(No Model.)

H. S. MAXIM.

Process of Removing Air from Globes of Electric Lamps.

No. 230,954. **Patented Aug. 10, 1880.**

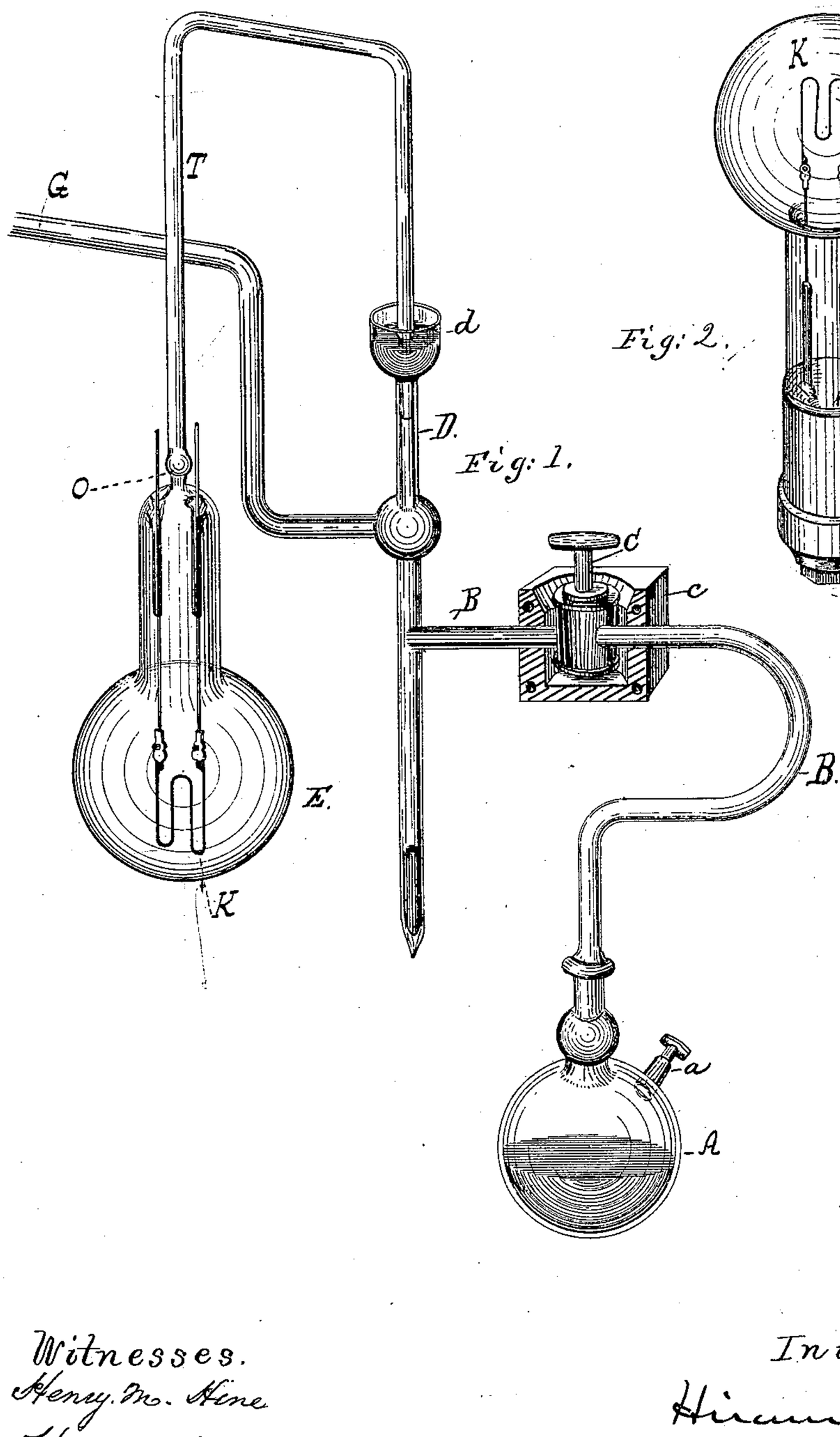

Fig. 1.

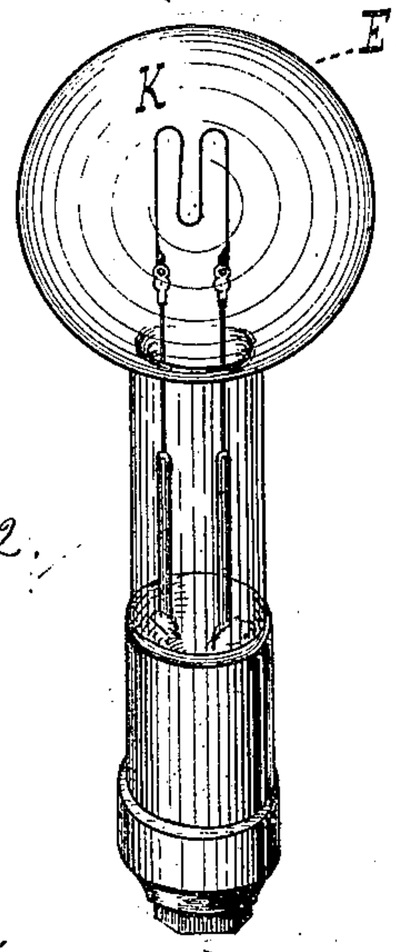

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF BROOKLYN, NEW YORK, ASSIGNOR TO SPENCER D. SCHUYLER, OF NEW YORK CITY.

PROCESS OF REMOVING AIR FROM GLOBES OF ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 230,954, dated August 10, 1880.

Application filed April 20, 1880. (No model.)

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of the city of Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Process of Removing Atmospheric Oxygen from the Globes of Electric Lamps, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

My invention relates more particularly to the class of electric lamps known as "incandescent" lamps, in which light is produced by the incandesence of a continuous strip or conductor.

It has been found necessary to protect the incandescent part of such lamps from oxygen, especially where it is made of carbon, as it rapidly deteriorates in the presence of even a very small amount of free oxygen. Such lamps are usually constructed with a glass globe inclosing the incandescent part, and various means have been used for removing oxygen from the globe, such as exhausting the air by means of an air-pump or displacing it by introducing an atmosphere of nitrogen. It is extremely difficult, if not impracticable, to produce a sufficiently high vacuum in the globe by the use of the air-pump alone to efficiently protect the conductor, and the presence of nitrogen in the globe is objectionable, as it "air-washes" the conductor, and the currents of connection carry away its heat.

It is the object of my present invention to obviate these difficulties and to remove atmospheric oxygen from the globe more perfectly than has hitherto been done.

I have shown in the drawings an apparatus suitable for performing my process; but I do not wish to be confined to the apparatus shown, as the particular form of the apparatus is not an essential part of my invention.

In the drawings, Figure 1 is a view of a globe attached to the apparatus for removing the air, and Fig. 2 is a view of a lamp completed and ready for use.

The globe E, having its conductor K properly mounted within it, and all its openings except the tube T securely sealed, is attached to the exhausting apparatus at *d* with a tight connection, preferably a joint of ground glass sealed with mercury.

G is a tube connecting with an air-pump suitable for producing a high vacuum, such as a Sprengel or a Geissler air-pump. B is a tube opening into the tube D, which is connected with G, and also with T, as shown.

C is a stop-cock, preferably of ground glass, and A is a vessel containing very volatile gasoline or other volatile hydrocarbon oil. It has a fill-pipe, *a*, secured by an air-tight stopper of ground glass, and has no other opening except into the tube B. Care should be taken to make all the joints and connections perfectly tight, so as to prevent all ingress of air. The cock C is first closed and the air is exhausted as perfectly as practicable by means of the air-pump. The cock C is then opened and the vapor of gasoline passes from A into the globe and mixes with the slight residuum of air remaining in it. The cock is then closed and the contents of the globe again exhausted, and the operation is repeated as many times as desirable. When the globe is finally exhausted, it is carefully sealed at O and mounted upon a proper base, as shown in Fig. 2.

It will be observed that with each operation of filling the globe with gasoline vapor and exhausting it the proportion of air remaining in the globe is very rapidly diminished, and when the contents of the globe are finally exhausted only an infinitesimal part of the residuum left in the globe consists of air, the greater part being gasoline vapor. As nearly an absolute vacuum can be produced by pumping out gasoline vapor as by pumping out air, and the removal of atmospheric oxygen is therefore accomplished many times as perfectly by this process as by the use of the air-pump alone.

The presence of a trace of hydrocarbon vapor or gas in the globe is not injurious to the incandescent conductor, but, on the contrary, is beneficial to it, especially if the conductor is made of carbon. When the conductor becomes highly heated, probably the greater part of the carbon contained in the hydrocarbon vapor is deposited upon the conductor at its hottest and consequently weakest points,

and tends to correct any slight irregularities in its thickness or width, and if there should be any trace of free oxygen present it would probably unite with the carbon of the residuum of hydrocarbon vapor instead of attacking the conductor.

It is obvious that other hydrocarbon vapors or gases may be used instead of vapor of gasoline, although I prefer gasoline on account of its high penetrating powers.

The process may be facilitated by boiling the conductor and its connections in gasoline before exhausting the air from the globe, so as to expel all air from the pores of the material.

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

The process of removing atmospheric oxygen from the globe of an electric lamp, consisting of first exhausting or otherwise removing the greater part of the air contained in such globe, and then admitting thereto and exhausting therefrom a hydrocarbon vapor or gas, substantially as described.

HIRAM S. MAXIM.

Witnesses:
J. C. CHAMBERLAIN,
HENRY HINE.