

April 9, 1935.

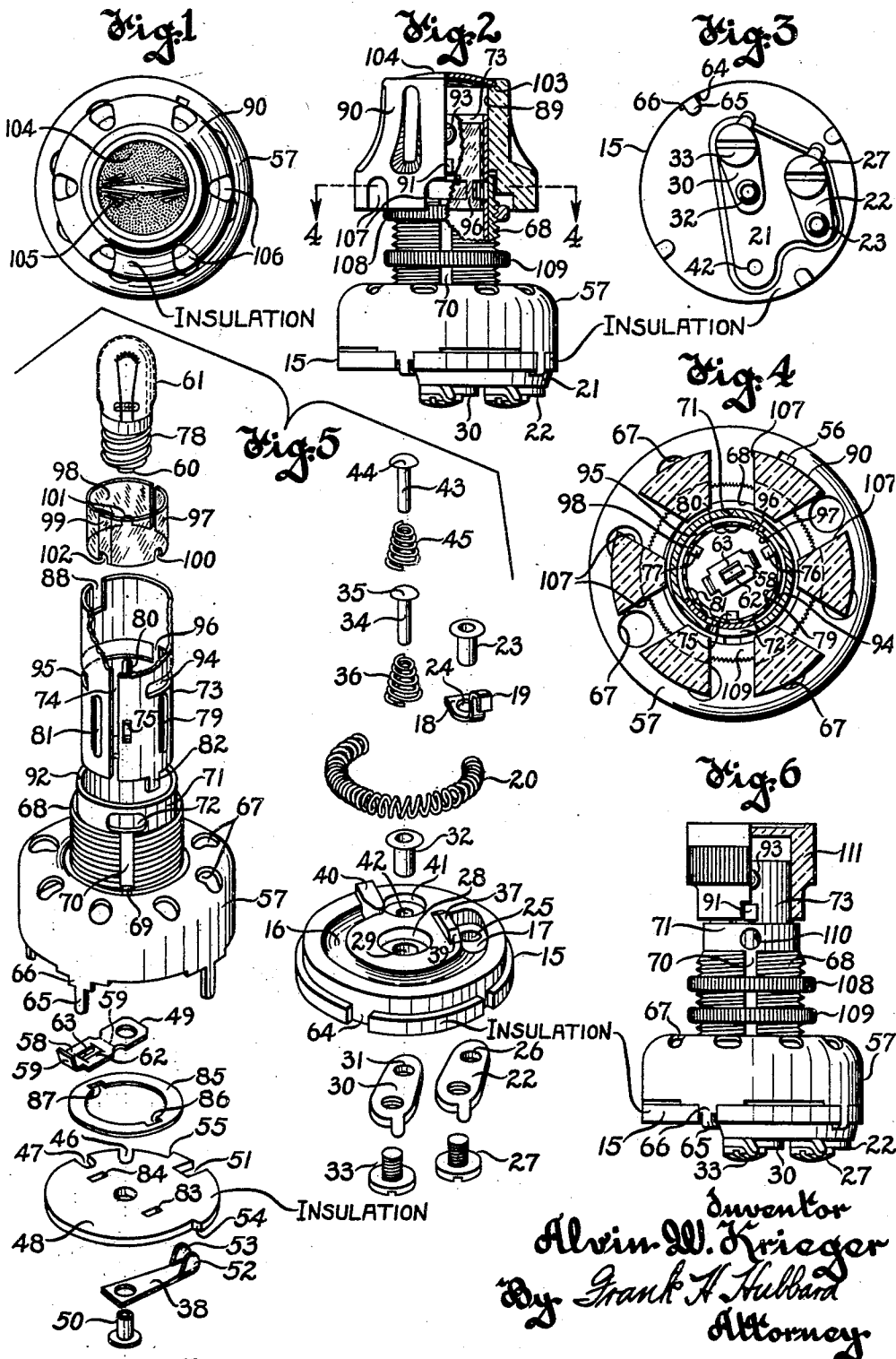
A. W. KRIEGER

1,997,258

RHEOSTAT FOR CONTROL OF RELATIVELY LOW VOLTAGE CIRCUITS

Filed Nov. 19, 1934

2 Sheets-Sheet 1



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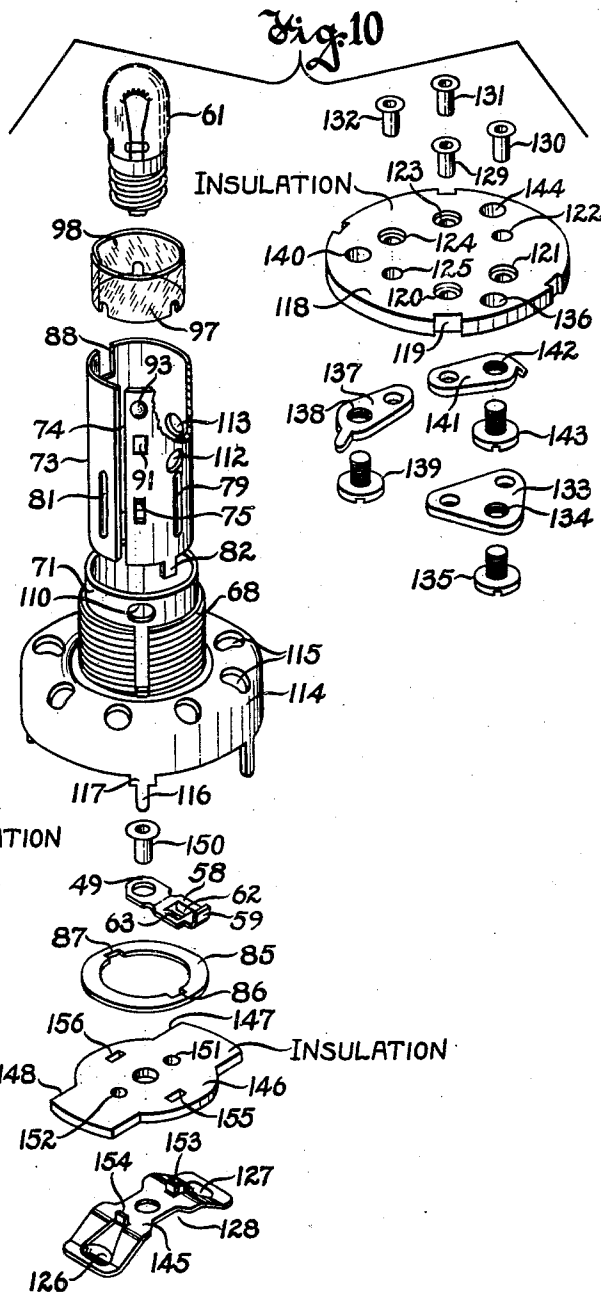
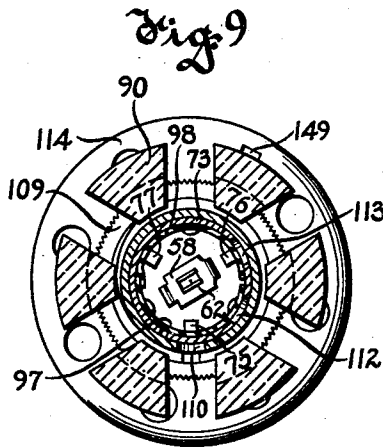
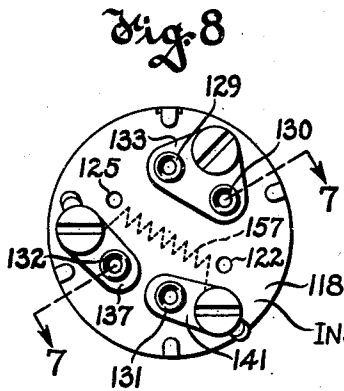
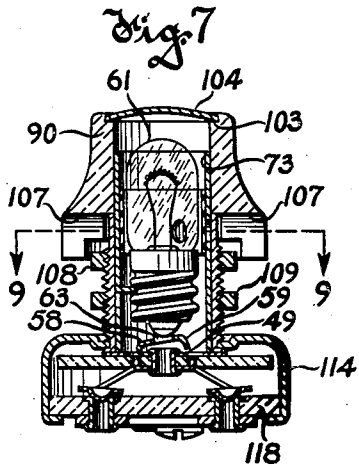
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2 Sheets-Sheet 2



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RHEOSTAT FOR CONTROL OF RELATIVELY
LOW VOLTAGE CIRCUITSAlvin W. Krieger, Milwaukee, Wis., assignor to
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Application November 19, 1934, Serial No. 753,591

15 Claims. (Cl. 201—56)

This invention relates to improvements in rheostats for control of relatively low voltage circuits.

A primary object of the invention is to provide a device of the aforementioned character having novel means for indicating the condition of the controlled circuit.

Another object is to provide a novel form of combined rheostat and indicating lamp whereby differently colored beams of light are produced in accordance with and utilized to visually indicate, the condition of the controlled circuit.

Another object is to provide a novel form of rheostat operating shaft having a plurality of distinctively colored light-transmitting elements associated therewith.

Another object is to improve the details of construction, assembly and operation of devices of the aforementioned character.

Another object is to provide a novel form of insulating operating knob for a combined rheostat and indicating light.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrate certain embodiments of the invention which will now be described, it being understood that the embodiments illustrated are susceptible of modification as to certain details of construction without departing from the scope of the appended claims.

In the drawings, Figure 1 is a knob-end view of a combined rheostat and indicating light as constructed in accordance with my invention.

Fig. 2 is a view partly in side elevation and partly in vertical section, of a device like that shown in Fig. 1.

Fig. 3 is a bottom plan view of said device.

Fig. 4 is a sectional view on the line 4—4 of Fig. 2.

Fig. 5 is a perspective view of the several parts of the device prior to assembly thereof; the insulating operating knob and the clamping nuts being omitted from this figure.

Fig. 6 is a side elevational view of a combined rheostat and light similar to that shown in Figs. 1 to 5, but employing a modified form of insulating operating knob and a modified form of bushing opening.

Fig. 7 is a vertical sectional view of another modified form of combined rheostat and indicating light.

Fig. 8 is a bottom plan view of the device shown in Fig. 7, the resistor being shown diagrammatically in dotted lines.

Fig. 9 is a sectional view, on the line 9—9 of Fig. 7, the electric lamp being omitted, and

Fig. 10 is a perspective view of the several parts of the device shown in Figs. 7, 8 and 9 prior to assembly thereof, the insulating operating knob and the clamping nuts being omitted.

The devices herein disclosed are in general quite similar to the devices disclosed in my Patent No. 1,971,614, dated August 28, 1934, and in the Meuer Patent No. 1,971,617, dated August 28, 1934.

Referring first to Figs. 1 to 5 of the drawings, the numeral 15 designates a molded insulating base, said base having a curved groove 16 of substantially semicylindrical form in transverse section formed in the upper surface thereof and extending around the major portion of said upper surface. The bottom wall of groove 16 (Fig. 5) is made flat at one end thereof, as indicated at 17, to accommodate the flat base portion 18 of a punched and stamped sheet metal member, said member having a vertically extending hooked end 19. The rheostat resistor is preferably composed of a suitable length of nickel-chromium alloy wire wound into the form of a coreless helix 20. Helix 20 is inserted into groove 16 and said sheet metal member is then inserted downwardly so that the base portion 18 thereof seats against the flat end 17 of the groove, and the hooked end 19 of said member is brought into clamping engagement with a plurality (say, two) of the end coils of helix 20.

Base 15 is provided on the lower surface thereof with a relatively large boss 21 (Figs. 2 and 3) of irregular contour. A terminal plate 22 is seated against the surface of boss 21, and the shank of a flanged eyelet 23 is adapted to penetrate aligned openings 24, 25 and 26 in portion 18, base 15 and plate 22, respectively; and the end of said shank is upset over plate 22 to secure said parts in assembled relation. Plate 22 is provided with a tapped opening to receive the shank of a binding screw 27 of usual form, and boss 21 is provided with a recess (not shown) to accommodate the shank of said screw.

The upper surface of base 15 is provided with a central cylindrical recess 28 which communicates with an opening 29 extending through the base. A terminal plate 30 is likewise seated against boss 21, said plate having an opening 31 in register with opening 29 to receive the shank of a flanged eyelet 32; the end of which shank is upset over plate 30 to secure the latter in position. Plate 30 is provided with a tapped opening to receive the shank of a binding screw 33, and

boss 21 is provided with a recess (not shown) to accommodate the shank of said screw. The shank 34 of a pin is adapted to slidably engage the tubular inner wall of eyelet 32, said pin having a convex or hemispherical head 35. A coiled compression spring 36 of substantially frusto-conical shape is interposed between the upper end flange of eyelet 32 and said head 35 to bias the latter upwardly.

Base 15 is provided on its upper surface with an integral projection 37 which is adapted to prevent excessive downward displacement of the resilient contactor 38 upon disengagement thereof from the resistor 20 (as hereinafter described), whereby stubbing of the contactor against the end of the resistor upon reverse movement of the contactor is avoided. Projection 37 is preferably provided with a beveled end 39 to insure against stubbing of the contactor with respect thereto. Base 15 is further provided on its upper surface with a projection 40 the flat surface of which is located substantially in the plane of the top surface of helix 20, whereby fouling or stubbing of the contactor 38 against the adjacent end of the helix is prevented in the event of a slight degree of overtravel of said contactor. As hereinafter described, however, the arrangement is preferably such that the contactor is restrained against movement in a clockwise direction to a degree sufficient to effect disengagement thereof from that end of the helix remote from the wiring terminal.

Base 15 is further provided in its upper surface with a relatively shallow cylindrical recess 41 which is located adjacent to the projection 40. An opening 42 communicates with recess 41 centrally of the latter, and a pin having a shank 43 is adapted to slide within said opening, said pin having a convex or hemispherical head 44. A coiled compression spring 45 of substantially frusto-conical shape is interposed between the bottom wall of recess 41 and said head 44 to bias the latter upwardly relatively to base 15. The head 44 of said pin is adapted to cooperate sequentially with a pair of notches 46 and 47 in a rotatable insulating plate 48 to respectively indicate to the touch the open circuit position of contactor 38 and the closed circuit position of said contactor wherein the resistor 20 is excluded from the controlled circuit.

As indicated in Fig. 5 the contactor 38 is positioned upon the lower surface of plate 48 and a center lamp contact 49 is positioned upon the upper surface of said plate, a bottom-flanged eyelet 50 being insertable upwardly through aligned openings in contactor 38, plate 48 and center contact 49 and upset over the latter to secure said parts to each other. The free end of contact 38 is normally biased away from the lower surface of plate 48, as by initially bending said contactor. Plate 48 is provided with a substantially rectangular notch 51 to accommodate a pair of upwardly extending lugs 52 and 53 formed integrally with contactor 38, whereby said contactor and said plate are restrained against rotary movement relatively to each other while providing for vertical movement of the free end of the contactor with respect to the plate. Plate 48 is provided on opposite sides of notch 51 with a pair of radial shoulders 54 and 55 which cooperate selectively with a lug 56 (Fig. 4) struck inwardly from the top of a dome-shaped sheet metal housing 57 to limit movement of plate 48 (and consequent movement of contactor 38) in opposite directions respectively.

The aforementioned center lamp contact 49 has a portion 58 thereof bent upwardly at an angle along the dotted line 59 (Fig. 5) to the form best illustrated in Fig. 7. Said portion 58 is provided at its free end with a lug 59 which is adapted to substantially limit the degree of downward displacement thereof under pressure of the usual center contact 60 of an electric lamp 61. The portion 58 of the center lamp contact is preferably provided with an I-shaped slit, and the two integral portions 62 and 63 defined by the slit are bent to extend upwardly in substantial parallelism (as indicated at 63 in Fig. 7). The cut metal edges of the portions 62 and 63 will scrape or bite into the center contact 60 of the lamp to insure a good electrical connection of these parts.

The aforementioned upward bias of the head 35 causes engagement thereof with the eyelet 50, thus providing for continuous electrical connection of the center lamp contact 49 and rheostat contactor 38 jointly with the terminal plate 30. Base 15 is preferably provided with a plurality of equally spaced peripheral notches, and housing 57 is provided with a corresponding number of equally spaced integral lugs to fit within said notches, said lugs being bent inwardly over the lower surface of base 15 to rigidly secure said parts to each other. In order to insure assembly of housing 57 and base 15 in a predetermined rotary relationship to each other, I provide one notch 64 of relatively greater width than the other notches, and I provide one of the lugs 65 with a portion 66 of such width as to fit only within notch 64, the bent portion of lug 65 being preferably of the same width as the other lugs on housing 57, whereby like forces are required for bending of the several lugs. Housing 57 is provided with a circularly arranged group of openings 67 in the upper surface thereof to provide for cooling or ventilation of the resistor 20.

Housing 57 is provided with a central opening to receive the reduced lower end of an externally threaded hollow metal bushing 68, said end of the bushing being upset to secure said parts to each other. Housing 57 is further provided with an integral lug 69 which is engageable with the walls of a vertical groove 70 in bushing 68 to prevent relative rotation of said housing and said bushing, and to insure a predetermined rotary relationship of said bushing and said housing.

Bushing 68 is provided at its upper end with an unthreaded reduced portion 71, said portion 71 having a circumferentially extending substantially elliptical opening 72 formed therein and arranged in a predetermined rotary relationship to housing 57, as, for instance, by aligning opening 72 with groove 70 and housing lug 69. Insertable downwardly into bushing 68 is a hollow cylindrical shaft 73 which is structurally quite similar to the operating shaft illustrated in my aforementioned Patent No. 1,971,614. Thus I prefer to form shaft 73 from a punched and stamped sheet metal plate whereby a vertical slit is provided to insure the desired degree of flexibility of said shaft at the upper end thereof. Shaft 73 is provided with a plurality of vertically and angularly spaced inwardly struck lugs 75, 76 and 77 (Figs. 4 and 5) for cooperation with the threaded screw shell contact 78 of lamp 61, and said shaft as shown is provided with three inwardly extending vertical ribs or beads 79, 80 and 81 to insure against wobbling or vibration of screw shell contact 76 relatively to the shaft.

The lower end of shaft 73 is provided with a

pair of lugs (one of which is shown at 82) to penetrate the pair of openings 83 and 84 formed in plate 48, said lugs being bent inwardly over the bottom surface of said plate to secure said parts in assembled relation. I prefer to interpose between plate 48 and the lower end of shaft 73 a ring 85 of brass or similar conducting material, said ring having notches 86 and 87 to receive the aforementioned lugs (see 82) to prevent displacement of the ring relatively to the shaft. When the parts are completely assembled the ring 85, which is in electrical engagement with shaft 73, is biased into electrical engagement with the upset lower end of bushing 68 (which in practice is grounded in the usual manner), thus insuring a good electrical connection between shaft 73 and bushing 68.

The upper end of shaft 73 is formed exactly in the manner disclosed in my Patent No. 1,971,614 aforementioned. Thus said end is provided with a notch 88 to telescopically receive a projection (not shown) which is formed integrally with the cylindrical wall of a recess 89 in the insulating operating knob 90 (Figs. 1, 2 and 4) whereby said knob and shaft are interlocked against rotation relatively to each other. Shaft 73 is preferably provided with an outwardly and downwardly projecting lug 91 (Fig. 2) which is engageable with the upper edge 92 (Fig. 5) of portion 71 of the bushing to limit downward displacement of said shaft and the parts carried thereby, the wall of recess 89 being provided with a notch (not shown) to provide clearance for said lug, and to assist in guiding said knob and said shaft into proper telescopic engagement with each other. Shaft 73 is also provided with a convex boss 93, and the wall of recess 89 is provided with a correspondingly shaped depression (not shown) into which said boss is adapted to snap to releasably retain the knob and shaft in assembled relation. These features are described in greater detail in my aforementioned patent.

As shown the shaft 73 is provided at an intermediate point in its length with a pair of circumferentially extending openings 94 and 95. Said openings are arranged in a predetermined angular relationship to the periphery of shaft 73, and one pair of the ends of said openings are spaced only slightly from each other, as by means of an integral portion 96 of shaft 73; the other ends of said openings being spaced from each other to a greater extent, as best illustrated in Fig. 5. For accomplishment of the results contemplated by me I prefer to position behind the respective openings 94 and 95 a pair of differently colored translucent or transparent sheets of substantially noncombustible insulating material, as for instance, the material sold under the trade name of "pyralin". Thus I have shown a transparent sheet 97 which is preferably colored red and is adapted to be positioned behind the opening 94, and a similar transparent sheet 98 which is preferably colored green and is adapted to be positioned behind the opening 95.

In practice I prefer to unite or join the sheets by overlapping thereof along a vertical line, as indicated at 99, the overlapped ends being secured to each other by employment of a suitable adhesive, or in any other well known manner. The united sheets are provided at the lower edges thereof with notches 100, 101 and 102 which respectively engage the upper ends of ribs 79, 83 and 81 on the inner surface of shaft 73, whereby the sheets are positively supported against downward displacement relatively to the shaft and re-

strained from rotary movement relatively to the latter. Due to the inherent resiliency of the material of which sheets 97 and 98 are composed the cylinder formed thereby will expand sufficiently to cause the same to frictionally engage the inner wall of the shaft, whereby accidental upward displacement of the sheets is prevented.

As best illustrated in Fig. 4, the free ends of the sheets are located behind the portion 96 of shaft 73, and the united ends of said sheets are located behind that portion of shaft 73 between slit 74 and opening 95. After insertion of lamp 61 into shaft 73 the knob 90 may be telescopically engaged with a snap action with the upper end of the shaft. It is to be understood that knob 90 is molded from opaque or substantially non-light-transmitting insulating material. Although said knob may be molded with an integral closed upper end, I prefer to provide the same with an open end, said open end being provided with an annular flange or recess 103 into which an outwardly convex metal disk 104 is insertable with a press fit. Disk 104 is preferably provided with a decorative outer surface as shown, and preferably the major motif 105 of the decoration may be utilized in conjunction with an indicating plate bearing the legends "Off", "High", "Medium" and "Low" (not shown) to indicate the condition of the controlled circuit. Such indicating means is particularly advantageous in the event of failure of lamp 61 to function properly.

Knob 90 is in general of substantially frusto-conical form, and the same is provided with a plurality of peculiarly shaped, equally spaced external recesses 106 which enhance the pleasing appearance of the knob and facilitate manual rotation thereof. The skirt portion of the knob is provided with a plurality of equally spaced radial notches or openings 107, certain of which are adapted to register sequentially with the opening 72 in the bushing.

In Figs. 1 to 5 it is to be understood that the several parts are in circuit-interrupting position. In Figs. 1 and 2 upon clockwise rotation of knob 90 to an extent which will bring the next succeeding notch 107 into register with bushing opening 72 the controlled circuit will be completed exclusive of resistor 20 (the lamp circuit being simultaneously completed) and a portion of opening 94 will register with bushing opening 72 and the particular notch 107 in knob 90. Due to the presence of the transparent red sheet 97, a beam of red light will be thrown outwardly through said notch 107. The device is preferably so mounted as by means of clamping nuts 108 and 109, upon an automobile dashboard that the beam of red light extends in a downward direction onto the dashboard, whereby the operator is informed that the fan motor (for instance) of the automobile heating system is operating at a relatively high speed.

Upon continued clockwise rotation of knob 90 the emission of a red beam of light will be continued, or a pair of smaller red beams will be emitted through two of the notches 107. When knob 90 is turned in a clockwise direction to such an extent that the portion 96 of shaft 73 (Fig. 4) is located centrally of the bushing opening 72 a red beam of light will be emitted through one of the notches 107 and a green beam of light will be emitted through the adjacent notch 107, thus indicating intermediate positioning of the rheostat contactor and a consequent medium rate of speed of the fan motor. Continued clockwise rotation of the knob results in the emission of a

single relatively large green beam of light, or a pair of relatively smaller green beams of light, to indicate a relatively slow speed of the fan motor.

6 By directing the beam or beams of light downwardly upon the dashboard, I am enabled to overcome the objectionable glare of the indicating light or light beam heretofore present in devices of this character. Moreover, by employ-
10 ing means of the character disclosed to provide for individual or joint emission of differently colored beams of light I am enabled to indicate more positively the exact condition of the controlled circuit.

13 The modification illustrated in Fig. 6 is substantially like the device aforescribed, and like parts have been given like numerals of reference. In Fig. 6, however, the portion 71 of
bushing 68 is provided with a relatively small
20 circular opening 110 which is adapted to cooperate with the parts aforescribed to provide for emission of a red beam of light upon completion of the controlled circuit by rotation of a knob 111, and during a predetermined degree
23 of continued rotation thereof. Upon further rotation of knob 111 a green beam of light is emitted through opening 110 to indicate inclusion of a relatively large part or all of the resistance 20 in the controlled circuit, with consequent relatively slow speed of the fan motor controlled by the rheostat.

30 The knob 111 of Fig. 6 does not have a skirt portion surrounding the reduced portion 71 of bushing 68 as in the device of Figs. 1 to 5. Knob
33 111 as shown preferably comprises a one-piece molded body of opaque or substantially non-light transmitting insulating material. The device of Fig. 6 is preferably mounted upon the dashboard of an automobile in such a relation
40 that any light passing through opening 110 is directed downwardly, for the purpose aforescribed.

The device illustrated in Figs. 7 to 10, inclusive, functions similarly to the devices aforescribed and employs certain of the aforescribed parts, as indicated by the corresponding numerals of reference. Thus I may employ a
43 bushing 68 the reduced upper end portion 71 of which is provided with an opening 110 like that shown in Fig. 6. The shaft 73 is like that shown
50 in the other figures, except that a pair of circumferentially spaced circular openings 112 and 113 are provided instead of the openings 94 and 95. Knob 90 is identical with the knob of Figs.
55 1 to 5 and functions in a corresponding manner.

The housing 114 is relatively shallower than the housing 57 aforescribed and is attached to bushing 68 in the aforescribed manner. Housing 114 is shown as provided with a plurality of
60 circularly arranged openings 115, but said openings may be omitted if desired, due to the exterior location of the resistor, as hereinafter described. Housing 114 is provided with a plurality of integral lugs, one of which lugs 116
65 has a portion 117 of greater width than the other lugs. The supporting base 118 preferably comprises a flat punched plate or disk of insulating material having a corresponding number of peripheral notches, the notch 119 being
70 adapted to accommodate the lug portion 117 to insure proper assembly of these parts.

Base 118 is provided with a symmetrically arranged group of six openings 120 to 125, inclusive; two of said openings, 122 and 125, being
75 adapted to receive and retain the bosses 126 and

127 in a bridging contactor 128 in the "off" position of the latter. The other openings of said group are provided with inwardly offset annular shoulders to respectively accommodate the upper end flanges of eyelets 129 to 132, inclusive. 5
The shanks of eyelets 129 and 130 are adapted to penetrate a pair of openings formed in a common wiring terminal member 133, and are upset over the lower surface of the latter to secure the same to base 118. Member 133 is provided
10 with a tapped opening 134 to receive binding screw 135, and plate 118 is provided with an opening 136 to provide clearance for the shank of said screw.

The shank of eyelet 132 is adapted to penetrate an opening in a terminal member 137 and is upset over the lower surface of the latter. Member 137 has a tapped opening 138 to receive binding screw 139, and plate 118 is provided
20 with an opening 140 to provide clearance for the shank of said screw. Similarly the shank of eyelet 131 penetrates an opening in a terminal member 141 and is upset over the lower surface of the latter. Member 141 has a tapped opening
25 142 to receive binding screw 143, and plate 118 is provided with an opening 144 to provide clearance for the shank of said screw.

The bridging contactor 128 comprises a punched and stamped sheet metal member of the form best illustrated in Fig. 10. The flat
30 intermediate portion 145 of said contactor is adapted to seat against the lower surface of a punched plate 146 of insulating material, said plate having opposite wings or extensions providing shoulders 147 and 148 for engagement
35 with a lug 149 (Fig. 9) struck downwardly from the top of housing 114 to limit the degree of rotation of plate 146 in opposite directions. The center lamp contact is superimposed upon plate 146, and an eyelet 150 is adapted to penetrate
40 aligned openings in said parts 49, 146 and 128 and is upset over the surface of the latter to secure said parts in assembled relation.

Plate 146 is preferably provided with openings 151 and 152 to receive upstanding lugs 153
45 and 154 on contactor 128 whereby the latter is positively restrained against rotary movement relatively to plate 146. Plate 146 is further provided with a pair of openings 155 and 156 to receive the pair of lugs formed at the lower end
50 of shaft 73 (one of said lugs being shown at 82), said lugs being bent outwardly from each other over the lower surface of plate 146 to provide for rotation of the latter by said shaft. Ring 85 is preferably interposed between plate 146 and
55 the lower end of shaft 73 for the purpose above described.

The opposite ends of contactor 128 are offset downwardly from the portion 145, and said ends are formed to provide the aforementioned downwardly extending bosses 126 and 127. As shown
60 diagrammatically in Fig. 8 the resistor 157 is electrically connected between terminal members 137 and 141, it being understood that one line of the fan motor circuit is electrically connected with the respective members 133 and 137. Thus the contactor 128 in one extreme position
65 thereof is adapted to engage the walls of openings 122 and 125 to effect interruption of the motor circuit and to likewise interrupt the circuit of lamp 61. Upon clockwise movement of knob 90 contactor 128 first snaps into engagement with the top flanges of eyelets 130 and 132 to complete the motor circuit and the lamp circuit
70 through members 133 and 137, the resistor 157 75

being thus excluded from the motor circuit. Moreover, under these conditions the opening 112 in shaft 73 is alined with the bushing opening and a red beam of light is preferably directed downwardly over the dashboard of the automobile to indicate high speed operation of the motor.

Upon further clockwise rotation of knob 90 contactor 128 will move with a snap action into engagement with the top flanges of eyelets 129 and 131 whereby the resistance 157 is included in the circuit of the fan motor to reduce the speed thereof. At the same time opening 113 will have been brought into registry with bushing opening 110 to provide for emission of a beam of green light to indicate relatively slow speed operation of the motor. The aforementioned stop 149 acts to prevent further clockwise rotation of knob 90, whereas upon counter-clockwise rotation of said knob the contactor will first be moved into bridging engagement with eyelets 130 and 132, and then into "off" position thereof wherein the bosses 126 and 127 re-engage the walls of openings 125 and 122, respectively, the stop 149 acting to prevent further movement of the parts in a counter-clockwise direction.

I have provided for one-hole mounting of each of the devices herein disclosed, and in each device I provide for emission of a radial beam or beams of light of predetermined color or colors to indicate the condition of the controlled circuit. As aforestated I therefore avoid the objectionable glare or appearance of prior devices of this character wherein the light is emitted endwise or axially of the operating shaft or knob.

What I claim as new and desire to secure by Letters Patent is:

1. In a device of the character described, in combination, a rheostat including a resistance and a pair of wiring terminals, circuit controlling means rotatable to interrupt the electrical connection between said terminals or to selectively electrically connect the same either exclusive of said resistance or inclusive of a portion or all of said resistance, said rheostat including an externally threaded hollow metal bushing to be supported in a fixed position, said bushing having a lateral opening formed therein adjacent to the outer end thereof, a hollow metal shaft rotatable within said bushing, said shaft having a pair of circumferentially spaced openings formed therein, said shaft being adapted in a given rotary position thereof to insure interruption of the electrical connection between said terminals, said shaft being also adapted upon rotation thereof in one direction from said last mentioned position to effect sequential registration of said pair of openings with said bushing opening, an electric lamp located within said shaft and carried thereby, means for insuring illumination of said lamp upon registration of either of said pair of openings with said bushing opening, and a pair of differently colored translucent sheets carried by said shaft and adapted to overlie the respective openings in the latter, whereby differently colored beams of light are emitted in different rotary positions of said shaft, emission of said beams of light being adapted to indicate closed-circuit positioning of the parts of the device and the respective colors of said beams of light being adapted to indicate the relative value of said resistance included in the circuit.

2. In a device of the character described, in combination, a rheostat including a resistance and a pair of wiring terminals, circuit controlling

means rotatable to interrupt the electrical connection between said terminals or to selectively electrically connect the same either exclusive of said resistance or inclusive of a portion or all of said resistance, said rheostat including an externally threaded hollow metal bushing to be supported in a fixed position, said bushing having a lateral opening formed therein adjacent to the outer end thereof, a hollow metal shaft rotatable within said bushing, said shaft having a pair of circumferentially spaced openings formed therein, said shaft being adapted in a given rotary position thereof to insure interruption of the electrical connection between said terminals, said shaft being also adapted upon rotation thereof in one direction from said last mentioned position to effect sequential registration of said pair of openings with said bushing opening, an electric lamp located within said shaft and carried thereby, means for insuring illumination of said lamp upon registration of either of said pair of openings with said bushing opening, a pair of differently colored translucent sheets carried by said shaft and adapted to overlie the respective openings in the latter, whereby differently colored beams of light are emitted in different rotary positions of said shaft, emission of said beams of light being adapted to indicate closed-circuit positioning of the parts of the device and the respective colors of said beams of light being adapted to indicate the relative value of said resistance included in the circuit, and an insulating operating knob attached to the outer end of said shaft and adapted to prevent emission of light from said end, said knob being formed to provide clearance for said beams of light when emitted through said bushing opening.

3. In a device of the character described, in combination, a rheostat including a resistance and a pair of wiring terminals, circuit controlling means rotatable to interrupt the electrical connection between said terminals or to selectively electrically connect the same either exclusive of said resistance or inclusive of a portion or all of said resistance, said rheostat including an externally threaded hollow metal bushing to be supported in a fixed position, said bushing having a lateral opening formed therein adjacent to the outer end thereof, a hollow metal shaft rotatable within said bushing, said shaft having a pair of circumferentially spaced openings formed therein, said shaft being adapted in a given rotary position thereof to insure interruption of the electrical connection between said terminals, said shaft being also adapted upon rotation thereof in one direction from said last mentioned position to effect sequential registration of said pair of openings with said bushing opening, an electric lamp located within said shaft and carried thereby, means for insuring illumination of said lamp upon registration of either of said pair of openings with said bushing opening, a pair of differently colored translucent sheets carried by said shaft and adapted to overlie the respective openings in the latter, whereby differently colored beams of light are emitted in different rotary positions of said shaft, emission of said beams of light being adapted to indicate closed-circuit positioning of the parts of the device and the respective colors of said beams of light being adapted to indicate the relative value of said resistance included in the circuit, and a tubular operating knob of opaque insulating material removably attached to the outer end of said shaft, said knob having an annular recess formed at the outer end

thereof, an imperforate metal disk having a press fit within said recess to close the outer end of said knob, said knob having a skirt portion adapted to overlie said bushing opening, and said skirt portion having a plurality of equally spaced lateral openings formed therein, certain of said last mentioned openings being adapted to register with said bushing opening in predetermined rotary positions of said shaft.

4. In a device of the character described, in combination, a rheostat including a resistance and a pair of wiring terminals, circuit controlling means rotatable to interrupt the electrical connection between said terminals or to selectively electrically connect the same either exclusive of said resistance or inclusive of a portion or all of said resistance, said rheostat including an externally threaded hollow metal bushing to be supported in a fixed position, said bushing having a lateral opening formed therein adjacent to the outer end thereof, a hollow metal shaft rotatable within said bushing, said shaft having a pair of circumferentially spaced openings formed therein, said shaft being adapted in a given rotary position thereof to insure interruption of the electrical connection between said terminals, said shaft being also adapted upon rotation thereof in one direction from said last mentioned position to effect sequential registration of said pair of openings with said bushing opening, an electric lamp located within said shaft and carried thereby, means for insuring illumination of said lamp upon registration of either of said pair of openings with said bushing opening, a pair of differently colored translucent sheets carried by said shaft and adapted to overlie the respective openings in the latter, whereby differently colored beams of light are emitted in different rotary positions of said shaft, emission of said beams of light being adapted to indicate closed-circuit positioning of the parts of the device and the respective colors of said beams of light being adapted to indicate the relative value of said resistance included in the circuit, and an operating knob of substantially frusto-conical form removably attached to the outer end of said shaft, said knob having a skirt portion adapted to overlie said bushing opening, said skirt portion having a plurality of equally spaced radial notches formed therein, certain of said notches being adapted to register sequentially with said bushing opening in predetermined rotary positions of said shaft, and two of said notches being adapted to jointly register with said bushing opening in a different rotary position of said shaft, for the purpose set forth.

5. In a rheostat for control of relatively low voltage circuits, in combination, an inverted cup-shaped sheet metal housing, said housing having an opening formed therein at the upper end thereof, an externally threaded hollow metal bushing having a reduced lower end inserted into said opening and upset over the inner surface of said housing to secure said parts to each other, a substantially cylindrical hollow metal shaft rotatable within said bushing, an operating knob carried by said shaft at the upper end thereof, said shaft having a plurality of circumferentially spaced openings formed therein in a plane below the upper end of said bushing, said bushing having a single opening formed therein in the plane aforementioned, said openings in said shaft being movable selectively into and out of registry with said bushing opening, a member of light-transmitting material of predetermined color lo-

cated within said shaft and adapted to overlie one of the spaced openings in the latter, a second member of light-transmitting material of a different predetermined color located within said shaft and adapted to overlie another of said spaced openings, said shaft being adapted to accommodate therewithin an electric lamp of suitable form, a lamp circuit, and means to effect interruption of said lamp circuit upon rotation of said shaft to one of its extreme positions, said means including means to provide for completion of said lamp circuit in other rotary positions of said shaft, the aforescribed parts cooperating to provide suitable visible signals corresponding with predetermined rotary positions of said shaft.

6. A combined rheostat and light comprising, in combination, a housing member, an externally threaded hollow metal bushing attached to said housing and opening into the interior of the latter, a tubular metal shaft rotatable within said bushing and having a portion thereof extending beyond the outer end of said bushing, a knob attached to said portion of the shaft, an electric lamp located within said shaft and electrically connected therewith and mechanically supported thereby, said bushing having a single opening formed therein adjacent to the outer end thereof, said shaft having a pair of openings formed therein, said openings being arranged quite closely adjacent to each other with reference to one side of said shaft and the same being relatively widely spaced from each other with reference to the other side of said shaft, said shaft being adapted in a given rotary position thereof to provide for closure of said bushing opening and the same being adapted in other rotary positions thereof to effect registration of one or the other of said pair of openings with said bushing opening, a circuit for said lamp, means for insuring completion of said lamp circuit in the last mentioned rotary positions of said shaft, and means associated with said lamp to provide for transmission of light of a predetermined color through one of said pair of openings and to provide for transmission of light of a different predetermined color through the other of said pair of openings.

7. A combined rheostat and light comprising, in combination, a housing member, an externally threaded hollow metal bushing attached to said housing and opening into the interior of the latter, a tubular metal shaft rotatable within said bushing and having a portion thereof extending beyond the outer end of said bushing, a knob attached to said portion of the shaft, an electric lamp located within said shaft and electrically connected therewith and mechanically supported thereby, said bushing having a single opening formed therein adjacent to the outer end thereof, said shaft having a pair of openings formed therein, said openings being arranged quite closely adjacent to each other with reference to one side of said shaft and the same being relatively widely spaced from each other with reference to the other side of said shaft, said shaft being adapted in a given rotary position thereof to provide for closure of said bushing opening and the same being adapted in other rotary positions thereof to effect registration of one or the other of said pair of openings with said bushing opening, a circuit for said lamp, means for insuring completion of said lamp circuit in the last mentioned rotary positions of said shaft, and means associated with said lamp to provide for transmission of light of a predetermined color through one of said pair of openings and to provide for transmission of light

of a different predetermined color through the other of said pair of openings, said last mentioned means comprising a pair of non-combustible differently colored sheets of transparent material interposed between the lamp bulb and the inner wall of said shaft and engaged with the latter for support and rotation thereby.

8. In a rheostat for control of relatively low voltage circuits, in combination, an insulating base member, a resistor carried by said base member, a plurality of wiring terminal members carried by said base member and exposed upon the lower surface thereof, a sheet metal housing rigidly attached to said base member, said housing having an opening formed in the upper end thereof, an externally threaded hollow metal bushing having its lower end portion penetrating said opening and rigidly secured to said housing, a hollow metal shaft rotatable within said bushing, said shaft having an insulating operating knob attached to the outer end thereof, an electric lamp located within said shaft and supported thereby, a contactor located within said housing and movable by said shaft to a given extreme position to effect interruption of the circuit controlled thereby, said contactor being movable from said extreme position to initially complete the controlled circuit exclusive of said resistor and said contactor being also movable to another extreme position to include in circuit the full value of said resistor, means associated with said contactor to provide for illumination of said lamp during completion of the controlled circuit, said bushing having a single opening formed therein adjacent to the upper end thereof in a given rotary relationship to said base, said shaft having a pair of openings formed therein in predetermined rotary relationships respectively to said contactor, a pair of differently colored translucent sheets carried by said shaft and adapted to overlie the respective openings in the latter, said pair of openings being adapted to register sequentially with said bushing opening in the aforementioned circuit-completing positions of said contactor, and an operating knob secured to the outer end of said shaft, said knob being shaped to provide clearance for light rays or beams when emitted through said bushing opening.

9. As an article of manufacture, a rotary operating shaft for rheostats and the like, said shaft being of tubular form, the interior of said shaft being adapted to provide for electrical connection with and mechanical support of an electric lamp, said shaft being provided at an intermediate point in the length thereof with a pair of circumferentially spaced openings, and a pair of translucent sheets of differently colored material located within said shaft and adapted to overlie the respective openings, said sheets and the interior of said shaft being cooperatively formed to provide for support of the former by the latter in relatively fixed positions.

10. As an article of manufacture, a rotary operating shaft for low voltage rheostats and the like, said shaft being of tubular form and the same being adapted to support therewithin an electric lamp of suitable size, an operating knob attached to the outer end of said shaft, said shaft being provided at an intermediate point in the length thereof with a pair of relatively long circumferentially extending openings, one pair of the ends of said openings being only slightly spaced from each other and the other pair of the ends of said openings being relatively widely spaced from each other, a pair of sheets of substantially non-com-

bustible material of different colors respectively, said sheets being united with each other at one pair of the ends thereof and jointly bent to substantially tubular form whereby the same are insertable within said shaft to respectively overlie said openings in the latter, said sheets being frictionally engaged with said shaft to prevent longitudinal displacement thereof in one direction, and said sheets and the inner wall of said shaft having cooperating parts to prevent relative rotary displacement thereof and/or longitudinal displacement thereof in the opposite direction.

11. In a rheostat for control of relatively low voltage circuits, in combination, a molded insulating base having a curved groove formed in the upper surface thereof, said groove being of substantially semi-circular form in transverse section, a resistance wire wound into the form of a coreless helix, said helix being adapted to seat within said groove and having one end thereof spaced from one end of said groove, a punched and stamped sheet metal member, said member having a vertically extending hook-shaped lug which is insertable downwardly into mechanical and electrical engagement with a plurality of the coils at the aforementioned end of said helix, said member having a base portion seated within the aforementioned end of said groove, a wiring terminal element underlying said insulating base, and a metal eyelet penetrating the base portion of said member, said insulating base and said terminal element and having its opposite ends upset to secure said parts in assembled position.

12. In a rheostat for control of relatively low voltage circuits, in combination, a molded insulating base having a curved groove formed in the upper surface thereof, said groove being of substantially semi-circular form in transverse section, a resistance wire wound into the form of a coreless helix, said helix being adapted to seat within said groove and having one end thereof spaced from one end of said groove, a punched and stamped sheet metal member, said member having a vertically extending hook-shaped lug which is insertable downwardly into mechanical and electrical engagement with a plurality of the coils at the aforementioned end of said helix, said member having a base portion seated within the aforementioned end of said groove, a wiring terminal element underlying said insulating base, a metal eyelet penetrating the base portion of said member, said insulating base and said terminal element and having its opposite ends upset to secure said parts in assembled position, said insulating base having a centrally located substantially cylindrical recess formed in said upper surface thereof, another wiring terminal element underlying said insulating base, another metal eyelet penetrating the bottom wall of said recess and said second mentioned terminal element and upset over the lower surface of the latter, a pin having a substantially hemispherical head at the upper end thereof, the shank of said pin being slidably engaged with the tubular wall of said eyelet, and a coiled compression spring interposed between the upper end of said eyelet and the head of said pin, for the purpose set forth.

13. In a rheostat for control of relatively low voltage circuits, in combination, a molded insulating base having a curved groove formed in the upper surface thereof, said groove being of substantially semi-circular form in transverse section, a resistance wire wound into the form of a coreless helix, said helix being adapted to seat within said groove and having one end there-

of spaced from one end of said groove, a punched and stamped sheet metal member, said member having a vertically extending hook-shaped lug which is insertable downwardly into mechanical and electrical engagement with a plurality of the coils at the aforementioned end of said helix, said member having a base portion seated within the aforementioned end of said groove, a wiring terminal element underlying said insulating base, a metal eyelet penetrating the base portion of said member, said insulating base and said terminal element and having its opposite ends upset to secure said parts in assembled position, said insulating base having a centrally located substantially cylindrical recess formed in said upper surface thereof, another wiring terminal element underlying said insulating base, another metal eyelet penetrating the bottom wall of said recess and said second mentioned terminal element and upset over the lower surface of the latter, a pin having a substantially hemispherical head at the upper end thereof, the shank of said pin being slidably engaged with the tubular wall of said eyelet, a coiled compression spring interposed between the upper end of said eyelet and the head of said pin, for the purpose set forth, said insulating base having another substantially cylindrical recess spaced from said central recess and positioned between the adjacent ends of said groove, an opening formed in the bottom wall of said second mentioned recess, a headed pin having its shank slidable within said opening, and a coiled compression spring interposed between the head of said last mentioned pin and the bottom wall of said recess.

14. As an article of manufacture, an operating knob for a combined rheostat and indicating light, said knob being molded to substantially frusto-conical form in longitudinal section from a body of substantially opaque insulating material, said knob having a passage extending longitudinally

therethrough, the wall of said passage being formed to provide an interlocking connection between said knob and a tubular shaft of suitable form, an opaque disk attached to the upper end of said knob to close said passage, said knob having a skirt portion formed at the lower end thereof, and said skirt having a multiplicity of equally spaced radial notches formed therein and extending upwardly from the lower edge thereof, for the purpose set forth.

15. In a rheostat for control of relatively low voltage circuits, in combination, a hollow sheet metal housing having a relatively large open end, an externally threaded hollow metal bushing attached to the other end of said housing for communication with the latter, a tubular metal shaft rotatable within said bushing, an operating knob carried by said shaft at the outer end of the latter, said bushing having a single lateral opening formed therein adjacent to the outer end thereof, said shaft having at least one opening formed therein in the plane of said bushing opening, said opening in said shaft being movable selectively into and out of registry with said bushing opening, a member of light-transmitting material of predetermined color located within said shaft and adapted to overlie said opening in the latter, said shaft being adapted to accommodate therewithin an electric lamp of suitable form, a lamp circuit, means to effect interruption of said lamp circuit upon rotation of said shaft to one of its extreme positions wherein said shaft and bushing openings are out of register, said means including means to provide for completion of said lamp circuit upon rotation of said shaft in a given direction to effect registry of said shaft and bushing openings, whereby a beam of light of the aforementioned predetermined color is emitted radially of said shaft and bushing, for the purpose set forth.

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