(No Model.) 2 Sheets—Sheet 1.

C. E. SCRIBNER.

ELECTRIC ARC LAMP.

No. 531,978. Patented Jan. 1, 1895.

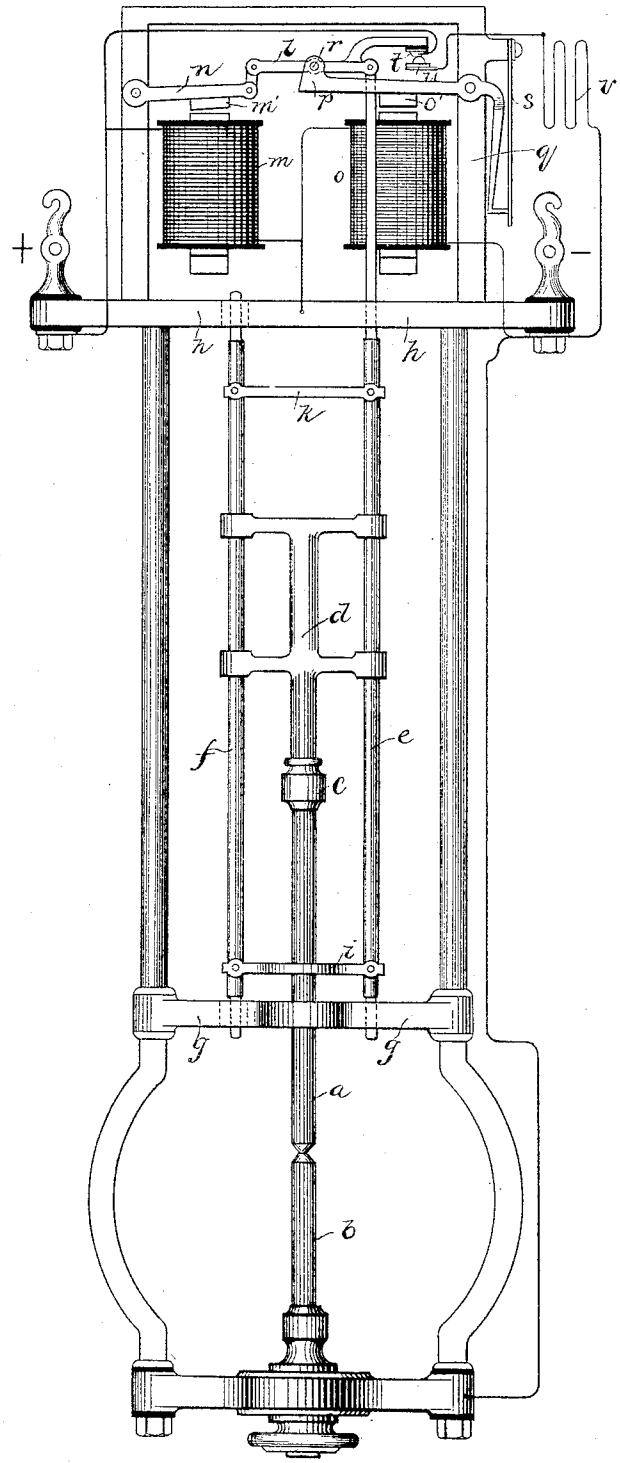

Fig. 1.

Witnesses.
George L. Cragg
Ella Edler

Inventor:
Charles E. Scribner
By Burton & Burton
Atty's

(No Model.) 2 Sheets—Sheet 2.

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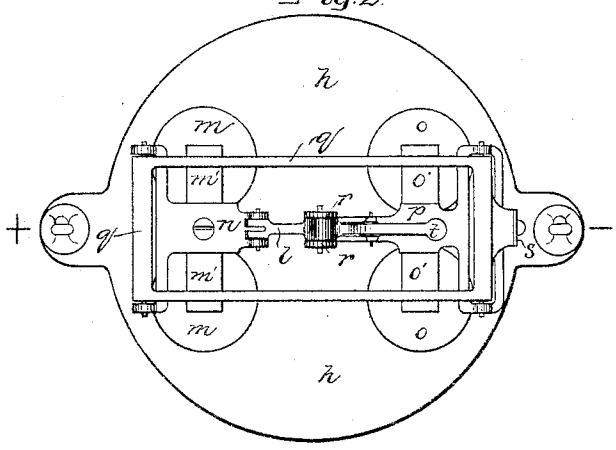
Fig. 2.



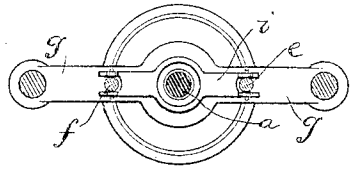


Fig. 3.

Witnesses.
George L. Cragg.
Ella Edler

Inventor;
Charles E. Scribner.
By Geo. H. Barton
Atty

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. 531,978, dated January 1, 1895.

Application filed May 7, 1891. Renewed May 9, 1893. Serial No. 473,604. (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 Electric-Arc Lamps, (Case No. 270,) 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.

My invention relates to arc lamps, and its object is to provide a lamp which shall be capable of burning long carbons and at the same time be shorter than the lamps heretofore generally used for the same purpose.

Speaking generally my invention consists in a vertically movable clutch by which the upper carbon is carried, and intervening mechanism controlled by the regulating mechanism, whereby the said carbon is fed downward. Thus the long rod heretofore employed and which necessarily projected above the frame of the lamp when the lamp was newly trimmed, is dispensed with.

My invention is adapted for use with any of the well known forms of regulating mechanism. I shall, however, describe my invention in connection with regulating mechanism substantially the same as that described in Letters Patent No. 415,571, granted to me, as assignor, November 19, 1889.

In the drawings Figure 1 is a side elevation illustrative of an electric arc lamp embodying my invention. Fig. 2 is a plan view thereof. Fig. 3 is a horizontal sectional view on line *w*—*w* of Fig. 1.

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

The lamp is provided with a pair of carbons *a* and *b*, and the upper carbon *a* is secured in the clamp *c* which is carried by the sliding clutch in the form of a cross head *d*. This sliding clutch is placed between the vertical guiding rods *e* and *f*. The rod *e* is supported in bearings provided in the plates *g* and *h*, the vertical movement of the rod *e* being limited by shoulders or other suitable stops provided on said rod *e* near said plates *g* and *h* respectively. The rod *f* is supported in bearings provided also in plates *g* and *h*. These bearings or openings in said plates are made wider than the ends of the rod *f* inserted therein, in order that the said rod *f* may be moved laterally toward and away from the rod *e*. The rods *e* and *f* are connected together by links *i* and *k* to maintain said rods in parallelism while allowing to said rods *e* and *f* some slight longitudinal motion independent of one another.

Normally the rods *e* and *f* rest in their lowest positions, the links *k* and *i* being at right angles to said rods. In this position the rods do not make contact with the surfaces of the clutch *d*. When, however, the rod *e* is raised, the links *k* and *i* assume oblique positions and the rods are drawn together thus clamping the clutch between their inner sides. During the burning of the lamp, the clutch *d* is thus clamped between the rods *e* and *f*, and any lowering of the rod *e* causes the rods to release the clutch, thus permitting it to descend and effect the feed of the carbons.

It will be observed that the rod *e* is suspended from the lever *l* after the manner in which the connecting rod, which, in my previous form of lamp extends to the clutch lever, has been connected with the regulating mechanism, and it is by means of this rod *e* that the regulating mechanism acts upon the clutch to effect all the regulating and feeding movements.

The regulating mechanism forms no essential part of my invention herein, but in order that its construction may be clearly understood I will describe the same as follows:—A magnet *m* included in the main circuit of the lamp is furnished with an armature *m'* attached to a lever *n*. A second electro magnet *o* having a coil of fine wire, and hence of high resistance, is provided with an armature *o'* attached to the bell crank lever *p*. The armature lever *n* is pivoted at one extremity to the frame of the lamp. The lever *p* is pivoted at its angle to the frame *q* of the lamp and is furnished with lugs *r* at the extremity of its shorter arm which form the pivotal support of the lever *l*. The free extremity of armature lever *n* is pivoted to the free extremity of the lever *l*. Against the longer arm of lever *p* a spring *s* rigidly attached to the frame *q* bears and tends to maintain the armature *o'* at a distance from its magnet. The cir-

cuit extends from the positive pole of the lamp, through the main magnet *m*, thence to the frame of the lamp, through the upper carbon *a* and the lower carbon *b* to the bottom of the lamp, and thence to the negative binding post. Of the terminals of the fine wire magnet one is connected to the frame of the lamp, and the other to the negative binding post. Hence the magnet *o* is in shunt of the carbons *a b*, and when an arc is formed, is in shunt of that arc.

In connection with the lamp I have shown a cut out circuit of well known character. A contact point *t* mounted on the lever *l*, but insulated therefrom, is adapted to rest against the insulated contact anvil *u* when the lever *l* is in its lowest position, as shown in the drawings. The contact *u* is connected through a resistance *v* to the negative binding post of the lamp and the contact anvil *t* to the positive binding post. Hence when these contact pieces are closed together a shunt circuit, including the resistance *v*, is completed about the lamp.

The normal position of the mechanism of the lamp is as shown in the drawings. The armatures *m'* and *o'* are released and the lever *l* is allowed to descend until the contact *t* rests upon the contact anvil *u*. When the lever *l* is in this position the vertical rods *e* and *f* are in their lowest positions and the stops at their lower extremities resting against the bearing *g*. The links *i k* extend at right angles to the rods which are therefore at their greatest distance apart and release the cross head *d* so that it slides freely up and down. When the lamp is furnished with entire carbons the cross head is raised to the upper parts of the rods *e f* and is supported in that position by the carbon which it carries, resting upon the lower carbon of the lamp. When, now, current is caused to traverse the lamp two paths from the positive post will be offered to it, the one through the cut out circuit, that is, through the resistance *v*, contact *t* and contact anvil *u* to the negative post of the lamp, and the other through the main magnet *m* of the lamp, thence to the frame *q*, thence through the rods *e* and *f* to the cross head *d*, through the upper carbon *a*, lower carbon *b* and to the negative post of the lamp. The magnet *m* is energized and attracts its armature *m'*. The downward motion of this armature is communicated through the lever *n* and a link to the rocking lever *l*, which, turning upon its fulcrum *r*, separates the contacts *t u* slightly and ruptures the cut out circuit. The full current now flows through the magnet *m* and the carbons of the lamp. The downward movement of armature *m'* is continued and the rod *e* which is pivoted at its upper extremity to the link *l* is raised. As the rod *e* rises the links *i* and *k* are caused to assume an acute angle with the rod and thus cause the approaching of the rod *f* toward it. The two rods clamp the cross head *d* between them, and, as the upward motion of rod *e* still continues, the two rods, their connecting links, the cross head *d* and carbon which it carries, are all raised. The carbons are thus separated and an arc is formed between them. The resistance of the arc causes a current to be shunted through the high resistance magnet *o*, which being energized attracts its armature *o'* in opposition to the spring *s* and lowers the fulcrum of the rocking lever *l* until the attractive force of the magnet *o* is balanced by the pressure of the spring *s* upon the long arm of bell crank lever *p*. Obviously the length or resistance of the arc between the carbons may be predetermined by the adjustment of spring *s*. As the length, and, consequently, the resistance of the arc increases, the strength of magnet *o* becomes greater and carbon *a* is lowered. When this action has taken place through a small distance the stop at the lower extremity of rod *f* comes in contact with its bearing in the plate *g*, the descent of rod *e* continues, the links *i* and *k* approximate more and more nearly to a position at right angles to the rod *e* and relax their pressure upon the cross head *d*, whereby it is released and the carbons approach toward each other. As this occurs the force of shunt magnet *o* is decreased, the fulcrum of rocking lever *l* is raised by the action of a spring *s* and the arc once more resumes its normal length and resistance. When the carbons are nearly consumed the cross head *d* is arrested in its descent, the resistance of the arc continues to increase until shunt magnet *o* has brought the rocking lever *l* into so low a position as to allow the contacts *t u* to come together when the lamp is shunted, the arc is extinguished and the current continues to flow through the cut out circuit.

I do not limit myself to the particular form of regulating mechanism which I have shown in the drawings. Nearly all of the arc lamps in use possess the equivalent of the lifting lever *l* and obviously my invention might be applied to any of these forms of lamps by simply linking one of the rods, as *e*, to the lever which is the equivalent of the lifting lever *l*.

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

1. The combination of the guide rods *e* and *f*, the links *i* and *k* connecting the two rods and maintaining them in parallelism, a cross head *d* provided with a clamp for securing to it one carbon of the lamp and adapted to be clamped between the guide rods *e* and *f* when the links *i k* do not extend at substantially right angles to the rods, and a stop *g* adapted to cause the release of the cross head *d*, substantially as and for the purpose specified.

2. In combination, two parallel rods *e f* connected by links *i k*, a cross head *d* furnished with means for attaching to it one of the carbons of the lamp and adapted to slide between the rods *e f* when the links *i k* are at

substantially right angles to said rods and to be clamped between said rods when said links are at an acute angle with them, a stop *g* adapted to arrest the downward movement of one rod *f* at a fixed point, a lever *l* pivoted at one end to the other rod *e*, said lever *l* being in connection with a magnet *m* included in the main circuit of the lamp and adapted to cause an upward movement of the rod *e*, and also in connection with a second electro magnet *o* in shunt of the arc adapted to produce a downward movement of rod *e*, substantially as and for the purpose specified.

3. In combination, two parallel rods connected by links, a cross head adapted to slide freely between the two rods when the connecting links are at substantially right angles to the rods, and to be clamped between said rods when said connecting links are at an acute angle with the rods, regulating mechanism adapted to raise and lower one of the rods, a stop adapted to prevent downward movement of the other of the rods beyond a certain predetermined amount, and a rod of carbon or other conducting material in rigid connection with the cross head, substantially as and for the purpose specified.

4. The combination in an electric arc lamp, of two parallel rods linked together, a carbon carrier adapted for movement upon the two rods, regulating mechanism for moving one of the rods with relation to the other, whereby the carrier may be moved with the rods or permitted to move independently of them to effect the feeding of the carbon electrode of the lamp.

5. A clutch or cross head adapted to carry the upper carbon and friction rods linked together and maintained in parallelism, in combination with the regulating mechanism; whereby one of the rods is raised and lowered within prescribed limits and the friction of the said rods upon the clutch or cross head increased and diminished from time to time to cause the carbons to feed and maintain the arc, substantially as and for the purpose specified.

6. The combination with a clutch in the form of a cross-head adapted to carry the upper member of a pair of carbons in an arc lamp, of a pair of rods for guiding said cross-head, said rods being combined with the regulating mechanism of the lamp and relatively movable thereby to control the descent of said clutch in response to the varying electrical conditions of the said regulating mechanism while the lamp is burning, substantially as described.

In witness whereof I hereunto subscribe my name this 25th day of April, A. D. 1891.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

GEORGE L. CRAGG.