Aug. 2, 1938. H. E. BUTLER 2,125,765

REMOTE CONTROL SYSTEM

Filed April 9, 1937

Fig. 1.

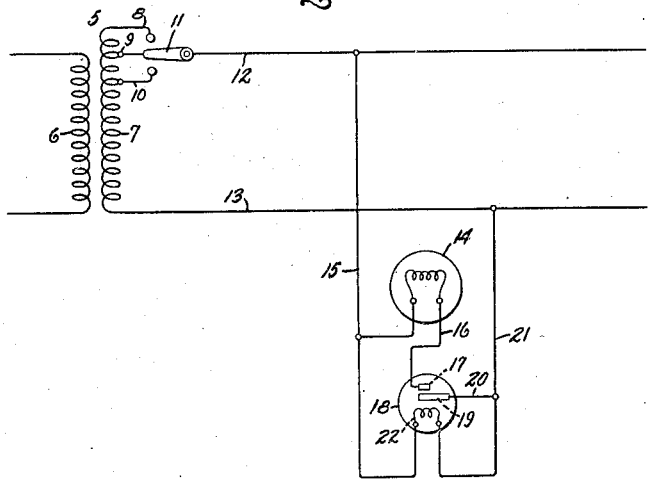


Fig. 2.

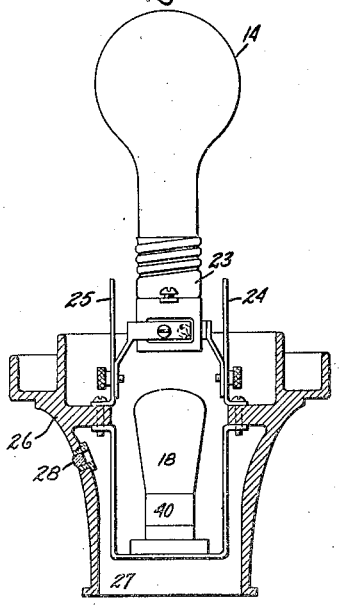
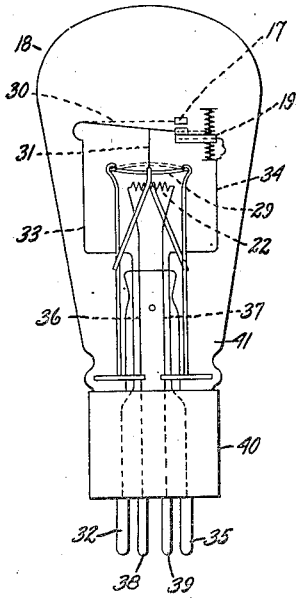


Fig. 3.



Inventor:
Henry E. Butler,
by Harry E. Dunham
His Attorney.

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2,125,765

UNITED STATES PATENT OFFICE

2,125,765

REMOTE CONTROL SYSTEM

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

Application April 9, 1937, Serial No. 135,907

3 Claims. (Cl. 171—97)

My invention relates to remote control systems for electric circuits, and more particularly to a system for turning on, and off, lamps in a street lighting system.

One object of my invention is to provide an improved system and apparatus for controlling street lamps from a central station without the use of a pilot wire.

For further objects and advantages of my invention, reference is had to the following description when taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the accompanying drawing, Fig. 1 is a circuit diagram indicating the connection and operation of the apparatus included in my invention. Fig. 2 illustrates an assembly of my apparatus, and Fig. 3 illustrates the control switch used in the system, the connection diagram of which is illustrated in Fig. 1.

Referring to the drawing in detail, I have shown in Fig. 1 a diagram of a system including a transformer 5 comprising a primary winding 6 and a secondary winding 7. The secondary winding is provided with a series of taps 8, 9, and 10 which are placed at different potential points in this winding, and by means of a switch 11, cooperating with these taps, the potential across conductors 12 and 13, constituting the supply circuit, may be varied. The apparatus connected across the supply lines 12 and 13, which is to be remote controlled, is a lamp 14 which I have diagrammatically illustrated. One terminal of the lamp is connected through a conductor 15 to the supply conductor 12, and the other terminal is connected, by means of a conductor 16, to one terminal 17 of a switching device 18. A second terminal 19 of the device 18 is connected through conductors 20 and 21 to the second supply conductor 13. A heater 22 of the device 18 is permanently connected to the supply conductors 12 and 13 by means of the conductors 15 and 21.

In Fig. 2, I have illustrated a cross sectional view of the top of a conventional lamp post in which the lamp 14 and the control device 18 are assembled. The lamp 14 is mounted in a socket 23, which is adjustably supported by brackets 24 and 25 mounted on a suitable flange within the post 26. The device 18 is mounted in a cradle 27 directly below the lamp 14, and within the post 26. A window 28 mounted in the post 26 affords a view of the heating element 22 of the device 18.

In Fig. 3, I have illustrated in detail the switching device 18 comprising contacts 17 and 19 operable by a thermal responsive element 29 and exposed to the temperature of the heating element 22. The heating element 22, as shown in Fig. 1, is connected across the supply conductors 12 and 13, and comprises a resistance element, preferably a filament of tungsten. The temperature of this filament varies in accordance with the potential variations across the supply source conductors 12 and 13. The thermal responsive element 29 comprises a bimetallic disk which assumes one position when heated above a predetermined temperature, and assumes another position when its temperature falls below this value to a second predetermined value. Temperatures between these two values do not effect an operation of the disk. The two positions are illustrated in Fig. 3. The full line position is assumed when the temperature of the filament 22 falls below the critical value, and in this position, the contacts 17 and 19 are brought into engagement, the contact 17 being mounted upon a resilient arm 30 which is connected through a rod 31 to the center of the bimetallic disk 29. A circuit is thereby established from a terminal 32 through conductor 33 to the resilient arm 30, and through the contacts 17 and 19 to a conductor 34 and a terminal 35. The heating element 22 is connected through conductors 36 and 37 to terminals 38 and 39 mounted with the terminals 32 and 35 in a base 40. The entire assembly is mounted within an evacuated receptacle 41 in which the contacts are protected from corrosion.

In the operation of street lighting luminaires, it becomes expensive to install pilot wires leading from the lamps to a central station for the control of switches which will turn on, or off, the current to the lamps. It is also inconvenient to extend the circuit to which these lamps are connected to the power house. It is permissible, however, to vary the supply line voltage of these circuits to which apparatus or lamps other than the street lighting lamps are connected as much as 10% above or below the rated value. Such variation of the voltage can be effected at the central station in many different ways. The thermal responsive switch illustrated in Fig. 3 and more fully disclosed and claimed in my U. S. Patent No. 1,982,368 is operable between its two positions by a variation of 10% above or below the normal value, and has the additional advantage of being unaffected by a continuous operation of the heating element at rated voltage. In accordance with my invention, therefore, I provide each of the lamps in the luminaire which is to be controlled, with a switch of this type and permanently connect the heating element across the supply con-

ductors for the lamps. When it is desired to connect the lamps into the circuit, it is only necessary to lower the line voltage at the source, and maintain this lowered line voltage for a period of time, approximately one or two minutes, during which the heating element of the switch, and consequently, the thermal element, reduces its temperature and assumes the full line position indicated in Fig. 3. The time period chosen is of such length that the slowest of all the switches on the line is given sufficient time to operate. After this period, the voltage may be increased to normal value, and although the heaters 22 of the thermal elements 28 reach a higher temperature, the temperature is insufficient to cause an operation thereof to the second position. When it is desired to disconnect the lamps from the circuit, it is only necessary to increase the line voltage above the normal value for a predetermined time period, thereby increasing the temperature of the thermal element and causing it to assume its second position, at which the contacts 17 and 19 are separated. A subsequent reduction of the line voltage to normal rated value is again insufficient to result in an operation of the thermal element, and, therefore, the lamps 14 remain disconnected from the circuit.

In Fig. 1, I have illustrated diagrammatically the simplest form of changing the voltage between the line conductors 12 and 13, consisting of tapped winding 7 and switch 11. When the switch 11 is moved to contact 8 of the winding 7, potential of the supply line is increased approximately 10% above normal, and when the switch 11 is in engagement with the contact 10, the line voltage is reduced approximately 10% below normal. Normal voltage is obtained when the switch 11 is in engagement with the contact 9. It is, of course, possible to use any other means for varying this line voltage. Furthermore, although I have illustrated my invention as being applied to street lighting circuits, it will be obvious to those skilled in the art that the invention can be applied to the control of any other electrical device for which it is found objectionable to supply a separate control wire. It may be noted here that although only 10% variation in voltage is required to operate the device 18, the device will not be operated by fluctuations in line voltage which may occur due to changes in load, because the particular change in line voltage necessary for operating the switch must continue over a definite period of time. As stated above, this period of time ranges from one to two minutes, but may, of course, be adjusted in accordance with the needs of a particular transmission circuit.

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

1. In an electric power distribution system, the combination of a single power circuit, a power consuming device, a switch operable to connect and to disconnect said device from said circuit, means responsive to predetermined changes in voltage of said circuit for respectively operating said switch to connect and to disconnect said device, and means for producing the said changes in voltage of said power circuit to effect the operation of said switch.

2. In an electric power system the combination of a single circuit, a power consuming device, a switch operable to connect and disconnect said device from said circuit, means for operating said switch including a heater connected to and responsive to the voltage of said single circuit, a thermostatic disk operable to one position when heated to one temperature and operable to a second position when heated to a second and lower predetermined temperature, and means for varying the voltage of said circuit to effect a heating of said element to either of said temperatures and a corresponding operation of said switch.

3. In a street lighting system, the combination of a single power circuit, means for changing the voltage on said power circuit above and below a predetermined value, a street lighting unit, a switch operable to connect said unit to said power circuit, and means for operating said switch comprising a heating element the temperature of which is responsive to the voltage on said power circuit, and a thermal element connected to operate said switch to connect said unit to said circuit when the voltage on said power circuit remains for a definite period of time at a predetermined value above rated value, and to disconnect said unit from said circuit when said voltage remains for a definite period of time below the rated value, and to maintain said switch in either of said operating positions when said power circuit voltage remains at normal value.

HENRY E. BUTLER.