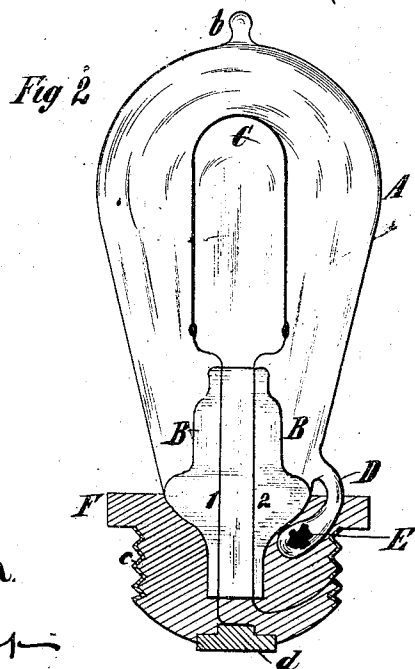
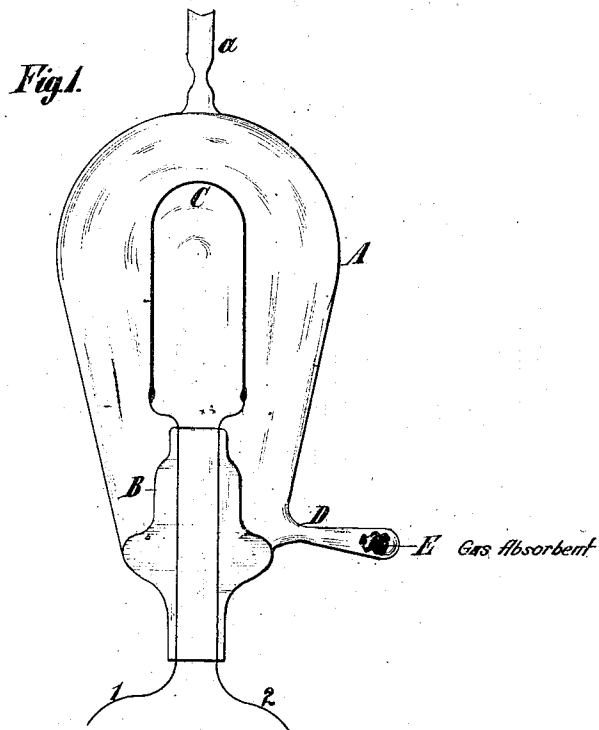


(No Model.)

T. A. EDISON.  
INCANDESCING ELECTRIC LAMP.

No. 401,646.

Patented Apr. 16, 1889.



WITNESSES:  
Thomas E. Birch.  
D. D. Mott.

INVENTOR:  
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# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE  
EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

## INCANDESCING ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 401,646, dated April 16, 1889.

Application filed August 7, 1882. Serial No. 68,617. (No model.)

### *To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Incandescent Electric Lamps, (Case 394;) and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

I have discovered that in the use of my incandescent electric lamp the stability of the vacuum is injured to some extent by the escape of occluded gases from the metal conductors within the exhausted glass chamber, which gases cannot practically be entirely driven off when the vacuum is being produced, since such conductors are not raised to a high degree of heat as the carbon filament is at that time. These occluded gases are not given off rapidly, but they escape slowly during the use of the lamp, gradually reducing the degree of exhaustion of the lamp. For this reason no means for the absorption of the gases, applied only during the course of manufacturing the lamp or before it is put into commercial use, can be relied upon to overcome completely this difficulty; but the lamp as commercially sold and used must be provided with means ever present for preventing the exuding gases from affecting the condition of the vacuum. I accomplish this object by permanently providing the lamp with a material which will absorb completely the occluded gases as they are given off. For this purpose I use a piece of charcoal, preferably a dense coconut charcoal, which is raised to a high degree of heat during the latter part of the process of exhausting the lamp, so as to drive off its own gases. This charcoal must be removed as far as possible from the light, in order that it may not be heated thereby in the use of the lamp, which heating would decrease its capacity for absorption of gases. To do this I inclose the charcoal in a glass tube having a closed outer end, and connected at its inner end to the chamber of the lamp, at the lower end of such chamber. This tube may be allowed to project directly out from the lamp when first attached for convenience in heating the charcoal by heat from a lamp

or other source applied externally to the tube. After the lamp is sealed this tube is heated at its junction with the globe and bent down against the neck of the lamp, it being included in and covered partly or wholly by the molded base, which is afterward formed on the lower end of the lamp.

In my patent, No. 248,428, is described a process of removing the occluded gases before the lamp is commercially used, which is the same that goes on during the use of the lamp constructed according to my present invention. After sealing off the lamp at *x* in said patent a complete lamp was obtained provided with the gas-absorbing material, which lamp might have been commercially sold and used in that form; but the bulb *B* of the lamp was cumbersome, liable from its position to be easily broken, and, to be heated by direct radiation from the light, and it detracted from the symmetrical appearance of the lamp.

During or before the process of exhaustion I may, if desired, place within the globe a compound of chlorine or bromine with any element which when heated gives off a chlorine or bromine gas, which will unite with the hydrogen given off by the carbon filament to form hydrochlorine or hydrobromine acid gas; or the chlorine or bromine gas may be introduced directly into the globe with the same result. The exhaustion of the lamp is then proceeded with until the highest possible degree of vacuum is attained, when the lamp is sealed off. Charcoal having the power of absorbing large quantities of hydrochloric-acid or hydrobromic-acid gas without materially impairing its absorbent capacity for other gases, the modicum of such gases which remain in the globe is taken up by the charcoal in the bulb attached to said globe, and a better vacuum is thus obtained than would occur if air only were left in the globe.

In the drawings, Figure 1 represents the lamp before being exhausted, and Fig. 2 the complete lamp embodying my present invention.

*A* is the glass globe, *B* the tubular support of glass for the leading-in wires 1 2, and *C* the incandescent carbon filament.

*D* is the tube, containing charcoal *E*, which

tube is closed at its outer end and is connected at its inner end with the lower portion of A. This tube when attached to A is allowed to project from the same, as shown in Fig. 1.

5 The lamp is exhausted through the tube *a*, and the charcoal heated to a high temperature, as before explained, the carbon filament being also raised to a high degree of incandescence by the passage of an electric current through it. The tube *a* is sealed off to  
10 form the knob *b*, Fig. 2. The tube *D* is heated and bent down, being covered partly or wholly by the molded base *F*, carrying the metal terminals *c* *d*, to which the leading-in wires are  
15 connected.

What I claim is—

An exhausted and sealed incandescent electric lamp provided with a tube or vessel containing a gas-absorbing material—such as charcoal—such tube or vessel being connected 20 with the exhausted chamber of the lamp and embedded in the base of the lamp, substantially as set forth.

This specification signed and witnessed this 10th day of February, 1882.

THOMAS A. EDISON.

Witnesses:

RICHD. N. DYER,

WM. H. MEADOWCROFT.