April 13, 1954 E. O. BAIRD ET AL 2,675,228

ELECTRICAL CONTROL MEANS FOR CLOSURE DEVICES

Filed Feb. 5, 1953 3 Sheets-Sheet 1

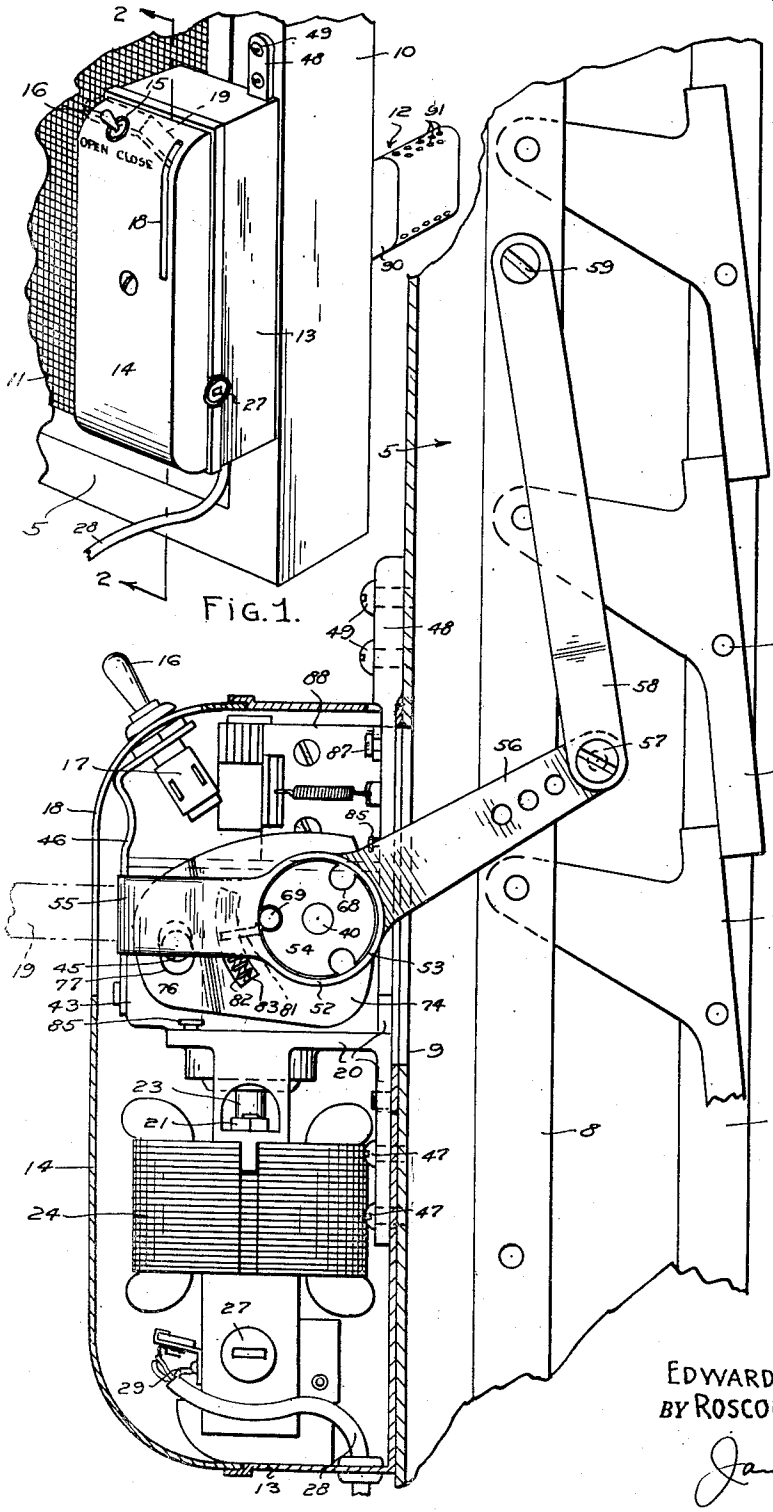

Fig. 1.

Fig. 2.

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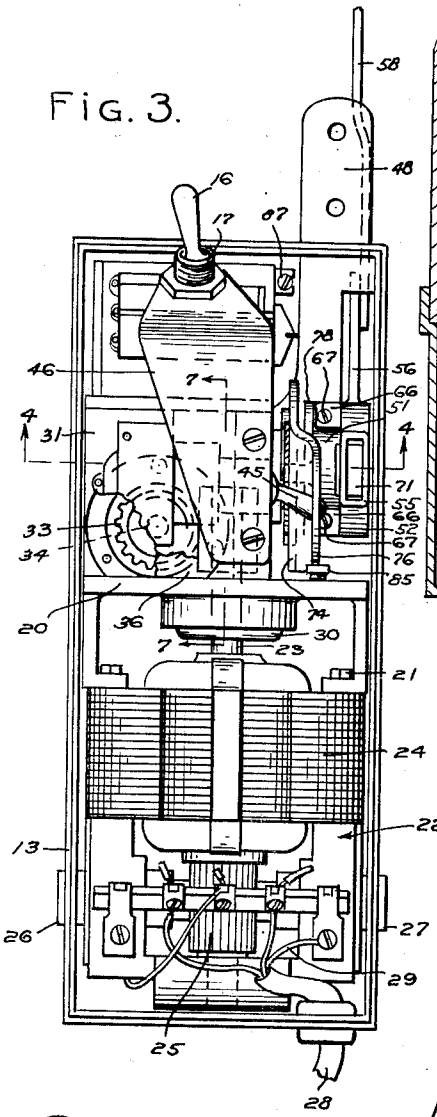
3 Sheets-Sheet 2

Fig. 3.



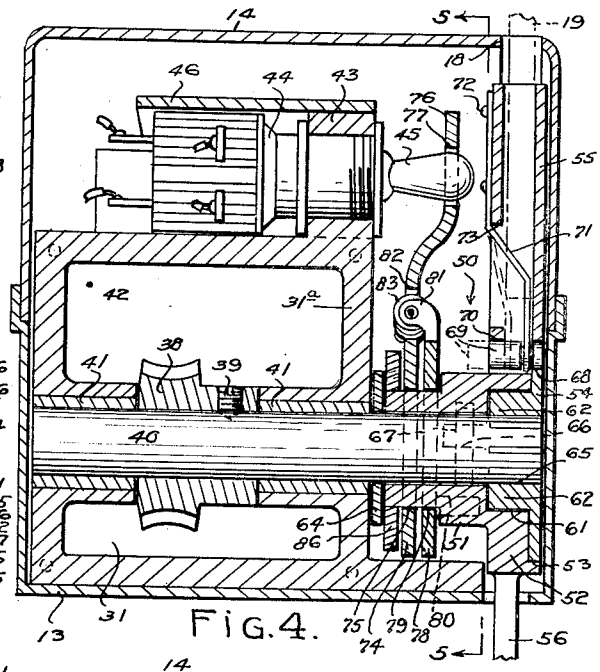


Fig. 4.

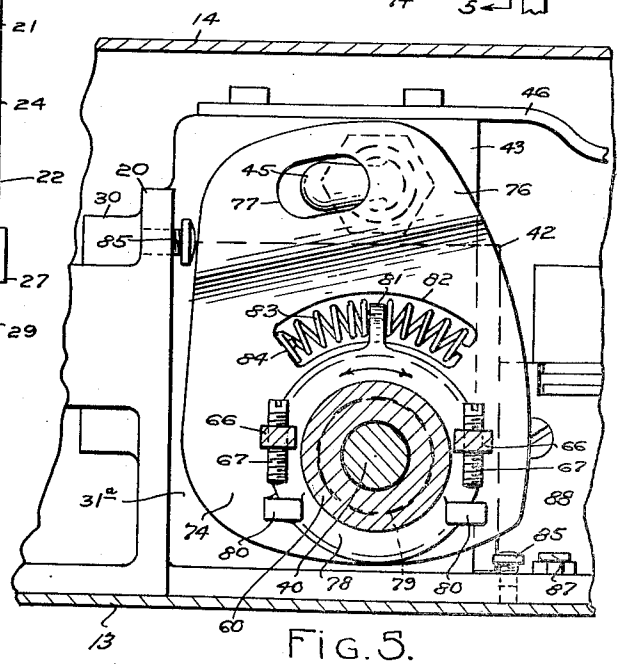


Fig. 5.

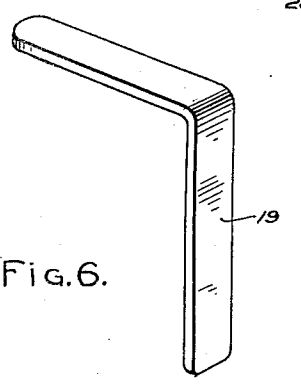


Fig. 6.

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ELECTRICAL CONTROL MEANS FOR CLOSURE DEVICES

Filed Feb. 5, 1953 3 Sheets-Sheet 3

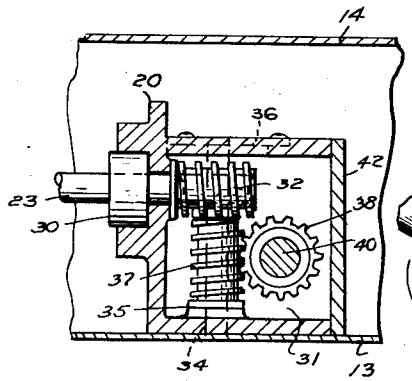

Fig. 7.

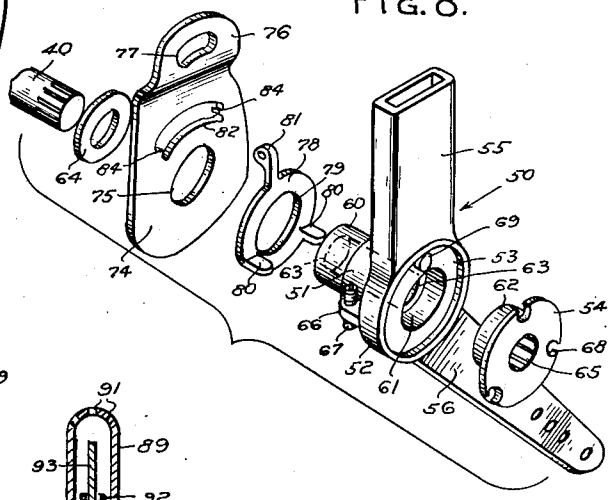

Fig. 8.

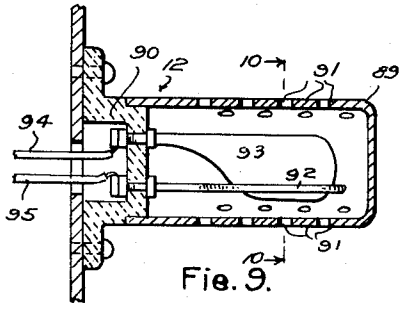

Fig. 9.

Fig. 10.

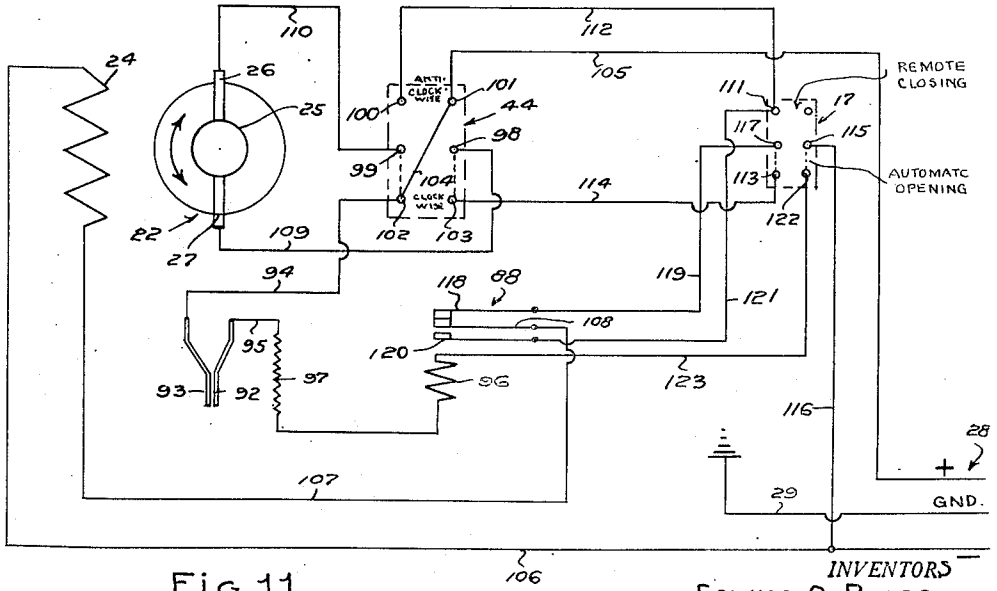

Fig. 11.

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Patented Apr. 13, 1954

2,675,228

UNITED STATES PATENT OFFICE

2,675,228

ELECTRICAL CONTROL MEANS FOR CLOSURE DEVICES

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Application February 5, 1953, Serial No. 335,262

6 Claims. (Cl. 268—21)

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This invention relates broadly to closure devices and has particular reference to a means associated therewith for actuating the closure device to either a closed or open position under the influence of a rain detector and is an improvement over our co-pending application, Serial No. 300,461, filed July 23, 1952.

The invention has for its prime object the actuation of a closure device, such as the conventional jalousie windows of the type that are shifted to a closed or open position by a single stroke actuating bar. The device of the present invention is adaptable for various other types of windows, such for instance, as casement windows or, with slight modifications, the device is adaptable for the operation of the conventional double-hung windows. The device contemplates automatically controlled mechanism that is associated with the operator bar of the window in conjunction with an electrical connector of the type commonly known as a rain-detector coupled with means for permitting an actuation of the window exclusive of the rain-detector by a remote control switch.

A further object of the invention resides in novel mechanical means to permit the manual shifting of the closure device to either a closed or open position exclusive of the electrical means, which is most desirable in those infrequent intervals when there is an electrical failure and current is not available for the device of this invention.

The invention further contemplates novel adjustable means for controlling the movement of the window operator bar to its maximum shifting position for a fully closed or open position of the window.

A further object of the invention resides in a novel clutch mechanism for disconnecting the electrical drive means so as to enable the manual shifting of the window in the absence of electricity.

Various other novel structural details will be more clearly apparent during the course of the following description, reference being had to the accompanying drawings, wherein has been illustrated a preferred form of the device and wherein like characters of reference are employed to denote like parts throughout.

In the drawings:

Figure 1 is a perspective view of the device connected with a fragmentary portion of a conventional window frame,

Figure 2 is a vertical section taken on line 2—2 of Figure 1, illustrating the mechanism in side elevation and showing the operative connection with an operating bar of a window,

Figure 3 is a front elevation of the mechanism as disposed within a casing and with the cover of the casing removed,

Figure 4 is an enlarged transverse sectional

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view taken substantially on line 4—4 of Figure 3, parts being shown in elevation and parts omitted for sake of clearness,

Figure 5 is a section taken substantially on line 5—5 of Figure 4,

Figure 6 is a perspective view of a crank employed for the manual actuation of the window,

Figure 7 is a fragmentary section taken substantially on line 7—7 of Figure 3,

Figure 8 is a perspective view of the several elements included within the window shifting mechanism, clutch and switch actuator, separated for sake of clearness,

Figure 9 is a longitudinal section through a rain-detector associated with the invention,

Figure 10 is a fragmentary section substantially on line 10—10 of Figure 9 and,

Figure 11 is a diagrammatic illustration of an electrical control wiring associated with the device.

Referring now more specifically to the drawings and particularly to Figures 1 and 2, a conventional jalousie window has been fragmentarily illustrated for purposes of illustrating the operative connection of the invention thereto. The window includes the usual frame 5 that supports a plurality of closure panels 6 to be simultaneously swung on their horizontal pivots 7 through the medium of a common operative bar 8. This type of window embodies either metal, wood or glass louvers, and the operating means for the louvers in this particular instance is of the type recognized as a single throw crank or lever that normally projects through an opening 9 in one side jamb 10. Other types of jalousie windows are operative through the medium of winding operators, commonly referred to in the copending application identified. The window may support the usual insect screen 11 without interference with the device of this invention, the screen being readily removable without interfering with the mounting of the invention. Fixedly supported upon the outer side of the frame 5 and preferably in the area of this invention, is an electrical connector of the type that is actuated by a single drop of water, the rain-detector being indicated as a whole by the numeral 12 in Figures 1 and 9. The rain-detector 12 will be more clearly described later.

The device of this invention is supported within a rectangular housing 13 having a removable cover 14. Cover 14 is apertured at 15 for the passage of an arm 16 embodied within a toggle switch 17, and serves as a remote control means for the control of the window. The cover 14 is further slotted at 18 for the insertion and shiftable movement of a flat crank 19 of generally L-shape, the operation thereof to be later described. The cover 14 has been stamped or embossed adjacent the toggle 16 to indicate an open or closed position of the mechanism.

Supported within the housing 13 in any desirable manner against displacement, is a metallic frame 20 that rigidly supports, as by screws 21, a series wound reversible type electric motor, indicated as a whole by the numeral 22. With the housing arranged in a vertical manner as shown, the motor will likewise be vertically disposed. The motor is provided with a drive shaft 23. Since the motor 22 forms no part of the present invention, its structure will not be described in detail other than to generally indicate a field winding 24 and armature 25 and the usual brushes 26 and 27. It might be pointed out at this time that the flow of current through the field windings 24 is in one direction, while the rotation of the motor is reversed by a change of polarity on the brushes 26 and 27 through the medium of a novel reversing switch, to be later described. A source of electrical energy is conducted from any convenient adjacent outlet in the building through a cable 28. A conventional equipment ground 29, shown in Figures 3 and 11, is employed as a protection against any possible shortage in the electrical system. The shaft 23 is journalled in a bearing of any desirable form 30 and extends through an opening in the frame to terminate in a gear housing 31. Splined or otherwise fixedly connected with the end of the shaft 23 is a worm 32. The worm 32 in turn meshes with a worm gear 33, splined or otherwise fixed upon a shaft 34, journalled at its lower end in a bearing 35 and at its upper end in a suitable bearing carried by a removable cover-plate 36. The cover-plate 36 is detachably connected to the gear housing 31 by screens or the like for easy removal and to facilitate the assembly of the gear 33 and its shaft. Below the gear 33, the shaft has also splined thereon a worm 37 having meshing engagement with a worm gear 38, pinned at 39 upon a cross shaft 40. The shaft 40 is journalled in suitable bearings 41 carried by the opposite walls of the gear housing 31. The shaft 40 projects beyond the side wall 31a to a point closely adjacent a side wall of the housing 13 for the reception of louver actuating mechanism, to be described. The drive from the motor 22 to the shaft 40 is of a novel reduction type that imparts a very considerable torque to the shaft 40 and permits the assembly of the gearing within a minimum space. It is contemplated that the frame 20 and housing 31 shall be cast as an integral unit. The housing 31 is provided with a cover-plate 42 to facilitate access to the housing 31 for the introduction of lubricants and facilitate the assembly of the shaft 40 and the gear 38. The housing 31 is further extended outwardly as at 43 and serves as a rigid mounting for a reversible type toggle switch 44, having a toggle arm 45 that projects beyond the housing 31 in substantial alignment with the shaft 40 and lies within the path of actuating mechanism, to be described. The extension 43 likewise serves as a mounting support for a plate 46 that serves as a rigid mounting for the toggle switch 17, thus permitting the removal of the cover 14 without disturbing the switch 17, since the cover may be easily removed after the conventional locknut of the switch is first removed.

The housing 13 and its encased frame 20 and associated elements are rigidly connected to the inner face of the jamb 10 in the position commonly occupied by the conventional jalousie operator and the base of the frame 20 has been drilled for the passage of screws 47 that are spaced apart a distance corresponding to the spacing of the screw openings that normally support the conventional operator. The frame base is further extended and projects through an opening in the housing 13, as shown at 48, and this extension is likewise drilled for the passage of screws 49 which likewise are spaced and positioned to correspond with the conventional screw openings of the jamb 10. In this manner it only becomes necessary to remove the conventional operator and substitute the device of this invention, requiring no cutting or additional drilling and tapping of the jamb. This particular mounting is common to the major number of conventional operators.

Referring now particularly to Figures 2, 4, 5 and 8, the numeral 50 denotes the actuating mechanism as a whole that is employed to automatically shift the operating bar 8, or to shift the operating bar 8 by the manual control crank 19. The mechanism embodies a hub 51 having an enlarged cylindrical head 52 that is recessed upon its outer face as at 53 for the seating reception of a clutch disc 54. The head 52 is provided with a preferably integral tubular crank arm 55 that is at right angle to the hub 51 and which normally is positioned slightly inwardly from one inner side of the housing 13 and its cover 14. Likewise formed integral with the head 52 is an angularly disposed crank arm 56 pivotally connected at its terminal end, as at 57, with a link 58. The link in turn at its opposite end is pivotally connected with the operator bar 8, as at 59. The hub 51 is further reduced in diameter to form a hub extension 60. Inwardly of the recess 53 of the head 52, the hub is provided with a relatively deep cylindrical recess 61 for the reception of a cylindrical hub 62 formed upon the clutch disc 54. The recesses 53 and 61 are axially disposed with respect to the hub 51 and concentric thereto. The hub 51 and its reduced extension 60 are further provided with an axially arranged cylindrical bore 63 for the mounting and rotatable support of the hub 51 upon the extended portion of the shaft 40. A thrust washer 64 is disposed between the inner end of the hub extension 60 and the adjacent side wall 31a of the gear housing, clearly shown in Figure 4. The disc 54 and its hub 62 are bored and splined for splined engagement upon the outer end of the shaft 40, as shown at 65. The inner face of the head 52 is provided with a pair of oppositely arranged lugs 66 threadedly supporting adjusting screws 67 for use in a manner to be presently described. The clutch disc 54 is apertured at equidistantly spaced points 68 for the reception of a clutch pin 69 that is shiftable in an opening 70 that extends entirely through the head 52. The pin 69 is normally urged into engagement within either of the apertures 68 under the influence of a preferably leaf spring 71, rigidly connected as by screws or rivets to the inner face of the crank 55, as at 72. The inner face of the crank 55 has been cut away, as at 73, to permit a lower angular extension of the spring 71 to normally lie against the inner wall of the forward face of the crank 55, in which position the pin 69 has been projected forwardly to engage in either of the apertures 68. Since the clutch disc 54 and its hub 62 are splined to the shaft 40, the shaft 40, clutch disc and the hub 51 and associated housing 52 are securely locked together by the pin 69. If for any reason there is a failure of the electric service, the operator may release the clutch connection by inserting the crank 19 through the slot 18 and downwardly into the tubular crank 55, where it will contact the spring

71 and shift it laterally, withdrawing the pin 69 from the aperture 68, thus permitting the operator through the medium of the crank 19, to shift the crank 55 and its associated crank 56 freely upon the shaft 40 to close or open the louvers. Upon removal of the crank 19, the spring 71 will tend to shift the pin 69 towards the disc 54 and, upon an actuation of the mechanism by the electric current, the first motion of the shaft 40 will naturally rotate the disc 54 and immediately that an aperture 68 registers with the pin 69, it will become locked together again. It should be understood, however, that the use of the crank 19 is only for emergency purposes in the event of an electrical power failure and normally is supported at some point convenient to the operator. The slot 18 is of a length that permits the maximum swinging motion of the crank 56 since there may be some slight variation in the throw necessary to open and close louvers in windows of different manufacture.

The means to throw the toggle arm 45 to either position of reversing action comprises a segment disc 74 having a cylindrical opening 75 for freely rotatable mounting upon the hub extension 60. The disc 74 is extended upwardly and offset outwardly, as at 76, and with the offset 76 being arcuately apertured at 77. The toggle arm 45, as clearly shown, projects through the arcuate opening 77. The opening 77 is on an arc struck from the axial center of the shaft 40. It will thus be apparent that when the disc 74 is rotated, through means to be presently described, the end wall of the arcuate opening 77 will engage and shift the arm 45 laterally, such motion and such engagement depending on which position the toggle arm 45 is in when the mechanism is actuated. The offset 76 has been made as a means to permit the assembly of the mechanism in a minimum space. The means for rotating the disc 74 consists of a disc 78 that is apertured at 79 for rotatable support upon the hub 60 and normally abuts the shoulder formed by the hub 51. The disc 78 is positioned upon the hub extension 60 between the hub 51 and the disc 74. The lugs 80 formed upon the disc 78 are disposed beneath the lower ends of the adjusting screws 67. Thus, a rotation of the hub 51 through the medium of the clutch 54 will be transmitted to the disc 78 at the moment of contact between either of the screws 67 and its adjacent lug 80. Movement of the disc 74 is through the medium of a lateral extension 81 formed upon the disc 78 and normally projecting through an arcuate and concentric slot 82. The extension 81 is apertured for threaded engagement upon a compression spring 83 that is positioned within the slot 82. The connection of the extension 81 with the spring 83 is substantially intermediate the ends of the spring. The opposite ends of the slot 82 are provided with lugs 84 that will successfully prevent the disengagement of the spring from the slot. It will thus be apparent that upon rotation of the aforesaid mechanism as described with respect to the disc 78, the extension 81 will first tend to compress the spring 83 in the direction of rotation. However, since the spring is relatively strong, the disc 74 will freely rotate until the end of the slot 77 contacts the toggle arm 45 and the spring 83 is sufficiently strong that the toggle arm will be thrust to a reverse position without unduly compressing the spring in either direction, depending on which direction the disc is being rotated. Stop screws 85 limit the motion of the disc 74 to the extent necessary to throw the toggle arm 45 to either of its limits of motion without damaging the switch. Since the rotation of the disc 74 will be stopped at its maximum throw, any tendency of the mechanism to coast will be absorbed by the spring 83 in either direction of possible coasting. The use of the adjusting screws 67 permit an easy and accurate adjustment for controlling the throw of the crank 56, thus permitting the crank 56 to be shifted to a maximum travel both for opening and closing the window, and with the screws 67 adjusted so as to contact the lugs 80 at the proper moment to rotate the disc 74 as the crank 56 approaches the fully closed or open position of the window. The screws 67 are adjusted by the installing operator by removing the cover 14 and after he has determined the degree of movement necessary for the crank 56 for a complete opening and closing of the window. The discs 74 and 78 are maintained upon the hub 60 by a washer 86 that preferably has a press fit upon the terminal end of the hub extension 60, with the discs 74 and 78 being slightly spaced apart for freedom of movement. Supported upon the base of the frame 20, as by screws 87, is a relay 88 and associated elements embodied within the electrical control means for the device.

Referring to Figures 9 and 10, a tubular casing 89 is supported upon the exterior face of the jamb pin through the medium of a bracket 90, preferably of porcelain or other non-conducting material. The casing 89 is apertured on its top and bottom as at 91 to permit the entry of water to the casing to be subsequently discharged through the bottom. A pair of electrical contact elements 92 and 93 are supported within the casing 89 in spaced relation to the casing and in spaced relation to each other. Electrical conductors 94 and 95 lead from the contacts 92 and 93 through a suitable preformed opening in the jamb 10 for suitable connection to the switch 44, and to the relay solenoid 96. A resister 97 is positioned in the conductor 95 for obvious reasons, see particularly Figure 11. The switch 44 is of the double pole, double throw type and is shown diagrammatically in Figure 11. The motor 22, its field windings 24 and brushes 26 and 27 have been illustrated diagrammatically in Figure 11, as is also the toggle switch 44. The toggle switch 44 embodies center binding posts 98 and 99 and binding posts 100, 101, 102 and 103. A conductor 104 connects the binding posts 101 and 102 for a purpose to be presently described. The binding post 101 is connected with one side of a source of electrical energy through a conductor 105. The opposite side of the source of electrical supply is connected to one side of the field windings 24 by a conductor 106, while the opposite side of the windings is connected through a conductor 107 to one spring contact arm 108 of the relay 88. The binding post 98 is connected with the brush 27 by a conductor 109, while the opposite binding post 99 is connected with the brush 26 by a conductor 110. The binding post 100 is connected with a binding post 111 of the remote control switch 17, by a conductor 112. The binding post 102 is connected to one metallic contact 93 of the rain-detector by the conductor 94. Binding post 103 is connected to a binding post 113 by a conductor 114. One binding post 115 of the switch 17 is connected to the negative side of the source of electrical energy by a conductor 116 and opposite center binding post 117 is connected to a spring contact 118 of the relay 88 by a conductor 119. A shiftable spring contact 120 embodied

in the relay is connected to the contact 111 by a conductor 121. The opposite side of the solenoid 96 is connected to a contact 122 of the switch 17 by a conductor 123.

The operation of the device is as follows:

Assuming that the mechanism has been installed, as indicated in Figures 1 and 2, and that the louvers 6 are presently in the closed position, either due to manual control or due to the presence of water in the rain-detector 12, and that the switch 44 has been shifted to the position for clockwise opening while the switch 17 is in a position for automatic operation. Now, if the rain-detector is cleared of water, the contacts 92 and 93 are open. This condition deenergizes the solenoid 96, permitting the spring torque 108 to assume the position shown in Figure 11. For purpose of differentiating between the rotation of the motor for either the closing or opening, we shall assume that the clockwise position of the switch 44 is the position for opening and the anti-clockwise position is the position for closing. This motion is obviously determined by the gears between the motor and the actuating shaft 40. This condition now prevailing, current flows from the positive side of the source of current through conductor 105 to contact 101, through conductor or bus bar 104 to contact 102, across the leg of the conventional switch arm shown in dotted line to contact 99, conductor 110, brush 26, armature 25, brush 27, conductor 109, contact 98, contact 103, conductor 114, contact 113, contact 117, conductor 119, through relay arms 118 and 108, conductor 107 to the field windings 24 and then through conductor 106 to the negative side of the source of current. The motor 22 is thus energized and drives through the train of gears 32, 33, 37 and 38 to rotate the shaft 40 in a clockwise direction. This rotation of the shaft 40 will rotate the head 52 through the medium of its clutched engagement between the clutch disc 54 and the clutch pin 69. The crank 55 is thus shifted in a clockwise direction and the integral crank 56 is likewise shifted in a clockwise direction, pulling upon the link 58 and causing the operator bar 8 to shift downwardly to simultaneously open all the louvers. At or near the full open position of the louvers, the right hand screw 67 will contact its adjacent lug 80 carried by the disc 78, rotating the disc in a clockwise direction and, through the medium of the lug 81, the spring 83 is partially compressed, causing the disc 74 to rotate clockwise to shift the toggle arm 45 to the right, which action interrupts the flow of current to the motor and disposes the legs of the switch in the reverse position to bridge the contacts 99 and 100 and 98 and 101. The moment of actuation of the disc 74 is readily determined by the actuating screws 67 which have been previously adjusted in accordance with the degree of throw of the crank 56 necessary to fully open or close the louvers. Any motion beyond the full actuation of the switch 44 will be absorbed in the spring 83, since the screws 85 have been adjusted to positively limit the arcuate motion of the disc 74. Thus, the spring 83 is an added safety measure against possible damage to the mechanism.

Now, since the device is set for automatic operation by the switch 17, should a drop of water enter the rain-detector and bridge the contacts 92 and 93, current will flow through conductor 105, contact 101, conductor 104, contact 102, conductor 94, contact 93, contact 92, conductor 95, solenoid 96, conductor 123, contact 122, contact 115, conductor 116 to the negative side of the current, energizing the solenoid 96 and causing the spring arm 108 to shift to contacting engagement with the arm 120. Current will now flow through conductor 105, contact 101, contact 93, conductor 109 to brush 27, through armature 25, brush 26, conductor 110, contact 99, contact 100, conductor 112, contact 111, conductor 121, through relay arms 120 and 108, conductor 107 to the field windings 24, conductor 106 and back to the negative side of the source of current. Since the polarity has thus been reversed, the motor 22 will rotate in an anti-clockwise direction for an anti-clockwise rotation of the shaft 40 and, through the medium of the clutch disc 54, the crank arms 55 and 56 will shift in an anti-clockwise direction, shifting the bar 8 upwardly through the medium of the link 58 to simultaneously close all the louvers. The anti-clockwise motion of the head 52 will cause its adjusting screw 67 on the left side to contact its adjacent lug 80, rotating the disc 78 anti-clockwise and through the medium of the lug 81 and spring 83, cause the disc 74 to rotate in an anti-clockwise direction to shift the toggle arm 45 in the reverse position or in the position for disposing the switch in the position as first described, which action interrupts the flow of current to the motor 22. The motor will remain inactive so long as current continues to flow through the solenoid, due to the presence of water in the rain-detector 12. It should be here noted, that when there is an absence of water in the rain-detector, the louvers have been opened and all parts are deenergized. By actual tests, a drop of water is sufficient to actuate the mechanism to close the louvers and, if no more water enters the rain-detector, the single drop will boil off in approximately three minutes, when the solenoid is deenergized and the parts are immediately activated to open the louvers.

In rare instances where there may be a failure of the electrical energy and it is desired to either open or close the louvers, the operator merely inserts the flat crank 19 through the slot 18 to engage in the tubular crank 55, which action shifts the spring 71 to the dotted line position shown in Figure 4, axially shifting the clutch pin 69 from its engagement in an opening 68 of the clutch disc 54. The crank arm 55 may now be freely swung in either desired direction free of the clutch disc 54, since the clutch disc 54 and shaft 40 are locked against rotation, due to the worm and worm gear drive assembly. Thus, the louvers may be manually controlled at any time exclusive of the electrical means. After the manual operation, the crank 19 is removed and upon the re-energizing of the mechanism, the disc 54 will obviously rotate and again become automatically clutched to the head 52 when one of the apertures 68 registers with the pin 69.

Under normal conditions, should the operator desire to actuate the mechanism to the exclusion of the rain-detector 12 in order to close the louvers, it being assumed that the switch 44 has been shifted to bridge the contacts 99 and 100 and 98 and 101, the switch 17 is shifted by the toggle arm 16 to bridge the contacts 111 and 117. Current will then flow through conductor 105, contact 101, contact 98, conductor 109, brush 27, armature 25, brush 26, conductor 110, contact 99, contact 100, conductor 112, contact 111, contact 117, conductor 119, through relay arms 118 and 108, conductor 107, field windings 24 and conductor 106 back to the negative side of the source

of current, actuating the motor to rotate the shaft **40** in an anti-clockwise direction to shift the crank arm **56** in a direction to move the bar **8** upward for simultaneous closing of the several louvers. After the louvers have been closed, the operator shifts the toggle arm **16** in the reverse direction or open position as indicated on the cover **14**, when all parts are in their normal position for automatic operation under the influence of the rain-detector. Since the closing of the louvers under the influence of the remote control switch **17** has shifted the switch **44** to the opposite position to bridge the contacts **99** and **102** and **98** and **103**, movement of the toggle arm back to the open position will reset the circuit for normal opening of the louvers and immediately that the switch **17** is shifted to open position, the motor will be energized to open the louvers, assuming of course, that no water is present in the rain-detector. Should water be present in the rain-detector, the parts will remain inactive. So long as the toggle arm **16** remains in the closed position, the motor will remain deenergized.

It will be apparent from the foregoing that a very simple and highly effective mechanism has been provided for controlling the closure device against unexpected rains. The automatic features are relatively simple in design and of such character that they can be encased in a relatively small housing and attached to the window frame in a simple manner requiring no alteration of the window structure. The electrical system may be connected to a convenient wall receptacle in windows already installed, but in new installations, provision will be made in a manner common in the industry. The device in its operative position has a pleasing appearance and is of such size that it offers no interference to the free operation of the conventional Venetian blinds. The adjustment for the throw of the operating crank for the louvers is simple and requires only that cover be removed from the housing **13**, after which the simple adjustment is made with a screw-driver. A single rain-detector may be employed to control a group of windows, thus simplifying the installation where multiple windows are to be controlled. The device embodies the very desirable feature of a manual control for the opening or closing and further embodies a novel remote control switch whereby the operator may close the windows electrically to the exclusion of the rain detector. The device of this invention is particularly adapted to that type of closure employing a plurality of simultaneously shiftable louvers requiring but a single stroke for either the opening or closing, and the structure is such that it can readily be adapted to the well known casement type windows. The device further lends itself to modifications that will adapt it to the double-hung windows. The driven elements from the shaft **40** are outstandingly novel, are simple, strong, durable, cheap to manufacture and assemble and serve to control the opening or closing of the louvers in a very unique and positive manner. The electrical wiring system is simple and incorporates therein those desirable well known elements, such as the motor, the switches, the relay and the equipment ground wire **29**, all being conventional and assembled into the essential combination shown.

Attention is directed to the fact that the resistor **97** is installed in the line **95** as a means to delay too quickly an action of the mechanism when the rain detector is too quickly cleared. The resistor has been calculated to cause the device to remain inoperative for several minutes since the single drop of water necessary to actuate the rain detector will not boil off as rapidly, due to the low voltage passing through the points **92** and **93**.

While a preferred form of the device has been illustrated and described, various structural changes are contemplated as readily fall within the spirit of the invention or the scope of the subjoined claims.

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

1. In combination a window operator and a rain actuated electrical circuit maker, the operator adapted for use in connection with a jalousie type window, wherein a plurality of horizontally swinging louvers are simultaneously shifted to an open or closed position under the influence of a common vertically shiftable single throw operator bar, the operator comprising a casing that is rigidly supported upon a frame of the window adjacent the operator bar, a reversible type electric motor and a reversing switch within the casing, the motor, switch and rain actuated circuit maker being connected to a source of electrical energy, a power shaft that is alternately driven in a clockwise and anti-clockwise direction by the motor to open or close the louvers, reduction gearing between the motor and the power shaft, a clutch head splined upon the power shaft and an operator head that is positively driven by the clutch head in either direction of motion of the power shaft, a crank arm carried by the operator head and connected to the operator bar, a tubular crank arm carried by the operator head, a clutch pin carried by the last named crank to be manually shifted to disengage the clutch head for freedom of movement of the operator head and its associated cranks to manually shift the louvers to open or closed position independent of the electrical means, a segment disc freely rotatable on the power shaft and having shiftable engagement with the switch, an actuating disc freely rotatable on the power shaft that has a resilient drive connection with the segment disc to shift the segment disc in either the clockwise or anti-clockwise direction for reversing the switch, adjustable drive means carried by the operator head for shifting the actuator disc when the first named crank has shifted the louvers to either the fully closed or open position, the circuit maker energizing the motor for a closing of the louvers and with the segment disc resetting the switch for reversing the motor to open the louvers when the circuit maker is open and a remote control switch to actuate the motor independent of the circuit maker.

2. The device as in claim 1, wherein the segment disc is adjustably limited in either the clockwise or anti-clockwise direction for actuating the switch to a reverse position, the resilient drive connection permitting a slight additional rotation of the drive shaft and associated elements beyond that position where the segment disc has actuated the switch to a reverse position, the reversing of the switch de-energizing the motor and reversing the polarity thereof.

3. A window operator for use with a window that embodies a plurality of horizontally swinging louvers shiftable simultaneously by a common operator bar, a housing that is supported upon a frame of the window adjacent the operator bar, a frame supported in the housing for the mounting support of a reversible motor and

a double throw reversing switch having a toggle arm, a power shaft driven by the motor in either a clockwise or anti-clockwise direction, reduction gearing between the motor and the shaft, a clutch head fixed upon one end of the shaft, an operator head supported on the shaft concentric to the clutch head and the operator head, a crank arm carried by the operator head and projecting through the window frame for driving connection with the operator bar, a hub formed on the operator head, an actuator disc supported on the hub, adjustable means carried by the operator head to rotate the actuator disc in either the clockwise or anti-clockwise direction when the operator head is rotated to close or open the window, the actuator disc being shifted as the window approaches the full closed or open position, a segment disc that is freely rotatably supported on the hub, resilient driving connection between the actuator disc and the segment disc in either direction of rotation, the segment disc having a shiftable connection with the toggle arm in either direction of rotation, the shifting of the toggle arm in either direction reversing the switch for changing the polarity of the motor, a source of electrical energy for the motor and switch and an electrical circuit, a rain actuated electrical connector in the circuit for actuating the motor in a direction to close the window, the switch being reversed in the fully closed position to de-energize the motor and reset the polarity for a reverse opening movement of the window when the rain detector is cleared of water.

4. An automatic closing and opening device for a single throw crank operated jalousie window that embodies a reversible type electric motor and a reversing type polartiy changing switch, a power shaft that is alternately driven in a clockwise or an anti-clockwise direction by the motor, a source of electrical energy and a circuit for the motor and switch, a clutch head fixed upon the drive shaft, an operator head rotatably supported on the power shaft and having clutched driving engagement with the clutch head, a crank arm carried by the operator head for operative connection with an opening and closing bar for the window, a tubular crank formed on the operator head for the reception of a manual control crank, a spring projected pin carried by the operator head for locking engagement with the clutch head, the pin being retracted by the engagement of the manual control crank in the tubular crank to disengage the clutch head, a hub extension formed on the operator head that has rotatable support on the drive shaft, threaded lugs formed on the operator head to parallel the hub, adjusting screws engaging the lugs, an actuator disc freely rotatable upon the hub, the actuator disc having lugs that project into the path of movement of the screws, a segment disc freely rotatable on the hub and having operative shifting engagement with the reversing switch in either a clockwise or an anti-clockwise direction of rotation of the operator head, spring means carried by the segment disc that has connection with the actuator disc, the actuator being shiftable under the influence of the contacting engagement of a screw as carried by the operating head with a lug as carried by the actuator disc, the segment disc being driven under the influence of the spring connection with the actuator disc, the discs being driven in either the clockwise or anti-clockwise direction under the influence of the movement of the operator head for a closing or opening movement of the window and a rain actuated connector in the circuit to energize the motor in a direction to close the window, the closing of the window resetting the mechanism to reopen the window when the rain detector is cleared of water.

5. A structure of the character described for opening and closing a jalousie window of the type having an operator bar, the structure comprising a reversing type electric motor, a reversing switch, a source of electrical energy and an electric circuit, a drive shaft driven in either a clockwise or anti-clockwise direction by the motor, a window operating assembly supported on the drive shaft, the assembly comprising a driven clutch head that is fixed upon the end of the shaft, an operating head for imparting an open or closed movement of the window, the head being axially recessed and axially bored for the seating and clutched reception of the clutch head, the head provided with an axially extended hub that is bored for freely rotatable support upon the shaft, oppositely disposed apertured and threaded lugs formed on the head for the reception of adjusting screws, an apertured actuator disc freely rotatably supported on the hub of the head, the actuator disc provided with oppositely disposed lugs that extend beneath and in the path of movement of the adjusting screws, the screws imparting a rotative movement to the actuator disc in either the clockwise or anti-clockwise direction when the operator head is shifted under the influence of the driven clutch head in a direction to close or open the window, a crank arm formed on the operator head that has operative connection with the operator bar, a segment disc that is apertured for freely rotatable support on the hub of the head in spaced relation to the actuator disc, the segment disc apertured for the mounting reception of a compression spring, a lug formed on the actuator disc that has positive connection with the spring intermediate the ends of the spring, the segment disc being rotated in either direction by the actuator disc, the segment disc having operative connection with the reversing switch, a tubular crank arm formed on the operator head, a clutch pin shiftably supported in the operator head for locking engagement with the clutch head, a spring to urge the pin to locking engagement, the pin being retracted from locking engagement by a crank device that is inserted in the tubular crank to release the operator head for the manual shifting of the window in either direction, the circuit including a rain actuated connector to energize the motor in a direction to close the window.

6. The device as in claim 5, wherein the clutch head is provided with circumferentially arranged and equidistantly spaced notches for the reception of the locking pin, the segment disc being offset at its upper portion with the offset arcuately and concentrically apertured for operative engagement over a toggle arm carried by the switch.

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