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ELECTRIC INCANDESCENT LAMP HAVING SECOND CLASS CONDUCTOR.

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Fig. 1.

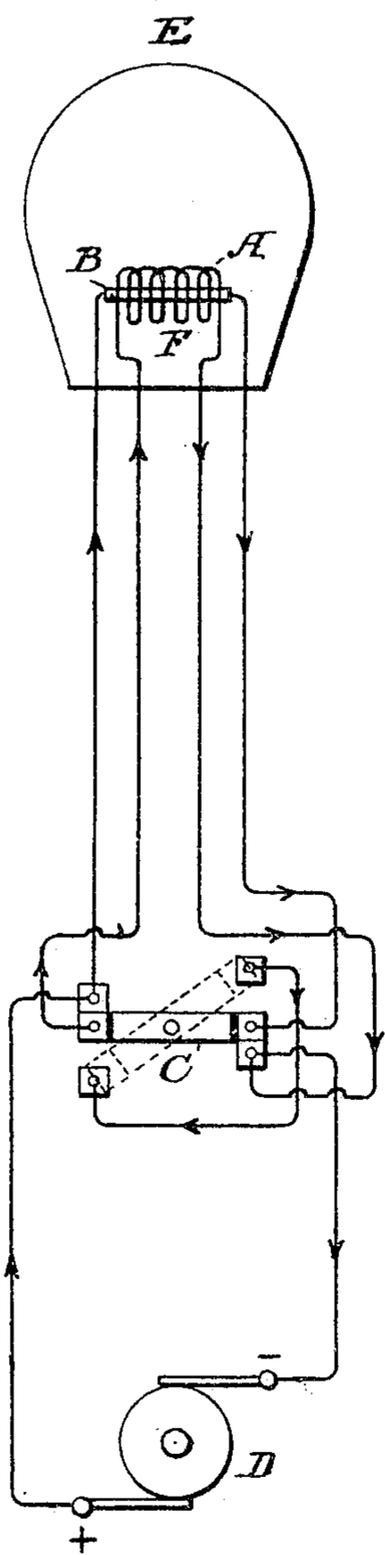
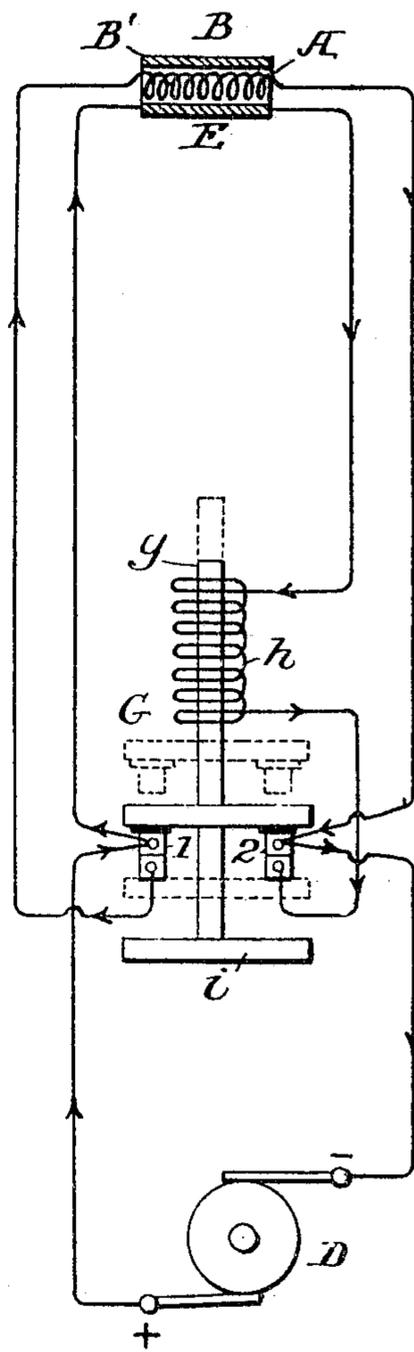


Fig. 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

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ELECTRIC INCANDESCENT LAMP HAVING SECOND-CLASS CONDUCTORS.

No. 799,219

Specification of Letters Patent.

Patented Sept. 12, 1905.

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*To all whom it may concern:*

Be it known that I, WILHELM BOEHM, chemist, a subject of the King of Prussia, German Emperor, residing at 74 Rathenowerstrasse, in the city of Berlin, Kingdom of Prussia, German Empire, have invented a certain new and useful Electric Incandescent Lamp Having Second-Class Conductors, of which the following is a specification.

This invention has reference to the employment of second-class conductors for electric incandescent lamps in which it is necessary to previously heat the incandescent body to a certain elevated temperature in order to allow the current to pass through the said body. On the other hand, such incandescent bodies required the use of a special resistance in order to prevent their fusion by the action of a current of undue intensity.

Various means, most of which comprised the use of a separate heater, have been devised to effect the elevation of temperature of the second-class conductor. Now it is obvious that the combination of a separate resistance and of separate heating appliances greatly complicate the construction and handling of incandescent lights of this kind.

In the accompanying drawings, Figure 1 is a diagrammatic representation of a lamp with suitable circuits and a hand-switch for switching the incandescent body and heating-body from parallel relation in a circuit to series relation therein; and Fig. 2 is a diagrammatic representative of a lamp, its circuits, and an electromagnetically-operated switch for automatically changing the circuits.

By my invention the construction of incandescent lights of this class is greatly simplified. In the first place, I make use of materials which emit a high degree of heat on the current passing through them and which at the same time when used in the form of threads or wires of a certain length and thickness are creating sufficient resistance for the protection of the light proper. Then, in the second place, my device is so arranged and made up that when the lamp is turned on the heating appliance and the resistance A combined are placed in parallel circuit to the incandescent body B. I thus elevate the temperature of the incandescent body B by the heater A, so that the body B becomes a conductor for the electric current. By then applying a suitable switch the heater A is put in series to the incandescent body B, so that it operates as a primary resistance for the incan-

descent body which has already reached a high degree of incandescence and which therefore necessitates the use of a special resistance in order to prevent fusion. 60

While I prefer to arrange the heater A in form of a coil around the incandescent body B in order to effect the uniform heating of the said incandescent body, still it is obvious that I may also use other arrangements of the two bodies relatively to each other to suit existing conditions. It is further obvious that I may employ different means to effect the switching of the two bodies constituting the lighting device. Thus I may effect this switching from parallel into series connection, whereby the heating-body becomes only a protecting resistance, either by hand or automatically, by the use of electricity, for instance. In the case of tubular-shaped incandescent bodies I may also arrange the heating-body A at the inside of the said incandescent body. By this arrangement the exterior incandescent tube B' acts as a protection against external influences upon the heating-body therein inclosed. 70 75 80

It is evident that by constructing second-class incandescent lights in the manner outlined the handling of this kind of devices is greatly simplified and the adaptability of these lights for various technical purposes is greatly enhanced. 85

In order to also utilize the quantity of electric energy absorbed by the resistance body A, which amounts to about ten per cent. of the total electric energy of the system for the purpose of illumination, I prefer to employ such material for the said resistance and heating body which on the passage of the current will emit a strong light by itself. Of the many substances and combinations of substances which on the passage of the current acquire the quality of emitting a powerful light and which at the same time are adaptable for a heating and resistance body combined, carbon in the form of threads or in any other suitable shape or condition has been found very serviceable. In this case the use of the vacuum will become necessary, which, however, does not interfere with the ready adaptability of the system. 90 95 100 105

When the current is turned on, it will first pass through the heating-body A, as above described, which acts as a heater until the body B becomes a conductor and acquires incandescence. If the current is now switched by means of a small lever C or otherwise, the 110

heater or resistance body A, which in the former position was in parallel circuit, is then switched into series; but it then not only acts as resistance, but at the same time possesses considerable incandescence of its own.

It is evident that I may also combine several heating and resistance bodies A, respectively, incandescent bodies B in any number and variety without departing from the spirit of my invention.

Referring to the drawings, D represents a source of energy for supplying current to a lamp E. The lamp comprises, essentially, an incandescent body B and a heating-body A, and in Fig. 1 the heating-body A is shown in the form of a coil around the incandescent body B, the bodies A and B being shown within a vacuum-chamber F, while in Fig. 2 the incandescent body is shown in the form of a tube B' with the heating-body within the same.

In Fig. 1 a hand-switch, as a lever C, and suitable circuits and contacts are shown for switching the bodies A and B from parallel to series. When the lever C is in the position, indicated in full lines, it will be readily seen that the bodies A and B are in circuit in parallel relation to each other, and when the lever C is in the position indicated by dotted lines they are in series relation, the current passing in each case from the source D, according to the arrows, the wires being connected to the contacts.

In Fig. 2 automatic means, as an electromagnetic switch G, are shown for accomplishing the switching from parallel to series, and when the core *g* is in the position indicated by full lines it will be seen that the bodies A and B are in circuit in parallel to each other; but when the magnet *h* becomes energized, drawing up the core *g* to the position indicated by dotted lines, carrying with it the insulated contacts 1 and 2 and contact-piece *i*, the bodies A and B will be switched into series relation.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In an electric incandescent lamp the combination with an incandescent body consisting of second-class conductors, of a single body of suitable material and of convenient size and means whereby the said body may be utilized both as a heater and as a regulating resistance for the incandescent lamp, substantially as described.

2. In an electric incandescent lamp, the combination with second-class conductors for the incandescent light, of a suitably-arranged resistance, acting as a heating-body for the incandescent light and means whereby the said resistance and heating body may be switched into parallel circuit and into series with the incandescent light, substantially as described.

3. In an electric incandescent lamp, an incandescent body of second-class conductors, a

heating-body, made of a light-emitting substance and means whereby the said heating-body may be switched into parallel circuit and into series with the incandescent body, substantially as described.

4. In an electric incandescent lamp, in combination with an incandescent second-class conductor, a heating and resistance body, made of light-emitting carbon, and means to switch the said body into parallel and series circuit, substantially as described.

5. In an incandescent lamp, an incandescent body, and a body so connected as to act as a heater for the incandescent body and then as a protective resistance therefor, substantially as described.

6. In an incandescent lamp, the combination of an incandescent body, a body adapted to act as a heater for the incandescent body and then as a protective resistance therefor, and means for changing such relations of the bodies.

7. In an incandescent lamp, the combination of an incandescent body, a body adapted to act as a heater for the incandescent body and then as a protective resistance therefor, and means for automatically changing such relations of the bodies.

8. In an incandescent lamp, the combination of an incandescent body, a body adapted to act as a heater for the incandescent body and then as a protective resistance therefor, and circuits and connections for changing the electrical circuits of the bodies, substantially as described.

9. In an incandescent lamp, the combination of an incandescent body, a body adapted to act as a heater for the incandescent body and then as a protective resistance therefor, and means whereby said second body is utilized as a heater and as a resistance for the incandescent body.

10. In an electric lamp of the type described, the combination with a glower, of a heating-conductor connected in circuit to operate independently of the glower until the latter becomes conductive and then in series therewith to serve as a ballast.

11. In an electric lamp of the type described, the combination with a glower, of a heating-conductor located in proximity to the glower and connected in circuit to operate independently thereof until said glower becomes conductive and thereafter connected in series therewith to serve as a ballast.

12. In an electric lamp of the type described, the combination with a glower and a heating-conductor located in proximity thereto and connected in circuit to operate independently thereof during the heating operation, of means for breaking connection to one terminal of the heating-conductor and thereby serving to connect said heating-conductor in series with the glower to serve as a ballast when the glower becomes conductive.

13. In an electric lamp of the type described, the combination with a glower, of a heater primarily connected in circuit to operate in-

dependently of the glower and a controlling device for interrupting said independent operation and at the same time insuring a series connection between the heater and the glower  
5 whereby the former serves as a ballast when the latter becomes conductive.

10 14. In an electric lamp of the type described, a glower and a heater-ballast device connected in circuit to operate independently of the glower, in combination with means for inter-  
rupting said independent operation when the glower becomes conductive and at the same time insuring operation of the heater and the glower in series with each other.

15 15. In an electric lamp of the type described, the combination with a glower, of a heater-  
ballast device so connected in circuit as to operate independently of the glower until the latter becomes conductive and then in series  
therewith without changing their mutual cir- 20  
cuit connections.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILHELM BOEHM.

Witnesses:

HENRY HASPER,  
WOLDEMAR HAUPT.