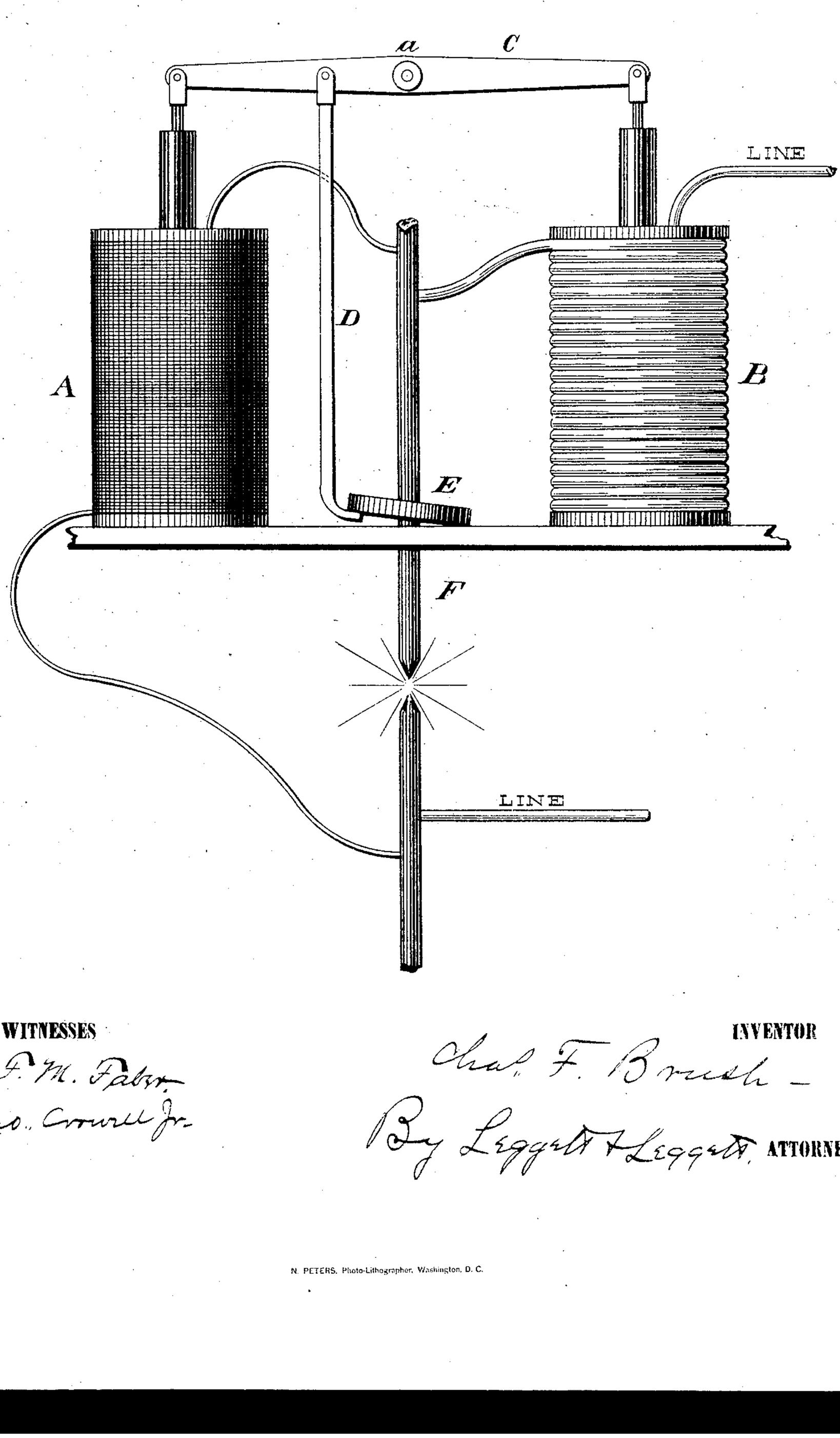
(No Model.)

C. F. BRUSH.

ELECTRIC ARC LAMP.

No. 312,184. Patented Feb. 10, 1885.



WITNESSES

F. M. Fabyr.

Jno. Cornell Jr.

INVENTOR

Chas. F. Brush

By Leggett & Leggett, ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES F. BRUSH, OF CLEVELAND, OHIO.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 312,184, dated February 10, 1885.

Application filed August 7, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. BRUSH, of 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to electric-light regulators, and has for its object the automatic control of the arc length, not necessarily depending on variation in the strength of the working-current.

I accomplish my object by employing two axial magnets—one of low resistance located in the working-circuit, and the other of high resistance located in a shunt around the arc between the carbons. These magnets are so arranged that they constantly tend to impel the carbon-moving mechanism in opposite directions, the main-circuit magnet tending to separate the carbons, and the shunt-circuit magnet tending to bring the carbons together, but with an inferior force.

In the drawings, A is a hollow helix or "axial magnet" of high resistance, having its ends connected with the upper and lower carbons, respectively. B is a similar helix, but of comparatively very low resistance, located in the main-line circuit including the carbons. These helices are provided with movable iron cores pivoted to opposite ends of a lever, C, which in turn is pivoted to a fixed support at *a*. D is a lifting and feeding arm, through the agency of which, together with the ring-clamp E, the upper carbon, F, is primarily lifted and afterward allowed to feed. The number of convolutions of the helix B is such that when the arc between the carbons is of normal length, and the helix A consequently excited to its normal strength, the attraction of the former helix for its core shall be just sufficient to sustain the carbon F, notwithstanding the counter attraction of the helix A. Any increase in the length of the arc between the carbons will shunt more current through the helix A, increasing its attraction for its movable core and allowing the clamp E, through the lever D, to ease its grip on the carbon or carbon-holder F, so that the latter moves downward by gravitation. If the arc becomes too short, the magnetism of the helix A is weakened. This is evidently equivalent to an increase of magnetism in the helix B, and the carbon F is raised as at first. Thus it will be seen that, although the magnetism of the helix B may remain perfectly constant, its available carbon lifting and sustaining force varies in an inverse sense with the length of the arc between the carbons through the agency of the variable current hereby produced in the helix A; consequently two or more regulators controlled by this device may be operated in a single electric circuit, each regulator performing its functions independently.

The axial magnets A and B may each consist of a pair of helices with corresponding cores connected together by a heel-piece in the manner customary with double axial magnets. They may also be arranged in various positions and with or without a lever, C, provided always that they tend to actuate the carbon F in opposite directions.

A regulator provided with common magnets—that is, magnets with fixed cores and armatures arranged to approach and recede from the ends of the cores—when combined with the main shunt-circuits in the manner above described is objectionable in practice on account of certain inherent disadvantages from which the solenoid or axial magnets are free.

With the common magnets the available range of motion is very small on account of their rapidly varying attraction for their armatures as the distances of the latter vary. This necessitates powerful magnets and a nice adjustment of armature distances, which adjustment is difficult to maintain.

The evil of the rapidly varying attraction with slight changes of armature distance is aggravated by the circumstance that one armature is farthest from its magnet while the other is nearest, and the contrary when the other limit of motion is reached.

With magnets and armatures arranged with relation to each other so that the moving part or parts may travel through a considerable distance with a substantial uniformity of pulling force, thus acting as in axial magnets, a

comparatively wide range of motion is attainable with very little change of power.

In this application I do not broadly claim the combination, with either of the carbons of an electric lamp, of two electro-magnets irrespective of their type, one being located in the main circuit and the other in a constantly closed shunt-circuit of high resistance, and devices actuated by the electro-magnets for establishing and regulating the arc, as such subject-matter and such others as are not herein claimed are reserved for another application and for a division of this application.

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

1. In an electric lamp, the combination of solenoid or axial magnet helices or equivalent magnets, one helix located in the main circuit and the other helix located in a constantly closed shunt-circuit of comparatively high resistance, with the feeding-carbon of an electric lamp, and devices operated by the simultaneous coaction of said magnet-helices to move the feeding-carbon to establish the arc and regulate the length of the arc, substantially as set forth.

2. In an electric lamp, the combination, with the feeding-carbon, of solenoid or axial magnet helices or equivalent magnets, one helix located in the main circuit and the other helix located in a constantly closed shunt-circuit of comparatively high resistance, and devices operated by the simultaneous coaction of said magnet-helices to move the feeding-carbon to establish the arc, regulate the length of the arc, and feed of the carbon, substantially as set forth.

3. In an electric lamp, the combination, with the feeding-carbon, of solenoid or axial magnet helices or equivalent magnets, one helix located in the main circuit and the other helix located in a constantly closed shunt-circuit of comparatively high resistance, and devices actuated by the simultaneous coaction of said magnet-helices and adapted to grip and move the carbon-holder of the feeding-carbon to establish the arc and regulate the length of the arc, substantially as set forth.

4. In an electric lamp, the combination, with the feeding-carbon, of solenoid or axial magnet helices or equivalent magnets, one helix located in the main circuit and the other helix located in a constantly closed shunt-circuit of comparatively high resistance, and devices actuated by the simultaneous coaction of said magnet-helices and adapted to grip and move the carbon-holder of the feeding-carbon to establish the arc, regulate the length of the arc, and feed of the carbon, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. BRUSH.

Witnesses:

LEVERETT L. LEGGETT,

JNO. CROWELL, JR.