(No Model.)

G. A. FREI.

INCANDESCENT LAMP.

No. 497,956. Patented May 23, 1893.

Fig. 1.

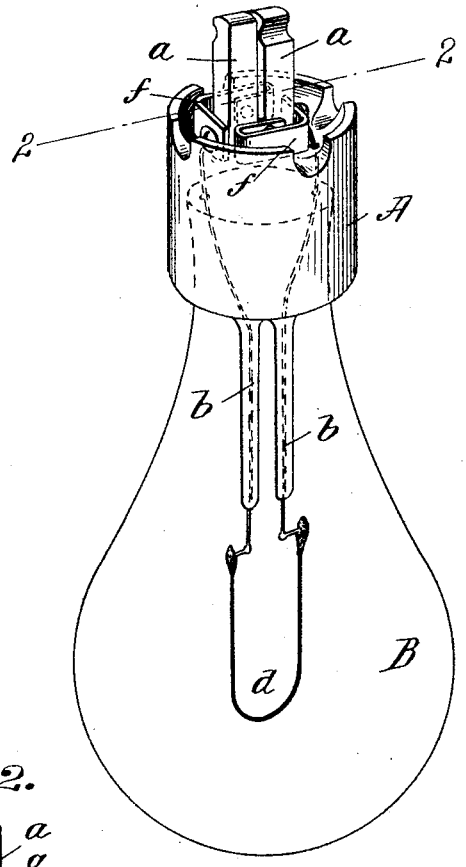


Fig. 2.

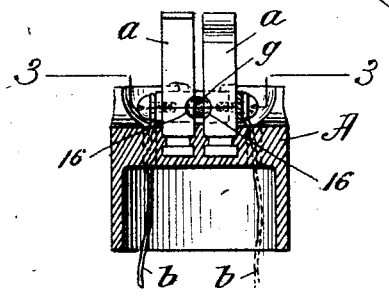


Fig. 3.

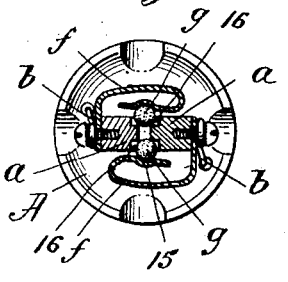
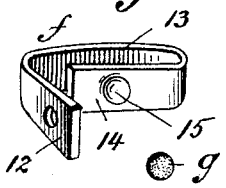


Fig. 4.



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UNITED STATES PATENT OFFICE.

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INCANDESCENT LAMP.

SPECIFICATION forming part of Letters Patent No. 497,956, dated May 23, 1893.

Application filed December 19, 1892. Serial No. 455,616. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV A. FREI, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Electric Incandescent Lamps, of which the following is a specification.

This invention relates to automatic circuit closing devices for electric incandescent lamps.

In the use of incandescent lamps on high tension circuits, or where lamps of low resistance are connected in series on constant-current circuits, it is found desirable to provide devices which will prevent the opening of a circuit when the carbon filament of a lamp burns through or becomes otherwise destroyed; and the object of this invention is to provide a device for the above indicated purpose which will be cheap, reliable, easy of application, and which will be so incorporated in the lamp that whenever the burned-out lamp is replaced it will not be necessary to specially manipulate switches or cut-out devices.

To these ends the invention consists in an electric incandescent lamp which has contact-pieces, for receiving the connection therewith of the electric conductors, and which contact-pieces also have connections with the carbon filament, and a spring which is adapted to have electrical connection with both of said contact-pieces, and a substance, of high resistance which is easily fusible under heat, supported relative to the spring to hold it normally out from its position as a direct connection between both of said contact-pieces, but on fusing to permit said spring to constitute the direct connection.

The invention also consists in certain preferred details of construction; and all substantially as will hereinafter fully appear and be set forth in the claims.

In the accompanying drawings a lamp embodying the present invention is illustrated.

Figure 1 is a perspective view of the improved lamp, the same being understood as removed from the socket,—no illustration of the socket being deemed necessary. Fig. 2 is a vertical, sectional view of the parts of the lamp at the upper portion thereof and comprising the cap, and the present novelties. Fig. 3 is a partial plan and partial horizontal sectional view taken on the line 3—3, Fig. 2. Fig. 4 is a perspective view on a larger scale of one of the springs and a piece, which is of high resistance and easily fusible, that is employed in the improved lamp in connection with the spring.

In the drawings A represents the cap of the electric incandescent lamp which may be constructed in any of the usual forms and of any of the suitable materials, as hard rubber, vulcanized fiber, or other non-conducting material, the same having the bulb, B, sealed thereinto; and the cap is provided with two posts or contact-pieces, *a*, *a*, sometimes termed the terminals of the lamp. These contact-pieces are to be of the usual, or otherwise suitable, form and they are set in the cap in insulation, one from the other, and, as well known, these parts are for receiving the connection therewith of the electrical conductors which respectively convey the current into and away from the lamp.

b, *b*, indicate the leading-in wires to each of which one end of the filament is suitably joined.

f represents the spring (duplicated) and *g* represents the substance which is of a high resistance and easily fusible under heat (also shown duplicated). Each spring is adapted to have, by reason of its resiliency, an electrical connection with both of the contact-pieces, *a*, *a*, but the aforementioned easily fusible substance of high resistance is so applied relative to the spring and contact-pieces as to place the one practically out of electrical connection with the other, except the connection constituted, as ordinary, by the leading-in wires and filament. Now, of course, when the filament becomes burned out, or otherwise destroyed, the current brought to one contact, *a*, can only pass to and through the other by way of the interposed easily fusible high resistance substance and spring, and the current being thus directed causes the fusing of the said substance permitting the spring to form a short circuiting connection between both of the contacts, all of which, of course, ensues automatically. And now noting the special preferred form, construction, and arrangement of the parts, each

of the springs comprises a one end part, 12,—the angularly turned intermediate portion 13,—and the return-bent terminal member, 14, as clearly seen in Fig. 4; and the part, 12, is screwed to the one contact piece, *a*, and the portions, 13 and 14, extend at the sides of both of the contact-pieces, *a*, *a*; the portion, 14, has the recess or indentation, shown at 15, and the adjacent corners of the two contact-pieces, *a*, *a*, are recessed, as seen at 16, in Fig. 3, they together forming cavities which, in conjunction with the one in the portion, 14, of the spring, effectually prevent the accidental displacement of the interposed fusible high resistance substance, *g*, which is here shown as of globular form, and in practice this piece, *g*, in place, holds the part, 14, about one thirty-second of an inch from the contacts, *a*, *a*.

The application of the springs and pieces, *g*, *g*, in duplicate, is to the end of increased certainty of the automatic operation, the one being relied upon to shunt the current in the event of the other failing to automatically operate by reason of any abnormal conditions which might affect the action of the spring and its fusible detainer. This interposed fusible substance is to have a resistance of about eight thousand times that of the carbon filament; and this substance, *g*, may for instance, be composed of oxide of mercury and carbon powder or plumbago, in the proportions of five of the former to one of the latter, these ingredients being amalgamated by the use of sirup or sugar.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An incandescent lamp having the two contact-pieces, *a*, *a*, and the leading-in wires and filament, and a spring connected to one of the contact-pieces and extended to lie across the other and having a cavity or recess therein and a substance which is easily fusible and of high resistance bearing in said cavity of the spring and also against one of the contact-pieces, *a*, for the purpose set forth.

2. An incandescent lamp having the two insulated contact-pieces, *a*, *a*, with the recesses, 16, 16, in their proximate portions, and the leading-in wires and filament, and the spring, *f*, connected to one of the contact-pieces and extended to lie across the sides of both thereof and having a cavity or recess therein, and a substance which is easily fusible and of high resistance resting in the recesses of the said contact-pieces and borne upon and held in place by the recessed portion of said spring, substantially as and for the purpose set forth.

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