

(No Model.)

2 Sheets—Sheet 1.

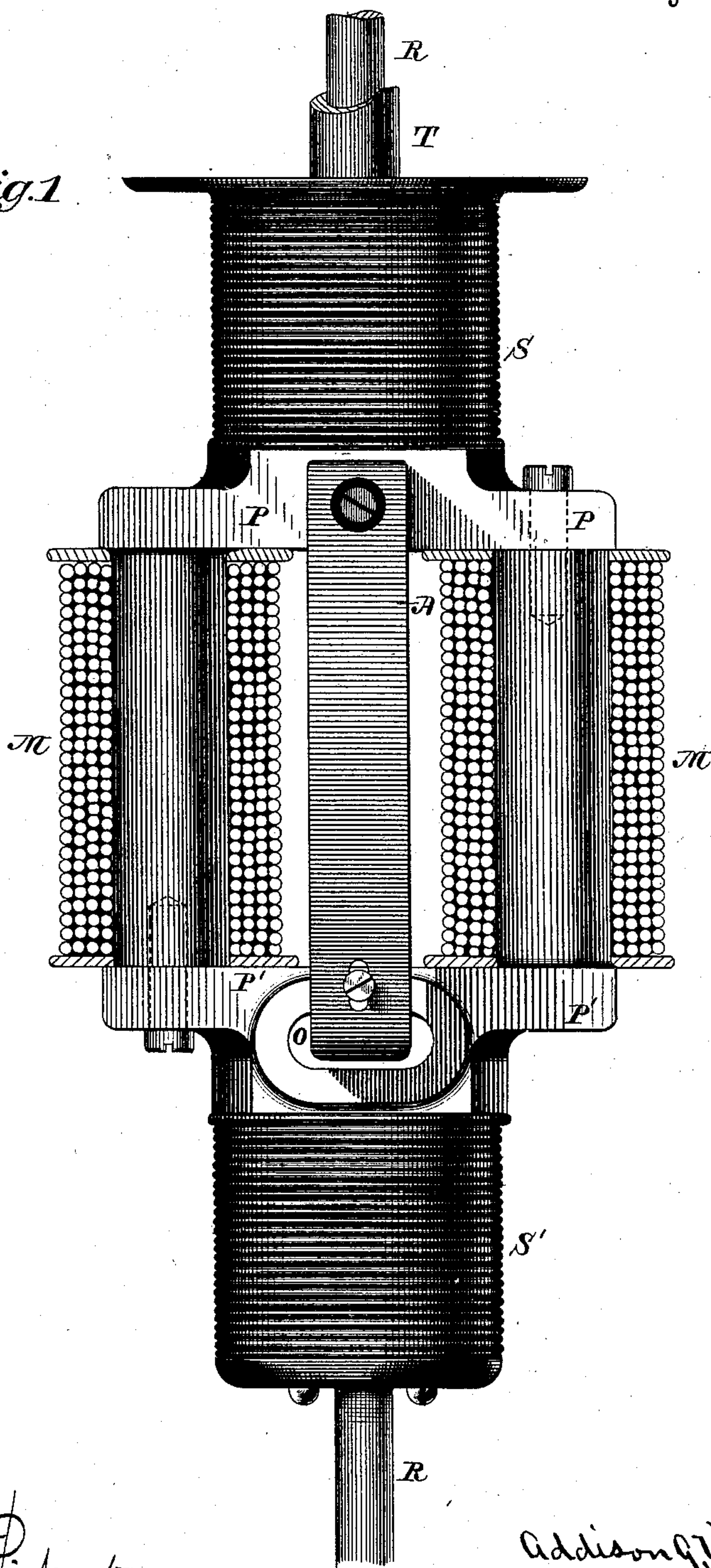
A. G. WATERHOUSE.

ELECTRIC ARC LAMP.

No. 366,613.

Patented July 12, 1887.

Fig. 1



Witnesses

Frank H. Pinkert
Barth B. Ward

Inventor

Addison G. Waterhouse

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2

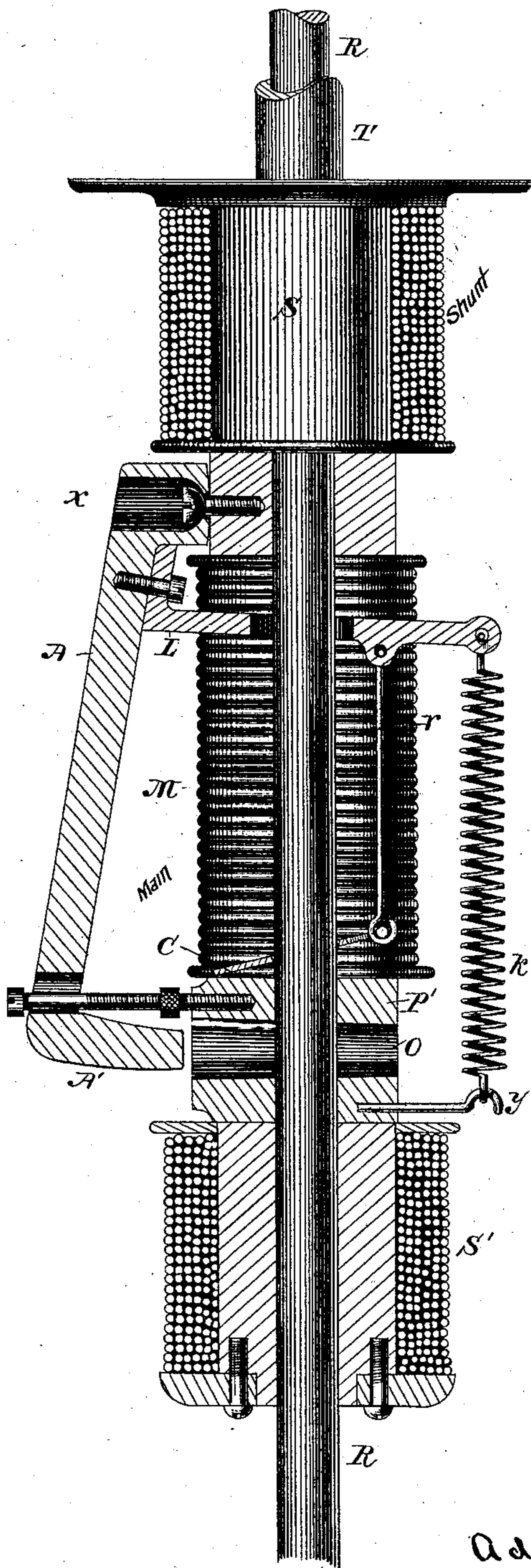
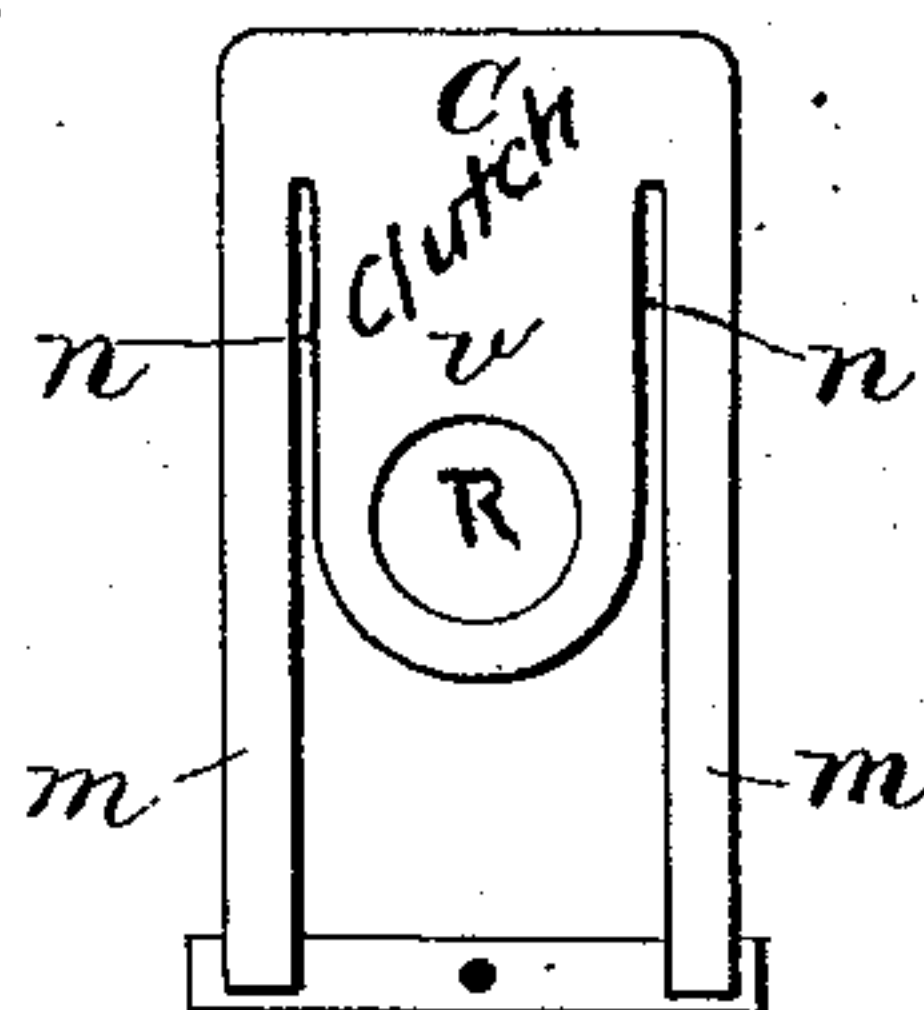


Fig. 3



Witnesses

Frank H. Pierpont
Barton B. Ward

Inventor

Adison Waterhouse

UNITED STATES PATENT OFFICE.

ADDISON G. WATERHOUSE, OF HARTFORD, CONNECTICUT, ASSIGNOR TO
THE WATERHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF
SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 366,613, dated July 12, 1887.

Application filed May 15, 1886. Serial No. 202,325. (No model.)

To all whom it may concern:

Be it known that I, ADDISON G. WATERHOUSE, of the city of Hartford, State of Connecticut, have invented a new and useful Improvement in Electric-Arc Lamps, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to that class known as "arc lamps," and is especially related to improvements on the electro-magnet used therein for the purpose of maintaining the carbon electrodes at the proper distance apart during the time the lamp is in operation. For this purpose I make use of an electro-magnet, around which both the main current passes on its way to the arc and also the shunt-current passes on its way around the arc. Both of these currents pass around the magnet in the same direction, and both unite in producing a magnetic effect upon the iron of the magnet, so that like poles will be produced by both currents in the same direction, the object of this magnet, when employed for regulating an arc lamp, being to use the main current for causing a separation of the carbons in order to form and maintain the arc, and the use of the shunt-current being to cause the carbon points to feed toward each other as the distance or resistance between them increases by the consumption of the points. This I accomplish by locating the wire carrying the main current on two parallel cores united at each end by pole-pieces, so as to form a quadrangular frame, two sides of which are formed by the main magnet-cores and the two ends by the two pole-pieces. The two cores are wound with the main-current conductors, through which the current passes in the same direction around both cores, and both unite in producing the opposite poles to the pole-pieces forming the ends of the frame, as shown in Figure 1, in which M M are the main magnets, and P and P' are the pole-pieces, forming the quadrangular frame M, P, M, and P'. The magnets M M are sufficiently separated to allow space between them for the carbon rod R and clutch C, shown in Fig. 2, in which is also shown the armature A, loosely pivoted to the pole P, so as to present a rolling contact-

surface and be free to roll against said pole P when attracted to it by the magnetism; but when not magnetized the armature A is held in its place by the loose pin or screw *x*. The armature A, thus forming a rolling contact against pole P, extends across the quadrangle to pole P', which is provided with an aperture, O, made elongated, so as to diminish any side attraction to the armature and present the two sides nearest the armature A which are on the plane of its motion.

The armature A is bent at one end, so as to present a tongue, A', at the opening O, which, when magnetism is produced, causes the tongue A' to be drawn into the opening O and the armature A to swing in toward the pole P'.

Attached to the armature A is the lever L, extending out at right angles, and at the end of L is hung a retracting-spring, *k*, secured to the stationary pin *y*. Now, when the magnetism draws the armature in, as stated, the lever L swings upward, which stretches the spring *k*, and when the magnetism weakens, the spring *k* draws the lever L down again, and thus causes the armature A to swing outward toward its original position.

Connected to the lever L is the link *r*, which is connected to the clutch C, (shown in Fig. 3,) so when the armature A is drawn in by the strength of the main magnets the lever L moves up, bringing with it the clutch C and carbon rod R, thus causing a separation of the carbon electrodes, and as the magnetism decreases the armature swings away and causes the carbons to feed together, as in the way common to arc lamps.

The clutch C, Fig. 3, is of peculiar construction, being made of thin sheet metal with clutch-opening in the center to surround and engage the rod R, cut away as shown, and having slits *n n* cut into it, so as to leave the spring-arms *m m*. This clutch is acted on by being lifted at the ends of the arms *m*, thus causing all parts of the clutch to act as a spring, which causes a constant contact and acts more promptly in arresting the downward movement of the rod R.

The shunt-magnets consist of cores extend-

ing out from the center of the pole-pieces P and P', and are wound with the shunt-coil, which extends around the arc, so that the current flowing through the shunt-wire will pass
 5 around the shunt-cores in the same direction as the main current passes around the main magnets, the result of which will be as follows: If the currents in both the main magnets and the shunts are passing in the same direction—
 10 say from left to right—the pole of north polarity will be toward the top—that is, the main magnets will make the north pole at P and the south pole at P'. In this case the lines of force return through the armature A, and it is
 15 drawn in toward the pole P, as stated; but when the shunt-magnets become active they produce magnetism in the same direction as the main magnets, which causes the north polarity, located at P, to be carried beyond P
 20 to the outer extremity of the upper shunt-magnet, and in like manner with the lower shunt-magnet, so that the poles P and P' are left neutral, or partly so.

As the strength of the shunt-magnets increases according to any increase in the length or resistance of the arc, so when the arc increases the magnetism moves away from the poles P and P', thus causing the armature A to swing away and the carbons to feed together,
 30 as stated.

The general arrangement of the lamp is shown by the drawings, consisting of the quadrangle formed by the main magnets M M and poles P and P', the shunt-magnets S and S', placed on each pole P and P', the armature A, as described, and the carbon rod passing through each of the shunt-magnets S and S', also through the poles P and P' and between the main magnets M M, where the clutch or any
 40 feeding mechanism can be placed which engages the rod R and causes it to respond to the action of the magnets, as above set forth.

I do not herein claim anything claimed in an application filed by me February 19, 1886,
 45 No. 192,324.

What I claim as my invention is—

1. In an electric lamp, an electro-magnet composed of a main magnet consisting of two magnetic cores, M M, united at each end by pole-pieces P and P', provided with an armature, A, rolling on one pole and capable of being drawn toward the other, and the shunt-magnets S and S', placed upon each of the poles P and P', substantially as and for the purposes set forth. 50

2. In an electric lamp, an electro-magnet, consisting of a quadrangular main magnet composed of two cores wound with main-current conductors and two pole-pieces uniting the ends of said cores, each pole being provided with outward-projecting cores for the purpose of receiving the shunt-conductors, and provided with an armature forming a continuous contact with one pole at one end, and capable of being swung to and from the other pole by the magnetic action of the main and shunt conductors, arranged in the manner above stated, substantially as and for the purposes set forth. 55 60 65

3. In an electric lamp, an electro-magnet provided with an armature, A, which forms a rolling contact with one of the poles of the magnet, and provided at the other end with a projecting tongue, A', extending at or nearly at right angle to the main body of the armature A, said tongue being attracted by the opposite pole of the magnet, which pole is provided with an oblong opening, O, with sides that are in close proximity to the tongue of the armature, and the ends of said opening O being more removed from said tongue, thereby reducing any side attraction, substantially as and for the purposes above set forth. 70 75 80

4. In an electric lamp, a clutch for engaging the carbon rod, composed of thin spring metal, with a central clutch-opening and spring-arms at the sides, substantially as described. 85

ADDISON G. WATERHOUSE.

Witnesses:

CHARLES E. CHAPIN,
 BARTON B. WARD.