(No Model.)

2 Sheets—Sheet 1.

J. C. KNIGHT.

ELECTRIC ARC LAMP.

No. 563,773.

Patented July 14, 1896.

Fig. 1.

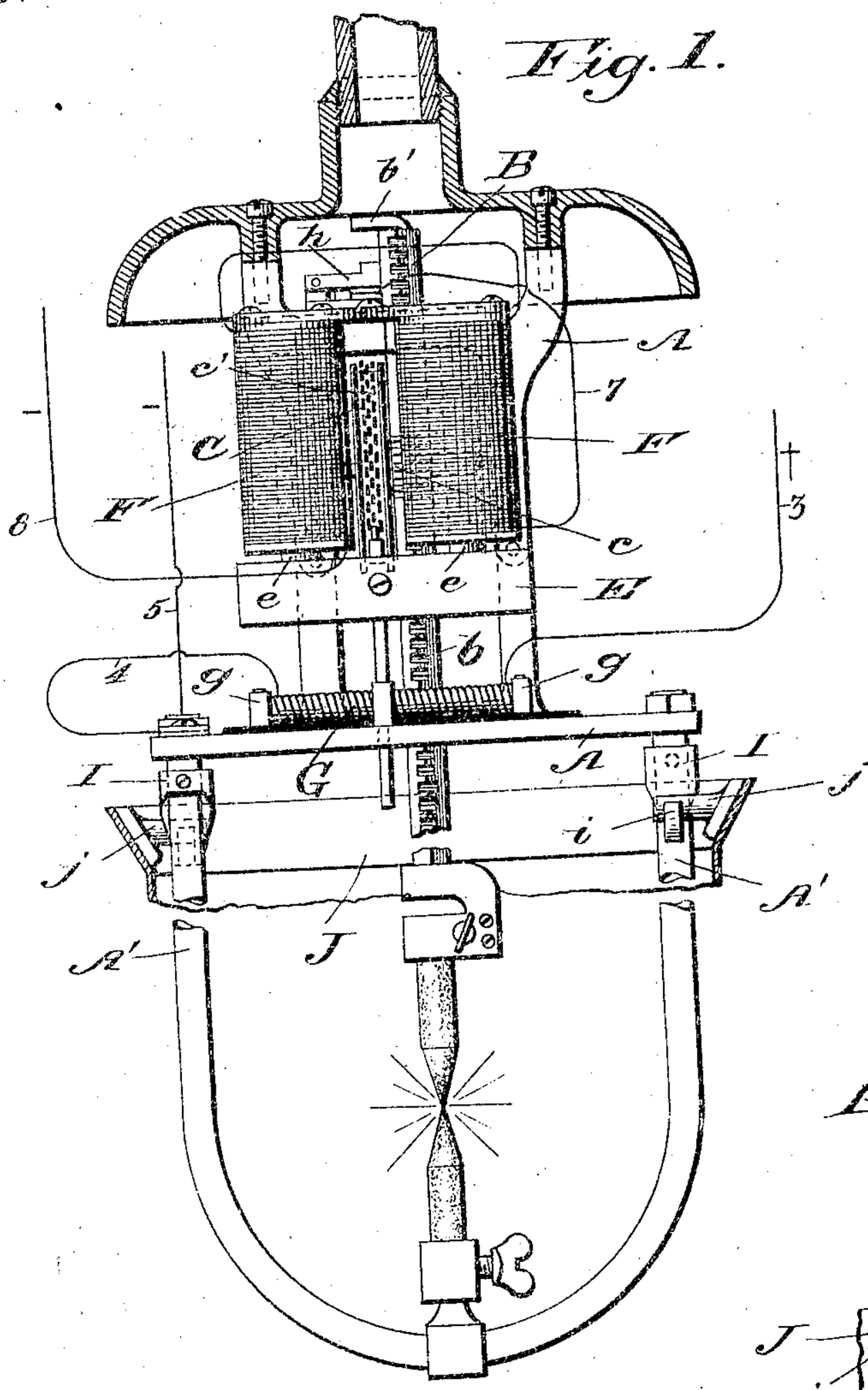


Fig. 2.

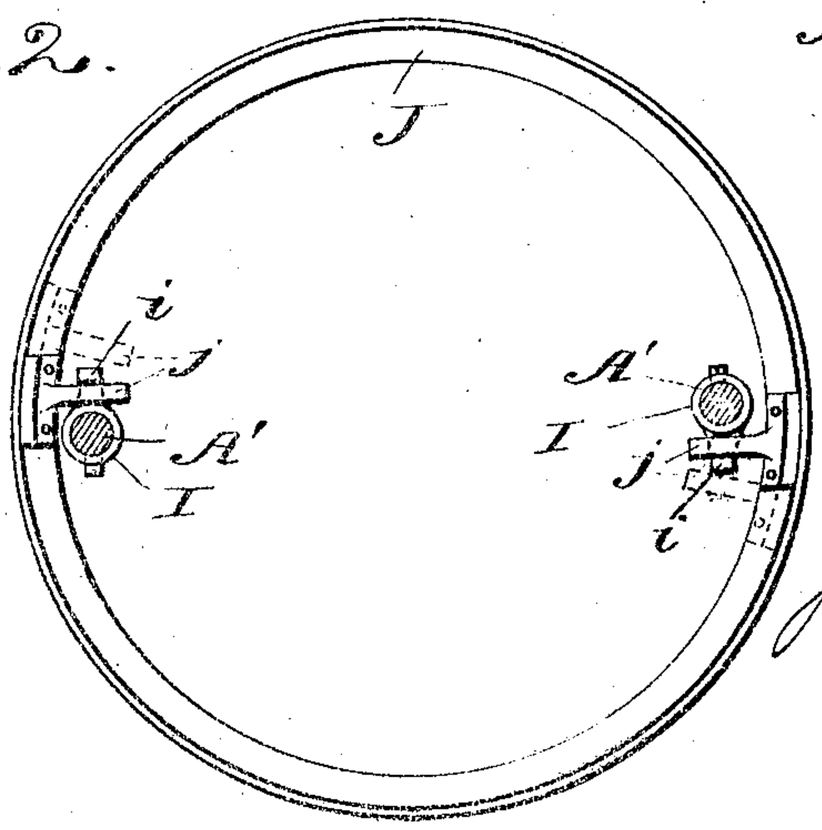
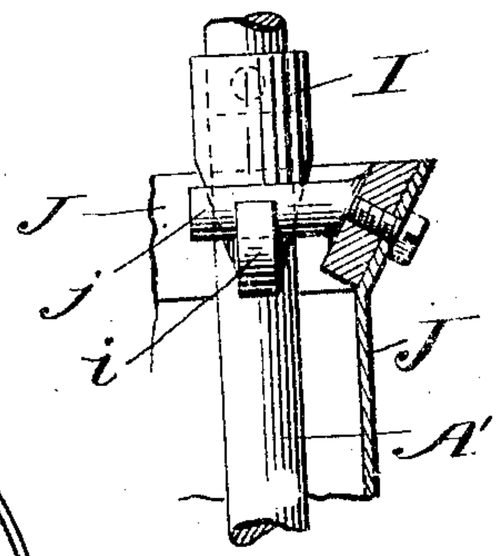


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2

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Fig. 4.

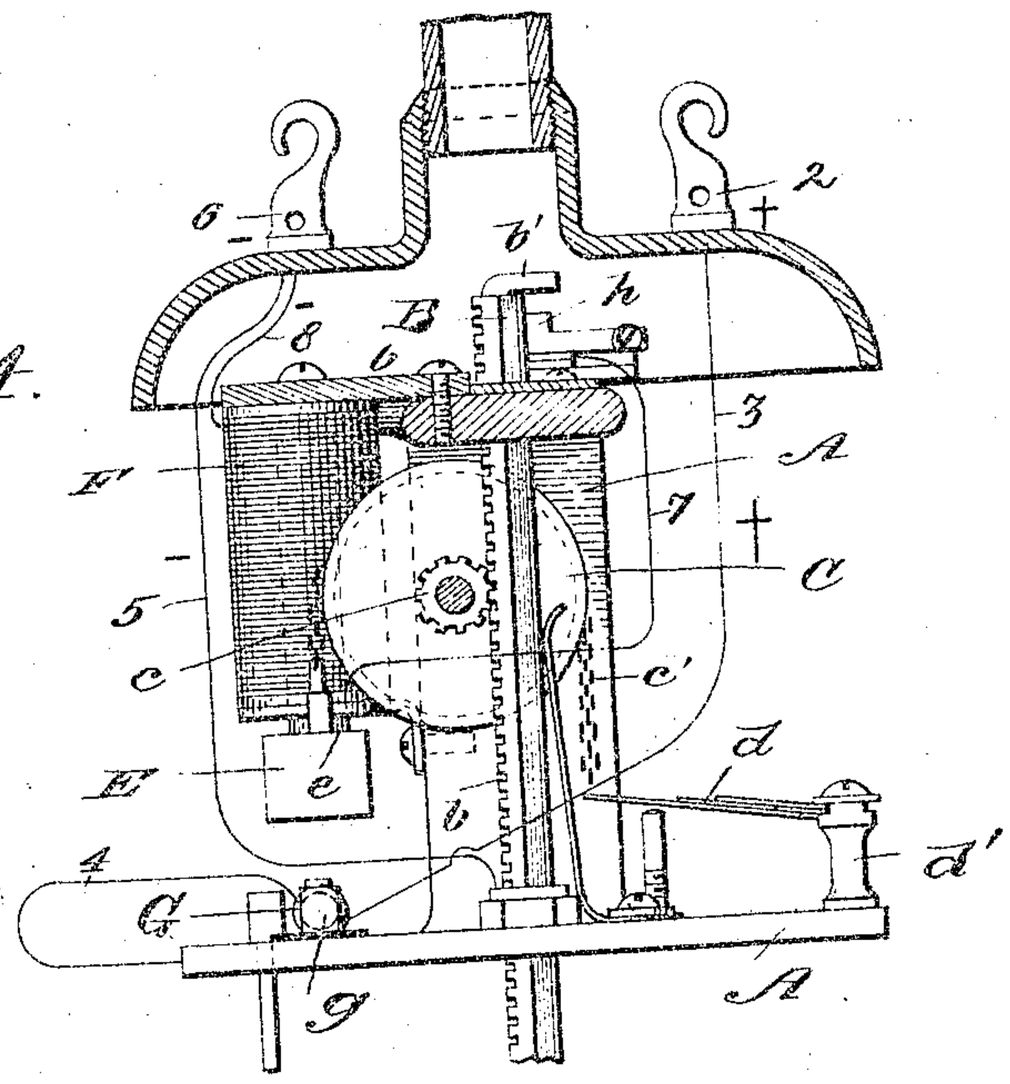
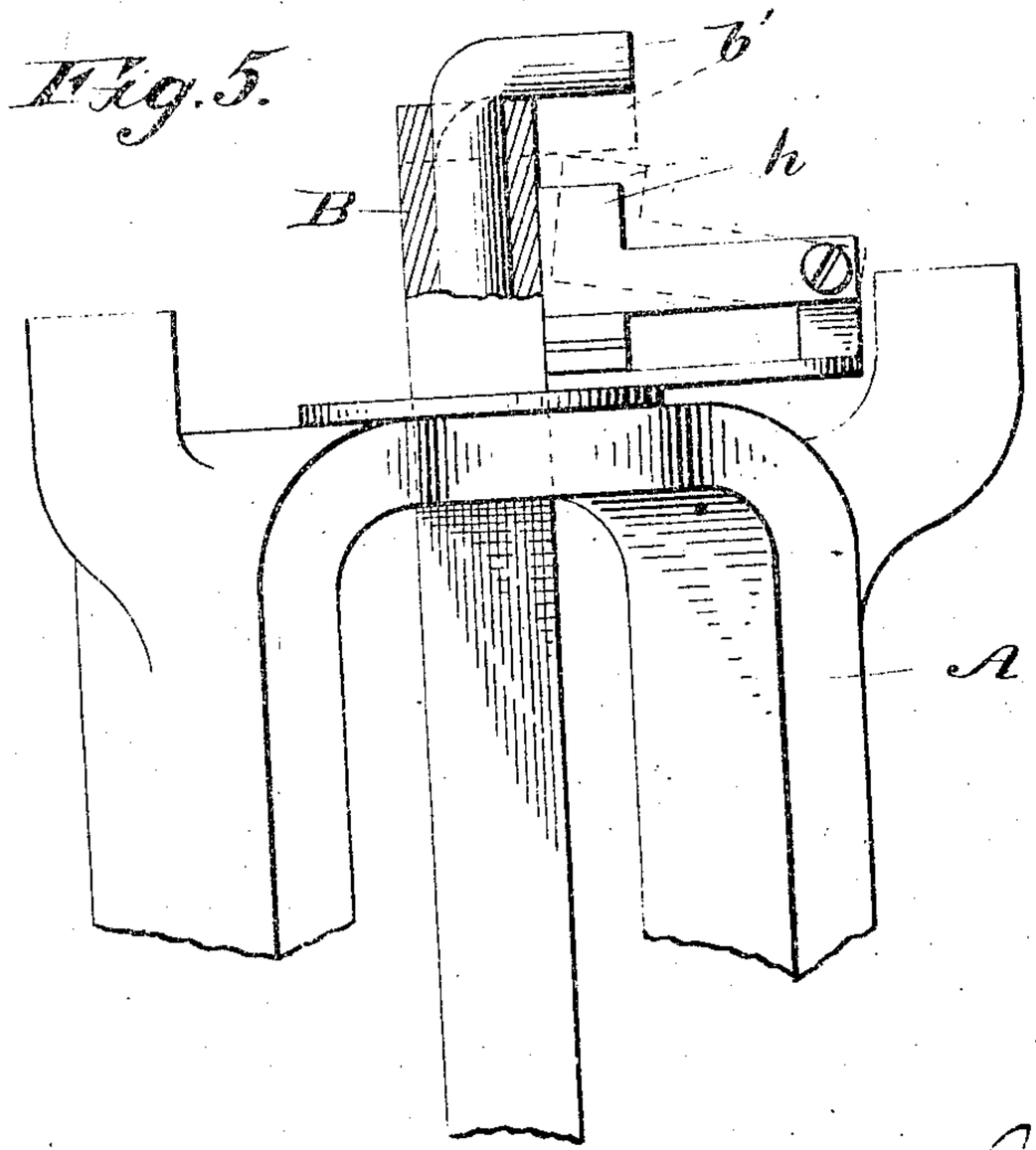


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN C. KNIGHT, OF ROSELLE, NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 563,773, dated July 14, 1896.

Application filed November 21, 1895. Serial No. 569,686. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. KNIGHT, a citizen of the United States, residing at Roselle, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Arc-Lamps, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to that class of arc-lamps in which the carbon-feeding mechanism is controlled by a shunt-magnet operating in connection with an armature the position of which controls a friction device or wheel geared to the upper carbon-rod; and the principal object of my invention is to cheapen the construction and improve the efficiency of the feeding mechanism of this class of lamps.

My invention also includes an improved cut-out device comprising two parts, one (or both) of which is permanently magnetized, and one of which is carried by the upper or movable carbon-rod and the other of which is a cut-out lever or switch to be operated to open the circuit when the carbon has been consumed. I have also provided an improved detachable fastening device for the globe-holder.

In the drawings, Figure 1 is a sectional elevation of a lamp embodying my invention. Fig. 2 is a plan view of the globe-holder to show its detachable connection with the lower rods of the lamp-frame. Fig. 3 is a detachable view, on a larger scale than Figs. 1 and 2, of one of the globe-holder-connecting devices. Fig. 4 is a sectional elevation taken at right angles to the position shown in Fig. 1. Fig. 5 is a detail view on a larger scale than the other figures, to show the cut-out device.

A denotes the metallic framework of the lamp, in which is guided vertically the upper or movable carbon-carrying rod B, having a toothed portion *b*, constituting a rack, with which meshes a pinion *c*, fixed to the shaft or hub of a pulley or friction-wheel C, over which passes a chain *c'*, one end of which is attached to a spring *d*, supported by a post *d'*, and the other end of which is connected to an armature E, having core-pieces *e* extending within the coils of a shunt-magnet F. The armature E is sufficiently heavy to overbalance the stress of the spring *d*.

Below the armature E is a short-wound and therefore relatively weak electromagnet G, having pole-pieces *g*, and which, as will be hereinafter explained, serves as a "pick-up" to lift the upper carbon rod or carrier to form the arc when the current is first turned on and the lamp is first lighted, this pick-up magnet being normally, or when the lamp is burning, entirely disconnected from the carbon-feeding mechanism and thus being entirely idle after it has performed its function of lifting the upper carbon to form the arc.

Attached to the upper end of the carbon-rod B is a permanent magnet *b'*, a portion of which is extended laterally from said rod, so as to be above the free end of a pivoted cut-out lever or switch *h*, which free end normally rests on a contact pin or block beneath it and with which contact pin or block the conductor 7, forming part of the shunt-circuit, is in electrical connection.

Instead of making the part *b'* a permanent magnet the cut-out lever or switch *h* may be permanently magnetized, and the part *b'* will then serve as an attraction-piece, or the parts *b'* and *h* may both be magnetized by opposite pole-magnets, so that they will attract each other.

Attached to the upper ends of the rods A', which support the lower-carbon holder B', are sleeves I, provided with notched lugs *i* to engage with inwardly-extending lugs or arms *j* on the globe-holder J. By lifting the globe-holder to disengage the lugs or arms *j* from the notched lugs *i*, and then by partially rotating said globe-holder to move the said arms or lugs *j* out of the vertical planes of the lugs *i*, the globe-holder will be released, so that it may be dropped down and removed from the lamp when desired.

The main current enters the lamp at the positive binding-post 2, passing thence through conductor 3, pick-up magnet G, conductor 4, lamp-frame A, and carbon rod or holder B to carbons and then out through conductor 5 and negative binding-post 6. The shunt-current passes from the lamp-frame through cut-out switch or lever *h*, conductor 7, shunt-magnet coils F, and conductor 8 to negative binding-post 6.

The operation of my lamp is as follows: When the current is first turned on, (the carbons being at such time separated, so that the

current cannot pass through them,) the full strength thereof is passed through the shunt-magnet F, thereby so fully energizing the latter as to suddenly lift the armature E into contact with said magnet, thus lowering the end of the chain c', which is connected with the spring d, so that the free or movable end of said spring rests on the stop or post m, thereby slackening the said chain and releasing its frictional hold on the wheel or pulley C to such an extent that the carbon-rod B will fall by gravity until the carbons are in contact. The current will now be directed from the shunt-circuit to the carbons, and the shunt-magnet will be so weakened that it will no longer hold up the heavy armature E, and the latter will drop by gravity into contact with the poles of the pick-up magnet G, which movement of the said armature will tighten the chain c' and turn the wheel C far enough to lift the carbon-rod B and establish the arc. The armature E is now, by the attractive power of the magnet G, held down steadily until by the gradual consumption of the carbons the arc is widened sufficiently to cause resistance enough to divert a portion of the current to the shunt-circuit, when the increasing power of the shunt-magnet will lift the armature E to or near feeding position, where it will be practically out of the magnetic field of the relatively weak short-wound magnet G, and the latter will now be entirely idle while the lamp is burning, said magnet G having normally no connection with the feeding mechanism. The lamp will now continue to burn in the usual manner until, by the gradual consumption of the carbons, the carbon-rod B has so far descended that the permanent magnet b' comes near enough to lift the cut-out lever or switch h, and thus break the shunt-circuit, permitting the armature E to fall, so that the carbon-feeding mechanism is rendered inoperative, and as the carbons now burn away and become widely separated the passage of the current is entirely suspended.

The steady holding down of the armature E by the magnet G prevents said magnet from dancing or jumping at the time of the first formation of the electric arc and before the normal burning conditions of the lamp are established, and thus this comparatively cheap short-wound magnet as effectively prevents all flickering of the lamp as the more expensive long-wound coil or relay magnets heretofore employed for this purpose in differential lamps, while at the time insuring a longer and more stable arc than is secured in a shunt-lamp when first lighted, thus avoiding flickering of light and waste of current.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In an electric-arc lamp, the combination with a movable carbon-rod and a feeding mechanism therefor, of a shunt-magnet and an armature for controlling said feeding mechanism, and a short-wound pick-up magnet in the main circuit, said armature being normally practically outside of the field of said magnet and the latter serving merely to hold said armature steady when the arc is first formed and before the shunt-magnet becomes sufficiently energized to properly control said armature.

2. In an electric-arc lamp, the combination with the lamp-frame A, of the movable gravity-feed carbon-rod B, the wheel or pulley C having a geared connection with said rod, the friction-chain c' passing over said wheel, a spring to which one end of said chain is connected, the armature E to which the other end of said chain is connected and which is provided with the core-pins e, the shunt-magnet F within the coils of which said core-pieces extend and the short-wound pick-up magnet G connected in the main circuit and arranged below the said armature, the latter, when in feeding position, being practically out of the magnetic field of said armature G.

3. In an electric-arc lamp, the combination with a movable carbon-rod and a feeding mechanism therefor, of a shunt-magnet and armature for controlling said feeding mechanism, and a cut-out device for said shunt-magnet comprising a metallic piece carried by said carbon-rod and a movable cut-out switch or lever, one or both parts of said cut-out device being permanently magnetized.

4. In an electric-arc lamp, the combination with the movable carbon-rod B provided with the permanent magnet b', of the cut-out lever or switch h in the shunt-circuit, the feeding mechanism for said carbon-rod and the shunt-magnet and armature for controlling said feeding mechanism.

5. In an electric-arc lamp, a movable carbon-rod and a feeding mechanism therefor comprising a shunt-circuit, a shunt-magnet, a spring, and an armature with which said spring is connected so as to have a tendency to lift said armature toward the said shunt-magnet, said armature however being sufficiently heavy to overbalance the stress of said spring, combined with a short-wound pick-up magnet connected in the main circuit, said armature being normally practically outside of the field of said pick-up magnet, and the latter being arranged below said armature so as to act to hold the same down steadily when the main portion of the current is passing through the main circuit, and before the shunt-magnet becomes sufficiently energized to properly control the said armature, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN C. KNIGHT.

Witnesses:
JOSEPH F. JAQUITH,
HENRY CALVER.