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E. O. BAIRD ET AL
RAIN ACTUATED ELECTRICAL CONTROL MEANS
FOR CLOSING AND OPENING WINDOWS

2,675,227

3 Sheets-Sheet 1

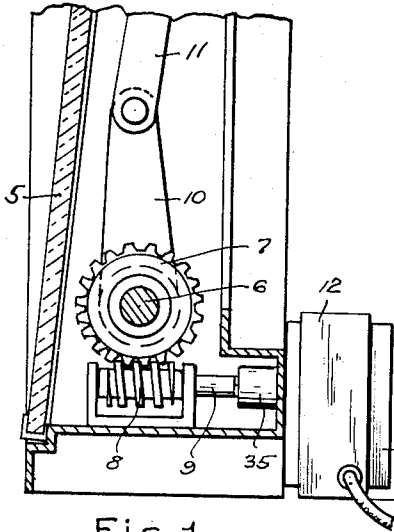


FIG. 1.

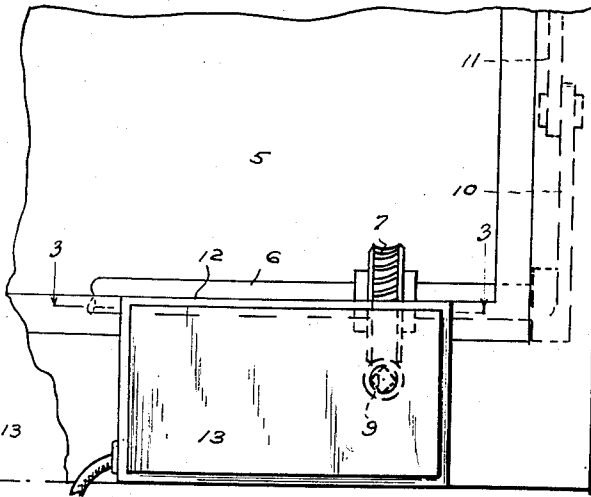


FIG. 2.

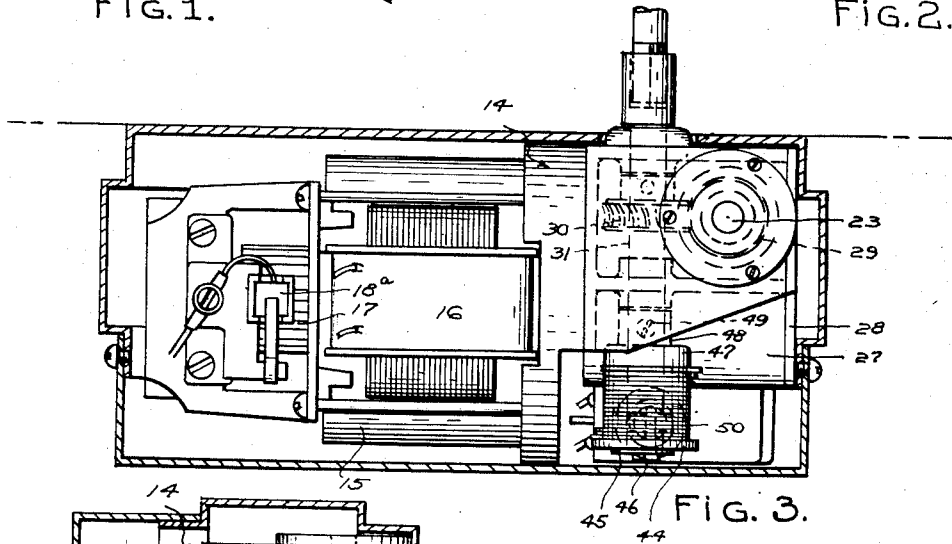


FIG. 3.

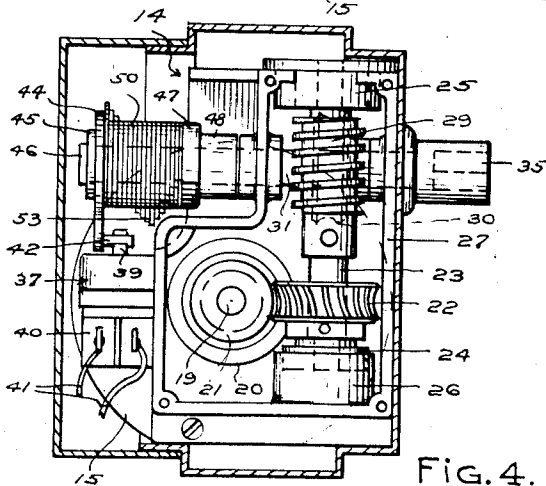


FIG. 4.

INVENTORS
EDWARD O. BAIRD
BY ROSCOE H. ROGERS,

James H. Gles
ATTORNEY.

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3 Sheets-Sheet 2

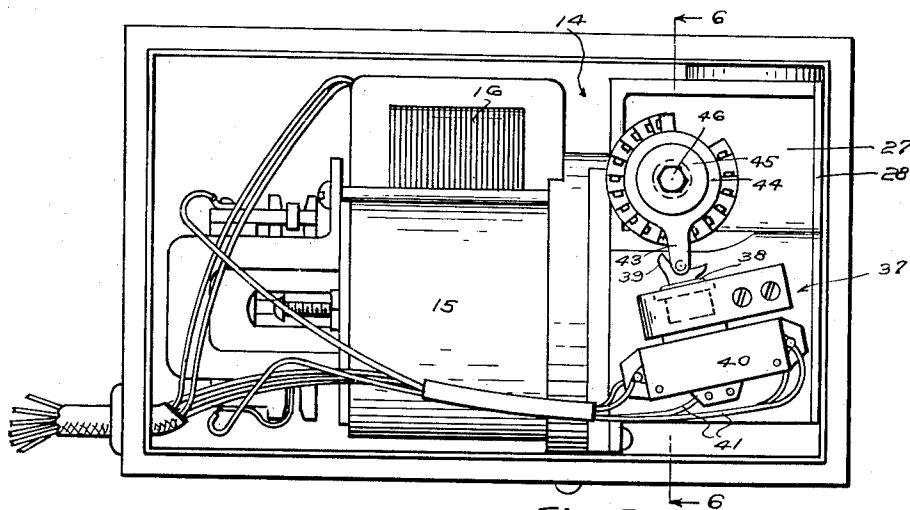


Fig. 5.

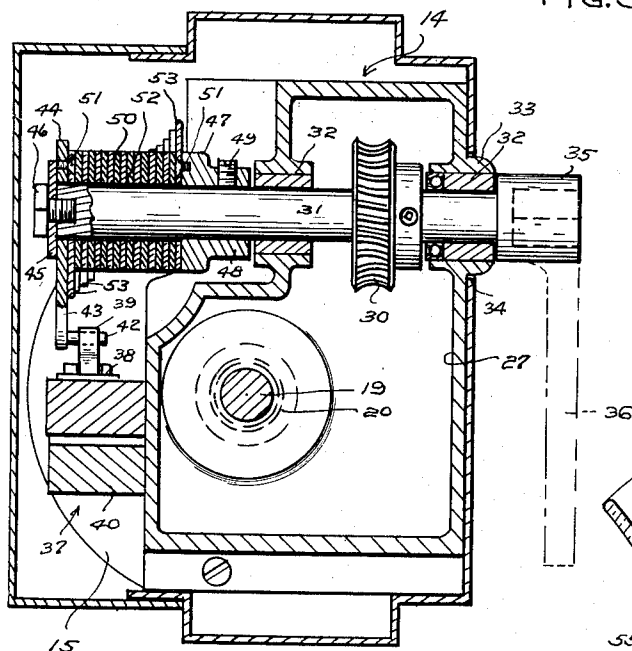


Fig. 6.

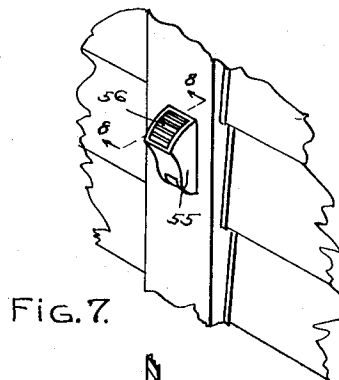


Fig. 7.

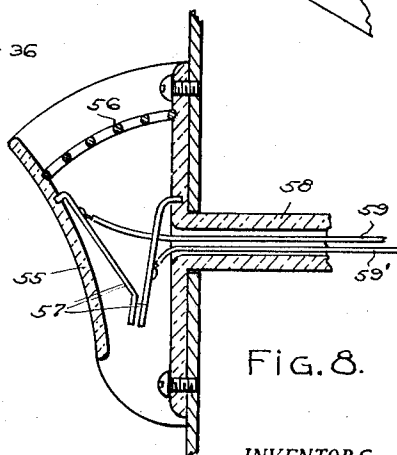


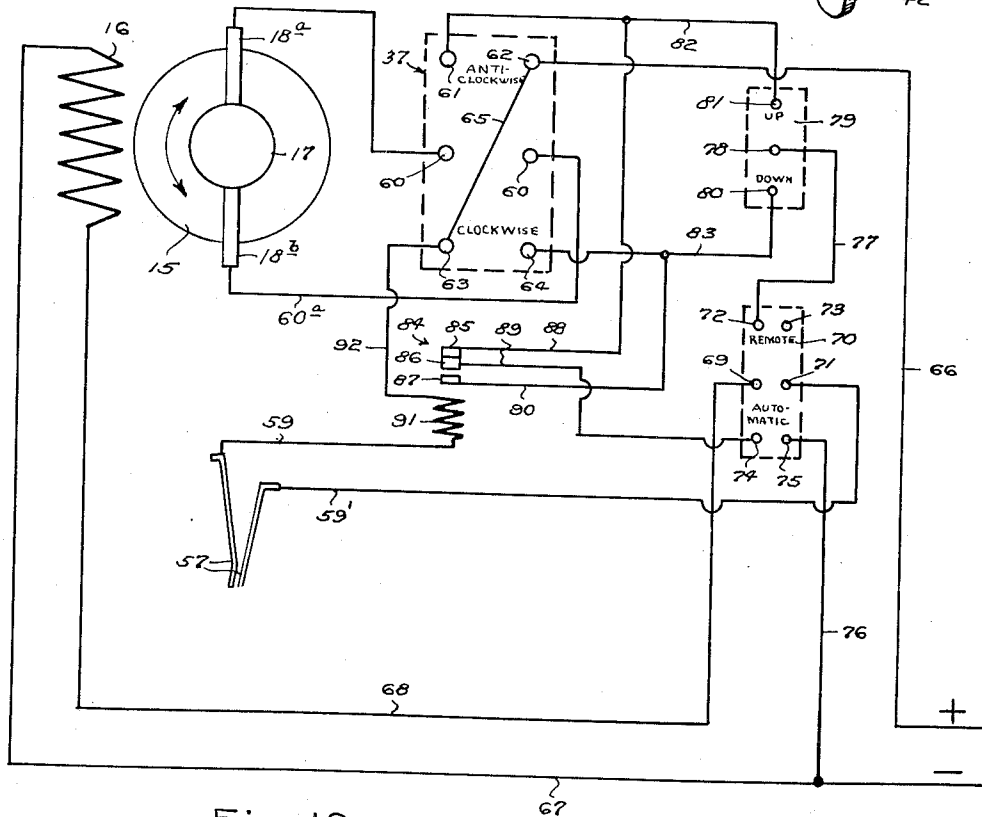
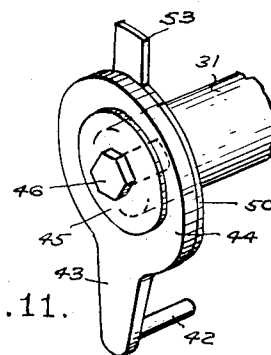
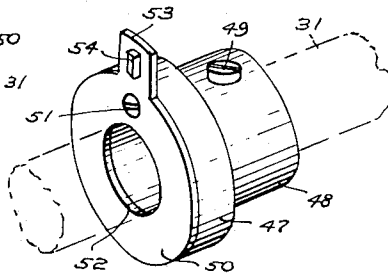
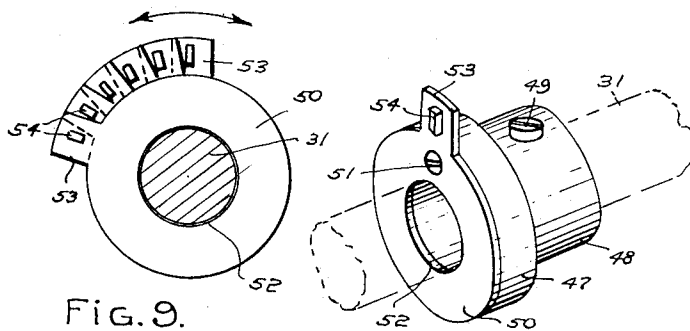
Fig. 8.

INVENTORS
EDWARD O. BAIRD
BY ROSCOE H. ROGERS,

James H. Rogers
ATTORNEY.

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3 Sheets-Sheet 3



INVENTORS
EDWARD O. BAIRD
BY ROSCOE H. ROGERS,
James H. Rogers
ATTORNEY.

UNITED STATES PATENT OFFICE

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RAIN ACTUATED ELECTRICAL CONTROL
MEANS FOR CLOSING AND OPENING
WINDOWSEdward O. Baird and Roscoe H. Rogers,
Fort Lauderdale, Fla.

Application July 23, 1952, Serial No. 300,461

6 Claims. (Cl. 268—21)

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This invention relates broadly to closure devices and particularly to means associated therewith whereby the closure device is automatically actuated to closure position and consists in the combinations, constructions and arrangements of parts hereinafter more clearly recited.

The invention has for its prime object, the combination of mechanical and electrical means actuable under the influence of rain whereby the closure device is automatically shifted to fully closed position and will remain so closed continuously during the presence of rain exteriorly of the closure and, upon the cessation of the rain, to be automatically actuated to again open the closure device to its original degree of opening.

The structure of this invention is designed primarily for use in connection with hinged window closures, such for instance as the well-known jalousie windows that embody a plurality of overlapping louvers pivotally supported in a horizontal position to span a window opening and with all the louvers moving in unison. The invention contemplates its use, with minor changes, to adapt itself to other forms of window closures, such as the conventional casement or awning type windows.

Since there are many and varied forms of louvered windows in use, each embodying more or less different louver operators, requiring a predetermined number of winding operations to close or open, the device of this invention has taken into consideration a very essential feature that will adapt it to any standard window and has embodied in its construction, a very novel form of easily and quickly adjustable timing device that definitely controls the number of predetermined turns for the opening or closing of the louvers, thus providing a structure that is capable of actuating automatically many forms of standard windows now in use.

The invention contemplates novel structural details of a very compact character that will be relatively inconspicuous at installation and, in the majority of installations, require no structural changes in the window or its encompassing frame.

The invention further contemplates novel rain detecting means to be arranged exteriorly of the window and serving as a circuit closer to actuate the closing and opening mechanism.

The invention further contemplates a remote control switch whereby the mechanism of the device may be manually controlled to the exclusion of the automatic rain actuating means.

Many very novel features of the system will be readily apparent during the course of the following description, reference being had to the accompanying drawings, wherein has been illustrated a preferred example of the device and wherein like

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reference characters are employed to denote like parts throughout the several figures.

In the drawings:

Figure 1 is a fragmentary transverse vertical section through the lower rail of a conventional jalousie window, showing the invention applied thereto,

Figure 2 is an inner side elevation thereof,

Figure 3 is an enlarged horizontal section, taken on line 3—3 of Figure 2, showing the invention in elevation,

Figure 4 is a transverse vertical section through the casing of the device with the operating mechanism in elevation and with an end cover plate removed, for sake of clearness.

Figure 5 is a side elevation of the operating mechanism, with the cover of the housing removed,

Figure 6 is a still further enlarged transverse section taken on line 6—6 of Figure 5,

Figure 7 is a perspective view of a rain detector embodied in the invention and shown applied to the exterior of the window,

Figure 8 is an enlarged vertical section taken on line 8—8 of Figure 7,

Figure 9 is an enlarged transverse section through a timing shaft and associated timing discs embodied in the device,

Figure 10 is a perspective view of an adjustable hub and one associated timing disc carried thereby, with the shaft in dotted lines,

Figure 11 is a perspective view of a switch actuator carried upon the timing shaft and with one timing disc connected thereto and,

Figure 12 is a diagrammatic wiring diagram for the several actuating means of this invention.

Referring now more specifically to the drawings and particularly to Figures 1 and 2, a conventional jalousie window operator has been shown to illustrate the device of this invention with at least one recognized operator. The jalousies embody a plurality of overlapping glass louvers supported in any one of many recognized end brackets whereby the louvers are hinged in a horizontal plane. One type of operator, here illustrated, embodies an operating shaft 6 carrying a worm wheel 7, driven by a worm 8. The worm 8 is driven through the medium of a shaft 9, usually extending forwardly of the inner face of the window and frame and with its free end preferably square or hexagonal. The shaft 6 carries a crank arm 10 which in turn is connected with an operating bar 11 and which in turn operates the several louvers in unison in a manner well known. While the device is hereinafter being described as associated with a jalousie type of window, it will be clearly apparent that the structure readily adapts itself to windows of the awning type or

with certain modifications will adapt itself to the operation of a casement type of window.

The structure of the present invention is housed or encased in a rectangular, preferably sheet metal, housing 12 having a cover 13. Housing 12 in the particular installation illustrated will be rigidly connected in any desirable manner with the inner face of the window sill and properly located with respect to an opening provided for the shaft 9, whereby the shaft 9 will be driven automatically through the medium of mechanism to be hereinafter described.

Rigidly positioned within the housing 12 and held therein against movement by any suitable means is a control mechanism indicated as a whole by the numeral 14. The device embodies a prime mover, here illustrated, as a series type reversible electric motor 15. Since the motor 15 forms no part of the present invention, its structure will not be described in detail other than to generally indicate a field winding 16, an armature 17 and the usual brushes 18a and 18b. It might be pointed out at this time that the flow of current through the field windings 16 is in one direction, while the motor is reversed by a change of polarity on the brushes 18a and 18b. However, this will be more clearly described in connection with Figure 12. The motor 15 has a forwardly extending drive shaft 19, suitably journaled in bearings, generally indicated at 20. Adjacent its outer end, the shaft 19 carries a worm 21. Worm 21 has connection with and drives a worm wheel 22 fixed upon a vertical shaft 23. The shaft 23 is journaled at its upper and lower ends in suitable bearings 24 and 25. The bearings 20 and 24 are recessed into castings 26, preferably formed integral with a gear housing 27. The gear housing 27 is closed at its inner end and formed open at its outer end, and is normally closed by a cover plate 28, sealed with respect to the housing 27 for retaining a suitable lubricant therein for the several gears. The bearing 25 is a removable type so formed to permit the assembly of the shaft 23 and associated parts. The shaft 23 further has fixed thereon a worm 29 that has constant meshing engagement with a worm wheel 30, fixed upon a timer shaft 31. The shaft 23 is at right angle to the shaft 19, while the shaft 31 is at right angle to the shaft 23 with the several worms and worm wheels providing a speed production drive from the motor 15 to the timer shaft 31.

The timer shaft, see more particularly Figure 6, is suitably journaled in antifriction bearings 32 carried by the housing 27. The outermost bearing 32 extends through an outwardly position boss 33, carried by the housing 27, and the housing 12 is apertured at 34 for the seating reception of the boss. The shaft 31 at its outer end is provided with a preferably cylindrical coupler head 35 having an open noncircular recess formed therein and having a cross-sectional configuration corresponding to the end of the shaft 9 with the head 35 serving as a driving coupler between the shaft 31 and the shaft 9. While the coupler 35 has been here shown as preferably cylindrical, it follows that in some forms of windows a straight crank operator is desired and, in such cases, a crank arm 36 illustrated in dotted lines in Figure 6 may be substituted for the coupler head. It will so far be seen that when the motor 15 is energized, the shaft 31 is driven in a predetermined direction at a relatively slow speed by the worm 21, worm wheel 22, worm 29 and worm wheel 30. Thus while the speed has

been materially reduced, the torque has been very considerably increased upon the shaft 31.

Rigidly fixed upon the outer face of the housing 27 and at a point directly below the shaft 31, is a combined circuit closer and polarity changer, indicated as a whole by the numeral 37. The circuit closer includes a toggle switch 38 having a pair of angularly disposed actuator arms 39. The circuit closer 37 is associated with a terminal block 40 for the several conductors, indicated generally at 41, serving to control the direction of rotation of the motor 15. The toggle switch 38 is tripped in opposite directions by a pin 42 carried by an arm 43 formed upon a disc 44. The disc 44 is rotatable and frictionally supported adjacent the inner end of the shaft 31 and is held thereon against displacement by a flat disc 45 held to the shaft by a set screw 46. Since the toggle arms 39 lie in the path of rotative movement of the pin 42, it follows that when the pin is shifted in one direction, the toggle switch 38 will be shifted to actuate the motor in one direction, and when the pin 42 is swung in the opposite direction, the toggle switch 38 will be shifted to cause a reverse drive to the motor 15.

Positioned upon the shaft 31 outwardly of the bearing 32, is a collar 47 having a hub 48, carrying a set screw 49 through the medium of which the collar 47 is adjustably held against turning upon the shaft 31. As clearly shown in Figures 3, 4 and 6, the disc 44 and collar 47 are spaced a predetermined distance apart and, positioned upon the shaft 31 between the disc 44 and collar 47, are a predetermined number of friction washers 50, see particularly Figure 9. The washers 50 abutting the disc 44 and collar 47 are fixed with respect to the disc and collar by set screws 51. The intermediate washers 50 are all concentric and apertured at 52 to be freely rotatable upon the shaft 31 and slightly frictionally in contact with each other. Each of the washers 50 are provided with a radial tab 53 having a forwardly projecting lug 54, preferably struck therefrom. The forwardly projecting lugs 54 lie in the path of movement of the next adjacent tab 53. It will thus be apparent that as the shaft 31 rotates, for instance, in a counter-clockwise direction, see Figure 9, the lug 54 of the fixed washer 50, as carried by the collar 47, will contact the edge of the tab of the next adjacent disc, and as the next adjacent disc is positively driven, it will in turn pick up and drive the disc next adjacent thereto and the several discs will be progressively driven until the final drive is imparted to the washer 50, as carried by the disc 44, thus swinging the arm 43 in a counter-clockwise direction to actuate the toggle switch 38. When the toggle switch 38 has been actuated in one direction, the polarity of the brushes 18a and 18b have been reversed so that when the cause has been removed that originally placed the mechanism in operation, the motor will be reversed and the shaft 31 driven in a clockwise direction, resulting in the several washers being progressively picked up and driven in a clockwise direction until the several washers and their tabs 53 and lugs 54 are in continuous abutting relation, the arm 43 will be swung in a clockwise direction, throwing the toggle switch 38 in the opposite direction and interrupting the flow of current to the motor 15, while at the same time reversing the polarity of the brushes 18a and 18b. The number of washers necessary to accurately determine the number of revolutions necessary for a predetermined opening and

closing of the louvers of the window may be varied for any particular installation and the predetermined revolutions of the shaft 31 are thus easily and simply controlled. To increase or decrease the number of revolutions of the shaft 31 requires only that the operator remove the set screw 46, washer 45 and disc 44 with its attached disc 50. Additional washers may be installed upon the shaft 31 or certain of the washers 50 may be removed from the shaft and upon a determination of the number of closure and opening rotations, the disc 44 is reinstalled with its washer 45 and set screw 46. The set screw 49 of the hub 48 is then loosened and the collar 47 shifted forwardly to cause the several discs to have frictional contact.

An electrical connector for exterior application is employed to actuate the electrical circuits hereinafter described. This connector is preferably installed adjacent the closure device to be actuated and usually, although not necessarily, is installed upon the frame of the window. The connector embodies a preferably ceramic or other moldable and insulating housing 55, open at its top and bottom. The connector here described is generally recognized as a rain detector with its upper end preferably flaring outwardly as shown and provided with a protective grill 56. Molded within the housing 55 with their ends in slightly spaced relation is a pair of metallic electrodes 57. Electrodes 57 substantially span the width of the housing 55. A preferably tubular conduit 58 is formed on the rear wall of the housing 55 and has any desirable length to extend through the frame of the window as a means for housing electrical conductors 59 and 59' connected with the contacts 57. The electrodes are so positioned in the housing 55 as to be protected against accidental contact by children or adults, while the grill 56 prevents the entry of undesirable matter likely to bridge the electrodes.

Referring now to Figure 12, the motor 15, field windings 16 and brushes 18a and 18b, have been illustrated diagrammatically. Toggle switch 37 has also been illustrated diagrammatically. The switch 37 is of the double pole, double throw type, embodying center binding posts 60 and binding posts 61 and 62 and 63 and 64. A conductor 65 connects the binding posts 62 and 63, for a purpose to be presently described. The binding post 62 is connected to the source of electrical supply, by a conductor wire 66. A conductor wire 67 from the source of electrical supply, is connected to one side of the windings 16, while the opposite side of the windings is connected through a conductor 68 to a binding post 69 of a control switch 70. The control switch 70 is provided to shift the mechanism from an automatic to a manual control. The switch 70 comprises a pair of center binding posts 69 and 71, outer binding posts 72 and 73 and 74 and 75. The binding post 71 has connection with the conductor wire 67 through a conductor 76. The switch 70 is of the double pole, double throw type. A conductor wire 77 leads from the binding post 72, to a binding post 78 of remote control switch 79. The switch 79 is of the single pole, double throw type and is provided with binding posts 80 and 81. A conductor wire 82 leads from the binding post 81, to the binding post 61 of the switch 37, while a conductor wire 83 leads from the binding post 80 to the binding post 64 of the switch 37.

Interposed in the circuit, is a relay, indicated as a whole by the reference character 84 and embodies the usual spring tensioned contacts 85, 75

86 and 87. The contacts 85 and 86 are normally in engagement. A conductor wire 88, leads from the contact 85 for connection with the conductor 82. A conductor wire 89 leads from the contact 86, to the binding post 74, while a conductor wire 90 leads from the contact 90 for connection with the conductor 83. A solenoid 91, embodied in the relay, is connected at one side to binding post 63, by a conductor wire 92, while the opposite side of the solenoid has connection with one metallic electrode 57, through the medium of a conductor wire 59. The companion electrode 57 is connected to the binding post 71 by a conductor wire 59'.

The operation of the device is as follows:

Assuming that the window is in an open position and that it becomes necessary to rotate the window operator in a clockwise direction for a closing movement, and the switch 37 is presently in the position for clockwise closing, as indicated in Figure 12, and also assuming that the switch 70 is in the position for automatic operation. Now, if a drop of water has entered the rain detector and has bridged the two electrodes 57, current will now flow from one side of the source of energy through the wire 56, terminal 62, wire 65, terminal 63, wire 92, solenoid 91, wire 59, through the electrodes 57, wire 59', terminal 71 of the switch 70, terminal 75 and wire 76, to the opposite side of the source of current, energizing the solenoid 91, tripping the relay 84 to break the contacts 85 and 86 and establish the contacts 86 and 87. Current will also flow from the terminal 63 to the terminal 69, to one brush 18a through armature 17 opposite brush 18b to the terminal 60, through terminal 64, wire 83, wire 90, contacts 87 and 86, wire 89 to terminal 74 of the switch 70, through terminal 69, wire 68, field winding 16 and wire 67, back to the opposite side of the source of current, thus energizing the motor and causing it to rotate in a clockwise direction. The motor will continue to operate, driving through its shaft 19, worm 21, worm wheel 22, shaft 23, worm 29, worm wheel 30, to rotate the timer shaft 31 in a clockwise direction. The number of revolutions imparted to the shaft 31 is determined by the timing discs 50 hereinbefore described. As the shaft 31 rotates, it carries with it the collar 47 and its attached washer 50. This rotation will successively pick up and drive the several timing washers through the medium of their tabs 53 and lugs 54 until all of the tabs and lugs are in full contact, at which time the outer fixed washer 50 will swing the disc 44 in a direction to trip the toggle switch 38, which action reverses the switch 37 to a point for anti-clockwise drive and for de-energizing the motor. Assuming that water still remains in the rain detector, the motor will remain at rest, with the trip arm 43 and its tripping finger 42 stopping in a position for a reverse movement, when the motor is again energized in travel in an anti-clockwise direction.

Now assuming that the water has left the rain detector, the solenoid 91 has been de-energized and the relay 84 shifted to its original position with the contacts 85 and 86 in engagement as long as the switch 70 remains in an automatic position. The motor will be again energized automatically when the water has left the rain detector so that the window will again be shifted to the open position. As before stated, when the solenoid 91 is de-energized and the relay 84 shifted to the position shown in Figure 12, it being understood now that the switch 37 has been previously tripped to the anti-clockwise position, the current will now flow through wire 66, termi-

nal 62, terminal 60, wire 60a, brush 18b, commutator 17, brush 18a to terminal 60', through terminal 61, wire 82, wire 88, contacts 85 and 87, wire 89 to terminal 74, through terminal 69, wire 68, field winding 16 and wire 67 to the opposite side of the source of current, thus changing the polarity upon the brushes 18a and 18b for reversing the rotative motion of the motor, which action drive, as before, goes in a reverse direction through the shaft 19, gears 21, 22, 29 and 30 to rotate the timer shaft in the opposite direction. This action results in the progressive pick-up of the several washers 50 through their tabs 53 and lugs 54, and when the several tabs and lugs are in engagement, the disc 44 will be rotated in the opposite direction to trip the toggle switch 37 back to the clockwise position, indicated in Figure 12, at which time the motor is again brought to rest. The rotation of the motor has thus shifted the window to the predetermined open position as determined by the predetermined timing rotations of the shaft 31. All parts will now remain inactive until such time as the electrodes are again bridged by water.

It is desirable that means be provided to manually control the window to the exclusion of the automatic means and rain detector. For this purpose, a remote control switch indicated at 79 has been provided. The switch 79 is of the single pole, double throw, type and, when it is desired that the switch 79 shall be employed, the switch 70 is shifted from the automatic to the remote control position. It should be noted that when the switch 70 is shifted to the remote control position, the rain detector, solenoid 91 and relay 84 are completely de-energized.

Assuming that the window is in the open position and the operator desires to shift it to the closed position, the switch 79 is swung downwardly to bridge the contacts 78 and 80. Current will now flow through wire 66, terminal 62, wire 65, through terminal 60, brush 18a, commutator 17, brush 18b, wire 60a, terminal 60, terminal 64, wire 83, terminals 80 and 78, wire 77, terminal 72, terminal 69, wire 68, field winding 16 and wire 67 back to the opposite side of the source of current, thus energizing the motor in a clockwise direction for closing the window. The motor remains energized and rotates continuously through its cycle of timing until switch 37 has again been tripped to the anti-clockwise position, at which time the window is fully closed and the motor has been de-energized. Should the operator desire to open the window, the switch 79 is thrown upwardly to the open position, bridging contacts 78 and 81, it also being understood that the switch 37 is now in the anti-clockwise or position to actuate motor for the opening of the window. The current will now flow through wire 66, terminal 62, terminal 60, wire 68, brush 18b, commutator 17, brush 18a, terminal 60', terminal 61, wire 82, terminals 81 and 78, wire 77, terminal 72, terminal 69, wire 68, field winding 16 and wire 67 back to the opposite side of the source of current, thus energizing the motor in a reverse direction for closing the window as before described and, when fully closed, the switch 37 will be again tripped to the clockwise position, in which position the window is fully closed and the motor has been de-energized.

It will thus be apparent from the foregoing, that a very simple and highly efficient system and mechanism has been designed to protect a building against unexpected rains. The automatic features are most effective and since, in each

installation, the device is set in its timing for a particular number of winding revolutions. This timing is simple and variable by the mechanic with relatively little effort. The device readily lends itself to installations with presently installed windows and, in most instances, require no alterations of the already installed structure. The coupling drive readily adapts itself to either a winding shaft of the window or, may accommodate itself to that type of window having a crank action. In most instances, it becomes only necessary to install the rain detector, mount the automatic and remote control switches in convenient places and then to plug into a convenient outlet for the source of electrical supply. Installations may obviously vary when the device is installed as a unit with the window in new installations. It has been found, that one operator of this invention is capable of simultaneously controlling a battery of windows, requiring only that the drive from the timer shaft be so arranged as to drive a line shaft in a manner that will be apparent. In such an instance, but a single rain detector will be employed.

While a preferred form of the device has been illustrated and described, various changes are contemplated in the shape, size and arrangement of parts as will 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 with a closure device having a plurality of simultaneously swinging panels, a source of electrical energy and a rain responsive electrical connector for controlling the flow of electrical energy, power means to swing the panels to closed or open position, the power means including a reversible electric motor, a timing device associated with and driven by the electric motor in either of its reversible directions, the timing device determining the degree of opening or closing movement of the panels, automatic control means associated with the motor and the rain responsive connector, the rain responsive connector when contacted by water, actuating the motor to drive through the timing device to close the closure device, the timing device inactivating the motor and resetting the motor for a reverse rotation when the rain responsive connector has been freed of water, the rain responsive connector when freed of water reactivating the motor to rotate in a direction to open the closure device automatically, the timing device inactivating the motor and resetting the motor for a reverse cycle of operation when the closure device has been shifted to its maximum open or closed position, manually controlled remote control means associated with the automatic means and the timing device to actuate the motor and timing device independent of the rain responsive connector and the automatic control means, the actuation of the closure device under the influence of the remote control means being limited to the degree of opening or closing as determined by the timing device, with the timing device reversing and interrupting the power to the motor at the maximum predetermined opening or closing of the closure device.

2. A device of the character described for closing and opening windows through a winding action in combination with an exteriorly arranged circuit closing rain responsive connector, comprising a reversible electric motor and a source of electrical energy, a timer shaft having a coupler

connection to the winding mechanism of the window, reduction gear means between the motor and the timer shaft, a circuit controlling and reversing switch for the motor, a timer carried upon the timer shaft to actuate the switch to either a clockwise or counterclockwise direction of turning movement of the shaft, the actuating of the switch in either direction interrupting the flow of current to the motor and resetting the motor for a reverse drive, a relay that is energized by the rain responsive connector in the presence of a drop of water to energize the motor for driving the timer shaft in a direction to close the window, the circuit controlling and reversing switch interrupting the flow of current to the motor and resetting the motor for a reverse rotation when the window is fully closed, the said relay serving to again establish a flow of current to the motor when the water has been dissipated in the rain responsive connector to again open the window, a remote control switch arranged in the circuit serving to manually control the actuation of the motor in either direction to the exclusion of the rain responsive connector, the timer interrupting the flow of energy to the motor after a predetermined number of rotations of the timer shaft in either direction.

3. A window actuating device of the character described comprising a reversible electric motor and a source of electrical energy, a timer shaft driven by the motor, the shaft having a winding connection with a shaft carried by a geared window operator, timer mechanism supported on the shaft to determine the number of rotations of the shaft necessary for fully closing or opening the window, a combined circuit interrupter and reverse set switch that is tripped in either direction of turning movement by the timer mechanism on the timer shaft, the said switch being tripped after a predetermined number of revolutions of the shaft to interrupt the flow of current to the motor and changing the polarity of the motor, a remote control switch in the circuit for manually controlling the opening or closing of the window, a rain actuated connector having spaced electrodes therein, circuit controlling means actuated when the electrodes are bridged by a drop of water to energize the motor to turn in a direction to close the window, the motor being de-energized and set for a reverse rotation by the interrupter and reverse switch when the window is fully closed, the electrodes when free of water serving to establish a flow of electrical energy to the motor for a rotation in the direction to open the window, an automatic switch in the circuit that is actuable to connect the remote switch into the circuit, the actuation of the automatic switch serving to interrupt a flow of current to the rain actuated connector, the remote switch being manually shifted to energize the motor for an opening or closing of the window within the limits of the timer mechanism, the timer mechanism embodying a trip arm that is frictionally actuated when the timer shaft has made a predetermined number of revolutions for tripping the interrupter and reverse switch at the maximum of predetermined opening or closing degree.

4. An automatic winding operator for closing and opening horizontally swung window panels, comprising a reversible type electric motor and a source of electrical energy, a drive shaft carried by the motor, a timer shaft, a casing having bearings for the support of the motor and timer shafts, reduction gearing between the motor and

timer shaft, a coupling device at one end of the timer shaft for connection with the window mechanism, a timer mechanism at the opposite end of the timer shaft, a combined circuit interrupter and polarity changer for the motor, the circuit interrupter and polarity changer embodying a toggle switch, a trip arm carried by the timer mechanism, the toggle switch lying in the path of the trip arm, the timer mechanism embodying friction drive means between the shaft and the trip arm that is changeable to accommodate the rotations of the timer shaft and coupler to the number of rotations necessary to close or open the window, rain actuated means to energize the motor for driving the timer shaft in a direction to close the window, the toggle switch being tripped by the trip arm when the window is fully closed to interrupt the flow of current to the motor and to change the polarity of the motor, the rain actuated means when free of activating water, actuating means to again establish a flow of current to the motor for a rotation in a direction to open the window and automatic and remote control switches to control either the automatic action of the window or the manual control of the window, the remote control switch when activated serving to actuate the motor in either direction independent of the rain actuated means.

5. The device as in claim 4, wherein the timer mechanism comprises a plurality of friction washers disposed on the timer shaft in concentric relation, means on the shaft that is fixed to one of the washers, the said trip arm being fixed to another of said washers and pick-up and drive means between the several washers with the first named fixed washer pick-up and driving the next adjacent washer whereby the several washers are progressively picked up and driven to finally pick up the second named fixed washer to swing the trip arm for actuating the toggle switch.

6. The device as in claim 5, wherein the several washers are provided with radial tabs having forwardly projecting lugs that lie in the path of the tabs of the next adjacent washer, a collar adjustable along the timer shaft to which the first named washer is fixed, a set screw for fixing the collar against movement on the shaft after adjustment, the said trip arm depending from a disc frictionally rotatable upon the timer shaft, the second named fixed washer fixed to the disc, the several intermediate washers, the disc and its attached washer being freely rotatable upon the shaft and in frictional engagement, the several washers being progressively picked up and driven from the collar to a point where all the tabs and lugs are in contacting driving engagement to rotate the disc and the trip arm to actuate the toggle switch, the number of washers determining the number of rotations of the timer shaft to close or open the window before the toggle switch is tripped to interrupt the motor and reverse the polarity of the motor.

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2,499,544	Vancil	Mar. 7, 1950
2,528,953	Gzupkaytli	Nov. 7, 1950
2,531,116	Donoghue	Nov. 21, 1950