

April 23, 1940.

H. F. SMITH

2,198,488

ELECTRICAL APPARATUS

Original Filed May 26, 1934

4 Sheets-Sheet 1

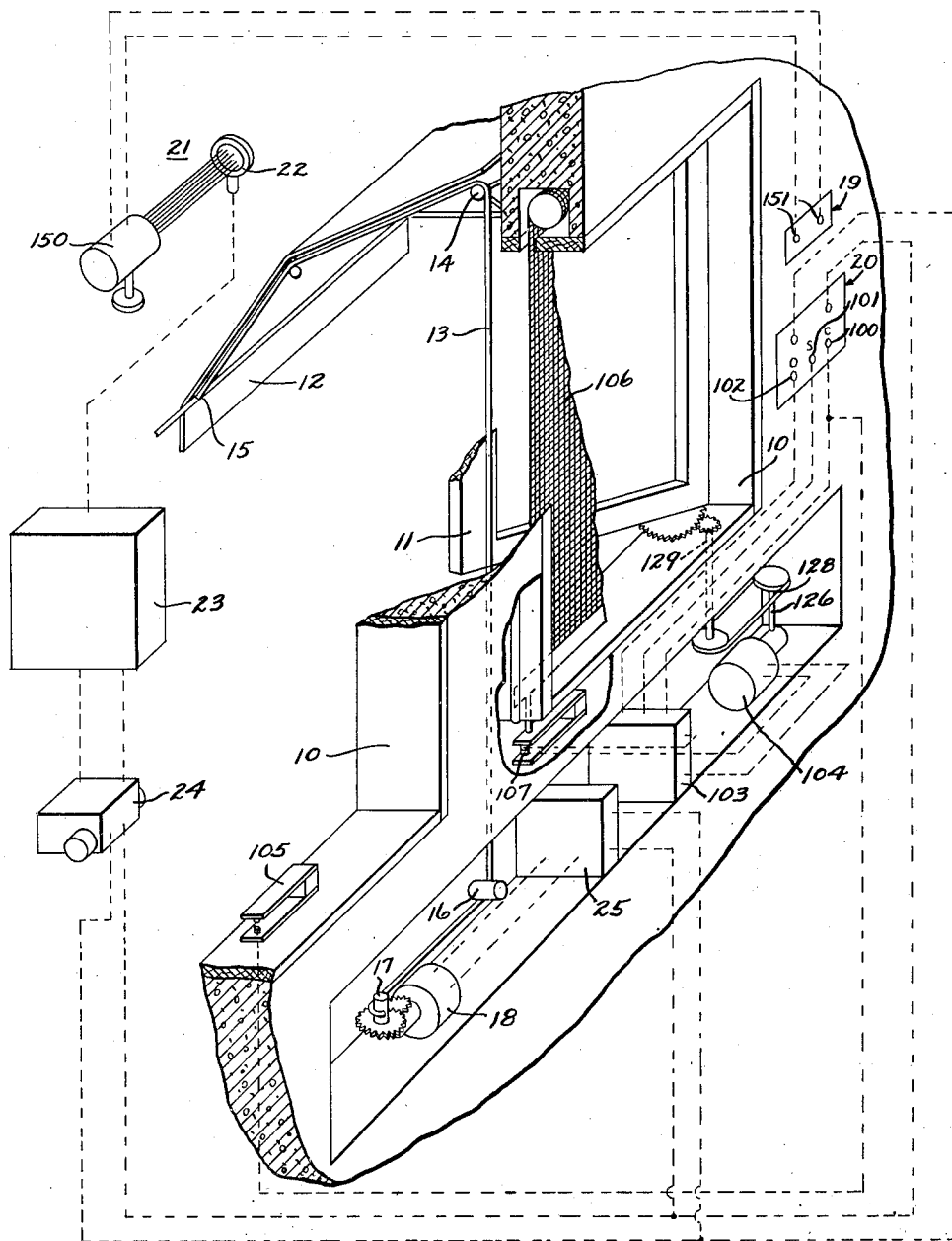


Fig. 1

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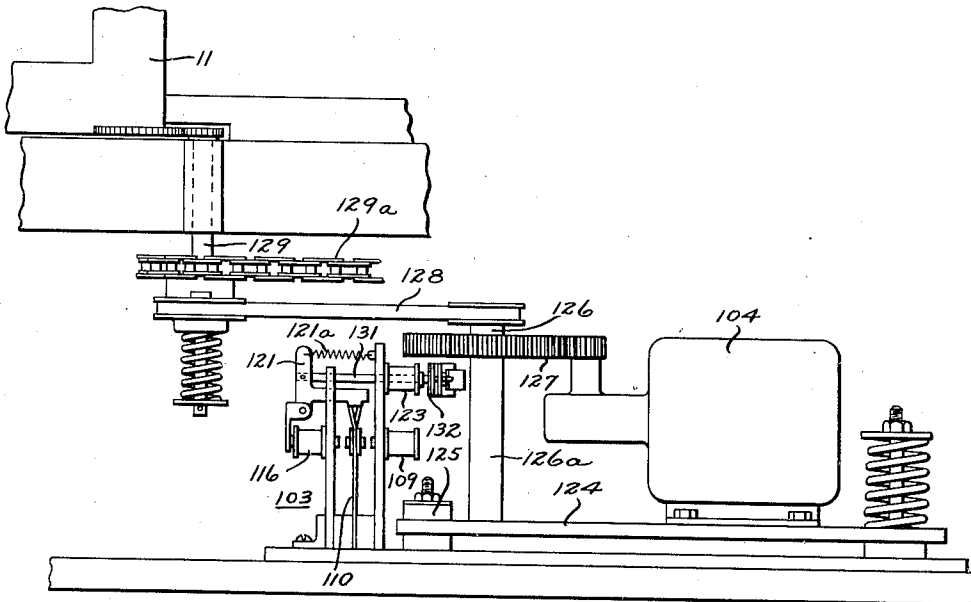


*Fig. 2*

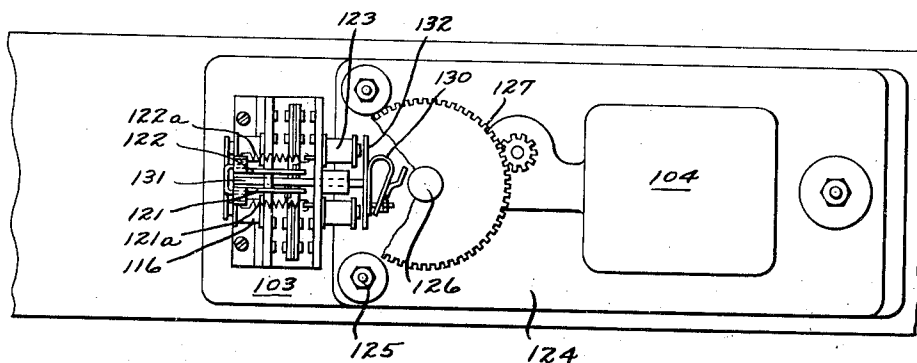


*Fig. 3*

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4 Sheets-Sheet 3

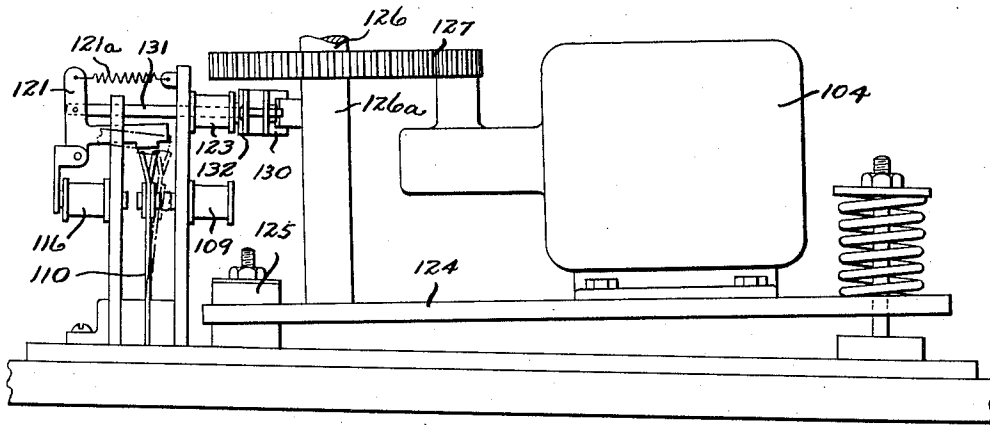


*Fig. 4*

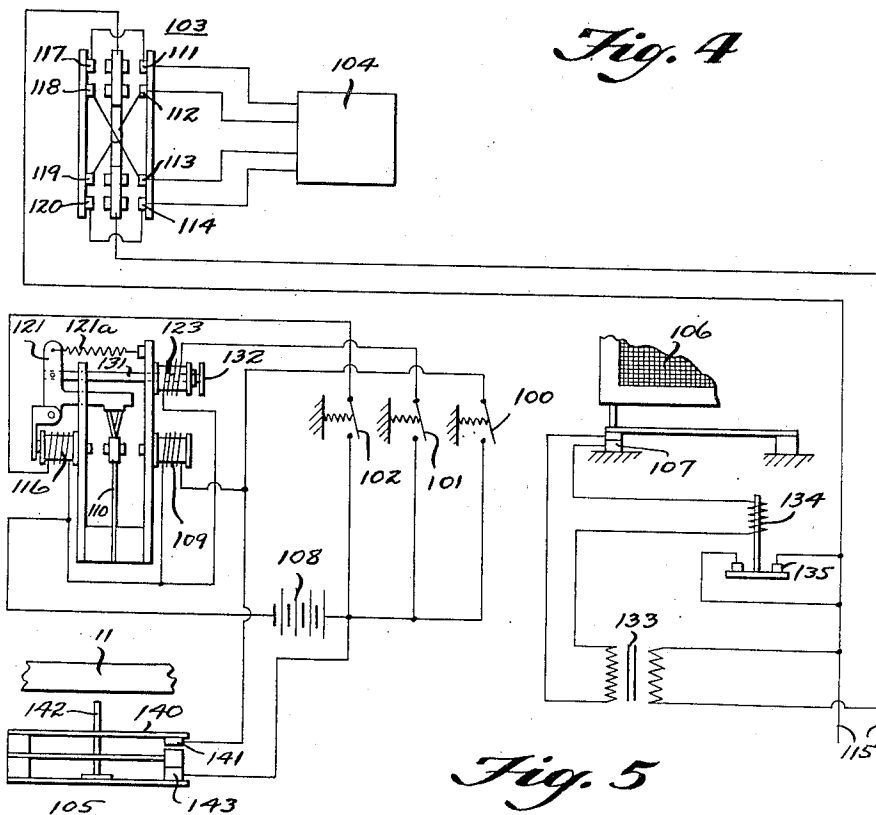


*Fig. 5*

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4 Sheets-Sheet 4

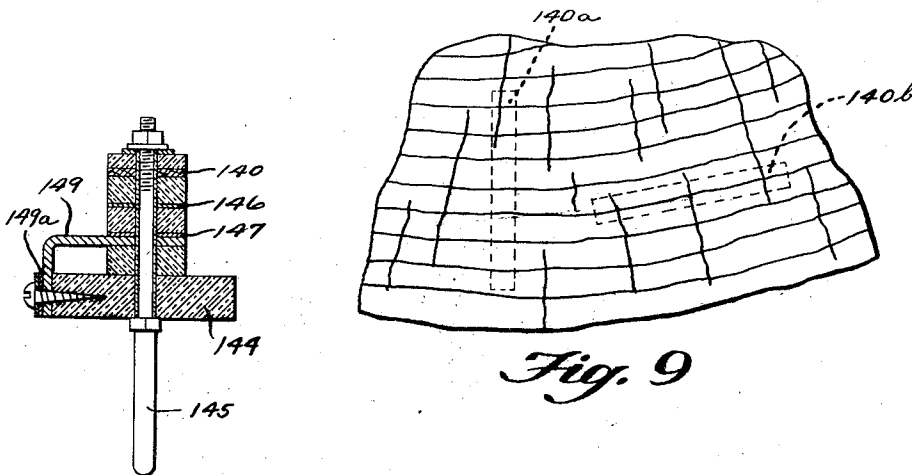
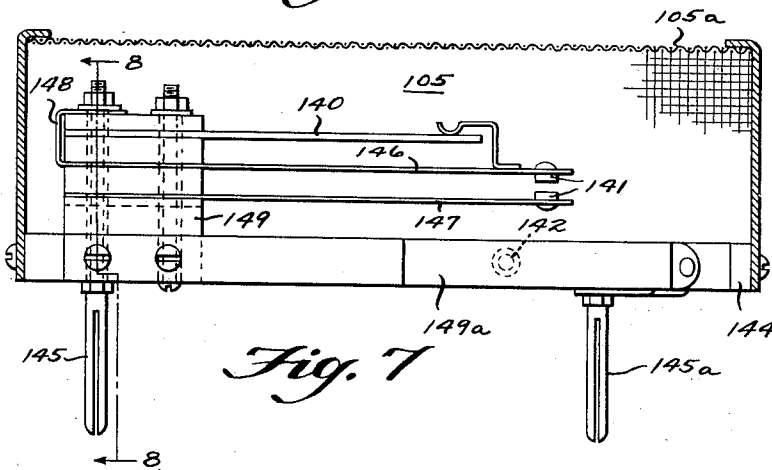
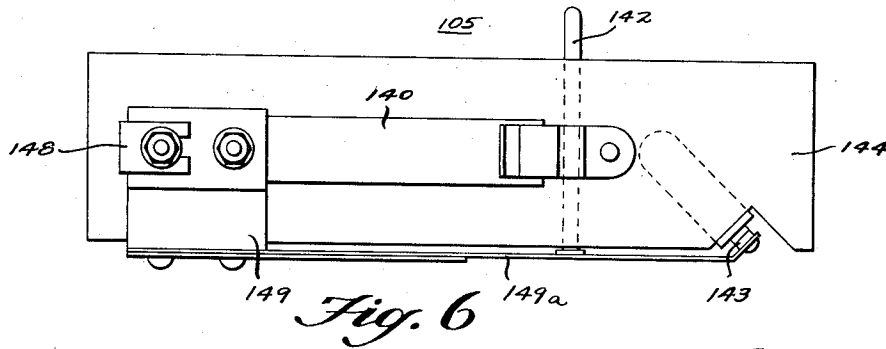


Fig. 8

Fig. 9

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## UNITED STATES PATENT OFFICE

2,198,488

## ELECTRICAL APPARATUS

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Original application May 26, 1934, Serial No. 727,774. Divided and this application January 21, 1937, Serial No. 121,547

8 Claims. (Cl. 268—117)

This invention relates to electrical apparatus and more particularly to the actuation of awnings, shades or other light transmission modifiers or closures for window or door openings automatically and manually.

This application is a division of my co-pending application, Serial No. 727,774, which was filed on May 26, 1934.

An object of this invention is to provide control devices for the fixtures associated with the windows, doors or other openings of edifices in such a manner that they may be controlled with but slight manual effort or automatically in accordance with various environmental conditions.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a diagrammatic representation, partly in section and partly in perspective, of a portion of an edifice embodying features of my invention;

Fig. 2 is an elevation of the motor drive for the window closure device;

Fig. 3 is a plan view of a portion of Fig. 2;

Fig. 4 is an enlarged view of a portion of Fig. 2 showing the controls in the stopped position;

Fig. 5 is a wiring diagram of the window closure control;

Fig. 6 is a plan view, with the protective screen removed, of the rain responsive device;

Fig. 7 is an elevation, with the protective screen added, of the device shown in Fig. 6;

Fig. 8 is a cross sectional view taken along the line 8—8 of Fig. 7, and

Fig. 9 is a cross sectional view of a piece of wood indicating how the rain responsive reed may be cut therefrom.

My invention is particularly applicable to an edifice such as a house, office building or the like, which is provided with one or more openings or windows of the character shown in Fig. 1, which is representative of a plurality of such openings or windows throughout the edifice. This window, door or the like is provided with one or more sash openings 10, each having a closure 11 in the form of a window sash or the like and an awning, shade or light transmission modifier 12 which may overhang one or more of the sash openings 10 on the outside of the building. Actuating means and control means, hereafter more fully described, are provided for actuating the closures

11 and modifiers 12, not only under manual control, but also automatically in accordance with selected environmental conditions.

The actuation of the awning, shade or light transmission modifier 12 now will be more fully described. The awning 12 which is pivotally secured to the building in the usual manner, may be raised or lowered by means of a cable 13 passing over a pulley 14 and attached to the lower or outer end of the awning at 15. This cable passes over a pulley 16 and winds around the drum 17 which is actuated by the motor 18 under a manual control at 19 and 20 and under an automatic environmental control 21. The awning is so controlled that it automatically raises, for example, when the sunlight diminishes below a certain intensity and automatically lowers when the sunlight increases above a certain intensity. This is accomplished by providing a photoelectric cell 22 which is responsive to such sunlight intensities, and which initiates impulses which are relayed eventually to the one or more motors 18 to actuate properly the awning or awnings 12. The electrical impulses initiated at the cell 22 flow to a current intensifying aggregate 23 from whence the current thus intensified flows to a master switch structure 24 which relays a governing current to the various individual relays 25, placed throughout the edifice, for each window of the edifice. Each relay 25 controls the flow of standard or city power current to its individual motor 18.

The actuation and controls for the closure member or members 11 is shown more in detail in Figs. 2 to 9 inclusive. A series of manually actuatable switches 100, 101 and 102 are provided which, by the proper energization of the relay 103, energize or deenergize the motor 104 which in turn actuates the closure member 11. The motor 104 is so related with respect to the relay 103 that the current to the motor 104 is cut off whenever the closure member 11 reaches its full closed position or full open position. In addition, the flow of current to the motor 104 is also cut off if movement of the closure member 11 should be abnormally resisted by binding or by reason of the fact that someone may accidentally interfere with its movement. In addition, a rain or other weather responsive member 105 is so related to the control circuits that the closure member 11 is controlled in accordance with weather or other environmental conditions. In this particular embodiment, when rain falls on the member 105, it so energizes the motor 104

that it closes the closure member 11 and prevents rain from blowing into the edifice.

Another control is superimposed on the circuits responsive to positions of the screen 106. The arrangement is such that if the screen 106 should be raised or should fly up under its own tension by being released, the switch 107 is opened and the flow of current to the motor 104 is stopped and cannot be resumed until the screen is lowered.

The foregoing results may be accomplished by a wiring arrangement more fully shown in Fig. 5. When the switch 100 is closed, the closure 11 is caused to close because current flows from the battery 108 through the switch 100 to the relay solenoid 109. The energization of the solenoid 109 moves the contact arm 110 to the right, thus closing the contacts 111 to 114. This permits flow of current from the power source 115 to flow through the motor 104 in the proper direction to close the closure member 11 through the gear train hereinafter more fully described. If it is desired to open the window, the switch 102 is closed and this causes current to flow from the battery 108 to the relay solenoid 116. This moves the arm 110 to the left, thus closing the contacts 117 to 120 and permits the flow of current to the motor 104 in the proper manner to open the window. The relay 103 is provided with two locking arms 121 and 122 which, under the tension of springs 121a and 122a respectively tend to lock the contact arm 110 in its closed position either on the right or on the left. Once the contact arm 110 is moved to a closed position, one of these locking arms 121 or 122 holds the arm 110 closed until the locking arms are tripped either by the action of the motor 104 itself or by the energization of the solenoid 123.

The motor 104 is mounted on a platform 124 which swings about a fulcrum 125 made in the form of rubber supports. The motor 104 drives a shaft 126, also carried on platform 124, through gears 127, the shaft 126 in turn actuating a belt 128 leading to a shaft 129 which is geared to one of the closures 11. The shaft 129 may be linked by chain 129a to other similar shafts to operate the other sashes of the window. When movement of the closure 11 is resisted, either because the closure member reaches its full open or full closed positions or because of some other abnormal resistance, a tension is placed on the belt 128 so that the platform 124 is lifted about fulcrum 125 from its position in Fig. 2 to the position shown in Fig. 4. When this occurs, the abutment 130 carried by the shaft bearing 126a hits the trip link 131 which in turn actuates the trip levers 121 and 122 and permits the arm 110 to assume its neutral position, thus stopping the motor 104.

The motor 104 may be stopped under manual control by closing the switch 101. When this switch is closed, the solenoid structure 123 is energized which in turn attracts the armature 132 carried by trip link 131. Armature 132 in turn actuates the trip link 131 to trip the levers 121 and 122 and open the circuit to motor 104.

The control from the screen 106 is as follows: When the screen rises, the switch 107 is opened. This stops flow of current from the transformer 133 to the solenoid 134. When the solenoid 134 is de-energized, the switch 135 is opened and thus current cannot flow to the motor 104. This stops the closure member 11 wherever it may be.

The rain or other weather condition control 105 is superimposed into the electric current cir-

cuit as follows: A moisture responsive reed 140 bends downward when it is moistened, thus closing contacts 141. When this occurs, current flows to the solenoid 109, thus energizing the motor 104, as heretofore described, and closing the window. In addition, there is a rod 142 placed in the path of the window closure 11 which opens the contacts 143 when the window reaches its full closed position. This prevents continuous flow of current through the solenoid 109 after the window has been closed and while the reed 140 is still wet. The rain responsive device conveniently may be mounted on an insulated platform 144 provided with plugs 145 and 145a which may be plugged into receptacles on the window sill and wired into the control system. The reed 140 normally, when dry, holds up the metal contact arm 146, but when it is wet, it lowers and permits the contact arm 146 to lower towards contact arm 147, thus closing contacts 141. The contact arm 146 connects by the U-shaped extension 148 with plug 145. The platform 144 is provided on one of its sides with a metal member 149 which is in electrical contact with the contact arm 147 and by a longitudinal extension 149a carries one of the contact members 143 and which is actuated by the rod 142 heretofore described. One of the contacts 143 is electrically connected to the plug 145a. A protective screen 105a may be placed over the platform 144.

The reed 140 may be made of any material which is sensitive to moisture. At present I prefer to make it of a thin wood strip cut with respect to the grain of the wood as indicated at 140a or 140b in Fig. 9. The grain therefore runs substantially parallel with the thickness of the reed.

Sometimes it is desirable to cause the awnings to stay down regardless of the sunlight intensity. One way of accomplishing this is to provide a lantern 150 which shines into cell 22 with sufficient intensity to lower the awnings. This lantern may be controlled from a switch 151 which has "on" and "off" buttons for lighting and darkening the lantern 150, as will be readily apparent.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In combination, an edifice having an opening in said edifice, a closure for said opening, a screen for said opening, means to move said closure, means to actuate said last named means in accordance with atmospheric conditions, and means controlled by said screen rendering one of said above named means inoperative.

2. In combination, an edifice having an opening in said edifice, a closure for said opening, a screen for said opening, means for manually controlling said closure, means for additionally controlling said closure in accordance with psychrometric conditions, and means controlled by said screen rendering one of said above named means inoperative.

3. In an edifice having an opening in said edifice, a closure for said opening, a screen for said opening, power means for actuating said closure, control means for said power means automatically responsive to atmospheric conditions for initiating operation of said power means in response to a change in said atmospheric conditions, means for rendering ineffective said power

means under abnormal resistance to the actuation of said closure, and means controlled by said screen rendering one of said means inoperative.

4. In combination with an edifice having an opening, closure members for said opening, a motor for operating one of said closure members, a control circuit for said motor, a switch in said circuit, first solenoid means for operating said switch including a manually operated member for closing the circuit to said solenoid, second solenoid means for operating said switch including a member operated by one of said closure members for controlling the energization of said second named solenoid, and a third means for mechanically operating said switch including a member responsive to the load on said motor.

5. In combination with an edifice having an opening, a closure member for said opening, a motor for opening and closing said closure member, a yieldable mounting for said motor, a control circuit for said motor, a switch in said circuit, means responsive to atmospheric conditions for operating said switch so as to initiate operation of said motor, means responsive to movement of said mounting for operating said switch, and means responsive to the load on said motor for actuating said mounting.

6. In combination, an edifice having an opening in one wall thereof, a closure for said opening, a screen for said opening, means to move said closure, means to actuate said last named means in accordance with atmospheric conditions, and means operated by said screen controlling one of the above named means.

7. In combination an edifice having an opening in said edifice, a closure member for said opening, a screen for said opening, means for manually controlling said closure member, means for additionally controlling said closure in accordance with changes in a psychrometric condition, and means responsive to the position of said screen for controlling one of the above named means.

8. In combination, an edifice having an opening in one wall thereof, a closure for said opening, a screen for said opening, means to move said closure, means to actuate said last named means in accordance with atmospheric conditions, means operated by said screen controlling one of the above named means, and means for stopping said closure actuating means in response to abnormal resistance to movement of said closure member.

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