

(No Model.)

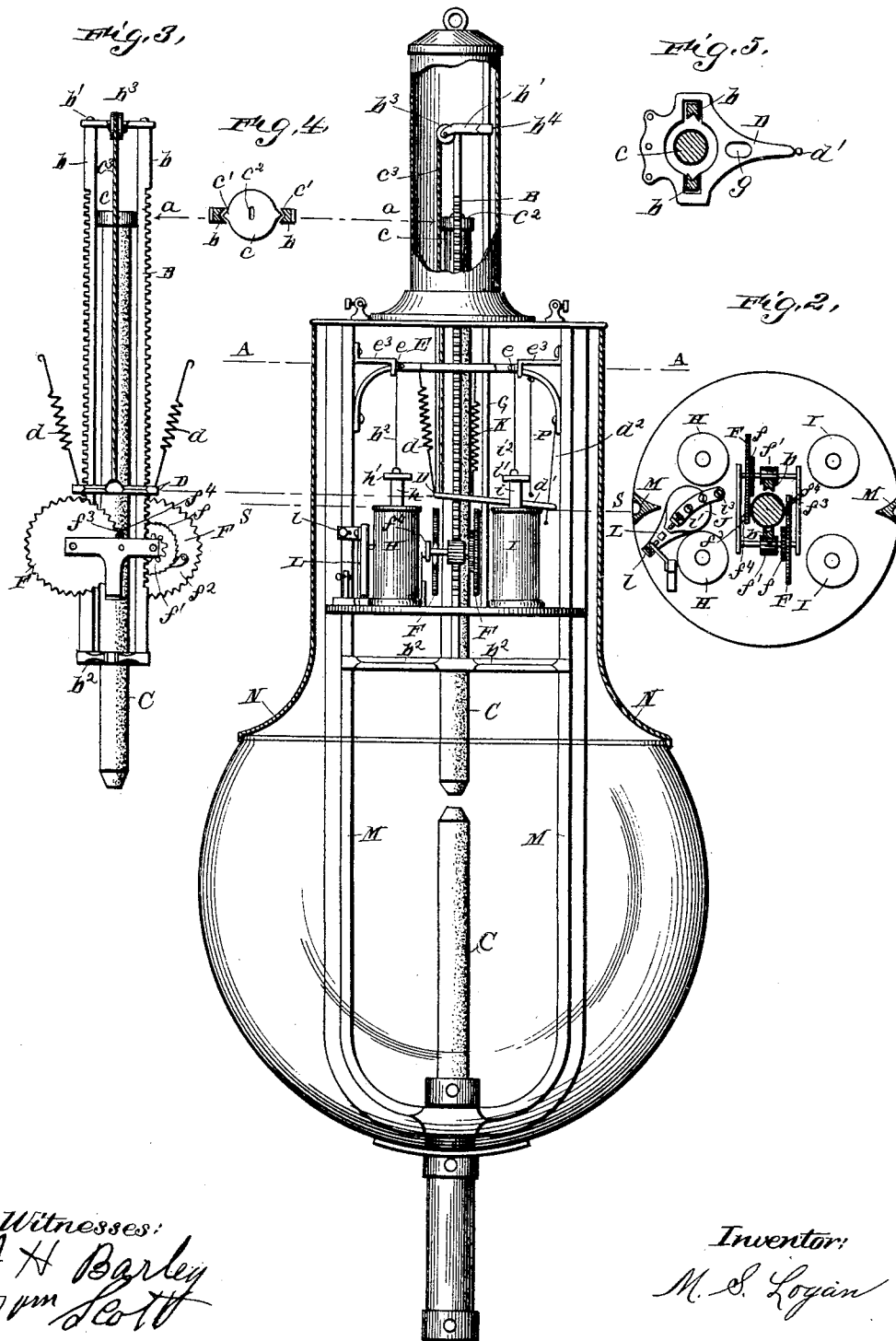
2 Sheets—Sheet 1.

M. S. LOGAN.
ELECTRIC ARC LAMP.

No. 479,007.

Patented July 19, 1892.

Fig. 1.



Witnesses:
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J. M. Scott

Inventor:
M. S. Logan

(No Model.)

2 Sheets—Sheet 2.

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Fig. 6.

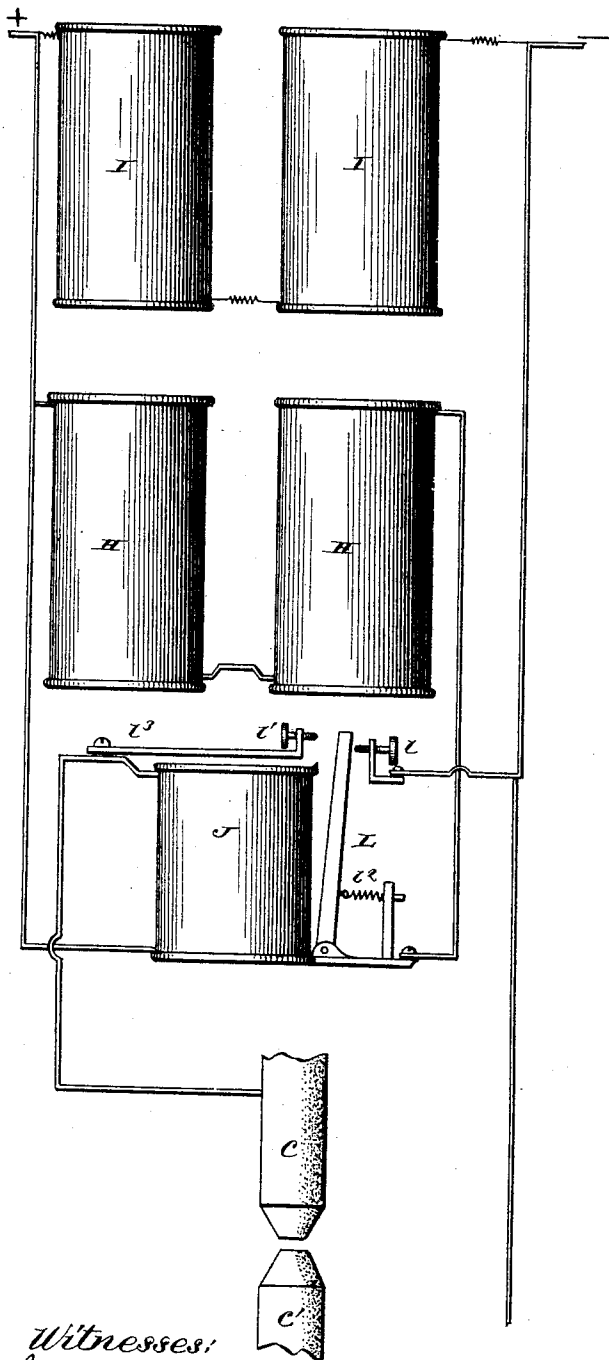
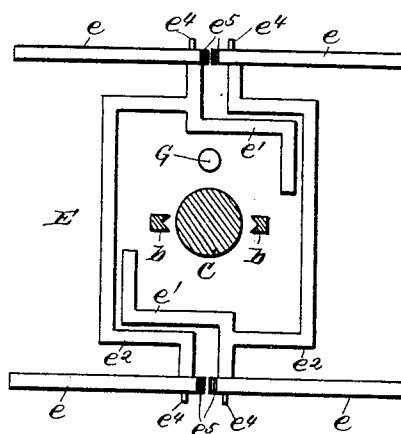


Fig. 7.



Witnesses:
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Inventor:
M. S. Logan

UNITED STATES PATENT OFFICE.

MAURICE S. LOGAN, OF OTTERVILLE, ASSIGNOR OF ONE-HALF TO JAMES H. BARLEY, OF SEDALIA, MISSOURI.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 479,007, dated July 19, 1892.

Application filed August 29, 1891. Serial No. 404,167. (No model.)

To all whom it may concern:

Be it known that I, MAURICE S. LOGAN, a citizen of the United States, residing at Otterville, in the county of Cooper and State of Missouri, have invented certain Improvements in Electric-Arc Lamps, of which the following is a specification.

The objects of my improvements are, first, to impart a reliable, steady, and uniform feed movement to the upper carbon, and, second, to diminish the length of the lamp. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the entire lamp. Fig. 2 is a top view of a horizontal cross-section of the lamp at the dotted line S, Fig. 1. Fig. 3 is a detached view of the combination feed-rod with the carbon in position. Fig. 4 is a top view, of a horizontal cross-section of the combination feed-rod at the dotted line *a a*. Fig. 5 is a top view of the clutch D, showing, also, a cross-section of the combination feed-rod and carbon. Fig. 6 is a complete diagram of the circuits of the lamp. Fig. 7 is a top view of the combination-lever, showing, also, a cross-section of the combination feed-rod, guide-rod, and carbon.

Similar letters refer to similar parts throughout the several views.

In Fig. 1, B represents the combination feed-rod, which is shown in detail in Fig. 3.

D, Fig. 1, is the clutch. (Shown, also, in Figs. 3 and 5.)

H is a low-resistance coil in a changeable circuit, being in a branch around the arc while the lamp is out of action; but when the lamp is brought into action it is automatically thrown into a branch of the arc circuit and remains in this position during the action of the lamp.

I is the feeding-magnet, placed in a circuit of high resistance. It will be seen in Fig. 2 that the coils H and I are arranged in pairs H H and I I, forming horseshoe magnets. The magnets H and I, Fig. 1, are provided with movable cores or plungers *h* and *i* and armature-plates *h'* and *i'*.

E is the combination feeding-lever, a top view of which is seen in Fig. 7, drawn on a full-sized scale.

$e^3 e^3$, Fig. 1, are brackets supporting the combination-lever in position, said combination-lever being provided with pivots $e^4 e^4 e^4$,

Fig. 7, which rest in suitable bearings in said brackets.

The armature-plate *h'*, Fig. 1, is provided at each end with links, only one of which h^2 is shown. The armature-plate *i'* is also provided at each end with links, only one of which i^2 is shown. Said armature-plates *h'* and *i'* are suspended by means of these links to the combination-lever E, the links being attached, respectively, to the extremities of the four arms *e e e e*, Fig. 7. The clutch D is also suspended from the combination-lever E by means of the links *d d*, Figs. 1 and 3, only one of which is shown in Fig. 1. These links are attached to the combination-lever E at the points $e^2 e^2$, Fig. 7.

K, Fig. 1, is one of the lifting-springs. The other, being on the opposite side of the lamp, is out of sight. These lifting-springs are attached to the combination-lever E at the extremities of the arms *e' e'*, Fig. 7, said lifting-springs having their lower ends fastened to the frame of the lamp.

G is a guide-rod for guiding the upper end of the combination feed-rod B, said guide-rod G being fixed stationary by being attached at its lower and upper extremities to the frame of the lamp.

P is an iron pendant so placed that its end comes in contact with the armature-plate *i'* at or near its end, as shown, one of these pendants being placed at or near the ends of one or both armature-plates. (Only one shown in the drawings.) The magnetism of the armature-plate holds these pendants in contact with itself, so as to steady the up-and-down motion of said armature-plate during the action of the lamp, in a manner similar to a dash-pot.

The clutch D in Figs. 1 and 5 is provided with an arm or extension d' , which engages with the tripping-pendant d^2 , so as to cause said clutch to trip at a predetermined position.

J, Figs. 2 and 6, but not seen in Fig. 1, is the switch-actuating magnet, more fully explained hereinafter.

L, Fig. 6, is the switch-lever, a top or end view of which is shown in Fig. 2, $l l' l'' l'''$, Fig. 6, also corresponding to the same letters in Figs. 1 and 2.

F F, Figs. 1, 2, and 3, is the retarding mechanism, Fig. 1 showing an edge view, Fig. 2 a

top view, and Fig. 3 a side view. Said retarding mechanism consists of two separate trains of wheels, each train engaging with one of the racks on the combination feed-rod B.

5 Each of said trains consists, essentially, of a saw-toothed wheel F, with its escapement-pawl f^4 , ratchet-toothed wheel f , and pinion-wheel f' for engaging with the rack on the rod B. The object of this retarding mechanism is to retard the descent of the combination feed-rod B when the clutch D is tripped, thus preventing said rod from dropping suddenly, but allowing it to descend slowly, giving the feeding mechanism time to readjust itself.

Fig. 3 shows the relation between the combination feed-rod B, the retarding mechanism FF, the clutch D, and the carbon C.

The combination feed-rod B consists of the bars b b , the upper tie-plate b' , and the lower tie-plate b^2 . The upper tie-plate b' is provided with a pulley b^3 and a guide b^4 , Fig. 1, for guiding the upper end of said combination feed-rod B on the guide-rod G. The lower tie-plate b^2 is provided with lateral arms, Fig. 1, which have guiding-jaws at their outer ends for guiding the lower end of said combination feed-rod B on the tracks M M. The bars b b of the combination feed-rod B, Fig. 3, supports a rack on the outer face of each, while the inner face of each is grooved, as shown by the cross-sections of b b , Figs. 4, 2, 5, and 7.

c , Figs. 1, 3, and 4, is the carbon-holder, Fig. 4 showing a top view and also showing the nipples c' c' , which slide freely in the grooves on the inner faces of the bars b b , thus guiding the upper end of the carbon C, the lower end of said carbon passing through a hole in the lower tie-plate b^2 .

c^2 , Figs. 1 and 4, is an eye or loop to which the cord c^3 is attached. Said cord then passes over the pulley b^3 , Figs. 1 and 3, and is finally attached to the clutch D.

In Fig. 1 the combination feed-rod B, with the carbon C, is shown in position in the lamp. The clutch D clutches the bars b b without touching the carbon C, as will be seen in Fig. 5. Therefore when the clutch D is tripped by the tripping-pendant d^2 , Fig. 1, at a predetermined position the combination feed-rod B will slowly descend by its own weight, while the carbon C will feed itself by drawing the cord c^3 over the pulley b^3 as it becomes slackened, owing to the descent of the combination feed-rod B.

Fig. 6 is a complete diagram of the circuits of the lamp. The current enters at +, and as the carbon circuit is open between C and C' the current passes through the magnets H H, thence through the lever L to the contact-point l , and leaves the lamp at -. This energizes the magnets H H, which, acting upon the feed mechanism, as will be more fully explained hereinafter, causes the upper carbon C to come in contact with the lower carbon C'. The carbon circuit being thus completed,

a portion of the current passes through the magnet J and through the carbons. This energizes the magnet J, which causes the lever L (which is of magnetizable material) to be thrown over against the contact-point l' . The portion of the current which now circulates through H H passes through the lever L onto the contact-point l' and unites at l^3 with the portion of current which circulates through J. The reunited current passes through the carbons and leaves the lamp at -. The magnets H H thus have a portion of their magnetism withdrawn when the current becomes divided, but retain a portion of their magnetism to assist the feeding-magnets I I in feeding the carbons together when the arc becomes too long.

Fig. 7 gives a detail view of the combination-lever E, which consists of two parts or levers which turn on the pivots e^4 e^4 , the shoulders e^5 e^5 of each being provided with cogs, which mesh together and which cause the two levers to act as one. Said combination-lever E is also provided with arms e e e e , to which the armature-plates h' and i' , Fig. 1, are attached. The armature-plate h' is attached to the lower pair of arms e e , Fig. 7, by two links, only one of which h^2 , Fig. 1, is shown, and the armature-plate i' is attached to the upper pair of arms e e , Fig. 7, by two links, only one of which i^2 , Fig. 1, is shown. The ends of two of the arms e e are shown in Fig. 1, to which the links h^2 and i^2 are attached. The two separate levers which compose said combination-lever E, Fig. 7, are each bent outward in the middle, allowing space in the center for the combination feed-rod B, carbon C, and guide-rod G. Said combination-lever is also provided with the arms e' e' , to the ends of which the lifting-springs (one of which K is shown in Fig. 1) are attached. The clutch D, Fig. 1, is attached to said combination-lever E at the points e^2 e^2 , Fig. 7, by the links d d , Fig. 3, one of which d is also shown in Fig. 1. It will now be seen that as the lifting-springs (one of which K is shown in Fig. 1) are attached to the ends of the arms e' e' , Fig. 7, that the tension of said lifting-springs will tend to draw the arms e' e' downward. This raises the points e^2 e^2 , which lift the clutch D, Fig. 1, which in turn lifts the combination feed-rod B. On the other hand, the armature-plates h' and i' being attached to the ends of the arms e e e e , Fig. 7, the action of the magnets H and I, Figs. 1 and 2, on said armature-plates h' and i' , Fig. 1, tends to draw said armature-plates downward, which in turn draws the arms e e e e , Fig. 7, downward. This lowers the points e^2 e^2 , which also lowers the clutch D, Fig. 1, causing it to be tripped by the tripping-pendant d^2 , allowing the combination feed-rod B to descend. The object of the combination-lever E is to produce an absolutely vertical motion of the cores h and i . As already shown in Fig. 6, the current first passes through the magnets H, Fig. 1. These magnets, acting on the com-

combination-lever E, Fig. 1, as already explained, lowers the clutch D and brings the carbons together. The carbon circuit being thus completed, a portion of the current is drawn through the magnet J. (Not shown in Fig. 1.) The magnets H thus losing the greater part of their energy, the lifting-springs (one of which K is shown) cause the combination-lever E to return, lifting the clutch D with the combination feed-rod B and carbon C, forming the arc. As the resistance of the arc increases the magnetism of the magnets I (being in a circuit of high resistance around the arc) increases until with the assistance of the remaining magnetism in the magnets H it is able to bring the clutch D to the tripping-point, allowing the combination feed-rod B and carbon C to be fed downward.

The effects of the assisting-magnets H are, first, to admit of a greater working tension on the lifting-springs, (one of which K, Fig. 1, is shown,) causing them to react quicker; second, it enables the lamp to burn with a fuller arc at the beginning; third, it lessens the tendency of the arc to increase by reason of the diminishing weight of carbon as it is being consumed; fourth, it assists the magnets I in bringing the carbons together.

The object of using a double rack, as shown in Fig. 3, is to balance the combination feed-rod B, giving it a perfectly central feed. If said combination feed-rod B were supported by a single rack on one side, a considerable side pressure would come on the guideways which keep said rod in a vertical position. This side pressure or friction would prevent said combination feed-rod from responding sensitively to the action of the feed mechanism of the lamp, while the double rack as used in this lamp holds the combination feed-rod B in perfect balance, removing all friction from the guideways, causing said combination feed-rod to feed very sensitively and accurately.

The guide-rod G, Fig. 1, may be single or double. If desirable, another guide-rod may be placed on the opposite side of the combination feed-rod B.

Having fully described my invention in the accompanying specification, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in an electric-arc lamp, of a coil permanently located in the arc circuit, a feed-regulating coil in a branch circuit around the arc, an auxiliary coil located (temporarily while the arc circuit is open) in a second branch circuit around the arc, and means for switching said auxiliary coil into the arc circuit in multiple with the coil permanently located therein, substantially as and for the purpose specified.

2. The combination, in an electric-arc lamp, of a lifting spring or springs, a feed-controlling magnet, feed-regulating mechanism controlled thereby, an auxiliary magnet located, first, (when the lamp is out of action,) in a branch circuit around the arc, and, second, (during

the action of the lamp,) in a branch of the arc circuit, performing the office, first, of starting the lamp, and, second, of assisting the feeding-magnet, a switch for changing the circuit of said auxiliary magnet, and a magnet in the arc circuit for actuating said switch, all substantially as shown and described.

3. The combination, in an electric-arc lamp, with feed-regulating mechanism, of the combination-lever E, the lifting spring or springs K, a feeding-magnet I, an auxiliary magnet H, capable of being switched from a branch circuit around the arc into the arc circuit in multiple with a magnet J, a switch for changing the circuit of said auxiliary magnet, and a magnet J for actuating said switch, substantially as shown and described.

4. In an electric-arc lamp, a combination feed-regulating lever consisting of a combination of two separate levers, each provided with the lateral arms *e e*, supplemented by corresponding arms of the other and adapted to admit of a vertical motion of the magnet cores or plungers, each lever being further provided with such other arms or shoulders, or both, as may be necessary, each arm or shoulder being supplemented by a corresponding arm or shoulder of the other, substantially as specified.

5. In an electric-arc lamp, a carbon-feed rod or carbon-holding rod provided with means for holding the carbon in a collateral position therewith, and also provided with means by which said carbon travels thereon in a longitudinal direction.

6. In an electric-arc lamp, a combination feed-rod embracing in its construction two parallel bars *b b*, having suitable space between them adapted to receive the carbon therein, in combination with the carbon inserted between the bars *b b* and having means provided whereby the carbon travels upon said bars in addition to the feeding movement of the bars *b b*.

7. In an electric-arc lamp, the combination of a double-rack feed-rod with two trains of wheels adapted to engage therewith, substantially as specified.

8. In an electric-arc lamp, the combination of the stationary guide rod or rods G with a traveling arm or arms *b^t*, attached to the upper end of the feed-rod B and adapted to move up and down upon said guide rod or rods, substantially as specified.

9. A dash-pot substitute consisting of one, two, or more iron strips or rods so placed that their free ends come in contact with the armature plate or plates and held in place by the magnetism thereof with sufficient force to check the sudden motions of said armature plate or plates, substantially as described.

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

MAURICE S. LOGAN.

Witnesses:

JAMES M. BYLER,
W. A. STIRLEN.