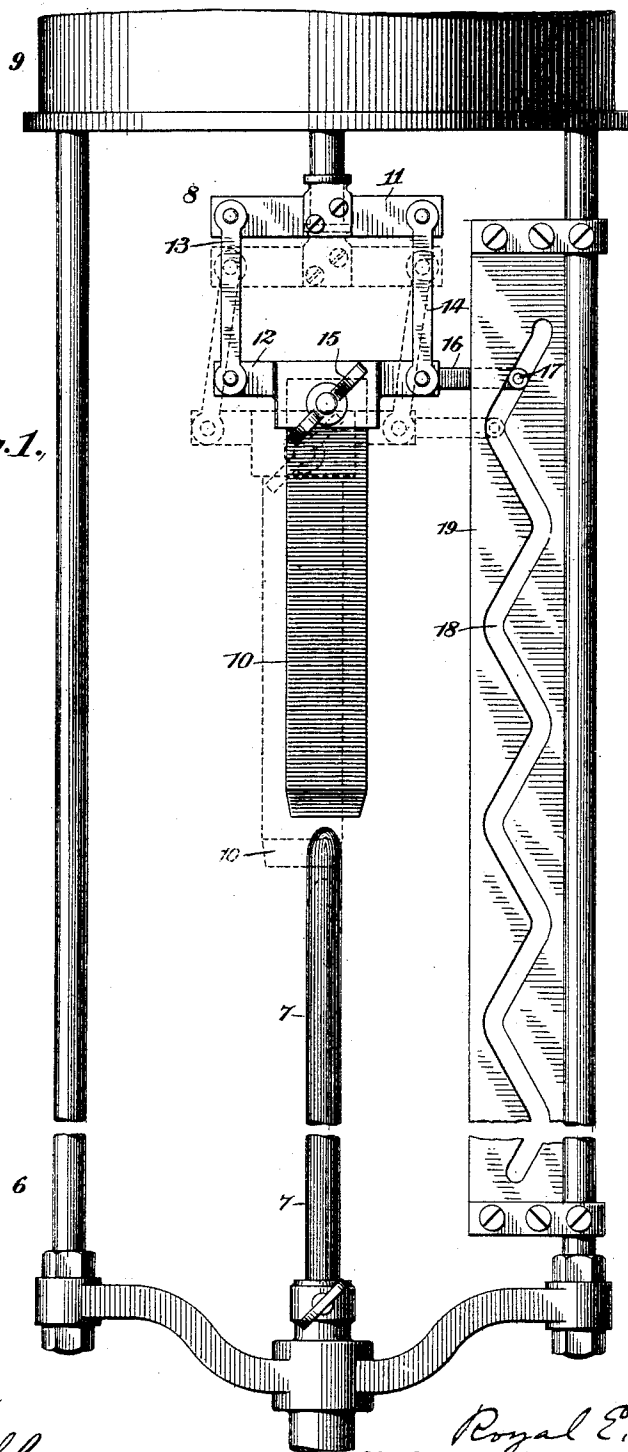


R. E. BALL.
ELECTRIC ARC LAMP.

No. 472,747.

Patented Apr. 12, 1892.

Fig. 1.



Witnesses

C. E. Ashley
H. W. Lloyd.

Inventor
Royal E. Ball.
By his Attorneys
Fowler & Fowler

(No Model.)

2 Sheets—Sheet 2.

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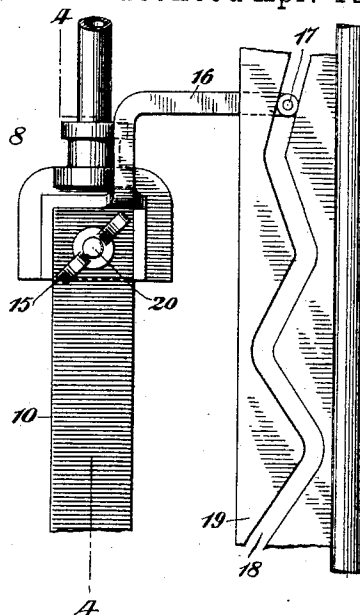
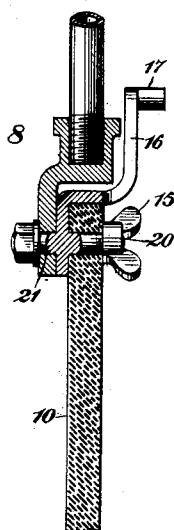


Fig. 5.

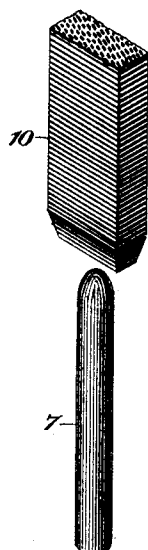
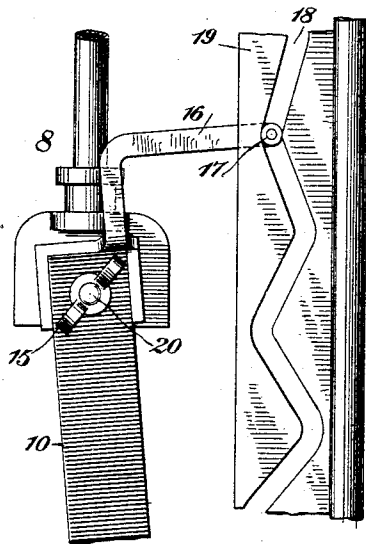


Fig. 3.



Witnesses

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Inventor,
Royal E. Ball,
By his Attorneys
Fowler & Fowler

UNITED STATES PATENT OFFICE.

ROYAL E. BALL, OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 472,747, dated April 12, 1892.

Application filed October 10, 1891. Serial No. 408,334. (No model.)

To all whom it may concern:

Be it known that I, ROYAL E. BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to prolong the life of the carbon, so that, for example, an ordinary single lamp may be made to burn twice (or more) as long as heretofore. This I accomplish by reciprocating or swinging one of the carbons forming the electric arc across the arc or in a direction transverse that in which the carbon is fed, the reciprocating or oscillating carbon being made with a greater cross-section than that of the other carbon.

In the accompanying drawings, in which I have illustrated a type of my invention, Figure 1 is a side view of an electric-arc lamp provided with my improvements, the upper portion of the lamp containing the carbon-feeding mechanism being broken away. Fig. 2 is a side view of a portion of an electric-arc lamp provided with my improvements, and Fig. 3 is a view of the same with the reciprocating carbon swung aside to one limit of its movement. Fig. 4 is a view in section on a vertical central plane indicated by line 4-4, Fig. 2. Fig. 5 is a perspective view of the ends of the two arc-forming carbons, showing the shape and relative proportions of the carbons that may be used.

Referring to the drawings, in which like numbers of reference indicate like parts throughout, 6 designates an electric-arc lamp having a lower carbon 7 of the ordinary pencil form and provided with a carrier 8 for the upper carbon, which carrier may be connected with and controlled by any well-known mechanism for regulating the arc, 9 being the casing inclosing such regulating mechanism, which is not shown.

The upper carbon 10, which is mounted upon and operated by the carrier 8, is reciprocated or swung so as to move laterally or in a direction transverse its length, so that this

carbon may be moved periodically across the arc as it is moved vertically or fed. The carbon 10 is made, preferably, flat and is of a considerably-greater cross-section than that of the lower carbon, being twice (or more) as great, as may be desired. By making it about as thick as the diameter of the lower carbon and forming it flat the lateral or shifting movement of the carbon can always be in the same plane, though of course this may be departed from in carrying out the invention.

The reciprocating or swinging action of the upper carbon is not limited to any particular means, and I have herewith shown two ways in which it may be operated.

Referring to Fig. 1, the carrier 8 comprises a fixed horizontal bar or plate 11, from which is swung a parallel bar or member 12 by means of links 13, pivoted at their respective ends to the said bars 11 and 12, respectively, in such a way that the lower bar 12 in swinging may always maintain a horizontal position. From the bar 12 of the carrier depends the upper carbon 10, which is made fast thereby to by a set-screw 15. As the bar 12 reciprocates horizontally from side to side, the carbon 10, carried thereby, will be likewise reciprocated from side to side and will remain perpendicular during such movement. From a suitable point on the laterally-movable part of the carrier extends an arm 16, which is provided with a stud or pin 17, having, preferably, an anti-friction roller adapted to travel through a vertically-arranged cam-groove 18, which is formed in a plate 19, secured to one side of the lamp. This cam-groove is formed with a sufficient number of bends or turns of equal curvature to move or reciprocate the carbon 10 over a prescribed and uniform range of movement periodically as the carbon is moved vertically in its feeding motion. Of course any form of cam or equivalent thereof may be used instead of the cam-groove shown in order to produce the requisite movement of the carbon to pass it across the arc.

In the form of the device shown in Figs. 2 and 3 for effecting the periodic movement of the upper carbon across the arc the carbon is swung on a shaft or pivot 20, to which it is tightly secured by means of a set-screw 15. This shaft 20 is loosely mounted upon the

carbon-carrier 8 by passing through an eye 21, formed therein, and the arm 16, which engages the cam 18, is made fast to this shaft. In this way as the carbon-carrier moves vertically the arm 16 will be rocked by the cam, which will serve to rock the shaft 20 in its bearings on the carrier 8, thereby swinging the carbon 10 from side to side periodically. In this form the high parts of the cam 18 increase in height as the lower end of the cam is approached, as shown in Figs. 2 and 3, in order to give a longer stroke or range of movement to the carbon as the same is shortened by being consumed by the arc.

From the foregoing description the operation of the invention will be evident. As the upper carbon wastes away and is fed to the arc it will be periodically reciprocated or moved across the arc, so as to consume one portion thereof and then the other, it being of a greater cross-section than the lower carbon, as above stated. Considering Fig. 1, as the upper carbon is moved downwardly the carrier and carbon are gradually moved to the left hand of said figure into the dotted-line position, at which time the arm engaging the cam is in the position shown in dotted lines, and as this downward movement continues the carbon is gradually drawn over toward the extreme right-hand limit of movement, which limit corresponds with that of the left hand, as will be readily understood from Figs. 2 and 3. As the upper carbon is fed downwardly it is gradually moved from the position shown in Fig. 2 to that shown in Fig. 3, which latter is the extreme limit of movement in one direction. The further downward movement of the carbon moves it in the other direction, and so the periodic movement is kept up while the carbon lasts. By making the cross-section of the reciprocating carbon twice as great, for instance, as that of the lower one the life of the upper carbon may obviously be doubled.

As before stated, my invention is not limited to any particular means, but is of a broad scope, as hereinafter pointed out in the claims.

Having thus described my improvements in electric-arc lamps, what I claim as my invention, and desire to secure by Letters Patent, is—

1. An electric-arc lamp having a carbon reciprocating or swinging transverse the direction in which it is fed.

2. An electric-arc lamp having a reciprocating or swinging carbon moving periodically across the arc.

3. In an electric-arc lamp, the combination,

with a lower carbon, of an upper carbon provided with feeding mechanism and adapted to reciprocate or swing transverse the direction in which it is fed and means for reciprocating or swinging it as it is fed.

4. In an electric-arc lamp, the combination, with a lower carbon, of an upper carbon provided with a feeding mechanism and adapted to reciprocate or swing transverse the direction in which it is fed and a cam or its equivalent and an arm engaging said cam and connected with and controlling the reciprocations or swinging of the upper carbon, whereby as the upper carbon is fed to the arc it may be automatically reciprocated or swung across the same.

5. In an electric-arc lamp, the combination, with a lower carbon, of an upper carbon having a cross-section twice (or more) as great as the cross-section of the lower carbon and adapted to reciprocate or swing transverse the direction in which it is fed.

6. In an electric-arc lamp, the combination, with a lower carbon, of an upper carbon provided with feeding mechanism for raising and lowering it and a vertically-arranged cam or cam-groove and an arm engaging said cam and connected with and controlling the reciprocations or swinging of the upper carbon, whereby as the upper carbon is raised or lowered it may be reciprocated or swung across the arc.

7. A carbon-carrier for an electric-arc lamp, comprising a horizontally swinging or reciprocating bar or member upon which the carbon is mounted.

8. A carbon-carrier for an electric-arc lamp, comprising an upper bar and a lower bar swung thereto by links, so as to move in the horizontal and carrying the carbon.

9. In an electric-arc lamp, the combination, with a carbon-carrier comprising an upper bar and a lower bar swung thereto by links so as to move in the horizontal and carrying the carbon, of means for swinging or reciprocating said lower bar for moving the carbon across the arc.

10. An electric-arc lamp having a carbon moving laterally to and fro so as to periodically move across the arc.

In testimony whereof I have hereunto set my hand, this 7th day of October, 1891, in the presence of two subscribing witnesses.

ROYAL E. BALL.

Witnesses:

WILLIS FOWLER,
HOSFORD B. NILES.