(Model.)

J. H. GUEST.

REGULATOR FOR ELECTRIC LIGHTS.

No. 254,546. Patented Mar. 7, 1882.

Fig. 1.

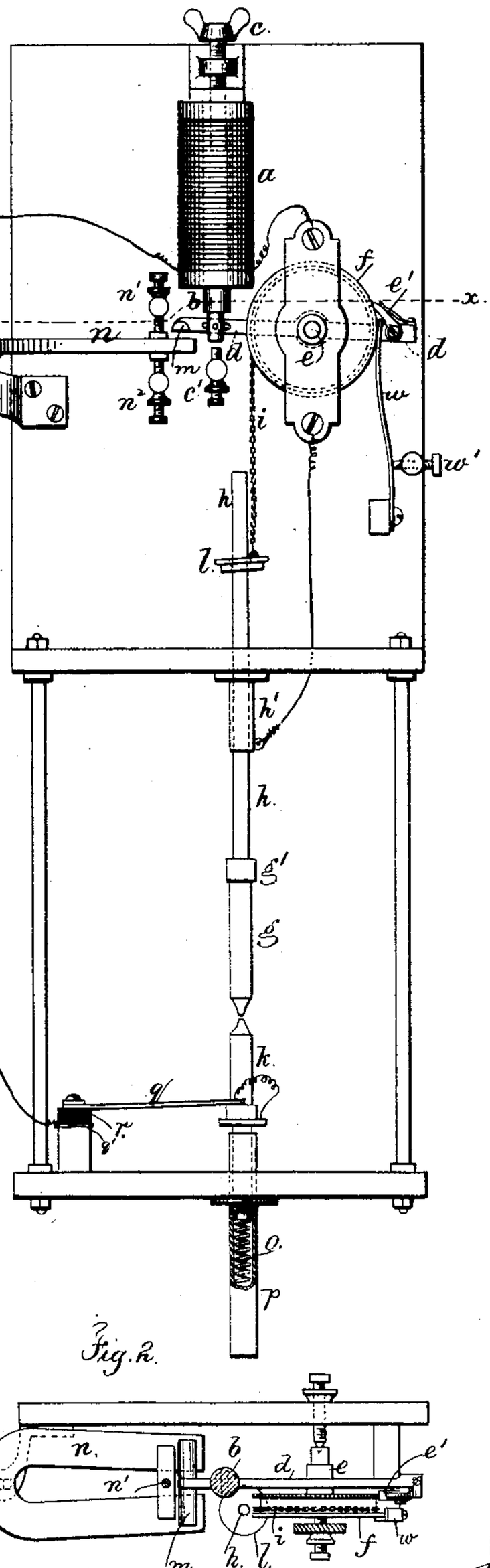


Fig. 2.

Fig. 3.

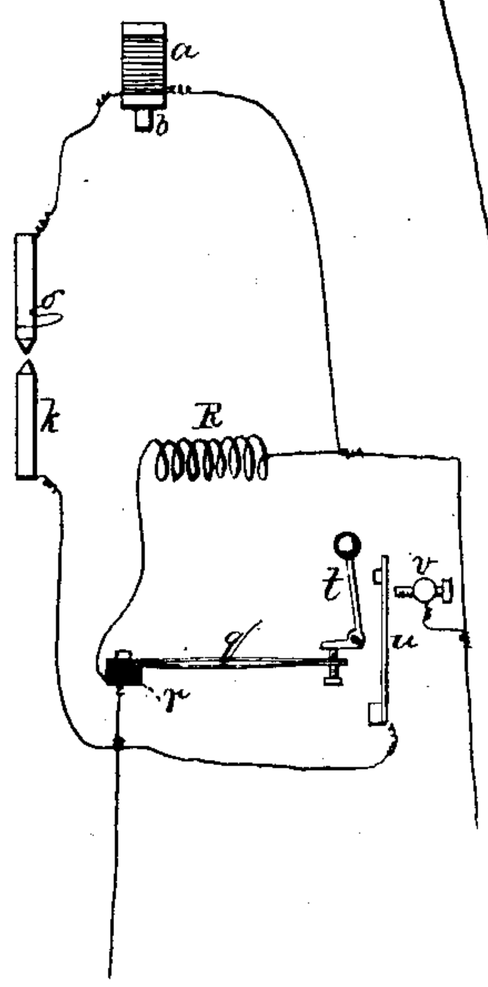
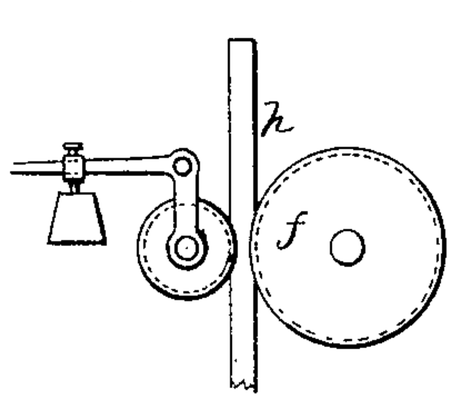


Fig. 4.



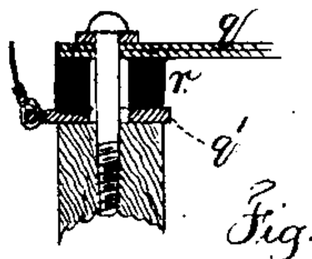
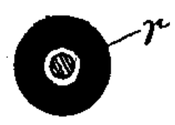


Fig. 5



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REGULATOR FOR ELECTRIC LIGHTS.

SPECIFICATION forming part of Letters Patent No. 254,546, dated March 7, 1882.

Application filed August 30, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOHN H. GUEST, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Regulators for Electric Lamps, of which the following is a specification.

Before my invention an electric-light-regulating apparatus had been made in which the electric current was caused to develop heat, and the expansion of different metals under varying degrees of heat was employed to determine the relative position of the carbons to each other and thereby the electric arc between the electrodes.

In my present improvement I make use of an axial electro-magnet and a lever to move one of the carbons and feed it gradually toward the other as the electrodes are consumed, and with this a permanent magnet is employed, so as to cause the lever and axial magnet to operate with great promptness as soon as the current becomes weakened by the increased length of arc between the electrodes, and I construct a thermostatic regulator of two different metals in contact with a piece of carbon or similar material, that becomes heated in consequence of the resistance offered to the electric current passing through the same. The conducted heat from the carbon to the thermostat operates the latter and moves one of the carbons, and regulates with accuracy the length of the arc between the carbons, and consequently the light, so as to obtain great uniformity.

In thermostat devices that have heretofore been employed the two strips of different metals have been acted upon by the current passing directly through them; but they had to be small and delicate to offer sufficient resistance to the electric current to become more or less heated. By my improvement I am enabled to make the thermostat strong and reliable, because the heat is not developed in itself, but it is conducted into the thermostat from the block of carbon or similar material in which the heat is developed.

In the drawings, Figure 1 is an elevation of my improvements. Fig. 2 is a plan view below the line *x x;* and Fig. 3 is a diagram illustrating the thermostat and a circuit-closing device in a shunt, to short-circuit the current in case of injury to any one lamp, and thereby prevent the extinguishing of other lights in the same circuit.

The helix *a* is provided with an endwise moving core, *b*, to form an axial electro-magnet. The core *b* has a limited movement between the adjusting-screws *c c';* and *d* is a lever connected with the core *b* and moving on a pivot, *e*.

The wheel *f* is adapted to be moved by the pawl *e'* upon the lever *d*, such pawl taking teeth in the wheel *f;* or by preference the wheel *f* may have a cylindrical rim, and a clamp be substituted for the pawl *e'*, said clamp being similar to the clamp in a wheel-feed sewing-machine, so that in either case the wheel *f* is moved gradually and progressively every time the core of the axial magnet moves downwardly. I employ this motion to feed one carbon toward the other as they are consumed.

The carbon electrode *g* is in a suitable clamp, *g'*, at the lower end of a rod, *h*, and this rod is guided in a suitable tube or slide, *h'*, so as to move in line with the other electrode or carbon, *k*.

Around the wheel *f* there is a chain, *i*, that is sufficiently heavy for the electric current to pass through the same without its becoming highly heated, and at the lower end of the chain a clamping-ring, *l*, is suspended, said ring surrounding the rod *h*, and the chain is connected near one edge of the ring. Hence the upper edge of the ring at one side and the lower edge at the other side gripe against the surface of the rod *h*, and suspend it in consequence of the ring being suspended at one side, and assuming a slightly-inclined position; but when this ring is held level by the hand the rod may be slipped freely through the ring or the ring moved over the rod. The spring *w* acts against the wheel *f*, and its pressure and friction should be regulated by the screw *w'*, so that the weight of the carbon-holding rod and carbon will not turn this wheel.

The electric current passes through the helix of the axial magnet and through the respective carbon electrodes, and the light is given between the electrodes as now usual. The devises thus far described are for lowering the upper carbon toward the lower one as the carbon is consumed. When the consumption of carbon increases the length of the electric arc the resistance becomes greater, the current lessens, and the core of the axial magnet de-

scends, and in so doing swings the lever *d* and turns the wheel *f*, so as to lower the electrode. The adjustment effected by the screws *c* and *c'* prevents the movement of the core being more than is necessary to cause the proper feed of the carbon.

The foregoing means will under ordinary circumstances operate the device that feeds the carbon; but to insure rapidity of downward movement in the core I sometimes make use of an armature, *m*, upon the lever *d*, and a permanent magnet, *n*, adjacent thereto, the same being adjustable by the screws *n'* and *n²* nearer to or farther from the armature *m*. Hence when the magnetism of the axial magnet lessens and the core begins to descend, the armature *m* is brought nearer to the permanent magnet, and the attractive force of said permanent magnet serves to accelerate the movement of the lever and insure the full stroke thereof, even though the electric current is augmented as the electrodes become nearer together.

If desired, the wheel *f* may act directly upon the rod *h*, there being a yielding roller at the opposite side of the rod to produce the necessary frictional contact, as shown in the detached view, Fig. 4.

A thermostat has heretofore been employed to adjust the carbons according to the heat developed by the electric current passing through such thermostat; but these devices, being very delicate, are liable to injury. I make use of a spring, *o*, within a case, *p*, to elevate the lower-carbon holder and carbon *k*, and keep it toward the upper carbon, *g*, and I also use a strong thermostat, *q*, made of bars of brass and steel or other metals of different expansive powers, so that when heated the forked end acts in the opposite direction to the spring and presses down upon the carbon-holder, and moves it and the electrode to increase the distance and lessen the current enough to cause a decrease in the heat of the thermostat. The block of carbon *r*, or similar material, offers sufficient resistance to the electric current passing through it to become heated, and to change its temperature according to the strength of the current the thermostat-bars are clamped firmly to the carbon block near one end, and the heat passes therefrom to the thermostat by conduction, and the thermostat regulates with the greatest accuracy the length of the electric arc, so as to maintain uniformity of light. The electric current also by preference passes through the thermostat-bars.

The thermostat and its block of carbon to heat the same may also be used to open and close a shunt-circuit in cases where any one lamp in a circuit containing several lamps may become injured. This is applied in the manner shown in the diagram Fig. 3. In this there is a shunt between the line-wires, in which are the carbon block *r* and a rheostat or resistance, R, the combined resistance of the carbon block and rheostat being greater than that of the lamp. When the lamp fails to give light in consequence of the carbons becoming separated the entire current is obliged to pass through this shunt, and the temperature of the carbon block *r* and thermostat is raised, and the thermostat operates a short-circuiting device—such as the weighted lever *t*—that falls over and closes contact between the spring *u* and the adjustable stop *v*, and establishes the current through the short-circuit connection, which prevents the other lamps in the circuit being extinguished.

The resistance-coil R may surround the thermostat *q*, so as to aid in heating the same by the heat generated in the coil.

In Fig. 5 I have shown a vertical section and sectional plan of the carbon and circuit connections to the thermostat-bars. The thermostat-bars *q* and metal plate or ring *q'*, to which the circuit-wire is connected, must be firmly clamped at opposite sides of the carbon, and a convenient manner of so doing is by a screw that passes freely through the carbon *r* and plate *q*, so as to be insulated from the same, as shown; but two screws and a bridge across the thermostat-bars might be used.

I claim as my invention—

1. The combination, with the axial electromagnet, the lever, pawl, and feed-wheel, of an armature on the lever, and a permanent magnet, and the circuit-connections and electrodes of an electric light, substantially as set forth.

2. The combination, with a thermostat, of a block of carbon or similar material and electric-circuit connections passing through the carbon, substantially as set forth, whereby the thermostat is heated by conduction from the carbon.

3. The combination, in an electric lamp, of two electrodes, a thermostat operated by the heat developed from the current and acting to separate the electrodes, an axial electromagnet, a lever and pawl, a feed-wheel, and a connection from the same to one electrode for feeding the carbon, substantially as set forth.

4. The thermostat-bars *q*, carbon block *r*, and circuit plate or ring *q'* at the opposite side of the carbon block, in combination with the clamping screw or screws to bind the parts together, substantially as set forth.

5. The combination, with an electric lamp, of a resistance and a thermostat in a shunt around the lamp, and a circuit-closing device operated by the thermostat to short-circuit the current, substantially as set forth.

6. The combination, in an electric lamp, of an axial magnet, a permanent magnet, a lever, a wheel, a pawl, the carbon and carbon-holder, a connection from the latter to the wheel, and a friction device applied to the wheel, substantially as set forth.

Signed by me this 27th day of August, A. D. 1880.

J. H. GUEST.

Witnesses:
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