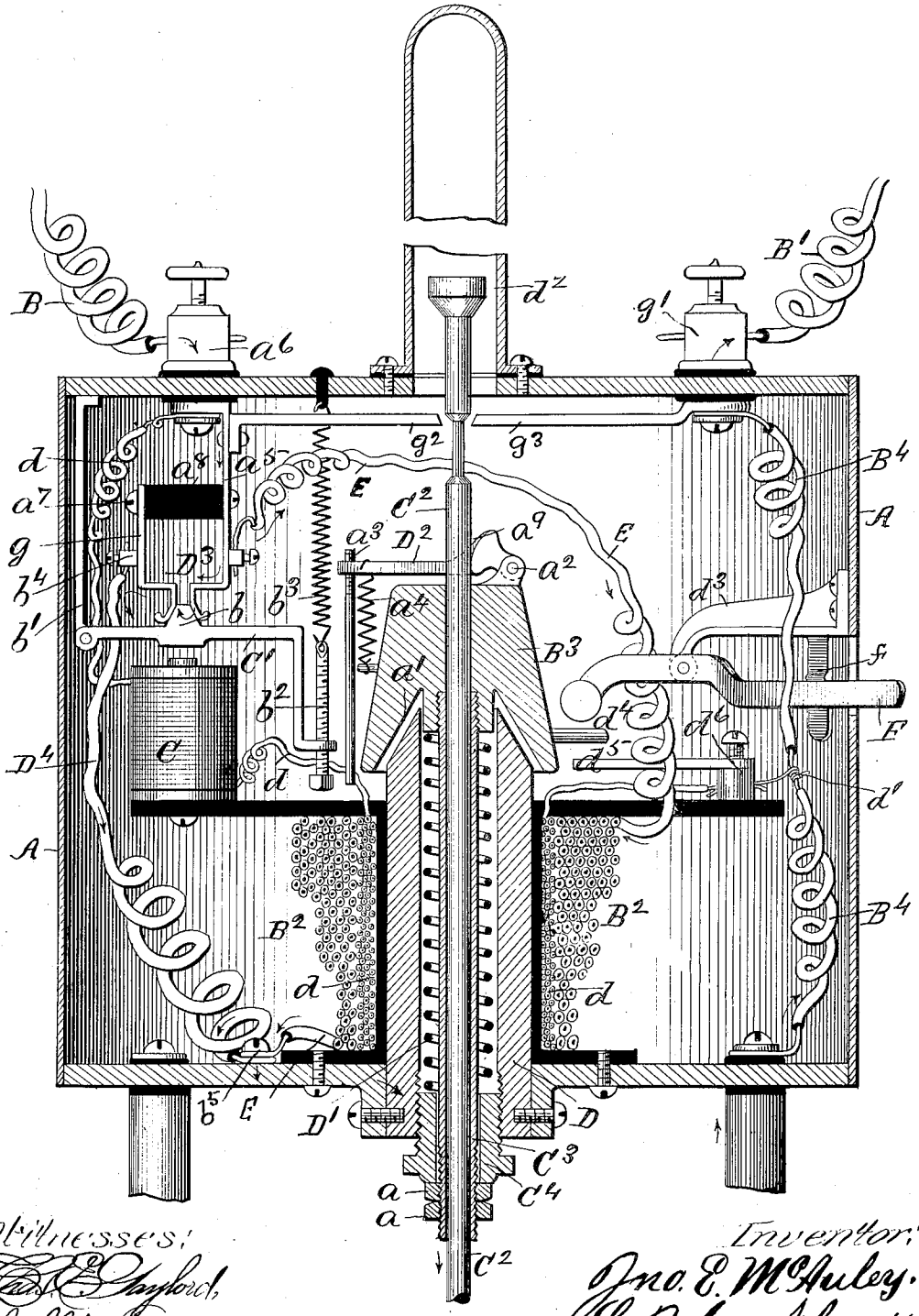
(No Model.)

J. E. McAULEY.

ELECTRIC ARC LAMP.

No. 454,443. Patented June 16, 1891.



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UNITED STATES PATENT OFFICE.

JOHN E. McAULEY, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO THOMAS F. VAUGHN, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 454,443, dated June 16, 1891.

Application filed April 21, 1890. Serial No. 348,789. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. McAULEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a full, clear, and exact description, that will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to certain new and useful improvements in electric lamps, and has for its object to provide an arc lamp of the character and embodying the improvements hereinafter described, and set forth in the claims.

The accompanying drawing represents in vertical section a well-known form of lamp with my improvements applied thereto.

A denotes the usual metallic inclosing case; B B′, respectively, the positive and negative connections.

B^2 is the main electro-magnet, and C is a small auxiliary magnet. D is the tubular core of the main magnet, and B^3 is its armature. Screwed into the under side of this armature is the metallic sleeve C^3, through which passes the carbon-rod C^2. Pivoted to an ear a^2, upon the upper side of the armature B^3, is the carbon-clutch rod D^2, said clutch-rod being provided with an eccentric face or cam a^9, adapted to hold the carbon in the sleeve C^3. Into the lower end of the core D of the main magnet is screwed the collar C^4, and upon the lower threaded end of the sleeve C^3, below the collar C^4, are suitable jam-nuts a. A spiral spring D encircles the sleeve C^3 in the hollow of the core D. This spring, reacting between the collar C^4 and the armature B^3, holds the armature away from the core with a force which may be regulated by screwing the collar C^4 into the lower end of the core, so as to increase or diminish the tension of the spring and require a greater or less force in the magnet to attract the armature.

In order to provide as large an area of the contact-surfaces between the core D and the armature B^3 as possible, the end of the core is beveled or chamfered off, as shown in the drawing, and the armature is provided on its under side with the conical recess a'. The cam-surface a^9 of the clutch-rod D^2 is kept normally in contact with the carbon-rod by a small spring a^4, fastened at its lower end to the armature and at the other end to the outer end of the clutch-rod.

a^3 denotes a threaded pin screwed into the end of the rod and extending down nearly to the magnet, so that when the armature is attracted by the magnet to the pin it will strike the latter and trip the clutch-rod, thus allowing the carbon stick to fall.

C′ is the armature of the auxiliary magnet C. It is pivoted at one end to a bracket b', depending from the top of the casing, and is held away from the magnet by a spring b^3, connected at one end with the top of the casing and at the other with an adjustable threaded pin b^2, screwed into the free end of the armature C′.

D^3 is a cut-out, consisting in the present instance of the bar a^5, having an insulated connection at its upper end with the positive binding-post and extending down into proximity with the armature C′.

g is the other arm of the cut-out, shaped like the bar a^5 and connected with and supported from the latter by the insulating-block a^8, to which it is fastened by a screw a^7. The arms g and a^5 extend for some distance parallel with each other, being bent inwardly at their lower portions and having their extreme ends bent back upon themselves and diverging, as shown, so as to receive between them a wedge-shaped rib or projection b on the upper side of the armature C′, the object of this formation of the end of the conductor and the armature being for the purpose of affording a sufficient area of contacting surfaces.

D^4 denotes the main wire through which the current passes to the carbon, this wire being connected to arm g of the conductor at its upper end by the binding-screw b^4 and to the bottom of the casing by the screw b^5.

B^4 is the return-wire connecting the lower carbon-rod with the negative binding-post g'. The auxiliary magnet C has one end of its coil d connected with the positive binding-post, and after being wound about the main

magnet B^2 has its opposite end connected to the negative wire B^4 at d'.

E is a large wire connected at one end to the arm a^5 of the conductor D^3 and at the other end, after being coiled around the main magnet B^2, to the screw b^5, which fastens the main wire D^4 to the bottom of the casing.

F is a thumb-lever pivoted midway of its length in the bracket d^3 and projecting through a slot in the casing. A small spring-brake f serves to hold the lever in either of two positions.

Projecting from one side of the armature B^3 is a pin d^4, adapted to make contact with an arm d^5, extending from the post d^6 on the main magnet when the armature is depressed, so as to make contact with its core. By this means the lamp may be cut out of the circuit at will.

g^2 g^3 denotes two bars projecting from the positive and negative binding-posts toward each other, leaving only sufficient space for the body of the carbon to pass. When the carbon-rod descends sufficiently to bring the cap d^2 down upon the bars, connection is established between them and the lamp is automatically cut out.

The construction being as above described, the operation of the lamp is as follows: The normal path of the current is over the main wire D^4 through the metallic connections at the bottom of the casing to the carbon-rod. A portion of the current passes continually over the wire at d through the auxiliary magnet C, and the coil d on the main magnet, out at the point d'. As the resistance in the arc increases the amount of current passing through the auxiliary magnet is augmented until the force of the magnet overcomes the tension of the spring b^8, and the magnet attracts the armature C', breaking the connection between the arms g and a^5 of the conductor D^3 and cutting out the main wire D^4. The current then passes over the wire E through the main magnet to the carbon. This causes the main magnet to attract its armature B^3, drawing it down until the pin a^3, striking the magnet, trips the clutch-rod and allows the carbon to feed. The resistance of the main magnet being then greater than that of the arc, the current is rediverted over the main wire D^4. It will thus be seen that two paths are provided for the current on its way to the carbon, over one of which the current passes directly to the arc without meeting any resistance, and over the other of which it meets, in passing, with the resistance of the magnet. As the arc lengthens, the resistance is of course increased till it reaches a point in excess of the resistance of the magnet, when the current shifts from the main wire D^4 to the wire E. It continues in this path until the carbon feeds down, when the resistance in the arc becomes less than that in the magnet and the current returns to the main wire.

It will be understood that by passing the current in the manner above described an equilibrium is established and a smoother better operation of the lamp is obtained and less power required to produce the desired results.

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

1. The combination of the cut-out D^3, the main wire D^4, the branch wire E, the main magnet B^2, its armature B^3, the auxiliary magnet C, its armature C', controlling the passage of the current through the cut-out of the main wire, the auxiliary wire d, the spring D', holding the armature B^3 away from its magnet, the spring-actuated carbon-clutch rod D^2, and the trip-pin a^3, substantially as described.

2. The combination, with the positive and negative wires, of the magnet B^2, connected to the positive wire, its spring-pressed armature, the arm d^5, connected with the negative wire, the pin d^4 in the armature, and the pivoted lever F for forcing the pin d^4 in contact with arm d^5 and the armature in contact with the magnet, thereby shunting the current, substantially as described.

3. In an arc lamp, the combination, with the positive and negative wires, the magnet B^2, the tubular core D, inclosing the carbon-rod and having its upper end beveled, of the armature B^3, connected with the carbon-rod, said armature having the conical recess a', adapted to contact with the beveled end of the core D, substantially as described.

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