

June 11, 1963

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3,093,744

LIGHT SENSITIVE CONTROL DEVICE

Filed Oct. 11, 1960

2 Sheets-Sheet 1

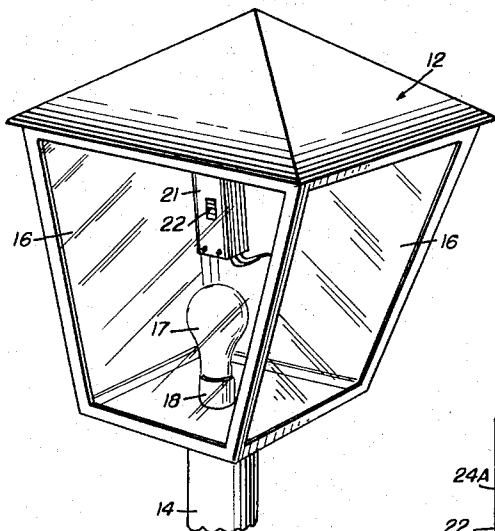


FIG. 1

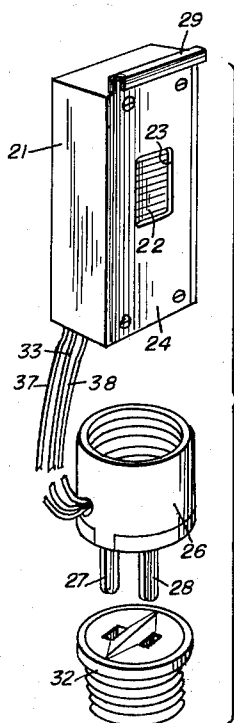


FIG. 2

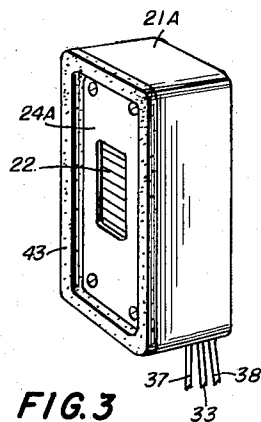


FIG. 3

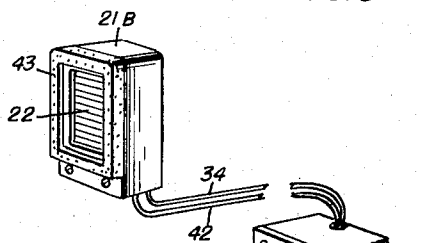


FIG. 4

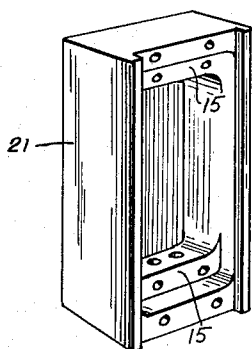


FIG. 5

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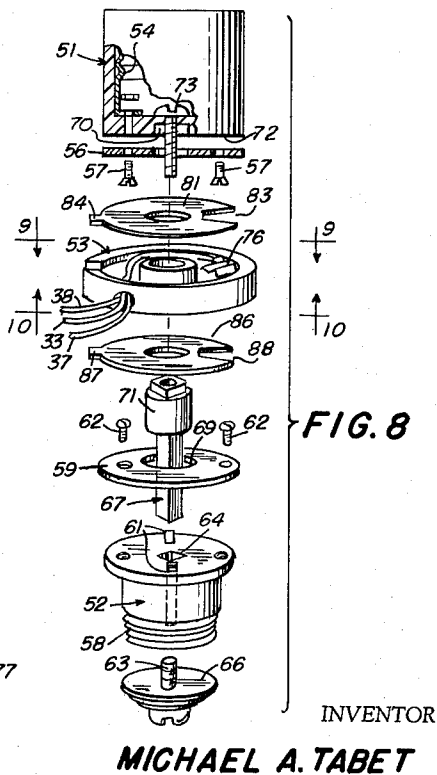
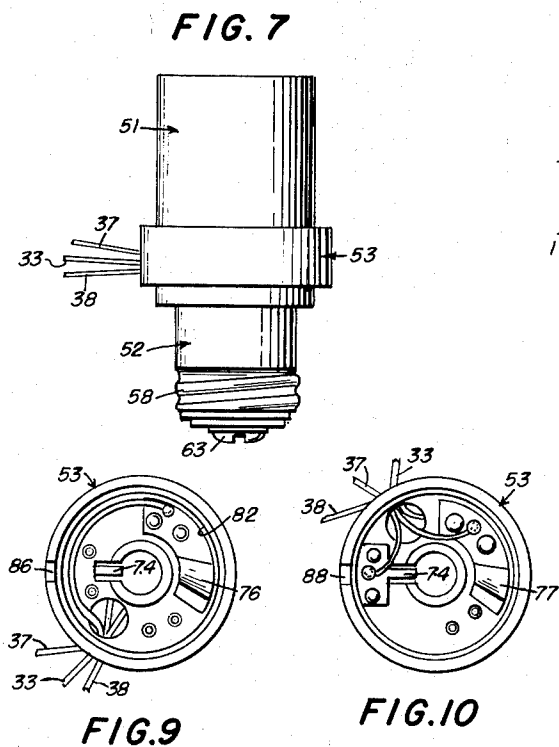
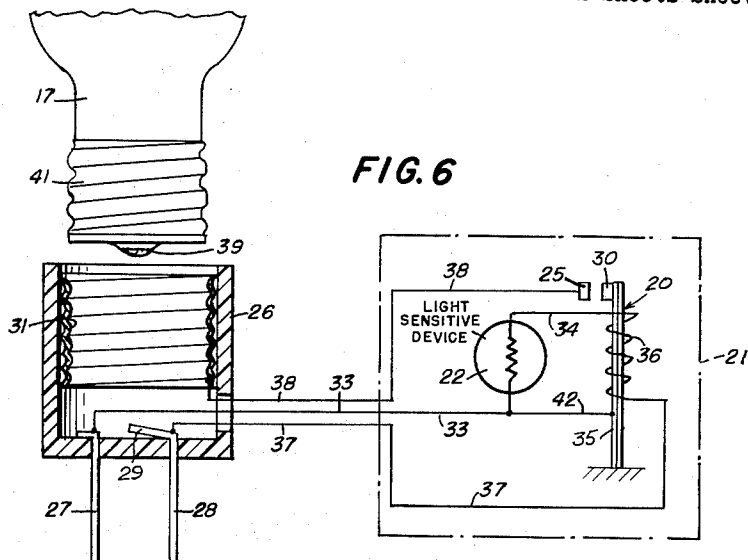
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LIGHT SENSITIVE CONTROL DEVICE

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5 Claims. (Cl. 250-239)

The present invention relates to a unit for controlling a circuit in response to changes in the level of natural light and the invention has particular utility for controlling the energization of a lamp bulb of a light fixture when the natural light falls below a predetermined level with the control unit so designed that it may be applied to a light fixture without altering the wiring connections thereto.

A control mechanism is available which is designed to energize the bulb of a post type light fixture when the natural light falls below a predetermined level. This prior arrangement includes a light sensitive device which is housed in a portion of the post which supports the light fixture. It requires an opening or window in the wall of the hollow post through which natural light may fall on a light sensitive element and the control mechanism requires rewiring of the light fixture.

It is an object of the present invention to provide a control unit with the light sensitive element mounted within a cup-shaped opaque casing which is designed as to be mounted along the inner face of a transparent or translucent pane of a light fixture or a window of a building so that the light sensitive element receives natural light through such a pane and opaque casing serves to prevent light from the energized bulb from falling on the light sensitive element.

Another object of the invention is to provide electrical connectors in operative relationship with the light sensitive element control unit so that the control device may be adapted to a conventional light fixture without the necessity of rearranging the circuit connections to the lamp bulb socket thereof.

Other objects and features of the invention will be appreciated and become apparent to those skilled in the art to which the invention pertains as the present disclosure proceeds and upon consideration of the following detailed description taken in connection with the accompanying drawings wherein several exemplary embodiments of the invention are disclosed.

In the drawings:

FIG. 1 is a perspective view of a conventional post type light fixture illustrating the invention applied thereto.

FIG. 2 is an enlarged perspective view of a control unit embodying the invention and showing one type of socket structure for adapting the control unit to a conventional light fixture.

FIG. 3 is a perspective view of a modified type of casing for the light sensitive element and its relay.

FIG. 4 is a perspective view of another type of casing for the light control element.

FIG. 5 is a perspective view of the opaque casing shown in FIG. 2 with the light sensitive element and the relay omitted.

FIG. 6 is a diagram of circuit connections to the light sensitive element and the relay and to an electrical fixture of the type shown in FIG. 2.

FIG. 7 is a side elevational view of an electrical fixture for adapting the control unit to a lamp socket.

FIG. 8 is an exploded view principally in perspective of the structure shown in FIG. 7 with portions shown in section.

FIG. 9 is a plan view taken on the line 9-9 of FIG. 8.

FIG. 10 is an inverted plan view taken on the line 10-10 of FIG. 8.

The light control device exhibiting the invention in-

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cludes an opaque casing which is substantially cup-shaped and which enshrouds a light sensitive element and the open end of the casing is adapted to face away from the lamp to be controlled and to be disposed inside a transparent or translucent pane of a lamp fixture or a window of a building. The control unit is particularly useful in connection with an outdoor lamp fixture 12 which may be mounted on a vertically disposed post 14. Such a lamp fixture has transparent or translucent panes 16 substantially encasing an incandescent lamp bulb 17 which is threaded in a conventional socket 18. A control device embodying the invention provides control of the energization of the bulb 17 when the natural light falls below a predetermined level and without rearranging the wiring leading to the socket 18.

A feature of the control unit pertains to the relationship of the casing to the light sensitive element and to the bulb 17. The casing 21 is formed of opaque material such as a phenol formaldehyde condensation product. The casing 21 is substantially cup-shaped and a light sensitive element 22 of a known type and which is formed essentially of interlaced grids is mounted in the casing 21 and exposed to the natural light through an aperture 23 formed in a plate 24 covering the open end of the casing 21. A relay of a known type having time delay characteristics may be mounted within the casing 21 under the light sensitive element. The relay is diagrammatically represented at 20 in FIG. 6. The contacts 25 and 30 of the relay are normally open and the contact 30 is actuated by an element 35 of a bi-metallic character which responds to changes in temperature. The hollow character of the casing 21 for accommodating the light sensitive element 22 and the relay 20 is shown in FIG. 5 and shoulders 15 are provided in the casing on which these members may be mounted.

The cover plate 24 may be provided with a hook 29 as shown in FIG. 2 for engaging over the upper edge of one of the panes 16. Such support for the casing 21 and the control elements therein disposes the casing inside the pane with the aperture 23 facing outwardly. The light sensitive element 22 is in position to be influenced by natural light but the opaque portion of the casing 21 shields the light sensitive element 22 from light rays emitted from the bulb 17. The light control unit is preferably mounted in such a manner that the light sensitive element 22 faces in a northerly direction.

The control unit includes electrical fixtures for controlling the energization of the lamp bulb 17 without altering the wiring connections to the bulb socket 18. It is for this purpose that a female type socket member 26 is provided having spaced prongs 27 and 28 extending from the insulating base thereof. The prong 28 is connected to a conventional center contact 29 as shown in FIG. 6. The prong 27 is not directly connected to the threaded sleeve 31 within the socket 26.

When the control unit is to be applied so as to control the energization of the lamp bulb 17 it is removed from the socket 18. A conventional plug 32 (FIG. 2) is threaded into the socket 18. The prongs 27 and 28 of the socket member 26 are then introduced into the spaced openings of the plug 32 so that opposite sides of the supply line are applied to the prongs 27 and 28. Then the lamp bulb 17 is threaded into the sleeve 31 of the socket member 26 and its center terminal engages the center contact 29 and the other terminal 41 engages the threaded sleeve 31.

A conductor 33 extends from the prong 27 and from one side of the line and is connected to one side of the light sensitive element 22. The other side of the light sensitive element is connected through a conductor 34 to a heater coil 36 which is in operative relationship

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with the temperature responsive bar 35. A conductor 37 extends from the other side of the heater coil 36 and from the casing 21 and into the socket member 26 and is connected to the prong 28 and the other side of the line. Thus the light sensitive element 22 is in series with the heater coil 36 and both are connected across the supply line. A conductor 38 extends from the contact 25 to a position outside the casing 21 into the socket member 26 and is connected to the threaded sleeve 31.

The relay is of the type that the contacts 25 and 30 are closed when the natural light falling on the light sensitive element 22 is below a predetermined level. Under these conditions a circuit is completed from the prong 27 through the conductor 33 and a conductor 42 and the bar 35 and the closed contacts 25 and 30 and the conductor 38 to the terminal 41 of the lamp bulb 17 and it is energized. The casing 21 prevents the light rays emitted by the energized bulb 17 from falling onto the light sensitive element 22 so that the bulb 17 remains energized.

When the natural light rises to a predetermined level as occurs as daylight approaches the light sensitive element 22 becomes more conductive so that sufficient current eventually flows therethrough to influence the bar 35. After a predetermined time interval the contacts 25 and 30 open so that the threaded sleeve 31 is disconnected from the supply line and the bulb 17 is deenergized. The bulb 17 remains deenergized until the natural light again falls below a predetermined level as occurs as night approaches. The light sensitive element 22 then develops more resistance and the current level in the heater coil 36 falls so that the bar 35 after a predetermined time interval closes the contacts 25 and 30 so that the supply line is again connected to the terminals 39 and 41 of the lamp bulb.

The casing for the light sensitive element 22 and the relay may take various forms and there is shown in FIG. 3 a casing 21A. The cover plate 24A of this casing is devoid of the hook 29 but the casing carries a resilient adhesive gasket 43 which upon wetting will adhere to a transparent or translucent pane. Accordingly this unit may be supported with its open end facing natural light but the casing 21A shields the light sensitive element 22 from the light rays emitted by the lamp bulb which is controlled by the unit.

In FIG. 4 the casing 21B houses only the light sensitive element 22. This substantially cup-shaped casing is provided with a resilient gasket 43 which when wetted will adhere to a transparent or translucent pane. In this embodiment the relay is encased in a separate housing 44. The housing 44 may be formed of any suitable material and may be closed by a removable plate 46 so that access may be gained to the relay. The conductors 34 and 42 connected to the relay as shown in FIG. 6 extends through an opening in the end wall of the housing.

Another type of electrical fixture is shown in FIGS. 7 to 10 for adapting the control unit to a conventional lamp bulb socket such as illustrated at 18 without altering the wiring leading thereto. The assembly shown in FIG. 7 includes a socket member 51 and a plug member 52 maintained in fixed relationship with respect to each other by a ring member 53 which is rotatable with respect to the members 51 and 52. The socket member 51 is provided with a threaded sleeve 54 (FIG. 8) which is electrically connected to a metal disc 56 such as by one of the screws 57 which secures the disc 56 of the socket member 51. The disc 56 forms an annular conductive member which is adapted to be engaged by a wiper arm 76 carried by the ring member 53 as hereinafter described.

The plug member 52 has a threaded sleeve 58 thereon. This sleeve is in electrical circuit relationship with a metal disc 59 through conductors 61 which extend through the insulating material forming the plug member 52. The disc 51 may be secured to the end of the plug member 52 in any suitable manner such as by means of screws 62.

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The disc 59 forms an annular conductive member for being engaged by a wiper arm 77 (FIG. 10) as hereinafter described and carried by the ring member 53. The center contact of the plug member 52 is formed by the head of a screw 63 which extends into an opening 64 along the axis of the plug member 52. A washer 66 formed of insulating material avoids circuit relationship of the screw 63 with the end portion of the sleeve 58.

A metal and electrical conductive pin 67 having a non-circular lower end portion extends into the non-circular opening 64 and through a larger aperture 69 in the disc 59. The pin 67 has a cylindrical shaped portion 71 in the area which extends through the ring member 53. The upper end portion of the pin 67 is of non-circular cross section and extends into a similar shaped opening 70 in the base end 72 of the socket member 51. The screw 63 is threaded into the lower end of the pin 67 and a screw 73 is threaded in the upper end of the pin 67 and this structure forms the center contact of the socket member 51 and an electrical circuit is provided from the screw 63 through the pin 67 to the screw 73.

The body of the ring member 53 is formed of insulating material and carries a resilient contact 74 which is adapted to remain in engagement with the periphery of the cylindrical portion 71 of the pin 67. The conductor 33 extends from this wiper arm through an opening to the outside of the ring member 53. The resilient wiper arm 76 carried by the ring member 53 engages the disc 56. The conductor 38 extends from the wiper arm 76 to the outside of the ring member 53. The resilient wiper arm 77 carried by the opposite face of the ring member 53 engages the disc 59. The conductor 37 extends outside the ring member 53 from the wiper arm 77.

A disc 81 formed of insulating material overlies the major portion of the ring member 53 and its perimeter fits within the annular recess 82 (FIG. 9). This disc is provided with an aperture 83 through which the wiper arm 76 may engage the disc 56. A lug 84 carried by the disc 81 fits in a notch 86 of the ring member 53 so that the insulating disc remains non-rotatable with respect to the ring member 53. A similar disc 86 formed of insulating material is arranged under the ring member 53. This disc has a lug 87 which is received in a notch 88 and maintains an aperture 88 therein in a position to expose the wiper arm 77 for engaging the disc 59.

In assembling the electrical fitting shown in FIGS. 7 to 10 the conductors leading to the exterior thereof are connected to the respective wiper arms. The insulating discs 81 and 86 are applied to the opposite faces of the ring member 53. The pin 67 is introduced into the opening 64 of the plug member 52 after the disc 59 is fixed thereto and the screw 63 is threaded into the lower end of the pin 67. The ring member 53 is then applied over the free end of the pin 67 so that the wiper arm 74 engages the perimeter of the cylindrical portion 71. The wiper arm 77 then engages the face of the disc 59. The socket member 51 with the disc 56 attached thereto is then arranged over the end of the pin 67 with the non-circular end portion fitting within the non-circular opening 70 in the base of the socket member 51. The wiper arm 76 then engages the disc 56. The screw 73 is then threaded into the upper end of the pin 67 to maintain the parts in assembled relationship.

An electrical circuit is provided with one side of a supply line extending from the screw 63 through the pin 67 to the screw 73 which forms the central contact of the socket member 51. The wiper arm 74 engages the pin 67 and one side of the supply line and the conductor 33 provides for connection to one side of the light sensitive element and to the conductor 42. The wiper arm 77 is in electrical circuit relationship with the other side of the line through the threaded sleeve 58 and the disc 59. The conductor 37 is connected to the opposite side of the line to complete the energization of the light sensitive element 22 and the heater coil 36. The conductor 38 is in

circuit relationship with the threaded sleeve 54 through the disc 56 and the wiper arm 76 so that the conductor 38 serves to control energization of a lamp bulb which is threaded into the socket member 51. The assembly shown in FIGS. 7 to 10 permits the light control unit to be applied to a socket such as 18 by turning to the socket member 51 while the ring member 53 remains stationary to avoid twisting of the wires 33, 37 and 38.

Any one of the control units shown in FIGS. 2, 3 or 4 may be attached to the fixture assembly shown in FIGS. 7 to 10. In a like manner the control units shown in FIGS. 3 and 4 may be connected to the electrical fixtures 26 and 32 of FIG. 2.

While the invention has been described with reference to specific structural features and with regard to the various structural characteristics it will be appreciated that changes may be made in the elements as well as the overall assembly. Such modifications and others may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. A unit for controlling energization of a lamp bulb of a lighting fixture having a bulb socket connected to an electrical source comprising, an opaque substantially cup-shaped casing having an open end, a light sensitive element within said casing exposed to natural light through said open end, means for supporting said casing in position with the open end of the light sensitive element facing in a direction away from said bulb socket, means including a socket member and a plug member insertable in said bulb socket, said socket member having therein a central contact and a sleeve contact for engagement by terminals of a lamp bulb, an electrical connection through said plug member from one side of said source within said bulb socket to one of said contacts in said socket member, flexible conductors extending from said means into said casing to energize the light sensitive element from said source, a relay responsive to operation of said light sensitive element, and flexible conductors extending from said means to said relay providing an interruptible circuit from the other side of said source within said bulb socket to the other of said contacts in the socket member.

2. A unit for controlling energization of a lamp bulb of a light fixture having a bulb socket connected to an electrical source according to claim 1 wherein the means for supporting the casing includes an adhesive carried by the open end of the casing.

3. A unit for controlling energization of a lamp bulb of a lighting fixture having a bulb socket connected to an electrical source according to claim 1 wherein the means for supporting the casing includes a hook carried by the plate.

4. A unit for controlling the energization of a lamp bulb of a lighting fixture having a bulb socket connected to an electrical source and having transparent or translucent panes disposed about the bulb socket comprising, an opaque substantially cup-shaped casing having an open end, a light sensitive element within said casing exposed

to natural light through said open end, means supporting said casing along the inner face of one of said panes with the open end of the casing and the light sensitive element facing in a direction away from said bulb socket, means including a socket member and a plug member insertable in said bulb socket for engagement with opposite sides of said source thereof, said socket member having spaced contacts therein for engagement by terminals of a lamp bulb, an electrical connection through the plug member from one side of said source within said bulb socket to one contact in said socket member, flexible conductors extending from said means into said casing to energize the light sensitive element from said source, a switch responsive to operation of said light sensitive element, and flexible conductors extending from said means to said switch providing an interruptible circuit from the other side of said source within the bulb socket to the other of said contacts in the socket member.

5. A unit for controlling the energization of a lamp bulb of a lighting fixture having a bulb socket connected to an electrical source comprising, an opaque substantially cup-shaped casing having an open end, a light sensitive element within said casing exposed to natural light through said open end, means for supporting said casing in position with the open end of said casing and the light sensitive element facing in a direction away from said bulb socket, means including socket member and a plug member insertable in said bulb socket for engagement with opposite sides of said source, said socket member having a central contact and a sleeve type contact therein for engagement by terminals of a lamp bulb received within the socket member, means maintaining the plug member and the socket member in fixed assembled relationship, an electrical connection through the plug member from one side of said source within the bulb socket to one contact in said socket member, flexible conductors extending from said means within said casing to energize the light sensitive element from said source, a switch responsive to operation of said light sensitive element, flexible conductors extending from said means to said switch providing an interruptible circuit from the other side of said source within the bulb socket to the other of said contacts in the socket member, a ring member rotatable with respect to said plug member and with respect to said socket member, and means including wiper arms carried by the ring member maintaining circuit relationship of said conductors with said plug and socket members.

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