

(No Model.)

W. S. HILL.
ELECTRIC LAMP.

No. 351,601.

Patented Oct. 26, 1886.

Fig. 1.

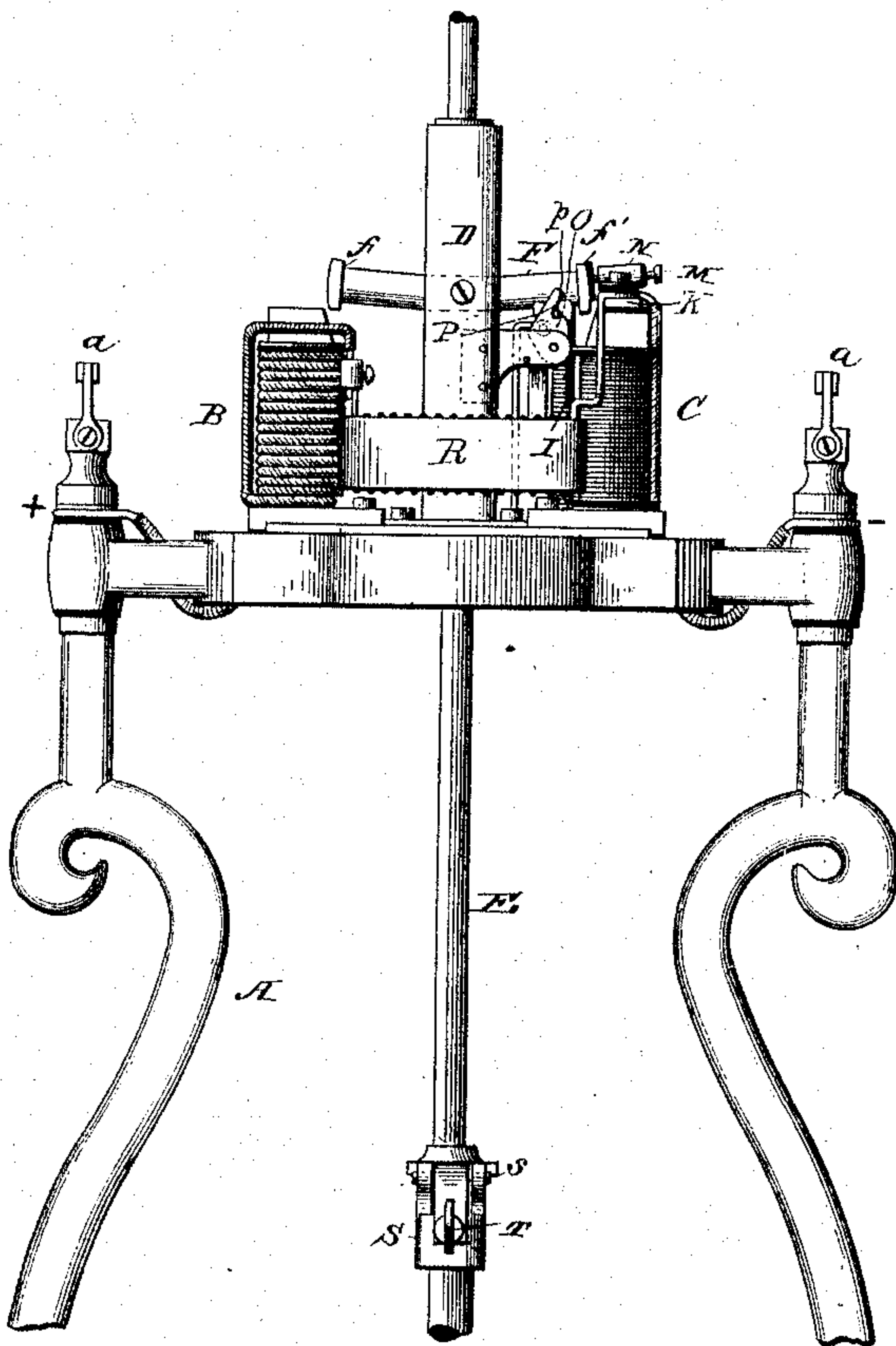


Fig. 2.

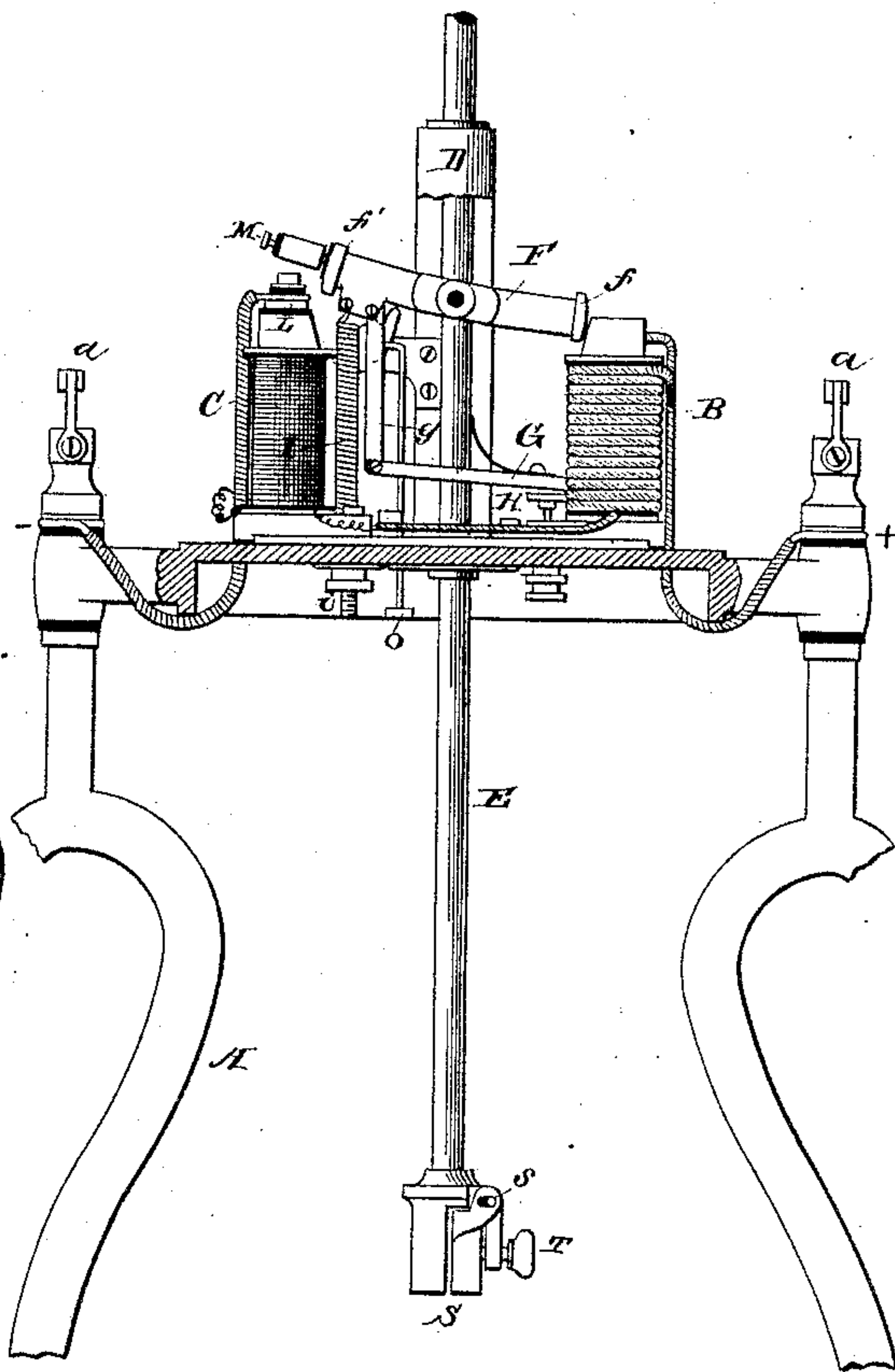


Fig. 4.

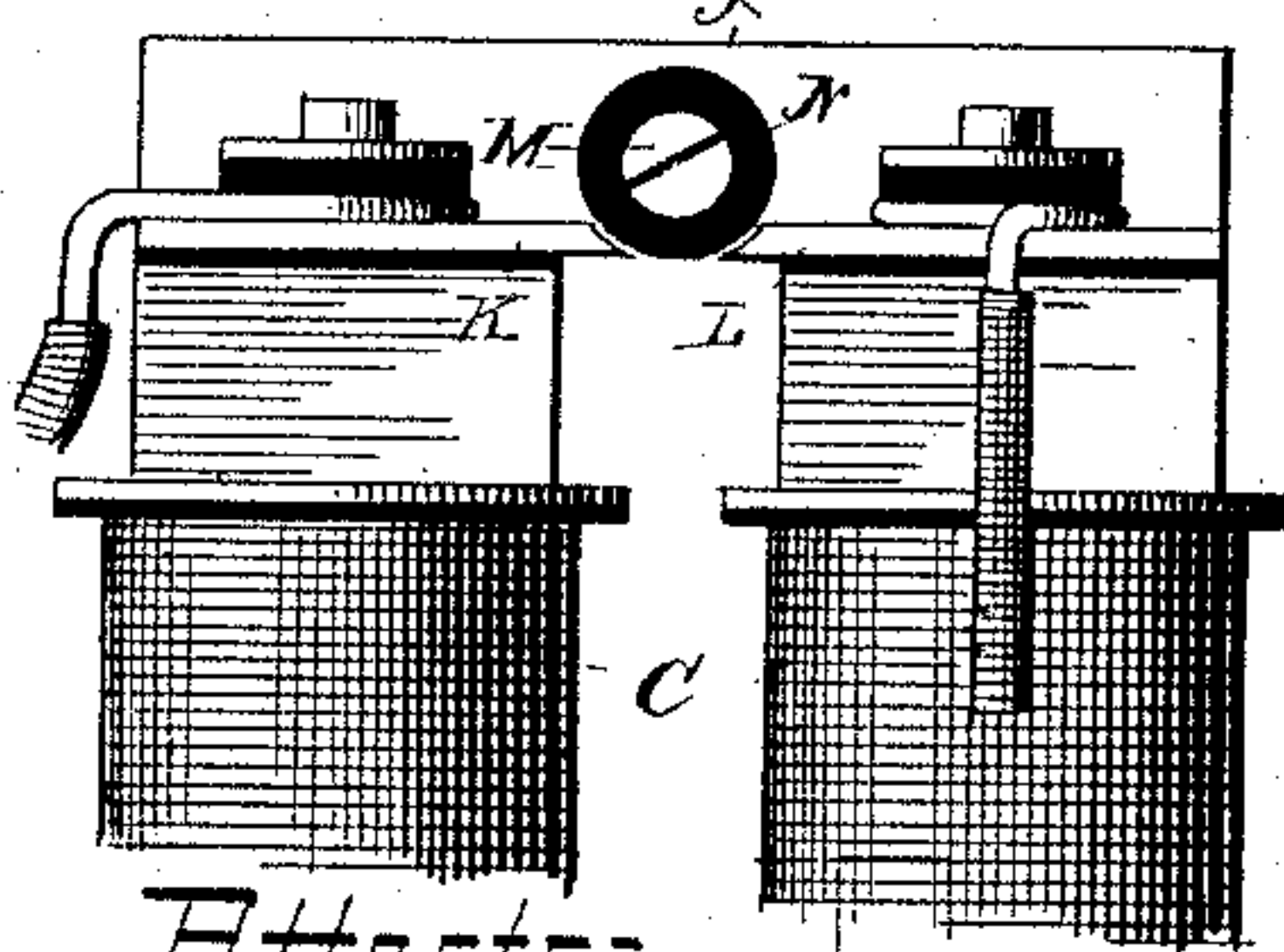
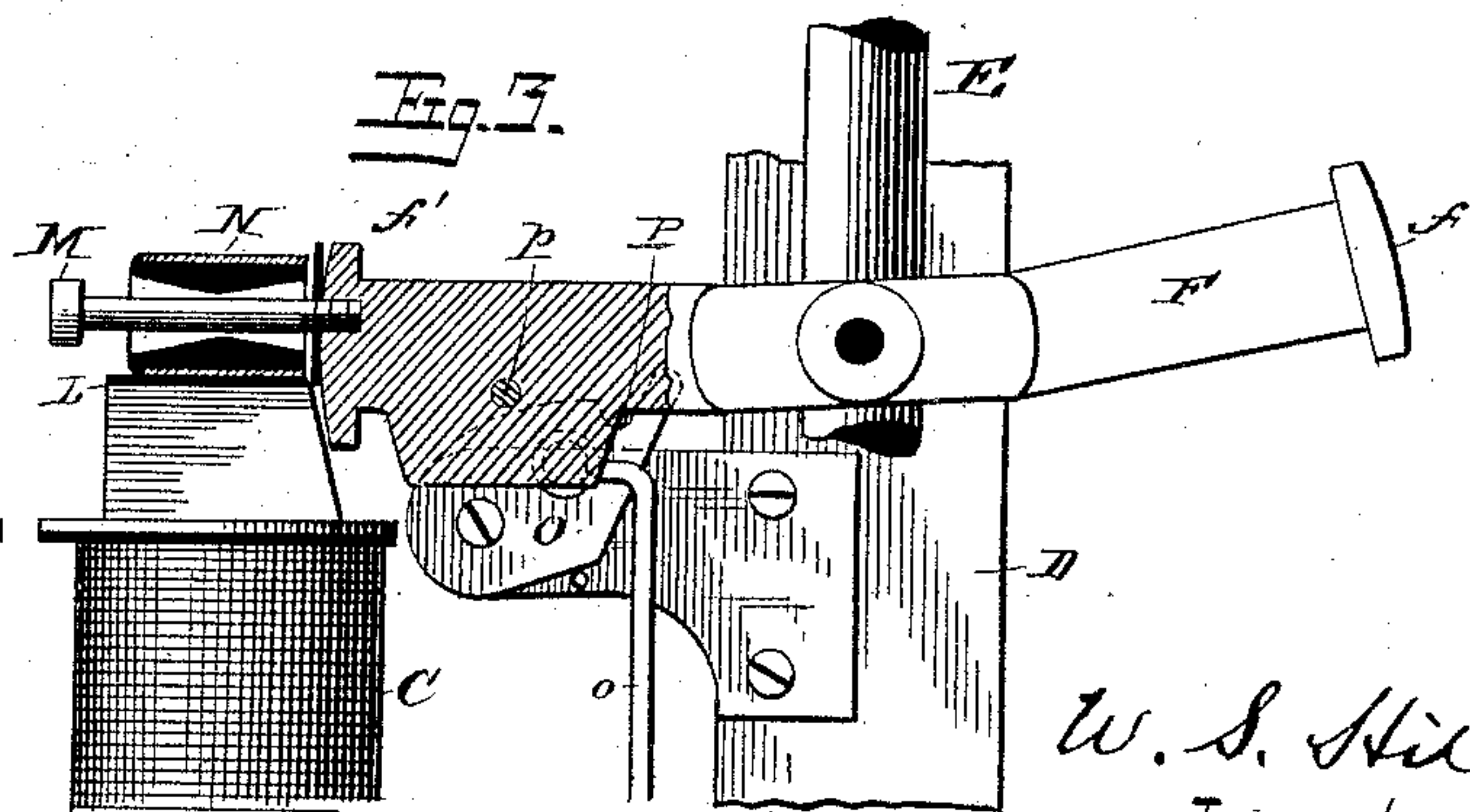


Fig. 3.



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UNITED STATES PATENT OFFICE.

WARREN S. HILL, OF BOSTON, MASSACHUSETTS.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 351,601, dated October 26, 1886.

Application filed March 11, 1886. Serial No. 194,868. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. HILL, a citizen of the United States, and a resident of Boston, Suffolk county, Massachusetts, have
5 invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

My invention relates to electric-arc lamps, and more particularly to that class of lamps in
10 which the separation of the carbon electrodes to form the arc and the feed of the carbons to regulate the arc are accomplished by means of electro-magnets operating in connection with suitable clutch mechanism.

15 The objects of my invention are to improve and simplify the construction of such lamps, and more especially to render their operation more steady; to produce a practical balance of the mechanism when the lamp is operating;
20 to dispense with dash-pots, clock-work, gearing, or other similar devices generally used; to provide a simple and effective cut-out; to provide a setting device whereby the lamp may be more surely, speedily, and easily lighted;
25 to provide simple and effective means for holding the carbons in position, and generally to produce an extremely sensitive mechanism for operating the lamp that will produce a steady and uniform light. I accomplish these objects
30 by the devices hereinafter described; and my invention consists in the construction and various combinations of such devices or their equivalents, for the purposes and in the manner substantially as hereinafter stated.

35 In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a lamp embodying my improvements. Fig. 2 is a similar view of the other side of the lamp, partially in section. Fig. 3 is an enlarged view of a portion of the operating mechanism.

40 The frame A of the lamp may be of any proper and desirable form and construction, and the conductors + and — are connected therewith in any ordinary manner, being shown in connection with the hooks or hangers a for supporting the lamp, so that connection is made with terminals of the circuit by simply hanging the lamp upon suitable connections
50 attached thereto.

Mounted upon the frame A and connected

in the circuit are the main and shunt magnets B C, of any desired shape, but preferably in the form of horseshoe-magnets with the poles extending upward.

55 Extending upward from the frame between the magnets is an arch, frame, or bridge piece, D, which forms a guide for the upper carbon rod or support E, and also forms a support to which the armature-lever F is pivotally at-
60 tached, the said lever being provided with an opening, through which the carbon-holder E can freely pass. This lever F is provided with suitable projections, *f f'*, at each end, which form armatures for the main and shunt mag-
65 nets, and these projections or extensions may be of any form or arrangement to co-operate with their magnets.

A clutch mechanism (shown as the well-known ring-clutch G) surrounds the carbon-
70 holder E, and is connected to the armature-lever, as by means of a link, *g*; and an adjustable stop or screw, H, regulates the movement of the clutch-lever in a well-known way.

75 It is well known that one of the chief requisites of a lamp of this character is to have the movement of the clutch and carbon-holder regular and steady, and at the same time sensitive to very slight changes in the resistance of the arc and the strength of the current flowing
80 through the main-line and shunt magnets, and while some attempts have been made to accomplish this result it has been common to employ dash-pots, clock-work, or other mechanism or appliances to prevent too rapid and frequent
85 changes in the feeding apparatus. These appliances are more or less objectionable and expensive, and I have dispensed with the use of any and all of them, and have produced a
90 practical balance in the armature-lever controlling the clutch when the lamp is in operation, and from this it follows that very slight changes in resistance or strength of current will vary the condition of the feed mechanism, and that, too, without the objectionable jumps
95 or flickering often found in this class of lamps. To produce this balance of the armature it is so arranged in connection with the main and shunt magnets that when the proper amount
100 of current is flowing the attraction of the main-line magnet B for the armature *f* shall be exactly balanced by opposing forces operating

upon the other limb of the armature-lever, and these forces are the attraction of the shunt-magnet C for its armature f' , which should be very slight to obtain the best results from the current in the line, the weight of the clutch G and carbon-holder E, sustained thereby, and to these I have added a spring, I, which is provided with means for adjustment, as the thumb-nut i . With these devices and this arrangement it will be seen that the clutch can be maintained in its proper position to hold the carbon-carrier and establish the arc and be practically balanced, so that a very slight change in the condition of the arc will cause the clutch to release its grip slightly upon the carbon-holder and allow it to feed the carbons, and, on the other hand, a very slight decrease of the resistance will cause the carbon to be raised. I have found this simple arrangement to be very delicate and effective, the forces in the operative condition of the lamp forming a practical balance.

In case of any practical derangement of the lamp or other disturbance, it is desirable to have some means of quickly and effectually short circuiting the lamp and cutting it out of the main-line circuit, and I have arranged upon the shunt-magnet C two plates, K L, properly connected with the main line and separated from each other, so that no current can pass. The adjacent ends of these plates K L are preferably curved, as shown in Fig. 4. I attach to the armature f' some sort of a device for connecting these plates or terminals when through any reason the forces opposed to the main-line magnet get abnormally strong, and I have shown a projecting pin, M, secured to the armature and carrying a sleeve, N, insulated therefrom. In order to give a sure and perfect bearing between this sleeve and the terminals, I arrange the same loosely on the pin and form the insulating material of such shape, as shown in Fig. 3, as to allow the sleeve to fit the terminals accurately when the cut-out is operative.

It is evident that instead of the exact construction shown the projecting pin can be insulated from the armature-lever, or other arrangements may be made without departing from my invention, one of the essential features of which is, that the connecting part or sleeve shall have free play upon its support to produce good contact or bearing with the cut-out terminals.

One of the most serious objections to automatic cut-outs is found in practice to be due to the fact that they do not always "pick up" or break contact when the lamp is started. If all the lamps are on the cut-out, on starting the generating-machine there is a practical short circuit around all the lamps, and there are difficulties in getting the machine and lamps into operation. To overcome this objection, I provide means whereby the lamp may be set on open circuit, as when it is trimmed, and as soon as it is once started the setting device is automatically put out of operative condition, and

leaves the lamp ready to operate or be cut out if any abnormal condition occurs. This setting mechanism may be variously constructed, that shown being very simple and effective, and consisting of a pivoted plate, O, having a notch or recess, P, formed in one side and adapted to engage a pin, p , on the armature-lever. A handle or rod, o , may be attached to said catch and extend down to a convenient position to be operated by the attendant, and when the lamp is set the arrangement of the parts is such that the cut-out is out of operative position, while the carbons are in proper position to allow the passage of the current to establish the arc, and as soon as this occurs the armature-lever is raised and the catch drops down into the position shown in Fig. 3, Fig. 1 showing it in operative position.

I have shown a resistance-coil, R, located in the cut-out circuit, which may be used or not to aid in starting the lamp; but I prefer to dispense with it in using my arrangement above described.

It is often difficult to secure the carbons properly in the holders, owing to their varying size, and it is desirable to have the clamp embrace and bear upon all parts of the carbon evenly in the clamp, and to accomplish this I have formed the clamp S as shown in the drawings, making it of two parts, one of which is rigidly secured to the carbon-holder, and the other is pivotally supported thereon, the pivot-opening s being elongated, so as to allow the screw T to confine the carbon between the jaws and still maintain them parallel under all conditions.

Having thus described my improvements, their operation when embodied in a lamp will be clearly understood by those skilled in the art, and while they are of such a nature that they can be embodied in a single lamp they may also be modified in form and arrangement and be used separately or in combination with other devices without departing from my invention.

What I claim is—

1. In an electric-arc lamp, the combination, with the main and shunt magnets and cut-out terminals, of an armature-lever pivoted between said magnets, supporting the clutch and carrying a connecting-piece for the cut-out, and an adjustable device connected to said armature, whereby a practical balance of forces is obtained upon the armature when the lamp is in operative condition, and when the balance is disturbed the cut-out is operated, substantially as described.

2. In an electric-arc lamp, the combination, with the main and shunt magnets and the cut-out terminals, of a pivoted lever forming or carrying armatures for said magnets, and a connecting-piece for the cut-out, the clutch connected to said armature, and an adjustable spring acting in conjunction with the weight of the clutch, substantially as described.

3. In an electric-arc lamp, the combination,

with the main and shunt magnets, of an armature-lever, cut-out terminals arranged upon the shunt-magnet, and a connecting-piece for the cut-out terminals carried by said armature-lever, substantially as described.

4. The combination, with the cut-out terminals, of a connecting-sleeve insulated from its support and loosely connected therewith, whereby a good bearing is obtained between the terminals and the sleeve, substantially as described.

5. The combination, with the main and shunt magnets and armature-lever, of cut-out terminals arranged upon the shunt-magnet, and a connecting device attached to the end of the lever and adapted to engage the terminals, substantially as described.

6. The combination, with the main and shunt magnets and armature-lever, of cut-out terminals arranged upon the shunt-magnet, a connecting device attached to the end of the lever, and a spring to operate said lever, substantially as described.

7. In an electric-arc lamp, the combination, with the magnets and armature-lever, of the cut-out terminals and connector, and a catch to hold said connector away from said cut-out terminals, substantially as described.

8. In an electric-arc lamp, a carbon-holder having a clamp consisting of a rigid part and a movable part having parallel bearing-surfaces, the movable part being provided with an elongated pivot-slot, and a rigid arm projecting over the movable part and carrying a clamp-screw, whereby the carbon may be secured between the parallel bearing-surfaces of the clamp, substantially as described.

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

WARREN S. HILL.

Witnesses:

E. F. ENDICOTT,
HENRY R. GARDNER.