(No Model.)

C. E. SCRIBNER.

ELECTRIC ARC LAMP.

No. 330,055. Patented Nov. 10, 1885.

Fig. 2

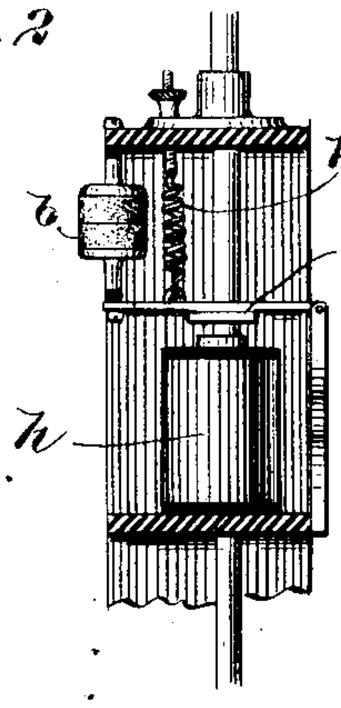


Fig. 3

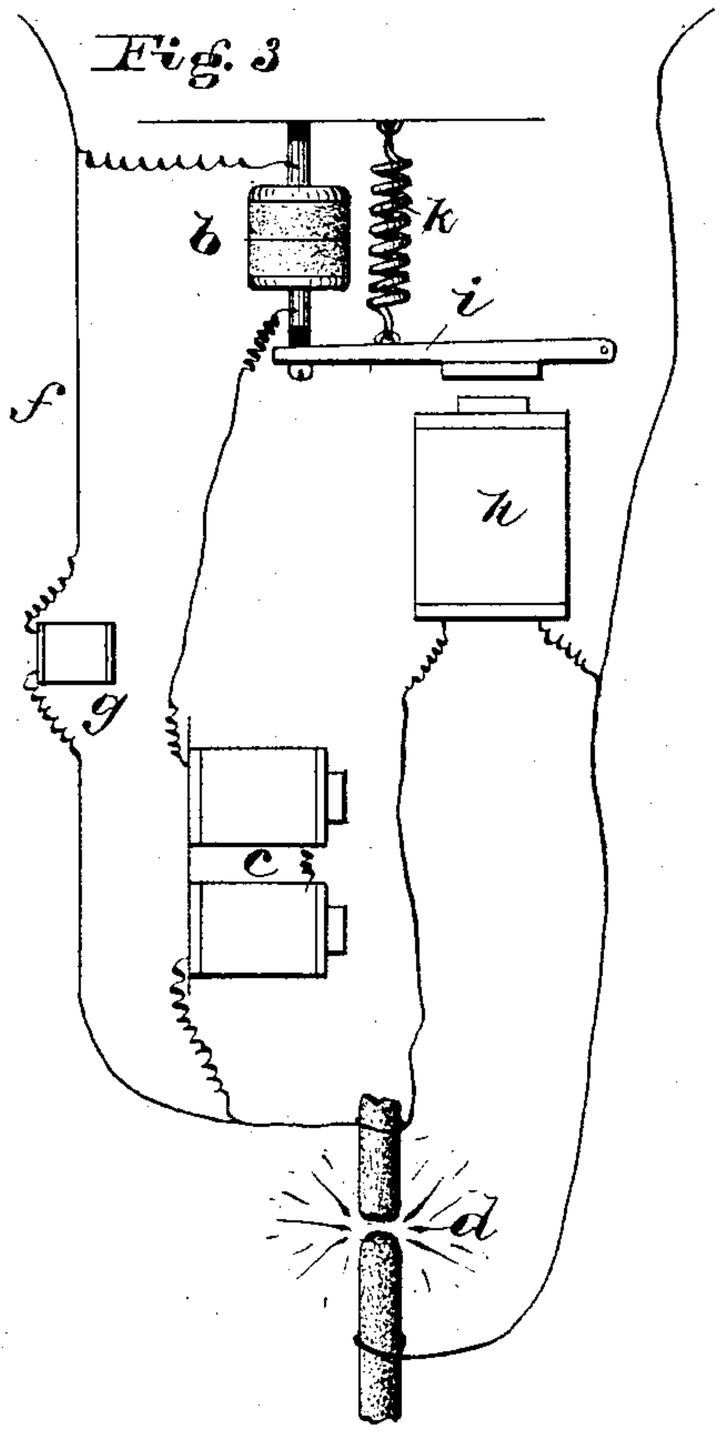
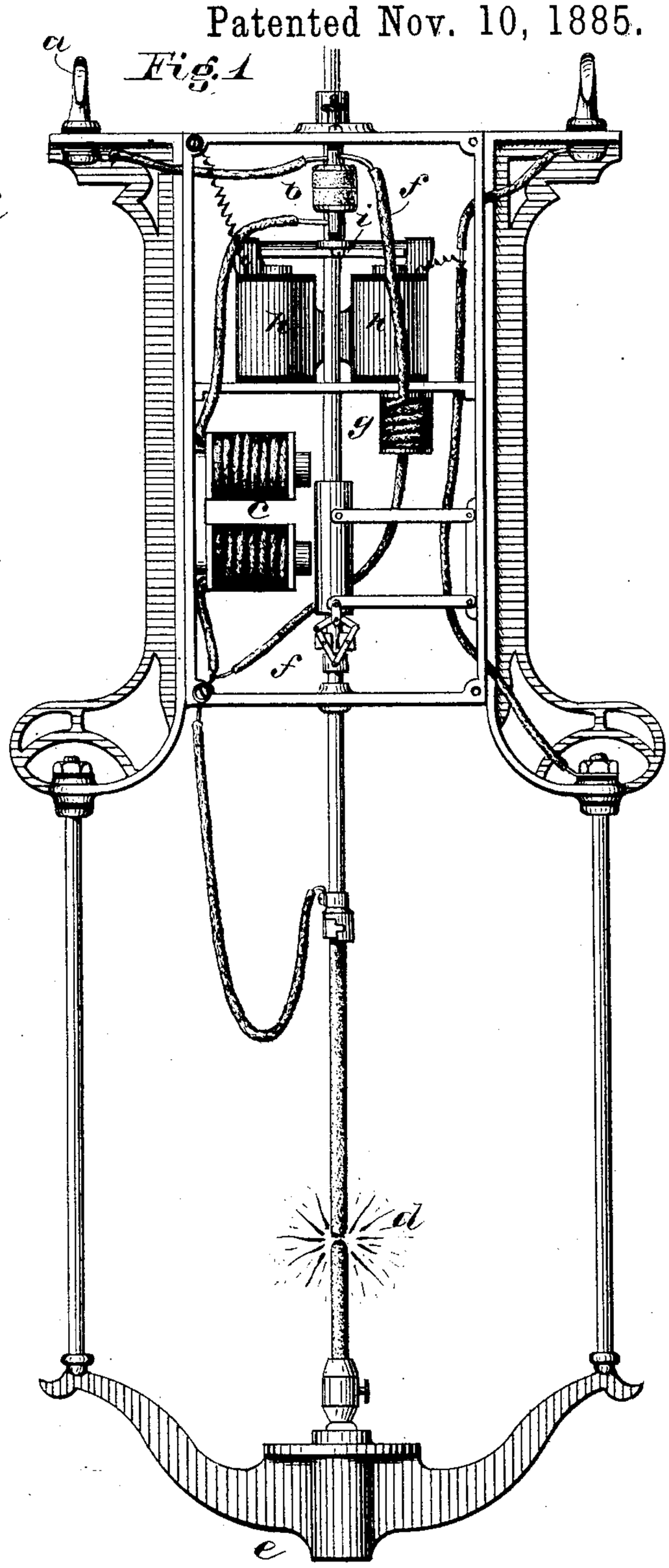


Fig. 1



Attest
Paul A. Staley
John C. Hopkins

Inventor
Charles E. Scribner
By George P. Burton
Attorney

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 330,055, dated November 10, 1885.

Application filed December 4, 1882. Serial No. 78,326. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Derived Circuits for Arc Lamps, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

In the drawings, Figure 1 is a front elevation of a lamp embodying my invention. Fig. 2 is a partial sectional elevation of the same, showing the variable rheostat and the magnet which is placed in the shunt of the arc. Fig. 3 is a diagram view illustrative of the circuits.

Like parts are indicated by similar letters of reference in the different figures.

In Fig. 1 the circuit may be traced from hook *a* through rheostat *b*, lifting-magnet *c*, the arc *d*, and carbon-support *e* out to line. The permanent shunt *f*, including resistance-coil *g*, is placed around the lifting-magnet and the rheostat. The electro-magnet *h* is included in the shunt of the arc.

The armature of the lifting-magnet carries the clutch. When the armature is in its lowest position, the clutch is disengaged from the carbon rod and the rod falls. When the armature is raised, the clutch grasps the rod. The armature rises as the current through magnet *c* becomes stronger and descends as the current becomes weaker.

The variable rheostat which I have shown consists of two pieces of carbon in contact. The armature *i* of the electro-magnet *h* being drawn up by the spring *k*, presses the two pieces of carbon together. It is well known that in such a rheostat the resistance decreases as the pressure increases.

When the circuit is closed through the lamp, sufficient current passes through the lifting-magnet to separate the carbons and establish the arc. As the length of the arc increases, more current will be directed through the electro-magnet *h*, which I term the "regulating-magnet." The pressure of the armature of the regulating-magnet will thus gradually be taken off from the rheostat. The resistance of the circuit of the lifting-magnet will thus be gradually increased, and as less current will pass through the magnet its armature will descend. It will thus be seen that the position of the armature of the lifting-magnet is directly dependent upon the resistance of the variable rheostat and changes its position as the resistance of the rheostat varies.

The carbon pieces may become entirely separated, thus completely cutting out the lifting-magnet when the resistance of the arc becomes great. The resistance of the rheostat may thus be varied from the minimum to infinity.

Usually before the circuit of the lifting-magnet is opened the armature of the lifting-magnet will descend sufficiently to permit the carbons to feed, thus reducing the resistance of the arc. The resistance of the arc, however, cannot increase beyond the point at which the circuit of the lifting-magnet is opened at the rheostat, since when the circuit is opened the lifting-magnet loses its entire magnetism. Any variation whatever in the resistance of the rheostat will result in a change in the position of the lifting-armature.

As the current varies through the lifting-magnet, the lifting-armature moves up and down in a limited field without feeding the carbons. This variation in the position of the armature is necessary to compensate for the variation in the strength of the main current.

As the strength of the current through the lifting-magnet increases, the length of the arc will increase. The strength of the magnet *h* and the resistance of the rheostat *b* being thus increased, the current through magnet *c* will be correspondingly decreased, reducing the amount of motion which the lifting-armature would otherwise have. It will thus be seen that the magnet *h* by varying the resistance of the rheostat *b* as the resistance of the arc changes, regulates the feeding of the lamp and the compensating action of the magnet *c*.

The permanent shunt always affords a path for the current around the lifting-magnet and variable rheostat. The resistance in the permanent shunt may be adjusted to that of the lifting-magnet, so that current will be sent

through the lifting-magnet to operate the feeding mechanism and establish the arc. The resistance should not be so high as to materially weaken the current when the circuit of the lifting-magnet is opened, or when the resistance of the variable rheostat is high.

As above stated, when the lower carbon piece of the rheostat is carried away from the upper piece the circuit of the lifting-magnet will be broken. The current will thus be all directed through the permanent shunt around the lifting-magnet. A path is thus always afforded for the current.

I may use any other well-known form of rheostat which varies under pressure as the equivalent of the one shown and described herein. I have used a spring wound helically and conically in place of the carbon.

I claim as my invention—

1. The combination, with the main circuit of an arc lamp, of a permanent shunt including resistance around the lifting-magnet, and a variable rheostat included in the main circuit with said lifting-magnet, substantially as and for the purpose set forth.

2. The combination, with the circuit of an arc lamp, of the lifting-magnet and a regulating-magnet included in the shunt of the arc, a permanent shunt including resistance around the lifting-magnet, and a variable rheostat, the armature of the regulating-magnet being adapted to operate the variable rheostat automatically as the resistance of the arc varies, substantially as and for the purpose specified.

3. In an electric-arc lamp, a circuit consisting of two branches, one branch including a variable rheostat and lifting-magnet, the other branch including resistance and means whereby the resistance of the variable rheostat is varied automatically by the armature of a magnet included in the shunt of the arc.

4. In an electric-arc lamp, a magnet in the main circuit shunted by a resistance-coil, the armature and clutch of said magnet adapted to separate the carbons, to feed one of them and to vary the length of the arc as the current through the magnet varies, in combination with a magnet in the shunt of the arc, and means whereby said magnet in the shunt of the arc varies the resistance of the circuit of the lifting-magnet as the resistance of the arc varies, and thereby regulates the feeding and compensating action of the lamp.

5. In an electric-arc lamp, the combination, with a lifting-magnet and a variable rheostat both included in the main circuit, of a shunt-circuit around said lifting-magnet and variable rheostat, and a resistance in said shunt-circuit, whereby current may be diverted from the lifting-magnet through the resistance in the shunt or from the resistance of the shunt through said lifting-magnet.

In witness whereof I hereunto subscribe my name, this 31st day of October, A. D. 1882.

CHARLES E. SCRIBNER.

Witnesses:
GEORGE P. BARTON,
E. J. COOK.