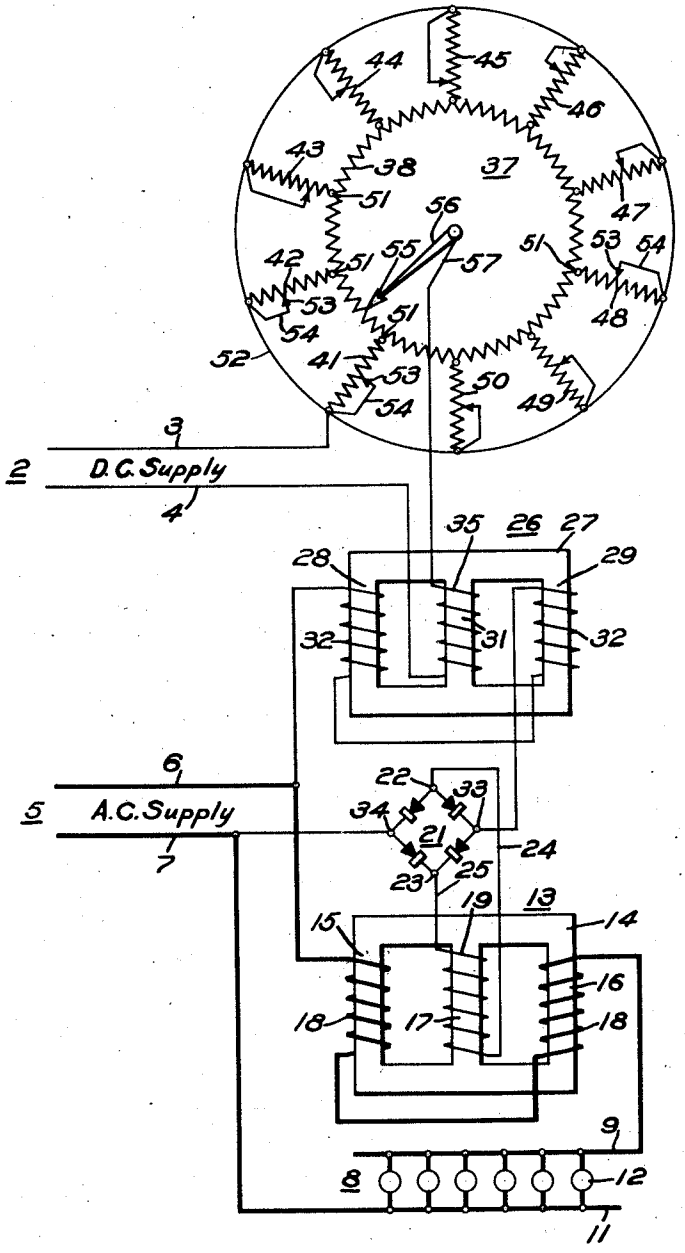
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PROPORTIONAL PRESET DIMMER SCHEME

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INVENTOR
Roy J. Wensley.
BY
Wesley G. Carr
ATTORNEY

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ROY J. WENSLEY, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

PROPORTIONAL PRESET DIMMER SCHEME

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My invention relates to current-control apparatus and particularly to apparatus for controlling the intensity of the illumination in lighting circuits used in theatres and auditoriums and for indoor and outdoor ornamental lighting.

An object of my invention is to provide a current-controlling apparatus wherein the lighting circuits are controlled by means of reactors and wherein a resistance element is provided for controlling the supply of direct current to the control windings of the reactors and wherein the degree of illuminating intensity of lamps in the circuit is determined by the resistance element which may be preset to produce predetermined lighting effects at any time as, for instance, during a scene of a theatrical production.

A further object of my invention is to provide a current-controlling apparatus for lighting circuits wherein a resistance element of simple form is provided with a plurality of resistance sections that may be individually preset to determine the degree of illumination of the lighting circuit.

A further object of my invention is to provide a resistance device for controlling the control winding of a reactor in which all of the current passing through the resistance element flows through the control winding of the reactor.

Further objects of my invention will be made apparent throughout the further description of my invention and are obtained by the means of the apparatus hereinafter described, and illustrated in the accompanying drawing, wherein,

The single figure diagrammatically illustrates the apparatus and wire connections employed in the circuit-controlling apparatus or system.

The structure illustrated in the drawing represents the apparatus necessary for a single lighting circuit, and it will be understood that all lighting circuits required for the stage or auditorium of a theatre or for ornamental mobile lighting, contain similar apparatus.

Referring to the drawing, the apparatus includes a uni-directional current source 2 having feed conductors 3 and 4 and an alternating-current source 5 having feed conductors 6 and 7. Each lamp circuit 8, comprising conductors 9 and 11, is provided with a plurality of incandescent lamps 12, and the current, supplied thereto from the alternating-current source, is controlled by means of a reactor 13 having an iron core 14 that is provided with three legs 15, 16 and 17. The primary windings 18 of the reactor are wound about the legs 15 and 16 of the core and are connected, at one end, to the feed conductor 6 and, at the other end, to the lighting-circuit conductor 9, as indicated in the drawing.

The control winding 19 for the reactor, which is wound about the center leg 17, is supplied with uni-directional current from a rectifier 21, the winding being connected to the terminals 22 and 23 thereof through conductors 24 and 25, respectively. It will be understood that the control winding serves to saturate the core of the reactor and thus reduce the impedance of the primary windings 18 substantially in proportion to the amount of direct or uni-directional current flowing through such control winding.

In order that the reactor 13 may be controlled by means of a minimum amount of uni-directional current, I provide a relatively small reactor 26 that is similar, in construction, to the reactor 13, its function being to supply the control winding 19 of the reactor 13 with current from its primary windings through a rectifier 21.

The reactor 26 comprises an iron core 27 having three legs 28, 29 and 31 and primary windings 32 that surround the legs 28 and 29 and are connected to the feed conductor 6 and a terminal 33 of the rectifier 21, the opposite terminal 34 of the rectifier being connected to the feed conductor 7.

Since the current required for the control winding of the reactor 13 is a very small portion of that required for the lighting circuit, very little of the current output is required from the reactor 26 in order to provide the necessary control current for the reactor 13. Accordingly, a very small quantity of uni-directional current is required for the control winding 35 of the reactor 26.

I have, therefore, provided a relatively small resistance element or unit 37 for controlling the current supplied from the uni-directional source to the control winding 35 of the reactor 26. The resistance element or unit 37 comprises a resistance member 38 that may consist of a coil of resistance wire, such as nichrome, in the form of a closed ring, as indicated in the drawing. A plurality of resistor sections 41, 42, 43, 44, 45, 46, 47, 48, 49 and 50, one for each scene of a stage production, for example, are connected to the resistance member 38 at uniformly spaced points 51, and the outer ends of the resistance sections are connected, at uniformly spaced points, to a conductor 52 that commonly connects all of the resistor sections and is connected to the feed conductor 3 of the uni-directional source 2.

Each of the resistor sections 41 to 50, inclusive, is provided with an adjustable contact 53 on the free ends of a flexible conductor 54 which serves to shut more or less of such resistor section.

The resistance of the resistance member 38, between two adjacent points 51, is considerably greater than the resistance of any single resistor section, 41 to 50, inclusive, in order that the current passing through any section from the conductor 52 to the resistance member 38 shall be localized to points within the immediate vicinity of the point of connection of a section to the resistance element 38.

The resistance unit is provided with a master contact 55 that is carried by a conductive operating arm 56 that is pivotally mounted to permit engagement of the contact 55 with the resistance element 38, at points throughout its circumference, provided the arm is rotated through 360 degrees. The contact 55 is connected to the control winding 35 of the reactor 26 through operating arm 56 and a conductor 57, it being understood that the other end of the control winding is connected to the feed conductor 4 of the uni-directional source 2.

For the purpose of illustration, it will be understood that the resistor section 41 is adapted to control the lighting circuit 8 during the period of scene 1 of a stage production, and resistor section 42 is for controlling the illumination of the same circuit during the period of scene 2, and so on. The degree of illumination for each scene will, therefore, be determined by the position of the movable or adjustable contact 53 with respect to its resistor section.

The reactors and the resistance sections are so proportioned that, when a contact 53 is disposed midway of its resistor section when the master contact 55 is in engagement with the point of connection 51, the reactor 13 will be so affected as to produce substantially 50% illumination.

A movement of the contact 55 away from a point 51 will add resistance in the circuit through the control winding 35 and further reduce the illumination, if so desired, during any part of the scene, minimum illumination being produced for a particular preset position of a contact 53 when the contact 55 is in the position midway between the point of connection 51 and its nearest neighboring point 51.

The operation of the device is as follows: uni-directional, or direct, current is supplied to the conductors 3 and 4 and, when the parts are in the positions shown in the drawing, the current will flow from the conductor 3 through the flexible conductor 54, adjustable contact 53 and substantially one-half of the resistor section 41, then, through substantially one-half of the portion of the resistance member 38, that is, between two connection points 51, the contact 55, the operating arm 56, conductor 57 and the coil 35, to the feed conductor 4.

By reason of the interposed resistance, very little current flows through the control winding 35 and, consequently, the impedance of the core 27 permits only a small quantity of current to flow from the feed conductor 6, through the primary windings 32 of the reactor 26, to the terminal 33 of the rectifier.

The rectified current supplied from the rectifier 21 to the conductor 25 passes through the control winding 19 of the reactor 13 and correspondingly reduces the impedance of the reactor to such degree that sufficient current is permitted to flow through the primary windings 18 to cause partial illumination of the incandescent lamps 12. To produce a greater amount of illumination, the operating arm 56 is moved toward the resistor section 41 until it engages the connection point 51, at which time the degree of illumination will be substantially 50%. If it is desired to increase the illumination to 100%, the contact 53 is moved into engagement with the connection point 51, thereby shunting the resistor section 41 and permitting current to flow directly, and without resistance, from the feed conductor 3 to the contact 51 and the contact 55.

It will be apparent from the foregoing that any number of scenes, within the capacity of the apparatus, may be preset by presetting the adjustable contacts 53 to produce any desired illumination for a particular scene. For instance, the illuminating effect for scene 5 is produced by moving the contact 55 along the resistance member 38 until it engages the connection point 51 of resistor section 45. Since substantially three-fourths of the resistance section 45, is shunted, the degree of maximum illumination possible under this setting is 75%. To obtain less illumination during the scene, the contact 55 is moved away from the point 51 to a portion of the resistance ele-

ment 38 in the control-winding circuit. It will be seen from the foregoing, that the apparatus is flexible and capable of producing any desired predetermined lighting effects at any time during a scene and that these effects may be predetermined by presetting the adjustable contacts 53 with relation to their respective sections.

By providing a secondary or control reactor, the uni-directional current required for controlling a reactor of large capacity, such as the reactor 13, is relatively small and, consequently, the wires of the resistance element or unit 37 may be made in such form that it requires very little space upon the switchboard.

While I have illustrated but one embodiment of my invention, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made in the apparatus illustrated without departing from the spirit and scope of my invention, as set forth in the appended claims.

I claim as my invention:

1. Circuit-controlling apparatus comprising a uni-directional-current-supply circuit, a reactor having a uni-directional-current-control winding connected to the supply circuit and a resistance unit for controlling the current supplied to the control winding comprising a plurality of adjustable resistor sections connected in parallel across the supply circuit, one of the conductors of which comprises a resistance element to which the sections are connected at spaced intervals and a movable contact connected in the circuit for engaging the resistance element at different points.

2. Circuit-controlling apparatus comprising a uni-directional-current-supply circuit, a reactor having a uni-directional-current-control winding connected to the supply circuit and a resistance unit for controlling the current supplied to the control winding comprising a plurality of adjustable resistor sections connected in parallel across the supply circuit, one of the conductors of which comprises a resistance element to which the sections are connected at spaced intervals and a movable contact connected in the circuit for engaging the resistance element at different points, the resistance of the said element between any two resistor sections being greater than that of a resistor section.

3. A presettable rheostat comprising a plurality of adjustable resistor sections connected in parallel between conductors of a current source, one of the conductors comprising a resistance element to which the sections are connected at spaced intervals and a movable contact member for taking off current at different points along the said element.

4. A presettable rheostat comprising a plurality of adjustable resistor sections each having a presettable contact means for shunting a predetermined portion thereof and connected in parallel between conductors of a current source, one of the conductors comprising a resistance element to which the sections are connected at spaced intervals and a movable contact member for taking off current at different points along the said element.

5. In a current-controlling system, in combination, a source of alternating current, a source of uni-directional current, a load circuit, a reactor for controlling the current supplied from the alternating-current source to the load circuit and having a direct-current control winding, a second reactor having an alternating-current winding connected to the alternating-current source and having a control winding, a rectifier for rectifying current from the alternating-current winding of the second reactor and supplying corresponding uni-directional current to the control winding of the first reactor, and a resistance unit for controlling the direct current supplied to the control winding of the second reactor, said resistance unit comprising a plurality of adjustable resistor sections connected in parallel across the direct-current supply circuit, one of the conductors of which comprises a resistance element to which the sections are connected at spaced intervals and a movable contact connected in the circuit for engaging the resistance element at different points.

In testimony whereof, I have hereunto subscribed my name this 8th day of November, 1929.

ROY J. WENSLEY.