(No Model.)

C. E. LONG.

ELECTRIC LAMP.

No. 249,149. Patented Nov. 1, 1881.

Fig. 1

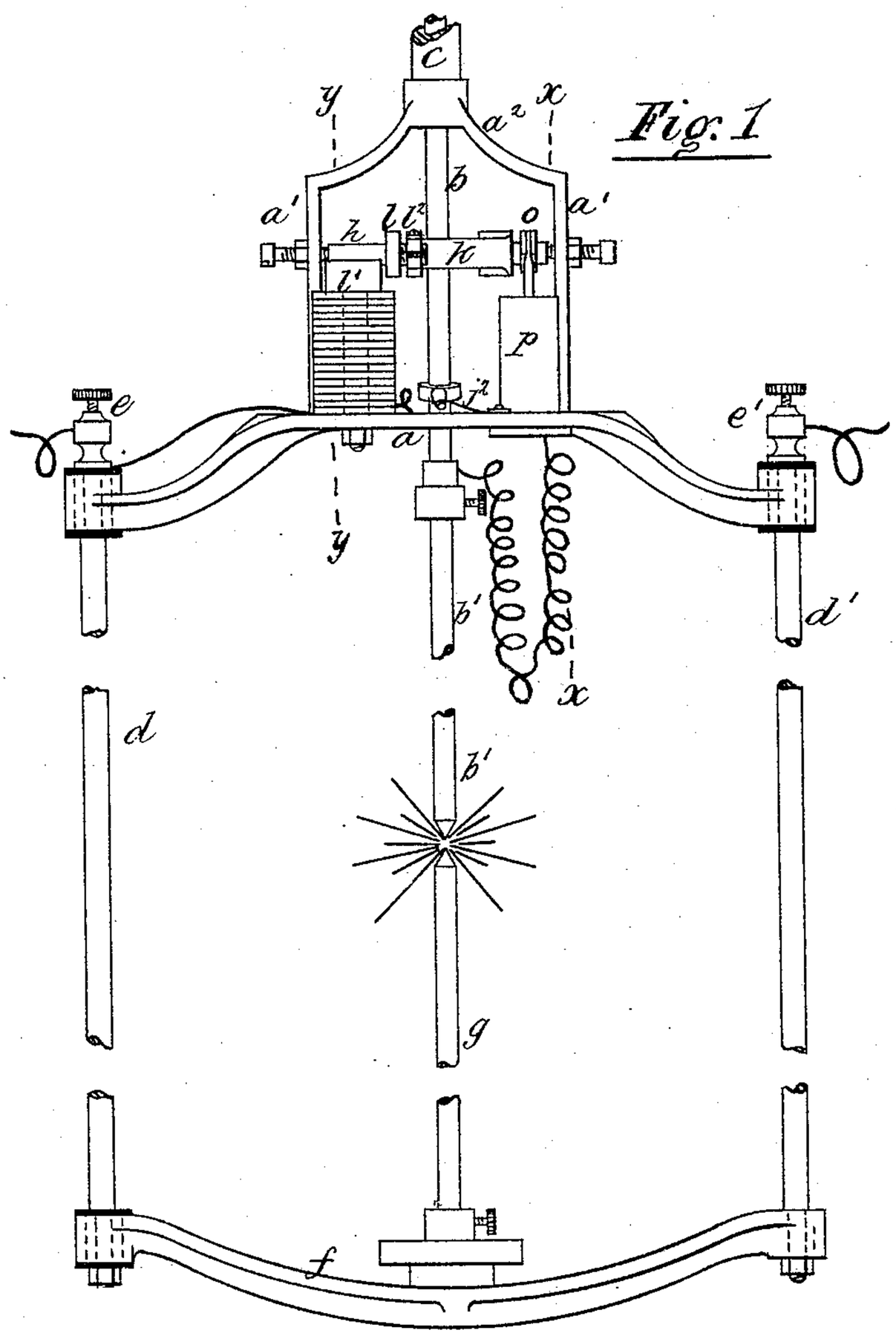


Fig. 3

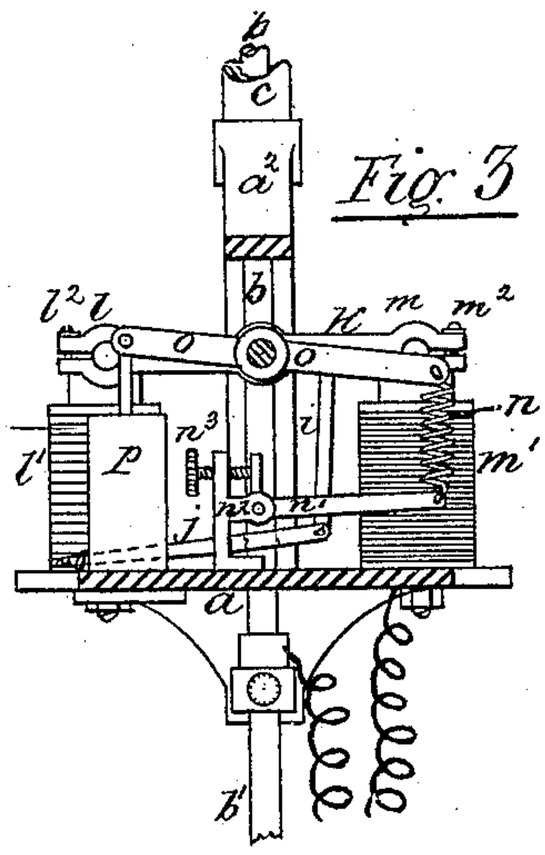


Fig. 4

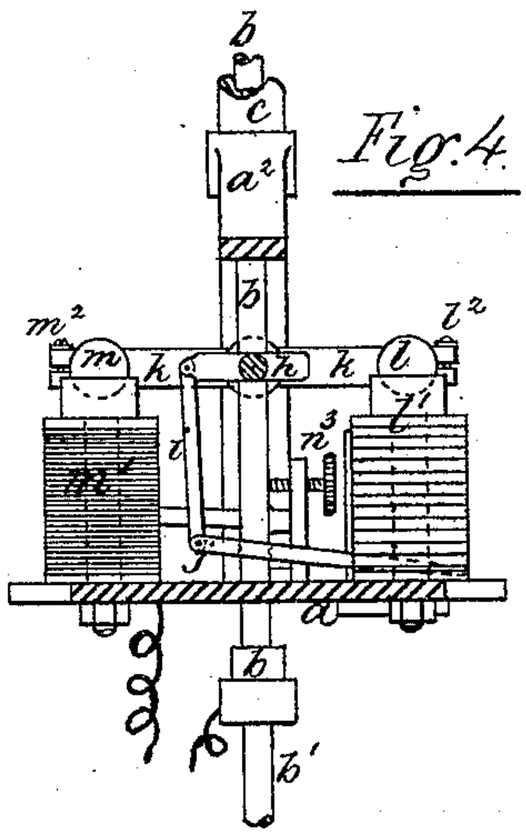
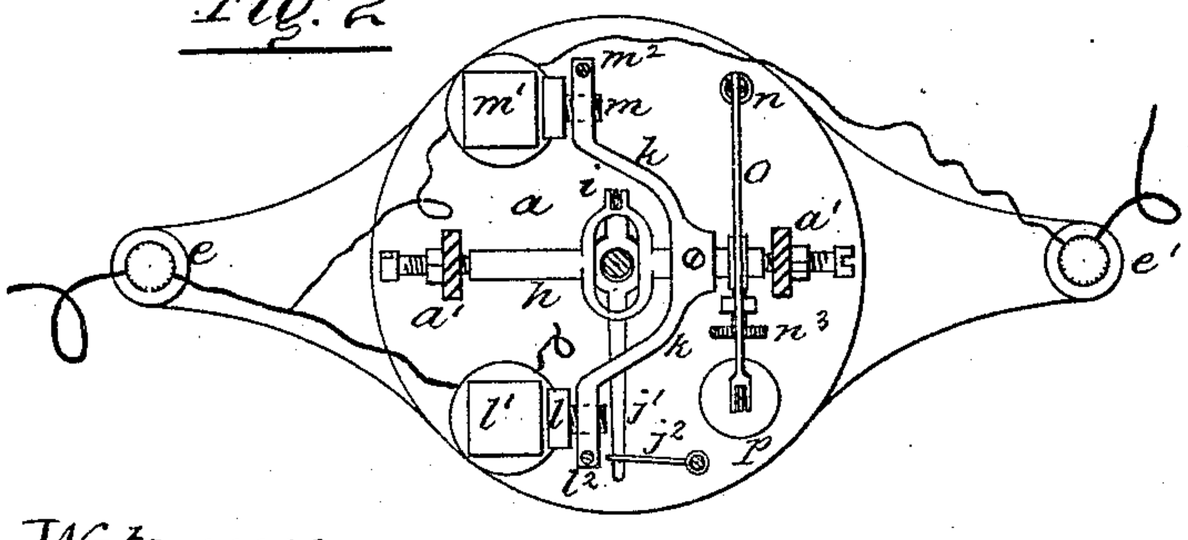


Fig. 2



Witnesses.

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UNITED STATES PATENT OFFICE.

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ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 249,149, dated November 1, 1881.

Application filed September 29, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDWARD LONG, of the city of New York, county and State of New York, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

This invention relates to that class of electric lamps in which the lower carbon is held stationary in the frame, and the upper carbon raised up from it to form the arc, and allowed to gradually feed down as the carbons are consumed.

It consists of a novel arrangement of the two actuating electro-magnets, and in the construction of the devices by which the upper carbon is controlled by the differential action of the two electro-magnets, one of which is wound with large wire, and is included in the arc-circuit, and the other one with fine wire and included in a derived or branch circuit. Each magnet acts by induction on independent armatures adjustably connected to two lever-arms arranged diametrically opposite one another on a rock-shaft, and this shaft is connected by a link to the upper carbon-rod-clamping device at a point much nearer the center of the shaft than are the armatures, so that the electro-magnets have to draw their armatures through a long range of movement to impart a short range of movement to the carbon, thereby greatly increasing the regulating powers of the electro-magnets and making the regulation of the feed of the carbon very uniform, on account of the delicate action of the magnets due to increase of leverage of their armatures over the movement of the clamping device. The rock-shaft is provided with an adjusting-spring set to oppose and assist to regulate the power of the main-circuit electro-magnet on its armature, and it is further provided with a dash-pot.

The improvements in the construction and the operation of the various parts will be fully understood by reference had to the accompanying drawings and the following description thereof.

Figure 1 is a front elevation of my improvements in electric-lighting apparatus. Fig. 2 is a plan view of the same with the upper part of the frame cut off. Fig. 3 is a side view sectional elevation cut through the line $x\,x$, looking toward the left; and Fig. 4 is a side view sectional elevation cut through the line $y\,y$, looking toward the right.

The upper part of the frame consists of the plate a, and standards $a'\,a'$, and cross-piece a^2, in the center of which is a hole in line with a hole in the plate a, and through which the upper-carbon-holding rod, b, passes. A tube, c, is screwed in the cross-piece a^2, and incases the rod b, and by it the lamp is suspended.

In arms projecting from the plate a are secured, by insulated connections, the side rods, d and d', the upper ends of which are provided, respectively, with the binding-posts e and e'. The lower ends of the side rods are secured to the cross-bar f, and in a socket in the center of it is held the lower carbon, g, the bar d by means of an insulated connection, and the bar d' by metallic contact therewith.

Pivoted on pointed bearings in the standards $a'\,a'$ is the rock-shaft h, framed at its center to surround the carbon-holding rod b, and at one side of this center framing is formed a slot, in which is pivoted the hanging link i, connected at its lower end to the clamp j. This clamp j has a hole in it slightly larger than the rod b, so that the rod is free to fall down through it when the clamp is in a horizontal position; but the rod is held by the clamp when it is moved into an angular position by the rocking of the shaft h. The clamp is also provided with a tail-piece, j', on the outer end of which rests the spring j^2, secured to the plate a.

The double armature-lever k is secured to the rock-shaft h by a set-screw passing through its hub, and by means of which they may be set in relation to one another to properly locate the armatures l and m, carried by the double lever k, in proper relation to the poles of the electro-magnets l' and m', when the clamp j is about to gripe the rod b; or the rock-shaft h and double lever k may be cast in one piece of some non-magnetic material, and the requisite adjustment provided for by making the link i adjustable as to its length.

The armatures l and m are circular pieces of iron with threaded stems at one of their sides,

and said stems fit into tapped holes in the ends of the double lever *k*, so that by turning the armature their front faces are moved to or from the poles of the electro-magnets *l'* and *m'*, to regulate the attractive powers of the magnets on the armatures, and when the armatures are properly set they are held rigidly in place by the set-screws l^2 and m^2, which closes by means of slots the tapped holes tight on the threaded stems of the armature. The cores of the electro-magnets *l'* and *m'* are connected to the plate *a*, which, with the rest of the frame, is made of iron, so that each core is affected somewhat by the change of current passing through the insulated wire of the other. The wire on the magnet *l'* is the large wire, and the electric current entering the lamp by the binding-post *e* passes through it, and then goes to the frame *a a'* a^2, down the rod *b*, through the carbon *b'*, to the carbon *g*, and from it up the side rod, *d'*, and so leaves the lamp by the post *e'*. The current in so passing causes the magnet *l'* to draw down the armature *l*, and so raises up the upper carbon to form the arc, but at the same time some of the current passes through the branch circuit formed by the fine wire surrounding the core of the magnet *m'*, one end of which is connected to the large wire as it leaves the post *e*, and the other end is connected to the other post, *e'*. The wire of the two magnets is so proportioned and their armatures so set in relation to the poles that the action of the two magnets balance one another on the double lever *k* when the arc is normal; but as soon as the arc becomes abnormal the current is decreased in the magnet *l'* and increased in the magnet *m'*; consequently the lever *k* is moved in an opposite direction to when the arc is being formed, and the clamp and rod *b* lowered gradually, the clamp allowing the rod to slide through it when it reaches its lowest position to bring the arc to its normal condition; but further movement of the rod *b* is instantly arrested by the increase of current passing through the magnet *l'*.

The cores of the magnets *l'* and *m'*, as before stated, are shown as connected together by the iron plate *a*. They may be made independent of one another, and each one be of horseshoe shape, their proper action on the clamping device being in any case easily attained by the adjustment of their armatures; and instead of being placed in vertical positions, as shown, it is evident they may be placed horizontally without altering their action on the lever *k*.

To one end of a double arm, *o*, on the shaft *h* is connected the spring *n*, the other end, which is connected to the bell-crank lever *n'*, pivoted in the frame n^2, and through this frame passes the set-screw n^3, butting against the short arm of the bell-crank lever *n'*, and by means of which the tension of the spring *n* is regulated, as desired, to oppose the proper amount of resistance to the action of the magnet *l'* on its armature *l*. On the other end of the arm *o* is connected the plunger of the dash-pot *p*, which is of the ordinary construction, and for the purpose well understood; so a further description of it here is unnecessary.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination, the electro-magnets *l'* and *m'*, the armatures *l* and *m*, adjustably connected to the levers *k* of the rock-shaft *h*, the rod *b*, passing vertically freely through an opening in the rock-shaft *h*, and a clamping device, substantially as described, operated by the rock-shaft to raise the rod *b* when the armature *l* is attracted by its electro-magnet *l'*.

2. The armatures *l m*, provided with screw-threaded stems, in combination with the levers *k*, provided with tapped and slotted holes, and set-screws l^2 m^2, substantially as and for the purpose set forth.

3. The bell-crank lever *n'*, screw n^3, spring *n*, arm *o*, dash-pot *p*, and lever *k* on shaft *h*, armature *l*, and electro-magnet *l'*, in combination substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand at New York, county and State of New York, this 27th day of September, A. D. 1881.

CHARLES E. LONG.

Witnesses:
ALFRED SHEDLOCK,
ABRAM M. LORYEA.