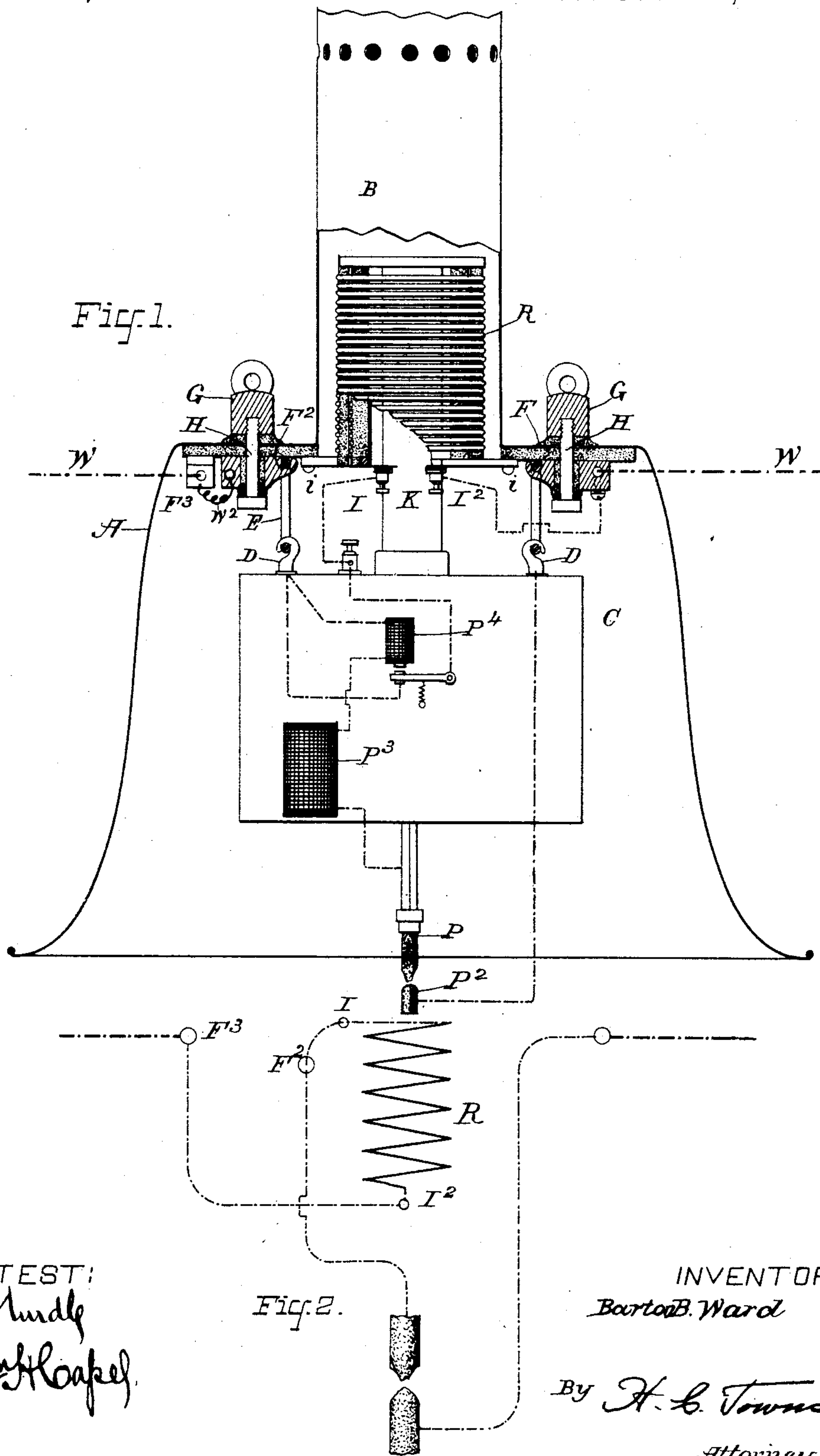


B. B. WARD.  
ELECTRIC ARC LAMP.

No. 444,473.

Patented Jan. 13, 1891.



ATTEST:

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*John H. Cooper*

INVENTOR:

*Barton B. Ward*

By *H. L. Townsend*  
Attorney

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Fig. 3.

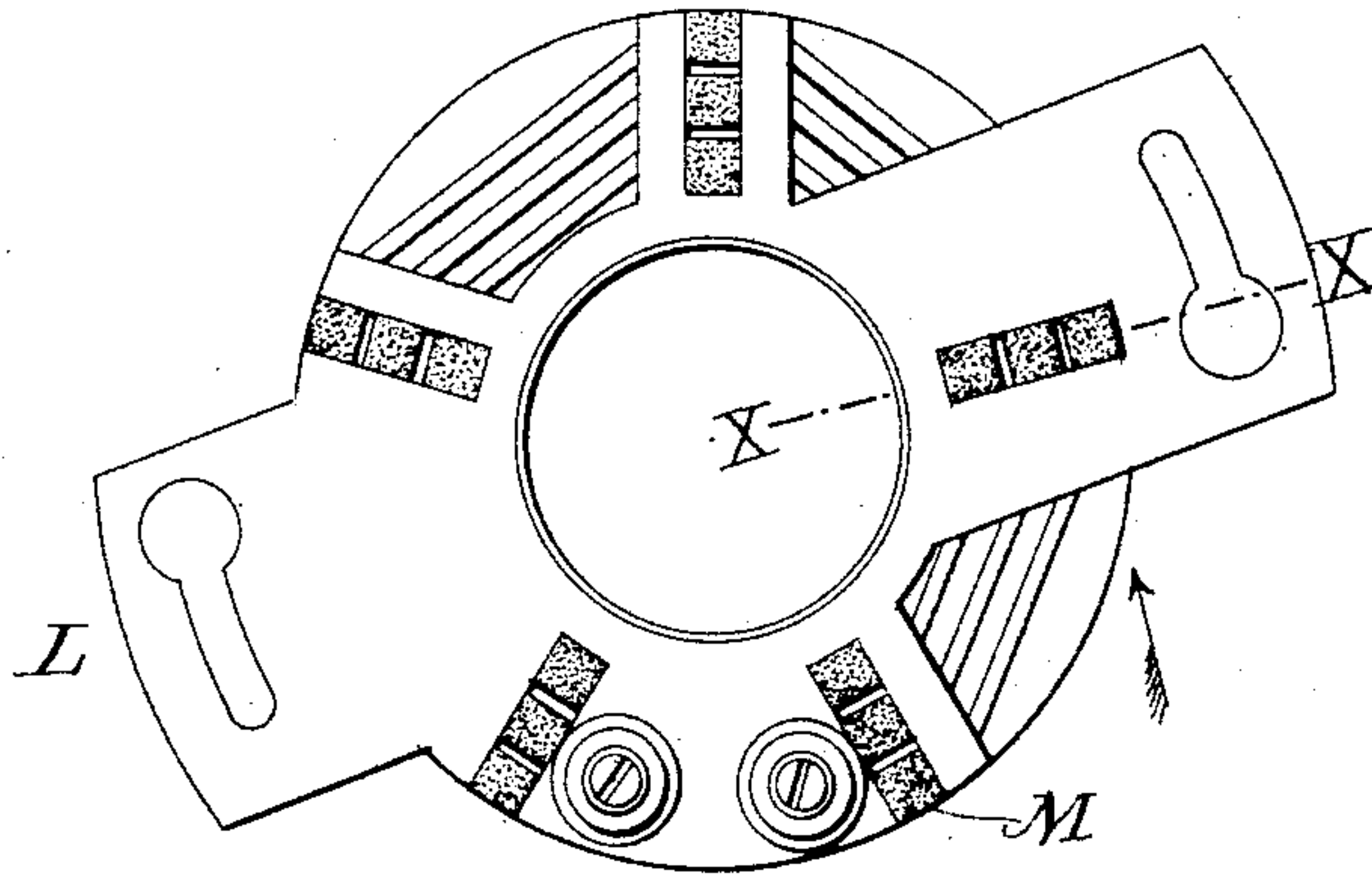


Fig. 4.

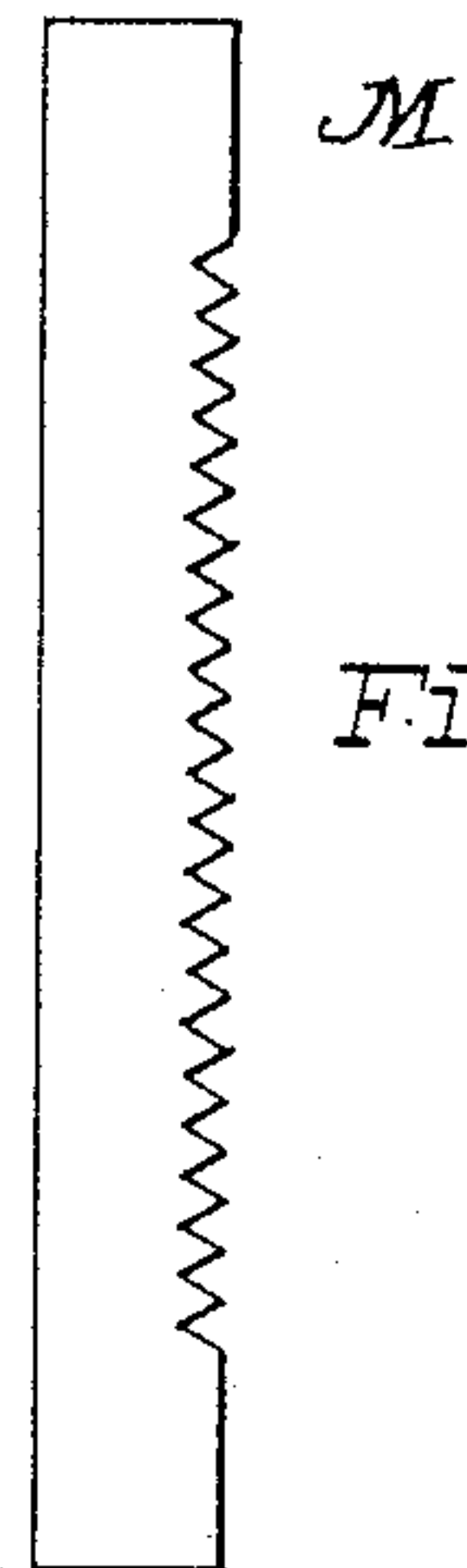
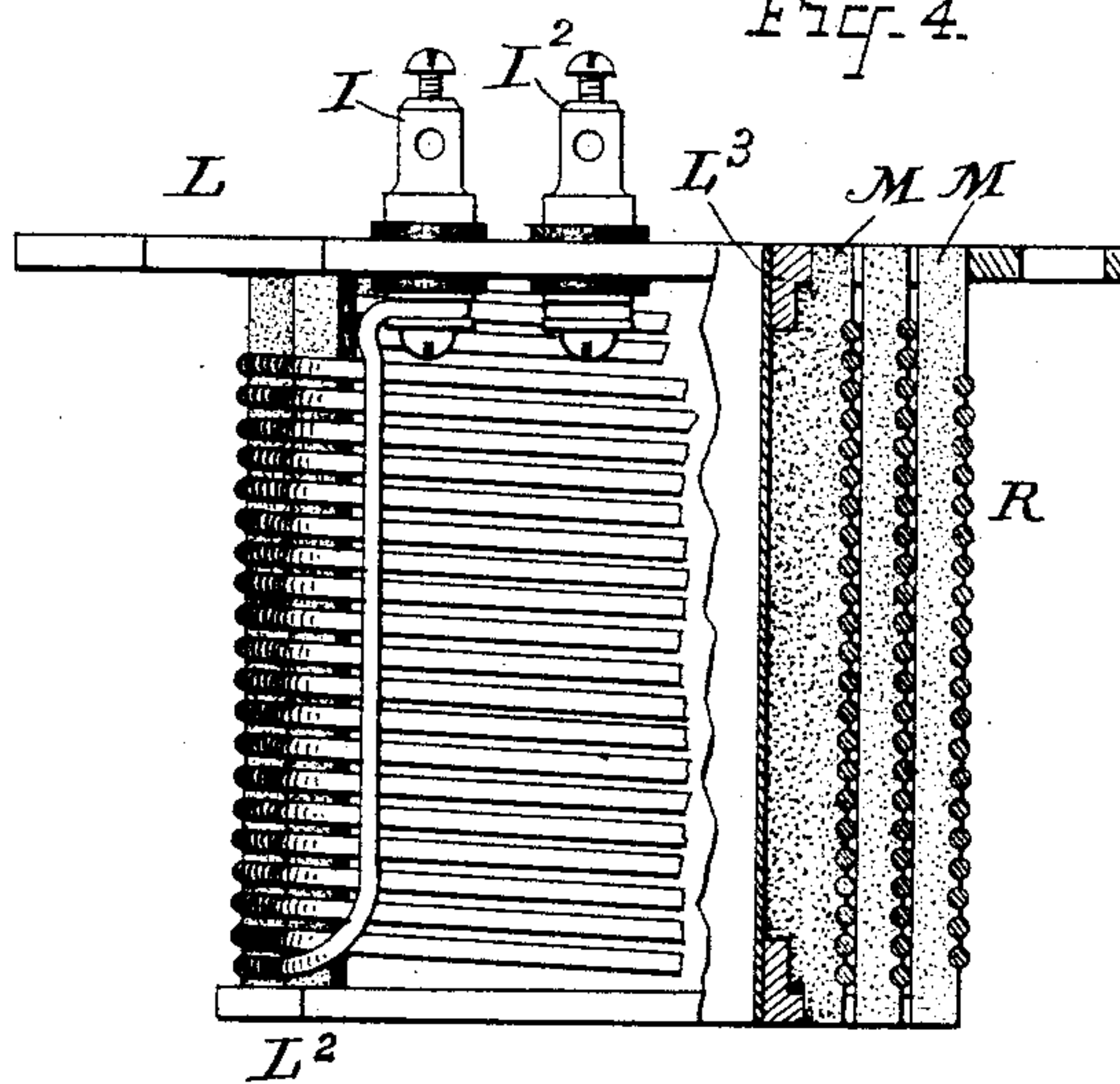


Fig. 5.

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# UNITED STATES PATENT OFFICE.

BARTON B. WARD, OF NEW YORK, N. Y., ASSIGNOR TO THE ELECTRIC CONSTRUCTION AND SUPPLY COMPANY, OF SAME PLACE.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 444,473, dated January 13, 1891.

Application filed April 11, 1890. Serial No. 347,520. (No model.)

*To all whom it may concern:*

Be it known that I, BARTON B. WARD, a citizen of the Dominion of Canada, and a resident of New York, in the county of New York and State of New York, have invented a certain new and useful Electric-Arc Lamp, of which the following is a specification.

My invention relates to the manner of disposing the artificial resistance used in connection with electric-arc lamps, either in circuit with the carbons or in a shunt around them.

The object of my invention is to secure compactness, accessibility, and facility of handling the lamp, as well as to permit the electric resistance to be readily connected up to the lamp-circuits, either in series with the carbon or into the branch circuit of a cut-out device.

My invention relates, further, to the special construction of the resistance and its frame, with the purpose of adapting it to its peculiar location and manner of support and of securing thorough ventilation or exposure of the resistance-wire to cooling-currents of air.

My invention consists in the combination, with an electric-arc lamp, of a lamp-hood, a chimney for the arc lamp, and an artificial resistance-frame mounted in the chimney of the hood independently of the lamp and provided with a vertical passage or opening to receive the lamp-chimney.

My invention consists, further, in the combination, with an electric-arc lamp, of the lamp-hood provided with devices for sustaining an arc lamp within it, with the chimney of the lamp extending up within the chimney of the hood, and an electric resistance-frame mounted in the chimney for the hood and having its resistance-wire connected to terminal binding-posts accessible within the lamp-hood.

My invention consists, also, in constructing the frame from a suitable supporting cage or frame having radial slots in its opposite heads, within which are supported and retained insulating bars or rods extending from one head to the other, and superposed upon one another in the slots, such insulating bars or rods having the resistance-wire wound over them and between them, as will hereinafter appear.

My invention consists also in the special de-

tails of construction and combinations of parts, hereinafter more particularly described, and then specified in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a lamp-hood and resistance-frame mounted in the hood and constructed in accordance with my invention, the parts being shown in vertical section. Fig. 2 illustrates a variation in the manner of connecting the resistance to the lamp-circuits. Fig. 3 is a plan of the resistance-frame inverted. Fig. 4 is a side elevation and partial vertical section of such frame. Fig. 5 represents one of the insulating bars or blocks over which the resistance-wire is wound.

A indicates a hood of any ordinary shape, adapted to protect an outdoor electric-arc lamp, and having the usual chimney B.

C indicates in outline the case of an electric-arc lamp, and D D hooks, which may also form electric terminals of the lamp and are adapted to suspend the lamp from hangers E E. These hangers may be in electrical connection with binding posts or blocks F F<sup>2</sup>, supported by the head of the hood but insulated therefrom as indicated. They may be held in place by means of bolts H, which pass up through the heads, and are provided with nuts G, that may have eyes or hooks for suspending the hood. The bolts H have bushings of insulating material, as indicated. The blocks or posts F F<sup>2</sup>, of conducting material, are properly connected with the line-wires W W. Block F may have one wire fastened directly to it while the other block F<sup>2</sup> may be connected by a short wire W<sup>2</sup>, the terminals of which are fastened, respectively, to block F<sup>2</sup> and to a third post or block F<sup>3</sup>, sustained in the head of the hood and having the other line-wire connected directly to it.

The carbons of the electric-arc lamp are indicated at P P<sup>2</sup>, while one of the lamp-magnets is indicated at P<sup>3</sup>, and in Fig. 1 a cut-out magnet is also indicated at P<sup>4</sup>. This cut-out magnet is placed in the circuit to the carbons and normally holds open a cut-out switch; but when the circuit is interrupted it releases its armature and closes the cut-out circuit.

R is an artificial electric resistance mounted on a suitable frame and sustained within the



chimney of the hood, as indicated. This resistance frame or support is provided with a vertical central passage adapted to receive the chimney K of the lamp when the lamp is sustained within the hood in the ordinary or any suitable manner. The means for sustaining such resistance-frame may be varied at pleasure. The particular devices for this purpose form no part of my invention.

The chimney D is provided at or near its top with a number of openings, as shown, through which the air heated by contact with the resistance-coils may escape. It will be seen that by this arrangement a circulation of cooling-currents of air is provided for up through the chimney and out of the top thereof, such current coming into contact with the resistance-wires, and thereby keeping their temperature down should it tend to become excessive.

The terminals of the electric-resistance wire are connected to binding-posts I I<sup>2</sup>, sustained on the resistance-frame or some part independent of the lamp. In the arrangement of the apparatus shown one of such posts I<sup>2</sup> connects to the block F, while the other is connected by a flexible wire with a post on the lamp which connects with the cut-out circuit in the lamp. By this arrangement the resistance R will be in the cut-out circuit when the cut-out magnet P<sup>1</sup> lets its armature drop to make connection with the stop that is connected to the hook B and hanger E, sustained from the post or block F<sup>2</sup>. The armature-lever for P<sup>1</sup> being connected with the post that is joined to wire I, the cut-out circuit will be formed in obvious manner.

The construction of the resistance-frame whereby a suitable ventilation is provided and whereby the central passage is readily provided for the chimney K is shown more clearly in Figs. 3, 4, and 5.

The supporting-frame or carrier on which the resistance-wire *r* is wound is made as follows: L L<sup>2</sup> are heads of a supporting-frame connected by a central tube L<sup>3</sup>, joined to the heads in any proper manner. In the heads L L<sup>2</sup> are radial slots or openings adapted to receive bars M, which may be of any suitable width or thickness in a radial direction, and which are superposed upon one another in the slots, as indicated. These bars or blocks are of insulating material, such as porcelain, lava, asbestos, or other suitable material, and are provided at their outer edges with notches or guides adapted to receive the resistance-wire. The inner one of the bars in each slot is provided, as shown in Fig. 4, with rabbets adapted to engage with rabbets or shoulders formed on the heads, so that it cannot slip out of place endwise. In building up the resistance the several bars or rods nearest the center of the heads are put in place and wire is wound around and over the same in the grooves until the grooves are filled, after which another set of bars is put in place over the first and the winding con-

tinued, the operation being repeated a number of times corresponding to the number of bars employed, the thickness of the wire, and the distance desired between the several layers. It is best to have the heads cut away as much as possible, leaving, however, sufficient material in which the slots may be formed, since by this means the wire will be better exposed to ventilating-currents of air which may circulate upward freely through the same in the spaces between the arms or extensions in which the slots are formed. On the lower head the binding-posts I I<sup>2</sup> are mounted and properly insulated therefrom, as indicated.

To support the resistance-frame, I may provide the lower head with arms or extensions, as indicated in Fig. 3, in which bayonet slot-joints are formed adapted to engage with the pins *i* on the head of the hood. The hood and resistance-frame, with resistance-wire in place, are fastened together, as shown in Fig. 1, and connection with them is made when the lamp is put in place. Should it be desired to use the resistance as a shunt or branch resistance around the lamp controlled by a cut-out switch, the connections may be made as in Fig. 1. If, however, it is desired to place the resistance in circuit with the carbons of the lamp, as may be sometimes necessary, then the connections may be readily changed, as indicated in Fig. 2. In this case the connecting-wire between post F<sup>3</sup> and post F<sup>2</sup> is detached, so as to break connection from F<sup>3</sup> to F<sup>2</sup>. Post I<sup>2</sup> and post or block F are also disconnected and a wire is run from F<sup>3</sup> directly to I<sup>2</sup>. Another connection is run directly from post I of the resistance to the block F<sup>2</sup>, thus putting the resistance in the circuit with the carbons, as indicated in Fig. 2.

It will be obvious that by means of these connecting devices or similar connecting devices adapted to change the connections between the resistance, the lamp, and the line-blocks or binding-posts, the resistance might be put into circuit in other ways. When the lamp is removed, the resistance remains in place.

What I claim as my invention—

1. The combination, with an electric-arc lamp, of a lamp-hood, a chimney for the arc lamp, and an artificial resistance-frame mounted in the chimney of the hood independently of the lamp and provided with a vertical passage or opening to receive the lamp-chimney.

2. The combination, with an electric-arc lamp, of a hood therefor, a chimney for the arc lamp, binding-posts for connection with the line-wire, mounted in the head of the hood for such lamp, an electric resistance-frame secured within the chimney of the hood and having a vertical central passage or opening for the chimney of the lamp, and binding-posts or connecting devices, substantially as described, for permitting the connections



of the resistance with the lamp and line wires to be charged at pleasure.

3. The combination, with an electric-arc lamp, of the lamp-hood provided with devices 5 for sustaining an arc lamp within it, with the chimney of the lamp extending up within the chimney of the hood and an electric resistance-frame mounted in the chimney for the hood and having its resistance-wire connected 10 to terminal binding-posts  $II^2$ , accessible within the lamp-hood, as and for the purpose described.

4. In an electric resistance-frame, the combination, with the supporting-frame having 15 the heads provided with radial slots, of insulating bars or rods seated in the slots and superposed upon one another and resistance-wire wound over said bars in layers between them.

20 5. In an electric resistance-frame, the combination, with the heads connected by a tube and provided with the radial slots, of insulating bars or rods mounted in the slots and provided with notches or grooves to receive 25 the resistance-wire and with rabbets or offsets engaging with the heads, as and for the purpose described.

6. In an electric resistance-frame, bars or rods M, of insulating material, disposed at 30 intervals around the circumference of such frame and provided with notches or grooves to receive the resistance-wire, said bars or rods being supported upon one another, as described, and holding the resistance-wire in 35 place between them in the notches.

7. In an electric resistance-frame, the combination, with the heads  $L L^2$ , of the connecting-tube and the bars M, superposed upon one another in slots in the heads and having 40 grooves or notches at their edges to hold the resistance-wire, as and for the purpose described.

8. The combination, with the hood for an electric-arc lamp, of a chimney for such hood 45 rising above the same and provided at near its top with openings to allow the escape of heated air, and a resistance-frame mounted within the chimney below such openings, and provided with binding-posts mounted on the 50 lower head of the frame at or near the bottom of the chimney and having their shanks connected, respectively, to the terminals of the resistance-coil.

9. The combination, with the resistance-frame having the connected heads and a cen- 55 tral passage or bore, of a wire-supporting bar or rod provided with notches in its outer edge and with rabbets or shoulders at its inner edge to hold it against longitudinal displacement. 60

Signed at New York, in the county of New York and State of New York, this 9th day of April, A. D. 1890.

BARTON B. WARD.

Witnesses:

WM. H. CAPEL,  
HUGO KOELKER.