includes jambs, a header and a sill, the jambs, header and sill being provided with guide channels for the sliding reception of the glazed panels, one edge of each of the panels having a toothed rack, the said actuating means including pinions that have meshing engagement with the racks, an operating shaft for selectively driving the pinions and whereby the panels may be separately controlled.

3. The structure according to claim 1, wherein the frame includes jambs, a header and a sill, the jambs, header and sill being jointly provided with mating vertical and horizontal guide channels, the first closure device comprising a pair of panels having transparent sheets of glass therein and whereby to constitute double-hung windows, the panels being vertically shiftable in the channels in overlapping relation, rack means carried by the corresponding ends of the panels and gear means carried by the frame that is engageable with the racks, the said gear means being controllable to actuate either of the panels individually in their sliding action, the second closure device comprising a plurality of slats that are connected together to move in unison and means associated with the gear means for actuating the slats in their pivotal movement independently of the panels.

4. A window device of the character described that comprises a rigid open metallic frame including jambs, a header and a sill, the jambs, the header and the sill being extruded to form circumferential guide channels, a pair of glazed window devices slidable in the channels in a horizontal plane in overlapping relation, the lower edge of each of the window devices being provided with rack bars, means for shifting the window devices in a horizontal path to and from an overlapping relation to each other that comprises a geared operator having an operating shaft, pinions carried upon the shaft and that engage the rack bars, means upon the shaft for alternately engaging and driving each of the pinions and whereby to shift each of the window devices independently of the other, a louvred closure device disposed within the frame in spaced relation to the window devices, the louvred closure device including a plurality of horizontally pivoted slats that are shiftable to and from an overlapping relation to each other, a common operator bar for all of the slats, crank means engageable with the operator bar and whereby to move the operator bar and the slats in their pivotal movement and means operable by the shaft for controlling the movement of the cranks independently of the pinions and the window devices.

5. The structure according to claim 4 wherein the cranks for the louvred devices are carried by a rock shaft that spans the frame in a horizontal manner, the rock shaft being connected intermediate its length with a geared operator and with the geared operator being alternately actuatable by the said shaft and an insect screen removably disposed within the frame between the window devices and the louvres.

6. A window device of the character described that includes a rigid open frame having jambs, a header and a sill, the jambs, header and sill being extruded to form guide channels throughout the inner periphery of the frame adjacent its inner side, first and second closure devices disposed in the frame in movable relation, the first closure device comprising a pair of shiftable window frames having glass panels therein, the window frames being shiftable in overlapping relation, gear racks carried by the corresponding edge of each window frame of the first closure device, the second closure device comprising a plurality of horizontally pivoted louvres and with the louvres jointly forming a complete closure for the forward side of the open frame, the louvres being pivotally supported upon the jambs to swing in a vertical plane to and from an overlapping position, a common operator bar connected to the opposite ends of the louvres and whereby to simultaneously control their movement, a rock shaft journalled in the jambs at its opposite ends, crank arms carried by the rock-shaft, links connecting the cranks with the operator bars, a geared operator for driving the rock-shaft, means for actuating the window frames of the first closure device that comprises a pair of spaced apart pinions, a drive shaft slidable through the pinions axially, a crank for rotating and sliding the shaft, means formed upon the shaft for alternate clutched engagement with the pinions and whereby to individually control the movement of the window frames, the shaft being extended forwardly to engage and drive the geared operator, the said shaft adapted to have a clutched engagement with the geared operator independently of the clutched engagement with the pinions and whereby to independently control the movement of the louvres, the said pinions having constant meshing engagement with the racks, housings for the rotative support of the pinions that is fixedly connected to the open frame and an insect screen disposed within the frame in spaced relation to the window frames and the louvres.

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