(No Model.)

2 Sheets—Sheet 1.

C. M. BALL.

ELECTRIC LAMP.

No. 281,229.

Patented July 17, 1883.

Fig. 1.

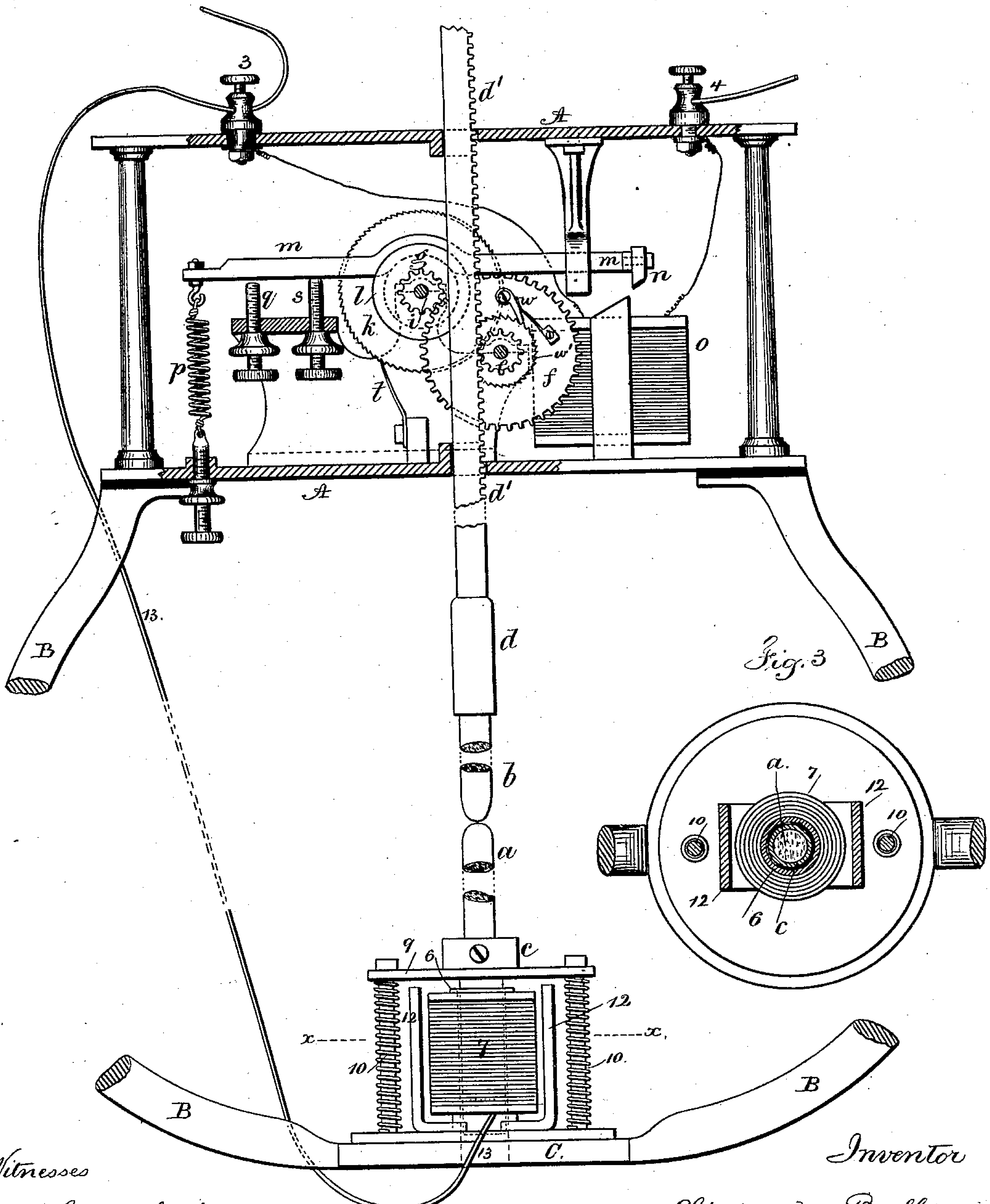

Fig. 3

Witnesses

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Inventor

Clinton M. Ball

per Lemuel W. Serrell atty.

(No Model.)

2 Sheets—Sheet 2.

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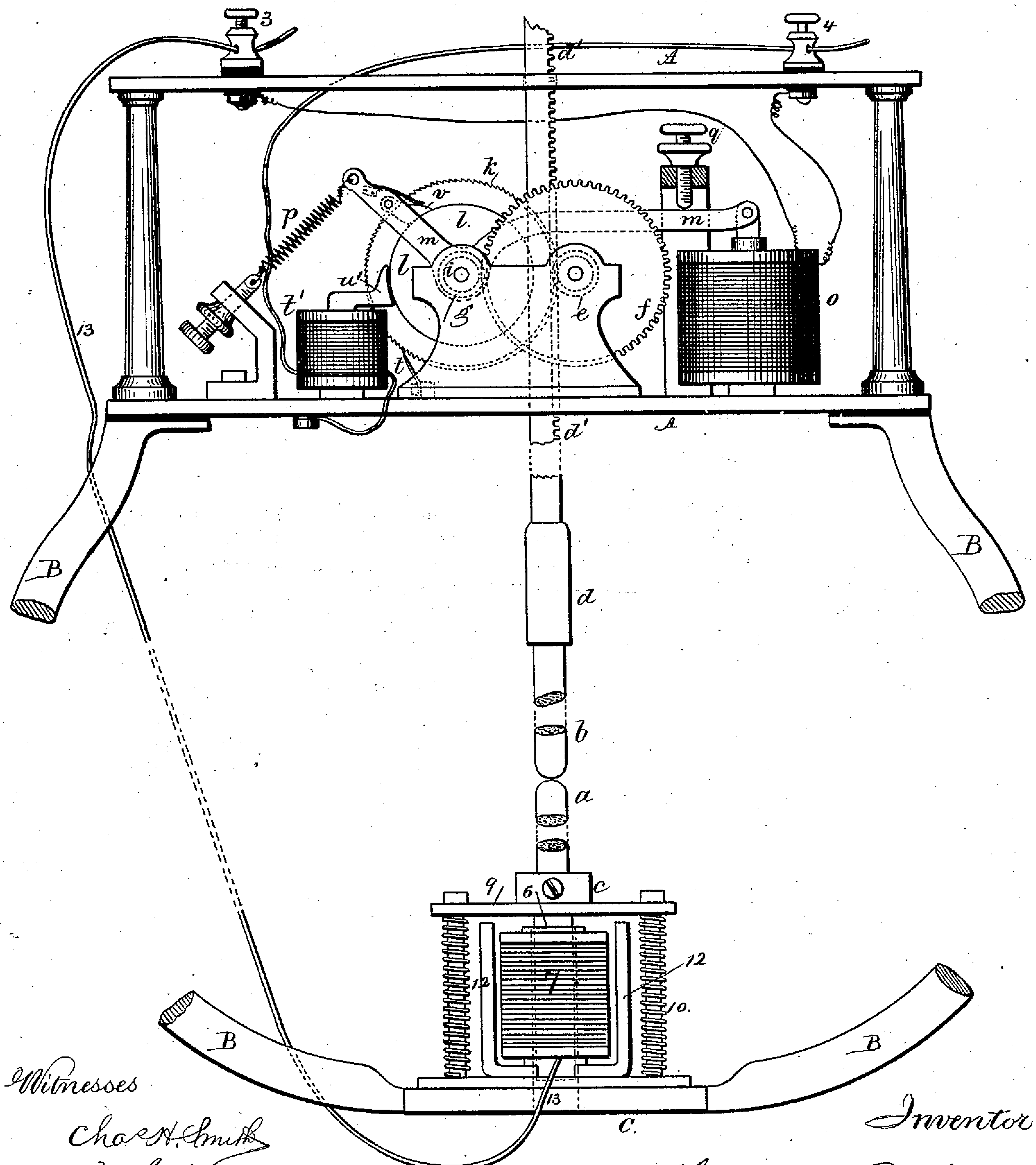
Fig. 2.



Witnesses
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J. Hail

Inventor
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N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

CLINTON M. BALL, OF TROY, NEW YORK, ASSIGNOR TO HIMSELF AND JOHN B. TIBBITS, OF SAME PLACE.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 281,229, dated July 17, 1883.

Application filed January 13, 1881. (No model.)

To all whom it may concern:

Be it known that I, CLINTON M. BALL, of Troy, in the county of Rensselaer and State of New York, have invented an Improvement in Electric Lamps, of which the following is a specification.

Electric lamps have been made in which the current to the lamp passes through the helix of an electro-magnet, and thence to the carbon electrodes or other source of light. The electro-magnet serves to regulate the feed of the carbons toward each other by relaxing the holding mechanism when the current weakens and allowing the carbons to be moved by gravity or by the action of a spring. In my present invention an electro-magnet of high resistance is placed in a shunt around the carbons, so that when the resistance increases in the main circuit, in consequence of the carbons becoming separated, the current through the resistance-magnet is increased, and the feed of the carbons is effected by the augmented magnetism of the electro-magnet. I combine with this magnetic feed a magnetic clamp to apply more or less friction to hold the carbons, and this clamp is magnetized by a helix in the main circuit, so that the clamp will cease to be operative if the current is interrupted, and in that condition the carbon-holder is liberated and may run down by gravity. I also employ an electro-magnet to separate the carbons and draw the electric arc. These devices, acting together, insure great uniformity in the light, because all the instrumentalities that act upon the carbons are controlled electrically.

In the drawings, Figure 1 is an elevation, partially in section, of the means for feeding the carbons in my improved lamp. Fig. 2 is similar view of a slight modification in the same, and Fig. 3 is a sectional plan at the line *x x*.

The carbons *a* and *b* are in holders *c* and *d* of any suitable character. To the carbon-holder *d* the rack *d'* is attached, and the pinion *e* gears into the same.

f is a gear-wheel upon the arbor of the pinion *e*, gearing to the pinion *g* on the arbor *i*, which arbor *i* has on it a ratchet or friction clamp wheel, *k*, and a friction-wheel, *l*.

The lever *m* has the arbor *i* for its fulcrum, and in Fig. 1 it is shown with a segmental recess to fit upon the friction-wheel *l*. At one end of the lever *m* is an armature, *n*, in proximity to the core of the electro-magnet *o*, and at the other end there is an adjustable retractile spring, *p*, and the two stop-screws *q* and *s*, Fig. 1, are below the lever. The helix of the electro-magnet *o* is in a shunt-wire, *r*, between the binding-screws 3 and 4. The magnetism in the core of *o* constantly attracts the armature *n* and keeps the lever *m* in contact with the friction-wheel *l*; but when the lamp is at an average brightness, the current passing over the shunt and through the high-resistance helix of *o* is not enough to overcome the spring *p*. When the light lessens, by reason of the increasing length of the arc through combustion of the electrodes, the current through the shunt-magnet *o* increases, the armature *n* is attracted, the wheels are turned, and the carbon is fed and the normal condition of the light restored. The feed will be more or less according to the condition of the carbons. The stop-pawl *t*, acting in the fine teeth of *k*, prevents the parts turning back, and as the magnetism in *o* lessens, the spring *p* draws the lever *m*, causing it to slip upon the wheel *l* until it comes into contact with the stop-screw *s*. If the magnetism in *o* lessens sufficiently, in consequence of the current being turned off, the spring *p* draws down the lever *m* until it comes into contact with the stop *q*, Fig. 1, the stop *s* forming a fulcrum on which the lever moves as it is lifted clear of the friction-wheel *l*, and that is then free to turn with the weight of the carbon-holder.

In Fig. 2 similar parts are shown to those in Fig. 1, except that an axial magnet, *o*, is represented instead of a magnet with an armature, and a friction-pawl, *v*, acts upon the edge of the wheel *l*, instead of the lever itself resting upon said wheel. The operations will be the same as aforesaid, except that the lever will not be lifted out of contact with the wheel, as described.

I remark that it is preferable to have the gear-wheel *f* loose on its arbor, and a pawl, *w*, secured to a ratchet-wheel, *w'*, that is tightly secured to the arbor, as seen in Fig. 1, so that the carbon-holder can be pushed up when inserting a new carbon.

If desired, the main-line circuit may pass through the helix t', Fig. 2, which is of low resistance, and magnetize the core u', the end of which is adjacent to the edge of the friction-wheel l, which is also of soft iron, so as to become magnetized by induction, and the two parts are near enough together to form a magnetic brake by reason of the attraction of the parts to each other, and this prevents the weight of the carbon and holder moving the parts; but if the circuit is broken, the core u' loses its magnetism and the holder and carbon are free to run down.

The lower-carbon holder c is movable endwise within a tubular core, 6, around which is a helix, 7. The inner end of the wire is attached to the tubular core 6, and the other end passes by the wire 13 to the binding-screw 3.

The armature 9 is adapted to slide upon the standards 10, around which are springs the strength of which may be adjusted to lift the armature, the carbon-holder c, the lower carbon, a, and to sustain also the weight of the upper carbon, b, and its holder d, and the electro-magnet is made with the external poles, 12, that are magnetized by induction, and act in conjunction with the tubular core upon the sliding armature. This armature is clamped to the lower-carbon holder, so that when the current is established through the carbons and through the helix 7 the magnetic force acting upon the armature will move the same and separate the carbons, so as to establish the electric arc.

I remark that the current, after it passes through the shunt and the resistance-magnet o, passes to the binding-screw 3. In Fig. 1 the binding-screw 4 is in metallic contact with the frame-work A, either directly or by a wire, and the binding-screw 3 is insulated. The pillars or rods B, extending from the frame A to the base C, should be insulated, so that the current will pass from the frame A through the carbons, and thence by the electro-magnet helix 7 and wire 13 either directly to the binding-post 3 or else through one of the side rods, if it is insulated from the base C, and its upper end connected by a wire to the insulated binding-post 3.

I claim as my invention—

1. In an electric lamp, the combination, with the carbons and the electric circuit passing through the same, of a shunt-circuit containing an electro-magnet of high resistance, a lever actuated by such magnet, and gearing operated by the lever to move one carbon toward the other when the energy of the electro-magnet in the shunt-circuit is augmented, and an adjustable spring to return the lever to its normal position, substantially as set forth.

2. In an electric lamp, the combination, with the electro-magnet of high resistance in a shunt around the electrodes or carbons, of a lever acted upon by the electro-magnet, a friction-wheel moved by said lever, an adjustable spring to act upon the lever in the opposite direction to the electro-magnet, and a stop to determine the movement of the lever and gearing between the friction-wheel and the carbon-holder, substantially as set forth.

3. The combination, in an electric lamp, of an electro-magnet and gearing to feed the carbon, a helix through which the electric current of the lamp passes, a core, and a friction-wheel of iron to act as a brake to sustain the weight of the carbon when the current is passing through the lamp, and to liberate the same when the current ceases, substantially as set forth.

4. The electro-magnet for separating the carbons or electrodes, composed of an iron tube through which the carbon-holder passes, a helix around such tube, two poles at opposite sides of the helix, an armature connected with the carbon-holder, and springs for sustaining the weight of the moving parts, substantially as set forth.

Signed by me this 8th day of January, A. D. 1881.

CLINTON M. BALL.

Witnesses:
WILLIAM G. MOTT,
GEO. T. PINCKNEY.