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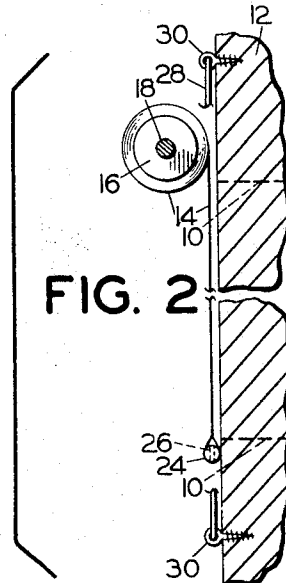
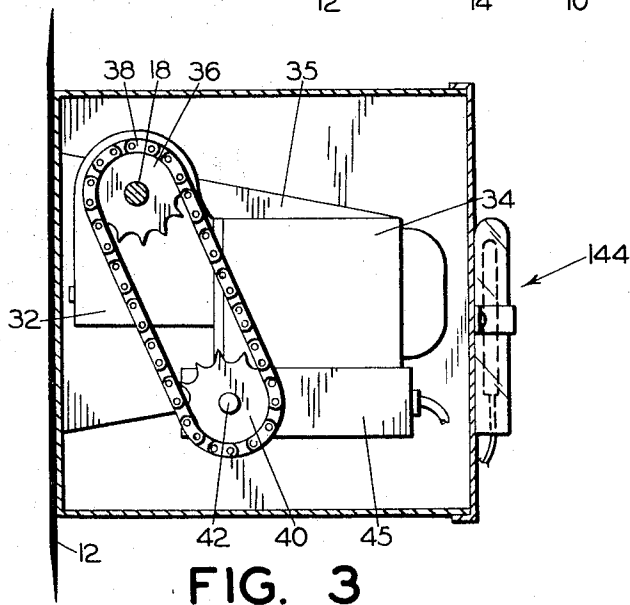
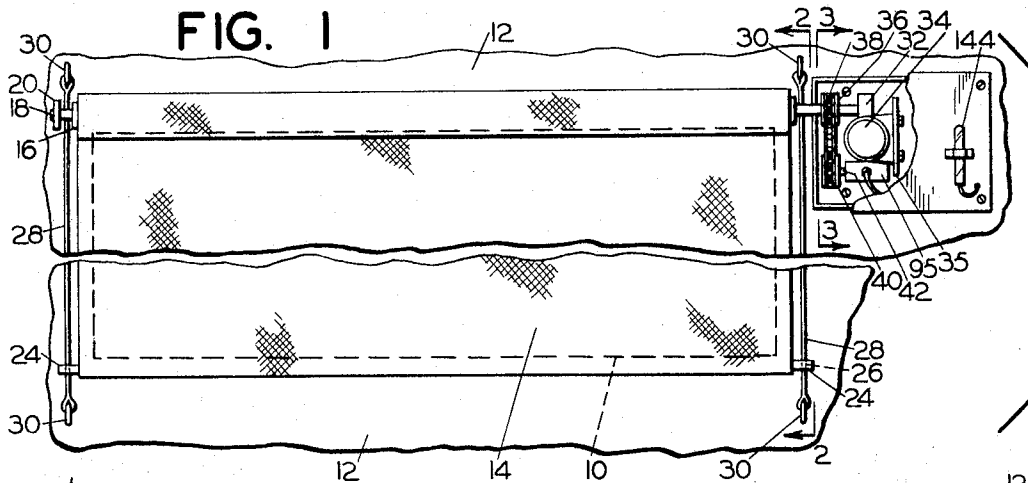
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AUTOMATIC ELECTRIC AWNING

Filed Oct. 5, 1964

2 Sheets-Sheet 1



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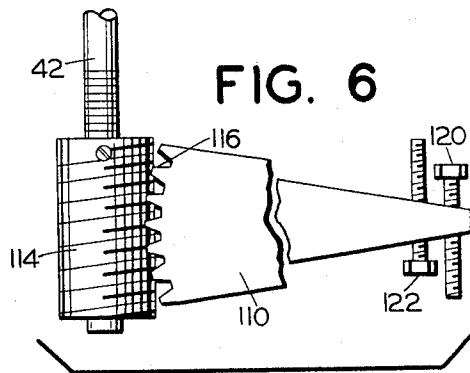
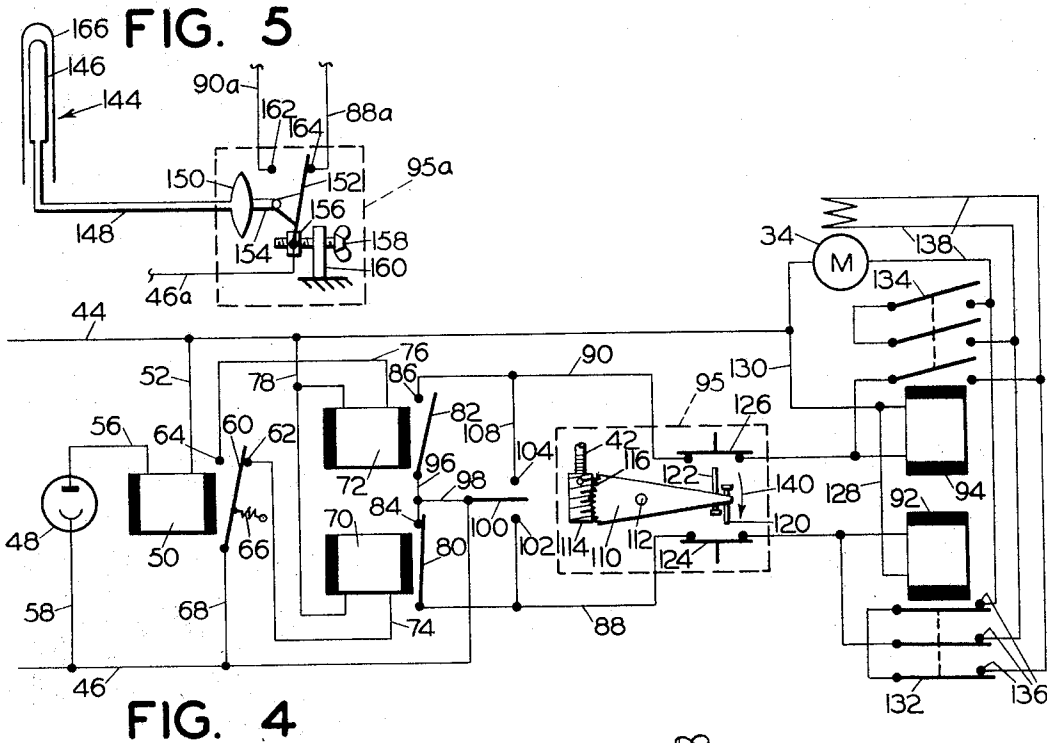
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## AUTOMATIC ELECTRIC AWNING

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This invention relates to an automatic electrically operated awning.

A primary objective of the present invention is to provide novel awning structure including drive and control means therefor adapted to operate the awning to either an upper or lower position depending upon the positions of need therefor.

A more particular object is to provide an awning driven between upper and lower positions by an electric motor which is controlled in its operation by either an optics (light sensing) or atmospheric sensing means.

Another object is to provide an awning and control means of the type described which employ delay mechanism in the control means whereby to accomplish a delay prior to each raising or lowering operation so that brief fluctuations in weather conditions will not energize the drive motor.

Another object is to provide an automatic awning and control means therefor wherein the latter is readily adjustable to vary the up and down travel distance of the awning whereby an awning is made adaptable to various window heights.

Additional objects will become apparent from the following specification and claims, considered together with the accompanying drawings wherein the numerals of reference indicate like parts.

In the drawings:

FIGURE 1 is a foreshortened front elevational view of an awning and drive motor embodying features of the present invention;

FIGURE 2 is a foreshortened, fragmentary sectional view taken on the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged sectional view taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a wiring diagram including the awning drive motor and control means therefor, this diagram illustrating one form of sensing control;

FIGURE 5 is a fragmentary view of a wiring diagram showing a second form of sensing control; and

FIGURE 6 is an enlarged, fragmentary, foreshortened elevational view of a limit switch included in the control means.

Referring now in particular to the drawings, and first to FIGURE 1, a window 10, which the present awning is to cover, is shown in broken lines. The window 10 forms a part of a building 12, also seen in FIGURE 2. The awning is designated by the reference numeral 14 and is formed of flexible material such as canvas. It is mounted on a roll 16 keyed to a shaft 18 journaled at one end in a lug 20 suitably secured to the building 12 and journaled at its opposite end in a side wall of a motor housing 22, also suitably secured to the building. The awning 14 hangs vertically from the roll 20 and carries at its bottom end a cross bar 24 extending beyond the side edges of the awning and having eyes 26 for slidable engagement with a pair of vertically disposed guide cables 28 mounted on the building by eye bolts 30. The bar 24 is preferably metal to provide a weight at the bottom of the awning, whereby the latter will roll up neatly on the roll and will unroll freely by gravity when released from the roll 16.

Shaft 18 projects into the motor housing 22 and comprises the output shaft of a gear reduction mechanism 32, also seen in FIGURE 3, driven by an electric motor

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34. The motor 34 is suitably secured integrally to the housing 22 by a bracket 35.

Keyed to the shaft 18 interiorly of the housing is a sprocket wheel 36 which is engaged by a sprocket chain 38 in turn engaging a sprocket wheel 40 keyed to a shaft 42. Shaft 42 comprises a limit control shaft which as will be seen in more detail hereinafter operates a limit lever.

Referring now to FIGURE 4 there is illustrated a first embodiment of a control system for operating the motor 34 under the influence of exterior weather conditions, such control system being designed to lower the awning when the light outside is bright and at all other times to raise the awning. The control system comprises power infeed lines 44 and 46, the line 44 leading to electric motor 34. Connected in series across the lines 44 and 46 are sensing and circuit selecting means comprising a photo cell 48 and a relay 50, respectively, the connecting series circuit comprising a wire 52 leading from the infeed line 44 to one side of the relay 50, a wire 56 leading from the other side of said relay to one leg of the photo cell, and a wire 58 leading from the other leg of the photo cell to the infeed line 46. The photo cell 48 has an internal construction such that when energized by a selected intensity of light the circuit just described across the infeed lines 44 and 46 is broken. On the other hand, when the photo cell is in a deenergized condition, as when the sun is not shining, said circuit is closed.

Relay 50 operates a switch arm 60 associated with a pair of contacts 62 and 64. Switch arm 62 is normally held in engagement with contact 62 by a tension spring 66 and is connected electrically to the infeed line 46 by a wire 68.

A pair of delay relays 70 and 72 are included in auxiliary circuits to be described and have wires 74 and 76 leading from one side thereof to the contacts 62 and 64, respectively. The other sides of relays 70 and 72 are connected to infeed line 44 by a common wire 78.

Relays 70 and 72, as stated hereinbefore, comprise delay relays and may be of the vacuum tube type wherein they remain deenergized a selected length of time after being subjected to a closed circuit. The delay of these relays is predetermined depending upon weather conditions in the area where the awning is installed and the protection to be afforded by the awning, and in general serve to prevent repeated operation of the electric motor upon brief fluctuations in the weather, as will be seen more fully hereinafter.

Relays 70 and 72 operate normally open switch arms 80 and 82, respectively, associated with respective contacts 84 and 86. Leading from contacts 84 and 86 are wires 88 and 90, respectively, leading to respective motor reversing relays 92 and 94.

Switch arm 82 and switch contact 84 are interconnected by a wire 96 and connected to this wire by means of a wire 98 is a manually operated double throw switch 100. This latter switch has a pair of contacts 102 and 104 connected respectively to the wires 88 and 90 by wires 106 and 108. As will be seen, the manual switch 100 is adapted to be closed in one direction or the other to raise or lower the awning independent of the automatic control means.

A lever 110 is pivotally mounted on a shaft 112 in a housing 95 also shown in FIGURES 1 and 3. This lever is driven by the shaft 42 in turn driven by the awning roll shaft 18 through the sprocket connection 38. The drive connection between the shaft 42 and lever 110 is accomplished by a worm gear 114, FIGURES 4 and 6, secured to the shaft 42 and intermeshing with a toothed portion 116 on one end of the lever. Thus, operation of the shaft 42 in one direction pivots the lever one way

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and operation of the shaft in the opposite direction pivots the lever the other way.

The opposite end of lever 110 from the toothed end has a pair of switch opening projections 120 and 122 in the form of stud screws. These screws are threadably mounted laterally in said end of the lever 110 and are arranged for engaging limit switches 124 and 126, respectively. Switches 124 and 126 are incorporated in wires 88 and 90, respectively. As will be seen more clearly hereinafter, pivotal movement of the lever 110 a selected amount in one or the other of its rotative directions engages and opens one or the other switches 124 or 126. The threaded mounting of the screws 120 and 122 in the lever 110 permits adjustment thereof whereby to open switches 124 or 126, respectively, after a selected number of rotations of shaft 42. This construction is to provide adjustability of movement of the awning according to the size of a window or otherwise to vary the length of travel of the awning in opening or closing movements.

Wires 88 and 90 lead to one side of motor reversing relays 92 and 94, respectively, and the other side of these relays are connected to the infeed line 44 by suitable connecting wires 128 and 130. Relays 92 and 94 operate normally open switches 132 and 134, respectively, associated with multiple contacts 136 and wires 138 which lead into the motor 34 and which upon selected use thereof, depending upon which relay 92 and 94 is energized, cause operation of motor 34 in forward or reverse directions.

The operation of the control means of FIGURE 4 will now be described. As stated hereinbefore relays 70 and 72 comprise delay relays and are set to close their respective switch arms 80 and 82 a selected time after energization of the sensing means, such as for example after three minutes. That is, when the photo cell 48 operates to close the circuit to one of relays 70 or 72 such circuit must remain closed for at least three minutes before one of the auxiliary circuits which include switch 80 or 82 will be energized. In the diagram of FIGURE 4, the parts are illustrated wherein the relay 70 has gone through the delay period and it has closed the switch arm 80 on the contact 84.

Thus, it will be assumed that the sun is shining or weather conditions are sufficiently bright to actuate the photocell 48. Since the photocell opens the circuit through relay 50 when it is actuated by light, the switch arm 60 is not influenced by the relay 50 and is pulled into engagement with contact 62 by the spring 66. This closes the circuit to delay relay 70 through the wire 68, switch arm 60, wire 74, and wire 78. After the selected time interval of delay of relay 70 it will close the switch arm 80 on contact 84 to close the circuit to the motor control relay 92. More particularly, with the switch arm 80 closed on its contact 84 a circuit is established from infeed line 46 through wire 98, wire 96, switch arm 80 and wire 88 to the relay 92. Switch 124 is closed at this time since the actuating end of lever 110 will have stopped at its other position on the last cycle, namely, in engagement with switch 126. In the diagram of FIGURE 4, and in the operation of the cycle so far described lever 110 is in motion in the direction of arrow 140, this motion having been started when the switch arm 80 was drawn into engagement with its contact 84 which served to energize relay 92, in turn closing the circuit to motor 34 to start its operation in one direction. Since it is being assumed that the circuit controlled by the photo cell 48 is open, which means that the photo cell is exposed to a bright light and it is desirable to lower the awning, the motor circuitry is such that relay 92 causes the motor to rotate in a direction to lower the awning. The motor 34 will thus operate until the control lever 110 is pivoted sufficiently to open switch 124. Opening of this switch breaks the circuit to the motor and the system will remain inoperative until such time that the photo cell is shaded, which closes the circuit to relay 50, for a time sufficient to over-

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come the delay of relay 72. After the selected delay of relay 72, which would result from a generally cloudy day, for example, the switch arm 82 is drawn into engagement with contact 86 to operate the motor 34 in the opposite direction. This causes a rotation of the motor in a direction to raise the awning, and such motor operates until projection 122 on the lever 110 opens switch 126, the lever 110 in this cycle being pivoted in a direction opposite to that designated by the arrow 140.

Manual switch 100 may be closed on either of its contacts 102 or 104 to raise or lower the awning in a hand controlled operation if desired. It is noted in the wiring diagram that the switch 100 is connected directly to infeed line 46 and therefore is in a circuit which bypasses photo cell 48 and the delay relays 70, 72 for direct control of the motor.

FIGURE 5 is a fragmentary view of a second embodiment of control means, and instead of the photo cell 48 and the delay relays 70 and 72 this embodiment utilizes a sensing assembly 144 in the form of a thermostat. This thermostat is adapted to be mounted on an exterior surface of housing 22 or elsewhere where it is in direct contact with the atmosphere and directly exposed to the sun's rays striking the area to be protected.

Thermostat 144 comprises a sensing bulb 146 of a conventional construction having a hollow interior filled with a heat expandable liquid or gas and having a flexible conduit 148 communicating with the interior of the bulb and leading to a bellows 150. Bellows 150 is pivotally connected to a switch lever 152 by means of an arm 154. Switch arm 152 is supported on a collar 156 threadably mounted on an adjusting screw 158 in turn threadably engaged in a supporting post 160 secured in a housing 95a. The free end of switch lever 152 is disposed between a pair of contacts 162 and 164 to which are connected wires 88a and 90a, the lever 152 being arranged to close circuits between an infeed line 46a and lines 88a and 90a. Wires 88a and 90a are associated with manual switch 100, control lever 110, and other portions of the motor control circuit the same as illustrated in FIGURE 4. In other words, the control mechanism shown in FIGURE 5 is employed in lieu of the photo cell 48, the relay 50, and the relays 70 and 72.

Sensing bulb 144 is contained in a transparent cover or shield 166 having a closed upper end and an open lower end. Such cover or shield serves to dampen fluctuations in weather conditions or erratic or momentary exposure to the direct rays of the sun to accomplish substantially the same delay of operation of the motor as do the relays 70 and 72 in the FIGURE 4 embodiment. For example, it will be assumed that weather conditions are mostly sunny with an occasional cloud in the sky.

In this sunny condition, the fluid in the bulb 146 is heated sufficiently to expand the fluid and operate the bellows 150 to move the switch arm 152 into contact 164 which causes the awning to be lowered. If a cloud should shade the assembly 144 only temporarily the residual heat around the bulb 146 which is trapped by the insulating cover 166 will prevent the bulb from instantaneously cooling. Instead, the residual heat within the cover 166 maintains an expansion of the liquid in the line 148 and a single small cloud, for example, will not cause a raising of the awning. After a selected cloudy or cool period, however, heat will escape from the interior of cover 166 and the bulb 146 will cool and permit the switch 152 to reverse.

The cover 166 also prevents instantaneous action by the bulb 146 in an inverse condition. That is, if the sky is generally cloudy with a few sunny patches the insulation caused by the cover 166 will not permit instantaneous heating of the bulb. The delay resulting from the cover 166 thus prevents repeated up and down movement of the awning by brief changes in weather conditions.

Adjustment of the collar 156 on the screw 158 is accomplished to selectively position the switch arm 152 with

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relation to the contacts 162 and 164 to control the sensitivity of operation of the electrical means in one direction or the other of awning travel.

Thus, in accordance with the principles of the present invention an awning is caused to respond to weather conditions for covering or uncovering a window as necessary. The important feature however resides in the fact that the control means for the awning is not responsive to brief weather changes. It is to be understood that the forms of our invention herein shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of our invention or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. An electrically controlled awning assembly comprising an awning arranged for movement between open and closed positions, electric motor means arranged to drive the awning to open and closed positions, an electric circuit for said electric motor means including a pair of auxiliary circuits, one of said auxiliary circuits being arranged to operate said electric motor means to produce opening movement of said awning and said other auxiliary circuit being arranged to operate said electric motor means to produce closing movement of said awning, weather sensing means in said circuit operable to control the opening and closing driving movements of said electric motor means, and a delay relay in each of said auxiliary circuits arranged to delay actuation of said motor means for a selected time after a controlling signal from said sensing means.

2. Operating means for driving an awning between open and closed positions comprising electric motor means arranged to drive the awning to open and closed positions, an electric circuit for said electric motor means including a pair of auxiliary circuits, one of said auxiliary circuits being arranged to operate said electric motor means to produce opening movement of said awning and said other auxiliary circuit being arranged to operate said electric motor means to produce closing movement of said awning, weather sensing means in said circuit operable to control the opening and closing driving movements of said electric motor means, and a delay relay in each of said auxiliary circuits arranged to delay actuation of said motor means for a selected time after a controlling signal from said sensing means.

3. Operating means for driving an awning between open and closed positions comprising electric motor means operating a drive shaft for driving the awning to open and closed positions, an electric circuit for said

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electric motor means including a pair of auxiliary circuits, one of said auxiliary circuits being arranged to operate said electric motor means to produce opening movement of said awning and said other auxiliary circuit being arranged to operate said electric motor means to produce closing movement of said awning, weather sensing means in said circuit operable to control the opening and closing driving movements of said electric motor means, and a limit switch operated by said drive shaft and arranged to open said auxiliary circuits at the end of the open and closed positions of the awning, said limit switch having adjustment means thereon for varying the extent of opening and closing driving movements of said electric motor means.

4. Operating means for driving an awning between open and closed positions comprising electric motor means arranged to drive the awning to open and closed positions, an electric circuit for said electric motor means including a pair of auxiliary circuits, one of said auxiliary circuits being arranged to operate said electric motor means to produce opening movement of said awning and said other auxiliary circuit being arranged to operate said electric motor means to produce closing movement of said awning, thermostat means operable on said circuit to control the opening and closing driving movements of said electric motor means, and a casing over said thermostat to delay temperature influence on said thermostat.

5. The operating means of claim 4 wherein said thermostat means comprises a sensing bulb containing a heat expandable fluid, and bellow means operated by said expandable fluid and in turn causing selected operation of said auxiliary circuits to energize said electric motor means in opening or closing drive movements of the awning.

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