

(No Model.)

G. R. LEAN.  
INCANDESCENT ELECTRIC LAMP.

No. 533,223.

Patented Jan. 29, 1895.

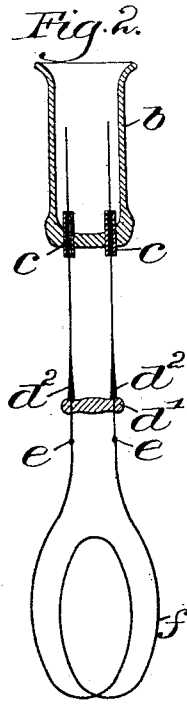
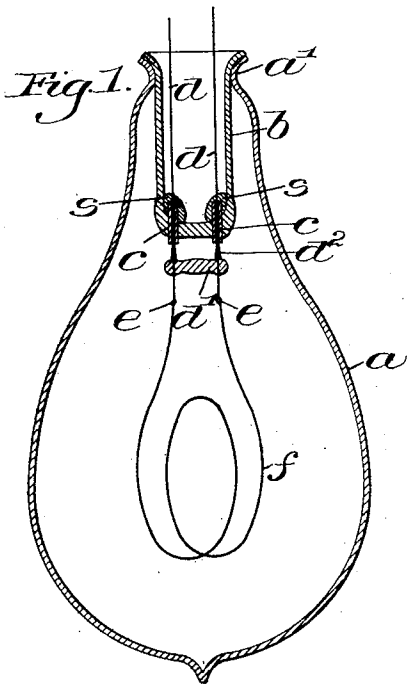
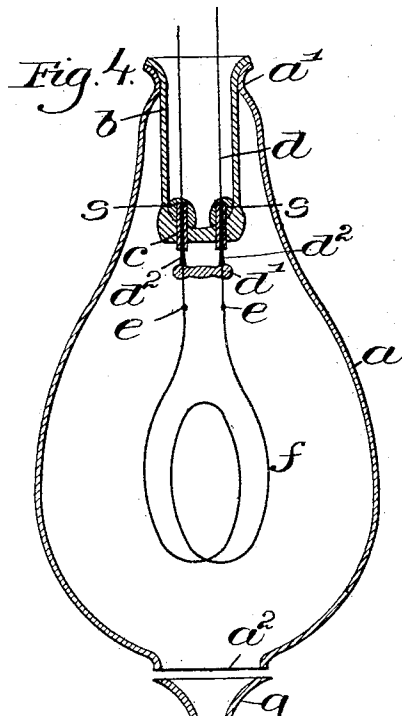
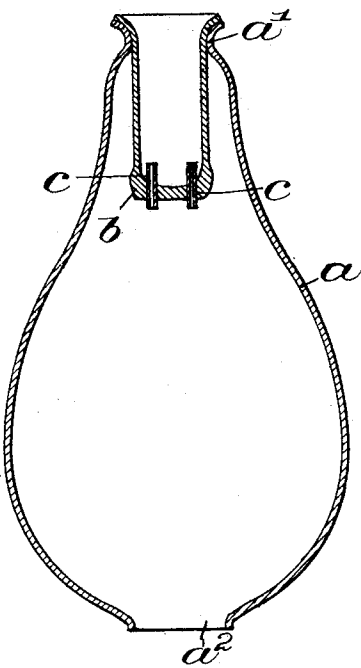


Fig. 3.



Witnesses  
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# UNITED STATES PATENT OFFICE.

GEORGE R. LEAN, OF CLEVELAND, OHIO.

## INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 533,223, dated January 29, 1895.

Application filed November 29, 1893. Serial No. 492,375. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE R. LEAN, of Cleveland, county of Cuyahoga, State of Ohio, have invented an Improvement in Incandescent Electric Lamps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the production of a cheap, simple and durable incandescent electric lamp, the bulbs of which may be used over and over when the lamp is burned out, by renewing the filament, at a small cost and by a simple operation.

In accordance therewith my invention consists, in an incandescent electric lamp, of the bulb, combined with tubular metallic guides sealed therein, leading-in wires extended completely through said guides, to sustain the filament, and a hermetic seal surrounding the leading-in wires at and sealing their entrance into said guides, substantially as will be described.

Other features of my invention will be hereinafter described and particularly pointed out in the claims.

Figure 1 is a vertical sectional view of an incandescent electric lamp embodying my invention. Fig. 2 is a detached view, in section, of the stem, with the leading-in wires loosely extended through the guides. Fig. 3 is a vertical sectional view of a bulb and its stem, the bulb being shown as open at the bottom to receive a new filament and leading-in wires, and Fig. 4 is a similar view showing the filament in place and the bulb ready to be closed.

As herein shown the bulb *a*, of glass or other suitable material, is open at its neck *a'* to receive a tubular stem *b*, open at its upper end, and preferably made of glass, the stem and bulb being sealed together in any suitable manner. Tubular metallic guides *c, c* are extended through the material of the stem at its lower end and hermetically sealed therein, said guides being preferably made of platinum or alloys of platinum, as a good joint with the glass can be made, and the guides can be drawn down to very fine walls when such metal is used. The sealing of the guides *c* in the stem *b* is accomplished before the stem is attached to the bulb.

Leading-in wires *d, d*, of iron, nickel, bronze, or any metal of comparatively good conductivity, which will not emit gases injurious to the filament, are joined to the filament *f* at the points *e, e*, in usual manner.

A glass bridge *d'* serves to maintain the filament and leading-in wires in proper shape to be applied to the stem or bulb in the course of manufacture.

Referring to Fig. 2 the leading-in wires, connected to the filament *f*, are shown as extended through the metallic guides *c*, in the stem *b*, previous to the sealing of the leading-in wires to the metallic guides in the stem, and the attachment of the latter to the bulb.

Insulating material is applied to the wires *d* at *d<sup>2</sup>*, so that when the said wires are drawn up in place, as shown in Figs. 1 and 4, the insulation *d<sup>2</sup>* will separate and effectively insulate the wires from the tubular guides *c*.

Glass or enamel may be used as the insulating material, and I have found that varnish may be readily applied to the wires and forms a good insulator after drying by a gentle heat.

The leading-in wires are better conductors than the guides *c*, and a very thin layer of insulation may be used with substantially no danger of rupture.

It is necessary to hermetically seal the leading-in wires in the tubular guides, and to accomplish this sealing I use a solder preferably composed of equal parts of tin and lead, with from five to ten per cent. of copper, applying the seal at one end of the guides, as at *s*, Figs. 1 and 4. The seal may, however, be made at the other end of the guides, if desired, outside of the stem *b*, but in such case a harder solder would be required, the melting point being high enough to withstand the heat of the filament. A solder containing a large proportion of silver fulfills such requirements, and I have found it very satisfactory, though other suitable solders may be used for the seal.

When a lamp burns out an opening, as *a<sup>2</sup>*, in Figs. 3 and 4, is made in the base of the bulb, and the leading-in wires are withdrawn from the stem, and a new filament with its attached wires is inserted, the leading-in wires *d*, being passed up through the guides *c* of the stem, as in Fig. 2, and sealed as de-

scribed, in proper position. The opening  $a^2$  is then closed by a funnel shaped tube  $g$ , Fig. 4, blown on to the bulb and then drawn down, and when the bulb is exhausted the tube is sealed and the surplus portion of the tube removed.

The stem  $b$ , it will be evident, forms practically a part of the bulb after it is secured thereto.

10 The lamp herein described is cheap in construction on account of the very small amount of platinum used; and the number of lamps cracked in manufacture and in use is very small, for the reason that the leading-in wires  
15 do not come in contact with the material of the stem or bulb, the thin walls of the guides carry no current, and the expansion and contraction of said tubular guides due to variations of temperature are much less than would  
20 be the case with a solid wire having the same coefficient of expansion, so that the metal approaches very closely the expansion of glass, producing a shorter and more secure seal, than would be otherwise obtainable.

25 The burned out lamps can be easily renewed, so that the bulbs and expensive tubular guides can be repeatedly used. The insertion of the parts through the opening in the bulb is easily accomplished, and the seals  
30 can be made more effectively than by the methods of construction now known to me.

My invention is not restricted to the precise construction and arrangement of parts as herein described as the same may be changed  
35 or altered without departing from the spirit of my invention.

I claim—

1. In an incandescent electric lamp, the bulb, combined with tubular metallic guides

sealed therein, leading-in wires extended completely through said guides, to be attached to and sustain the filament, and a hermetic seal surrounding the leading-in wires at and sealing their entrance into said guides, substantially as described.

2. In an incandescent electric lamp, the bulb, combined with tubular metallic guides sealed therein, leading-in wires of greater electrical conductivity than and extended through said guides, to sustain the filament, and a hermetic seal having a lower melting point than that of the leading-in wires, surrounding the wires at and sealing their entrance into said guides, substantially as described.

3. In an incandescent electric lamp, the bulb, combined with tubular metallic guides sealed therein, leading-in wires secured to the filament and extended through said guides, and insulating material interposed between said wires and guides, substantially as described.

4. An incandescent electric lamp bulb, having a temporary opening, combined with tubular metallic guides permanently sealed in said bulb, and leading-in wires having insulated material applied thereto secured to the filament and adapted to be inserted in and extending through said guides and positioned through the temporary opening in the bulb, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE R. LEAN.

Witnesses:

FRANK NOVILLE,  
II. JUDSON.