No. 777,116. PATENTED DEC. 13, 1904.

R. J. LOUIS.

AUTOMATIC RHEOSTAT.

APPLICATION FILED MAR. 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

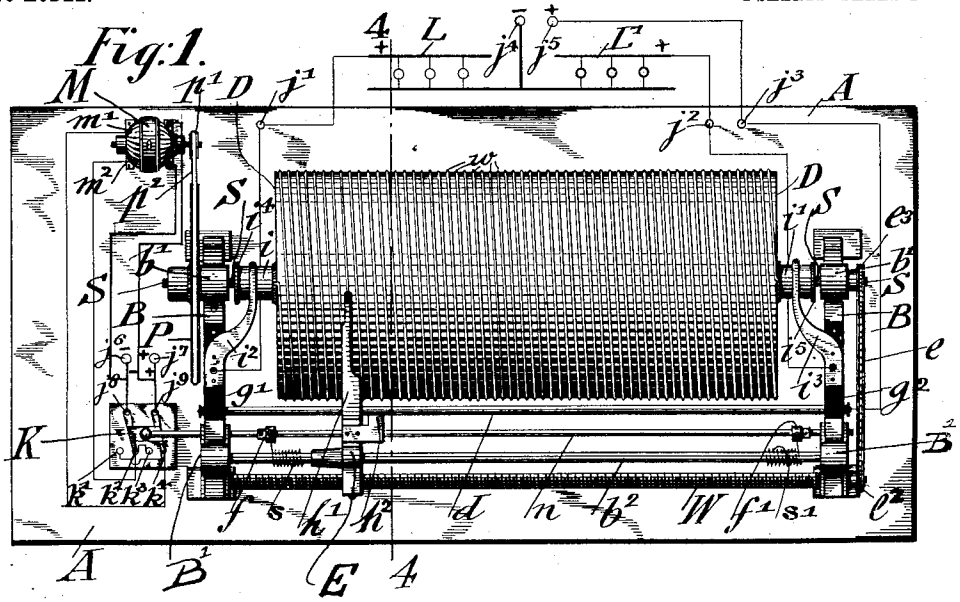


Fig. 2.

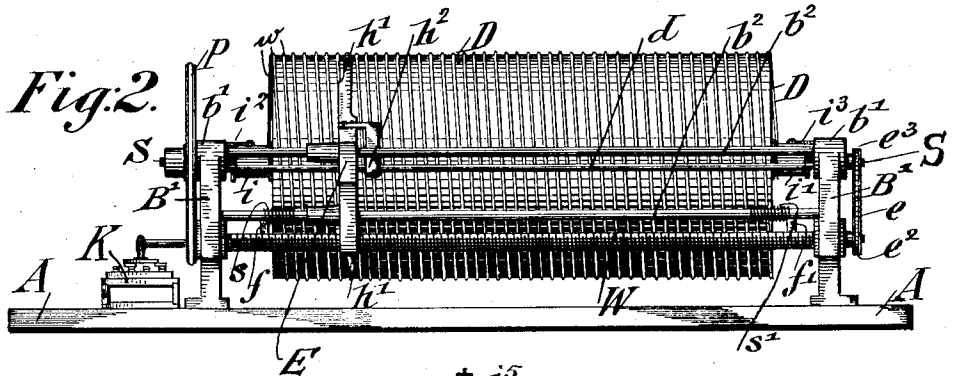
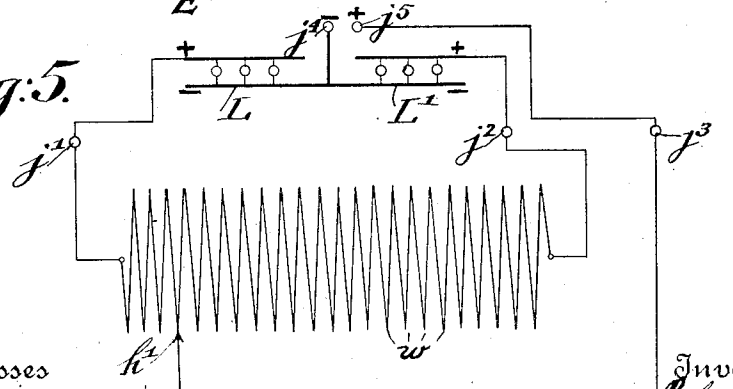


Fig. 5.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

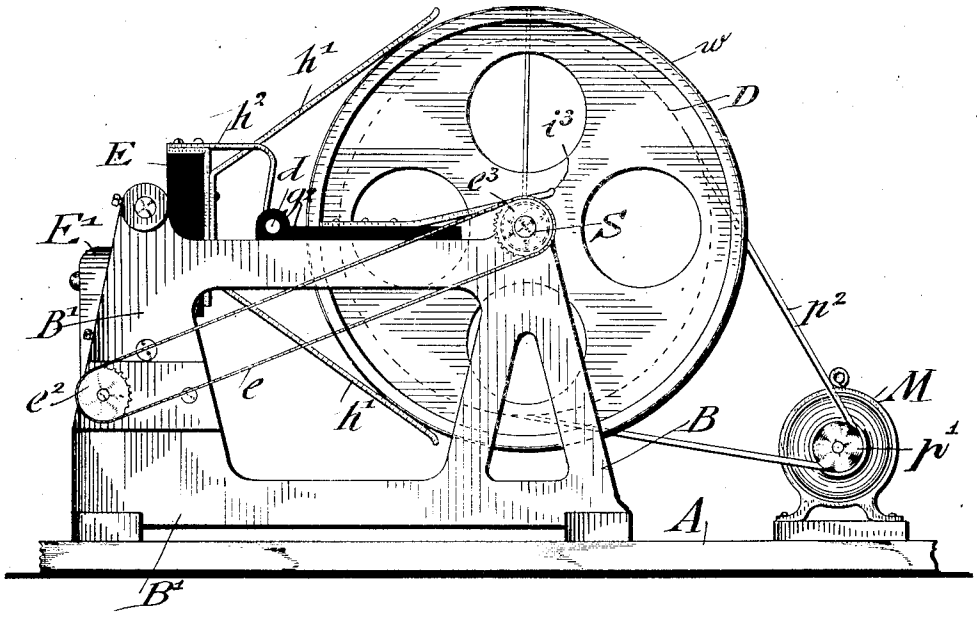
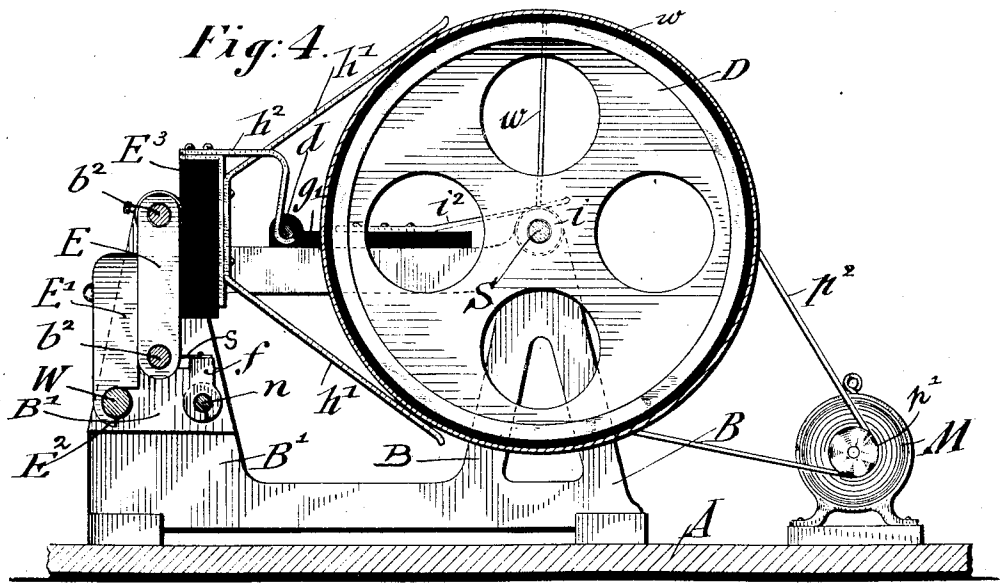


Fig. 4.



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No. 777,116. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

ROBERT J. LOUIS, OF NEW YORK, N. Y.

AUTOMATIC RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 777,116, dated December 13, 1904.

Application filed March 4, 1903. Serial No. 146,082. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. LOUIS, a citizen of the United States, residing in New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Automatic Rheostats, of which the following is a specification.

This invention relates to automatic rheostats to be used in connection with incandescent lamps for spectacular effects, as in show-windows, art paintings, stage effects, and other places where it is desired to uniformly and continuously vary the brilliancy of the incandescent lamps in circuit therewith, and has for its object to provide an automatic means whereby resistance is uniformly and continuously cut in or out of the circuit containing the lamps, thereby uniformly varying the brilliancy of the same without the objectionable flickering attendant the rheostats hitherto in use when one or more resistance-coils are cut in or out of the circuit; and the invention has further for its object to provide an improved automatic rheostat the resistance-wire of which is connected with two banks of incandescent electric lamps and to provide means to uniformly cut resistance-wire in the circuit, so as to decrease the brilliancy of one bank of incandescent lamps and cut resistance-wire out of the circuit to simultaneously increase the brilliancy of the other bank of incandescent electric lamps, which lamps may be arranged in show-windows, in the scenery of theaters, and such other places where a uniformly-varying brilliancy of incandescent lamps mounted for such purposes is desirable and necessary. The lamps may be arranged more particularly in the frame of art paintings, in which case one bank of incandescent lamps is arranged on the front and another bank of incandescent lamps is arranged on the rear of the painting, the variation of the intensity of the light varying the color effects of the pigments of the paintings.

For this purpose the invention consists of an automatic rheostat comprising a drum, a resistance-wire wound spirally on said drum and connected electrically with incandescent lamps and a source of electric power, pedestals provided with bearings for the shaft of the drum, means for rotating the drum, a screw-spindle supported by the pedestals adjacent the drum and having the same pitch as the wire-wound drum, means for rotating the screw-spindle at the same velocity as the drum, guide-rods also supported by the pedestals, a slide-piece movable on said guide-rods and engaging the screw-spindle, contact-fingers on said slide-piece and touching the wire on the drum, but insulated from the screw-spindle, a conductor connected to the contact-fingers and to the positive terminal of a source of electric power, conductors connecting the ends of the resistance-wire on the drum with the positive terminals of two banks of incandescent electric lamps, a conductor connecting the negative terminals of the two banks of incandescent lamps with the negative terminal of the source of electric power, and means for changing the direction of rotation of the drum and screw-spindle, for changing the direction of reciprocation of the slide-piece provided with the contact-fingers, for changing the length of resistance-wire on the drum in circuit with either bank of lamps; and the invention consists, further, of certain details of construction and combination of parts, which will be described more fully hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my improved automatic rheostat, showing the same connected to two banks of electric incandescent lamps. Fig. 2 is a front elevation of Fig. 1. Fig. 3 is an end view of Fig. 1 drawn on a larger scale, showing the sprockets and chain transmission. Fig. 4 is a vertical transverse cross-section taken on line 4 4 of Fig. 1, also drawn on a larger scale; and Fig. 5 is a wiring diagram, showing the rheostat as connected in circuit with two banks of electric incandescent lamps.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a bed plate or board on which is screwed a pedestal B, provided with bearings *b'* for supporting the shaft S, on which is mounted a drum D, made of any suitable insulating material or of metal and lined with an insulat-

ing layer. The drum D is provided with grooves arranged spirally on the surface of the same, in which is placed a resistance-wire, preferably German silver, so as to be held in position thereby, but not entirely submerged therein. The ends of this wire pass from the cylindrical surface of the drum to the shaft S and are here connected to collector-rings which are insulated from the shaft. The shaft S is provided at one end with a pulley P, which is connected by a belt p^2 with a pulley p' on the shaft of an electric motor M, and provided at the other end with a sprocket e^3.

The pedestal B is provided with an extension B', in which the ends of two guide-rods b^2 are suitably supported. A screw-spindle is also mounted on the pedestal extension B' and is provided at one end with a sprocket e^2 of the same size as the sprocket e^3 at the end of the shaft S. A chain c passes over the sprockets e^2 e^3, so as to rotate the screw-spindle at the same velocity as the shaft S.

On the guide-rods b^2 is mounted a slide-piece E, provided with an extension E', which in turn is screw-threaded at its lower end E^2 and adapted to engage the screw-spindle W. Besides the guide-rods b^2 the pedestal extension B' is also provided with a contact-rod d, which is insulated from the pedestal extension, and with another rod n, which is movable and provided with lugs f f' at each end of the same. This rod n is loosely mounted on the pedestal extension and adapted to be reciprocated in the same and attached at one end to a handle of a reversing-switch K. One of the guide-rods b^2 is provided with two helical springs s s', which are connected at the inner side of the lugs f f' and are met by the reciprocating slide-piece at either end of its stroke and compressed. The resiliency of the springs actuate the movable rod w with rapidity, so as to throw the switch.

The ends of the resistance-wire, wound spirally on the drum D to the same thread as the screw-spindle W, are connected to collector-rings i i', on which rest suitable brushes or contact-fingers i^2 i^3. To prevent the brushes from slipping sidewise, the collector-rings are provided on their outer ends with guard-rings i^4 i^5. The brushes are mounted on the pedestal extensions, but insulated therefrom by insulating-plates g' g^2 and connected with the positive terminals of two banks of electric incandescent lamps, as shown in Fig. 1.

The slide-piece E is provided with contact-fingers h', which are insulated from the slide-piece E by a block of insulating material E^3 and adapted to slide on or touch the resistance-wire of the drum D. Electrically connected with the contact-fingers h' is a contact-maker h^2, which glides along the contact-rod d. Connected with the contact-rod d is a conductor leading to a binding-post j^3, which is connected with the positive terminal j^5 of a source of electrical power. One of the brushes—i^2, for instance—is electrically connected to a binding-post j', which is connected to the positive terminal of a bank of incandescent lamps L. The other brush, i^3, is similarly connected to a binding-post j^2, which is connected to the positive terminal of another bank of lamps L'. The negative terminals of these two banks of incandescent lamps are connected to the negative terminal j^4 of the source of electrical power.

The reversing-switch K, connected to the movable rod h, may be of any suitable construction or design, the two poles j^8 j^9 being connected with a source of electrical power j^6 j^7. The remaining poles k' k^2 k^3 k^4 are suitably connected with the terminals m' m^2 of the motor M, so that on operating the switch the polarity of the current to the armature of the motor is altered and the direction of rotation of the same changed.

In the construction of my improved automatic rheostat it is essential that the resistance-wire of the drum D be wound to the same thread as the screw-spindle W and that the velocity of the drum D and of the screw-spindle W be also the same, so that when the current of the motor is turned on and the drum and screw-spindle rotated the reciprocating slide-piece E is moved by the screw-spindle W with a speed corresponding to the "unwinding" of the resistance-wire of the drum D on the contact-fingers h'. By suitably connecting with the two banks of lamps described, and shown in the drawings, any number of other lamps many varied effects may be produced.

It is well known that some substances absorb certain rays of light and reflect some rays of light, assuming a constant source of light. When, however, the source of light is varied, the amount of reflected rays will also be varied. With these underlying principles I have found that if a number of lamps be arranged at the front top of an oil-painting and a number of lamps arranged at the rear top of the same the variation of the intensity of the lamps will change the color effects of the oil-painting remarkably when either one or the other of the lamps are varied. When the front top lamps are brightened, the rear top lamps are simultaneously darkened, and the effects of the paintings will be due to the reflection of the light, and when the front top lamps are darkened and the rear top lamps brightened the effects of the painting will be due to the penetrating of the light-rays through the painting, causing by the diffusion of the same through the pigments of the paintings entirely-different color effects than when most of the light-rays are reflected, due to the brightness of top front lamps. It is clear that the uniform but complementary variation of the intensity of the lamps will produce many varied effects, such as have not been heretofore known.

The operation of my improved rheostat is as follows: The slide-piece E, provided with the contact-fingers h', being at one end of the drum D, the power-circuit connecting with the terminals j^6 j^7 is closed, thereby starting the motor M. This motor transmits its power by pulleys P, p', and a belt p^2 to the shaft S, and the drum D is rotated thereby. Simultaneously the sprocket e^3 is rotated, and this transmits its power by chain e to sprocket e^2, which in turn rotates the screw-spindle W. Thereupon slide-piece E, which engages the threads of the screw-spindle W, is moved along the length of the spindle, and the contact-fingers h' make contact with the wire of the drum D in such a manner that the spirally-wound resistance-wire glides under the contact-fingers h' of the slide-piece E, and as the resistance-wire on one side of the slide-piece E is in series with one bank of lamps L' the length of the resistance-wire is continuously and uniformly cut out of circuit with the bank of lamps L'. Resistance being cut out, the brilliancy of the lamps is continually and uniformly increased until when all the resistance is cut out and the slide-piece E has reached the end of its stroke the lamps obtain their maximum brilliancy. Somewhat before the slide-piece E reaches the end of its stroke it is met by the helical spring s', connected with the lug f' on the movable rod n, and in continuing its stroke compresses the spring s'. This by its resiliency forces the rod n in the same direction and moves the handle of the reversing-switch K, changing thereby the polarity of the current to the motor M. This changes the rotation of the motor, drum, and screw-spindle, and the slide-piece E is moved by the screw-spindle W the length of its stroke, but now in a different direction than before. The resistance-wire of the drum which on the first stroke was cut out is now again cut in the circuit and the lamps L' continuously and uniformly decreased in brilliancy until when all the resistance-wire is cut in the circuit and the slide-piece E reaches the end of its stroke—that is, the position from which it started when the operation was begun—the lamps L are dark. Here it again engages a similar spring s and lug f, whereby the rod n and reversing-switch K is again actuated and the current to the motor M changed in polarity, changing thereby the direction of rotation of the motor. This changes again the direction of rotation of the drum and screw-spindle, the stroke of the slide-piece E is again repeated, and the brilliancy of the lamps L' increased.

So far but one bank of lamps has been considered. It will, however, be seen that as the ends of the resistance-wire of the drum D are connected with the two positive terminals of the two banks of lamps L and L', as shown in Figs. 1 and 5, and the length of this resistance-wire in circuit with each bank of lamps varied by the reciprocation of the slide-piece E the brilliancy of the two banks of lamps is complementary—that is, when one bank attains its maximum brilliancy the other attains its minimum brilliancy, and vice versa. Thus an improved means is provided whereby the brilliancy of incandescent lamps may be uniformly, continuously, and automatically varied without the objectionable flickering attendant the rheostats now in use when resistance-coils are cut in or out of circuit. For spectacular effects in art galleries two banks of lamps L L' are arranged and the lamps mounted on the top part of the frame of the painting at the front and rear of the same and connected with the ends of the resistance-wire of the drum D, as described. Thus on the reciprocation of the slide-piece E the resistance-wire on the drum D is simultaneously cut into circuit with one bank of lamps and cut out of circuit with the other bank of lamps and the brilliancy of the lamps correspondingly varied, producing by their uniform and continuous variation of brilliancy illuminating effects on the painting which bring out more clearly the artistic details of the same. For use in show-windows the lamps on the different sides of the window-frame are properly connected and by their uniform variation spectacular effects are produced, which appeal more to the eyes of the passers-by than the uniform brilliancy hitherto in use. Moreover, the varied illumination effects serve especially to bring out to greater advantage the desirable qualities of the commodities exhibited. In the illumination of scenery of theaters also varied desirable and fascinating effects may be produced, which serve to give the settings even greater magnificence and grandeur than hitherto produced.

My improved automatic rheostat offers many advantages over those now in use, inasmuch as it is automatic in operation and produces at the same time a uniform variation in the brilliancy of the lamps with which it is connected in circuit.

Having now described my invention, I claim as new and desire to secure by Letters Patent—

1. An automatic rheostat, comprising a drum, a resistance-wire wound spirally on said drum, fingers in contact with said resistance-wire and movable along the same, means for rotating said drum, means for reciprocating the contact-fingers, and means at each end of said drum for changing the direction of rotation of the drum and reciprocation of the contact-fingers, substantially as set forth.

2. An automatic rheostat, comprising a drum, a resistance-wire wound spirally on said drum, fingers in contact with said resistance-wire and movable along the same, an electric motor for rotating the drum, means for reciprocating the contact-fingers longitudinally of said drum, and means at each end

of said drum for reversing the motor and reciprocation of the contact-fingers, substantially as set forth.

3. In combination, with a rheostat, comprising a drum wound spirally with resistance-wire, a screw-spindle supported longitudinally of said drum, fingers in contact with said resistance-wire and movable by said screw-spindle, of means for rotating the drum and screw-spindle, and means at each end of said drum for reversing the direction of rotation of the drum and screw-spindle, substantially as set forth.

4. In combination, with a rheostat, comprising a drum wound spirally with resistance-wire, a screw-spindle longitudinally of said drum, fingers in contact with the resistance-wire on the drum movable by said screw-spindle, of an electric motor for rotating the drum and screw-spindle, a reversing-switch for said motor, and means for actuating the switch when the contact-fingers have reached either end of the drum, substantially as set forth.

5. An automatic rheostat, comprising a drum wound spirally with resistance-wire, fingers in contact with said resistance-wire and movable along the same, a screw-spindle, a slide-piece, fingers on said slide-piece and in contact with the resistance-wire on the drum, an electric motor for rotating the drum and screw-spindle, a reversing-switch, and means at each end of the drum engaged by the slide-piece for actuating the switch, substantially as set forth.

6. An automatic rheostat, comprising a drum, a shaft for said drum, a resistance-wire wound spirally on said drum, pedestals provided with bearings for the shaft, a screw-spindle supported by the pedestals, an electric motor for rotating the drum and screw-spindle, guide-rods supported by the pedestals, a reciprocating slide-piece moving on said guide-rods and screw-threaded for engaging the screw-spindle, contact-fingers on said slide-piece moving along the wire on the drum, but insulated from the slide-piece, a movable rod supported by the pedestals and adapted to be moved therein, a reversing-switch connected with the end of the movable rod, lugs on the movable rod at each end of the same, springs attached to the lugs to be engaged by the slide-piece at each end of the stroke for moving the rod, actuating the switch and reversing the direction of rotation of the electric motor, a conductor connected with the contact-fingers, and a conductor connected with one end of the wire on the drum, substantially as set forth.

7. An automatic rheostat, consisting of a drum, means for imparting rotary motion to said drum, a resistance-wire wound spirally on said drum, a screw-spindle adjacent said drum, a slide-piece engaging said screw-spindle movable longitudinally of said drum, contact-fingers carried by said slide-piece and moving along said resistance-wire, a conductor connected with the contact-fingers and with the positive terminal of a source of electric power, conductors connecting the ends of the resistance-wire on the drum with the positive terminals of two banks of incandescent lamps, and a conductor connecting the negative terminals of the banks of incandescent lamps with the negative terminal of the source of electric power, substantially as set forth.

8. An automatic rheostat, consisting of a drum, a resistance-wire wound spirally on said drum, means for rotating the drum, fingers placed in contact with said resistance-wire, means for moving the contact-fingers longitudinally over said drum, a conductor connected with the contact-fingers and to the positive terminal of a source of electric power, conductors connecting the ends of the resistance-wire on the drum with the positive terminals of two banks of incandescent lamps, one bank of lamps placed at the upper front part of an oil-painting and the other bank of lamps placed at the upper rear part of an oil-painting, and a conductor connecting the negative terminals of the banks of lamps with the negative terminal of the source of electric power, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

ROBERT J. LOUIS.

Witnesses:
C. P. GOEPEL,
HENRY J. SUHRBIER.