(No Model.) 2 Sheets—Sheet 1.

# G. R. MACINTIRE.

## ELECTRIC ARC LAMP.

No. 535,841. Patented Mar. 19, 1895.

Fig. 1.

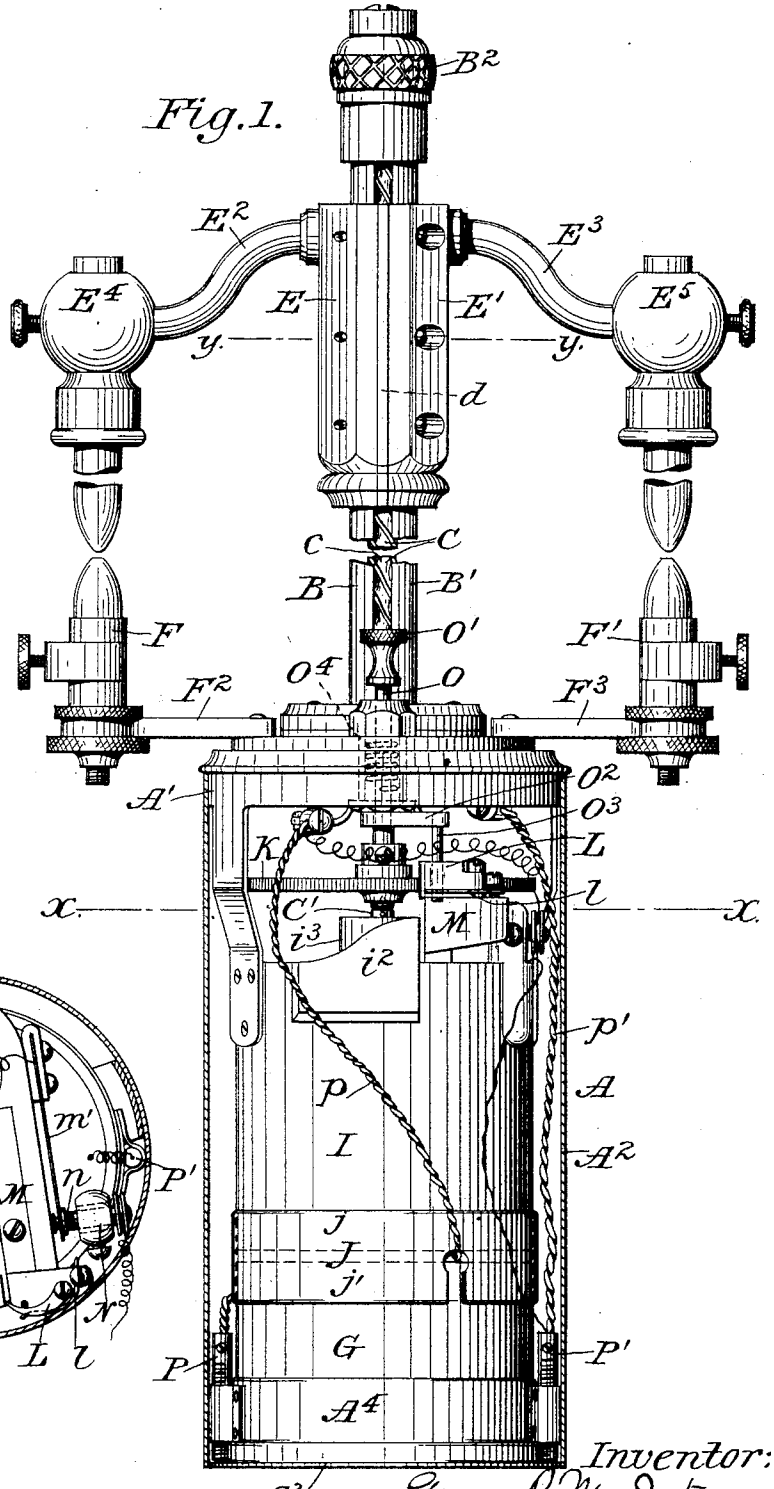


Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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## ELECTRIC ARC LAMP.

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Fig. 3.

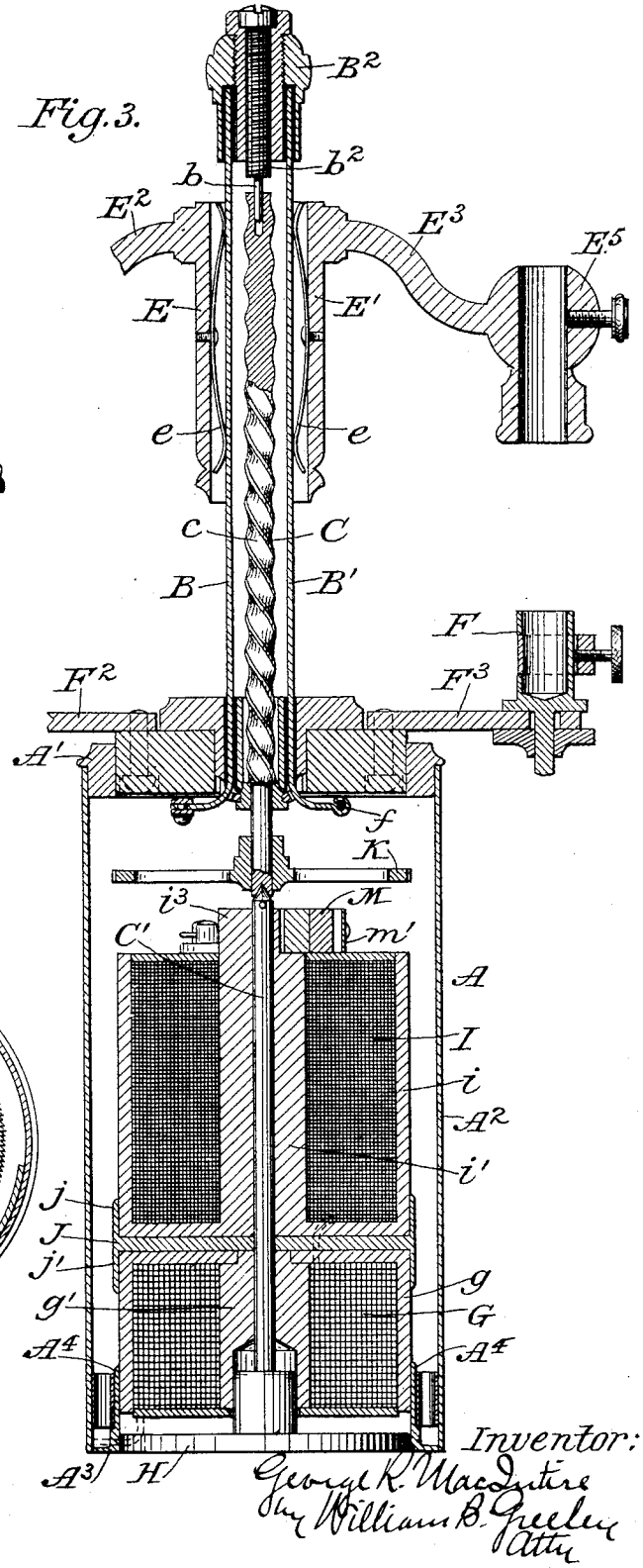



Fig. 4.

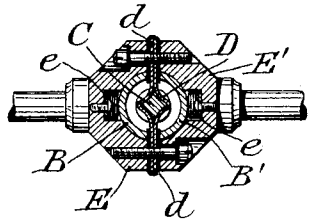
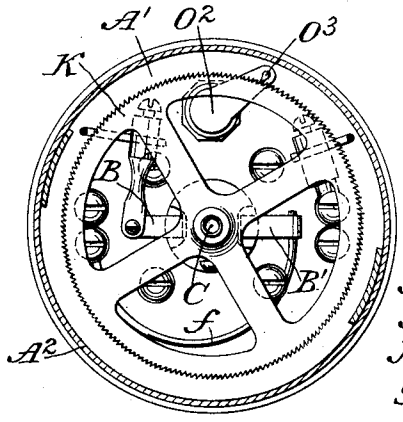



Fig. 5.

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# UNITED STATES PATENT OFFICE.

GEORGE R. MACINTIRE, OF NEW YORK, N. Y.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 535,841, dated March 19, 1895.

Application filed July 5, 1894. Serial No. 516,559. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE R. MACINTIRE, of the city, county, and State of New York, have invented certain new and useful Improvements in Electric Lamps, (Case B;) and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

In another application for Letters Patent of the United States filed July 5, 1894, and bearing the serial number 516,558, (Case A,) I have described certain improvements in electric arc lamps, which have for their object the production of a compact lamp, containing various novel features of construction. The lamp there described is particularly adapted for a pendent lamp and is provided with but a single pair of carbons. In the present application I describe a lamp which embodies some of the general features of the other lamp referred to but differs in certain details of construction and particularly in that it is provided with a plurality of pairs of carbons the feed of which is controlled and determined by a single set of feeding mechanism. Moreover the lamp herein described is represented as adapted to be supported from beneath upon a standard or upon a bracket.

In the accompanying drawings in which is illustrated a lamp embodying the present improvements, Figure 1 is an elevation of the improved lamp, the shell which protects the feeding mechanism being shown in section and some other parts being broken out to save space. Fig. 2 is a horizontal section on the line *x*—*x* of Fig. 1. Fig. 3 is a vertical central section of the lamp, some parts being broken away to save space. Fig. 4 is a section on the line *y*—*y* of Fig. 1, the direction of sight being upward. Fig. 5 is a section on the line *x*—*x* of Fig. 1, looking upward.

The feeding mechanism and other parts of the lamp are supported by a base A which is adapted to be set in a socket suitable for its reception or to be otherwise secured to a standard or bracket and comprises a plate A′, a protecting shell $A^2$, and an annulus or bottom piece $A^3$ by which the magnets are supported within the shell $A^2$.

To the plate A′ are secured two or more sections B, B′, which together make up a supporting and guiding sleeve and separately constitute parts of the circuit, the said sections being insulated from the plate A′ and from each other. At their upper ends the sections are secured together, being still insulated from each other, by a suitable cap-piece $B^2$. Within the sleeve B, B′, a shaft C having a spiral groove *c*, is mounted to rotate freely and at the same time to have capacity for a limited vertical movement. The upper end of the shaft C may be guided by a pin *b* which is carried by a screw $b^2$ fixed in the cap-piece $B^2$. The shaft is supported vertically by the armature of the series magnet, preferably resting upon the point of an intermediate rod C′ which is fixed to or in turn rests upon said armature. Means are provided, as hereinafter described, for rotating the shaft C and upon said shaft is mounted a driving nut D which is connected by webs or arms *d*, *d*, with a carriage E, E′, which slides freely upon the outside of the composite sleeve B, B′. The carriage is made up of the two sections E, E′, which are insulated from each other and are also insulated from the nut D, the contact of each section E, E′, with the corresponding section of the sleeve B, B′, being assured by a spring *e* which is fixed to the respective section of the carriage and bears upon the corresponding section of the sleeve. The vertical edges of the section E, E′, of the sleeve or tube are separated by a sufficient distance to prevent the leaping of the current from one to the other and also to permit the free movement of the webs or arms *d*, *d*. The section E of the carriage E, E′, has an arm $E^2$ which supports one upper carbon holder $E^4$ and the other section E′ in similar manner is provided with an arm $E^3$ which supports the upper carbon holder $E^5$. The lower carbon holder F, which corresponds to the upper carbon holder $E^4$ is supported by an arm $F^2$ from the plate A′, the said arm being insulated from the plate. In like manner the lower carbon holder F′ which corresponds to the upper carbon holder $E^5$ is supported by an arm $F^3$ from the plate A′ said arm $F^3$ being also insulated from the plate A′.

The series magnet G is supported by the

bottom piece or annulus $A^3$, being preferably secured to a vertical flange $A^4$ of said bottom piece and being preferably of the kind commonly known as the iron-clad magnet having a jacket $g$ which is connected with the core $g'$. The armature H of the series magnet is formed as a disk which covers the lower end of the magnet, and, as hereinbefore stated, supports the rod C′ and the shaft C, whereby, when the current is completed through the series magnet and the armature H is attracted, the shaft C, the carriage E, E′, and the upper carbon holders $E^4$, $E^5$ will be raised sufficiently to separate the upper carbons from the lower carbons for the formation of the arcs.

Upon the series magnet G is supported the shunt magnet I, the latter being held in position by a disk J having a double flange $j$, $j'$. The lower flange fits upon the upper end of the magnet G while the upper flange receives the lower end of the magnet I. The magnet I is also preferably of the iron-clad variety, having a jacket $i$ connected with the core $i'$. Both cores $g'$ and $i'$ are bored axially for the reception of the rod C′.

The shaft C has fixed thereto a ratchet wheel K which is engaged and rotated by a pawl L. The latter is pivoted upon the end of the armature M of the shunt magnet I and is pressed by a spring $l$ into engagement with the ratchet wheel. The armature itself is pivoted near the periphery of the magnet I and is normally held away by a spring $m$ from the head $i^2$ of the jacket $i$ and the head $i^3$ of the core $i'$. The armature bears an insulated spring contact piece $m'$ which is connected with the coil of the magnet and upon a suitable post N is mounted an insulated back contact $n$ which is electrically connected in any convenient manner to one side of the main line, while the other end of the coil of the magnet I is connected to the other side of said main line.

In the plate A′ is mounted a short shaft O, being provided above the plate with a thumb-piece O′ and below the lower plate with an arm $O^2$ having a tooth $O^3$. The shaft is acted upon by a spring $O^4$ (shown in dotted lines in Fig. 1) to hold the tooth $O^3$ in engagement with the ratchet wheel K and thus to constitute a hold pawl to prevent backward movement of said ratchet wheel. By a partial rotation of the shaft O by means of the thumb-piece O′ the tooth $O^3$ may be made to engage the pawl L and disengage the same from the ratchet wheel to permit the free rotation of the shaft H when the carriage E, E′, is raised by hand.

One terminal of the main line is connected to a binding post P and thence to the series magnet G. From the series magnet connection is made by a suitable conductor $p$ to one section B of the sleeve B, B′. From thence the circuit is continued through the section E of the carriage, arm $E^2$, upper carbon holder $E^4$, lower carbon holder F across the arm $F^2$ and an intermediate conductor $f$ to the other section B′ of the sleeve B, B′. From this point the circuit is completed to the section E′ of the carriage E, E′, arm $E^3$, upper carbon holder $E^5$, lower carbon holder F′, arm $F^3$, and conductor $p'$ to the binding post P′ to which the other terminal of the main line is connected.

It will be obvious that the supporting and guiding sleeve and the carriage might be made in any desired number of sections within reasonable limits, and that therefore the lamp may be provided with a corresponding number of pairs of carbons the feed of all of which would be controlled by a single shaft C and its actuating mechanism, although I have represented but two pairs of carbons. It will be obvious also that in this case, as in the lamp shown in the other application referred to, the upper carbons may descend by gravity but that the carriage supporting them is positively advanced by the action of the pawl L. The operation of this lamp is substantially the same in general as that of other lamps of like character and need not be further described herein.

I claim as my invention—

1. In an electric lamp, the combination of a series magnet and a shunt magnet mounted axially one upon another, with their cores in line, a spirally grooved shaft supported by the armature of the series magnet in line with the axis of said magnets, a ratchet wheel fixed to said shaft, an armature for the shunt magnet pivoted near the circumference thereof to swing across its end and having an actuating pawl for said ratchet wheel, and a carbon carrier having a nut to engage said shaft, substantially as shown and described.

2. In an electric lamp, the combination of a carriage composed of insulated sections, a carbon holder carried by each section, a spirally grooved shaft engaging said carriage to move it progressively, and independent electrical connectors for the several sections of the carriage, substantially as shown and described.

3. In an electric lamp, the combination of a supporting base, a sleeve mounted on said base and composed of insulated longitudinal sections, a carriage mounted to slide on said sleeve and composed of insulated sections in contact respectively with the sections of said sleeve, carbon holders carried by the sections of the carriage, other corresponding carbon holders, and a single feeding mechanism for actuating said carriage, substantially as shown and described.

4. In an electric lamp, the combination of a supporting base, a sleeve mounted on said base and composed of insulated longitudinal sections, a carriage mounted to slide on said sleeve and composed of insulated sections in contact respectively with the sections of the carriage, other corresponding carbon holders,

a spirally grooved shaft mounted to rotate in said sleeve and adapted to actuate said carriage, and means to rotate said shaft, substantially as shown and described.

5. In an electric lamp, the combination of a supporting base, a series magnet supported therein and bored axially, an armature placed below said magnet and having a rod extending up through the bore of the magnet, a carbon supporting carriage, a guide therefor, an actuating shaft therefor supported on said rod, and means to actuate said shaft, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE R. MACINTIRE.

Witnesses:

A. N. JESBERA,

A. WIDDER.