(No Model.)

E. THOMSON.

INCANDESCENT ELECTRIC LAMP.

No. 335,158. Patented Feb. 2, 1886.

Fig. 1.

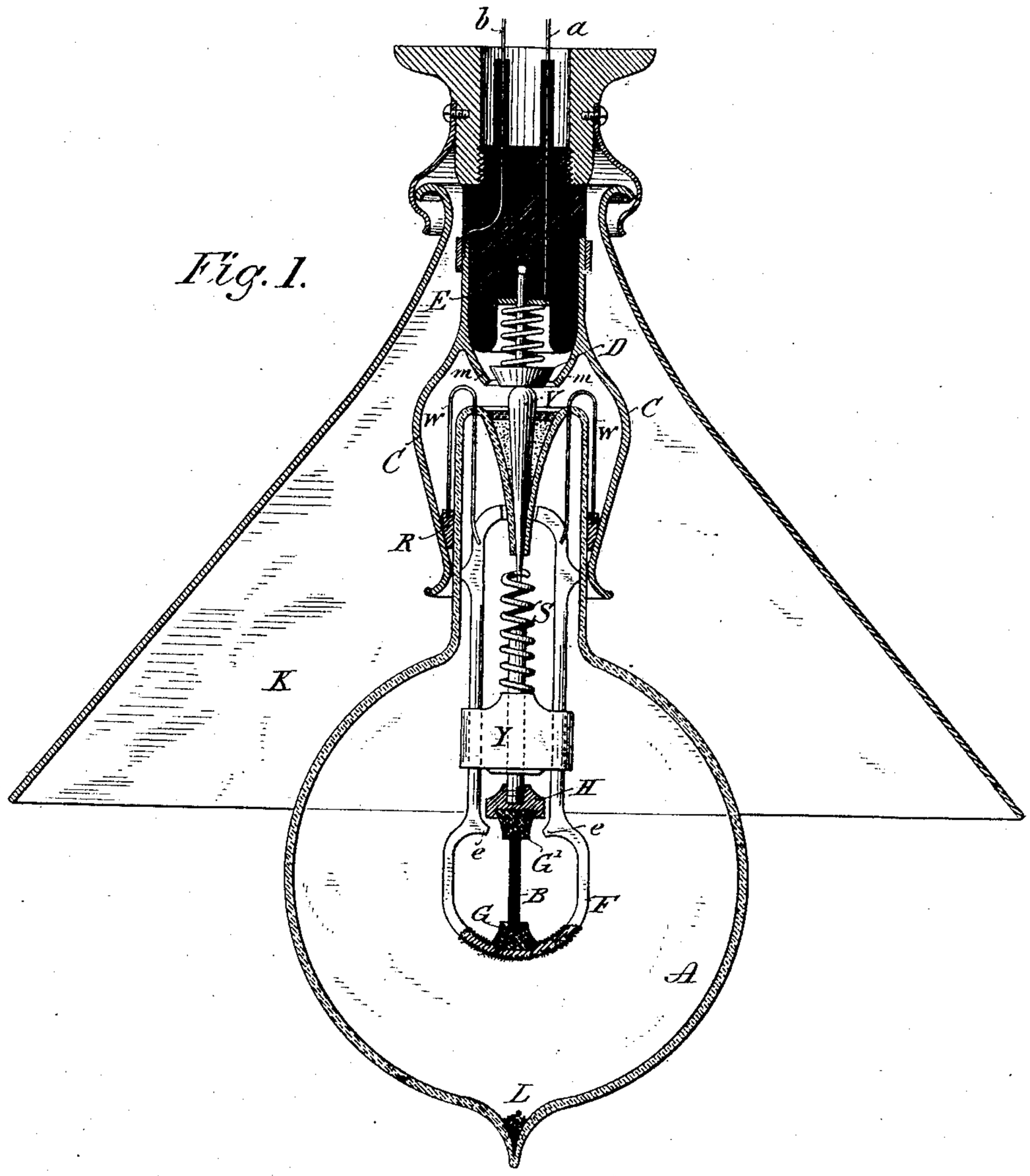
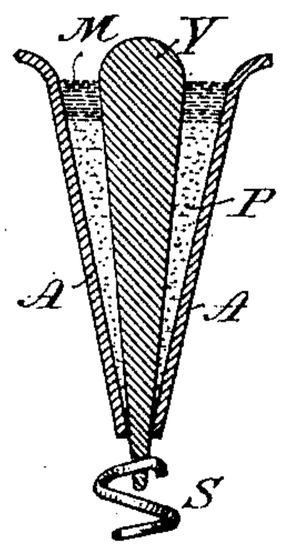


Fig. 2.



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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF BOSTON, MASS.

INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 335,158, dated February 2, 1886.

Application filed January 2, 1883. Serial No. 80,640. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

My invention relates to sealed electric lamps, and more especially to that type in which an incandescent strip or rod is used as the source of light.

The object of my invention is to avoid as far as possible the liability of leakage at the point where the conducting wires or rods pass through the glass casing, and to provide a means whereby the continuity of the general circuit may be preserved when the lamp is removed from its socket, or when the carbon breaks, so that an incandescent lamp may be used in series with other incandescent lamps or with arc-lamps.

My invention consists of certain novel switching appliances, to be hereinafter described and claimed.

My invention consists, further, of certain novel constructions and devices that will be described and claimed.

In the accompanying drawings, Figure 1 is a vertical central section of the complete lamp. Fig. 2 is a detail of construction.

In Fig. 1, A is the lamp-globe of glass. From the neck or other portion of said globe is hung the metallic conducting-frame F, which serves to support the incandescent carbon B or other material and to convey the electric current to or from the same. Said frame is preferably stamped out of sheet-steel, and its surface is enameled or coated with glass or porcelain, or any other material that will not be affected by the gases or liquids contained in or generated in the lamp, so as to protect the metal from the action of said gases. The upper end of the frame F F is brazed or otherwise connected to wires W W, of iron, platinum, or other suitable material, which pass outward through the glass envelope, being suitably sealed at their point of exit, and upon the exterior of said globe are connected with a metallic ring, plate, or other suitable terminal, R, by means of which separable connection is made with one of the wires supplying current to the lamp. The wires or supports W are upon the interior of the lamp suitably enameled or coated, in the same manner as the frame F. At the lower end of frame F is a suitable support or electrode, G, for the carbon stick or pencil B. Said electrode is by preference made of a small block of very dense graphite electrically connected with the steel frame F by plating or otherwise. Upon the frame F, and above the carbon, is a movable yoke or cross-head, Y, of some insulating material—such as glass or porcelain—which carries a piece, H, of some conducting material, terminating in an electrode or support, G′, similar to G, and in electric connection with one of the outside conductors by a spring, S, or by other suitable means. The opposed faces of G and G′ have small cavities formed in them for the reception of the ends of the rod B, of carbon or other suitable material, which latter is held in place by the spring S. The latter is suitably connected with the entering conductor V, to be presently described.

The entering conductor V is an elongated cone, preferably of steel or iron, inserted into the inwardly-turned conical end of the lamp-globe. At its smaller extremity it is sealed into the glass, while above it is surrounded with a semi-solid or nearly solid amalgam, (indicated at P,) which is contained in the inwardly-turned conical end, and above which is a layer of wax or paraffine, M, as shown in Fig. 2. The rod or conductor V is made thick and tapering to its smallest section, where it is inserted through the glass, this construction being adopted in order to make the joint as small as possible, but at the same time to give strength and conductivity to the major portion of the rod. In order to produce a tight and close joint, I propose to employ an amalgam that will adhere closely to both the glass and the metal of the conductor, and for this purpose use an amalgam containing sodium or potassium, or even lead, which amalgam is placed around the conductor in a semi-solid or nearly solid mass. The conductor may be of iron or of other materials to which the amalgam will adhere as well as to the glass. The layer of paraffine or hard wax serves to hold the amalgam in place.

Formed upon or connected with the frame F are conducting-stops *e e* for the piece or holder H. Should the rod B break, the holder H is brought by the spring S or by gravity into contact with the projections *e e*, so as to preserve the continuity of the circuit, as will be understood by an inspection of Fig. 1.

The lamp is held in place by spring-clips C C—two or more—attached to a body of insulating material, E, and resting in contact with the ring R, before referred to, while the conductor V makes contact with a yielding stop or plug, D, forced downward by a spring above it, and electrically connected with the entering wire *a* from the circuit upon which the lamp is placed, spring-clips C C being in connection with the other wire, *b*, of the circuit.

When the lamp is removed from the clips C C, the stop or plug D acts as a circuit-closer to connect *a* and *b*, and for this purpose is arranged to come into contact with the springs *m m*, or other suitable contacts connected with a spring or springs, C C, so that the circuit is maintained intact. An outer shade or cover, K, suitably supported, covers all the metal portions of the lamp and holders that are otherwise exposed.

The current enters, say, at *a*, passes to D, to V, to S, to H, through B, rendering it incandescent, to G, to F F, and out at W W R to C C, and to wire *b*. The lamp A is exhausted of air while at a high temperature and hermetically sealed. The source of light is the outer surface of B rendered very highly incandescent.

I propose to construct the carbon B so that its exterior shall be of greater density or hardness, and therefore a better conductor, than its interior, thus confining the greater part of the electric flow to the exterior, and preventing the vaporization and disintegration of the interior, which would otherwise ensue if the rod were uniform, owing to the fact that the interior cannot radiate as freely as the outside of the rod. By thus constructing the incandescing-rod so that its exterior shall be of hard good conducting carbon, the internal structure, being less heated than it otherwise would be, helps to retain the form, even at very high temperatures, of the exterior—such that a rod or filament as ordinarily used would but for a short period sustain.

The rod B may be made by taking a rod of rather poorly-conducting carbon, dipping the latter momentarily in sugar, sirup, tar, or other carbonaceous matter and baking in close vessels, repeating the operation until the desired hardness or conductivity of skin is obtained; or a hard thin tube of carbon of good conducting power may be filled with a more spongy carbon with cementing sirup or tar, and afterward carbonizing the whole in close vessels.

It is essential that pure carbon, and carbon only, exist in the rod B, and that such carbon be prepared of the qualities herein mentioned at a very high temperature, out of contact with air, and finally located in a good vacuum; or it may be heated in pure dry hydrogen and inserted in the lamp-globe, said globe having been previously filled with hydrogen, so as to drive out the air. A good exhaustion of said globe is then obtained, the lamp sealed, and the final traces of hydrogen removed by small fragments L of a dry substance having an affinity for hydrogen at moderate elevation of temperature. For example, fused sodium manganate or chromate, or barrine dioxide, lead dioxide, or silver oxide may be used in presence of sodium oxide, all dry and pure. The substance used should absorb water, vapor, and hydrogen below a red heat. By these means every trace of oxygen will be excluded or removed from the interior of the lamp-globe.

I make no claim herein to the above method of preparing the vacuum for the incandescing body, but reserve the same for a separate patent; nor do I make any claim herein to the sealing compound described, as such will form the subject of a separate application for patent.

What I claim as my invention is—

1. The combination, with the metallic supporting-frame for the incandescing conductor, of the block G, of hard graphite, resting directly in or on said frame, and electrically united therewith by plating, said block itself forming a holder for the end of the incandescing conductor.

2. The combination, with the reciprocating holder H, bearing against the end of the carbon pencil, for making electrical connection to said pencil, of a spring forcing said holder against the carbon pencil and a contact in the path of the holder, as and for the purpose described.

3. The combination of a holder, H, bearing directly on the end of the carbon pencil, a guide-frame therefor supporting the pencil at its lower end, a spring, S, above the holder, and a contact in the path of the holder H, as and for the purpose described.

4. The combination of frame F, holder G, rod B, holder H, and contact *e*, as and for the purpose described.

5. The combination, with the inverted conical neck for the globe, of the conical entering conductor V.

6. The combination of the incandescent lamp having projecting conductor, a spring-actuated and reciprocating contact in the bottom of the lamp-socket, and a spring arranged in the path of said contact and connected to one of the circuit-wires, all as set forth, so that the act of inserting the lamp into its socket will actuate the contact and break the connection between said contact and the spring.

7. The combination of the incandescent lamp having spring-socket, the reciprocating

contact-block D, conductor V, and springs *m*, arranged in the path of the block D and connected to one of the circuit-wires.

8. The combination of insulating-block E, plug D, spring-clips C, and lamp provided with a conducting-ring forming one terminal, and a conductor, V, projecting from the lamp proper, forming the other terminal and adapted to make contact with plug D.

9. The combination, with the lamp, of springs C, contact-springs *m*, and spring-actuated plug D.

10. The combination, with the globe A, of the frame F, lower holder, G, supported by said frame, supporting-wires W, yoke Y, holder H, spring S, and entering conductor connected therewith.

11. The combination, with the frame F, of the electrode or holder G, of any suitable material, the longitudinally-reciprocating support H, carried by the frame, and the incandescing-rod B.

Signed at New Britain, in the county of Hartford and State of Connecticut, this 28th day of December, A. D. 1882.

ELIHU THOMSON.

Witnesses:
E. WILBUR RICE,
W. O. WAKEFIELD.