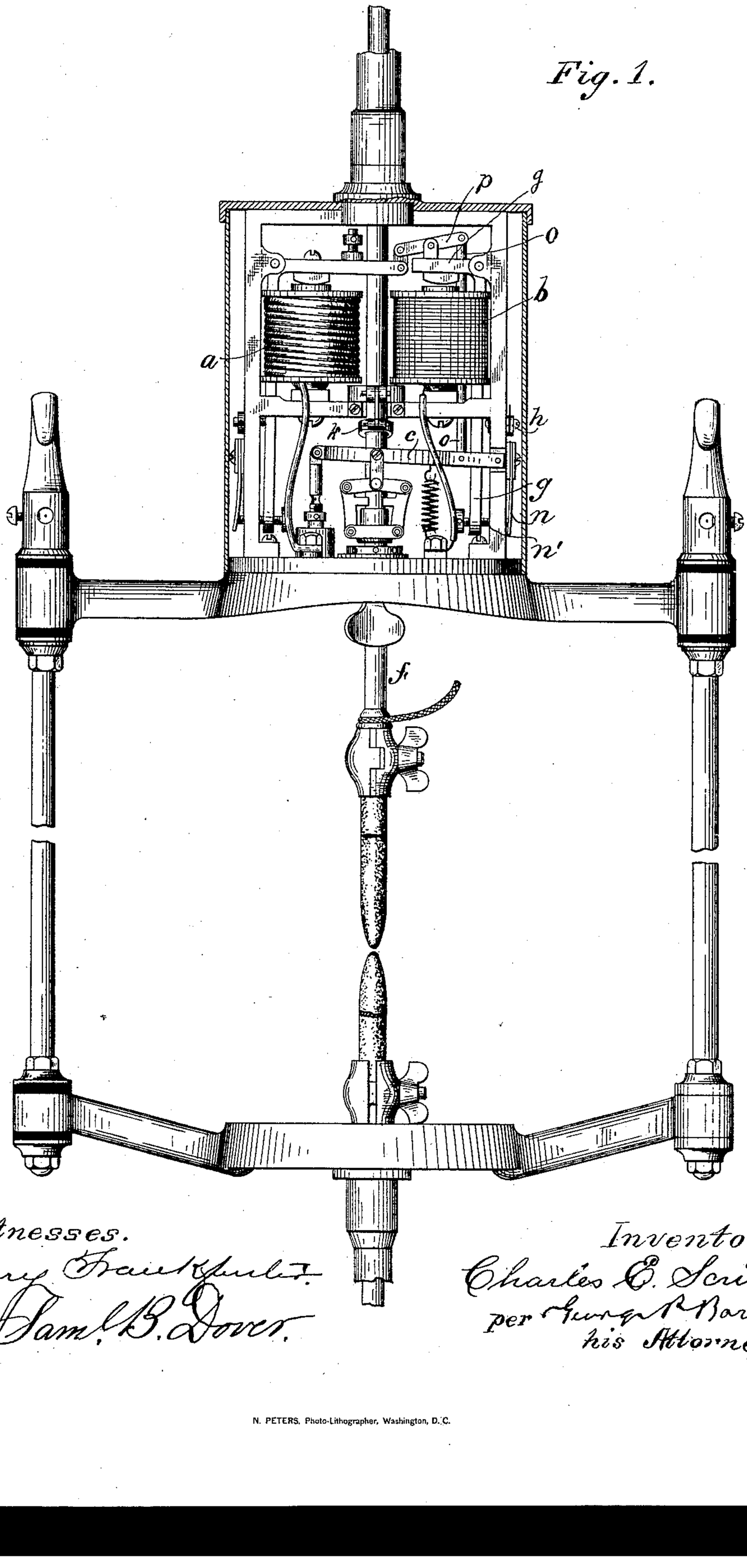
(No Model.) 3 Sheets—Sheet 1.

C. E. SCRIBNER.

ARC LAMP.

No. 415,572. Patented Nov. 19, 1889.

Fig. 1.



Witnesses.
Henry Brandenburg.
Sam'l B. Dover.

Inventor.
Charles E. Scribner
per George B. Barton
his Attorney

(No Model.) 3 Sheets—Sheet 2.

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ARC LAMP.

No. 415,572. Patented Nov. 19, 1889.

Fig. 2.

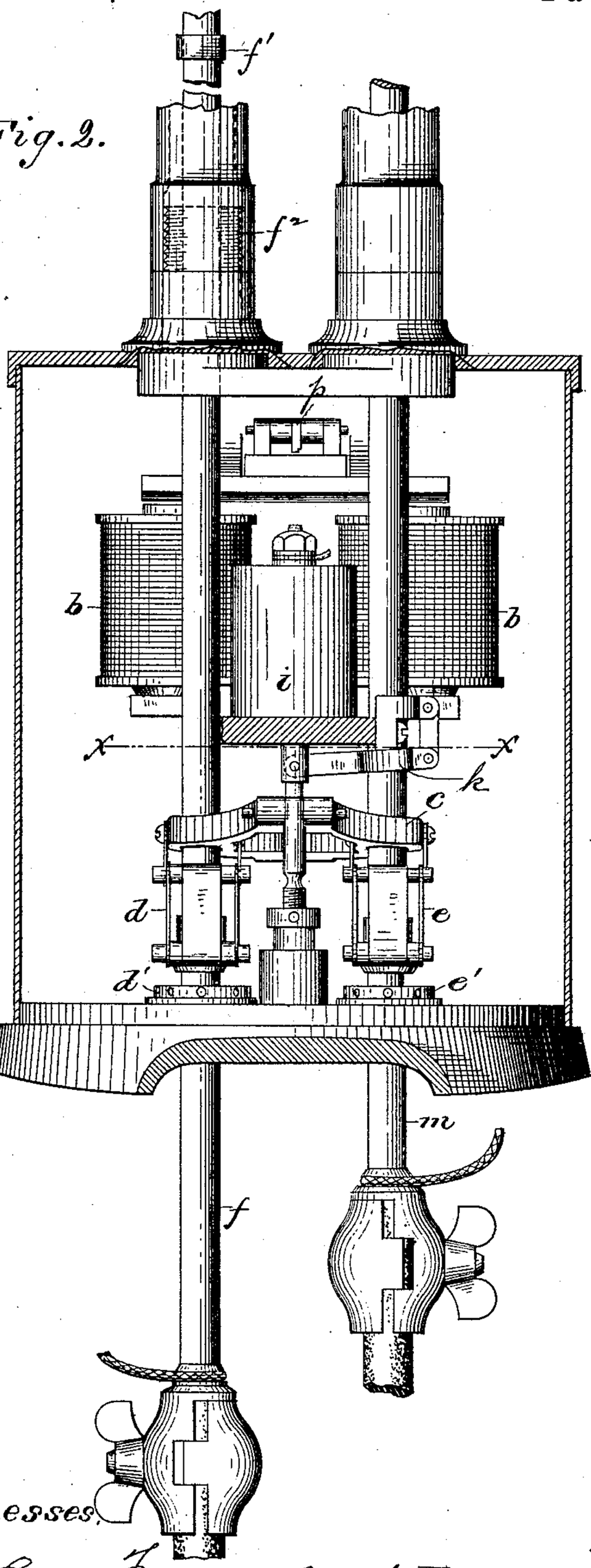
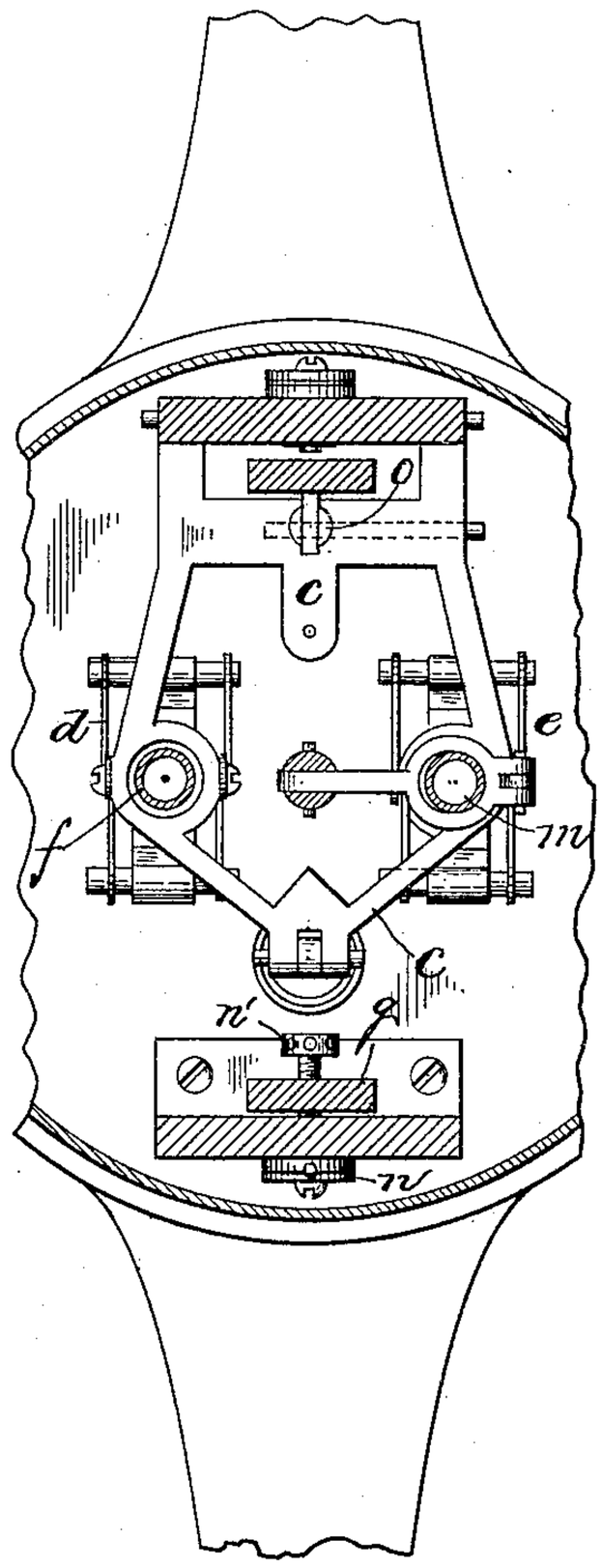


Fig. 3.



Witnesses:
Henry Paul Fowler.
Sam'l B. Dover.

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per. Geo. P. Barton
his Attorney.

(No Model.) 3 Sheets—Sheet 3.

C. E. SCRIBNER.

ARC LAMP.

No. 415,572. Patented Nov. 19, 1889.

Fig. 4.

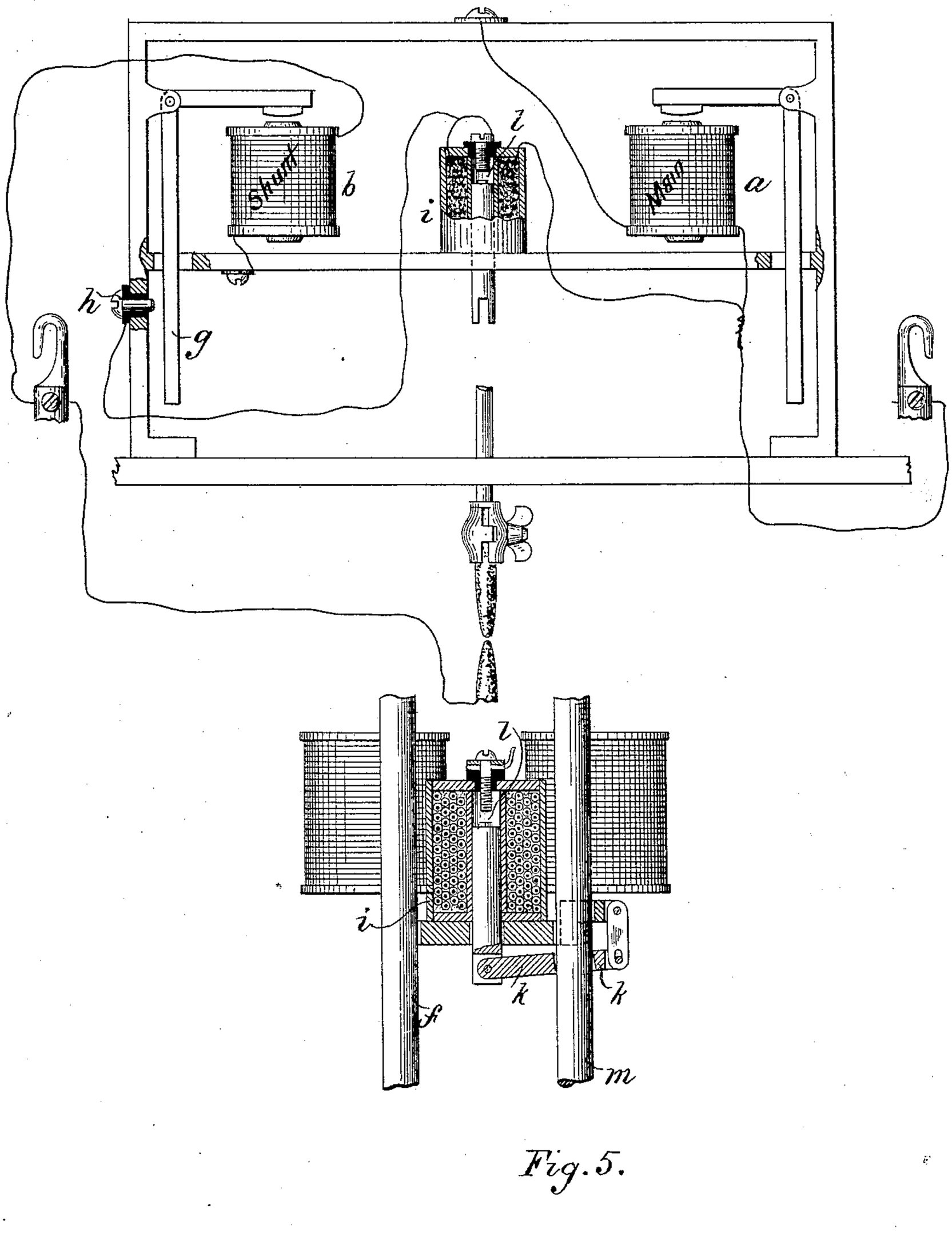

Fig. 5.

Witnesses.
Henry Frankfurter.
Sam'l B. Dover.

Inventor.
Charles E. Scribner
per. George P. Barton
his Attorney

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 415,572, dated November 19, 1889.

Application filed December 22, 1884. Serial No. 151,004. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Double-Carbon Arc Lamps, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric-arc lamps; and it consists in the combination of mechanism whereby two sets of carbons may be used in the same lamp.

In my application, Serial No. 116,102, for electric lamps filed December 31, 1883, I have described and claimed certain regulating mechanism for single-carbon electric lamps. In the lamp herein described I make use of similar regulating mechanism modified so as to be adapted to double-carbon electric lamps. The second carbon-rod is held up by an annular clutch while the first carbon is burning. The first carbon-rod is finally arrested in its descent, and the arc of its carbon increases until the magnet in the shunt of the arc draws its armature to a contact-point connected through a solenoid or electro-magnet, which operates the annular clutch which sustains the second carbon-rod. The second carbon-rod is thus released and falls, shunting out the arc of the first set of carbons and the fine-wire electro-magnet. The fine-wire electro-magnet is thus de-energized, and the spring opposing the attraction of its armature by pressure upon its armature-lever thereupon operates to separate the second set of carbons and establish the arc. Before the first arc is established the rod of the second set of carbons is raised and clamped by the annular clutch, in which position it is held until the first rod is arrested in its descent. The first rod, after the arc of its carbon is established, continues to descend until finally, while the arc continues to burn, it is arrested by a stop. When, therefore, the current is cut off and the first arc goes out, the first set of carbons will remain separated. The feeding-clutches of the two rods are not both actively in use at the same time. They are, however, attached to the same support or lever and work uniformly.

In the drawings, Figure 1 is a front elevation of a portion of an electric-arc lamp embodying my improvements. Fig. 2 is a side elevation of the regulating and transfer mechanism of the same, certain parts being broken away. Fig. 3 is a plan view as seen from section-line $x\ x$ of Fig. 2. Fig. 4 is a diagram illustrative of the circuits. Fig. 5 is a detailed view of the annular clutch which sustains the second carbon-rod until the first carbon-rod is finally arrested in its descent.

Like parts are indicated by similar letters of reference throughout the different figures.

The lifting-magnet a, of coarse wire, is included in the main circuit, and the feeding-magnet b, of fine wire, in a shunt of the arc in the usual manner. The lever c carries two clutches $d\ e$, of well-known construction.

The first carbon-rod f is first fed by mechanism operating in the usual manner until the rod is arrested in its descent by the collar f' coming against stop f^2, as shown in Fig. 2. The arc then continues to increase in length, and consequently in resistance, until sufficient current is sent through magnet b to move armature-lever g into contact with contact-point h, closing the circuit of retaining electro-magnet or solenoid i. This armature-lever g, I have shown in the form of a bell-crank, with connecting-levers p and q, whereby motion of the lever g is communicated to the lever c, upon which the clutches are mounted. This feeding-lever mechanism, it will be seen, is operated gradually as the arc increases in length. This mechanism is so adjusted that the clutches are opened to cause the rods to feed at the proper moment. The feeding-lever mechanism, in addition to operating the clutches, acts as a switch to close the circuit of the retaining-magnet for the purpose of shifting the arc from the first set of carbons to the second set of carbons. The annular clutch k is thus lifted and the circuit is closed at a point l, thus holding said annular clutch up out of engagement with the second rod m during the remainder of the time that the lamp is burning. The rod m, being thus released, descends until the second

set of carbons are brought together. The arc of the first set of carbons is thus shunted and goes out, and the strength of the current through the electro-magnet *b* is so weakened that the armature-lever *g* is carried away from the poles of said magnet by the force of spring *n*, which presses against the adjustable screw *n'*, passing through the lower part of the bell-crank or armature-lever *g*. The link or rod *o*, attached to lever *p* and lever *c*, is thus carried up, and with it the lever *c* and clutch *e*. The second set of carbons are thus separated and the arc established.

When the clutch *d* of carbon-rod *f* comes against its opposing stop and opens, permitting said rod *f* to descend, the other rod *m* is held suspended by the annular clutch *k*. On the other hand, when the rod *m* is released by its clutch *e*, the first rod *f* is held suspended by the stop *f'*. It will thus be seen that the weight of only one rod and its carbon bears upon the lever *c* at the moment of feeding as long as the lamp continues to burn.

The clutches *d* and *e* come against their opposing stops *d' e'* simultaneously, and they are opened simultaneously. The moment of feed with relation to the length of arc is therefore the same, no matter which rod is feeding—that is to say, while the first set of carbons is burning the first rod feeds at the moment the arc becomes of a given length, and while the second set of carbons is burning the second rod feeds when the arc is of the length of the arc of the first set at the moment of feeding. The arc of the lamp is thus maintained at a uniform length, no matter which set of carbons may be burning.

I claim—

1. The combination, in a double-carbon electric-arc lamp, of a solenoid or electro-magnet and its armature, a clutch controlled by said armature, a rod supported by said clutch, and a contact-point *l*, whereby the circuit may be closed and maintained through the said electro-magnet or solenoid and the clutch held out of engagement with its rod, substantially as and for the purpose specified.

2. The combination, with a solenoid or electro-magnet and its armature, of the clutch and one of the two rods of the lamp, the circuit, contact-point *h*, and the feeding mechanism, whereby the said circuit is closed through said contact-point *h* and the solenoid or electro-magnet, substantially as and for the purpose specified.

3. The combination, with a solenoid or electro-magnet and its armature, of the clutch and one of the two rods of the lamp, which is adapted to be sustained by the said clutch, circuits through the said solenoid, two switching devices connected with said circuits to close the circuit of the said solenoid, one of the switches being controlled by the feeding mechanism of the lamp and the other being controlled by the solenoid-armature, whereby the circuit of said solenoid may be closed to release the carbon-rod and its armature held suspended during the operation of the lamp.

4. The combination, with the two sets of carbons and the carbon-rods, of the retaining-magnet, which is connected with the clutch which normally supports the rod of the second set of carbons, a circuit through said retaining-magnet, with contacts adapted to be closed by the feeding mechanism of the lamp, whereby the clutch may be lifted by the retaining-magnet and the second carbon-rod set free and the clutch retained during the operation of the lamp.

In witness whereof I hereunto subscribe my name this 26th day of November, A. D. 1884.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,

HARRISON P. NICHOLS.