

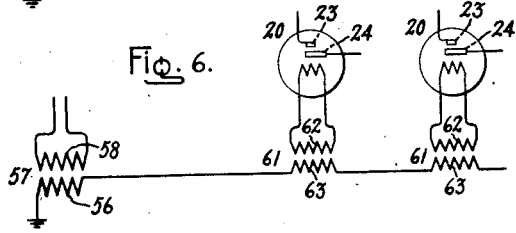
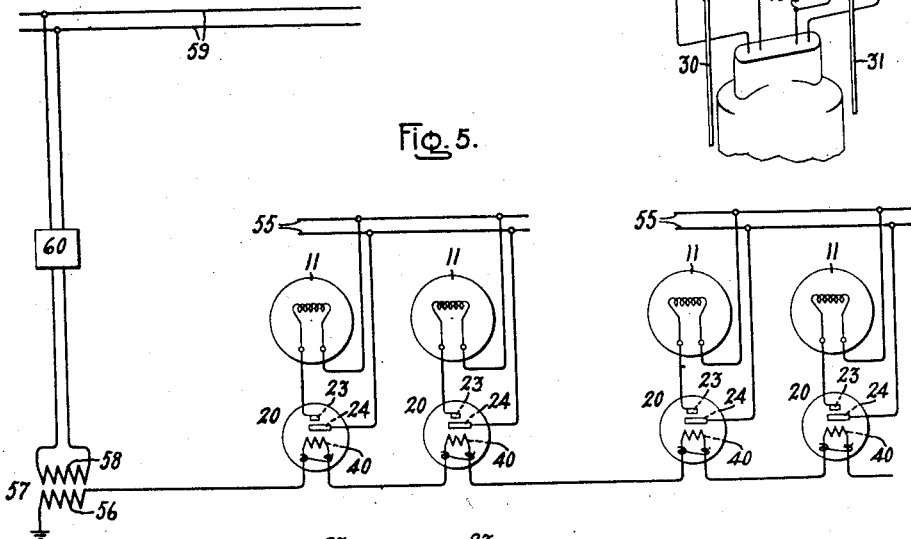
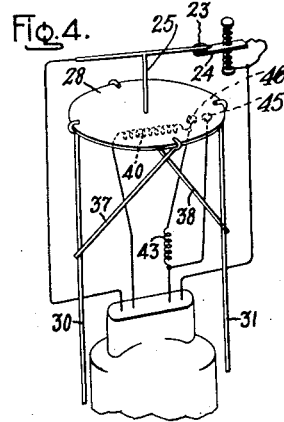
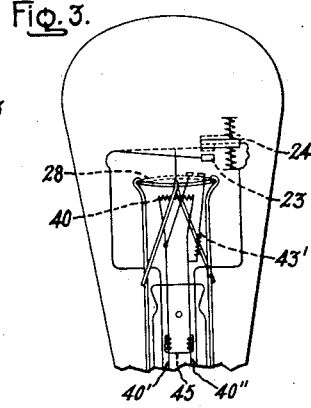
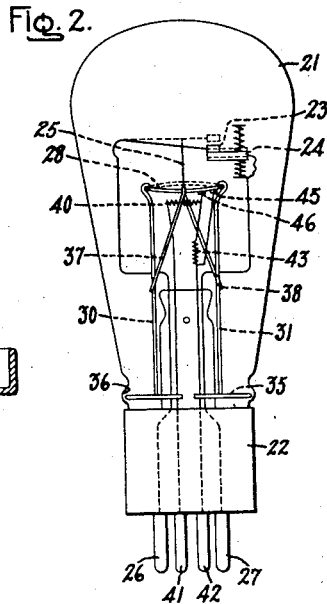
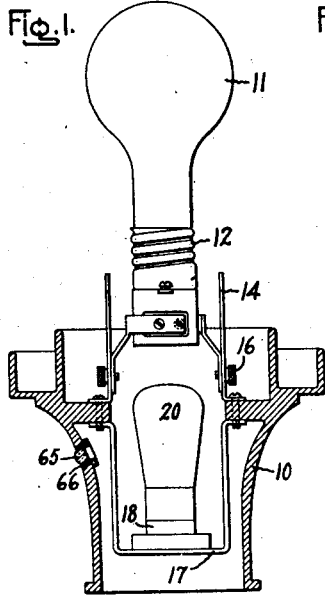
Nov. 27, 1934.

H. E. BUTLER

1,982,368

REMOTE CONTROL SYSTEM FOR ELECTRIC CIRCUITS

Filed Aug. 16, 1932



Inventor:
Henry E. Butler,
by Charles E. Tullar
His Attorney.

UNITED STATES PATENT OFFICE

1,982,368

REMOTE CONTROL SYSTEM FOR ELECTRIC CIRCUITS

Henry E. Butler, Scotia, N. Y., assignor to General Electric Company, a corporation of New York

Application August 16, 1932, Serial No. 629,026

11 Claims. (Cl. 171-97)

My invention relates to an improved remote control system for controlling electric circuits and more particularly to a remote control system for controlling electric street lighting circuits.

5 The main object of my invention is to provide an improved system and apparatus whereby street lights may be turned on, and off, from a central control station.

Another object of my invention is to provide improved apparatus for turning on, and off, electric street lighting units whereby it may be easily determined whether the lamp of the unit or the control device is out of order.

Other objects of my invention will appear in the following description when considered in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

Fig. 1 of the accompanying drawing illustrates a sectional view of a commonly used street lighting unit having mounted therein a control device in accordance with my invention; Fig. 2 is an assembly view of a control device built in accordance with my invention; Fig. 3 is a modification of the device illustrated in Fig. 2; Fig. 4 is an enlarged view of the control mechanism illustrated diagrammatically in Figs. 2 and 3; Fig. 5 is a circuit diagram of a system of control embodying my invention, and Fig. 6 is a modification thereof.

30 Referring to the drawing in detail, Fig. 1 illustrates a sectional view of the base 10 of a street lighting unit, such as are commonly used, having mounted therein a lamp 11 in socket 12. The socket 12 is adjustably mounted on brackets 14 and may be adjusted and held in proper position by means of screws 16. Directly underneath the lamp socket, supported by a bracket 17 and mounted in a socket 18, is a control unit 20, the construction and operation of which are described hereinafter in detail.

40 Fig. 2 illustrates an assembly view of a control unit 20 including an evacuated glass envelope 21 and a base 22. Within the envelope 21 is the mechanism for a thermostatically operated switch comprising contacts 23 and 24, which are respectively connected to plug contacts 26 and 27, located in base 22. Contact 24 is a resiliently mounted stationary contact and contact 23 is a movable contact operatively connected by a rod 25 to a thermostatic member 28. This member is made up of laminations of two metals having different coefficients of expansion and may be of any shape, but it is preferably in the shape of a disk. The disk 28 is suitably supported with-
55 in the envelope by brackets 30 and 31 which are

provided at their upper ends with hooks adapted to engage the edge of the disk, and attached at their lower ends to a split ring 35. The split ring is held by its own resiliency in a groove 36 in the envelope 21.

The two brackets 30 and 31 are arranged to engage the disk 28 at diametrically opposite points. In order to provide a more substantial support for the disk 28, auxiliary brackets 37 and 38 are arranged to engage the disk at points substantially equidistant from the points at which the brackets 30 and 31 engage the disk. The auxiliary brackets 37 and 38 are attached to the brackets 30 and 31 in any convenient manner, as for example, by welding.

In order to effect the operation of disk 28, a heater 40 is provided, consisting of any suitable resistance material, but preferably of a tungsten filament. Heater 40 is placed directly underneath the disk 28 and is connected to plug contacts 41 and 42 in the base 22. When the disk 28 is cool it assumes the position illustrated in full lines, but when heated it assumes the dotted line position in which contacts 23 and 24 are separated.

It has been found desirable to keep the current consumption of heater 40 to a minimum thereby increasing the life of the heater. In order to accomplish this, a resistor 43 is connected in series with the heater 40 and is arranged to be shunted only during a starting period during which full voltage is applied to the heater 40 to obtain quick action. This result is obtained by providing two contacts 45 and 46, which are respectively connected to the ends of resistor 43 and arranged under the disk 28. When disk 28 is cool it flexes downward, engages the contacts 45 and 46 and completes a shunt circuit around resistor 43 through itself. When current is supplied through contacts 41 and 42, full voltage is applied to the heater 40 and disk 28 is caused to flex into the position illustrated, in dotted lines in Fig. 1, whereby it opens the shunt circuit around resistor 43 and reduces the current flowing through the heater 40. The amount of the reduction is dependent upon the particular thermostatic unit used. A reduction of 30% of the starting current has been found to furnish enough heat to maintain the disk in operating position.

Fig. 3 illustrates a modification of the device shown in Fig. 2 being provided with a heater adapted to be connected in series circuit. The contacts 23 and 24 are normally separated. A resistor 43' in this modification is arranged to

60

65

70

75

80

85

90

95

100

105

110

be connected in shunt to the heater 40 when the disk 28 is in operating position. In this modification an oxide coated wire 45 is connected across the heater-leads 40' and 40'' to act as a cutout for the heater in case the heater burns out. In all other respects this device is the same as that shown in Fig. 2.

Fig. 5 is a diagram of connections for a system of street lighting control using, in accordance with my invention, the thermostatic switches described above. Lamps 11 are diagrammatically illustrated as being supplied from a source 55. Each lamp circuit includes a device 20 connected in series therewith, the circuit of the lamp being completed through contacts 23 and 24. The heaters 40 for the devices 20 are connected in series with each other and to the secondary 56 of a transformer 57. The primary 58 of the transformer is supplied from a source 59 through a control switch 60.

Fig. 6 is a modification of Fig. 5 in which the heaters 40 for devices 20 are supplied from individual transformers 61. The secondary windings 62 of the transformers 61 are respectively connected to the heaters and the primaries 63 are connected in series to transformer winding 56.

The operation of any number of lamps 11 may be controlled from a common control unit 60. The choice of the control units 20 is dependent upon factors of economy. If the lamps to be controlled are lit more than 12 hours per day, a normally closed unit 20 may be chosen. In such a case when it is desired to turn on the lights 11 the current to transformer 57 is shut off thereby permitting the heaters 40 to cool and close the contacts 23 and 24.

The heaters 40 may all be connected in series as illustrated in Fig. 5 or individually to transformer windings as illustrated in Fig. 6. When the series circuit is used I use a device 20, as illustrated in Fig. 3. The heater 40 in this case is provided with a shunt connected resistor to reduce the current flowing through it after the thermostat has operated and is being kept in operating position. The heater is also provided with any convenient oxide film cutout which shorts the terminals of the heater in case it burns out.

In a system, such as illustrated in Fig. 6, I use control devices such as illustrated in Fig. 2. In this device the resistor is connected in series with the heater and reduces the current drawn from the transformer when the thermostat has flexed into operative position.

Another difficulty has been heretofore encountered in the servicing of street lighting units in that when a light was out it was impossible to determine whether the lamp was burned out or the control unit was out of order. I overcome this difficulty by providing a window 65 in the base 10 of the lighting unit. The window may consist of any suitable glass mounted in a bushing 66. This window is placed in the base of the unit in such manner that the filament heater of the control device may be easily seen and thereby determined whether the control unit is functioning; such determination being facilitated by the fact that the filament glows brightly, at a high temperature, when full voltage is applied; less brightly, or at a low temperature, when the reduced voltage is applied; and not at all when the heater is burned out.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

75 1. A control unit for a street lighting system

including a lamp switch, a thermostatic member operatively connected to said switch, a heater for effecting the operation of said member, a resistor and means operated by said member for connecting said resistor in series with said heater to reduce its temperature when said member assumes its operating position. 80

2. A control unit for a street lighting system including a lamp switch, a thermostatic member operatively connected to said switch, a heater for effecting the operation of said member, a resistor and means operated by said member for connecting said resistor in shunt to said heater for reducing its temperature when said thermostatic member assumes its operating position. 85 90

3. A control unit for a street lighting system including a lamp switch, a bimetallic disk connected to operate said switch, a heater arranged to effect the operation of said disk, and an evacuated envelope enclosing said elements provided with a base having terminals connected to said switch and heater respectively. 95

4. A thermostatic switch including a bimetallic disk supported at its periphery and operable to flex into one position when cold and to flex into another position when heated, a switch contact operable by said disk, a second contact arranged to cooperate with said first contact to open and close a circuit, a heating unit arranged to effect the operation of said disk, and an evacuated envelope enclosing said heater and switch contacts having a base having terminals connected to said heater and switch contacts respectively. 100 105

5. In a street lighting system, the combination of a lamp, a thermostatic switch in the circuit of the lamp, a heating unit for effecting the operation of said switch and for indicating the open and closed positions of said switch respectively, and a control switch in the circuit of said unit. 110

6. In a thermostatic switch, the combination of a pair of contacts, a thermostatic element arranged to open and close said contacts, and a heater arranged to effect the operation of the said element and to indicate the open and closed positions respectively of said contacts. 115 120

7. In a thermostatic switch, the combination of a pair of contacts operable to open and to close a circuit, a thermostatic element arranged to operate said contacts, a heater arranged to effect the operation of said element, and means operated by said element for reducing the operating temperature of said heater when said element has moved into operative position to a value sufficient to maintain said element in said operated position. 125

8. In a thermostatic switch, the combination of a pair of contacts, a thermostatic element arranged to cause the opening and closing of said contacts, a heater arranged to effect the operation of said element and to glow at a higher brilliancy when the thermostat is in the open contact position than when it has moved into the closed contact position. 130 135

9. In a thermostatic switch, the combination of a pair of contacts, a thermostatic element arranged to cause the opening and closing of said contacts, a heater arranged to effect the operation of said element and to glow at a higher brilliancy when the thermostatic element is in the closed contact position than when it has moved into the open contact position. 140 145

10. In a thermostatic switch, the combination of a pair of contacts operable to open and closed positions, a thermostatic element arranged to operate said contacts, a heating unit arranged to glow at a high brilliancy when said contacts are 145 150

at one of said two positions and at a low brilliancy when they are at the other of said two positions, and an evacuated envelope provided with a base containing terminals for the contacts and heater, respectively, arranged to transmit an indication of the temperature of said heater.

erate said contacts, a heating unit arranged to glow at a high brilliancy when the said contacts are in one of said positions and a lower brilliancy when said contacts are in the other of said positions whereby a light indication of the position of said contacts is obtained, and a glass envelope arranged to transmit said indication.

11. In a thermostatic switch, the combination of a pair of contacts operable to open and closed positions, a thermostatic element arranged to op-

HENRY E. BUTLER.

10	85
15	90
20	95
25	100
30	105
35	110
40	115
45	120
50	125
55	130
30	135
15	140
0	145
5	150