

(No Model.)

R. S. DOBBIE.
ELECTRIC ARC LAMP.

No. 469,041.

Patented Feb. 16, 1892.

Fig. 1.

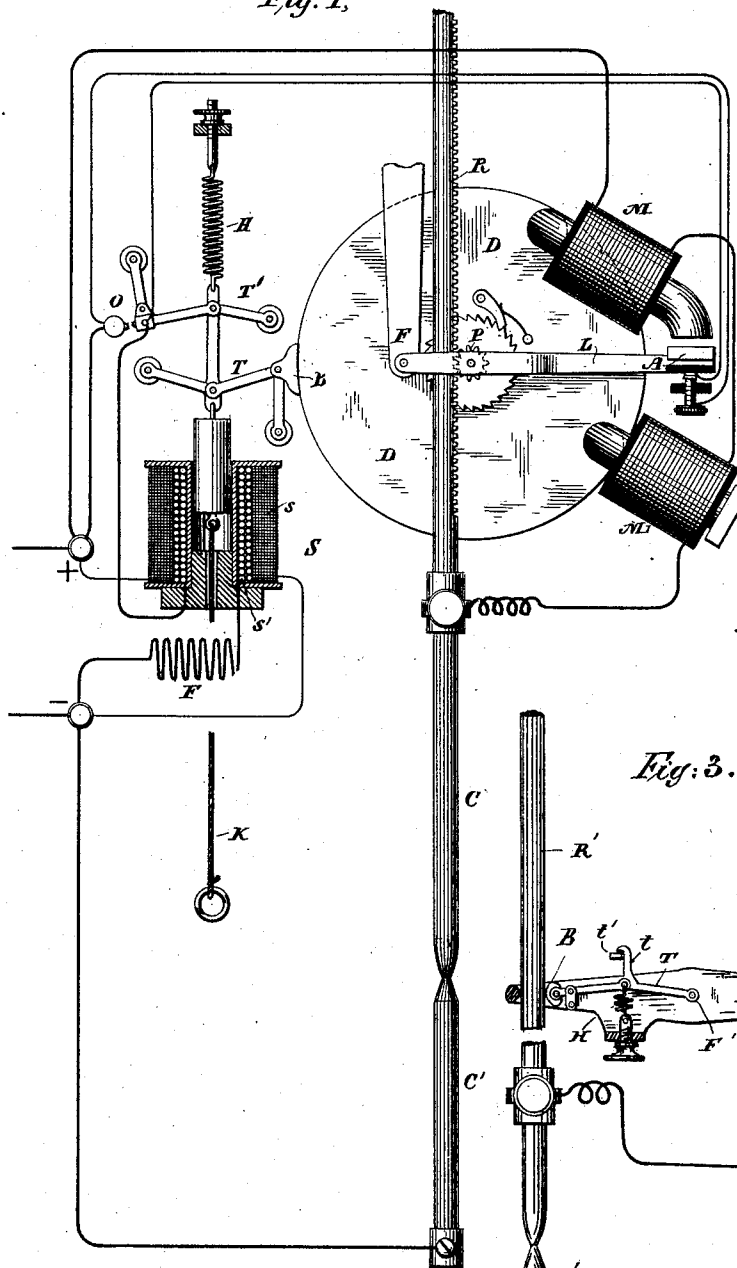


Fig. 2.

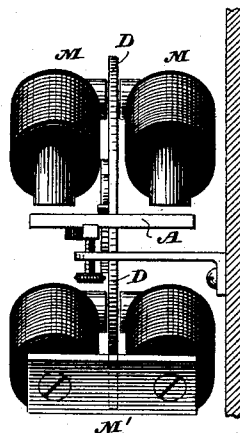
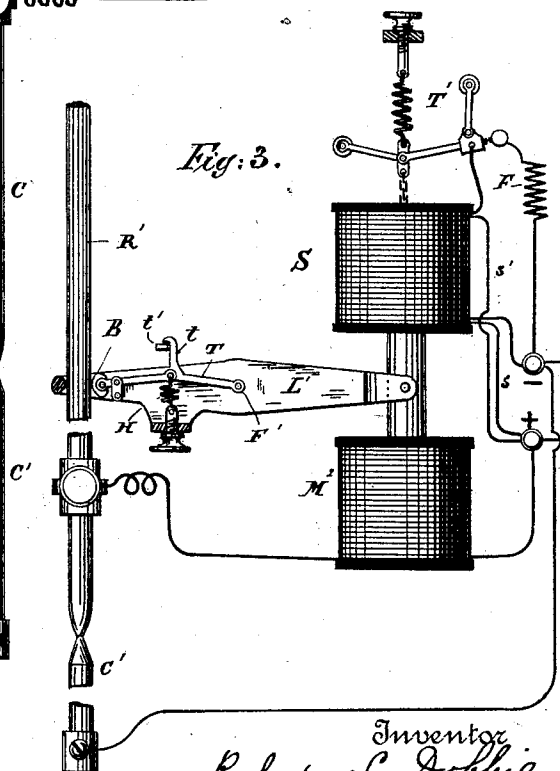


Fig. 3.



Witnesses
Geo. W. Brock
Harold S. Jones

Inventor
Robert S. Dobbie.
by G. M. Plympton, atty.

UNITED STATES PATENT OFFICE.

ROBERT S. DOBBIE, OF JERSEY CITY, NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 469,041, dated February 16, 1892.

Application filed October 23, 1890. Serial No. 369,080. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. DOBBIE, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Arc Lamps, of which the following is a specification.

My object is to produce an arc lamp wherein the feed will be smooth and even, the arc if broken will be automatically re-formed, and wherein if in case two or more lamps be arranged in series for any reason the feed be interrupted a shunt around the lamp capable of sustaining the full flow of current indefinitely will be firmly closed. I accomplish these objects, as well as general smoothness and reliability of operation, by operating a brake by a system of toggles so arranged that the maximum increase of force is obtained when the brake-shoe is in contact by using similar toggles to close the contacts for the shunt around the lamp, and by damping a feed-disk by Foucault currents set up by magnets that are preferably excited by the same current that passes through the arc.

To these ends my invention consists of the several apparatus constructed, arranged, and combined substantially in the manner hereinafter described, illustrated, and claimed, reference being had to the accompanying drawings, wherein—

Figure 1 is a general diagrammatic view of my invention; Fig. 2, a detail view of certain parts; and Fig. 3 is a view of a modification. Like reference-letters indicate like parts in the several views.

I have preferred to show my apparatus diagrammatically, because the relative position and association of the several mechanisms, though of great practical importance, are foreign to my invention. So the many mechanical supports and guides are omitted for the sake of clearness as being matters to be determined solely by choice or by mechanical economies.

As illustrated in Figs. 1 and 2, C C' are the carbons, the upper held by the sliding holder rod and rack R. The feeding-pinion P gears with the rack R in the usual way, being supported on the lever L. The feed-disk D, braked by a brake B, is secured coaxially to the pinion P on lever L. The pinion P is pre-

vented from turning relatively to the disk D in the direction to feed the carbon by a pawl and ratchet, also coaxially secured. This ratchet enables the holder to be pushed up by the lamp-tender for the insertion of new carbon or for similar matters. It may, however, be omitted in many cases, as where means K are provided for retracting the brake.

That there may be little lateral motion between the periphery of the disk and the brake-shoe the lever L is preferably fulcrumed near the latter. Its other end, which is supported when the lamp is not in operation by an adjustable stop, carries the armature A for my starting-magnet M. This when drawn up by the magnet forms the arc in the usual way. My magnet M is of peculiar construction and serves the double function of an arc-forming magnet and of an electro-magnetic damper for my feed-disk D. This I accomplish by dividing my magnetic circuit at the rear and presenting salient poles to each face of the disk. The Foucault currents generated by the motion of the conducting-disk serve effectually to dampen its rotation. If it be found desirable to increase this effect, one or more supplemental magnets M' in the same circuit may be employed. By the term "magnet" I include any field-producing agency whatsoever used for my purpose; also, since it is clear that the damping-poles might have other relative position in the magnet M, I do not limit myself to poles placed at the rear of the magnet. I prefer, however, as shown, to form this magnet of the two cores having two exciting-coils and so located that when the armature A is drawn up there will be a practically-continuous horseshoe-magnet, presenting strong damping-poles to the disk D. To avoid the possibility of the armature A sticking to this magnet M, which, if lever L were light, might sometimes occur, I may use any of the well-known means of preventing my armature from making actual contact with the polar faces of magnet M.

My brake-shoe B is attached to a toggle-joint T, placed in such position that the toggles will be nearly in a line when the brake is on. The brake is put on by the operation of a spring H, and is withdrawn by the solenoid S acting on its armature, which is attached to the toggle center. The solenoid has

the usual shunt-windings s between terminals, and when the lamp is arranged for series distribution, in addition, a low-resistance shunt s' , open during normal operation at the contacts O . These contacts are operated by a system of toggles similar to that used in the brake, saving that it is the solenoid S that makes contact and the spring H that breaks it. When, therefore, the brake is removed from the disk by the solenoid S to a predetermined distance, the contact will be made at O and the low shunt put around the lamp. This will only be when the difference of potential between terminals has grown abnormally large, as when the feed or the arc itself is interrupted. In such cases upon restoring the arc the current flowing through the shunt-coils s' will be so far reduced that the contacts O will again open and the normal condition of the lamp be resumed. To insure this relation it will in most cases be necessary to add the resistance F to the shunt s' . If it be desired, the shunt s' may equal the resistance of the arc, and thus the action just set forth have no effect on the other parts of the circuit. In any case the shunt s' should be capable of carrying the full current indefinitely. In such instances I also provide a connection O' , closing the circuit through s' at f , while the lever L rests on its stop.

The *modus operandi* of this form of my apparatus is as follows: While the lamp is not in use the carbons C and C' are in contact and the brake firmly applied by the spring H . When the current is turned on, the magnet M at once forms the arc. As the arc lengthens, the difference of potential between terminals increases and with it the shunt-current in s . Thus the pressure on the brake is gradually removed, till finally the brake slips and the disk D rotates. The motion is not, however, free, for besides the friction of the brake itself the damping-magnets so effectually retard the rotation that it is as though the disk were immersed in some viscous fluid. As the feed continues, the arc is shortened and its resistance accordingly reduced. With this occurs a fall of lamp potential and a consequent reduction of the shunt-current, which thus again allows the brake to act. This is the normal operation. In the case of constant-current circuits, for which the form of lamp illustrated is especially adapted, there are three chief causes that interrupt this normal operation. The first is where a gust of wind ruptures the arc. In this case the current momentarily flows round the shunt s ; but this almost instantaneously closes the shunt s' , which remains closed till the carbons again touch. In this case, also, the damper and brake are both automatically non-acting and the feed and restoration of the arc accordingly quicker. Upon the carbons touching, the current is so far shunted from s' , that the spring H breaks the contact O and restores the normal operation. Another cause is the interference of the feed by foreign particles or its becoming

out of order. In this case the shunts act as in the first case and the current flows through s' till the feed is resumed. A third cause is when the lamp is about burned out, and the end of rack R , reaching the pinion P , allows the carbons to form a permanent closed connection in the usual manner. With constant-potential circuits no such provision for shunting the current is needed unless several lamps are run in series together, and in place of allowing the carbons to come together permanently at the end of the rack-feed a stop may be used, as is now usually done in such cases.

By the foregoing description I have set forth one form of my complete device. It is, however, obvious that my novel features may with slight change be applied to many other types of arc lamp. Fig. 3 shows one such modification, in which my toggle-brake is utilized in a lamp of the type in which the length of arc is adjusted by the differential action of main and shunt solenoids. My lever L' in this form carries the toggles T and actuating-spring H' for applying the brake-clutch to the smooth holder-rod R' . The lever L' is pivoted at or near its center and bears at the end remote from R' the solenoid armature A' . S' is the shunt-solenoid tending to shorten the arc, while M' is the series magnet which draws the arc and which tends to increase its length. The action of these magnets need not be further explained, as they are well known. When the carbons burn away and feed is required, the lever L' reaches such position that a projection t on the toggles comes in contact with a stop t' and withdraws or lessens the brake-pressure. As the carbon thereupon falls, the brake end of the lever rises, and the brake thereby released catches the sliding rod at somewhat above its former position. This occurs before the latter has fallen appreciably. The solenoid S' contains the open-circuited safety-shunt s' , as more fully indicated in Fig. 2, which may be operated by the armature-core A' in the same way.

It is often necessary to have but small resistance in the external circuit of a plant at starting in order that the proper pressure and current may be established in the dynamos. In such instances, if the carbons be apart, the current cannot build up unless some temporary path is afforded it. I have therefore added the circuit connections O' , referred to above. It will be seen that a closed connection of low resistance is thereby established at starting, and in this the initial current may build itself up until by the withdrawal of the brake the carbons meet and the arc is struck, thus breaking the initial circuit at A .

I will not attempt to detail at length the many variations that may be made in the parts of my apparatus.

The solenoids in the figures may be replaced by other magnetic means—such, for instance, as magnets—and by the term “so-

lenoid" in the claims I include all such modifications. So by the term "magnets" I include any known magnetic means having like functions. In the other details, also, many modifications may be made; but all such modified details are within my invention.

Having fully and sufficiently set forth how one form of my complete invention may be made and used, I claim, with no further limitations than those hereunder named--

1. In combination with the other operating parts of an arc lamp, a feed-disk, a brake therefor, spring-toggles for operating the brake, a solenoid included between the terminals of the lamp, an armature therefor attached to the said toggles for retracting the brake, a second shunt winding on said solenoid open-circuited at contacts O, toggles for closing the said contacts and actuated by the said solenoid against the action of a spring, and the starting-magnet M, presenting salient poles to the faces of the feed-disk, as and for the purposes set forth.

2. In combination with the other operating parts of an arc lamp, a feed-disk, a brake therefor actuated by spring-toggles against the action of a shunt-solenoid, a second set of toggles actuated by the said solenoid against the detracting action of the brake-

toggle spring to close contact at O, and a shunt connection around the lamp normally open-circuited at contacts O, as and for the purposes set forth.

3. In combination, in an arc lamp, a conducting feed-disk, starting mechanism provided with an arc-striking magnet or magnets and armature, the said magnet or magnets presenting opposing poles to the opposite faces of the said disk, and the said armature forming a part of the magnetic circuit of such magnets passing through the said disk, substantially as and for the purposes set forth.

4. In combination, in an arc lamp, a conducting feed-disk, a support for the same, one or more starting-magnets for striking the arc, adapted to produce one or more fields of force through the feed-disk, and one or more supplemental magnets for producing similar fields in the feed-disk, substantially as set forth.

In testimony hereof I affix my hand, this 21st day of October, A. D. 1890, in the presence of the subscribing witnesses.

ROBERT S. DOBBIE.

Witnesses:

HAROLD BINNEY,
WALTER WARD.