(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

ELECTRIC LAMP.

No. 294,533. Patented Mar. 4, 1884.

Fig 1

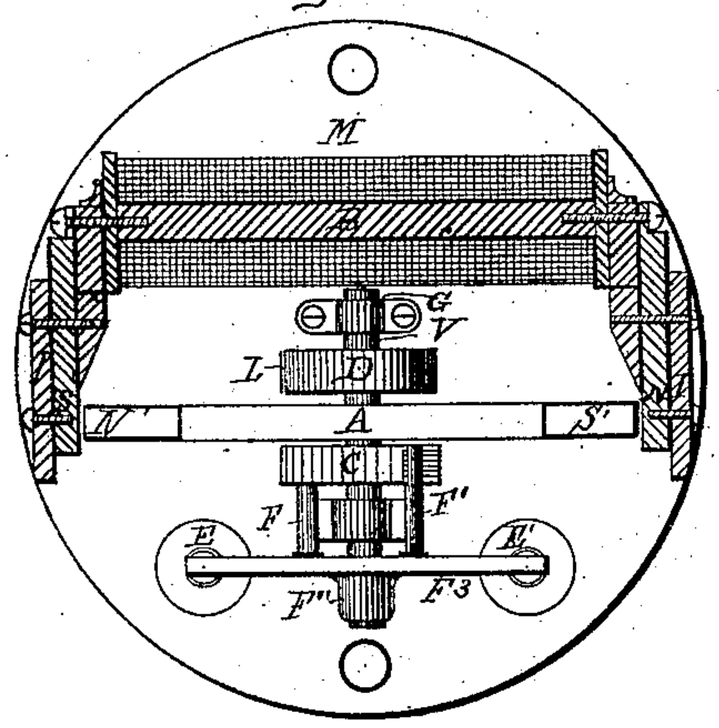


Fig 2

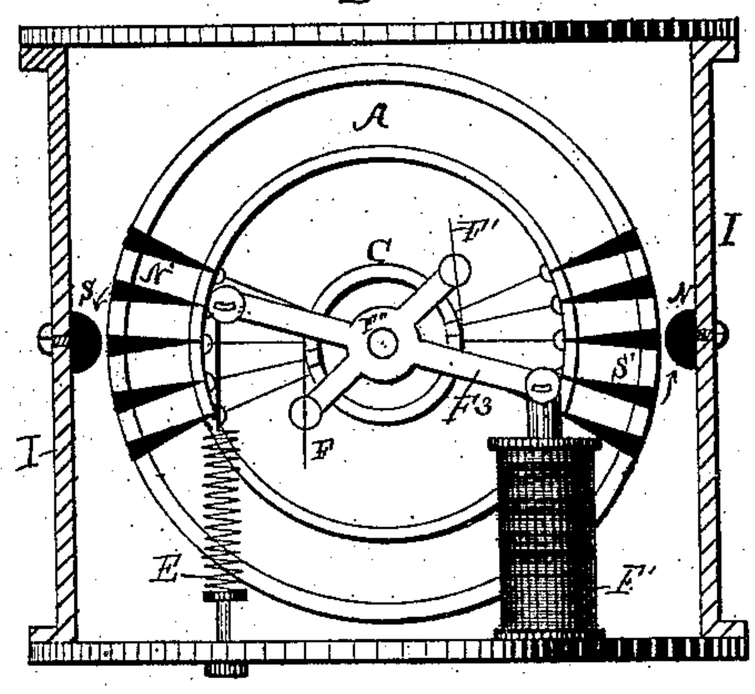


Fig. 3.

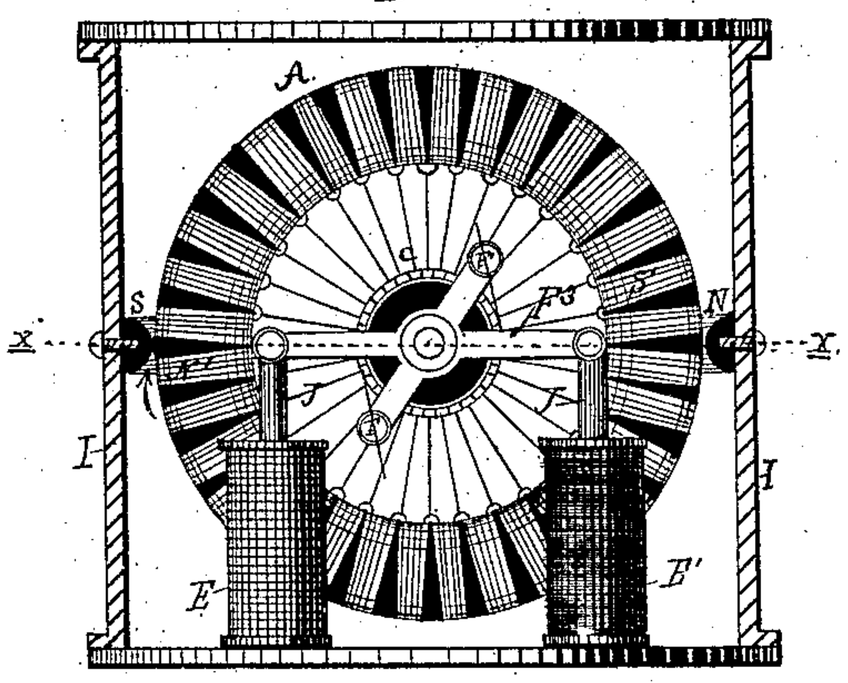
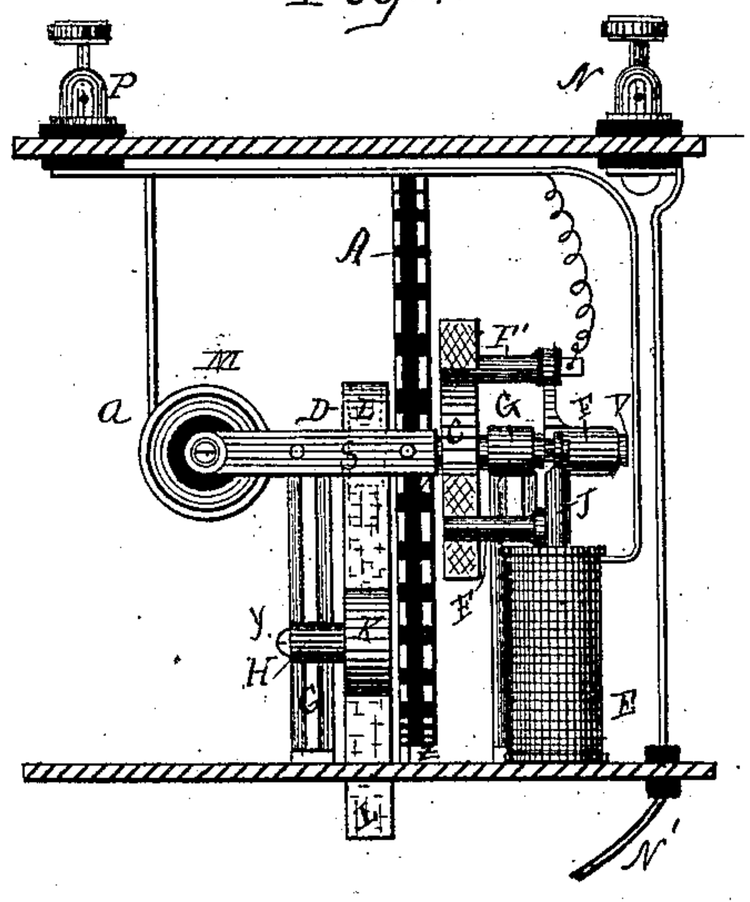


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

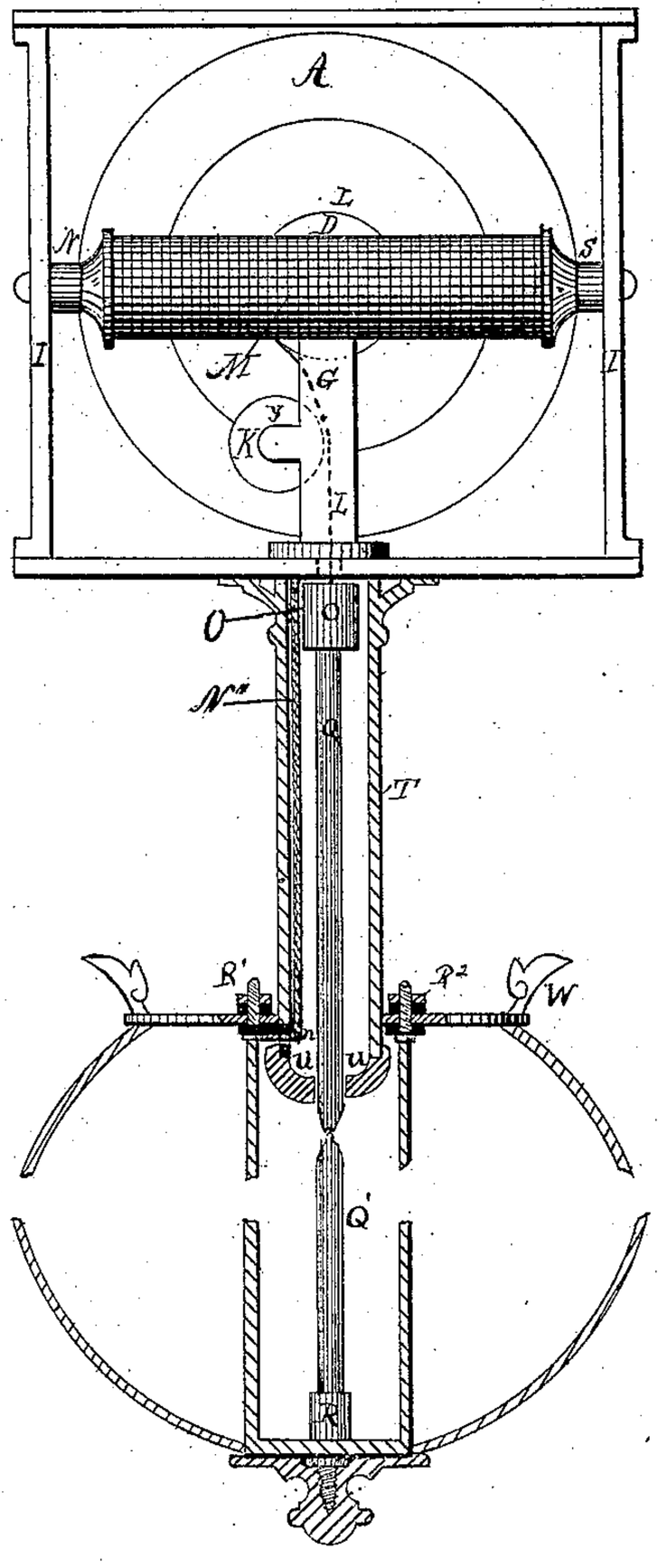
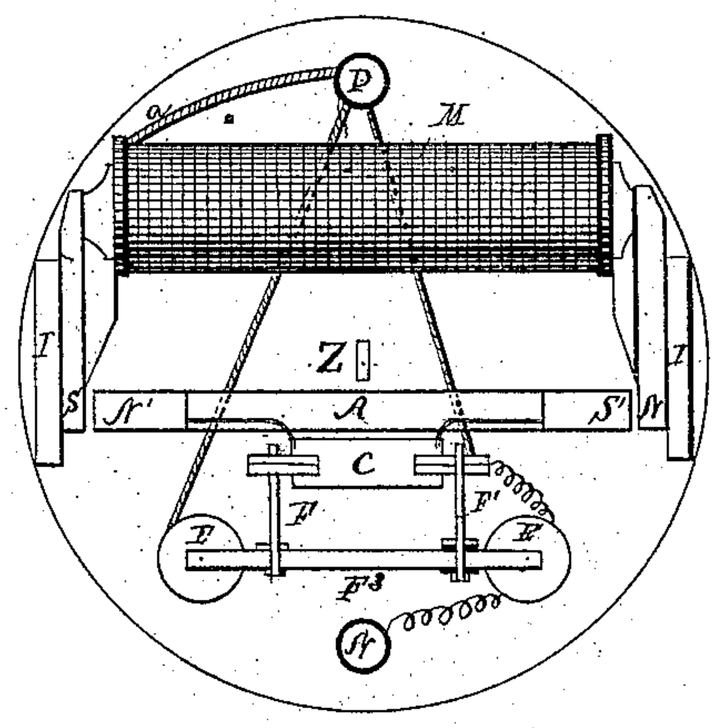


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF CHICAGO, ILLINOIS.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 294,533, dated March 4, 1884.

Application filed May 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, of Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Electric Lamps for Continuous Currents; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to certain new and useful improvements in electric-arc lamps, by means of which, when the arc of the lamp has once been adjusted so as to obtain a steady and unvarying light, it will be kept in the same condition, and thereby rendering it almost impossible to extinguish the light by the rupture of the circuit, the current necessary to operate said lamps and to reduce the light being compelled to operate the feeding mechanism with perfect regularity.

The invention consists in the new and peculiar construction of parts and their various combinations, as more fully hereinafter described.

Figure 1 is a horizontal section on the line X X in Fig. 3. Fig. 2 is a vertical elevation of one side of the top of the lamp, showing the armature, commutator, brush-holders, and pivoted balance. Fig. 3 is a full front view of the armature and some other parts of the lamp mechanism. Fig. 4 is a side elevation of the lamp mechanism. Fig. 5 is a rear elevation of the lamp, the lower part being partially in section. Fig. 6 is a plan showing the electric connections.

In the accompanying drawings, A represents an armature wound with separate coils, as shown in Figs. 2, 3, and 4, upon a ring, which is provided with iron projections extending between each two adjacent coils of wire, and form on the opposite sides of the ring the poles of the armature.

B is the core of the field-magnet M, provided with polar extensions N and S, designed to react upon the poles of the armature A.

C is a commutator, and each section thereof is connected, as shown, to the armature-coils.

D is a pulley mounted on the shaft of the armature A, and has secured to it a copper strip or band, L, intended to feed the carbons. One end of this copper strip is fastened to said pulley, as shown in Figs. 4 and 5.

E is an electro-magnet in the main circuit, and E′ is an electro-magnet in a derived circuit between the two poles of the lamp.

F is a brush-holder in metallic contact with the top part of the lamp, and F′ is a second brush-holder insulated from the rest of the lamp, as shown in Fig. 4. These brush-holders bear upon opposite sides of the commutator C, and thus allow the current to be sent through the coils of the armature.

F^3 is a pivoted balance-arm carrying at each end a core, J, of the electro-magnets E and E′.

G are the standards furnishing the bearings for the shaft of the armature A, pulley D, and commutator C.

I are two uprights holding the bottom and top plates of the lamp together.

N and S are two extensions of the poles of the field-magnet M, designed to act upon the armature A. The brush-holders and brushes are carried by the pivoted balance F^3, and partake of the oscillations produced by the electro-magnets E and E′, and thus bring the brushes bearing upon C either below in line with or above the contracted fixed poles N and S, so as to produce, by the main current, either a motion to the right or to the left by displacing the poles of the armature with regard to the narrow fixed poles N and S.

N′ and S′ are the poles of the circular armature A.

In Fig. 2 it will be seen that in place of the electro-magnet E a spring is employed.

In the drawings the parts in black in the armature indicate the iron projections of the core, between which is wound the copper conductor or wire intended to magnetize the same, and the electro-magnets are intended to work the pivoted balance F^3, so as to adjust the brushes upon the commutator and compel the armature to move either backward or forward and produce the feed of the carbons in the lamp by the rotation of the shaft of the armature, winding up or unwinding the band L upon the pulley D. The shaft of the armature is marked V.

G′ is one of the standards carrying the shaft V, and H is a projection from said standard through which a spindle, Y, passes, which

carries the pulley K, which brings the copper ribbon L in line with the opening Z in the bottom plate of the lamp, said opening being central therein. This copper ribbon L is carried and fastened to one end of the pulley D, upon the same shaft with the armature, so that when the latter changes its polarity a rotating movement is given to the pulley, which raises or lowers the carbons in the lamp, the free end of such ribbon being attached to the carbon-holder O. The fixed poles N and S of the field-magnet M are rigidly secured to the parts I of the frame by suitable screws. T is a tube fastened to the top part of the lamp, and provided with a nipple, *a*, at its lower end, through which the positive carbon Q passes, said nipple being made of porcelain, or any other material which is a poor conductor of heat.

Q′ is the negative carbon of the lamp. R is the lower-carbon holder, and R′ and R″ are side rods supporting the lower-carbon holder and insulated from the top part of the lamp proper, as shown. The glass globe is held up against the top of a crown, W, by a flange and screw at the bottom of the lamp, as shown.

Fig. 6 shows a diagram of connections. The main current enters at P and there divides itself into three different currents, each terminating at the metallic frame of the lamp. The first circuit is from P to the field-magnet M, entering at *a* and leaving the coils of this magnet by the brass end thereof, to which the free end of the said helix is soldered, and which is in contact with all positive parts of the lamp. The second circuit is from P to F′ and commutator C, through the armature A to said commutator and to positive parts of the lamp by means of the brush and holder F. The third circuit is from P to the electro-magnet E, through the coils of the same, the free end being also soldered to the brass end of the core, and it is thus also in contact with the positive parts of the lamp. The negative part of the lamp is in contact with the pole N by a suitable conductor, N′. (Shown in Fig. 4.) In Fig. 5 the negative conductor is shown as passing inside of the tube T and R′ at *n*, as shown by the dotted lines. The shunt-solenoid E′ is connected anywhere in the lamp between the carbons, or directly between the positive and negative poles of the lamp, as shown in Fig. 6. Thus the current entering at P passes through all the positive parts of the lamp and through the carbons and back to N′ and N. The electro-magnet E can be replaced by a spring, as shown in Fig. 2, the spring answering all purposes of counteracting the movement of the electro-magnet E′, and so regulating the adjustment of the brushes around the commutator C.

Having described the different parts of my invention, I will now proceed to explain the same while in operation.

On establishing the current from a proper source of electricity between the positive and negative poles of the lamp, the current divides itself, as above explained, through the different parts of the lamp, the electro-magnet M is energized thereby, and so is the armature A. On examining Fig. 3 it will be seen that the brushes carried by the oscillating beam F are in such place upon the commutator C as to produce an attraction between S and N′ and N and S′, thus making A revolve in the direction indicated by the arrows. As long as the carbons are meeting, no current passes in E′, so E keeps the brushes in the same position, and A keeps on revolving in the same direction; but as soon as the carbons are separated, a derived current passing through E′ counteracts E with a power proportionate to the distance between the carbons of the lamp. When the proper length of arc is attained, the electro-magnet E′ has drawn in its core so as to place the brushes upon the commutator in line with N and S of the fixed magnet, and the magnetism in A will now so oppose that in N and S that the armature A will be kept there as long as the brushes do not take another position upon C; but soon the carbons burn away and the distance between the same gets gradually greater and more current is passing through E′, which will draw in its core deeper and deeper until the brushes on C have assumed the position shown in Fig. 2, when the armature A will be revolved in the direction indicated by the arrows, thus allowing the ribbon L and the carbon Q to move down. As soon, however, as the carbons are at their normal distance from one another, E′ will grow weaker and E stronger, which latter magnet will place the brushes in line with N and S as long as the arc is normal. The action of the lamp is such that when the top carbon is lifted up it will at once be sent down by the action of E′, displacing the brushes, and in the same way, if the carbons are brought in contact E′ is powerless, and E brings the brushes so as to cause A to revolve in such direction as to wind up the ribbon and separate the carbons. The electro-magnet M and armature A are not at all influenced by the weight of the carbons or the holders. The beam F being pivoted upon a proper and light bearing, responds readily to the action of E′ and E, so that as soon as the arc is either too short or too long E′ and E will actuate the beam F and place the brushes where they will cause the armature to move either to the right or to the left. As will be seen, in this lamp the feed is obtained from the armature A and the electro-magnet M acting upon one another by the constant passage of the main current through the same. No use is made of a derived circuit to demagnetize the main magnet or armature, but the desired result is produced by simply displacing the polarity in the armature upon its periphery with regard to the main electro-magnet M, and by displacing the polarity I am enabled to obtain motion from right to left or from left to right. The displacement of polarity is accomplished, as above

explained, by a lightly-pivoted beam actuated by a coil, E′, in a derivation between the two poles of the lamp, so that the condition of the arc influences the coil or solenoid E′, causing the displacement of the brushes and at the same time of the polarity of the revolving armature A, which, reacting upon the stationary poles of the electro-magnet M, will either make the carbons approach or recede from one another, or cause the same to remain stationary as long as their distance apart remains constant.

I do not limit myself to any special device driven by the above motor and feeding the carbons in an electric-arc lamp, since a variety of devices can be used to obtain the same result.

Having described my invention in its different parts and operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric-arc lamp, a circular armature provided with iron extensions from its core, between which extensions the wire is wound and acted upon by a fixed field-magnet having contracted poles, said armature and field-magnets being energized by the main current, the circuits in said armature and field-magnet to be a derivation one from the other, and their respective coils having an equal resistance, in combination with suitable mechanism to produce the feed of the carbons in an electric-arc lamp, as described and set forth.

2. In an electric-arc lamp, and in combination with the carbons thereof, a field-magnet having contracted fixed poles acting upon a revolving circular armature provided with an iron core, and both provided with proper circuits, and means, substantially as described, for altering the point of entering and leaving of the current through the coils of the armature, so as to displace the polarity upon the circumference of the same with regard to the fixed poles of its field-magnet, and thus to produce the feed of the carbons by the action of the revolving armature, substantially as described.

3. In an electric-arc lamp, a fixed field-magnet having contracted poles and a circular armature capable of oscillating or revolving between the same, the armature being provided with a commutator and properly-insulated contact-brushes, said field-magnet and armature reacting upon one another at their polar extremities, in combination with means for automatically changing the position of the brushes upon the commutator above mentioned before the motion of the armature has occurred, in order to displace the polarity of the circular armature with regard to the fixed poles of its field-magnet, and thus cause said armature to revolve or oscillate either to the right or left to produce the feed of the carbons, substantially as set forth.

4. The herein-described method of regulating the feed of carbon in an electric-arc lamp, which consists in raising or lowering the same by the rotation of an annular armature in which the polarity is shifted automatically by reason of the varying resistance of the arc, the upper carbon being attached to a band wound upon the axis of said armature, as set forth.

5. In an electric-arc lamp, a fixed field-magnet provided with fixed contracted poles between which is mounted a circular armature capable of an oscillating or rotary motion, in combination with an oscillating beam carrying properly-insulated brush-holders and brushes bearing upon the commutator of said armature, said beam being connected to and operated by a solenoid located in a derivation between the poles of the lamp, so arranged that whenever the carbons are close together said beam shall first be drawn down toward the said solenoid, and thereby move the brushes to such points on the commutator as will cause the armature to revolve and separate the carbons; and, second, when the proper arc is obtained, the beam to move the brushes to the median magnetic line, so that the armature will be prevented from revolving either way; and, third, on the arc growing longer by oscillating in the opposite direction, to place the brushes upon such points of the commutator that the armature shall be caused to revolve to feed the carbons and restore the normal arc, substantially as described.

6. In an electric-arc lamp, the combination, with a rotating armature and a pulley, D, attached to the axis thereof, of a copper ribbon, L, attached to said pulley and provided with a carbon-holder, O, from which the carbon hangs down above the lower carbon of said lamp, as described and set forth.

7. In an electric-arc lamp, the feed mechanism of the same, consisting of a field-magnet, M, and circular armature A and connections, substantially as described, whereby proper currents circulate therethrough when the same are in operation, in combination with a pivoted balance or beam, F^3, brush-holders and brushes F and F′, all operated by an electro-magnet, E′, in a derivation between the poles of the lamp, and an electro-magnet, E, in the main circuit, or an equivalent therefor, counteracting E′, substantially as described.

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