(No Model.)

S. E. NUTTING.

ELECTRIC ARC LAMP.

No. 543,399. Patented July 23, 1895.

Fig. II

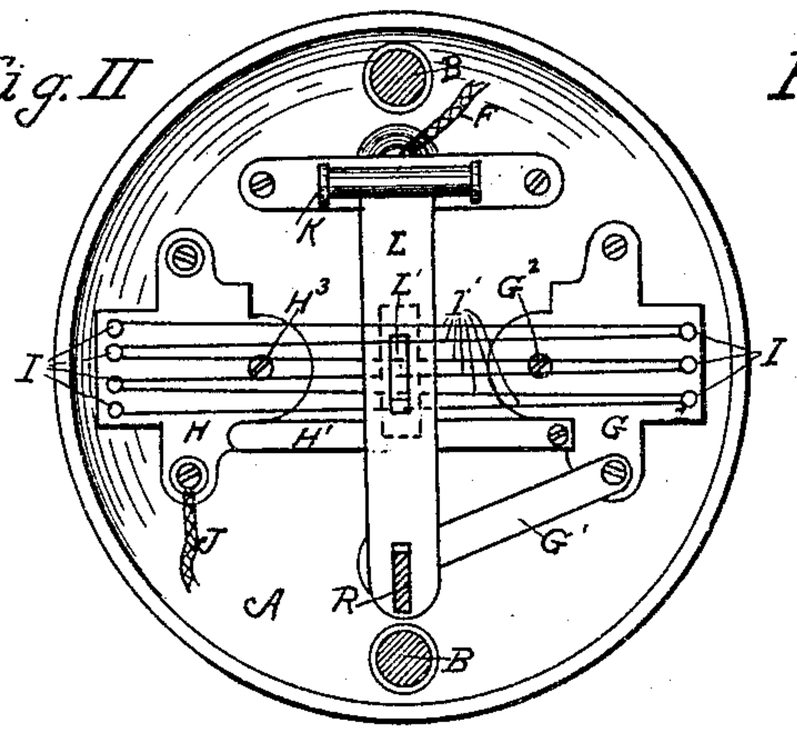


Fig. III

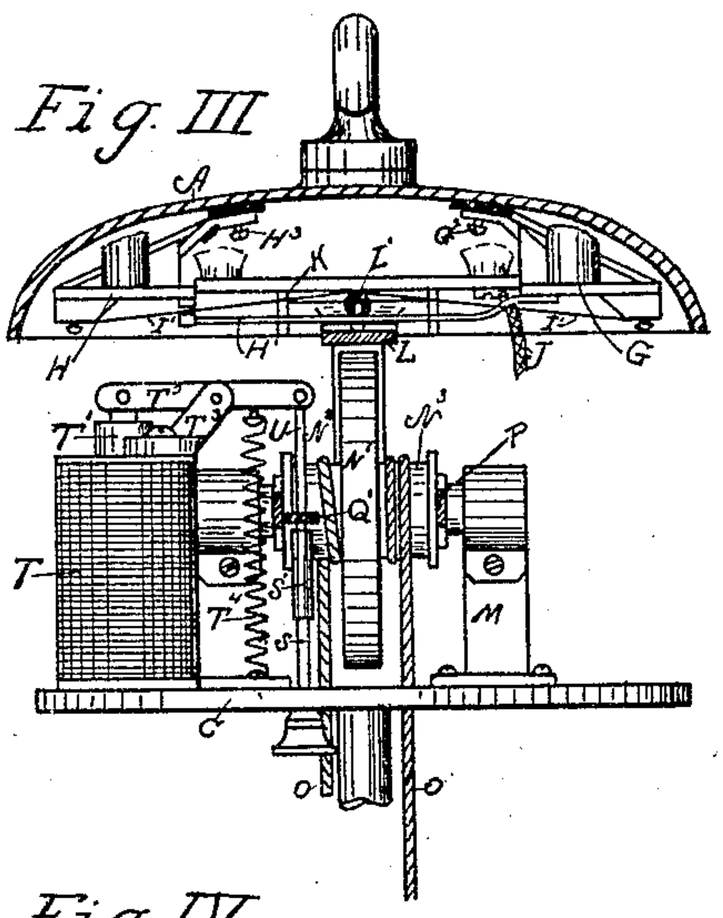


Fig. IV

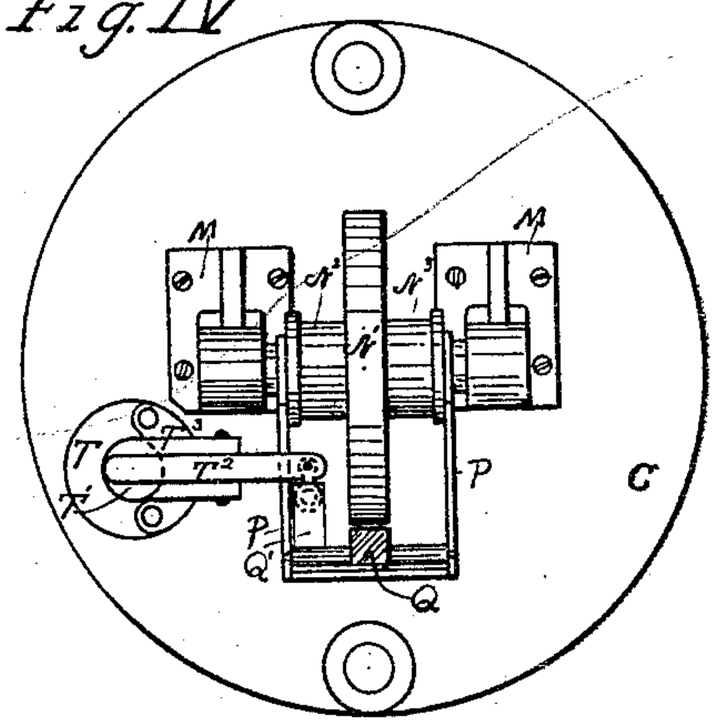
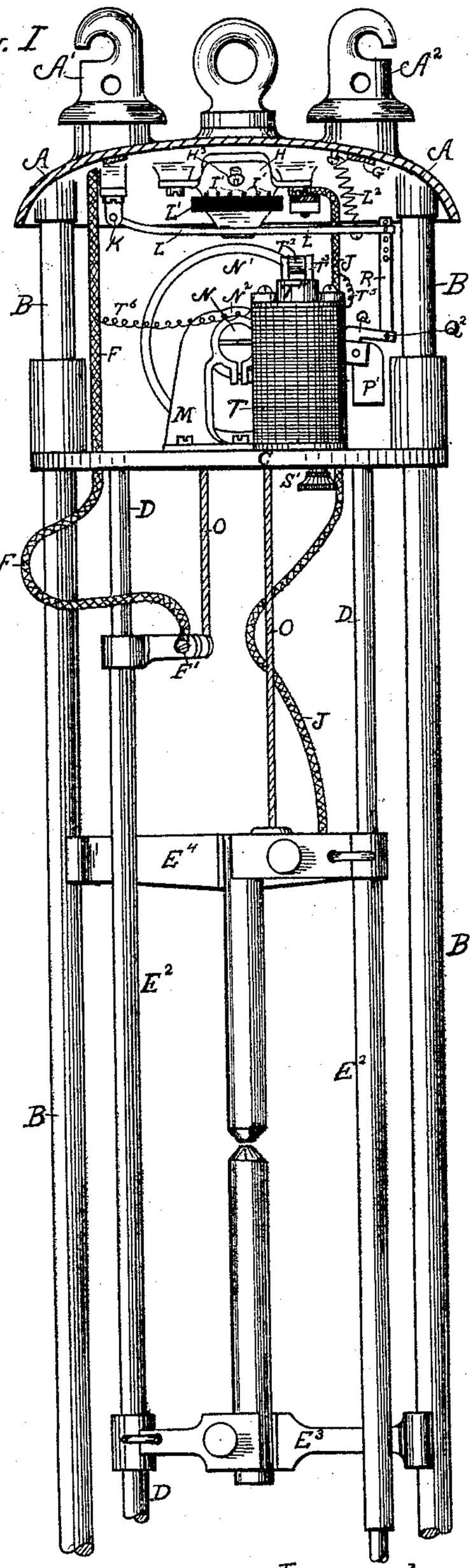


Fig. I



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SAMUEL E. NUTTING, OF OAK PARK, ASSIGNOR TO GEORGE W. FURBECK AND JOSEPH KETTLESTRINGS, OF CHICAGO, ILLINOIS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 543,399, dated July 23, 1895.

Application filed October 5, 1894. Serial No. 524,949. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL E. NUTTING, of Oak Park, Cook county, Illinois, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates to arc lamps known as "series" lamps, or those in which the current-supply is kept practically constant and each lamp is required to control its own arc independent of others in the circuit; and its object is to provide a shunt in such a lamp capable of releasing the carbons and allowing them to approach each other without disturbing the arc-drawing device, especially when the arc-drawing device is one employing the expansive effect of heat due to the current of the lamp passing resistance.

In the drawings, Figure 1 represents a front elevation of my improved lamp with a portion of the lower end of the frame with the cross-bar connecting the frame together broken away. The cover and a portion of the works at the top are in section to allow a view of the construction. Fig. 2 represents a plan view of the cover, looking up from below; Fig. 3, a side elevation, partly in section, of the feeding mechanism; and Fig. 4 a plan view of the base-plate, showing location of brake-wheel, shunt, and trip mechanism.

In my preferred construction, as illustrated in the drawings, I employ a cover A, depending side rods B B, secured to the cover at one end and connected together at the other by a cross-bar. (Not shown.) A plate or base C is mounted upon the side rods at a suitable distance from the cover and adapted to carry a portion of the working mechanism. Supplemental side rods D D are placed between the main side rods B B and extend from the base C to the cross-bar at the bottom. Both are insulated from the other portions of the frame and from each other. Mounted upon these rods D D are cross-heads E^3 and E^4, each having an extended bearing E^2 and E^2 attached and adapted to slide freely upon their respective rods. Both cross-heads are insulated from the outside rods, but each engages loosely with one of the rods to guide its outer end. A suitable clamp is provided each cross-head for holding the carbon.

Upon the base C, I mount a brake-wheel N′ in suitable bearings. The drums N^2 and N^3 are fixed with the brake-wheel upon its shaft. A chain O is attached at one end to the cross-head E^3 through a projecting portion attached to the upper end of the extension E^2, but insulated therefrom. It then passes up through the plate C, around the drum N^2, through the wheel N′, around the drum N^3, down through the plate C again to the cross-head E^4, where it is attached through an insulator. The chain is wound upon the drums in such a manner that any movement of the wheel upon its axis will move both carbons, but in opposite directions.

A swinging frame P is loosely mounted upon the axle of the wheel N′ outside the drums N^2 and N^3. A brake Q is mounted in the outer end of this frame and adapted to bear against the wheel when drawn up by its outwardly-extended end Q^2, and inwardly-extending portion of the brake Q′ is provided to engage with the stop or trip S′ for releasing the brake from the wheel.

I mount the shunt coil or magnet T also upon the plate C. This coil is provided with a movable core T′, a lever T^2, connected with the core and pivoted to the extended bracket T^3. A link U connects the outer end of the lever to the stop or trip S′. This trip S′ is loosely mounted upon a stationary post S and is adapted to be moved up and down the post by a movement of the lever T^2. The retracting-spring T^4 is adapted to act against the pull of the magnet.

Mounted upon the cover A, I have arranged a device for obtaining a movement from the expansive effect of heat suitable for separating the carbons and establishing the arc.

G and H are two similar brackets secured to the cover, but insulated from it. In the outer end of each of these brackets I fix a row of pins I I. Back and forth around these pins a small steel wire I′ is tightly drawn and the ends secured to the outside pins on one of the brackets. The screws G^2 and H^3 serve to tilt the brackets slightly and alter the tension of the wire when required. The lever L, with its bridge L′, is drawn tightly against the wires by the spring L^2. This lever is pivoted at one end to the fixed bracket K, so as to be

free to move up and down as the wires are expanded or contracted. A link R connects the free end of the lever to the extending portion of the brake Q^2. The bridge L′ is an insulator and serves to keep the current from passing to the lever.

The metal spring H′ is a safety device for electrically connecting the brackets G and H when excessive current is required to pass through the lamp.

Binding posts or terminals A′ and A^2 are provided for connecting the lamp in circuit. Terminal A′ is connected to the lower-carbon holder or cross-head E^3 by a flexible conductor F at F′. Terminal A^2 is connected to the bracket G by the metallic strip G′. The bracket H is connected to the upper-carbon holder or cross-head E^4 by a flexible conductor J.

The shunt or derived circuit T is connected to the conductors J and F through the wires T^5 and T^6.

The operation of my invention is as follows: The current entering the lamp at the terminal A^2 passes through the strip G′ to the bracket G. There dividing between the small wires it passes across through them to the bracket H, then through the conductor J to the upper carbon, from the upper carbon to the lower, up through the extension of the cross-head E^3 and conductor F to the other terminal of the lamp A′, thus completing the main circuit. The shunt or derived circuit leaves the main circuit through the wire T^5, passes through the high resistance on electromagnet T, and out to main circuit again through T^6. The main current in passing from the bracket G to bracket H heats the small wires I′ and expands them, allowing the spring L^2 to draw up the free end of the lever and with it the link and projecting end of the brake Q^2. This tilts the brake against the wheel, raises the projecting tongue Q′ away from the trip S′, rotates the wheel and separates the carbons, thus establishing the arc. As long as the current is maintained constant, or nearly so, the lever and brake remain up and nearly stationary. The arc being established and resistance thus introduced into the lamp-circuit a current begins to pass through the shunt-circuit, energizing the magnet T. Thereupon the lever T^2 is moved up at its outer end, carrying the trip to a higher position. As the arc grows longer the shunt becomes stronger until trip S′ comes in contact with Q′, tilts the brake Q back, releases the wheel, and allows the carbons to approach each other. This weakens the shunt and allows the trip to retract and the brake to again engage with the wheel.

In case two or more of these lamps are run in series on what is known as a "constant-potential" circuit, and the constancy of the current depends largely upon the lamps themselves or the resistance of their arcs, the operation is somewhat different. Here the arc-drawing mechanism varies because of a variation in the current at times, while the shunt or tripping device is less decided in its action. Both the arc-drawing device and the shunt tend to keep the arc constant in length and resistance. My invention applies to both conditions.

It will be seen from the foregoing that the operating parts of the shunt have no direct connection with and are movable independent of the arc-drawing mechanism. This simplifies the construction and operation and is desirable when a heat device is employed in conjunction with the shunt to operate the lamp because of the unyielding character of the heat movement.

In referring to the part S′ I call it a "trip." By this I desire to be understood as meaning a point with which the clamping or holding device must come in contact in order to be disengaged or released from its hold.

What I claim as new and of my invention is—

1. In an arc lamp the combination of a device for separating and moving the carbons consisting of an electric conductor attached to fixed brackets at each end and adapted to expand by heat from the main current, a carbon carrier, a clamping device adapted to engage with the carbon carrier, means for communicating the expansive movement of the conductor to the clamping device and a device actuated by a derived or shunt circuit around the arc for releasing the carbon carrier from the clamping device, substantially as shown and described.

2. In an arc lamp, the combination of a device actuated by heat from an electric current passing through the lamp, a brake-wheel suitably mounted upon its shaft, a swinging-frame, a brake pivoted in the swinging-frame and adapted to engage with the brake-wheel, means adapted to communicate the action of the heat device to the brake, and a shunt circuit around the arc adapted to move an independent trip and release the brake from the brake-wheel, substantially as set forth.

3. In an arc lamp the combination of a device actuated by heat from an electric current passing through the lamp, a brake wheel suitably mounted upon its shaft, a swinging frame pivoted concentrically with the brake wheel, a brake pivoted in the swinging frame and adapted to engage with the brake wheel, a lever and link adapted to communicate the action of the heat device to the brake, and a shunt circuit around the arc adapted to release the brake wheel from the brake, substantially as set forth.

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