

(No Model.)

C. G. ANDERSON.
INCANDESCENT ELECTRIC LAMP.

No. 365,499.

Patented June 28, 1887.

Fig: 1.

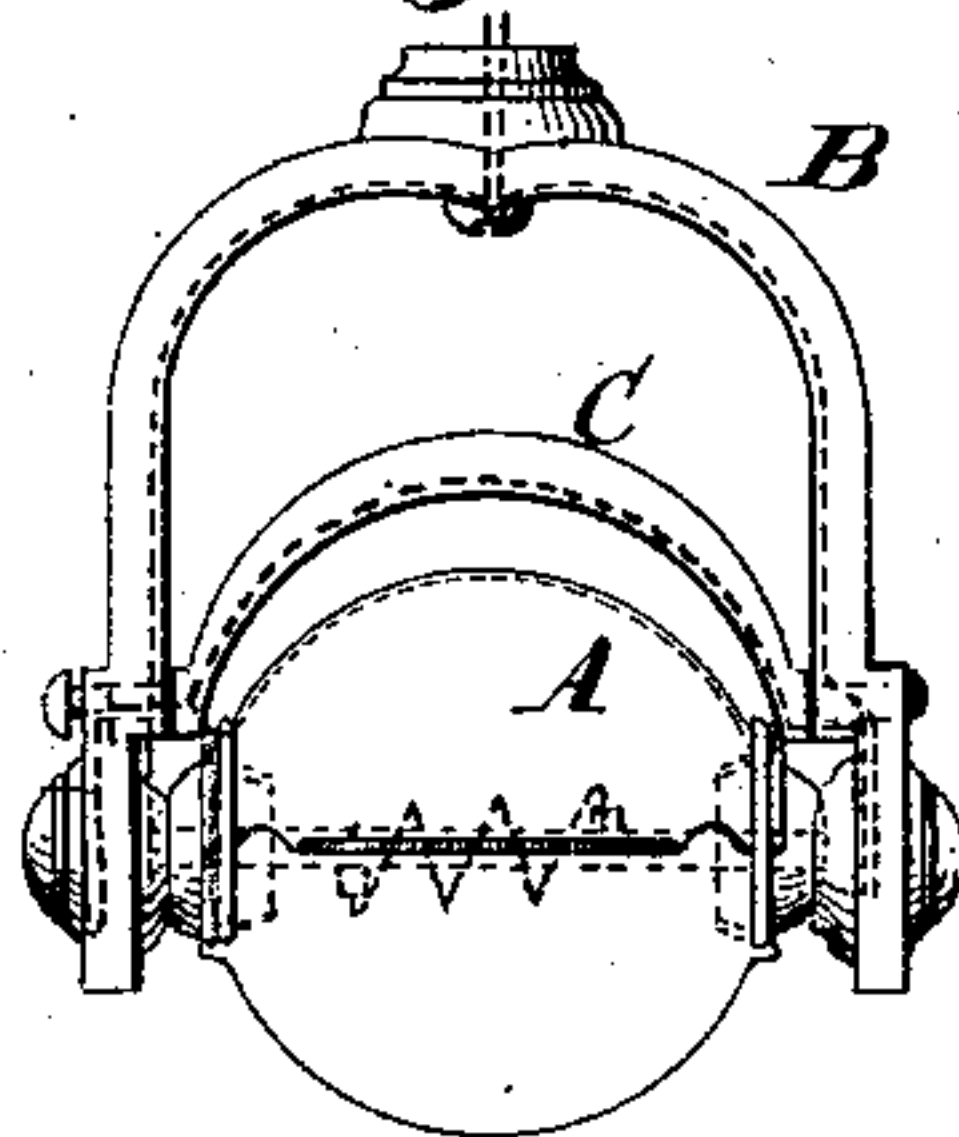


Fig. 2.

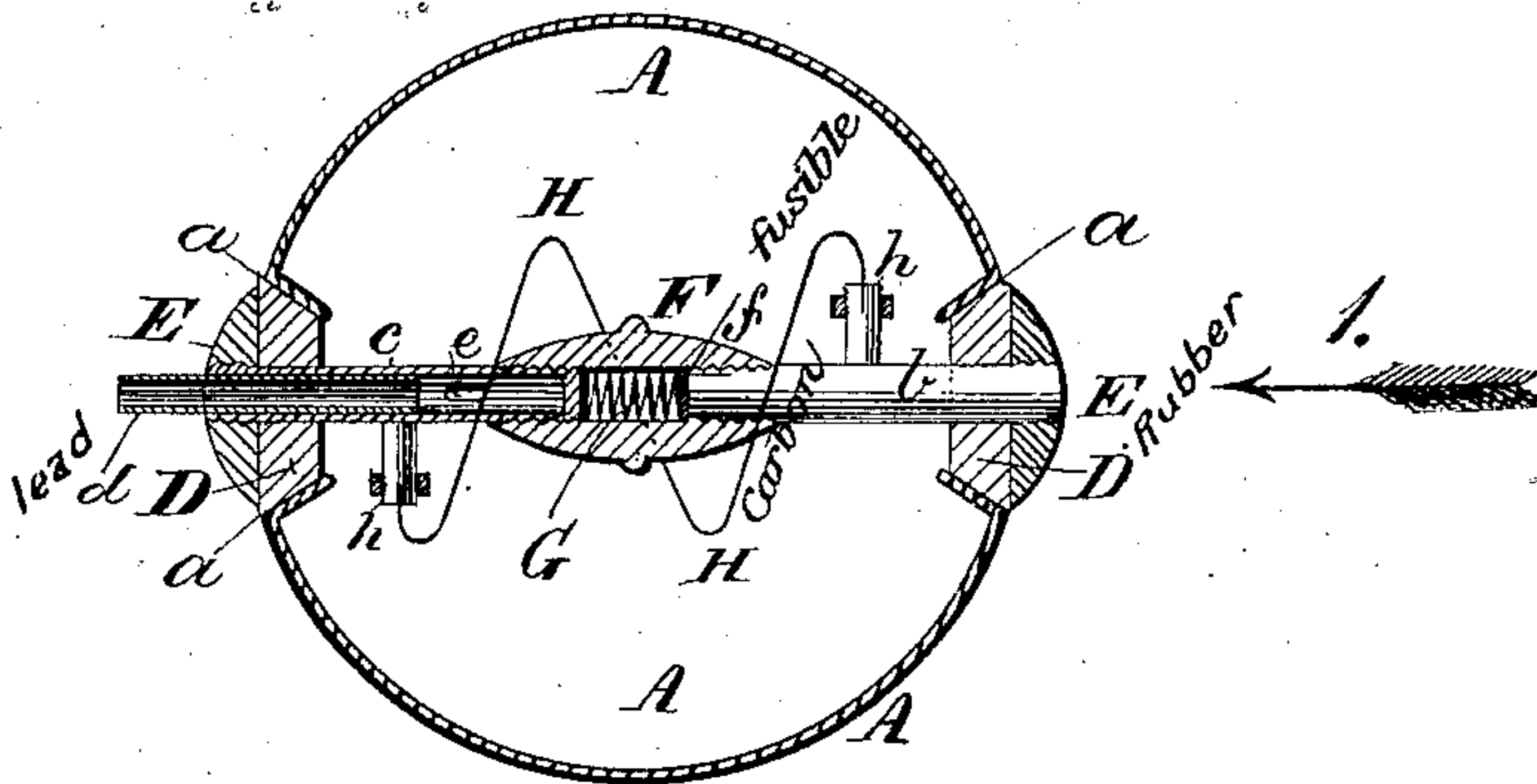
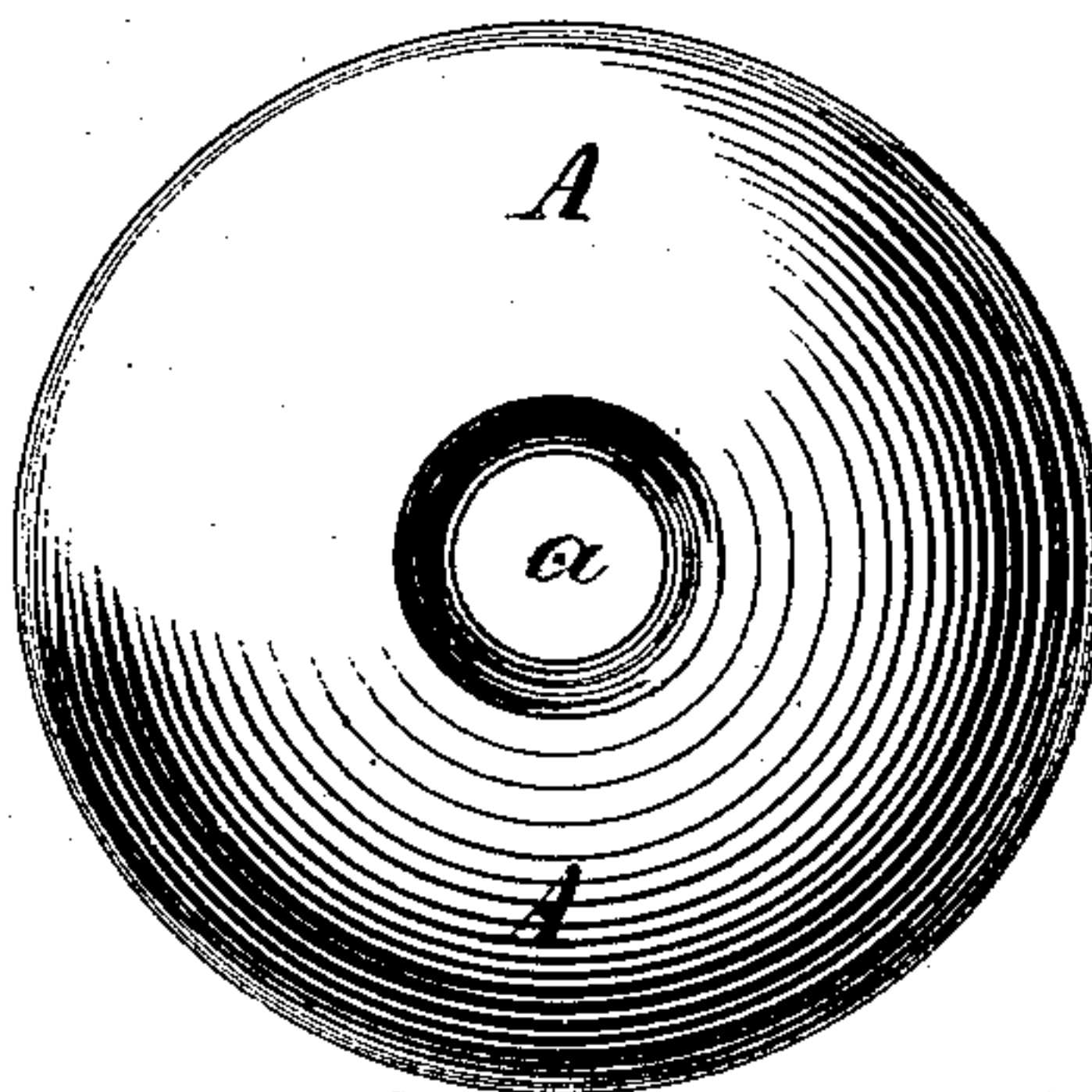


Fig. 3.



~~WITNESSES:~~

WITNESSES:
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John A. Thompson.

INVENTOR

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C. GUSTAF ANDERSON, OF HARTFORD, CONNECTICUT.

INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 365,499, dated June 28, 1887.

Application filed November 15, 1886; Serial No. 218,921. (No model.)

To all whom it may concern:

Be it known that I, C. GUSTAF ANDERSON, a citizen of Sweden, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Incandescent Electric Lamps, of which the following is a specification.

My invention relates to incandescing electric lamps, also called "glow-lamps," and has for its object to provide an improved construction of the glass bulb, whereby the air may be exhausted from the same to form a vacuum and the bulb sealed up to maintain the vacuum without melting the glass for the said purpose, thus not requiring the service of a glass-blower for the purpose of inserting and attaching the incandescing filament.

The invention has also for its object to provide a simple construction whereby, when the incandescing filament breaks, as it does occasionally, electric connection will be formed independently of the filament through the rod and pole-pieces to which it is attached, so as to maintain the circuit through all the lamps in a series working with low resistance, thus maintaining the light of all the lamps in the circuit with exception of the one in which the filament broke.

As operating electric lamps in series or by low resistance is becoming more and more usual, the importance of such an improvement will be readily understood, since without it all the lamps of the circuit would be extinguished as soon as the filament in one of the globes would break.

For the system of multiple arc with parallel circuit and high resistance it is not necessary and not intended, as in that system the circuit passes through each lamp separately from two parallel wires, so that consequently each lamp really has a separate circuit, and the extinguishing of one does not affect the others.

The invention will be hereinafter fully described, and specifically pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 represents a front view of a glow-lamp constructed according to my present invention, the frame and manner of suspending and attaching the globe being the same as that shown in my pending application, No. 194,103,

filed March 5, 1886. Fig. 2 is a central section of the globe with its filament attached. Fig. 3 is an end view of the globe itself, the filament and end stoppers removed, the view being seen in direction of arrow 1.

In my pending patent above referred to provision is made for maintaining the circuit by means of a bridge between the arms of the frame when the globe is being removed or the switch is turned to extinguish the light; but no provision is made in that patent for maintaining the circuit if the filament breaks and the globe is not removed from the frame.

A is the glass bulb, and B the elastic frame provided with a bridge, C, to which the bulb A is suspended in the manner shown in my pending patent application above referred to. The globe or bulb A has two diametrically-opposite openings, *a*, preferably tapering inward, as shown.

D is a stopper or plug, preferably of soft rubber, adapted to close air-tight the said openings, *a*. Centrally through the said stoppers D are inserted a rod, *b*, and a tube or tubular rod, *c*, both made of metal. These are threaded on their inner ends and interconnected by a correspondingly-threaded coupling, F, of insulating material, leaving a space between the ends of the said rods *b c* centrally within the said coupling, in which space is inserted a spiral spring, G, in metallic contact with one of the said rods—for instance *c*—and pressing with its free end upon a thin washer, *f*, of mica or other non-conducting material not too refractory to yield to the action of a sufficiently strong electric current.

H is the incandescing filament, and is attached with its ends to suitable binding-posts, *h*, secured to the rods *b c*. A hole, *e*, through the side of the tube *c* communicates with the interior of the bulb A, and within the said tube *c* is soldered a lead tube, *d*, one end of which projects outside of the tube *c*. The outer ends of the rods *b c* are threaded suitably to receive a nut, E. These nuts are convex on their outer surface, so as to act as the pole-pieces, like those in my pending patent above referred to, and to fit the correspondingly-concaved poles of the elastic frame B.

It is not necessary that both pieces E should be threaded and act as nuts. One of them—for

instance, that on the rod *b*—might be soldered and rigid with it like the head of a bolt. The coupling-rods *b c*, stoppers *D*, and nuts *E*, being inserted in the bulb, as shown in Fig. 2 of the drawings the nuts are tightened against the soft-rubber stoppers, so as to make an entirely air-tight joint against the seat in the holes *a*. The air in the bulb is exhausted by a vacuum-pump through the lead tube *d*, the projecting end of which latter is then compressed and twisted—for instance, with a pair of pliers—and melted to close air-tight within or flush with the convex surface of the nut or pole-piece *E*. By this construction it is evident that a vacuum can be formed and maintained without the necessity of melting the glass of the bulb, and consequently the same bulb can be used indefinitely and the filament removed and replaced by a new one without breaking or discarding the glass bulb or its fastenings.

If, as sometimes happens, the filament *H* breaks, the intensity of the current will heat the spring *G*, and thereby the thin mica washer *f*, sufficiently to melt or puncture the said washer, causing the spring to form metallic contact even with the rod *b*, and thus maintain circuit by passing the current directly through the said rods *b c* and spring *G* from one pole-piece *E* to the other. By the just-described central cut-out in the bulb *A*, adapted to be attached to the elastic frame *B*, having the bridge *C*, it is evident that the circuit is maintained even when the lamps are operated in series or by low resistance; for if the bulb is taken away, the current passes by way of the bridge *C*, and if the filament *H* breaks the current passes directly through the rods *b c* and spring *G*, as before stated.

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

1. In an electric lamp, the combination, with a bulb having pole-pieces *E* attached thereto, and a filament connected electrically or metalically with the said pole-pieces, of a cut-out establishing connection between said pole-pieces when said filament breaks, substantially as and for the purpose set forth.

2. In an electric lamp, the combination, with a bulb having pole-pieces *E* attached thereto, of rods *b c*, attached to the said pole-

pieces, a filament, *H*, attached to the said rods, an insulating-coupling, *F*, connecting the inner ends of the said rods, a spring interposed between the inner ends of the said rods, and a fusible insulator interposed between the said spring and one of the said rods, substantially as set forth.

3. In an electric lamp, the combination, with a bulb having pole-pieces *E* attached thereto, and with an elastic frame, *B*, adapted to receive and grasp the said bulb by the said pole-pieces, and having also bridge-piece *C*, maintaining the circuit when the bulb is removed, the said bulb having filament *H* electrically or metalically connected with the said pole-pieces, of a cut-out establishing connection between the said pole-pieces when the said filament breaks.

4. The combination of a bulb, *A*, having opposite openings *a*, stoppers *D*, adapted to close the said openings *a*, a rod passing through the said stoppers and secured to the same by means of shoulders or nuts *E*, and a soft-metal or fusible tube, *d*, connecting the exterior and interior of the bulb through one end of the said rod, for facilitating the forming of a vacuum in the said bulb, substantially as specified.

5. In an electric lamp, the combination of a bulb, *A*, having opposite inwardly-tapering openings *a*, elastic stoppers *D*, adapted to close the said openings, a rod, *b c*, passing through the said stoppers and having filament *H*, convex pole-pieces upon the outer ends of the said rod in contact with the said stoppers, one of the said pole-pieces *E* being threaded upon the said rod, and a soft-metal tube, *d*, secured air-tight within the hollow end of the said rod and connecting the exterior and interior of the bulb by means of a side opening, *e*, in the said rod or tube, for facilitating the forming of a vacuum in the said bulb, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 9th day of November, 1886.

C. GUSTAF ANDERSON.

Witnesses:

THOMAS McMANUS,
JOHN C. PALMER.