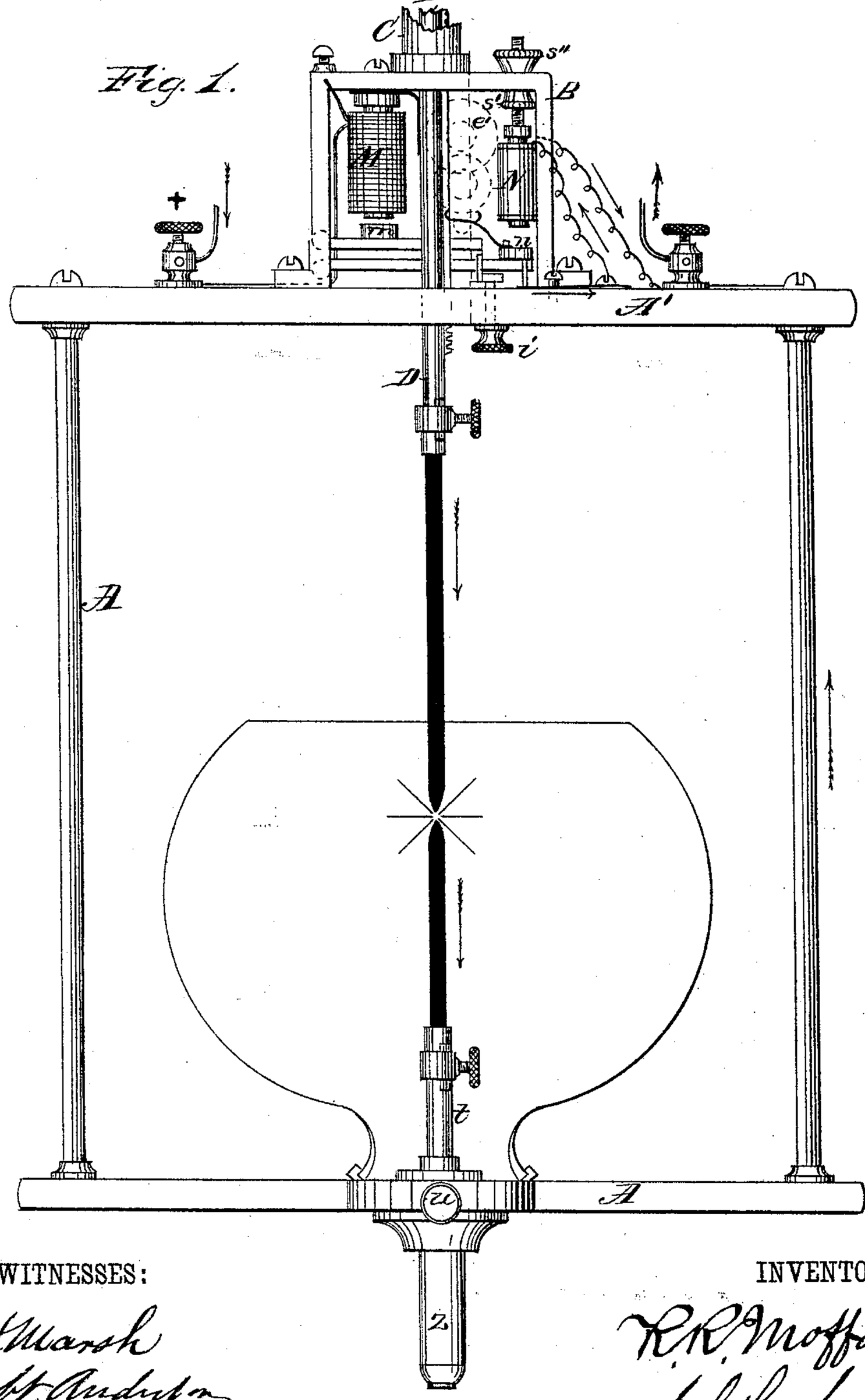
(No Model.) 3 Sheets—Sheet 1.

R. R. MOFFATT & S. CHICHESTER.

ELECTRIC LAMP.

No. 252,125. Patented Jan. 10, 1882.

Fig. 1.



WITNESSES:

E. H. Marsh

Robt. Andrews

INVENTOR

R. R. Moffatt

S. Chichester

(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

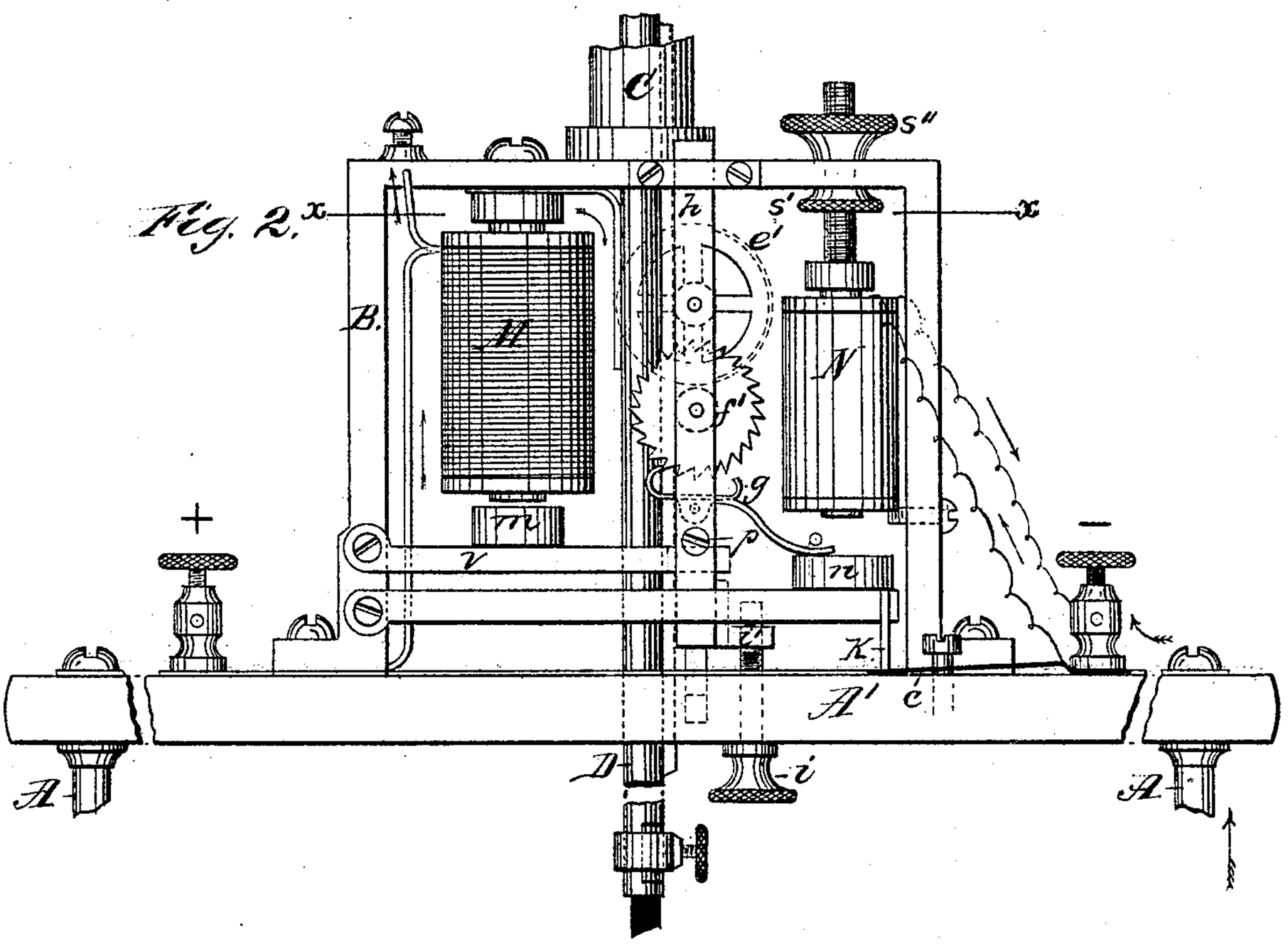
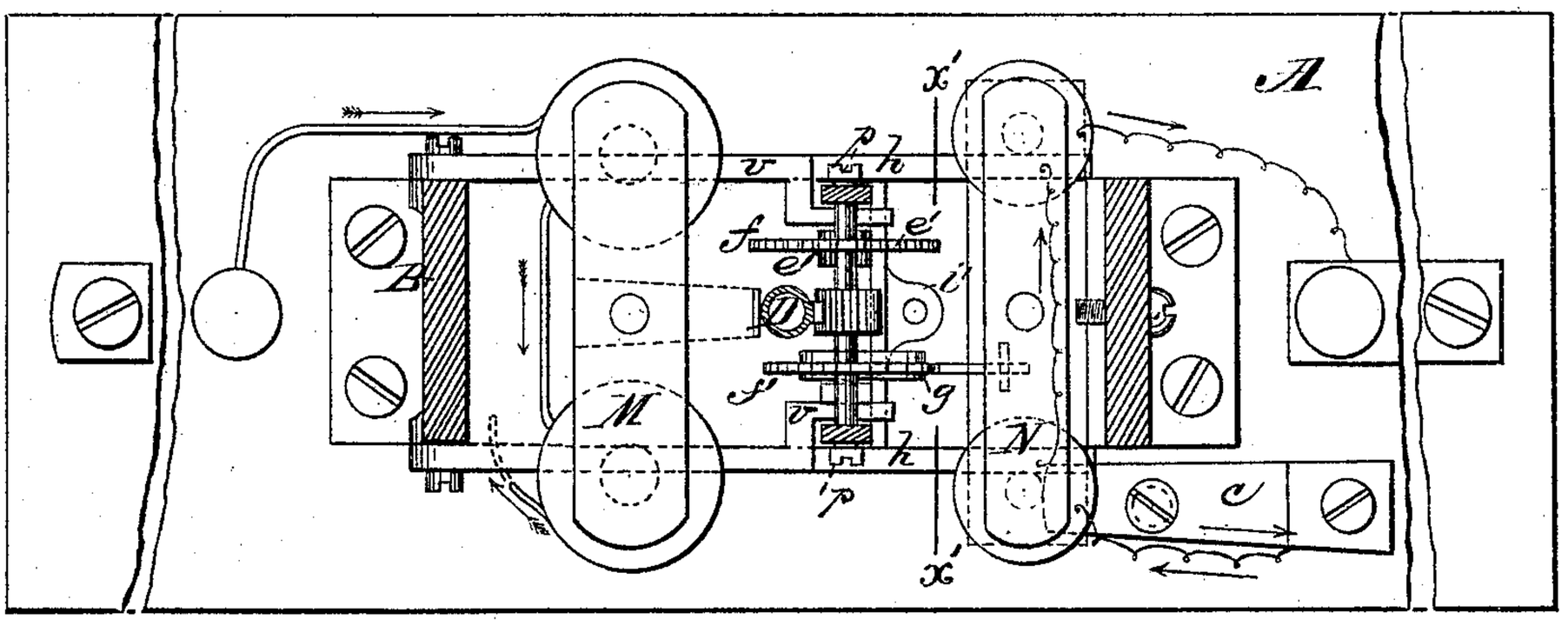


Fig. 3.



WITNESSES:

E. H. Marshall

Robt. Anderson

INVENTOR

R. R. Moffatt

S. Chichester

(No Model.) 3 Sheets—Sheet 3.

R. R. MOFFATT & S. CHICHESTER.

ELECTRIC LAMP.

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Fig. 4.

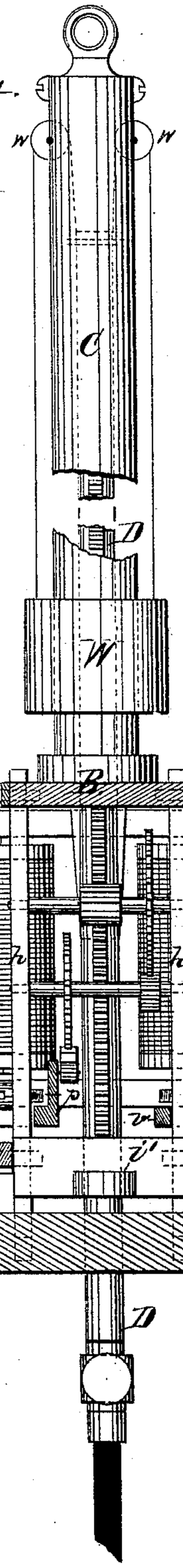

Fig. 5.

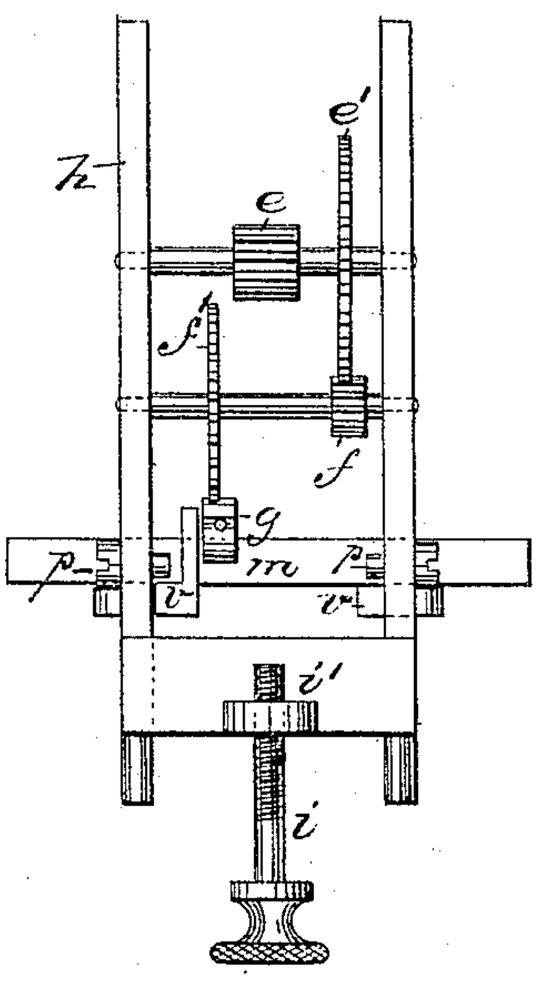

Fig. 6.

WITNESSES:

E. H. Warshall

Robt. Anderson

INVENTOR

R. R. Moffatt

S. Chichester

UNITED STATES PATENT OFFICE.

RICHARD R. MOFFATT AND SYLVESTER CHICHESTER, OF BROOKLYN, N. Y.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 252,125, dated January 10, 1882.

Application filed July 21, 1881. (No model.)

To all whom it may concern:

Be it known that we, RICHARD R. MOFFATT and SYLVESTER CHICHESTER, both of the city of Brooklyn, county of Kings, State of New York, have invented a new and useful Improvement in Electric Lamps or Regulators; and we do hereby declare that the following is a full and exact description of the same, reference being made to the accompanying drawings.

Our invention relates to that class of electric lamps that produces the voltaic arc. The power operating the carbon-holder is derived from gravity and magnetism.

The novel device we employ for controlling the movement of the carbons to maintain a constant arc and light consists in the employment of an automatic circuit-breaker in a shunt or derived circuit around the arc, combined with mechanism arranged in such a manner that when the armature of the electro-magnet that is located in said circuit is moved it will cause the carbons to feed a limited distance. At the same time it will break the circuit and allow the armature to return to its former position, closing the circuit, to be again operated upon, as above, when the resistance in the arc and the strength in the current in the shunt or derived circuit is increased by the consumption of the carbons.

This invention is especially adapted for many lamps arranged in series, and as it eliminates sudden changes of resistance in the arc it produces a more constant and steady light.

In the annexed drawings, Figure 1 is a longitudinal view of the lamp. Fig. 2 is an elevation, showing a view of the parts that regulate the movement of the carbon-holder. Fig. 3 is a cross-section taken on the line *x x*, Fig. 2. Fig. 4 is a longitudinal section taken on the line *x' x'*, Fig. 3. Fig. 5 is a view of the wheel-frame detached from the same. Fig. 6 is a section of the lower-carbon holder, showing the means for holding and adjusting the same.

Similar letters of reference indicate like parts in the several figures.

Letter A in the drawings denotes the metal frame of the lamp. The upper part, A', is of wood.

B is the case that contains the mechanism and upper-carbon holder.

C is a tube by which the lamp is suspended.

D is the upper-carbon holder, which is provided with a rack that engages and operates with a pinion, *e*, to which is attached a gear-wheel, *e'*, the latter engaging and operating with the gear-wheel *f* and escapement-wheel *f'*.

g is an escapement having a lever-rod, by which it is operated.

h h are rods or supports, in which the gear-wheels and pinion are mounted. They are secured together and arranged in the case in such a manner that they can be moved up and down.

i is an adjusting-screw engaging with a cross-piece, *i'*, that secures the rods *h h* together. This adjusting-screw regulates the distance that the rods *h h* move upward by coming in contact with the frame A'.

M is an electro-magnet located in the main or arc circuit. *m* is its armature, secured to a tilting frame-piece, *v*, one end of which is pivoted to the case B. On the other end is mounted the escapement *g*.

p p are small pins or screws, against which the frame-piece *v* presses when raised.

N is an electro-magnet located in a shunt or derived circuit having great resistance. *n* is its armature mounted upon a tilting frame, one end of which is pivoted to the case B, as shown.

k is a contact-point (made of platinum or other suitable material) secured to the armature *n*, the lower end of which rests upon a metallic spring, *c*, which has metallic contact with one terminal of the shunt or derived circuit. The other terminal is connected with the negative binding-post. A screw-rod, *s*, provided with nuts *s'* and *s''*, permits of an adjustment of the magnet N, so that it may be secured at any desired distance from its armature.

W is a counter-weight, made slightly lighter than the racked carbon-holder, to which it is connected by means of cords passing over small pulleys *w w*. The object of this counter-weight is to partly sustain or balance the upper-carbon holder and reduce its weight, so that the power required in the electro-magnet to form and sustain the arc is reduced to a minimum.

The lower-carbon holder *t* is secured to the frame A by means of a ball or universal joint,

so as to admit of a slight movement. *u* is a set-screw by which it is secured firmly in position.

z is a tube-extension, which permits of a long carbon being inserted in the carbon-holder, and also serves as a handle in moving or adjusting said carbon-holder.

The electric current enters the lamp at the binding-post marked +, passes through the electro-magnet M, the case B, upper-carbon holder D, the upper and lower carbons, the frame A, to the binding-post marked —. A small portion of the electric current passes from the case B through the tilting frame and armature *n*, the contact-point *k*, the spring *c*, thence through the electro-magnet N to the binding-post —. The greater the resistance in the arc or main circuit the greater the quantity of electricity passes through the shunt or derived circuit in which is located the electro-magnet N.

The operation of the lamp is as follows: When the circuit is complete and the current flows the armature *m* is drawn toward the electro-magnet M, raising the end of the armature-frame, engaging the escapement *g* with the escapement-wheel *f'*, and, pressing upon the pins or lugs *p*, raises the rods *h h*, the racked carbon-holder D, and its carbon, thus separating the electrodes, when the arc appears. As the electrodes are consumed and the resistance of the arc increases the quantity of current flowing through the shunt or derived circuit increases until the electro-magnet N has power enough to raise the armature *n*, which movement operates the escapement, causing it to allow the escapement-wheel to move one tooth and the distance between the carbons to be reduced a very little. When the armature *n* is raised, as stated, it raises the contact-point *k* from the spring *c*, the latter following it for a slight distance only. In separating, the circuit through the electro-magnet N is broken, when the latter ceases to attract and the armature falls back to its normal position again, to be acted upon when the resistance in the arc and the strength in the magnet N are increased. This operation continues while the light is in operation. When the arc is broken by accident or intent the electro-magnet M ceases to attract and the armature *m* falls, which disengages the escapement from its wheel and allows the racked carbon-holder to move down quickly until the electrodes touch, when the electric circuit is again complete and the magnet M acts as heretofore described, establishing the arc. When the electric current is not flowing in the lamp the end of the frame *v* that carries the escapement will rest upon the cross-piece *i'*, leaving the escapement out of gear, when the carbon-holder can be moved up or down freely.

We do not limit ourselves to the specific device or arrangement herein shown for carrying out our invention, as various forms or constructions of mechanism may be adapted which will operate the breaking and closing of the shunt or derived circuit so as to raise and lower the armature *n* for regulating the arc.

Having thus described our invention, we claim—

1. In an electric lamp, in combination with the carbon-holder, the electro-magnet M, its armature *m*, the escapement-wheel *f'*, and escapement *g*, the latter arranged so that it will be forced into and out of gear by the movement of the said armature, the magnet N, located in a by-pass or derived circuit, its armature *n*, and the contact-point *k*, for making and breaking said circuit, substantially as herein specified.

2. In an electric lamp, the combination of the electro-magnet N, located in a by-pass or derived circuit, its armature *n*, the escapement *g*, and device for breaking said circuit when the armature is attracted by the electro-magnet N, and allowing the armature to return and close the circuit again, said movement causing the operation of the escapement and the arc to be regulated as the carbons are consumed, substantially as herein specified.

3. In an electric lamp, the combination of the armature *n*, the contact-point *k*, the spring *c*, or its equivalent, the escapement *g*, the escapement-wheel *f'*, a by-pass or derived circuit around the arc, and mechanism for regulating the movement of the carbon-holder by the breaking and closing of said by-pass or derived circuit extending around the arc, substantially as herein specified.

R. R. MOFFATT.
S. CHICHESTER.

Witnesses:
ARTHUR C. SALMON,
C. E. PITCHER.