

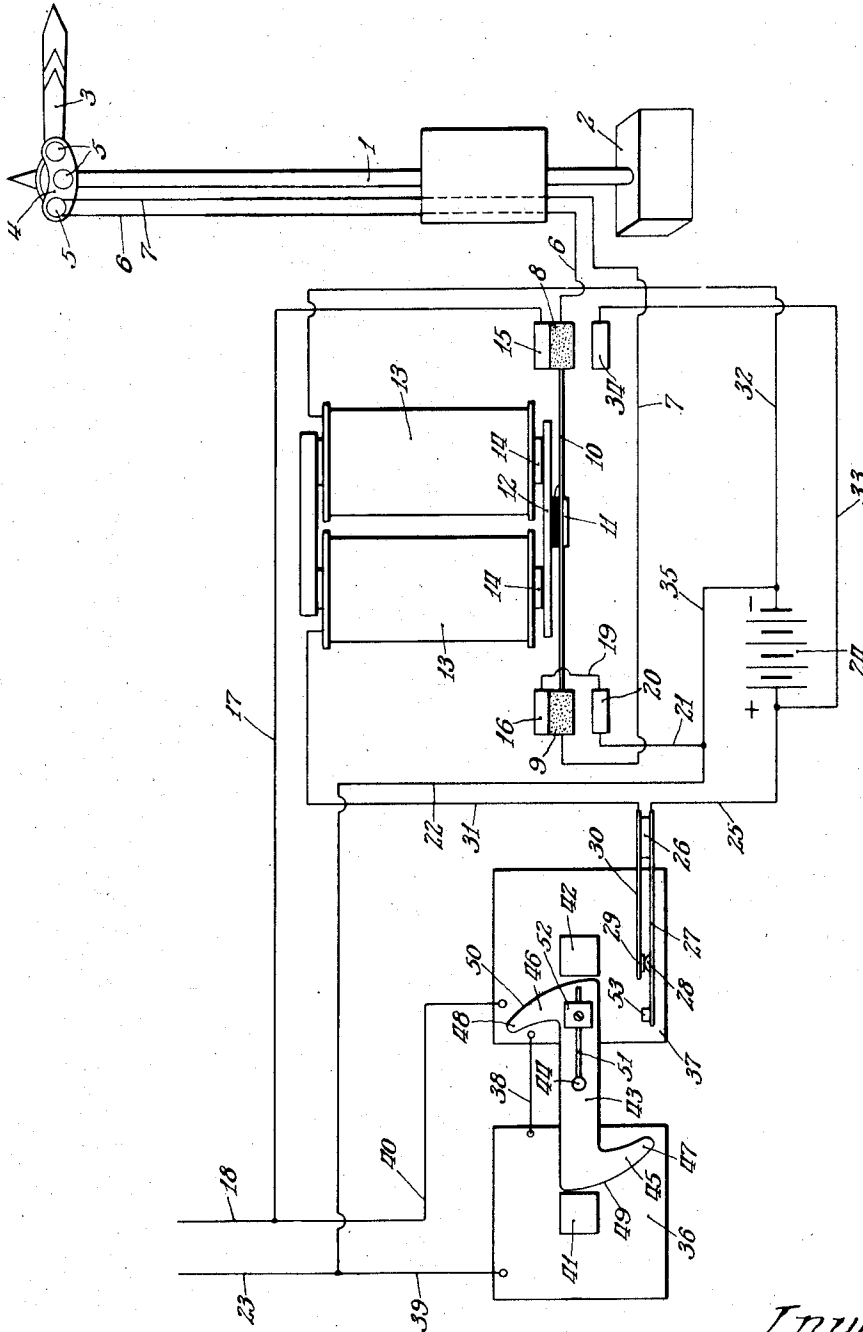
May 6, 1924.

1,492,691

O. M. LEICH

CONTROL SYSTEM

Filed Dec. 7, 1922



Inventor:
Oscar M. Leich.

By: *Leich & Mueller* Attys.

Patented May 6, 1924.

1,492,691

UNITED STATES PATENT OFFICE.

OSCAR M. LEICH, OF GENOA, ILLINOIS, ASSIGNOR TO LEICH ELECTRIC COMPANY, OF GENOA, ILLINOIS, A CORPORATION OF ILLINOIS.

CONTROL SYSTEM.

Application filed December 7, 1922. Serial No. 605,404.

To all whom it may concern:

Be it known that I, OSCAR M. LEICH, a citizen of the United States, residing at Genoa, in the county of De Kalb and State of Illinois, have invented a certain new and useful Improvement in Control Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to control systems, and more particularly to a system of controlling devices for regulating the current supply to an electrical device.

It is a purpose of the invention to provide a new and improved control system for controlling the supply of current to an electrical device, such as a light in a railway signal, so that the light will always burn brightly and thus the signal will be made easily read.

It is a further purpose of the invention to provide means for controlling the current supplied to an electric signal light comprising control devices which are adapted to connect the signal light with a main source of current supply, or with an auxiliary source as desired, so as to obtain the desired brightness of the light in the circuit.

It is still a further purpose of the invention to provide in combination with an electrical device means for connecting said device with a main source of current normally and with an auxiliary source of current when the current from the main source falls below a predetermined minimum, said minimum being such in the case of a signal light that the light will still be brightly illuminated when the current reaches such a minimum. Thus when the switching devices act to connect the signal light with the auxiliary current source the brightness of the same will be maintained, although the main current supply falls below such a value as would keep the light burning brightly. As soon as the main current supply again reaches a point above said minimum the light or other electrical device will again be connected with the main source of current supply.

It has been found where relays or similar switching devices are used that only connect the light with the auxiliary source of supply when the current in the main source of supply fails, the devices will not operate

to throw in the auxiliary supply of current except when the main source of supply fails completely or almost completely. This will result in the lights merely growing or burning very dull without the switching devices operating to throw in the auxiliary current supply to obtain a bright light in the signal.

It is a purpose of the invention to provide switching means that will overcome this difficulty, and it has been found that a switching device, such as a relay, which is sensitive enough to operate so as to throw in the auxiliary current supply when the main current supply has been reduced but has not failed is not capable of carrying the heavy currents which are necessary to supply the current for the light from the auxiliary source of current supply.

It is still a further purpose of the invention to provide a control device of the above mentioned character comprising a relay which is controlled by the strength of current from the main source of supply so that the armature of the same will move to such a position as to break the circuit between the auxiliary source of current and a direct current relay, whereby the armature of the direct current relay moves to such a position as to connect the signal light or other device with the auxiliary source of current. The switching device of which the armature for the first mentioned relay forms a part may be very light in construction due to the fact that only a small current is necessary to operate the direct current relay, but the direct current relay which is actuated from the auxiliary source of current supply is so constructed that the armature thereof acting as a switching device between the auxiliary current supply source and the signal device or other source will close positively and will not be affected by the strength of the current passing through the contact points thereon.

Ordinarily the main source of current supply will be alternating and the relay controlled by the strength of the current from said main portion will be an alternating current relay but it is not necessary that this be so as the device can be operated in substantially the same manner from a main source of current supply which will be direct and the relay used with the alternating current can be used just as well with a direct current.

Other objects and advantages of the invention will appear as the description of the accompanying drawings proceeds. However, I desire to have it distinctly understood that I do not intend to limit myself to the exact details shown or described, but that I intend to include as part of my invention all such obvious changes and modifications of parts as would occur to a person skilled in this art and as would fall within the scope of the claims.

In the drawings is shown diagrammatically a signal, lines leading from the main source of current supply and the control devices between said signal and said main source of current supply, whereby the circuit is normally connected with said main source but is disconnected therefrom when the main source of supply drops below a predetermined minimum and the signal is connected with an auxiliary source of current supply shown as being a battery in the drawing.

Referring in detail to the drawings a signal 1 is shown provided with a base 2 and having a semaphore 3 thereon, said semaphore being provided with an arcuate member 4 having openings 5 therein in which panes of various colored glass are mounted for showing a visible signal at night, a light being mounted in back of said member 4 for lighting up said colored panes, and being supplied with current through the conductors 6 and 7. The conductor 6 is connected with the contact 8 and the conductor 7 is connected with the contact 9, said contacts 8 and 9 being mounted on a bar 10 carried by the member 11 mounted on the armature 12 of the electromagnet comprising the coils 13. Normally the armature 12 will be in an upward position against the pole pieces 14 and the contact members 8 and 9 will be in engagement with the stationary contacts 15 and 16, the contact 15 forming the terminus of the conductor 17 which connects with the line wire 18 from the main source of current supply and the contact 16 is connected by the connection 19 with the contact 20 which in turn is connected by the connection 21 with the conductor 22 leading to the line wire 23 which leads to the main source of current supply.

It will thus be seen that when the armature is in the raised position with the contacts 8 and 9 in engagement with the contacts 15 and 16, the current for the light in the signal, will be supplied from the wires 18 and 23 leading from the main current supply, and the armature will remain in this position as long as the electromagnet comprising the coils 13 is energized. An auxiliary source of current supply, such as the battery 24 is provided, and has a conductor 25 leading to a switch 26 having a resilient movable contact member 27 pro-

vided with the contact 28 which engages with the contact 29 on the cooperating contact member 30 of said switch. From the cooperating contact member 30 a conductor 31 leads to the coils 13 and a conductor 32 leads from said coils 13 back to the battery 24. A conductor 33 leads from the one pole of the battery 24 to the contact 34 and a conductor 35 connects the other pole of the battery with a conductor 21 leading to the contact 20.

It will be seen that when the circuit is broken by opening the switch 26 the electromagnet of the relay having the armature 12 will be de-energized and the armature 12 will drop due to the action of gravity until the contacts 8 and 9 on the member 10 will engage with the stationary contacts 20 and 34. As the contacts 30 and 34 are connected to the opposite poles of the battery 24 or other auxiliary source of current supply, and as the contacts 8 and 9 are connected with the light in the signal 1, it will be evident that when said armature drops as referred to above a connection will be established between the auxiliary source of current supply 24 and the signal light. It will also be evident that at the same time the connection between the main source of current supply and said signal light will be broken. An electromagnet comprising the coils 36 and 37 connected together by the connection 38 is connected with the main source of current supply by means of the conductors 39 and 40 connecting respectively with the line wires 23 and 18. The coils 36 and 37 are provided with cores 41 and 42 and a pivoted armature 43 pivotally mounted at 44 extends between the cores 41 and 42 in the position shown in the drawing when the full strength of current is obtained from the main source of supply. It will be noted that the armature 43 is substantially Z-shaped having the arms 45 and 46 thereon which are provided with tapering end portions 47 and 48, and which have arcuate surfaces 49 and 50 in a direction toward the cores 41 and 42 from the pivotal center 44. In the drawing the relays are shown in elevation and the armature 43 lies in a vertical plane and rotates about a horizontal axis. The cores or pole pieces 41 and 42 extend outwardly beyond the coils 36 and 37 to a certain extent and the armature 43 is also provided with an arm 51 extending outwardly from the pivotal center 44 thereof and having a weight 52 mounted thereon so as to be shiftable lengthwise thereof. The normal tendency of the weight 52 will be to hang downwardly and thus the armature 43 will tend to swing to a position at right angles to that shown in the drawing, if the electromagnet is not acting on the same. However, the electromagnet normally when the full strength of the current

from the main source of supply is on, is held in the position shown in the drawing due to the magnetic action of the electromagnet. If the strength of the current is reduced, the armature 43 will begin swinging in a clockwise direction in the drawing due to the action of the weight 52 and will swing as far out of the horizontal position shown in the drawing as the weight 52 can carry the same against the strength of the magnetic field. As the source of current supply diminishes more and more the armature will swing further out of its horizontal position in a clockwise direction until the weight 52 over balances the same and when the strength of the current from the main source of supply reaches a predetermined minimum, which is adjusted for by adjusting the weight 52 on the arm 51, the armature 43 will move quickly out of its position toward the vertical position and will engage with a member 53 on the movable contact 27 of the switch 26 so as to move the same to such a position that the contacts 28 and 29 will be separated, thus breaking the circuit through the first described electromagnet and causing the armature 12 to be released so that the contacts 8 and 9 will engage with the contacts 34 and 20 and connect the auxiliary source of current supply with the light of the signal, thus maintaining the same at the desired brilliancy.

It will be evident that the arrangement of the device can be used as well with a main source of supply supplying a direct current as one supplying an alternating current, as the relay which is controlled by the main supply current is so constructed that it can be used with either alternating or direct current, but alternating current is preferred, as this is the most frequently available.

It will also be evident that various devices may be controlled in this manner where it is desired to maintain a substantially constant strength of current for the same and while said device may be operated in this manner the control device is particularly adapted for signalling systems, as it is highly important that the signal is always very readily visible.

Having thus described my invention, what I desire to claim and secure by U. S. Letters Patent is:

1. The combination with an electrical device, of a main source of current for operating said device, an auxiliary source of current and switching means for normally connecting said device with said main source and with said auxiliary source when the current from said main source falls below a predetermined minimum, comprising a relay controlled by the strength of the current from said main source and a relay actuated

by the current from the auxiliary source and controlled by said other relay.

2. The combination with a signal light, of a main source of current for said light, an auxiliary source of current and switching means for normally connecting said light with said main source and with said auxiliary source when the current from said main source drops below a predetermined minimum, comprising a relay controlled by the strength of current from said main source and controlling a relay actuated by the current from the auxiliary source.

3. The combination with an electrical device, of a main source of current for operating said device, an auxiliary source of current, and means for normally connecting said device with said main source and with said auxiliary source when the current from said main source falls below a predetermined minimum, comprising switching means for connecting said auxiliary source of current with said device, electromagnetic means for holding said switching means out of such connecting position, a switch for controlling the supply of current to said electromagnet means, and means for opening said switch comprising an electromagnet energized by the current from said main source and a member held out of engagement with said switch by said electromagnet when the current energizing the same is above a predetermined minimum.

4. The combination with an electrical device, of a main source of current for operating said device, an auxiliary source of current, and means for normally connecting said device with said main source and with said auxiliary source when the current from said main source falls below a predetermined minimum comprising switching means for connecting said auxiliary source of current with said device, electromagnetic means for holding said switching means out of such connecting position, a switch for controlling the supply of current to said electromagnet means, and means for opening said switch comprising an electromagnet energized by the current from said main source and a member held out of engagement with said switch by said electromagnet when the current energizing the same is above a predetermined minimum, said member being adjustable.

5. The combination with a signal light, of a main source of current for said light, an auxiliary source of current and switching means for normally connecting said light with said main source and with said auxiliary source when the current from said main source drops below a predetermined minimum, comprising an adjustable relay controlled by the strength of current from said main source and controlling a relay actuated by the current from the auxiliary

source, said switching means operating to throw in the auxiliary source without failure of said main source.

6. The combination with an electrical device, of a main source of current for operating said device, an auxiliary source of current, and switching means for normally connecting said device with said main source and with said auxiliary source when the current from said main source falls below a predetermined minimum, comprising an adjustable relay controlled by the strength of the current from said main source and a relay actuated by the current from the auxiliary source and controlled by said other relay.

7. The combination with an electrical device, of a source of alternating current for operating said device, an auxiliary source of current and switching means for normally connecting said device with said alternating current source and with said auxiliary source when the alternating current falls below a predetermined minimum comprising a relay controlled by the strength of the alternating current and a relay actuated by the current from the auxiliary source and controlled by said other relay, said switching means operating to throw in the auxiliary source without failure of said main source.

8. The combination with a signal light, of a source of alternating current for illuminating said light, an auxiliary source of current, and switching means for normally connecting said light with said alternating current source and with said auxiliary source when the alternating current drops below a predetermined minimum comprising a relay controlled by the strength of the alternating current and controlling a relay actuated from the auxiliary source.

9. The combination with an electrical device, of a source of alternating current for operating said device, an auxiliary source of current, and means for normally connecting said device with said alternating current source and with said auxiliary source when the alternating current falls below a predetermined minimum, comprising switching means for connecting said aux-

iliary source of current with said device, electromagnetic means for holding said switching means out of such connecting position, a switch for controlling the supply of current to said electromagnetic means, and means for opening said switch comprising an electromagnet energized by the alternating current, and a member held out of engagement with said switch by said electromagnet when the current energizing the same is above a predetermined minimum.

10. In a device of the character described, an operating circuit, a source of alternating current, a battery, a relay energized from said battery for connecting said operating circuit with said alternating current source when energized and with said battery when de-energized, and an alternating current relay for disconnecting said first mentioned relay from the battery when the alternating current drops below a predetermined minimum.

11. In a device of the character described, an operating circuit, a main source of current, an auxiliary source of current, a relay energized from said auxiliary source for connecting said operating circuit with said main source when energized and with said auxiliary source when de-energized, and a relay energized from said main source for disconnecting said first mentioned relay from said auxiliary source when the current from said main source of supply drops below a predetermined minimum.

12. In a device of the character described, an operating circuit, a main source of current, an auxiliary source of current, a relay energized from said auxiliary source for connecting said operating circuit with said main source when energized and with said auxiliary source when de-energized, and an adjustable relay energized from said main source for disconnecting said first mentioned relay from said auxiliary source when the current from said main source of supply drops below a predetermined minimum.

In witness whereof, I hereunto subscribe my name this 24th day of November, A. D. 1922.

OSCAR M. LEICH.