(No Model.) 2 Sheets—Sheet 1.

J. C. KNIGHT.

ELECTRIC ARC LAMP.

No. 535,589. Patented Mar. 12, 1895.

Fig. 1.

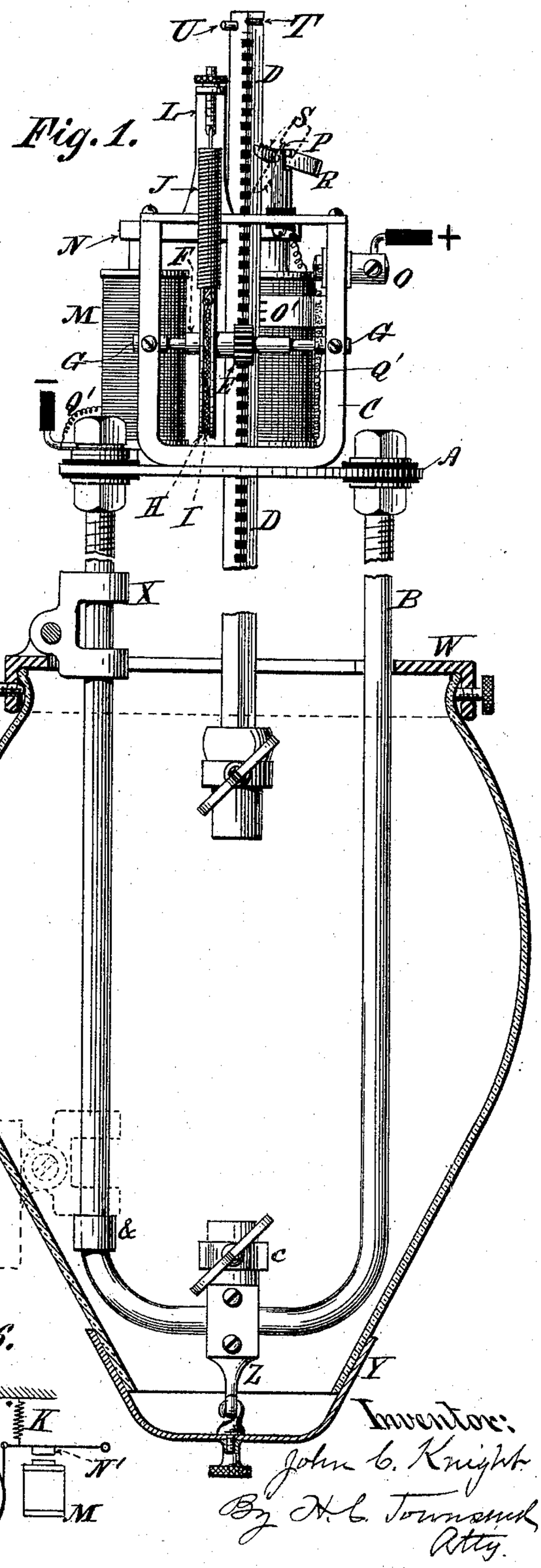

Fig. 2.

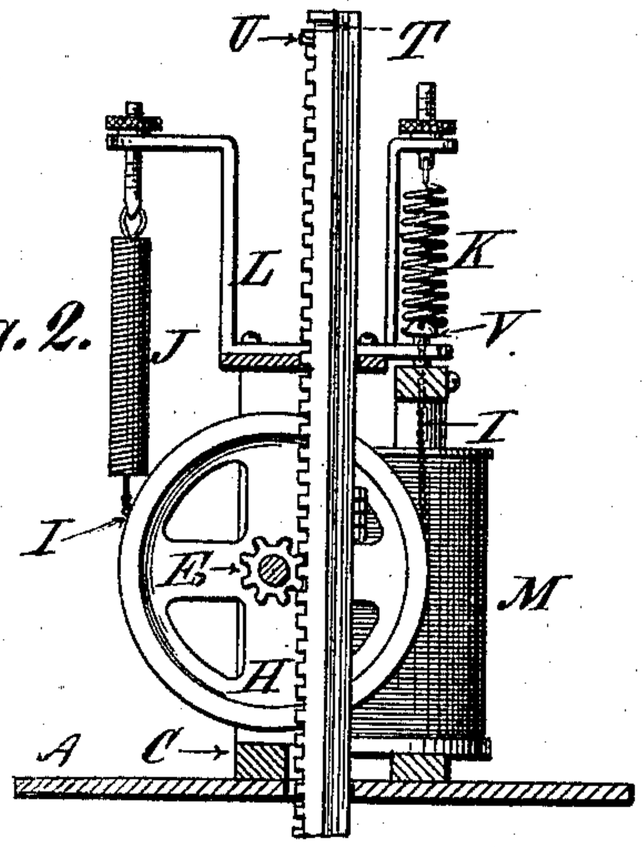

Fig. 3.

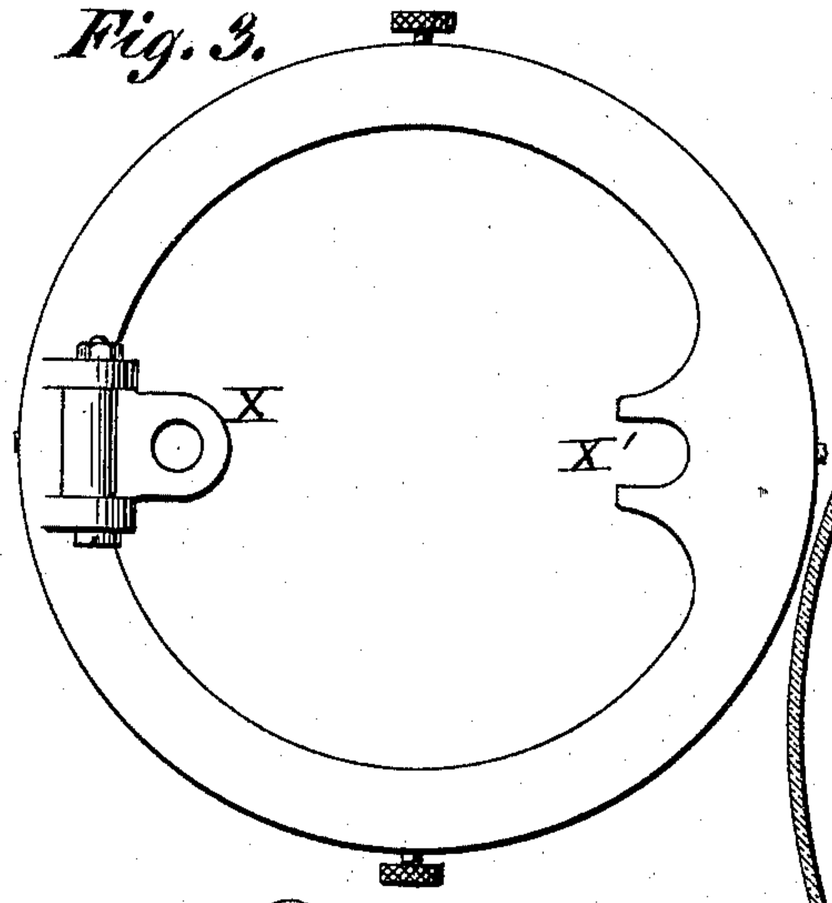

Fig. 4.

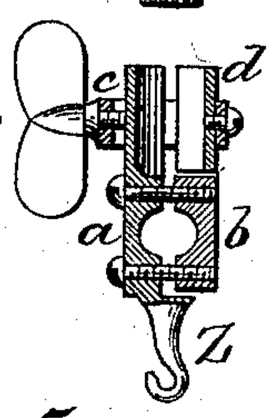

Fig. 5.

Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

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ELECTRIC ARC LAMP.

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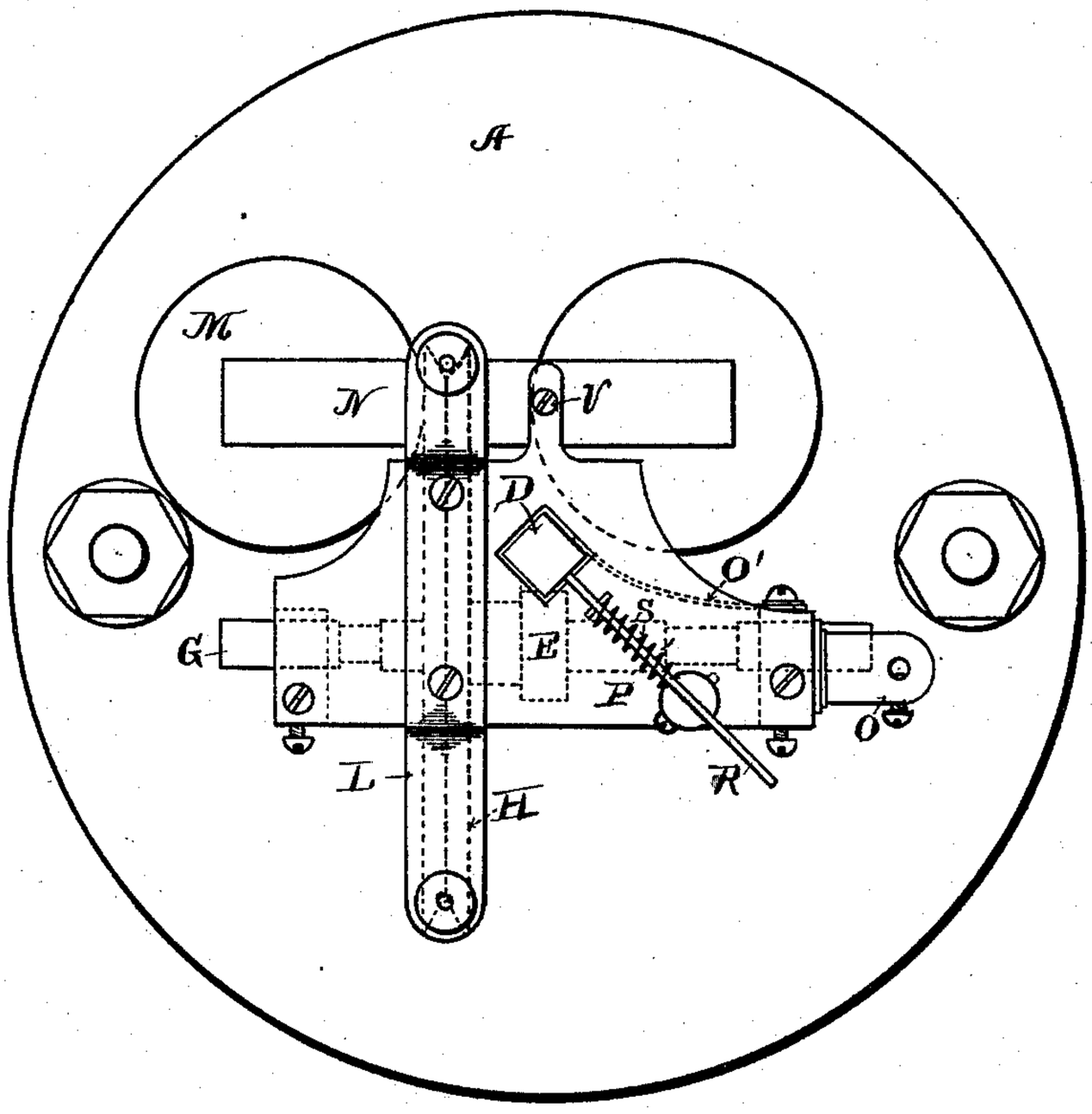
Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN C. KNIGHT, OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 535,589, dated March 12, 1895.

Application filed March 2, 1894. Serial No. 502,057. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. KNIGHT, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a certain new and useful Electric-Arc Lamp, of which the following is a specification.

My invention relates to electric arc lamps in which the feeding mechanism is controlled by a shunt or derived circuit and which may be used on any circuit and particularly on what are known as constant potential circuits, the lamps used with which being generally unprovided with a cut-out for closing a safety low resistance shunt circuit around them.

My invention provides a simple and effective feeding mechanism which operates on the frictional plan and provides for perfect control of the feed through a wide range of voltage as from four to ten volts.

It further provides a particular means for breaking the shunt or derived circuit when the lamp burns out.

It also provides for supporting the shade in a manner particularly advantageous for trimming and for an improved lower carbon holder.

To these ends my invention consists in the construction and combination of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming a part of this specification; Figure 1, represents, in front elevation, an arc lamp embodying the several features of my invention. Fig. 2, is a transverse vertical section of the feeding mechanism clearly showing the frictional feed controller. Fig. 2ª, is a plan on a greater scale, of the operating mechanism of the lamp. Fig. 3, is a plan of the ring support for the shade or globe. Fig. 4, is a vertical transverse section through the lower carbon holder. Fig. 5, represents a portion of the cut-out; and Fig. 6, represents a modification in detail.

In the drawings A, represents the base of the lamp from which the depending frame B, is thoroughly insulated and upon which is secured the feeder frame C.

The rack D, for the upper carbon is an angular rod, which may be hollow or not, but preferably hollow, and has the teeth thereof formed on one of the angles. This rod passes through corresponding angular openings in the base and in the upper cross-piece of the frame C, and is thereby steadied and prevented from turning.

In mesh with the rack is a pinion E, mounted on a shaft which turns upon cone bearings G, adjustably and removably secured in the frame C. Upon the shaft is also mounted the friction wheel H, which may be provided with a V or any other shaped groove for the reception of the friction strap I, or its periphery may be flat and the friction strap also flat. I find, however, that a V groove and a chain for the friction strap produce the best results.

The brake strap lies in the groove of the wheel for one half the circumference thereof and has its ends connected each to a spring as J and K, the spring being in turn connected by tension screws to a support L, arising from the upper cross-piece of frame C.

Upon the base A, is mounted the feed magnet M, preferably of solenoid construction, as shown. The brake strap is secured to the armature N, of said magnet in any suitable way, being shown in Fig. 2, as passed therethrough, and held by a set screw, the spring K, being connected to said strap just beyond the armature.

These few parts are all that are necessary for the construction of a perfectly operating feeding mechanism for an arc lamp.

The circuits for the lamp are as follows:—The positive lead is connected to the frame by a binding post O, whence the current travels through the frame to the rack D, through the carbons and frame B, to the negative lead; a contact spring O′, being secured to the frame C, and bearing upon the rack rod to insure perfect contact between said two parts. The shunt or derived current passes from the frame C, to the rack D, thence through the cut-out P, by wire Q, to and through the coils of the solenoid, and thence to the negative lead by wire Q′. The cut-out P, consists of a post mounted on and insulated from the frame C, the upper end of which is notched for the reception of a trip arm R. This trip arm is slotted, as at *x*, Fig. 5, and pivoted on a pin passing through said slot. A spring S, encircles the arm R, being secured thereto at one end and bearing against the post at the other. This trip arm is weighted at one end so as to tend to keep

the other end elevated as seen in full lines in Fig. 1. When in this position the elevated end is pressed against the smooth surface of the rack D, and makes electrical contact therewith. As the lamp burns down and the rack descends, the contact point of arm R, falls into a slight notch T, in the upper end of the rack. Then, as the rack continues to descend, said contact point follows along, the arm gradually pushing back against the action of spring S, until the rack reaches very nearly the lowermost position (see dotted position Fig. 1), when the said point leaves the notch and flies up out of engagement with the rack, being overbalanced by the opposite weighted end. This breaks the shunt circuit which will remain broken until the rack is again lifted, when the arm R, again passes thereagainst.

The rack D, is provided with the usual stop pin U, to stop its descent in time to put out the light and prevent the burning of the carbon holders. In my construction, however, the main function of said stop is to prevent the rack from falling through its bearings when its carbon is removed. The cut-out performs the original function of said stop pin by rupturing the shunt circuit and stopping the feeding mechanism, thus maintaining the upper carbon in fixed position until the arc has ruptured.

The spring J, acts as a feeding spring while the spring K, operates to strike the arc. The latter is sufficiently stronger than the former to counteract its action, lift the armature and place sufficient tension on the brake strap to hold the feed rack elevated. When the armature in descending stretches spring K, the brake strap is pulled along by spring J, and rotates the friction wheel to feed the rack and its carbon down, but when the armature reaches a certain point in its descent, the tension of spring J, becomes so reduced that the brake wheel slips on the strap and gravity acts to feed the rack. Then, when spring K, retracts, it stops the feeding, by the friction of the strap on the brake wheel, and as it retracts still farther it reverses the direction of the brake wheel and raises the rack and its carbon to the proper arcing position.

The mechanism in feeding operates as follows:—The carbons being placed at the usual arcing distance and the current being turned on, the shunt will be of sufficient strength to attract the armature, decrease the tension upon the brake strap, and cause the upper carbon to feed down onto the lower one. The current then being decreased in the shunt, the spring K, retracts the armature and brake strap thus rotating the brake wheel and lifting the rack to strike the proper arc. Any lengthening in the arc will cause an attraction of the armature and a pull upon spring K, sufficient to release the tension upon the brake strap and allow the brake wheel to rotate and the feed rack to descend. Should said rack descend too far, a decrease in the magnetism of the solenoids would follow and the rack bar would be lifted the required distance. In this way perfect and steady control of the descent of the upper carbon is maintained.

It is obvious that in the place of one or both of the springs the usual equivalent (a weight) might be used, but I prefer the springs as they are more sensitive in their action and reaction upon the brake strap.

In Fig. 6, is indicated one construction for the use of a weight in the place of the feeding spring. In this modification the strap I, is attached as before to an armature N′, at one end, said armature being retracted by spring K, while at the other end it is attached to one end of the curved rocking lever J′, which is supported on any suitable rigid support on the lamp frame as L′, and has suspended from its opposite end a weight J^2. It will be noticed that as the armature is attracted the weight J^2, descends and as it descends the arm of the lever to which it is attached becomes gradually shorter as the fulcrum shifts so that the effect or tension of the weight upon the brake strap is graduated in the same manner as when the spring J, is used. This view indicates an ordinary magnet M′, used in the place of the solenoid magnet.

This feed controlling device is obviously applicable to those lamps wherein a drum and chain take the place of the rack and pinion. I, therefore, do not wish to limit myself to the application of said device to the rack and pinion.

Aside from providing tension devices for the feeding and striking springs, I may limit the motion of the armature by a stop screw V passing through a projection from the frame C, as shown in Fig. 2.

My improved shade support consists of a ring W, provided with the usual screws for securing the upper edge of the shade and is hinged at one side to a sleeve X, constructed to slide upon one side of the frame B. The ring also has a guide notch X′, opposite the hinge for steadying it at the opposite side of the frame. About the lower end of the shade which is open, a cup Y, is placed provided with a suitable handle on the outside and with a hook on the inside for engagement with another hook Z, depending from the lower carbon holder.

Fig. 1, represents in full lines the shade in its proper position. In trimming the lamp the attendant has merely to lift the shade and its attachments slightly by pressing up on the cup Y, until by a slight side movement the hook on the cup can be disengaged from the hook Z, when the globe will be free to slide downward until the sleeve X, strikes the stop &, placed upon the frame B. The shade may then be swung entirely free from the carbon holders so as to give easy access thereto and at the same time allow the attendant to conveniently wipe out the shade.

The ring W, is made of sufficient weight to cause it to hang substantially as shown in dotted lines in Fig. 1, and so relieve the attendant from the necessity of holding it out of the way while he is trimming the lamp.

The cup now in common use is generally secured to the frame by a screw connection, which form of connection is necessitated by the form of shade support. This connection, however, is inconvenient and requires considerable time to remove and replace the cup.

It is obvious that instead of the hooks the bayonet joint connection might be used between the cup and the lower carbon holder.

The lower carbon holder consists of the piece *a*, grooved to fit the frame B, and provided at its lower end with the hook Z, having its upper end recessed to form the fixed half or portion of the carbon socket. Co-operating with this piece is a piece *b*, also recessed. These two pieces are connected together by screws so as to clamp the holder upon the frame B. The carbon clamp which co-operates with the upper end of piece *a*, consists of a ring *c*, connected at one side with the other or movable half *d*, of the carbon socket and has a set screw passing through the opposite side and bearing against the fixed part of the carbon socket.

Obviously an eye may be used in the place of either one of the aforesaid hooks, but I prefer to use two hooks since they can be more readily attached and detached than can a hook and eye.

What I claim as my invention is—

1. In an electric arc lamp, the combination, substantially as described, of the base plate, the frame C, mounted thereon, a shaft journaled in said frame, a pinion on said shaft in mesh with the rack bar carrying the upper carbon, a friction wheel on said shaft, a support mounted upon the frame C, and carrying adjusting screws, a spring J, attached to one of said screws, a heavier spring K, attached to the other of said screws, a brake chain connecting said springs and being held thereby in engagement with said brake wheel, a magnet in a shunt of the lamp circuit the armature of which is attached to said chain, and a stop in the path of the armature for limiting the retraction thereof.

2. In an electric arc lamp, an automatic cut-out in the shunt circuit thereof consisting of the movable carbon carrying-rod provided with a notch, a pivoted counter-balanced arm mounted on the frame of the lamp with its elevated end normally in engagement with said rod and means for holding said arm in engagement with said rod until the rod passes out of the reach thereof, substantially as and for the purpose set forth.

3. The combination with the post P, mounted upon the frame of the lamp and connected in the shunt circuit of the lamp, of the counter-balanced arm mounted by a slot and pivot in the upper end of said post and making, with the elevated end, electrical contact with the carbon carrying rod, a spring connected to said arm and bearing against said post for insuring said contact, and means on said rod for carrying the elevated end of said arm down, as the rod descends, until the arm swings free thereof and returns to its elevated position.

4. A shade support for an arc lamp, consisting of a slide running upon the lamp frame, a weighted ring carrying the shade hinged to said slide to swing the shade out of the way when lowered at the time of trimming, and means for retaining the ring and its attached shade in the proper elevated position.

5. The combination with the lamp frame, of the slide running thereon, the shade supporting ring hinged to said slide to swing downwardly therefrom, and a supporting cup for the shade fitting about the lower end thereof and detachably connected to the lamp frame.

6. In an arc lamp, the combination, with the lower shade support provided with a hook, of the lower carbon holder detachably connected to the lamp frame and having a hook formed thereon for engagement with the hook on said support.

7. A lower carbon holder consisting of a block recessed to fit the lamp frame and having the rigid portion of the carbon socket formed thereon, another block recessed to fit the lamp frame, screws passing through said blocks for clamping them together upon the said frame, a ring having the movable portion of the carbon socket secured to one side thereof, and a set screw passing through the other side of the ring and bearing against the rigid portion of the socket.

Signed at New York, in the county of New York and State of New York, this 19th day of February, A. D. 1894.

JOHN C. KNIGHT.

Witnesses:
WM. H. CAPEL,
THOS. F. CONRELL.