(No Model.)

J. R. FINNEY & L. CAMPBELL.

ELECTRIC ARC LAMP.

No. 265,050. Patented Sept. 26, 1882.

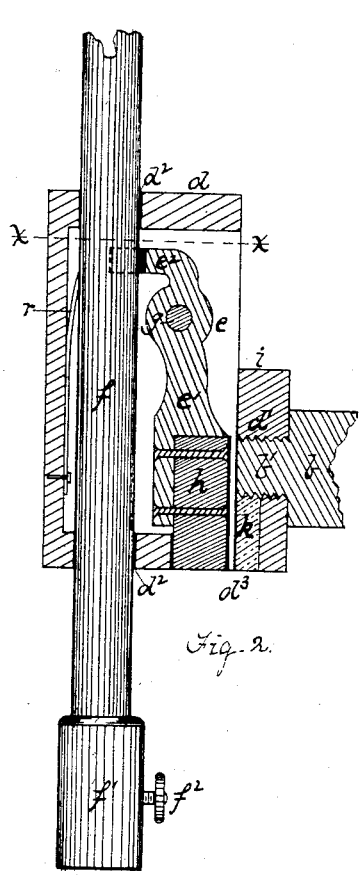

Fig. 2.

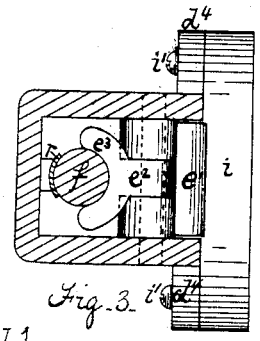

Fig. 3.

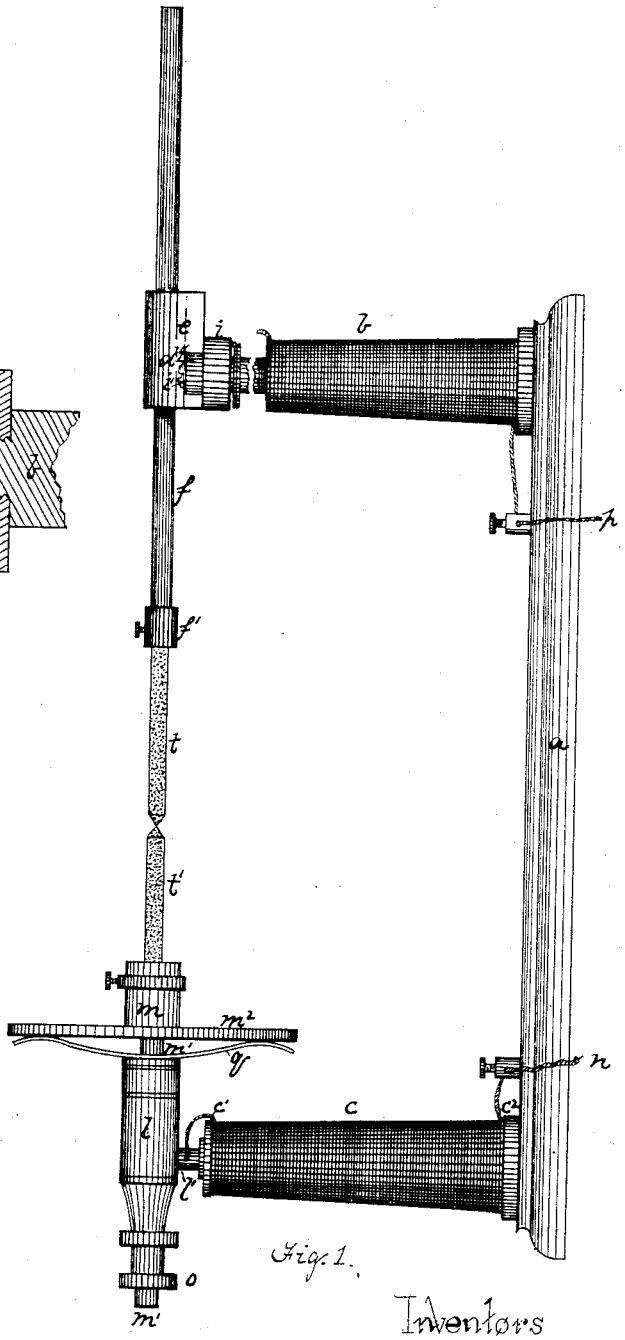

Fig. 1.

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JOSEPH R. FINNEY AND LOUDON CAMPBELL, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO T. B. KERR, TRUSTEE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 265,050, dated September 26, 1882.

Application filed June 26, 1882. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH R. FINNEY and LOUDON CAMPBELL, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric-Arc Lamps; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of our improved lamp. Fig. 2 is a view of the feeding devices in vertical section. Fig. 3 is a section on the lines *x x* of Fig. 2.

Like letters of reference indicate like parts in each.

On the bar or standard *a*, formed of wood or other insulating material, we mount two iron arms, *b c*.

At the outer end of the arm *b* is a frame or case, *d*, made of copper, brass, or other diamagnetic material, which is secured to the arm *b* by screw-socket *d'* or otherwise.

In the outer half of the case *d* is the upper-carbon rod *f*, which extends through holes d^2 in the upper and lower sides of the case *d*. This rod *f* is preferably formed of copper or other diamagnetic substance, and fits nicely in the holes d^2, but is capable of sliding freely through them.

In the inner part of the case *d*, between the rod *f* and the end of the arm *b*, is a lever, *e*, which is pivoted on the pin *g*, extending across the case *d*. This lever is formed of copper or other diamagnetic metal, and has a long arm, *e'*, below the pivot *g* and a short bent arm, e^2, above the pivot, which short arm has a recessed face, e^3, corresponding in shape to the side of the rod *f*. The lower end of the arm *e'* is faced with a piece of iron, *h*, which extends down into a recess or opening, d^3, in the lower end of the case *d*, where it has a limited movement upon the pivot *g*. The case *d* is provided with lugs d^4 at the sides, by which it is attached to a collar or cross-piece, *i*, by means of screws *i'*. The piece *i* is bored and provided with a screw-thread, by means of which the case *d* is attached to the upper arm, *b*, as at *d'*. The end of the arm *b* is reduced and screw-threaded, as at *b'*, and extends through the piece *i* flush with its inner side, where it is directly opposite the iron piece *h* on the lower end of the lever *e*. That part of the piece *i* which is below the threaded end *b'* and opposite to the lower end of the block *h* is faced with iron, as at *k*, so that the entire face which is opposed to the piece *h* is of iron.

The lower arm, *c*, is provided with suitable flanges, *c' c²*, and at its outer end has a threaded recess or socket, in which the lateral stem *l'* of the sleeve *l* of the lower-carbon holder is secured. The lower-carbon holder *m* has a stem, *m'*, which extends down through a hole in the sleeve *l* and projects below its lower end, where it is screw-threaded and fitted with a nut, *o*. At the base of the carbon-holder *m* is a shade stand or holder, m^2; and placed on the stem *m'*, between the upper end of the sleeve *l* and the lower surface of the shade-holder m^2, is a spring, *q*, the tension of which is regulated by means of the nut *o* on the lower end of the stem.

The arms *b* and *c* are wrapped respectively with the positive and negative wires *p n* of the circuit a sufficient number of times to form electro-magnets of the requisite strength for the operations hereinafter described. The ends of the wires *p* and *n* terminate in the parts *d* and *l*.

Fastened to the outer side of the case *d* is a weak spring or leaf, *r*, one end of which is in contact with the feed-rod *f*. The purpose of this spring is to establish a permanent contact between the case *d* and the rod *f* to prevent sparking.

At the lower end of the rod *f* is an upper-carbon holder, *f'*, which is a simple socket, the carbon *t* being secured therein by means of a set-screw, f^2. The lower carbon, *t'*, is secured in the holder *m* in a similar manner.

The operation of our improved lamp is as follows: The wires *p* and *n*, being connected with the opposite poles of a battery or other source of electricity, and the parts being in the position shown in the drawings, the passage of the current through the coil on the upper arm, *b*, will magnetize the latter and the iron block *k*, causing the armature *h* to be

attracted thereto, and thus move the lever *e*, so as to clamp the rod *f* by means of the short arm e^2. This will hold the rod *f* in a fixed position until, by the lengthening of the arc between the carbons *t t'*, occasioned by the consumption of the latter, the resistance is increased and the strength of the current passing around the coils of the arm *b* is so weakened as to partially demagnetize the arm and release the armature *h*, when the weight of the lower end of the lever *e* will cause the lever to assume a vertical position and release the rod *f*, permitting it to slide downward in the sleeve or case *d*. When the points of the carbons come in contact and the circuit is closed the passage of the current through the coil on the arm *c* magnetizes the arm and the sleeve *l* and causes the latter to attract the lower-carbon holder *m* against the pressure of the spring *o* and separate the points of the carbons *t t'* sufficiently to form the arc. This operation is repeated whenever, by the consumption of the carbons, the current is weakened or the resistance becomes so great as to demagnetize the arms *b* and *c*. Thus we secure a steady automatic operation of the lamp, which continues without change until the carbons are completely consumed. The feed of the rod *f* is so gradual and easy and the movement of the lower-carbon holder in forming the arc is so rapid that there is little or no fluctuation or vibration in the light produced. We adjust the tension of the spring *q* so carefully with relation to the strength of the electro-magnet *c* as to preserve a practical equilibrium between them, except in the case of the cessation of the current.

By forming the sleeve or case *d* and lever *e* of a diamagnetic metal we prevent any change of polarity in the upper electro-magnet, *b*.

By dispensing with springs and other devices liable to get out of order in the feeding apparatus we obtain a great advantage, not only in the construction, but in the care and operation of the lamp.

The lever *e*, being operated by the power of the electro-magnet *b* and releasing its hold by the weight of its lower arm, is certain in its operation and entirely independent of the defective operation of any machinery, which has in many lamps been a fruitful source of trouble and failure. The force of the bite of the lever *e* upon the rod *f* may be regulated by the relative length of the arms. If the arm *e'* is lengthened, great power is obtained. This, however, requires to be proportioned to the weight of the feed-rod *f* and the carbons secured thereto.

By mounting the magnets *b* and *c* upon the insulating bar or standard *a* we are enabled to dispense with any other insulation between the parts of the lamp.

The advantage of the spring *r* is very great in all lamps in which the feed-rod slides through a case or sleeve, because where the current passes from the said case or sleeve to the rod, and the rod is loose enough to slide therein, there is more or less space between them, and any slight irregularity in the rod will cause a spark between it and the case. The presence of the spring *r* or equivalent contact furnishes a conductor and entirely prevents all sparking.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In an electric-arc lamp, the combination, with a carbon-holder or feed-rod, of a diamagnetic sleeve or case wherein the feed-rod slides, a pivoted diamagnetic lever having one end forked and the other faced with iron, and an electro-magnet arranged within the circuit, substantially as and for the purpose specified.

2. In an electric-arc lamp, the combination of an upper-carbon holder or feed-rod, a diamagnetic sleeve or case wherein said feed-rod slides, a pivoted diamagnetic grip-lever provided with an iron facing to act as an armature, and an electro-magnet, with a lower-carbon holder having a pendent stem, a sleeve wherein the stem of said holder slides, an interposed spring, and a second electro-magnet, the electro-magnets being arranged within the circuit and insulated from each other, substantially as and for the purposes specified.

In testimony whereof we have hereunto set our hands this 24th day of June, A. D. 1882.

JOSEPH R. FINNEY.
LOUDON CAMPBELL.

Witnesses:
C. C. LEE,
T. B. KERR.