(No Model.)

B. B. WARD.

ELECTRIC ARC LAMP.

No. 509,188. Patented Nov. 21, 1893.

Fig. 1.

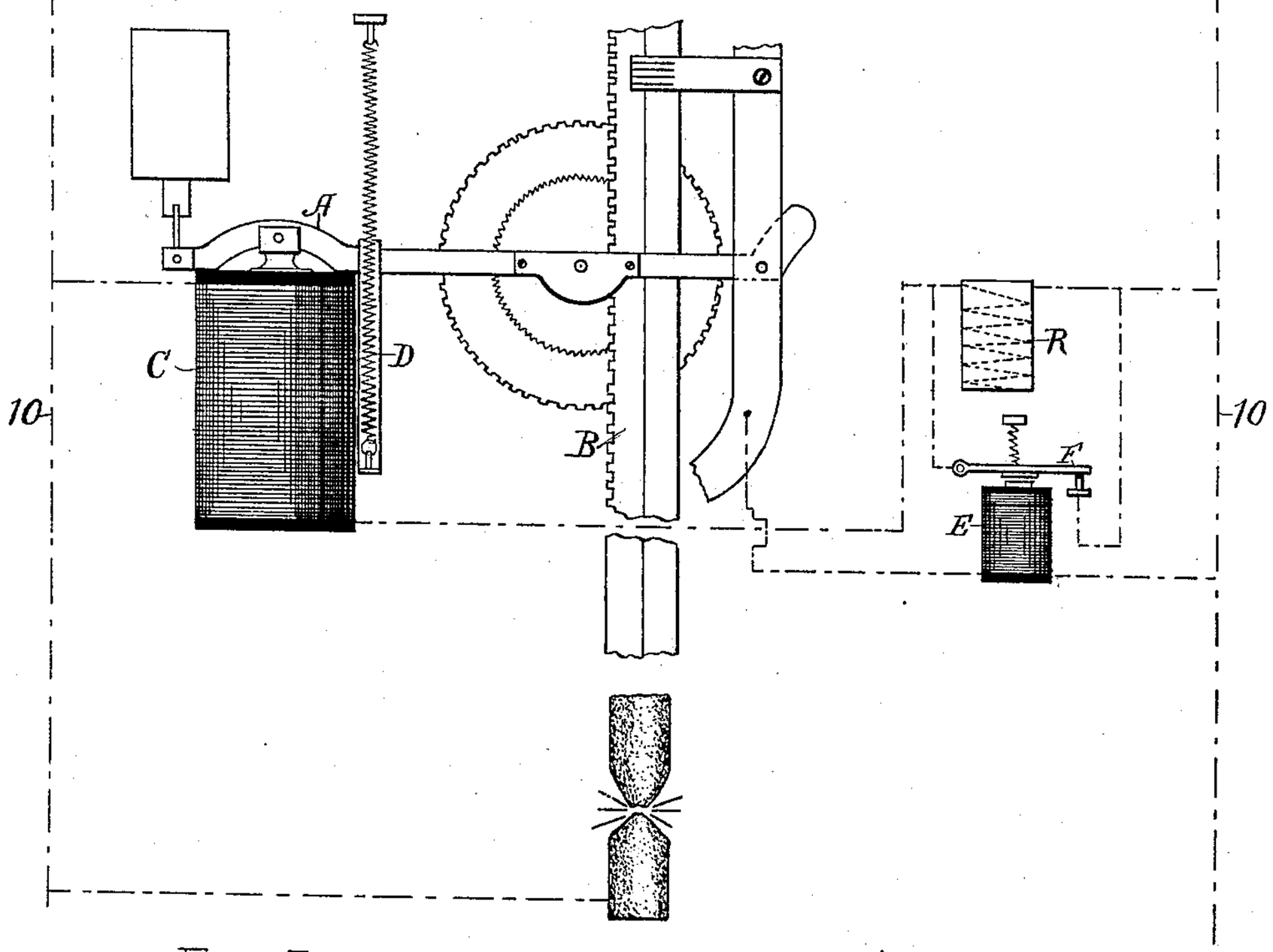


Fig. 2.

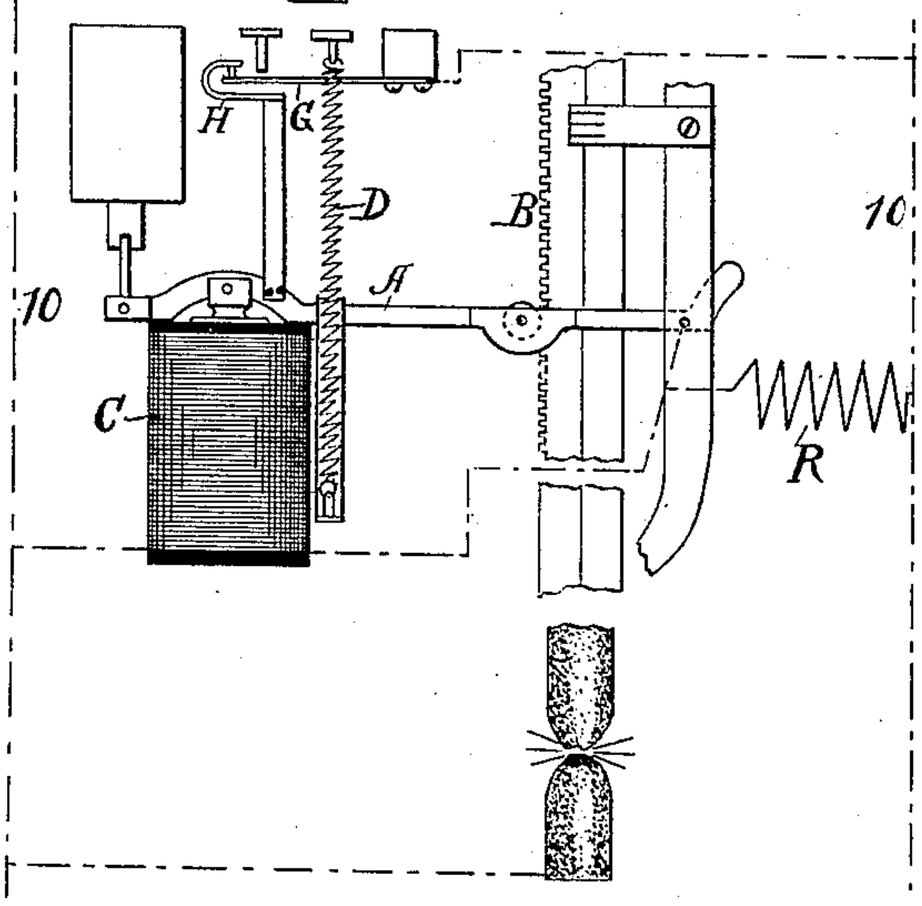
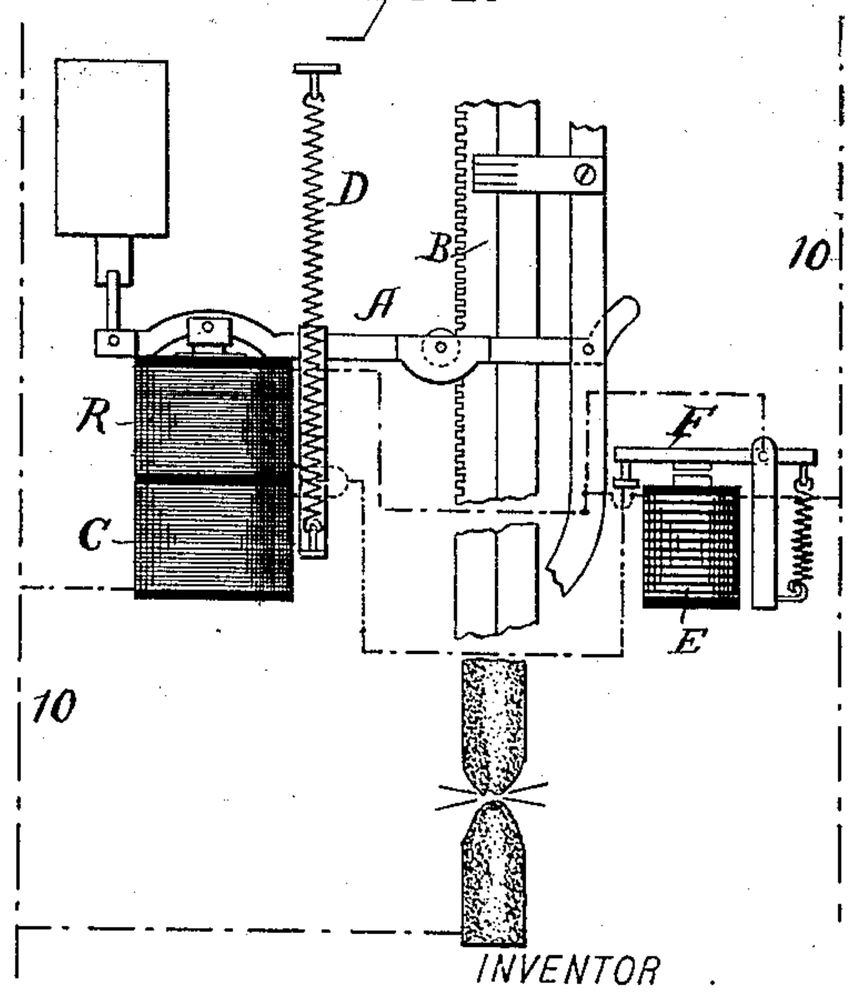


Fig. 3.



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BARTON B. WARD, OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 509,188, dated November 21, 1893.

Application filed February 15, 1893. Serial No. 462,456. (No model.)

To all whom it may concern:

Be it known that I, BARTON B. WARD, a citizen of the Dominion of Canada, and a resident of New York, in the county of New York and State of New York, have invented a certain new and useful Electric-Arc Lamp, of which the following is a specification.

My invention relates to that class of electric arc lamps in which the feed regulating mechanism is mounted upon a suitable lever or support actuated in one direction by a coil in derived circuit to the arc and in the other by a suitable spring or opposing mechanical influence which is not dependent for its action upon the flow of current through the carbons, or in other words to lamps in which the adjustment of the feeding action and the formation of the arc are dependent upon the differential action of a derived circuit coil and a spring or weight, the coil serving to move the mechanism in a direction to move the carbons toward one another or to relieve the mechanism and permit the carbons to feed and the spring or weight serving to move the parts in an opposite direction or one that pulls the carbons apart to form the arc or to cause the feeding mechanism to check the feed. In this class of lamps the starting of the lamp is practically dependent upon the action of the derived circuit coil.

The object of my invention is to provide for the protection of the coil from injury by flow of current through it when the lamp goes out of action, and to this end consists in the combination with said coil of a protective artificial resistance normally out of circuit therewith, and means for throwing the same into circuit with the coil when the arc becomes abnormally long or the lamp goes out of operation. The resistance operates to cut down the flow of current through the coil to such extent as to prevent undue flow of current through the same, but as the circuit of the coil is intact, the coil can be effective in starting the lamp into operation again which it could not, however, do if in this class of lamps the attempt were made to protect it automatically by breaking the circuit through it completely so as to leave it unconnected with the circuit.

In carrying out my invention I prefer to make the protective resistance operate as a magnet coil to assist the normally operating derived circuit coil in starting the lamp.

My invention is especially useful for lamps when run off circuits of constant or maintained potential.

Other features of my invention relate to the manner of throwing the resistance into circuit with the coil by a circuit controller or switch actuated by the armature or equivalent portion of the derived circuit coil itself. The control of the switch might, however, be secured by a magnet in the direct circuit of the arc.

The principle of my invention will be readily understood from the accompanying diagrammatic views of lamp mechanisms, magnets, switches, &c.

In the accompanying drawings:—Figure 1, shows one form of apparatus embodying my invention. Fig. 2, shows a modification in which the protective switch is actuated by the derived circuit magnet or coil itself. Fig. 3, illustrates a modification of my invention wherein the protective resistance is made to operate as a magnet coil which assists the derived circuit magnet coil in starting the lamp.

Referring to Fig. 1, A, indicates the movable lever or other support upon which the feed regulating devices of the lamp are mounted and B, the carbon carrier which holds the upper carbon and is adjusted in its movements by means of the devices carried by or controlled by lever A. In the present instance I have indicated an adjustment as effected through the action of a feed regulating clock-work of ordinary description with which the carbon carrier B, is geared, said clock-work being mounted upon lever A, and so arranged that as the lever is pulled down, the clock-work will be released and the carbon allowed to feed while the reverse movement of the support A, will stop the feed by locking the clock-work, but as will be well understood any other feed regulating devices might be employed in place of those indicated.

C, is the derived circuit magnet or coil which is in a derived circuit around the arc and operates upon the lever A, in a direction to cause the carbon to feed through the attachment of the core, armature or equivalent

portion of the magnet C, to the lever A, as indicated. Acting in opposition to the electro-magnet C, is a spring D, or other suitable mechanical retractor. When the magnet C, loses its power the retractor lifts the support A, and draws the carbons apart, thus interrupting the circuit at the arc as well understood in the art.

To start the lamp, the electro-magnet C, draws the support A, down, until the carbons are allowed to feed together whereupon the current is shunted from the magnet C, and the retractor operates to lift the support and establish the arc, and the feeding of the carbon then goes on through the differential action of the coil C, and the retractor in obvious manner. The constant potential lines or feed wires indicated at 10, feed current to the lamp in the ordinary way.

To protect the coil C, from injury when the lamp goes out of action as just described, through the action of the retractor which causes the carbons to separate, I provide an artificial resistance of any proper amount indicated at R, in the circuit of the coil C. This resistance is made of sufficient amount to cut down the current which would flow from one main to the other through the coil C, when the lamp is out of action and to thereby prevent current flowing in such amount as to injure the coil. The resistance R, is, however, normally out of circuit during operation of the lamp and is only switched into circuit when the resistance of the arc becomes abnormally long or the lamp goes out of action as already explained. One of the simpler ways of controlling a switch for this purpose is indicated in Fig. 1, where E, indicates an electro-magnet placed in the circuit with the carbons and operating upon a switch lever F, of any desired construction which is provided with contacts and connections as indicated, whereby it may shunt the resistance R, out of circuit when the magnet E, is energized. When the magnet E, loses its power through the lamp going out of action the switch F, is retracted by a spring or other suitable device and opens the shunt of resistance R, thus throwing the latter into circuit with coil C.

When the lamp is to be started the current flows in the magnet C, and brings the carbons together whereupon magnet E, becomes energized and shunts out the resistance R.

In Fig. 2, I have shown an arrangement wherein the switch is controlled by connection with the support A. The switch as shown consists of a spring G, and a contact hook H, carried by the support A. The spring G, is mounted on any suitably fixed support and is so arranged that when the support A, is fully retracted the hook H, will leave it, but when the hook is pulled down by the lever A, the connection will be made and will be maintained during the normal vibrations of the support A, up and down produced through normal fluctuations of the arc. When the lamp goes out of action by the carbons ceasing to feed, then the switch comes into action through the recession of the support A, to break the shunt around the resistance and throw it into circuit with the coil C.

In Fig. 3, the resistance R, is applied as a magnet coil to assist the coil C, and its switch into and out of circuit by means of the magnet E, in the same way as the resistance in Fig. 1. It might be controlled, obviously, by the same switch device as shown in Fig. 2.

When the current is turned onto the lamp to start it, the current circulating in the protective resistance assists the coil C, the current flowing in series from resistance R, through coil C, but as soon as the lamp starts, then the magnet E, switches the resistance R, out of connection and the lamp then operates in the normal way under the differential action of coil C, and the opposing spring D, or other retractor. When, however, the carbon ceases to feed and the lamp thereby goes out of operation, the magnet E, will throw the resistance R, into circuit with C, so that the latter will be protected from injury.

What I claim as my invention is—

1. In an electric arc lamp, the combination, substantially as described, of a feed regulating magnet placed in a derived circuit around the arc and normally tending when energized to draw the carbons together and produce a feed of the same, a retractor acting in opposition to said magnet, and tending to separate the carbons and hold them apart, a protective artificial resistance normally out of circuit with said derived magnet, and means for throwing the same into circuit with the coil when the arc becomes abnormally long or the lamp goes out of operation, as and for the purpose described.

2. The combination in an electric arc lamp, of a derived circuit feed magnet coil, an artificial protecting resistance operating as an assisting coil in starting the lamp but normally out of circuit with said coil, and means for throwing said resistance coil into said circuit when the arc becomes abnormally long or the lamp goes out of action.

3. The combination, substantially as described, in an electric arc lamp, of a feed regulating and carbon supporting mechanism mounted upon a suitable lever or support, a derived circuit magnet operating on said support in a direction to draw the carbons toward one another, a retractor acting on the support in a direction to separate the carbons, an artificial protective resistance normally out of circuit while the lamp is burning, and means for throwing said artificial resistance into the derived circuit with said magnet when the arc abnormally lengthens or the lamp goes out of action.

4. The combination, substantially as described, in an electric arc lamp having a feed regulating derived circuit magnet and a retracting spring or weight opposing the same for separating the carbons when the arc shortens or current ceases to flow through said

carbons, an artificial protective resistance for said coil or magnet, and an electric switch for throwing said resistance into circuit with the coil, said switch being actuated by the coil but adjusted as described to keep the resistance out of action during normal fluctuations of power for said magnet, and to throw the resistance into circuit when the magnet loses its power.

5. The combination, substantially as described, in an electric arc lamp, of a feed regulating and carbon supporting lever or other support, a derived circuit magnet coil tending to pull said support in a direction to move one carbon toward the other, a retractor operating in opposition to said magnet and serving to lift the carbons when the said magnet decreases in power to a predetermined extent, a supplemental magnet coil assisting the first but normally out of circuit while the magnet is of normal power, and means for throwing said supplemental magnet coil into the derived circuit when the said magnet decreases abnormally in power from lengthening or rupture of the arc.

6. The combination, substantially as described, in an electric arc lamp, of a derived circuit feed regulating coil, the support for the feed mechanism actuated by said magnet, a retractor operating on said support in a direction to hold the carbons apart, and a protective switch in the circuit of said coil or magnet actuated thereby but adjusted as described to maintain the condition of the circuits unchanged during normal vibrations of the armature's magnet but to come into action to protect the magnet when the latter decreases abnormally in power, as and for the purpose described.

Signed at New York, in the county of New York and State of New York, this 13th day of February, A. D. 1893.

BARTON B. WARD.

Witnesses:
WM. H. CAPEL,
T. F. CONREY.