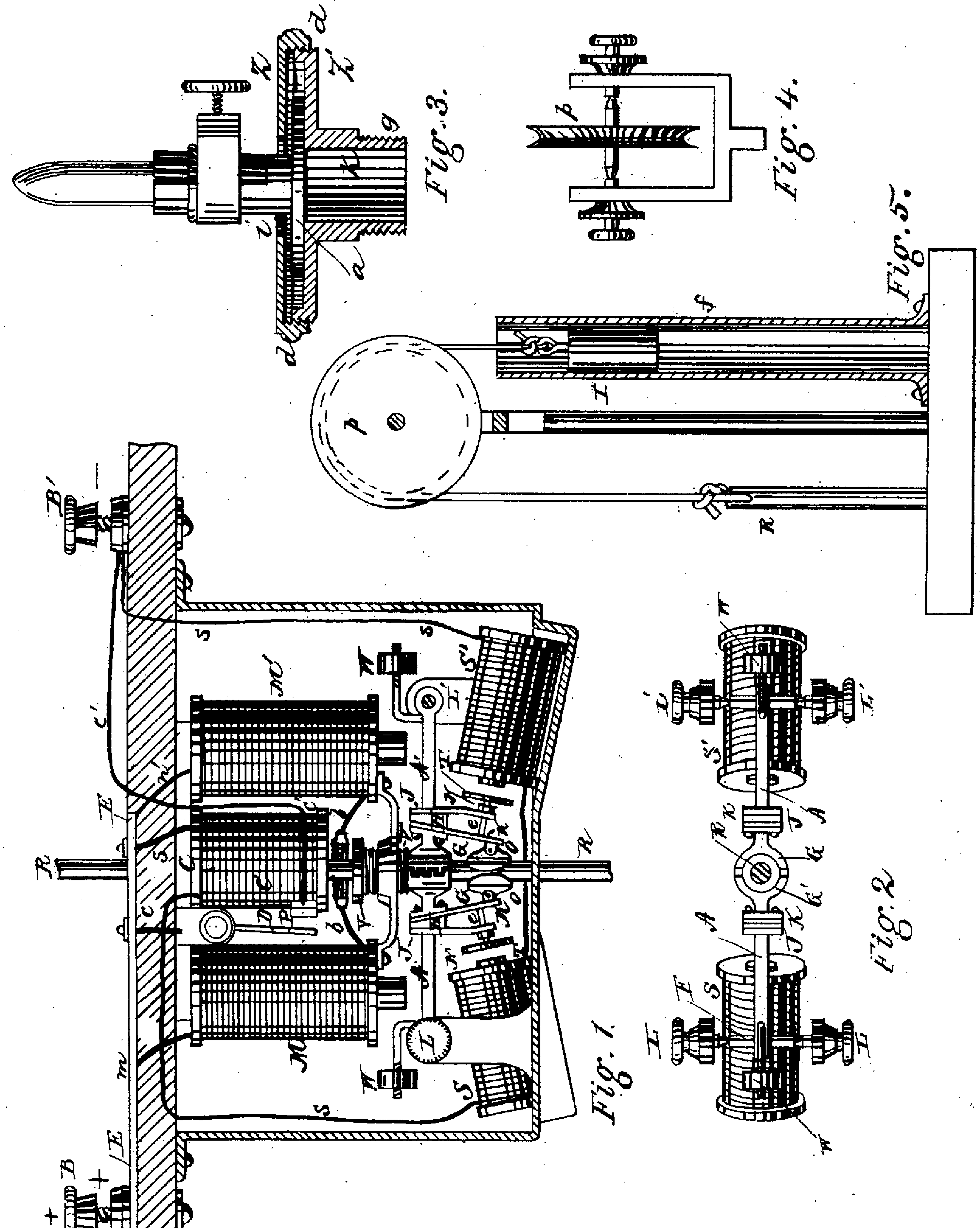
(No Model.) 3 Sheets—Sheet 1.

A. L. AREY.

ELECTRIC LAMP.

No. 253,811. Patented Feb. 14, 1882.



Witnesses,
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(No Model.)

3 Sheets—Sheet 2.

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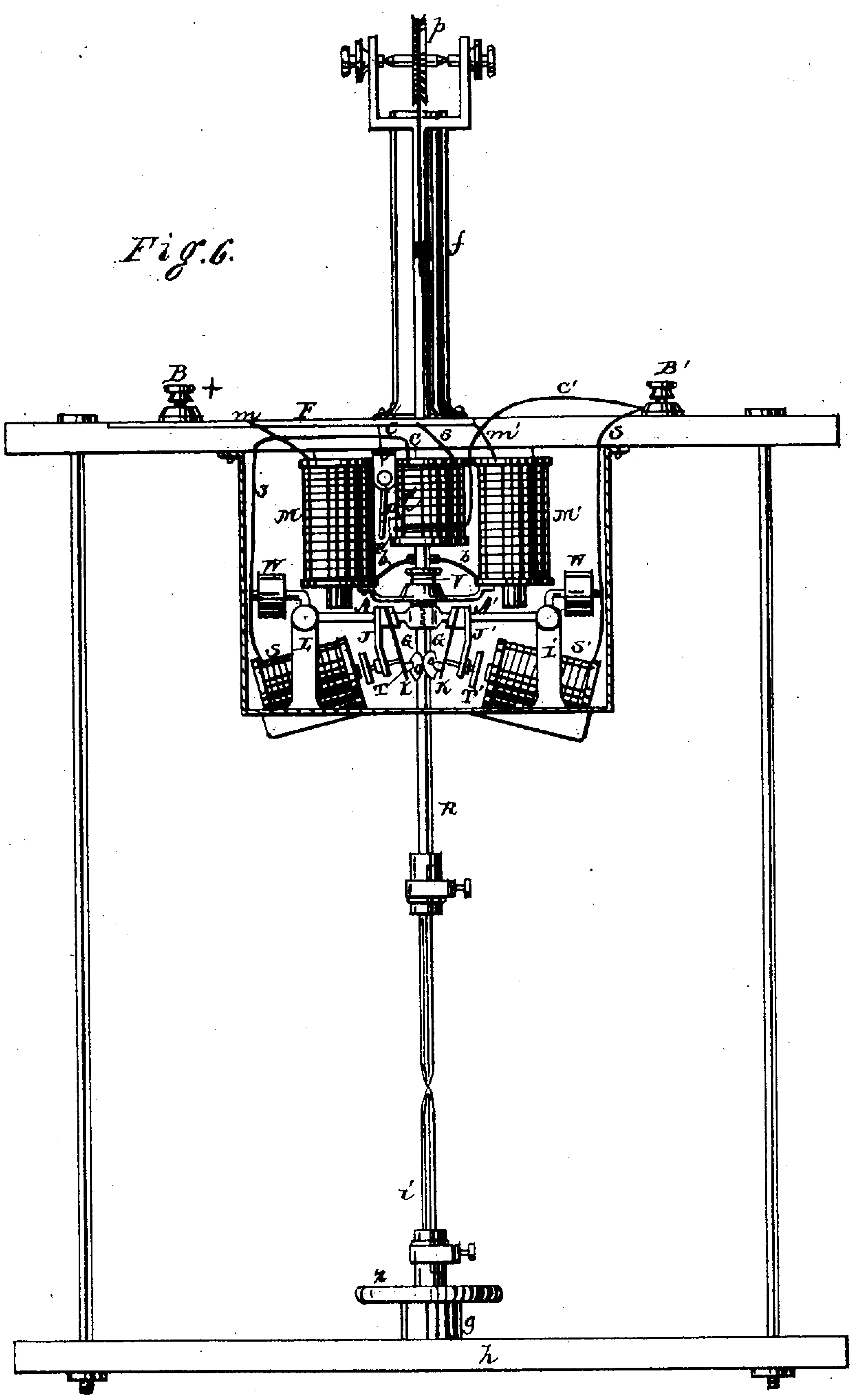
Fig. 6.



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(No Model.)

3 Sheets—Sheet 3.

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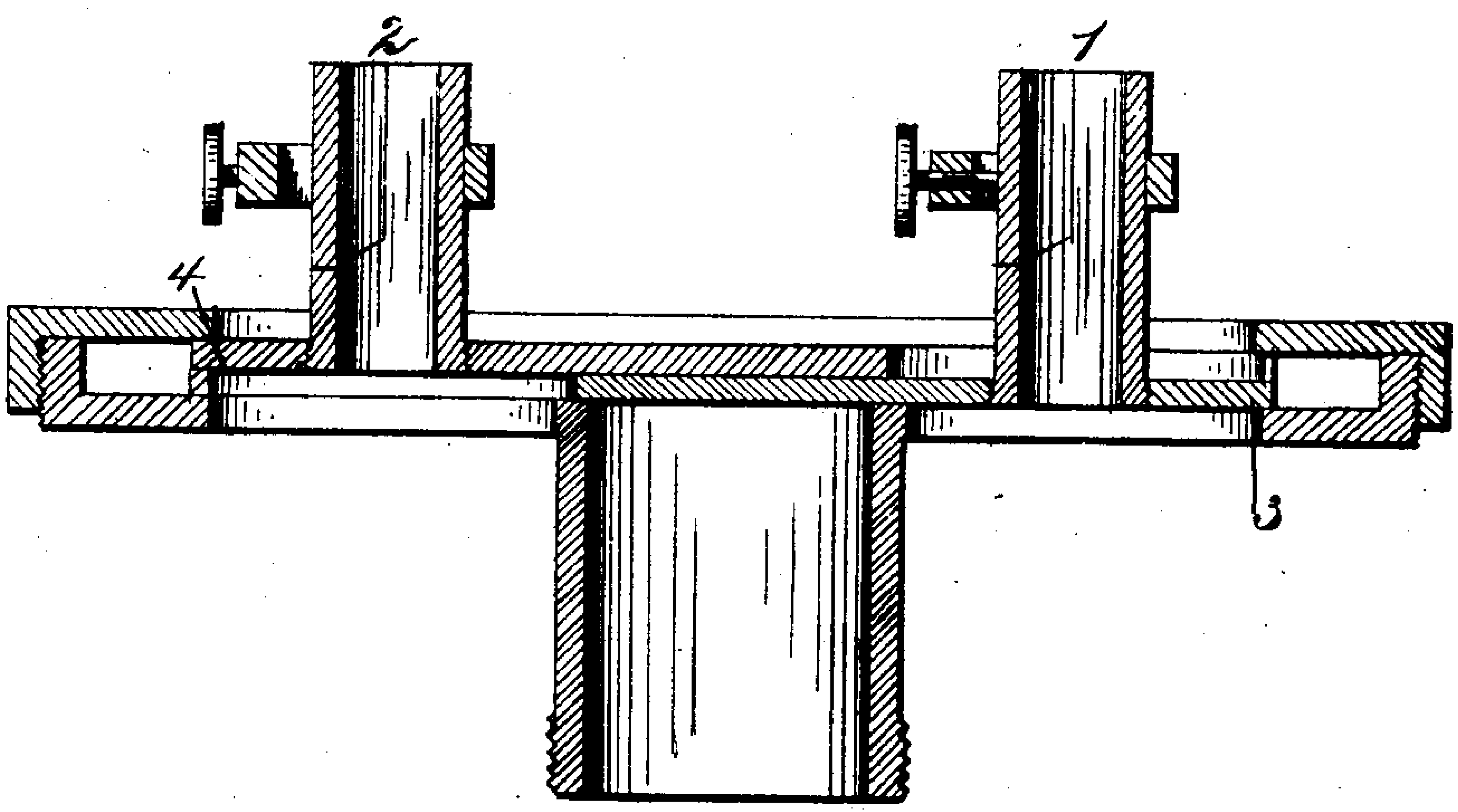
Fig. 7



Witnesses:
F. L. Ourand
Jno. R. Young.

Inventor:
A. L. Arey
by W. H. Doolittle,
Attorney.

UNITED STATES PATENT OFFICE.

ALBERT L. AREY, OF CLEVELAND, OHIO.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 253,811, dated February 14, 1882.

Application filed August 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. AREY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electric Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an electric lamp with certain mechanisms to regulate the approach of the carbons, and which, while performing automatically the various offices required of them, shall overcome the unsteadiness of the light, commonly called "winking," caused by the sudden approach and withdrawal of the carbon points.

The mechanisms are illustrated in the accompanying drawings, in which Figure 1 is a side view of the lamp apparatus with the box or casing removed, showing the interior. Fig. 2 is a detached plan view of the shunt, helices, and vibrating arms. Fig. 3 is an enlarged sectional view, in detail, of the adjustable lower-carbon holder. Fig. 4 is a sectional view of part of the counterbalancing mechanism, and Fig. 5 is an enlarged view of the counterbalancing or weight mechanism attached to the upper-carbon rod. Fig. 6 is a view in elevation of the lamp.

Similar letters refer to similar parts throughout the several views.

A A′ represent a pair of vibrating armatures actuated by an electro-magnet, M M′, and so arranged and constructed, as hereinafter described, as to clamp the rod R, carrying the upper carbon, and raise it a distance equal to the desired length of the voltaic arc, and to release the raised rod R, allowing it to feed down or approach the lower carbon without obliging the armatures A A′ to move back through the distance which they move while separating the carbon points, as hereinafter explained.

The current enters the lamp through the positive binding-post B, at the base of which is attached a brass extension-piece, E, which carries the current to the wires forming the various circuits. The main circuit leaves the extension-plate E by the wires *m* and *m′*, passing through the low-resistance helices M M′, respectively, and thence to the carbon-rod R by means of the brushes *b b*, thence passing through the carbon points and the adjustable lower holder to the frame of the lamp, which is in electric connection with the negative binding-post B′. A derived circuit also leaves the extension-piece E by the wire *s*, passing through the high-resistance helices C, S, and S′, and thence to the negative binding-post B′. A cut-out circuit leaves the extension-piece E by the metallic connection *c*, passes to the lever D, and when said lever is in contact with the plate P it passes by the wire *c′* to the negative binding-post B, as shown in Figs. 1 and 6.

The armatures A and A′ consist of metallic arms pivoted to the standards L L′, and each is provided with a head, H, at its free end. To the sides of each of the heads is rigidly attached a plate, J, which extends below the armatures, and to the other side of the heads is secured a spring, K, carrying at its lower end a clamp, O, and a rod, *e*, which passes from the spring K to the armatures T T′ and carries the adjusting-nuts N N′. The described devices connected with the vibrating armatures A A′ and T T′ operate conjointly, and move together by means of the geared segments G G′, which mesh together, but do not touch the rod R, and are counterbalanced by the movable weights W W′.

The object in placing the clamps below the line of the pivots L L′, as shown, is to give them a greater horizontal motion for a given vertical motion than they would have were they situated in the line of the pivoted beams L L′; and by such arrangement the rod is clamped and relieved with greater precision. It is evident that the same objects would be accomplished by placing the clamping mechanism above the line L L′.

The operation of the armatures A A′ is as follows: When the magnet M M′ is energized the armatures are drawn up and the rod R is clasped by and between the clamps or plates O O′, and is lifted the distance desired, or until the segments G G′ strike the adjusting-screw V, Fig. 1, by which is regulated the length of the voltaic arc. The magnets M M′ are of such strength, or are placed at such distance from the armatures A A′, that they will hold said armatures up, even after the voltaic arc is increased in length.

In further explanation of this action of the armatures it may be added that if only a few convolutions of wire were wound about the core of the magnets M M′ the attraction of the armatures would be much less powerful than if a great number were wound about it, the current remaining the same. I may therefore wind the magnets M M′ of such strength that with the normal current it would be just strong enough to lift the armatures and the carbon-rod. Under such conditions the armatures and carbon-rod would be lifted only so long as the current maintained its full strength. If, however, I wind the magnet so that with only three-fourths of the normal current the attraction is sufficient to raise the carbon-rod and the armatures, they will be held in position until a change in the length of arc introduces resistance enough into the circuit to reduce the current to less than three-fourths of its normal strength, and this I prefer to do, arranging the magnets S S′ at such distances from, and winding them with such quantity of wire that with the normal strength of the shunt-current they will just fail to attract, the armatures T with force enough to release the clamping mechanism, and that when the shunt-current is increased, and before the main current has been decreased enough to allow the armatures A A′ to fall back to their original position, the attraction shall be great enough to overcome the tension of the spring K, and thus release the clamping mechanism, allowing the carbons to approach each other without causing the lamp to flicker or wink.

Below the bearings of the armatures A A′, and facing the armatures T T′, are placed two helices, S S′, Figs. 1 and 2, actuated by the derived circuit.

The armatures T T′, Figs. 1, 2, 6, are so controlled by the tension of the springs K K′, which are adjusted by means of the nuts N N′, that they are made to just balance the normal attraction of the helices S S′. When, however, the resistance of the arc increases, the attractive force of the electro-magnets S S′ so overcomes the tension of the springs as to allow the carbon-rod R to feed through, thus renewing the normal condition of the lamp without causing the armatures A A′ to move from the position against the adjusting-screw V, to which it was first raised by the magnets M M′ when the voltaic arc was established.

The adjustable holder for the lower carbon point (shown in Fig. 3) consists of a circular disk, *a*, to which is connected a device for holding the carbon point, said disk being placed between two clamping-plates, Z Z′.

From the lower plate depends a tube, *g*, which is threaded for screwing into the frame at *h*, as seen in Fig. 6. The plates are screwed together at *d*, Fig. 3, with the disk *a* between. The hole in the plate Z, through which the carbon-clamp *i* passes, and the hole K through the lower section or plate, Z′, are sufficiently large to permit the carbon point to be slightly displaced or moved laterally in order to bring the upper and lower carbons at all times to the most advantageous relative position. The plates or sections Z Z′, on being screwed together, inclose and clamp the disk in the annular space between them, which space is also sufficiently large to permit of said lateral adjustment.

In a double lamp two disks, each carrying a device for holding the carbon point, may be used and clamped, as above described, and as shown in Fig. 7, in which carbon-holder 1 is attached to the lower holder, 3, and carbon-holder 2 is attached to upper plate, 4. Both plates have large holes to permit of lateral adjustment of carbon-holders.

The carbon-rod R is counterbalanced by a weight, I, Fig. 5, to which is attached a cord passing over the pulley *p* and connected to the rod. The weight moves within a tube or cylinder, *f*, Figs. 5, 6, the base of which is slightly greater than the diameter of the weight to keep the tube in position, and also to increase the resistance of the air therein, and thus tend to give the weight and rod a uniform movement.

It will be evident that by changing the relative weights of the rod R, its carbon point, and the weight I, so that the weight of the rod and carbon shall exceed the weight of the counterbalance, I can obtain any velocity of the rod R that may be desired for the movement of the carbon point. The pulley *p* is mounted upon a shaft, and has pivoted bearings, as seen in Fig. 4. The contact-lever D, Figs. 1 and 6, is suspended from the frame by a pivot at *y*, and, being of iron, will be attracted to the helix M, when the voltaic arc is normal, by the excess of attraction of the helix M, which is energized by the main current, over that of the helix C, which is actuated by the derived or shunt circuit S S′. If, however, from any cause the main circuit passing through the coil M is interrupted, the central helix, C, draws the lever D toward it, closing the short circuit C C′ through the plate P, the contact between the plate P and the lever D being maintained by what I designate the "force" of the current, meaning that force which must be exerted when two electrodes of opposite polarity which are in contact are separated. Again, it is a well-known fact that a wire carrying a strong current of electricity manifests some of the properties of a magnet, and that if the wire be coiled so as to form a helix or solonoid all the properties of a magnet are manifested. This property I use in my cut-out mechanism, the swinging piece D being attracted by the helix of wire M carrying a portion of the main current of the lamp and held against said helix so long as the main circuit is unbroken. When, however, the main circuit is interrupted, gravity causes the piece

D to assume a vertical position, and the attraction of the shunt-helix draws it toward said helix, thus closing the cut-out circuit; but I do not claim this construction and arrangement of the said lever D in my present application.

I do not herein claim broadly the arrangement of vibrating armatures controlled by an electro-magnet in the main circuit, as the same is described and claimed in my application filed May 23, 1881.

I am aware that various devices have been patented by means of which a magnet in the main circuit of an electric lamp actuates mechanism which separates the carbon points, and a magnet in a shunt-circuit moves the carbons forward, as shown in Patent No. 229,536, granted M. G. Kellogg July 6, 1880; but none of these devices cover the ground which I desire to cover, inasmuch as they have two or more sets of clamping mechanisms and propel the carbon-rod against the friction of one set, while I use but one set of clamps actuated by two armatures, and simply release the rod, allowing it to feed by its own weight.

I am also aware that numerous devices to steady or retard the motion of the carbon-rod, called "dash-pots," have been patented, as shown in United States Patent No. 219,209, granted C. F. Brush, and in the Jasper lamp, patented in France; also, that weights and pulleys have been used in many lamps to produce a positive motion of the carbons, as in the Rapieff and Wederman lamps, as shown in Patent No. 233,289, C. W. Siemens, and I do not claim any such devices; but

What I do claim, and desire to secure by Letters Patent, is—

1. An electro-magnet in the main circuit of an electric lamp, provided with the vibrating armatures, with their heads and geared segments, and the double lifting-clamp mechanism attached to said armatures, and consisting of one set of clamps arranged in respect to the upper carbon in the line described, and actuated by said armatures to separate the carbon points, in combination with the electro-magnets of high resistance in the shunt-circuit and its armatures T T′, whereby the said clamping mechanism is released when an increased resistance of the main circuit diverts the current into the shunt-circuit.

2. The electro-magnet of low resistance in the main circuit, wound only of such strength that with less than the normal current it just lifts the vibrating armatures A A′, in combination with said vibrating armatures, whereby, after the voltaic arc is increased in length, the said magnet continues to hold the said armatures up, substantially as described.

3. The combination of the electro-magnets M M′, of low resistance in the main circuit, the vibratory armatures A A′, actuated by said magnets, the double lifting-clamp mechanism attached to said vibrating armatures, and the upper carbon point, whereby the upper carbon point is separated from and fed to the lower point, and whereby, after the voltaic arc is increased in length, the said vibrating armatures and lifting mechanism are held by the said magnets in the same position to feed the upper carbon point to the lower one that they occupy after the points are separated, substantially as described.

4. The combination of the vibrating armatures, the counterbalance-weights, the adjusting-nut, the clamps O O, and their connecting mechanism, substantially as described.

5. The double lifting mechanism connected with the vibrating arms, and consisting of the segmental gears G, the heads H, the plates J, the springs K, the clamps O, armatures T, rods *e*, and nuts N, in combination with the bearings L and counter-weights *w*, substantially as described.

6. The combination of the magnets M M′, vibrating armatures A, and armatures T, with their connecting mechanism, and the helices S, substantially as described.

7. The combination of the magnets M M′ in the main circuit, the vibrating armatures A A′, having the geared segments G G′, the armatures T T′, and their connecting mechanism, substantially as described.

8. In a lower-carbon holder, the plates provided with holes, and an annular space between the plates to inclose a disk or disks, in combination with such disks, to provide for the displacement and lateral adjustment of the carbon point, substantially as described.

9. The combination of the adjustable lower-carbon holder, the disk or disks for carrying one or more carbon points, and the plates which inclose and clamp the said disk or disks, substantially as described.

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

ALBERT L. AREY.

Witnesses:

JNO. W. SIMS;
JOHN R. YOUNG.