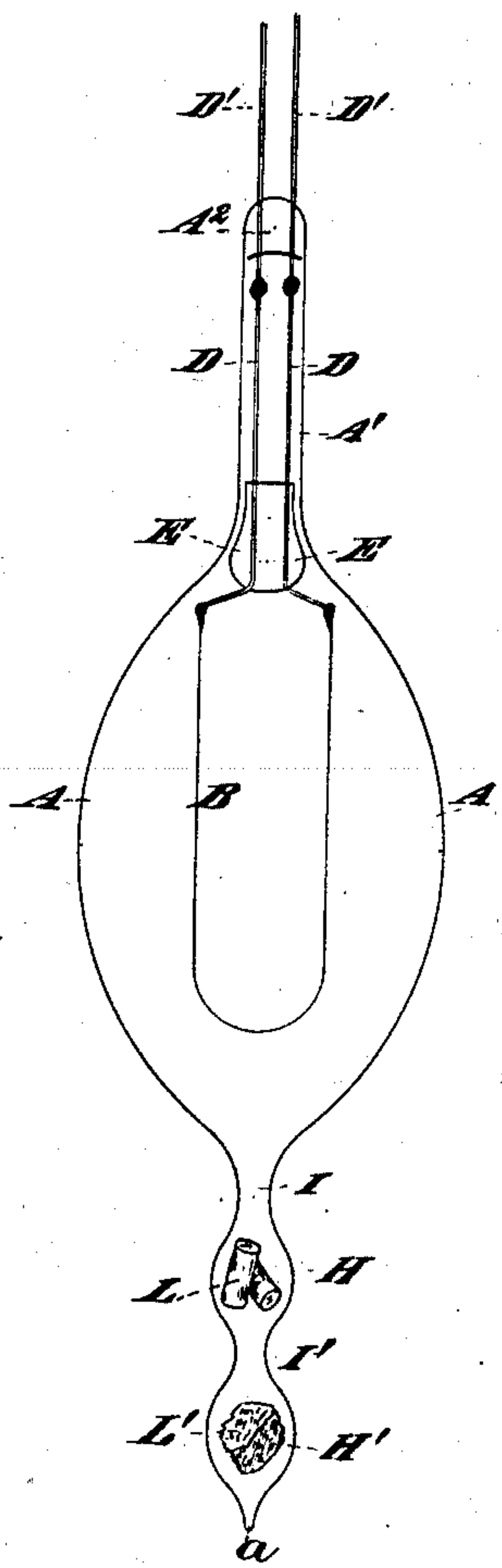


(No Model.)

W. L. VOELKER.  
INCANDESCENT ELECTRIC LAMP.

No. 255,219.

Patented Mar. 21, 1882.



Witnesses—  
Charles R. Searle,  
L. J. Pierce

Inventor—  
William L. Voelker,  
By A. M. Pierce,  
Attorney.

# UNITED STATES PATENT OFFICE.

WILLIAM L. VOELKER, OF MORTON, PENNSYLVANIA, ASSIGNOR TO JOHN  
H. IRWIN, TRUSTEE, OF SAME PLACE.

## INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 255,219, dated March 21, 1882.

Application filed December 13, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM L. VOELKER, of Morton, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Incandescent Electric Lamps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing and the letters of reference marked thereon.

My invention relates especially to the construction of incandescent electric lamps of the class known as "vacuum," and has for its object the production of a completed lamp in which the vacuum is perfect or as nearly so as can possibly be attained.

It consists essentially in forming the bulb which constitutes the wall of the completed lamp with an elongated section of tubing attached to its upper extremity, said tubing being so constructed and arranged as to contain certain chemicals used in forming a high vacuum, and in certain novel methods of construction and manipulation, all of which will be hereinafter first fully described, and then pointed out in the claims.

The drawing herewith presented illustrates the method of construction employed by me in my improved lamp.

Heretofore great difficulty has been experienced in obtaining a perfect vacuum in the construction of electric lamps, as by the ordinary method of sealing the bulb after exhaustion with the pump some air will be admitted during the process. The presence of moisture, &c., in lamps thus constructed has also been a source of great annoyance. To overcome these difficulties is the object of my invention.

In the drawing, A is the glass bulb of the lamp, formed in the usual manner.

B is the filament of carbon, soldered to the copper conductors D, extending through a mass of non-conducting material, E, seated in the tube A' at the neck of the bulb. Before reaching the extremity of tube A' the copper conductors are secured to platinum connections D', extending through the sealed portion of the tube. Tube A' is made solid at A<sup>2</sup> for about one-half an inch, as indicated.

H is a small bulb attached to the extremity

of bulb A, and having communication therewith by means of the small tube I. Bulb H contains hydrate of potassa L. To bulb H is attached a second small bulb, H', communicating with H by means of small tube I'. Said bulb H' contains broken pumice-stone L', saturated with sulphuric acid.

In the drawing the lamp is shown in an inverted position, as it is so supported while completing the vacuum. When the lamp is completed, ready for exhaustion, it is charged with pure carbonic-acid gas. It is then exhausted to the highest possible degree attainable with a mercurial pump, after which the rarefaction is continued still further by the aid of hydrate of potassa in the manner well known and understood by chemists and others skilled in the art to which my invention relates. When the exhaustion is complete the lamp is sealed at a. It is then connected with an electric generator and the carbon filament heated to a low red heat, the heat being gradually increased until the filament is incandescent. By this means the aqueous vapor contained in the pores of the carbon is expelled without decomposition, and is finally absorbed by the sulphuric acid with which the pumice-stone is saturated, the slight residue of carbonic acid contained in the lamp being gradually absorbed by the hydrate of potassa. Traces of oxygen existing in the lamp, combining with the carbon at white heat, form carbonic acid, and also with the hydrogen (ever present in carbon) to form water, both of which are absorbed by the before-mentioned chemicals. It will thus be seen that a vacuum is attained that in the present state of the art may be considered as absolutely perfect.

After the above chemical reactions are considered complete the lamp is finally sealed at I, and is ready for permanent use.

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

1. The herein-described method of attaining a perfect vacuum in incandescent electric lamps—that is to say, by forming the main bulb of the lamp with two small bulbs having free communication with said main bulb containing the incandescing filament of carbon,



placing in one of said bulbs hydrate of potassa and in the other pumice-stone saturated with sulphuric acid, exhausting and sealing the lamp in the usual manner, and then heating the carbon gradually from a low red heat to incandescence, and finally sealing the main bulb of the lamp, and removing the small bulbs, substantially as shown and described.

2. The main bulb A, incandescing filament of carbon B, connections D D', bulb H for holding hydrate of potassa, and bulb H' for

holding pumice-stone saturated with sulphuric acid, the whole combined and arranged to operate substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

WILLIAM L. VOELKER.

Witnesses:

SAMUEL BELL,  
J. M. GAUN, Jr.