



# UNITED STATES PATENT OFFICE

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## LIGHTING CONTROL SYSTEM

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3 Claims. (Cl. 177-353)

This invention relates to a lighting control system and more particularly to a remote control system for extinguishing lights or other sources of energy by remote control from a central location such as a specially controlled radio transmitter.

It is the object of the present invention to provide a remotely controlled relay system for extinguishing lights from a central station such as a radio transmitter. It is the aim of the invention to provide a remotely controlled unit for use in such a system which is compact and rugged and virtually fool-proof.

It is a further object of the invention to provide a unit for extinguishing lighting systems in the course of blackouts which is flexible in operation and which may be selectively set to enable a manual control of the lights to turn the same on and off, a selective setting of the system to permit the lights only to be turned off by wireless control requiring a manual reenergization thereof, or alternatively to permit the lights to be turned off and on successively by the wireless control without the interposition of any manual control.

It is a further object of the invention to provide a remotely controlled unit which may be operated from a conventional radio receiver to extinguish lighting systems on the occasions of desired blackouts. Any faulty operation of the radio receiver which would cause the failure of the desired control is easily perceptible to induce the taking of the necessary steps to eliminate such faults. The control unit is capable of convenient testing to determine the effectiveness thereof and its tuning to the desired frequency.

Other objects and purposes will appear from the following detailed description of the invention following hereinafter taken in conjunction with the accompanying drawing, illustrating a preferred embodiment of the invention.

In the drawing is shown electric supply mains 1 and 2 for energizing a conventional lighting system which may be plugged in at the outlet receptacle 3. The supply system may be any conventional commercial 110 volt alternating current distribution system. The invention seeks to provide for the deenergization of the lights connected to the outlet receptacle 3 upon the occurrence of conditions requiring an extinguishment thereof. This control is exercised from a radio transmitter operating on a predetermined frequency to which a radio receiver is tuned and which operates to energize relays

and switches in predetermined order and sequence to break the electric supply circuit comprising the mains 1 and 2 which are connected to the outlet plug 3 and which in turn feeds the lighting system connected thereto.

The power supply or power pack of the radio receiver B includes in the circuit thereof a coil 10; this coil leading to the terminals B' may be connected in the plate supply conductor for the radio receiver R. Relay 10 controls an armature 11 and contactor 12 to bridge the connection across terminals 13 and 14 when the relay 10 is energized and to complete the circuit of the supply mains 1 and 2 and the outlet plug 3. The receiver must be in operation to complete this circuit across terminals 13 and 14 and furthermore the receiver must be in good working order, otherwise the circuit at this point will be broken, giving notice that some elements of the radio receiver must be repaired or replaced, such as condensers, rheostats, faulty tubes and the like.

Another relay 20 is connected to the output transformer T of the radio receiver at terminals T'. This coil may be disposed in the output circuit of the radio receiver in lieu of the loud-speaker coil. This relay controls an armature 21 and contactor 22 which bridges the terminals 23 and 24 of the control system. This relay operates intermittently in accordance with fluctuations therein corresponding to those in the speaker coil which have no effect on the control system; but on such occasions when a remotely controlled blackout from the central transmitter is desired, a sustained note of predetermined characteristics is received by the radio receiver and this relay assumes the position shown in the drawing for a sufficient length of time to exercise the desired control, as explained in detail below.

The completion of the circuit to the lights connected to the outlet plug 3 depends not only upon the bridging of the contact terminals 13 and 14 by the auxiliary contactor 12, but also upon the closing of the main switch 34 in the main 2 at contact 34'. This switch is controlled by a main relay winding 30 disposed upon the central core 11 of a 110 volt A. C. solenoid having additional legs 72 and 73. A movable armature 31 is pivoted to the leg 73 and the tension thereof is adjusted by spring 74 which controls the force tending to maintain the armature 31 displaced from the legs 71 and 72 and against which the force of attraction of the main relay winding 30 operates to cause a downward movement of the

armature 31. The spring and force of attraction may be adjusted for forces ranging from fifteen to twenty pounds. A mechanical transmission member is connected between the armature 31 and switch 34 which may be formed in part by a flexible transmission member 32 and a rigid member 33. This transmission system also controls a secondary switch 35 which is operated conjointly with switch 34 to exercise the desired effects upon the control circuits explained below. The structure of the armature 31 and the mechanical members and switches connected therewith is such that the assembly operates similarly to a conventional chain pull switch which effects an alternate closing and opening of a circuit, with the armature each time resuming its position shown in the drawing in preparedness for the next downward movement of armature 31 to throw the switches 34 and 35 into closed position if they previously were open, or to throw them into open position if they previously were closed.

A manually operated switch 50 connected to the main 1 and cooperating with terminal 50' in line 51 is adapted to complete a circuit through the main relay coil 30 to the main 2 through conductors 52 and 54 to selectively and alternately open and close the main switch 34 to deenergize and energize the lighting system, assuming the circuit is completed across contacts 13 and 14. The control by switch 50 is effected by a momentary depression thereof and the same may be in the form of a push-button switch.

In supplement to the above control exercised by the movement of the armature 31, relay 20 is adapted to complete a circuit through the main relay 30 between the mains 1 and 2 upon the receipt of the proper signal from the central transmitting station which may be a police transmitter, to maintain the contactor 22 in raised position for a predetermined period of time. The intermittent energization of the contactor 21 and 22 by the normal variations of current in the coil 20 corresponding to ordinary broadcast reception or the receipt of static and interference completes a circuit from main 1, contacts 23, 24, lines 66, 67, switch 35, terminal 35', line 68, normally closed switch 57, line 62, time delay resistor 60 and through divided paths including relays 40 and 30 to the line 54 and main 2. However, the resistance of element 60 is such that insufficient current flows through either of the circuits 40 and 30 to energize these relays to cause the actuation of the armatures controlled thereby. However, this current through element 60 causes a heating thereof which affects a bimetallic switch 61 in close proximity thereto to eventually cause a short circuiting of this resistor if the current is passing therethrough for a sufficient length of time. This length of time may be adjusted to any limit from one second to three minutes and preferably is set for at least one minute; therefore the intermittent closing and opening of the circuit at contacts 23 and 24 is insufficient to energize the main relay 30 under normal conditions. However, upon the receipt of a sustained transmission through the radio receiver, emanating for example, from the police transmitter, the circuit outlined above remains closed at contacts 23 and 24 for at least the prolonged period of time, and the heating of the element 60 causes the bimetallic strip 61 to make contact at this free terminal 61' with the cooperating terminal 61'' in conductor 63 which serves to short circuit

the resistor 60 and which operates to connect the main 1 through the circuit outlined above extending through switch 35 to the relay 40 running through conductor 63, relay 40, conductor 64, conductor 54 to line 2 and in parallel thereto through conductors 65, 53 and 52, main relay 30, conductor 54 to line 2. The energization of relay 40 operates to lift armature 41 and contactor 42 to bridge terminals 43 and 44 to provide another short circuit for resistor 60 through conductors 56 and 55 to the circuit extending through conductors 53, 52 and 54. Thus, main relay 30 is operated at the end of the predetermined lapse of time to attract armature 31 and to open switches 34 and 35 if such were previously closed. The action of relay 40 is so sluggish that the short-circuit across terminals 43 and 44 remains closed even though resistor 60 cools off, which may be the case after four seconds, and opens the short-circuit completed by the strip 61. Thus the circuit for energizing relay 30 is operative as long as relay 20 is energized for a sustained period of time such as one to two minutes. Of course, strip 61 may close the short-circuit across resistor 60 after eight seconds or the like, and the operation thereof is intermittent without affecting the action of main relay 30.

A repeated energization of the main relay 30 is necessary to re-close the circuit at the main switch 34 if it is desired to bring the lighting system into operation once again after the blackout is terminated. Of course, this control can be exercised by a momentary depression of the manual switch 50. On the other hand, if it is desired to provide for the re-closing of the lighting circuit by remote control, a conditioning switch 36 is connected across the switch 35. If the conditioning switch 36 is in open position, as shown in the drawing, then it exercises no effect on the action of switch 35 and merely permits switch 35 to control the opening of the circuit. However, when switch 36 is closed, it operates as a short circuit across switch 35 when the same is open, and a repeated signal from the central transmitting station for a predetermined length of time affects the time delay device 60 and the circuits governed thereby to complete the circuit through the main relay 30 to effect a closing of the switches 34 and 35 after they have once been opened.

A neon lamp 4 may be connected directly across conductors 54 and 66 to visibly indicate the reception of energy by the intermittent completion of the circuit across mains 1 and 2 through the bridging of terminals 23 and 24. If desired, this neon testing lamp may be plugged into an outlet receptacle connected across these mains in much the same manner as the lighting system is connected to the outlet plug 3. When the system is tested and tuned in this manner, or for instantaneous operation, switch 57 is opened, and serves to conveniently interrupt the circuit to the time delay elements.

While I have described my invention as embodied in concrete form and as operating in a specific manner for purposes of illustration, it should be understood that I do not limit my invention thereto, since various modifications will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

I claim:

1. A lighting control system including electric supply mains with a light outlet therein, a main switch in one of said mains, a main relay to al-

ternately open and close said main switch, and control means for said main relay including an auxiliary contactor controlled by the output of a radio receiver, and a second contactor controlled from the power supply for said radio receiver adapted to open the circuit through said supply mains in response to failure of the energy supply for said receiver.

2. A lighting control system including electric supply mains with a light outlet therein, a main switch in one of said mains, a main relay to alternately open and close said main switch, control means for said main relay including a manually operated switch for selectively connecting said main relay across said mains and an auxiliary contactor controlled by the output of a radio receiver, and a second contactor controlled from the power supply for said radio receiver adapted to open the circuit through said supply mains in response to failure of the energy supply for said receiver.

3. A lighting control system including electric supply mains with a light outlet therein, a main switch in one of said mains, a main relay to alternately open and close said main switch, and control means for said main relay including a manually operated switch for selectively connecting said main relay across said mains, an auxiliary contactor controlled by the output of a radio receiver, and a time delay device in circuit with said auxiliary contactor to control the operation of said main relay in response to a predetermined lapse of time of operation of said auxiliary contactor, a connection between the terminals of said auxiliary contactor and said time delay device including a secondary switch adapted to be operated conjointly with said main switch to connect said time delay device for operation in response to the reception of predetermined energy for a predetermined period by said receiver, and a conditioning switch connected across said secondary switch to selectively set the control system for alternate deenergization and energization of the lighting system by the wireless control when the switch is closed or for deenergization only of the lighting system by the wireless control when the switch is open.

4. A lighting control system including electric supply mains with a light outlet therein, a main switch in one of said mains, a main relay to alternately open and close said main switch, and control means for said main relay including an auxiliary contactor controlled by the output of a radio receiver, and a time delay device in circuit with said auxiliary contactor to control the operation of said main relay in response to a predetermined lapse of time of operation of said auxiliary contactor, a connection between the terminals of said auxiliary contactor and said time delay device including a secondary switch adapted to be operated conjointly with said main switch to connect said time delay device for operation in response to the reception of predetermined energy for a predetermined period by said receiver, and a conditioning switch connected across said secondary switch to selectively set the control system for alternate deenergization and energization of the lighting system by the wireless control when the switch is closed or for deenergization only of the lighting system by the wireless control when the switch is open.

5. A lighting control system including an electric circuit with a light outlet therein, a main switch in said circuit, a main relay to alternately open and close said main switch, control means

for said main relay including an auxiliary contactor controlled by the output of a radio receiver, a time delay device in circuit with said auxiliary contactor to control the operation of said main relay in response to a predetermined time of operation of said auxiliary contactor, and means for connecting said auxiliary contactor to said time delay device to render said device operative by the operation of said auxiliary contactor from the output of the radio receiver both before and after the operation of said main switch to effect a continuous control of the alternate opening and closing of said main switch by the radio receiver, said time delay device comprising a heating resistor and a bimetallic switch controlled thereby for short-circuiting said resistance and a relay energized by the current permitted by the short-circuit to effect an additional short-circuit around said heating resistor.

6. A lighting control system including an electric circuit with a light outlet therein, a main switch in said circuit, a main relay to alternately open and close said main switch, control means for said main relay including an auxiliary contactor controlled by the output of a radio receiver, a time delay device in circuit with said auxiliary contactor to control the operation of said main relay in response to a predetermined time of operation of said auxiliary contactor, means for connecting said auxiliary contactor to said time delay device to render said device operative by the operation of said auxiliary contactor from the output of the radio receiver both before and after the operation of said main switch to effect a continuous control of the alternate opening and closing of said main switch by the radio receiver, a visual tuning indicator to determine the operativeness of the control system, and a disconnecting switch between the time delay device and the circuit completed by the auxiliary contactor for opening the time delay device during tests for proper tuning.

7. A lighting control system including an electric circuit with a light outlet therein, a main switch in said circuit, a main relay to alternately open and close said main switch, control means for said main relay including an auxiliary contactor controlled by the output of a radio receiver, a time delay device in circuit with said auxiliary contactor to control the operation of said main relay in response to a predetermined time of operation of said auxiliary contactor, means for connecting said auxiliary contactor to said time delay device to render said device operative by the operation of said auxiliary contactor from the output of the radio receiver both before and after the operation of said main switch to effect a continuous control of the alternate opening and closing of said main switch by the radio receiver, an auxiliary switch adapted to break said connecting means to exclude the control exercised by the radio receiver following the opening of the main switch, and a manually operated switch for completing a circuit through said main relay to close said main switch following the opening thereof and when said auxiliary switch is in circuit interrupting position in said connecting means.

8. A lighting control system including an electric circuit with a light outlet therein, a main switch in said circuit, a main relay to alternately open and close said main switch, control means for said main relay including an auxiliary contactor controlled by the output of a radio receiver, a time delay device in circuit with said auxiliary contactor to control the operation of said main

relay in response to a predetermined time of operation of said auxiliary contactor, a secondary switch adapted to be operated conjointly with said main switch to connect said time delay device in circuit with said auxiliary contactor to render said device operative when the main switch and secondary switch are in circuit-closing position, and an auxiliary switch for selectively short-

circuiting said secondary switch to render said device operative even when the main switch and secondary switch are in circuit-interrupting position to effect a continuous control of the alternate opening and closing of said main switch by the radio receiver.

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