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H. N. POTTER.

HEATER CUT-OUT FOR ELECTRIC LAMPS.

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NO MODEL.

Fig. 1

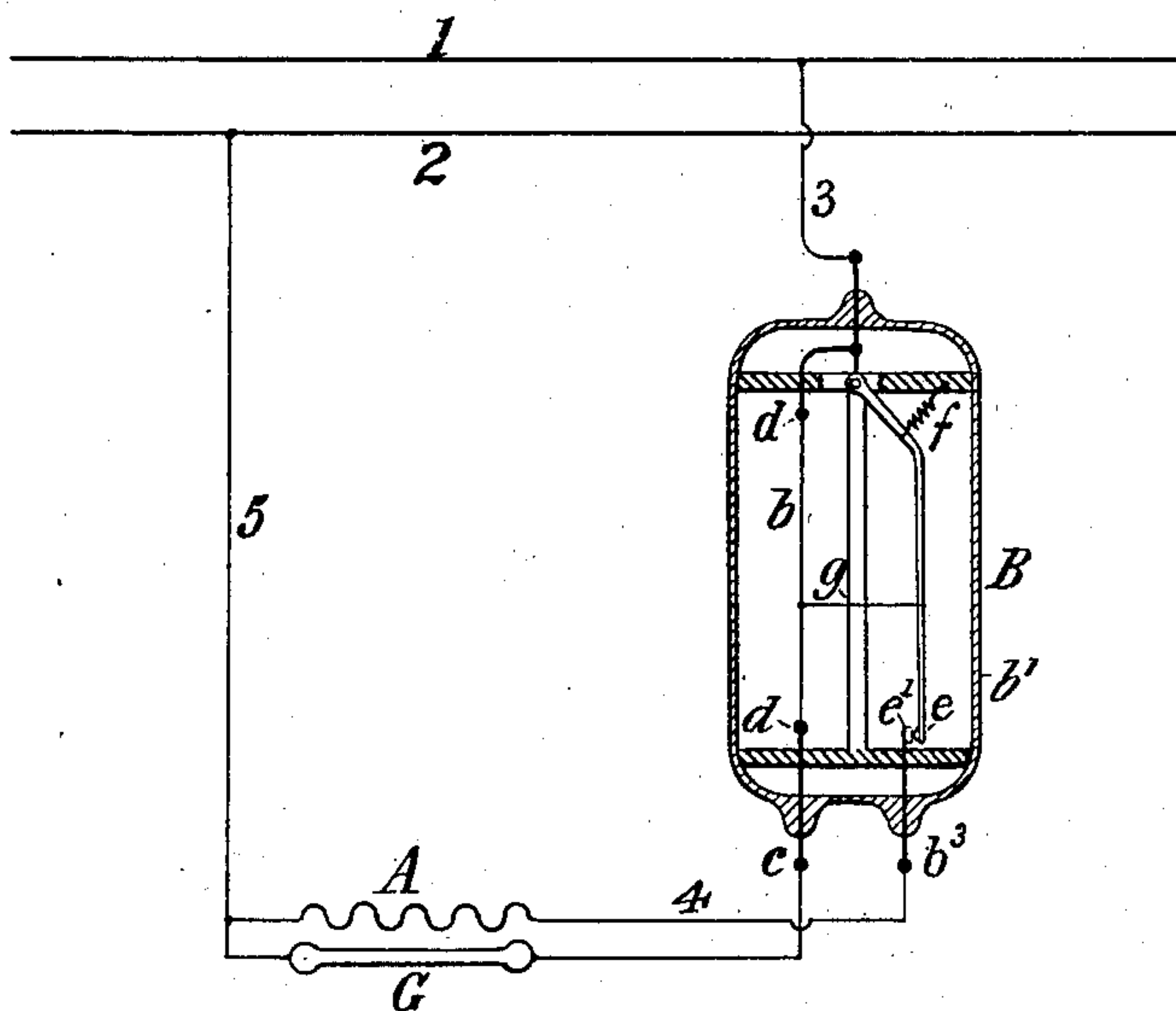
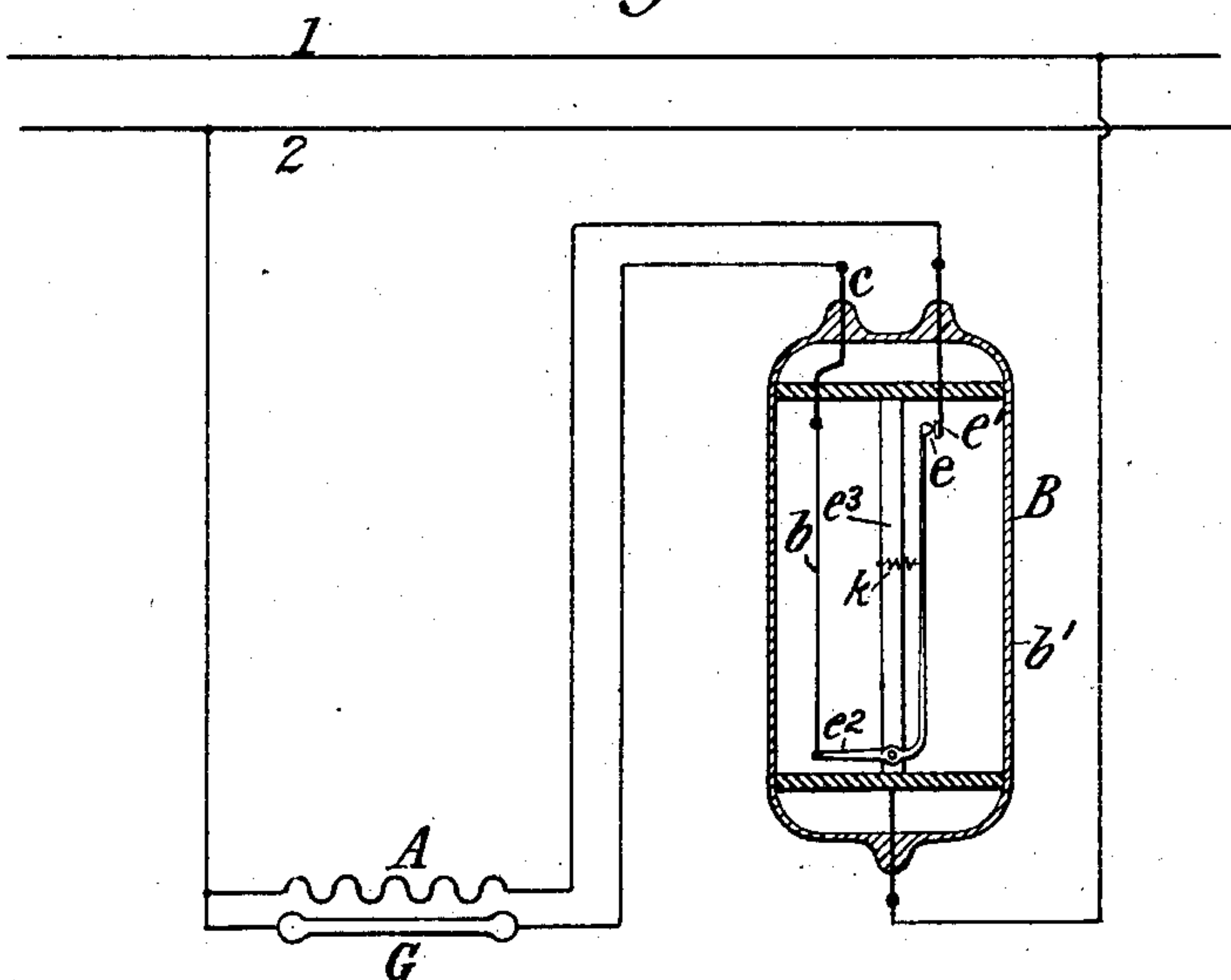


Fig. 2



Witnesses:

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HEATER CUT-OUT FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 721,602, dated February 24, 1903.

Application filed August 9, 1899. Renewed April 30, 1901. Serial No. 58,198. (No model.)

To all whom it may concern:

Be it known that I, HENRY NOEL POTTER, a citizen of the United States of America, and a resident of Göttingen, Germany, have invented certain new and useful Improvements in Heater Cut-Outs for Electric Lamps, of which the following is a specification.

The invention relates to the class of device employed for cutting out of circuit the electric heating device employed for heating the glowers of electric lamps to conducting temperature; and the object of the invention is to provide a simple and efficient device for automatically effecting this result.

In another application I have described a special form of ballast or steadying resistance to be employed in series with the glower of this form of lamp. This ballast device consists of a strip or wire of iron inclosed in an atmosphere of inert gas—such, for instance, as hydrogen—and my present invention relates particularly to the utilization of this form of ballast device for operating an automatic cut-out for the heater-circuit; but certain features of the invention have a wider application.

The ballast-wire usually consists of a comparatively short length of iron wire; but the length varies according to the purposes or characteristics of the lamp with which it is to be employed—say from an inch to ten or twelve inches, according to the circumstances. This wire when current is traversing the glower is heated to a red or dull-red temperature and when so heated expands somewhat in length. I make use of this expansion to operate a circuit-breaker through which the circuit to the heater is closed when the glower is not in operation. Various different forms of circuit-breakers thus operated may be employed.

In Figure 1 of the drawings I have illustrated one form, and in Fig. 2 a modification, of the invention.

Referring to the drawings, G represents the glower of a lamp of the character referred to, composed of the rare earths suitably prepared and formed into a proper shape. The glower is a non-conductor of electricity when cold and a conductor when heated to the proper temperature. The preliminary heat is given

to the glower by means of an electric heating device—such, for instance, as that shown at A in the drawings. The heater, here shown diagrammatically, comprises a length of conductor, usually of platinum, arranged in proximity to the glower and designed to be raised to a high temperature by the passage of an electric current. The heat necessary for rendering the glower conductive is imparted thereto from the glower; but when the heater has been rendered conductive it is desirable that the heater be cut out of the circuit, so that energy will no longer be wasted in continuing to operate the heater. Moreover, continuous operation of the heater would soon destroy it.

In series with the glower is connected the balancing or current-restraining device B, consisting of a strip of iron, usually in the form of wire, as shown at *b*, which is sealed in a tube *b'*, formed of glass or other suitable material. The ends of the iron wire are usually connected to short platinum leading-in wires *c*, by means of which connections are made to the work-circuit. The wire *b* is stretched tightly between the two leading-in wires or between insulated supports *d*, carried within the tube. A contact-arm *e* and a contact-point *e'* therefor are also contained within the tube. When the wire *b* is cold and occupies a straight line between its supports, the arm *e* is in contact with its point *e'*. When, however, the iron wire is expanded by heat by the passage of current there-through, the arm *e* moves automatically away from its contact-point. This may be accomplished by a spring or equivalent device *f*, tending to draw the arm away from the point. This tendency, however, is opposed by connection *g* from the iron wire to the arm *e*. This connection is made by either a non-conducting material or a piece of wire having an insulated point within its length, so that the current will not traverse it. When the lamp is not in use, the arm *e* is drawn against the point *e'* by reason of the connection *g*; but when the iron wire has been expanded the spring *f* withdraws the arm from the point, and thus interrupts the circuit connections there-through. One end of the arm *e* is connected with the terminal of the balancing-wire *b*

either within or outside of the tube. A conductor 3 connects this terminal with one side 1 of the main circuit. The contact-point e' is connected by conductor 4 with one terminal of the heating-conductor A, and the other terminal of the heating-conductor is connected by a conductor 5 with the other side 2 of the main circuit.

The balancing-conductor and the circuit-breaker are both included in the inclosing tube b' , a suitable leading-in wire b^3 leading through the wall of the tube to the contact-point e' . The tube is filled with an inert atmosphere—such, for instance, as hydrogen—the pressure of which may be varied according to circumstances. Usually I employ a pressure about equal to atmospheric pressure. By reason of this inert atmosphere the contact-points will not be oxidized or deteriorated, and therefore they may be of other material than platinum. Inclosing the contacts also serves to keep them free from dust and dirt and mechanical injury.

In Fig. 2 I have illustrated a modification of the device in which the motion is transmitted to the arm e through a lever e^2 , carried by a frame e^3 , of non-conducting material or of suitable conducting material insulated at the necessary points. The lever e^2 is pivoted to the frame e^3 and connected at one end to the iron wire b , and at its other end it carries rigidly the end of the arm e which is remote from the contact-point e' . A small spring k normally tends to draw the arm away from its contact-point; but it is held against that point so long as no current is traversing the wire b by the tension of that wire. When, however, the wire b is expanded by heat, the spring k moves the arm e away from its contact-point e' , and thus breaks the circuit.

I make no claim, broadly, herein to the utilization of the energy expended in the ballast-conductor for the purpose of breaking the heater-circuit, but have made such broad invention the subject-matter of another application, filed the 2d day of September, 1899, Serial No. 729,277.

I claim as my invention—

1. The combination of an electric-lamp

glower which is a non-conductor when cold and a conductor when heated, an electric heater therefor, a balancing device included in series with the glower, a cut-out for the heater consisting of two contact-points normally in contact with each other, means tending to separate such points and a mechanical connection with one of said points for separating the points upon the expansion of the said balancing device.

2. The combination with a lamp-glower composed of material which is a non-conductor when cold and a conductor when hot and a balancing-conductor in series therewith, consisting of an iron wire inclosed within an air-tight case containing an inert atmosphere, a circuit-controller also contained within such case and mechanically operated by the expansion of the said iron wire and a heater for said glower having its circuit connections through said circuit-controller.

3. The combination of an air-tight inclosing globe, an iron ballast device for electric lamps inclosed therein, and a circuit maker and breaker also inclosed therein and having a mechanical connection with said ballast device whereby the expansion and contraction of the ballast device operate said circuit maker and breaker.

4. The combination of an electric-lamp glower, a ballast-wire of soft iron in series therewith, a heater-circuit in shunt around the glower and the ballast-wire and a circuit making and breaking device for the heater-circuit mechanically operated by the expansion and contraction of the ballast-wire, substantially as described.

5. A combined steadying and circuit-controlling device for electric lamps consisting of a ballast-wire, a frame for supporting the same, contact-points carried by said frame and connections from said ballast-wire to one of the contacts of said circuit-controlling device for operating the latter by the expansion and contraction of the ballast-wire.

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Witnesses:

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