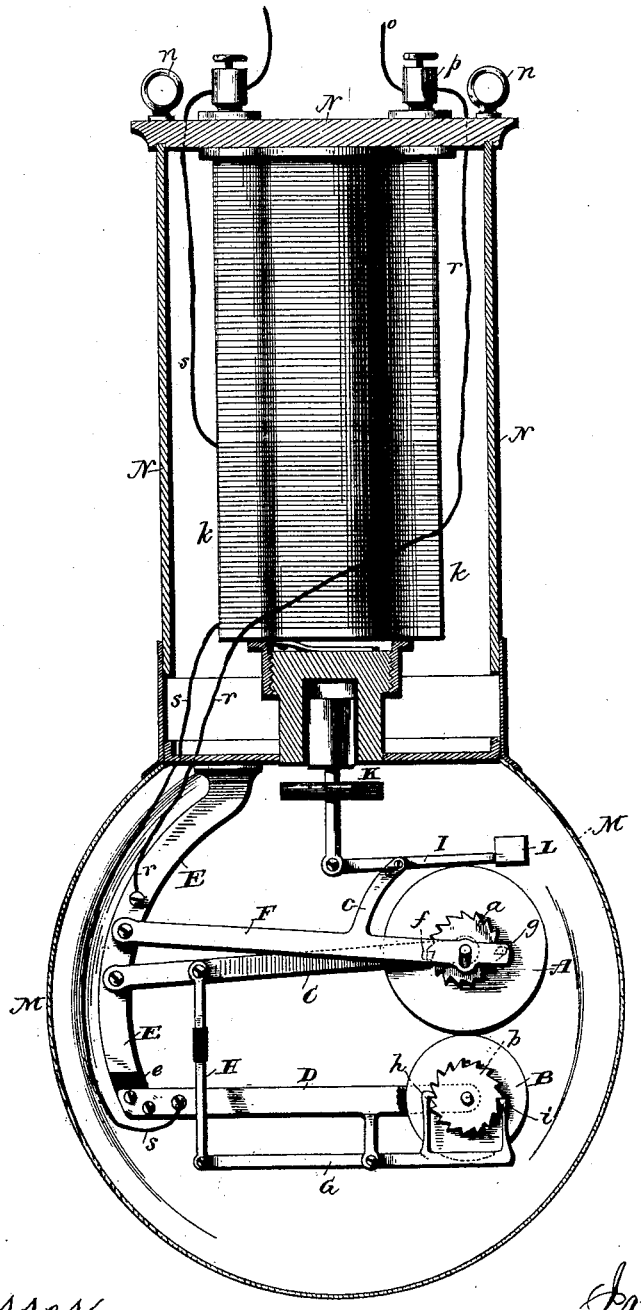
(No Model.)

E. C. RUSSELL.

ELECTRIC ARC LAMP.

No. 418,987. Patented Jan. 7, 1890.



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UNITED STATES PATENT OFFICE.

EDWIN C. RUSSELL, OF SKOWHEGAN, MAINE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 418,987, dated January 7, 1890.

Application filed July 24, 1889. Serial No. 318,571. (No model.)

To all whom it may concern:

Be it known that I, EDWIN C. RUSSELL, a citizen of the United States, residing at Skowhegan, in the county of Somerset and State of Maine, have invented certain new and useful Improvements in Electric Lamps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawing, making a part of this specification, and to the letters of reference marked thereon.

My invention relates to that class of electric lights known as the "arc lamp," and has in view the construction of a lamp of that character which shall be compact and occupy but comparatively small space, and in which the carbon shall burn for a longer time and at smaller expense than is now possible with arc lamps as ordinarily constructed.

With these ends in view it consists in the construction, combination, and operation of parts, as hereinafter specified and claimed.

The figure in the accompanying drawing represents a view of my lamp partly in elevation and partly in section.

To accomplish the objects of my invention, I employ for the production of a light two disks of carbon A and B, the positive-carbon disk A being, as shown, of greater diameter than the negative one B, to compensate for the relative differences in the degree of their consumption when the lamp is in operation. These disks A and B are mounted on short shafts having bearings, respectively, at the ends of arms C and D, supported upon a hanger bar or arm E, that extends downwardly from the lamp frame-work, to which it is secured. The upper positive-carbon supporting-arm C is pivotally attached to said hanger-arm E, for a purpose hereinafter set forth, while the lower negative-carbon supporting-arm D is rigidly and immovably attached to such arm E.

I make my carbons in the form of disks, because in such form they do not occupy much space, and because they can be used to better advantage than any other form. To automatically effect the rotation of these carbon disks periodically, in order that after the lamp has been in use for a time and portions of the carbons have been consumed the arc may be formed at new points on their peripheries. There are attached to each or upon the before-mentioned shafts, on which they are mounted, so as to revolve therewith, ratchet-wheels *a* and *b*, which are adapted to be engaged by double spring-pawls *f* and *g* and *h* and *i*, formed, respectively, upon the ends of levers F and G, the lever F being pivoted at its opposite end to the hanger-arm E a short distance above the point of attachment to the same arm E of the positive-carbon carrying-arm C, and the lever G being pivoted at a point intermediate its ends to the negative-carbon carrying-arm D, the end of said lever G opposite to the one having the double pawls *h* and *i* being connected by a link H to the carbon-carrying arm C, for a purpose hereinafter stated.

Extending from the positive-carbon rotating arm F, at a suitable point between its pawl-carrying end and where it is pivoted to the hanger-arm E, is a short arm *c*, to which is pivoted an arm or lever I, carrying at one end an armature K, in position to be attracted by a magnet of any desired construction when a current is passed through it, and at its opposite a weight L, for a purpose hereinafter described.

A glass globe M, in which is formed a vacuum or which is filled with any of the usual gases to effect the exclusion of the air, incloses the carbon disks and their attendant mechanism, the other essential parts of the lamp being inclosed by a suitable casing N, of preferably non-conducting material. Rings *n n*, secured to the top of the casing N, serve as means for suitably suspending the lamp at any desired place.

The operation of my lamp is as follows: The lamp being connected with the main wire *o* by a suitably-arranged binding-post *p*, secured at the top of casing N, and put in the circuit by any of the usual forms of switch devices, the current will pass through a wire *r* to the positive-carbon disk A, which at this stage of the operation rests in contact with the negative-carbon disk, thence to the negative carbon B, from which it passes by its supporting-arm D to a wire S, connected to the magnet K, and passing thence to the main

wire again. The effect of the current passing through the magnet will of course be the attraction of the armature K, which will result, through its connection with the positive carbon and its rotating devices, first in the partial rotation and then separation of such carbon from the negative carbon until the formation of the arc movement of such carbon to effect its separation being possible because of the pivotal connection between the arm C, carrying it, and the hanger or supporting-arm E. Its partial rotation is caused by one of the double spring-pawls *f* engaging the ratchet-wheel *c* when the bar or arm C, carrying such pawl, is raised by the movement of the armature of the magnet K. Another partial rotation of said carbon disk is made when the current is cut off from the lamp. The armature then being no longer under the influence of the magnet, the consequent dropping of the carbon will cause an engagement of the ratchet-wheel *d* by the other of the double spring-pawls *g*. Simultaneous and similar rotations of the lower carbon are caused by a movement of the pawl-carrying arm D, which movement is effected by means of the link-connection between it and the pawl-carrying arm C.

The proper relative position of the armature with reference to the magnet is always maintained by the lever I, which, as the diameters of the carbons are gradually reduced, causing thereby a continued lowering of the positive carbon A, effects a corresponding raising of the armature by reason of the downward movement of its weighted portion, which rests upon and moves downward with the said carbon A.

It is not necessary, of course, that the negative carbon should rotate or that it should be of disk form, because it may, if desired, be of any other shape and stationary without departure from the scope of my invention; but I prefer the construction and arrangement I have described.

Suitable non-conducting material *e* is arranged on the hanger-arm E to effect the insulation of the positive and negative carbons from each other, except at the point where the arc is to be formed, and insulating material is also arranged on the link H for the same purpose.

By means of my device a periodic and perfectly automatic rotation is given to the carbons, so that on each successive use of the lamp new surfaces are brought together for the formation of the arc, thus enabling the construction of an arc lamp occupying but comparatively small space, and in which the carbons are used to the best possible advantage and their replacement made necessary only at infrequent intervals.

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

1. In an arc lamp, the combination of an electro-magnet, an armature, a rotatable disk of carbon, a ratchet-wheel secured to said disk at its axis, an arm, pivoted to the lamp frame-work, which is attached to the armature and provided with double pawls, which have alternate engagement with said ratchet-wheel when said armature is attracted and released by said magnet, substantially as specified.

2. In an arc lamp, the combination of a rotatable disk of carbon mounted on an arm pivotally attached to the lamp frame-work, an electro-magnet, an armature which operates both to adjust the carbon to an arc-forming position and to rotate it, an arm, pivoted to the lamp frame-work and attached to said armature and said carbon, which, when said armature is attracted by the magnet, effects the raising of said carbon, and the pawl-and-ratchet devices, substantially as described, for effecting the rotation thereof, all substantially as shown.

3. In an arc lamp, the combination of an electro-magnet, an armature, a rotatable disk of carbon, supported on an arm pivotally attached to the lamp frame-work, a second rotatable disk, supported on an arm rigidly attached to the lamp frame-work, each of which disks carries a ratchet-wheel, pawls adapted for engagement with the latter, and connections, substantially as described, between said pawls and said armature, all substantially as and for the purpose set forth.

4. In an arc lamp, the combination of an electro-magnet, an armature, suitably-supported rotatable disks of carbon, each of which carries a ratchet-wheel, pawls adapted for engagement with said ratchet-wheels, said pawls being simultaneously operated when the armature is attracted and released by the magnet, whereby simultaneous partial rotations may be given said carbons, substantially as and for the purposes set forth.

5. In an arc lamp, the combination of a magnet, an armature, a weighted arm supporting said armature and operating to automatically maintain it in its relative attractive position to said magnet, a rotatable disk of carbon, and pawl-and-ratchet devices operating through the medium of said magnet and armature to cause a rotation of said disk, substantially as and for the purposes specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

EDWIN C. RUSSELL.

Witnesses:
JAMES FELLOWS,
JOHN WESTON.