

No. 652,610.

Patented June 26, 1900.

M. W. HANKS.

ELECTRIC LIGHTING APPARATUS.

(Application filed May 2, 1899. Renewed Apr. 16, 1900.)

(No Model.)

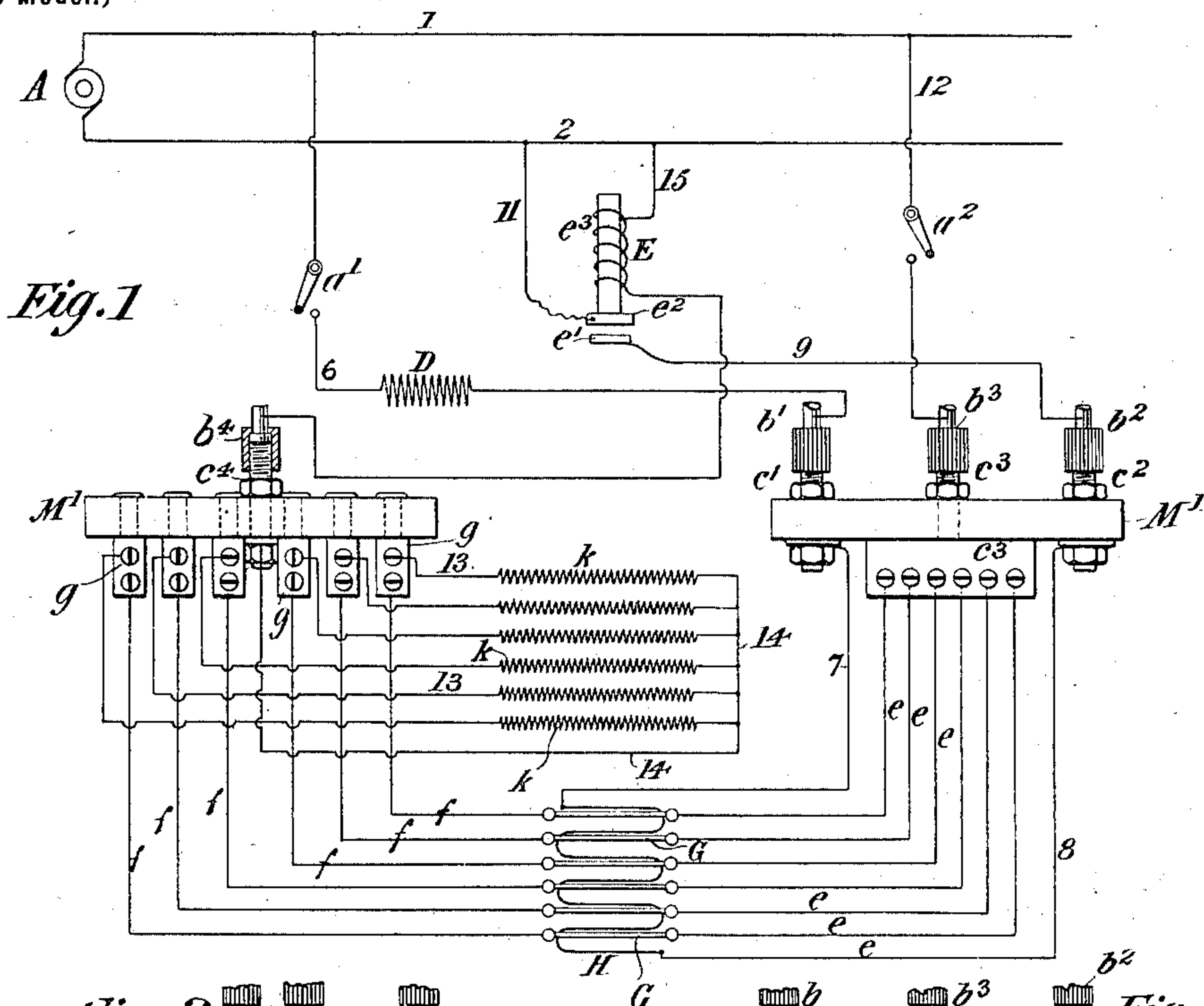


Fig. 1

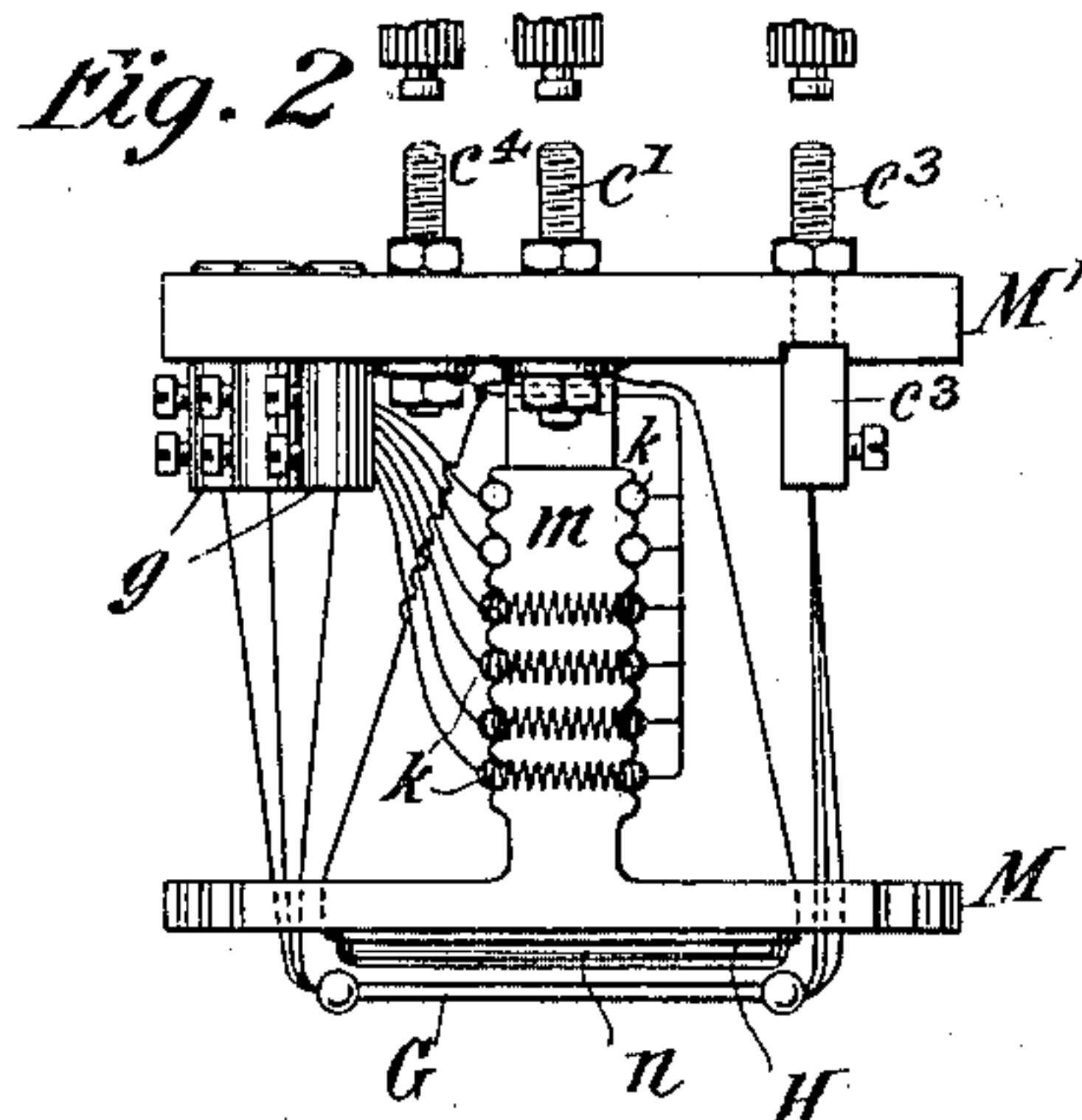


Fig. 2

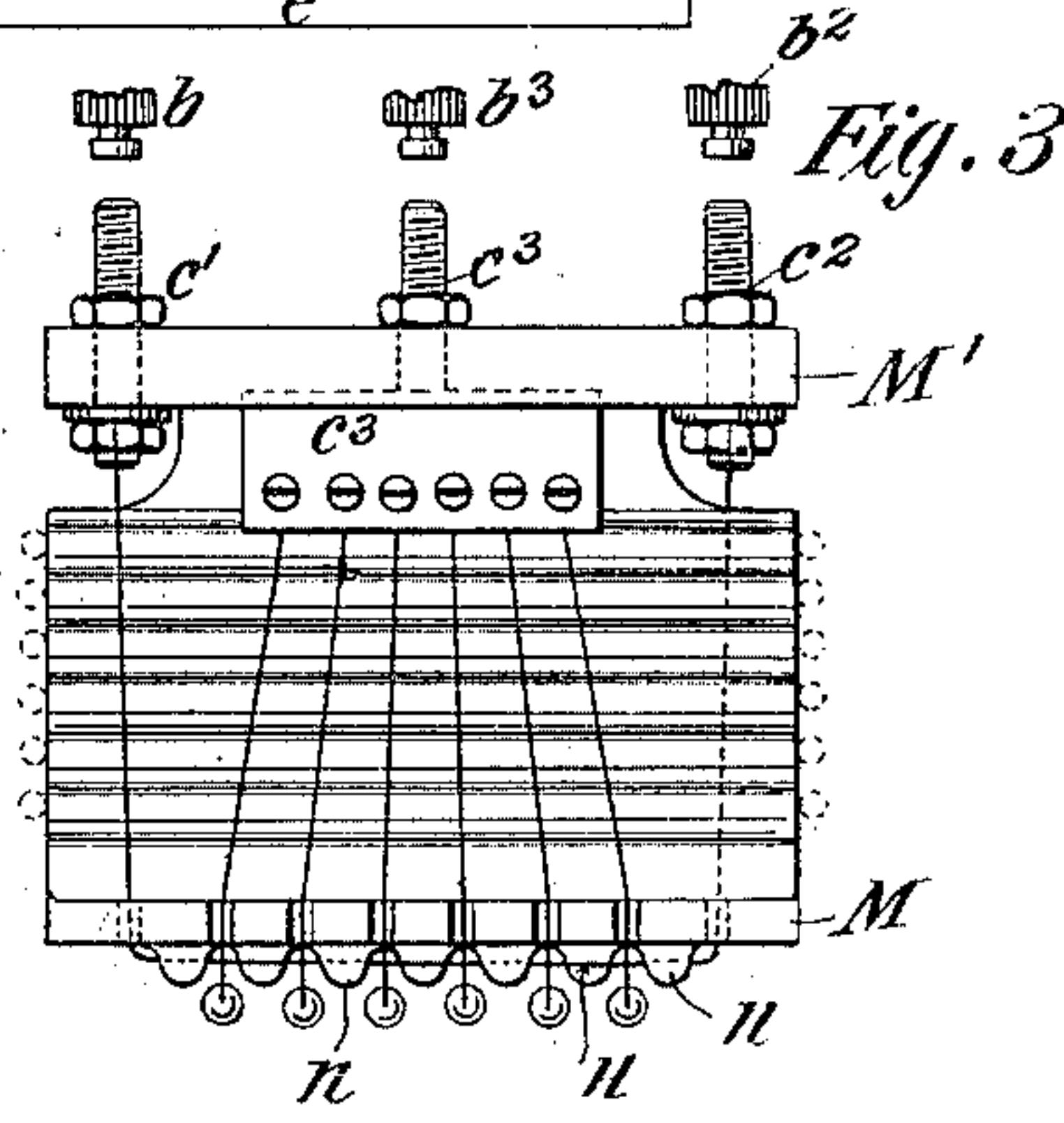


Fig. 3

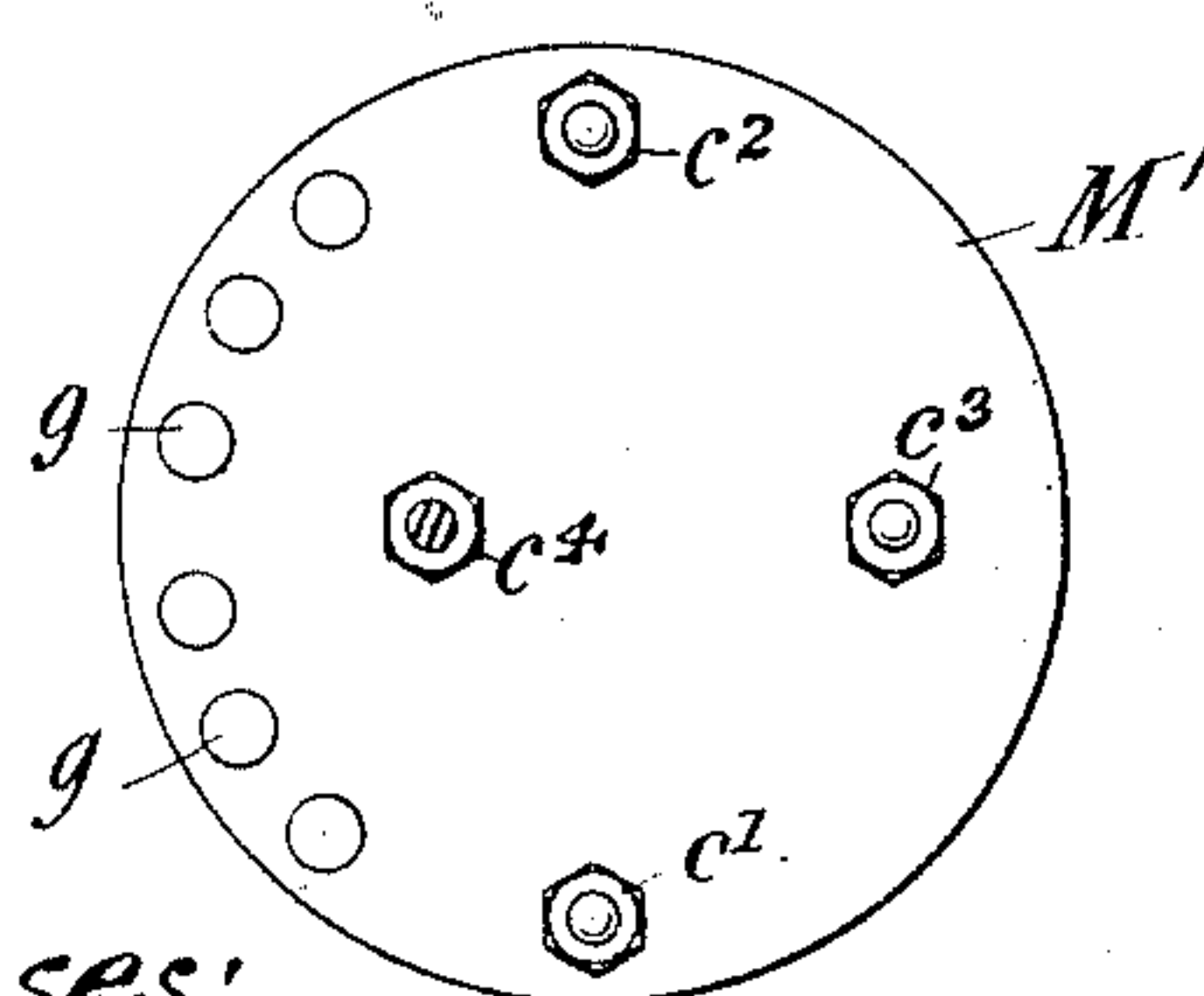


Fig. 4

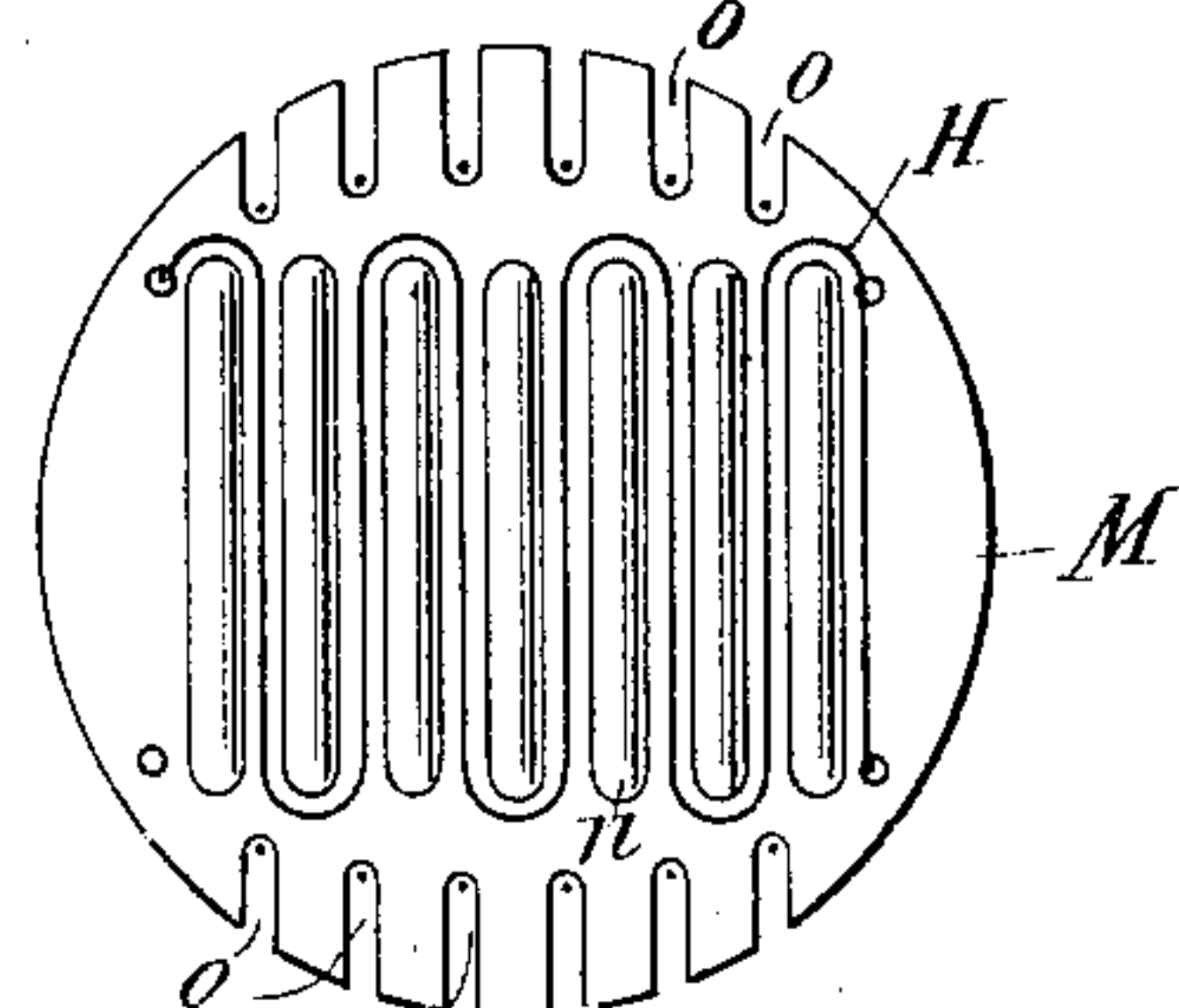


Fig. 5

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UNITED STATES PATENT OFFICE.

MARSHALL W. HANKS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO
GEORGE WESTINGHOUSE, OF SAME PLACE.

ELECTRIC-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 652,610, dated June 26, 1900.

Application filed May 2, 1899. Renewed April 16, 1900. Serial No. 13,137. (No model.)

To all whom it may concern:

Be it known that I, MARSHALL W. HANKS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric-Lighting Apparatus, of which the following is a specification.

My invention relates to the class of electric-lighting apparatus in which the luminant or glower is composed of a material which is a non-conductor when cold and requires to be heated in order to become a conductor. Such luminants are composed of a rare earth or a mixture of rare earths.

The object of my invention is to provide a convenient and effective means for supporting the glowers and other necessary parts of the apparatus and for forming convenient detachable circuit connections therewith.

The invention consists generally in improvements in the construction of the supporting device for the glowers and in the arrangement of the heating device for bringing the glowers to a conducting temperature, and also in the disposition of steadying resistances or balance-coils for preventing the glowers from receiving an excessive current when in operation, and other details which will be described in connection with the accompanying drawings.

In the drawings, Figure 1 is a diagram showing the general circuit connections. Fig. 2 is a side view of the glowers and the supporting structure for the glowers, heating-coils, and steadying resistances. Fig. 3 is another side view of the same, and Figs. 4 and 5 illustrate details.

Referring to the figures, A represents a suitable source of electric currents from which conductors 1 and 2 are led. The glowers of the lamp are represented at G, and the heating-conductor for raising them to the conducting temperature is shown at H. The circuit through the heating-conductor is from the conductor 1, through any suitable form of circuit-closing device a' , by way of wire 6, to the contact b' , which is designed to make electrical connection with the post c' . A resistance or reactive coil D may be included in the conductor 6. From the contact-post

c' a conductor 7 leads to one terminal of the heating-coil H, the other terminal of which is connected by a conductor 8 with the contact-post c^2 . From this binding-post the circuit connections are continued through a corresponding contact b^2 of conductor 9 to one contact-plate e' of a circuit-controller E. The remaining plate e^2 of this circuit-controller is connected by the conductor 11 with the main circuit-conductor 2. When, therefore, the switch a' is closed, the circuit is completed through the heating-conductor H, and thus the glowers are raised to their conducting temperature.

The circuits of the glowers are from the conductor 1 by way of conductor 12, switch a^2 , contact b^3 , contact-post c^3 , and thence through the several conductors $e e e$, which are respectively connected with the terminals of the respective glowers G G. The remaining terminals of these glowers are connected by conductors $f f$, &c., with binding-posts $g g$, from which conductors lead, respectively, to the terminals of steadying resistances $k k$, which are interposed in the circuits to prevent the flow of an excessive current through the glowers when they are heated to their conducting temperature. The steadying resistances are of such composition and construction as to prevent an undue increase of current when the resistance of the glowers is decreased by the heat developed therein. The remaining terminals of the steadying resistances are connected with a conductor 14, which leads to a binding-post c^4 . From this binding-post connections are continued through contact b^4 , the solenoid e^3 of the circuit-controller E, and thence by way of conductor 15 to the main conductor 2. The parts are so adjusted that when current is flowing through one or more of the glowers, the number being predetermined, the circuit-controller will be operated to separate the contact-plates e' and e^2 in any suitable manner, and thus interrupt the heater-circuit, inasmuch as it is then no longer required to be in operation.

Heretofore it has been proposed to so locate the steadying-coils k that circuit connections would have to be made and broken between the respective steadying-coils and a remov-

able portion of the lamp carrying the glowers whenever the glowers were removed. I locate the steadying-coils upon a portion of the lamp which carries the glowers themselves, so that the number of circuits which it is necessary to break when the glowers of a multiple-glower lamp are to be removed is much lessened. In carrying out this part of my invention I locate the glowers upon or near to the face of a plate M, Figs. 2, 3, and 5, and there is secured to this plate in any convenient manner a plate M', which carries the binding-posts c' , c^2 , c^3 , and c^4 and also the binding-posts g .

In Fig. 1 I have for the purposes of the diagram represented the plate M' in two positions, so as to better show the circuit connections. These two plates may be secured together in any convenient manner. I have shown them as connected by a bridge-piece m , and the entire structure may be of porcelain or other suitable insulating material. The heating-conductor H is located upon the surface of the plate M, Fig. 3, in proximity to the glowers. I usually form upon the surface of the plate M longitudinal ribs n and arrange the heating-conductor H in loops about these lugs, as shown, for instance, in Fig. 5. The lugs or ribs prevent the convolutions of the heating-conductor from coming in contact with each other. The entire surface may be coated with an enamel after the heating-conductor has been placed in position for the better protection of the glower and to provide against a short circuit between the glowers and the heating-conductor.

The conductors leading to and from the glowers are located in slots o , formed in the edges of the plate M, and they are connected with the binding-post c^3 and the respective insulated posts g , as already described. The steadying resistances k are shown as being carried by the bridge-piece m , being located in grooves therein. They may, however, be located upon any other suitable portion of the glower-carrying structure, provided it is removable with that structure. After the steadying resistances k are placed in position they may be enameled on the surface of the supporting structure in a manner similar to that employed with the heating-conductor h . The circuit connections are made with the four contact-posts c' , c^2 , c^3 , c^4 in any convenient manner. In the drawings I have represented the corresponding contacts b' , b^2 , b^3 , b^4 . These are carried by the stationary or fixed portion of the lamp and are arranged to be coupled to the posts c' , c^2 , c^3 , c^4 , respectively, by means of loose coupling-nuts, (represented at p' , p^2 , p^3 , and p^4 .) In this manner firm and reliable electrical connections can be made—four in number—whereas in former constructions there would have to be an additional coupling or contact device for each additional glower above one. In this way a readily-detachable glower-supporter is secured, so that when any of the glowers are injured or to be replaced

it is only necessary to loosen the four coupling ends, remove the structure, and replace the defective part. It will be understood, however, that I do not limit the application of my invention to lamps employing multiple glowers, as many features thereof are useful in connection with lamps employing but one glower.

I claim as my invention—

1. In an electric-lighting apparatus, the combination of one or more glowers, a support therefor, a heating device for the glowers carried by said support, steadying resistances for the respective glowers also carried by the said support, and a detachable coupling device for securing the support to a stationary support.

2. In an electric lamp, a removable portion comprising one or more glowers, a support therefor, a heating-conductor carried by the support, steadying resistances carried by the support, and means for forming electrical connections with the heating-conductor and the glowers.

3. In an electric-lighting apparatus, the combination of one or more glowers composed of a material which is a non-conductor when cold and a conductor when heated, means for heating the glowers, steadying resistances included in the respective circuits of the glowers, all united in one structure, and a detachable coupling for securing the same to a lamp-support.

4. In an electric-lighting apparatus, the combination of a glower-supporting plate, a heating-conductor carried upon one surface of the plate and steadying resistances carried at the opposite side of the plate.

5. In an electric-lighting apparatus, the combination of a support for the glowers, a heating-conductor carried upon one surface thereof, an enamel covering therefor, steadying resistances also carried by the support contact-posts for receiving the terminals of the heating-circuit and of the glower-circuits, and a mechanical coupling device for holding the contacts in electrical connection with an electric circuit, substantially as described.

6. The combination of a glower-supporting plate, lugs or ribs on the face thereof, and a heating-conductor placed in the spaces between the ribs.

7. In a glower and heater supporting plate, a plate having ribs upon one face and slots in opposite edges, substantially as described.

8. The combination of a supporting-frame for electric-lamp glowers comprising two parallel plates of non-conducting material, a centrally-located intervening bridge-piece and one or more glowers carried by the supporting-frame adjacent to one of the parallel plates upon the side remote from the bridge-piece.

9. In an electric lamp, the combination of a glower-supporting frame, comprising two parallel plates of insulating material and an intervening bridge connecting the same,

heating - conductors carried by one of the plates, and contact-posts carried by the other plate and steadying resistances supported between the plates.

- 5 10. In an electric lamp, the combination of a glower-supporting frame, comprising two parallel plates of non-conducting material and a single uniting support for the two, insulated binding-posts respectively electric-
10 ally connected with one terminal of the several glowers, a common binding-post connected with the remaining terminals of the glowers, a heating-conductor and two insulated binding-posts connected with the re-
15 spective terminals thereof, said binding-

posts being carried by the plate remote from the glowers.

11. In an electric lamp, the combination of multiple glowers, a supporting-frame therefor, a steadying resistance in series with each glower independently of the others, said
20 steadying resistances being carried by the glower-supporting frame, and an enamel coating for said steadying-coils.

In testimony whereof I have hereunto sub-
scribed my name this 28th day of April, 1899. 25

MARSHALL W. HANKS.

Witnesses:

HUBERT C. TENER,
CHARLES A. TERRY.