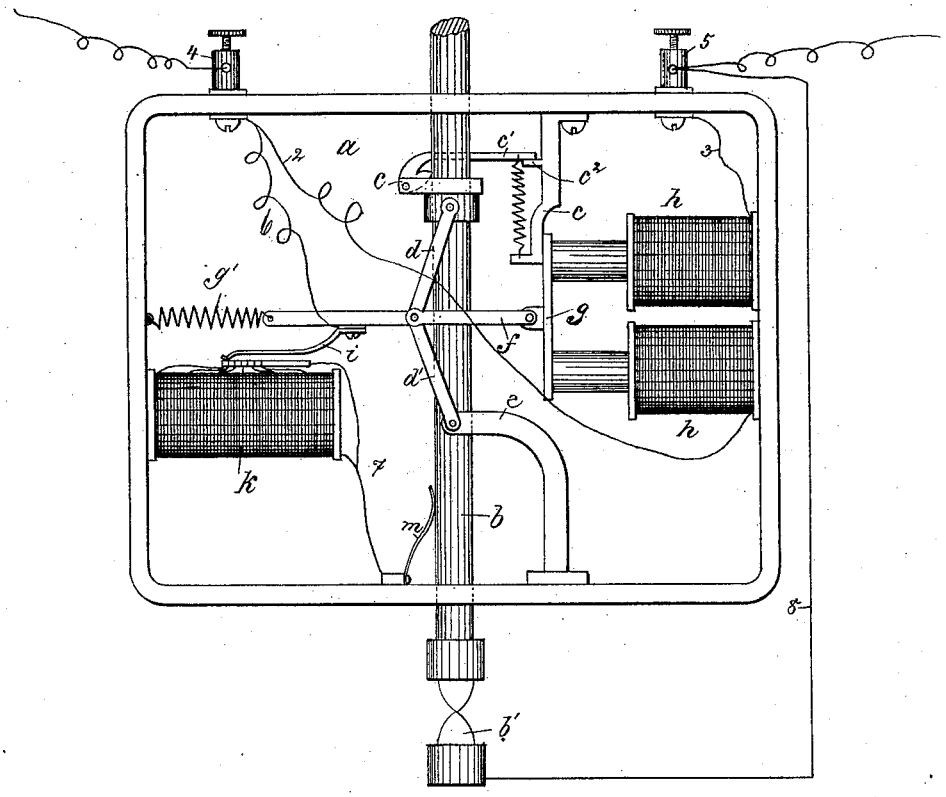
(No Model.)

J. J. SKINNER.

ELECTRIC ARC LAMP.

No. 304,673. Patented Sept. 2, 1884.



Witnesses.
Henry Marsh.
Arthur Tipperlen.

Inventor.
Joseph J. Skinner.
by Crosby & Gregory
Attys.

UNITED STATES PATENT OFFICE.

JOSEPH J. SKINNER, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 304,673, dated September 2, 1884.

Application filed February 18, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. SKINNER, of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Electric Lamps, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

My invention relates to an electric lamp of that class in which the carbons are controlled by a single magnet included in a shunt-circuit around the carbons and arc.

The present invention consists, essentially, in the combination, with the controlling-magnet placed in a shunt-circuit, of appliances whereby the said magnet is energized when the carbons are in contact, and while the arc-resistance is small, the said magnet operating by its continued attraction to first separate the carbons and establish the arc, and subsequently to produce the feed of the carbon, when the strength of the said magnet is still further increased by the lengthening of the arc due to the consumption of the carbons. The lamp is provided with resistance, which, before the current begins to flow, is included in the main circuit through the carbons, and thus causes a sufficient portion of the current to pass through the shunt-magnet to energize the latter, the armature of which is connected with the usual clamp or carbon-controlling device in such a manner that the said armature in its movement caused by the attraction of its magnet will lift the upper carbon, thus establishing the arc, which, by its resistance, tends to still further strengthen the said magnet. The armature also operates a circuit controller or switch, which removes the resistance from the main circuit, preferably gradually in proportion as the arc is lengthened, so that the resistance of the arc takes the place of that removed from the circuit.

The drawing shows in front elevation an electric lamp embodying this invention, the front plate of the lamp box or frame being removed.

The lamp-box *a*, upper carbon or carbon-holding rod, *b*, and the clamp *c*, or carbon-controlling device may be of any suitable or usual construction, the said clamp being shown in this instance as connected with one end of a toggle-jointed or elbow-lever, *d d'*, the other end of which is pivoted on an arm, *e*, fixed with relation to the lamp-box. The joint of the lever *d d'* is connected by a link, *f*, with the armature or cores *g* of the controlling magnet or solenoid *h* of the lamp in such a manner that by the continuous movement of the said armature toward its magnet, the toggle-lever is first straightened, separating its ends and raising the upper end, and connected clamp *c*, after which by the further movement of the armature, the lever is again bent, causing its ends to be drawn together, or the clamp *c* connected with the movable end to be lowered, so that the arm *c'* of the clamp-jaw *c* will ultimately be brought against the stop or tripping projection c^2, causing the jaw to relax its pressure on the carbon-rod and permitting the latter to feed by gravity in the usual manner.

The magnet *h* is included in a shunt or derived circuit, 2 3, from the main circuit entering the lamp at the binding-post 4, and leaving it at the binding-post 5, the said main circuit being continued by wire 6 to a circuit-controlling device, *i*, operatively connected with the armature *g* of the magnet *h*. The main circuit is continued from the circuit-controlling device or contact-spring *i* through a greater or less portion of the resistance *k* to the wire 7, connected by a suitable contact spring or brush, *m*, with the upper carbon, from which the main circuit is continued to the lower carbon, *b'*, and thence by wire 8 to the binding-post 5. The spring *i* preferably co-operates with a series of contacts connected with the different portions of the resistance *k* in such manner that when the armature *g* is wholly retracted, as before the current begins to flow, the whole or the greater portion of the said resistance *k* will be in the main circuit, so that, although the carbons are in contact and offer but little resistance, nevertheless a considerable portion of the current will be caused to pass through the shunt 2 3 and magnet *h*, energizing the latter, so that it attracts its armature *g*, thus straightening the toggle-lever, raising the carbon, and establishing the arc. As soon as the carbons are separated the arc itself will offer sufficient resistance to cause the magnet *h* to be energized the necessary amount,

and consequently the resistance *k* may be removed from the main circuit, and the magnet *h* will then be affected by the variations in resistance of the arc alone in the usual manner.

The circuit-controlling device *i* and its cooperating contact-points are preferably so arranged that in the movement of the armature by which the lever is straightened the resistance *k* will be gradually removed from the circuit, the portion removed being replaced by the preferably somewhat greater resistance of the increasing arc, and by the time that the lever is straightened so that the clamp is raised to its highest point the said resistance *k* will preferably be wholly removed. Then as the carbon burns away, increasing the length of the arc, the attractive strength of the magnet *h* is proportionately increased, moving the joint of the toggle-lever beyond the central line, and thus drawing the ends of the lever together and gradually depressing the clamp, thus tending to move the carbon downward to compensate for its consumption, until finally the clamp is moved down to the point at which the arm *c'* is engaged and the pressure of the clamp-jaw relaxed by the tripping projection c^2, thus permitting the carbon to slip and feed in the usual manner.

The armature *g* has a suitable retractor, (shown as a spring, *g'*,) and the bracket c^3 serves as a stop to limit the movement of the armature away from its magnet.

In other lamps with which I am acquainted, in which an initial resistance causes the energizing of a shunt-magnet, which subsequently governs the feeding of the carbons, this initial resistance is removed before the establishment of the arc, and the latter operation is accomplished by a retractor acting in opposition to the shunt-magnet, while in the present invention the initial resistance is removed during or after the establishment of the arc, and the arc is established by the direct pull of the shunt-magnet.

The mechanical devices which I have employed in carrying out the present invention are substantially the same as those shown and described in Letters Patent to E. Thomson, No. 274,413, dated March 20, 1883.

I claim—

1. The carbon-controlling device or clamp and the controlling-magnet, in a shunt around the carbons, and the armature of the said magnet, combined with the actuating mechanism for the said clamp connected with the said armature, and adapted to produce in the continuous movement of the armature in one direction a movement of the clamp first in one and then in the opposite direction, and resistance controlled by the said armature, whereby the magnet is caused to be energized before and during the establishment of the arc, substantially as described.

2. The controlling-magnet in a shunt around the carbons, and the clamp connected with the armature of the said magnet, and operated by the attraction thereof to establish the arc, combined with resistance, and a circuit-controlling device therefor operatively connected with the said armature, whereby the said resistance is included in circuit with the carbons when the armature is retracted, and removed by the movement of the said armature when attracted to establish the arc, substantially as described.

3. The clamp and controlling magnet in a shunt around the carbons, and an armature and a toggle-lever connected with the said clamp and armature, combined with resistance, and a circuit-controlling device therefor, operated by the said armature to place the said resistance in circuit with the carbons when the armature is retracted, and remove it therefrom when the magnet is energized to establish the arc, substantially as described.

4. In an electric lamp, a controlling magnet in a shunt-circuit around the carbons, and a carbon-clamp operated by the attraction of the said magnet to establish the arc, combined with resistance included in the circuit of the carbons while the latter are in contact, and a controlling device for said resistance operated by the said controlling-magnet, whereby the said resistance is gradually removed from the circuit of the carbons as the latter are separated and the arc-resistance produced, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH J. SKINNER.

Witnesses:
JOS. P. LIVERMORE,
W. H. SIGSTON.