(No Model.)

T. H. BLAMIRES.

ELECTRIC LAMP.

No. 291,867. Patented Jan. 15, 1884.

Fig. 1.

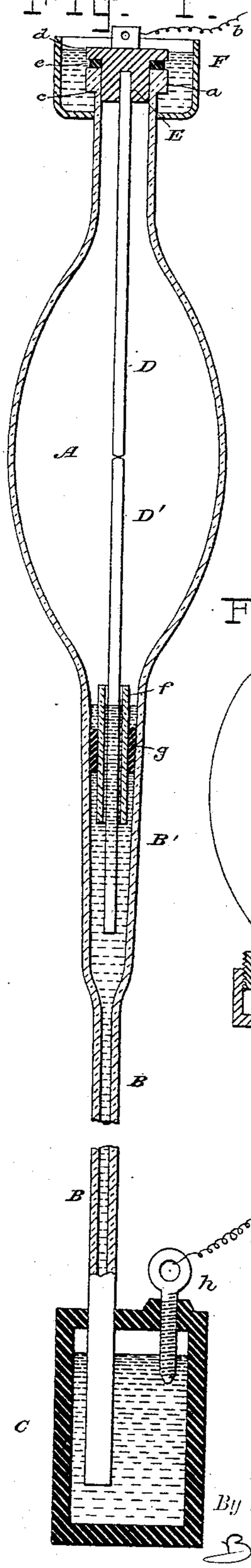


Fig. 2.

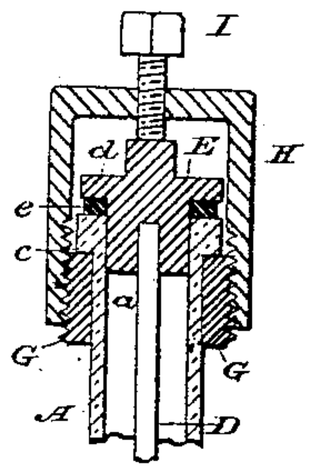


Fig. 3.

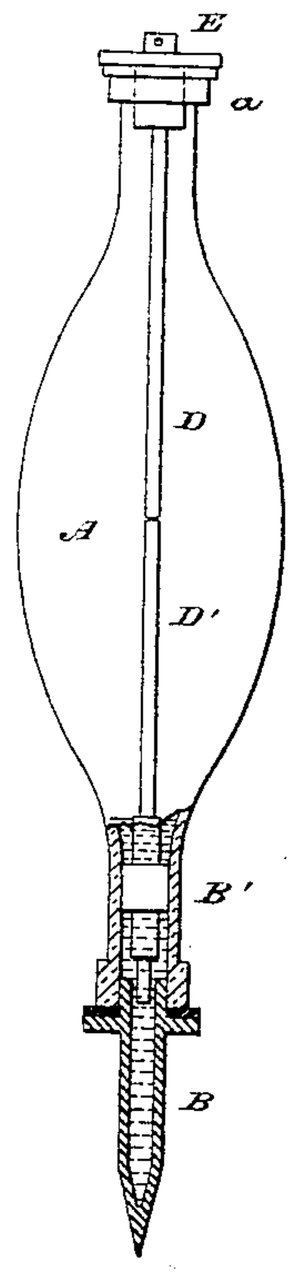


Fig. 4.

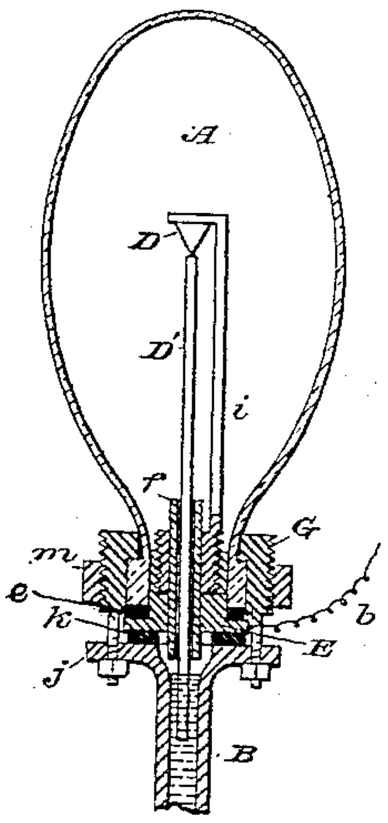


Fig. 5.

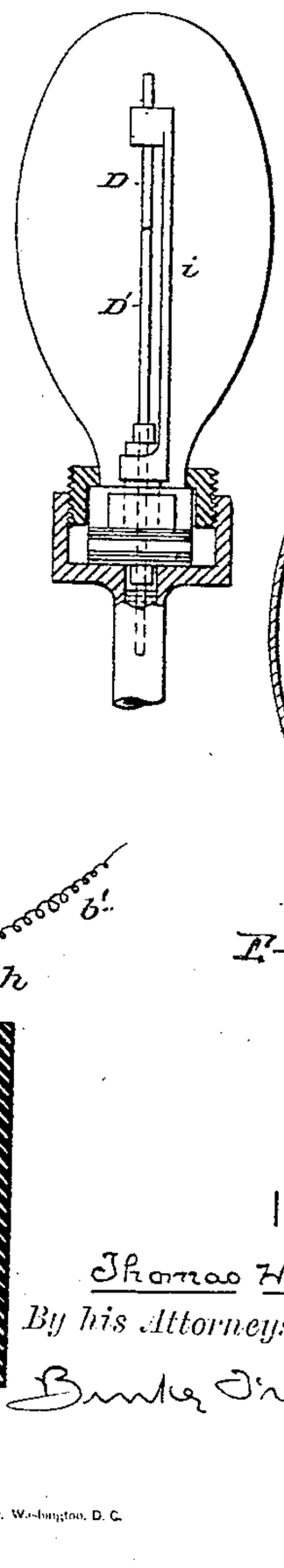
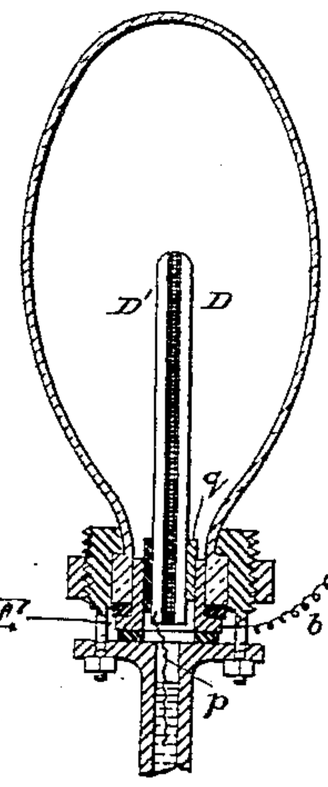


Fig. 6.



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THOMAS H. BLAMIRES, OF HUDDERSFIELD, COUNTY OF YORK, ENGLAND.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 291,867, dated January 15, 1884.

Application filed September 12, 1882. (No model.) Patented in England February 2, 1880, No. 455.

To all whom it may concern:

Be it known that I, THOMAS HOWARD BLAMIRES, a subject of the Queen of Great Britain, residing at Huddersfield, in the county of York, England, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

My improved lamp is of that class wherein an exhausted glass globe or bulb is employed containing an incandescent carbon or carbons, the vacuum being produced by filling the bulb with mercury and then withdrawing the latter into the stem of the lamp and preventing its return, preferably by means of a column of mercury of sufficient height to counterbalance the pressure of the atmosphere, as in a barometer.

The invention consists in certain features of construction, which will be fully hereinafter set forth.

Several different forms or modifications of my invention are shown in the accompanying drawings, of which—

Figure 1 is a vertical longitudinal section of the preferred form of lamp, embodying my whole invention. Fig. 2 is a detail view of the upper section thereof. Fig. 3 is an elevation partly in section of a modified construction of Fig. 1; and Figs. 4, 5, and 6 are sections showing other modifications.

Referring to Fig. 1, the lamp consists of a globe or bulb, A, of glass, with a long tubular stem, B, depending from its lower end and projecting into a cup or vessel, C.

Inside the globe A are arranged the carbons D D′, which are of any ordinary or suitable kind, for producing light upon the passage of an electric current through them. The carbons being in place, the lamp is inverted and filled with mercury, which runs down through the stem into the globe, and when both globe and stem are full of mercury the end of the stem is closed and placed in the mercury-cup C, and the lamp turned back to the vertical position. The mercury will then flow out of the lamp into the cup until the column is balanced by the atmosphere, leaving a perfect vacuum in the globe. This is the preferred method of exhausting the globe. All the different forms of my lamp are designed to be exhausted in this manner, although capable of being exhausted in the usual way.

I will now describe the lamp shown in Fig. 1 more in detail. The top of the globe A terminates in an orifice or neck, *a*, closed by a cap or stopper, E, to which the carbon D is fixed. I make this stopper of metal, so that it affords a connection between the external circuit-wire, *b*, and the carbon D. The other carbon, D′, projects downward into the mercury in the stem B and floats therein, so that it is kept continually pressed upward against the carbon D with a light contact. The neck *a* has a shoulder, *c*, and is ground on top to a perfectly flat surface. The stopper E fits into the neck, and has a flange, *d*, which projects over the top of the neck. Between this flange and the ground surface of the neck is placed a washer, *e*, of india-rubber, leather, or other suitable luting material. The stem B is wider or of greater diameter at B′, shortly below where it joins the globe than elsewhere, to provide room for the lower carbon, D′, and its accessories. This carbon is placed in a glass tube, *f*, and is free to slide therein, and the tube *f* is supported within the portion B′ of the stem by means of a ring, *g*, which is fitted around it. This ring is best made of insulating material.

The lamp is prepared for use as follows: The carbon D′ is first placed in the glass tube F, around which is the ring *g*, and these are dropped into the globe through the neck *a*, and rest in the portion B′ of the stem. The stopper E, with the carbon D attached, is then put in place, with the washer E beneath its flange. A sleeve, G, (shown in Fig. 2,) screw-threaded on its exterior, and divided diametrically into two parts, is then placed around the neck *a*, and a cap, H, is screwed down over the same. A screw, I, in this cap is then screwed down against the stopper E, drawing up the cap H and sleeve G until the latter abuts against the shoulder *c*, as shown in Fig. 2, and pressing the stopper E down firmly upon its seat. The lamp is then inverted, filled with mercury, and turned back and the bottom end of the stem inserted in the cup C. The cap H and sleeve G may now be removed, as the atmospheric pressure upon the stopper is sufficient to make a perfectly-tight joint and

prevent the admission of air. To prevent accidental disturbance, however, the stopper may be covered with plaster-of-paris or other suitable cement. The mercury-cup C is a closed vessel, into which the stem B fits tightly, and which is fitted with a screw-plug, *h*, which dips into the mercury within. Thus the variations in the atmospheric pressure are prevented from affecting the height of the column of mercury, and so altering the level of mercury in the stem B.

Electrical connection with the battery or generator is made by means of the wire *b*, which connects with the metallic stopper E, and by a wire, *b'*, which connects with the screw-plug *h*, by which means the current passes through the column of mercury in flowing between the wire *b'* and the carbon D'.

In order to prevent expansion around the neck *a* and stopper E, which might cause leakage, and also in order to prevent the possibility of a leakage of air through that joint, I provide a small vessel or channel, F, inclosing the neck and stopper, and containing some liquid, as mercury or water. This serves to keep the neck cool and to exclude air.

The novel features of my invention consist in the metallic stopper connection E, the adjustment of the lower carbon by causing it to float in the mercury, the employment of a tight mercury-cup, C, and the reservoir F of liquid surrounding the stopper. The metallic stopper affords a means of establishing electrical connection with the carbon D without having to resort to the expedient of passing the wire through the glass and uniting them by fusion, which is defective, owing to the difference in expansion between glass and metal causing a leakage around the wire. It also affords a ready means of gaining access to the globe, in order to renew the carbons, or for other purposes. The floating of the lower carbon in mercury causes it to press upward against the upper carbon with a light touch, insuring an imperfect electrical contact with consequent high resistance, which is extremely desirable in a lamp of this character. As either carbon wastes away, which is inevitable, but in the perfect vacuum found in my lamp is very slow, the lower carbon rises and the contact is preserved. The hermetic closing of the mercury-cup C insures that the mercury in the stem B shall preserve a constant level, so that the upward tendency of the floating carbon remains uniform. The vessel F insures absence of leakage at the stopper-joint.

I will now describe the other forms of lamp shown, constituting modifications of my invention.

Fig. 3 shows a lamp similar in construction to that shown in Fig. 1, except that the cup C is not used, and the tube B is made of soft metal instead of glass, and connected to the glass globe by a stopper applied similarly to the stopper E. The metal tube is thus joined to the glass, and is used to produce the vacuum in the same manner as the glass stem in Fig. 1. The metal tube is then nipped, so as to perfectly close it, and is cut off a short distance below the stopper, leaving sufficient mercury to float the carbon.

Fig. 4 shows a lamp without any neck or orifice at the top of the globe A, but with such a neck at the bottom thereof. Into this neck is fitted a hollow stopper, E, with a packing-ring, *e*, interposed between its flange *d* and the ground end of the neck, as already described. A carbon or metal block or point, D, is connected to this plug by an arm, *i*, and the carbon pencil D' passes loosely through a glass tube, *f'*, which is supported in the bore of the stopper. The lower carbon is thus insulated from the stopper. The tube or stem B is of metal, and has a flange, *j*, which is clamped against the stopper E, a washer, *k*, of india-rubber or other material being interposed to make a tight joint and insulate the stopper E from the tube B.

The clamp for uniting the parts is the equivalent of the stopping device shown in Fig. 2, and consists of a divided sleeve, G, externally screw-threaded, a ring, *m*, screwing thereon to hold its two parts together, a screw, *n*, projecting downward from each part of the sleeve G, and nuts screwing on these screws and forcing the flange *j* up firmly against the stopper and the latter against the neck of the globe. The electrical connection with carbon or metal point D is made through wire *b*, stopper E, and arm *i*, and connection with the floating pencil D' is made through the mercury, as before described.

Fig. 5 shows a similar construction to Fig. 4, except that, in place of the screws *n n* and their nuts, the flange *j* is made cup-shaped and screws upon the divided sleeve G. The carbon D is here shown as a pencil, the same as in Fig. 1.

Fig. 6 shows a construction of my lamp wherein the Jablochkoff candle is burned in a vacuum. The globe A and tube B are made separate, and are connected together in the same manner as shown in Fig. 4. The candle, consisting of parallel carbon-pencils D and D', is fitted in the bore of the stopper E. The pencil D' is insulated from the stopper, and connects with the mercury column through a wire, *p*, and the pencil D is electrically connected with the stopper E by a metal piece, *q*, or otherwise. The external connections are the same as described with reference to Fig. 4.

It is obvious that this invention is equally applicable whether the light is produced by incandescence of the material or by the electric arc between carbon points.

My invention may be in part availed of in case a loop or filament of carbonized material of high resistance is employed, instead of carbon pencils, as in the several "incandescing" lamps.

I claim as my invention—

1. An electric lamp consisting of the com-

bination of a glass globe containing mercury and formed with an aperture or neck, a metallic stopper closing said neck hermetically, the luminous carbon or carbons or equivalent electric lighting elements in said globe, an electrical connection between one terminal of said carbons and said metallic stopper, and electrical connection between the other terminal of said carbons and said mercury, substantially as set forth.

2. An electric lamp consisting of the combination of a glass globe formed with an aperture or neck, a metallic stopper closing said neck hermetically, a carbon or equivalent electric lighting element fixed to said stopper, a column or body of mercury in said globe, and electrical connection between the other carbon and said mercury, substantially as set forth.

3. An electric lamp consisting of the combination of a glass globe, a tube extending downward from the bottom thereof, a carbon or equivalent electric lighting element fixed in place in said globe, a body of mercury in said tube, and the other carbon floating in said mercury, and thereby pressed buoyantly against the fixed carbon, substantially as set forth.

4. In an electric lamp, the combination of a glass globe, A, formed with a neck having a shoulder, *c*, a metallic stopper, E, and its packing, *e*, a divided sleeve, G, screw-threaded on its exterior, a ring or cap screwing onto said sleeve and thereby holding its halves together, and a screw-coupling, substantially as shown, whereby the stopper is pressed to its seat by drawing against said sleeve.

5. An electric lamp consisting of a glass globe, a long tube or stem extending downwardly from the lower end thereof, the carbon or carbons or other electric lighting elements in said globe, a column of mercury in said tube, and a tight mercury-cup inclosing the lower end of said tube, substantially as set forth, whereby the variations in atmospheric pressure are prevented from affecting the height of the column of mercury.

6. In an electric lamp, the combination of a glass globe having a neck, a stopper closing said neck hermetically, and a vessel or receptacle surrounding the neck and containing a liquid whereby the stopper-joint is immersed, substantially as set forth.

In witness that I claim the foregoing I have hereunto set my hand this 26th day of May, 1882.

T. H. BLAMIRES.

Witnesses:
A. B. CROSSLEY,
ALLEN CROWE.