

(No Model.)

N. F. RUTHERFORD.
ELECTRIC ARC LAMP.

No. 477,273.

Patented June 21, 1892.

Fig. 1.

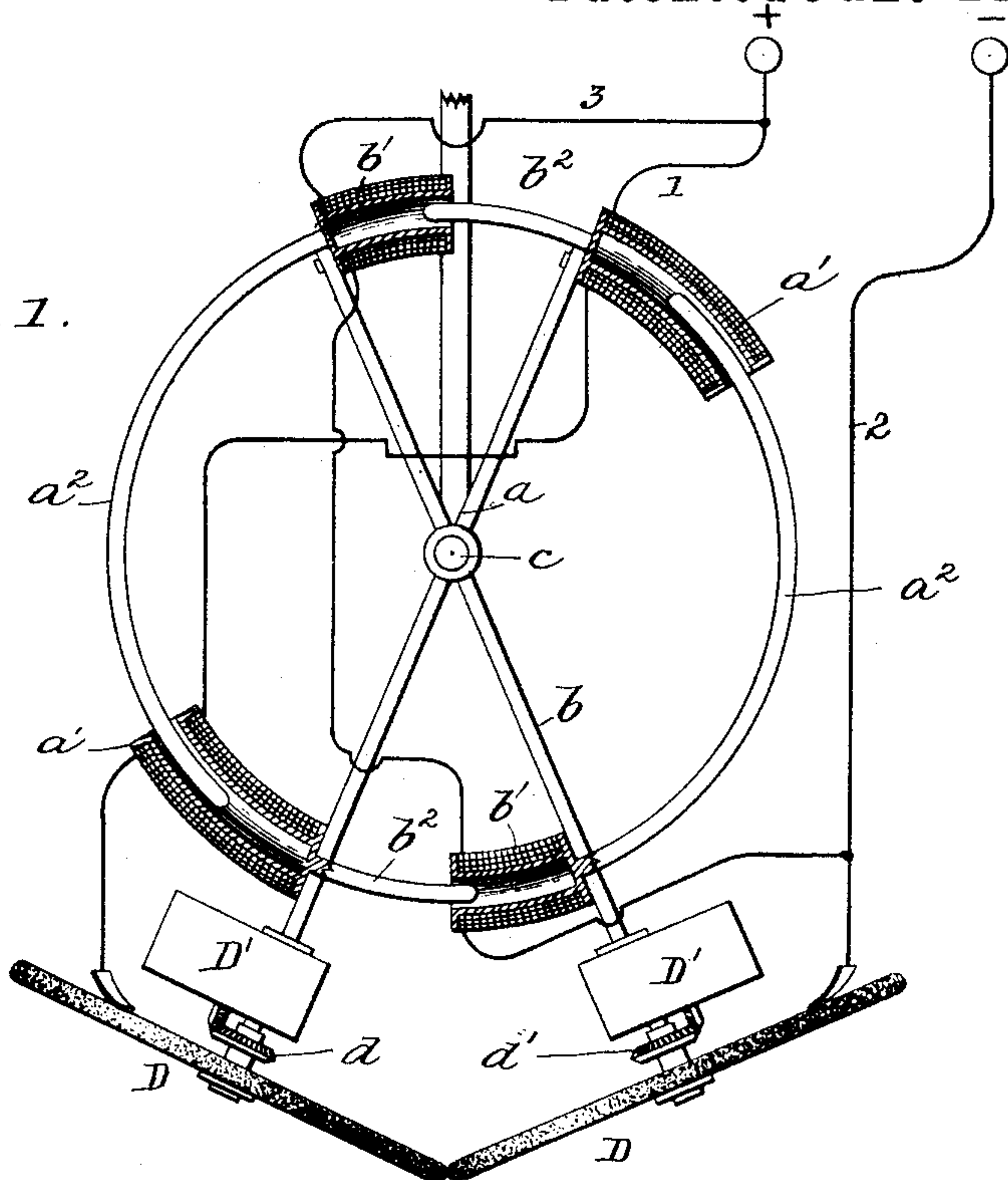
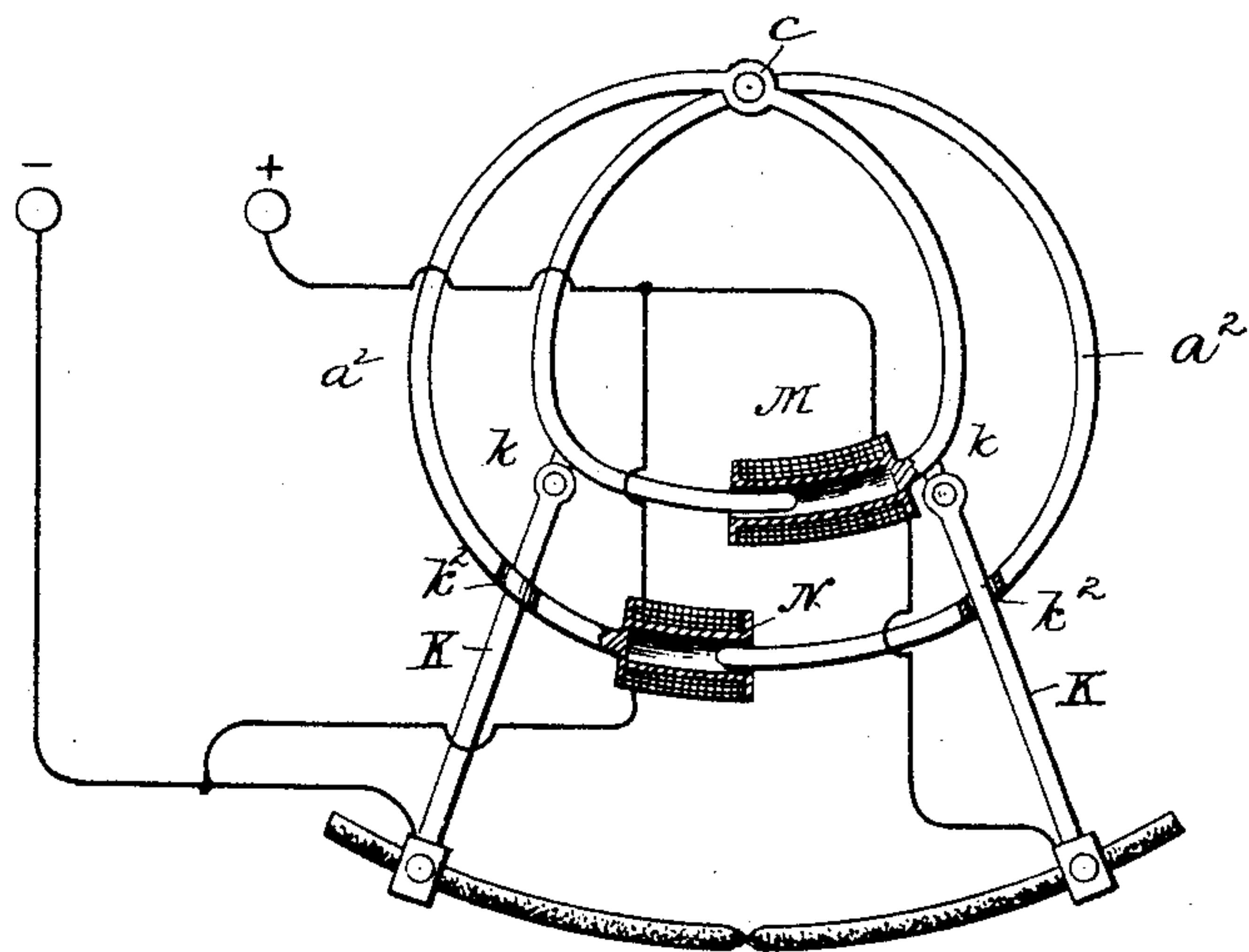


Fig. 2.



WITNESSES:

Frank S. Ober
James Mark Boies

INVENTOR

Norman F. Rutherford

BY

W. J. Johnston

ATTORNEY.

UNITED STATES PATENT OFFICE.

NORMAN F. RUTHERFORD, OF BATHURST, NEW SOUTH WALES.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 477,273, dated June 21, 1892.

Application filed August 13, 1891. Serial No. 402,506. (No model.)

To all whom it may concern:

Be it known that I, NORMAN F. RUTHERFORD, a subject of the Queen of England, residing in Bathurst, New South Wales, have
5 invented certain new and useful Improvements in Arc Lamps, of which the following is a specification.

My invention relates to electric-arc lamps, and has for its object the production of a simple mechanism for accomplishing the striking
10 of the arc and the maintaining of the same.

The invention consists of two crossed levers pivoted at their point of intersection. One lever carries or has attached to it on each side
15 of its pivot a solenoid-magnet in the main circuit and the other lever has two similar magnets included in a shunt-circuit to the arc. The cores of each set of magnets are carried by the opposite levers—that is to say, the cores of the
20 shunt-magnets are attached to the lever carrying the main solenoids, and the cores of the main solenoid are attached to the lever carrying the shunt-solenoids. The carbon electrodes are preferably in the form of disks rotatable on the bearings and carried on the
25 ends of the two levers.

In the accompanying drawings, Figure 1 represents in a semi-conventional manner my improved lamp mechanism, and Fig. 2 is a
30 modification of the same.

Referring to the drawings by letter, *a* and *b* represent two crossed levers pivoted at their intersection upon a stud *c*. To the lever *a* and upon each side of its pivot is attached a
35 solenoid-magnet *a' a'*. These solenoids are shaped on the arc of a circle having for its center the pivot *c*. They are attached to opposite sides of the lever, as shown. The lever *b* has attached to it in a similar manner and
40 at the same distances from the center two solenoid-magnets *b' b'*. The cores of the solenoids *a' a'* are curved pieces of soft iron *a² a²*, attached, respectively, to the lever *b* at points directly back of the solenoid which it
45 carries and extending in the opposite direction. The cores of the solenoids *b' b'* are curved pieces of metal *b² b²*, somewhat shorter than the pieces *a² a²*, and are attached to the levers *a a* at points immediately behind each
50 of the solenoids which it carries. It will be seen that from this magnetic system when the solenoids *a' a'* are energized they will

have the tendency to separate the adjacent ends of the levers *a* and *b*, and when the solenoids *b' b'* are energized they will have the
55 tendency to bring the adjacent ends of the levers together.

D D represent two carbon disks mounted, respectively, on the lower ends of the levers *a* and *b*. They occupy planes at right angles
60 to their respective levers and with their perimeters in contact, or nearly so.

D' represents clock-work supported by the levers and arranged to rotate the disks *D*.

The circuits of the lamp are as follows:
65 from positive binding-post by wire 1 through the main solenoids *a' a'*, thence to one of the carbons *D*, crossing the arc-space to the other carbon *D*, and finally to the negative binding-post by wire 2. The shunt-circuit 3 extends
70 from the positive binding-post through the shunt-magnets *b' b'*, and thence to the negative binding-post.

The operation is as follows: When no current is flowing through the lamp, the weight
75 of the mechanism holds the edges of the carbons in contact. When the current is turned on, the main magnets *a' a'* become strongly energized, and the pull which they exert on their cores *a² a²* separates the adjacent ends
80 of the levers and establishes the arc between the carbons *D D*. When the arc becomes too long, the resistance thus caused forces the current to flow through the high-resistance shunt-magnets *b' b'*, causing them to attract
85 their armatures *b² b²* and draw the adjacent ends of the levers together, thus shortening the arc and making it again normal.

I have described the carbons as made in the form of disks; but when so formed means must
90 be provided for rotating them in order to entirely consume them. I therefore mount upon each lever a frame carrying a clock-work *D'*, which engages with the pinion *d* on a sleeve carrying the carbon disk. This clock-work
95 may be made to rotate the disk as slowly as desired.

In Fig. 2 is shown a modification, in which one of the levers carries the solenoids, both main and shunt, and the other carries the ar-
100 matures. The levers are bent to form one turn of a spiral. The solenoids and armatures are on the ends of the respective levers. The two arms *K K*, carrying the carbons,

which in this instance are pencils, are pivoted, respectively, to one end of each of the levers at the points k k' and pass through openings or rings k^2 formed in the other ends of said
5 levers. M represents the main magnet, and N the shunt-magnet. When the current is turned on, M draws its armature and the carbons are separated, thus establishing the arc. When the shunt-magnet acts, it draws car-
10 bons together. It will be observed that the two magnets act differentially, and that the movement of the carbons is the result of a movement of the two pairs of ends of the levers in opposite directions—that is to say, the
15 point k moves inward, while the point k^2 moves outward. The movement of the carbon is, therefore, greater than that of either of the armatures.

I claim—

- 20 1. The combination, with a pair of levers pivoted at their intersection, each carrying a

carbon electrode, of two pairs of solenoids, one in the main circuit of the lamp and the other in the shunt-circuit of the lamp, one of the levers carrying the main magnets and the
25 cores of the shunt-magnets and the other carrying the shunt-magnets and the cores of the main magnets, substantially as described.

2. In an arc lamp, a pair of levers pivoted at their intersection and carrying, respect-
30 ively, the carbon electrodes, in combination with main and shunt solenoids and the cores thereof, the said magnets and cores being carried by the levers, and devices carried by the levers for feeding the carbon electrodes.
35

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

NORMAN F. RUTHIERFORD.

Witnesses:

FRANK S. OBER,

WM. A. ROSENBAUM.