(No Model.)

P. O. JENKINS.

INCANDESCENT ELECTRIC LAMP.

No. 365,384. Patented June 28, 1887.

Fig. 1.

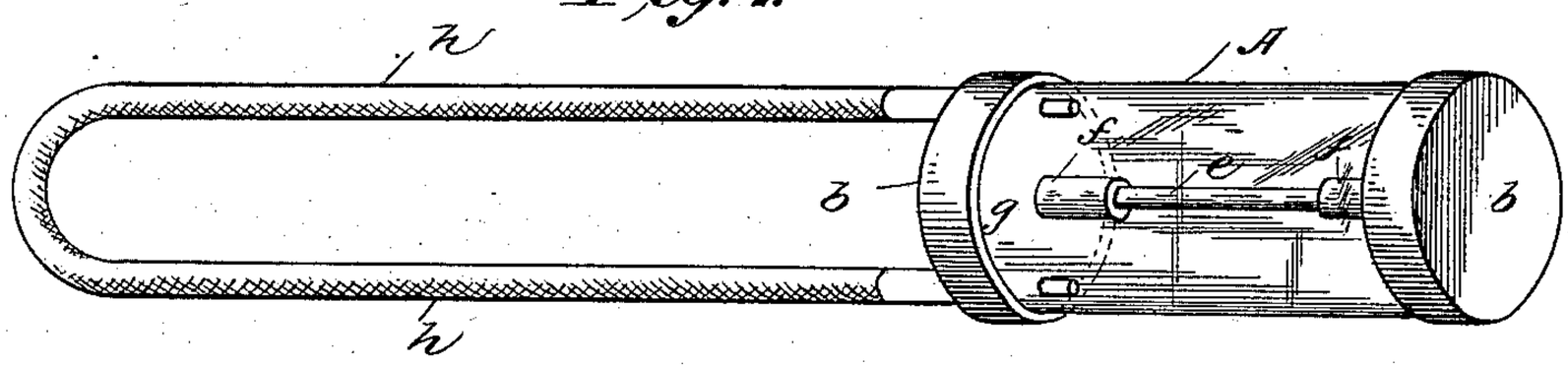


Fig. 2.

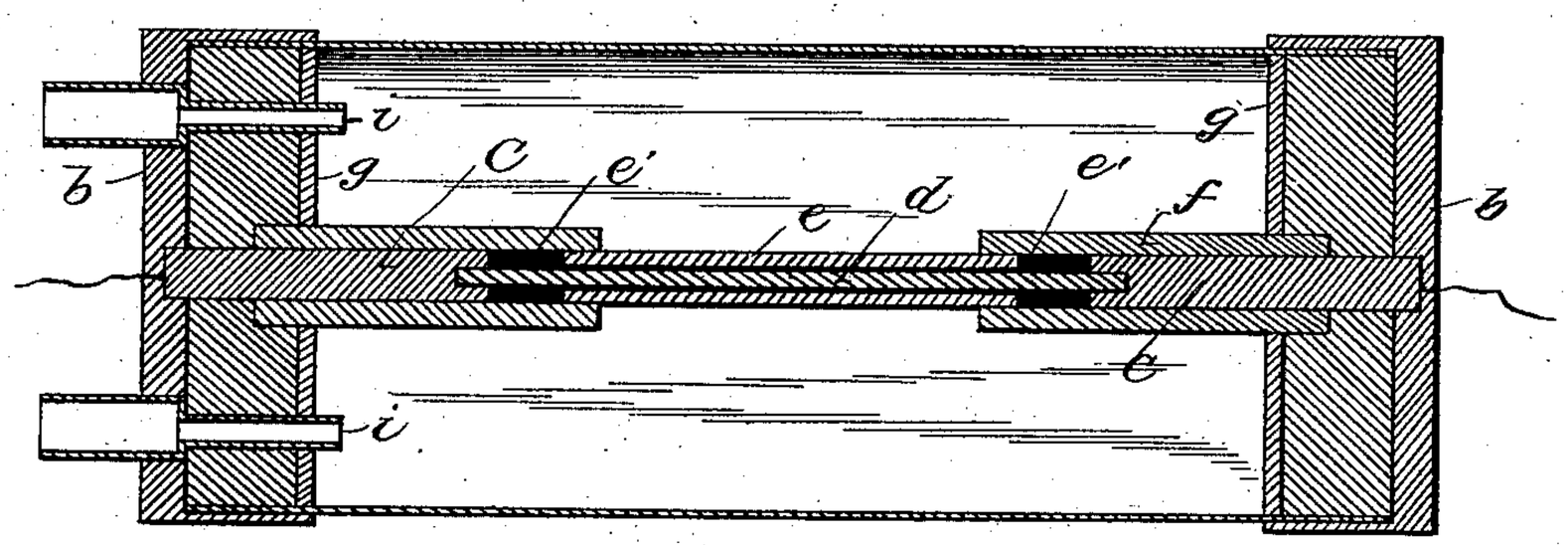


Fig. 6.

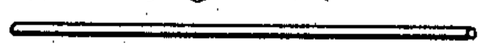


Fig. 7.

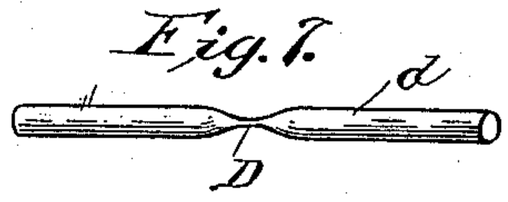


Fig. 8.

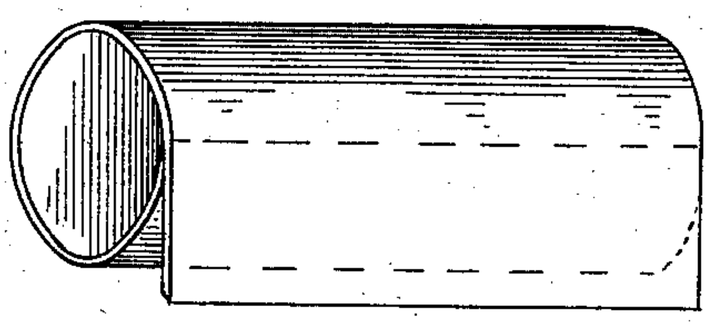


Fig. 9.

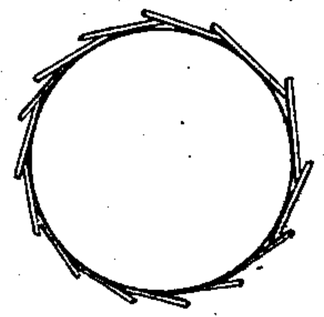


Fig. 5.

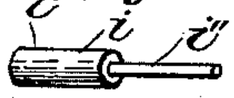
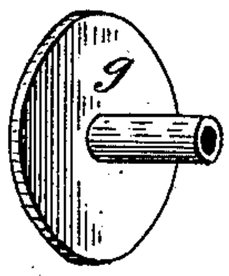


Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE.

PHILIP OSCAR JENKINS, OF WASHINGTON, DISTRICT OF COLUMBIA.

INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 365,384, dated June 28, 1887.

Application filed July 23, 1886. Serial No. 208,833. (No model.)

To all whom it may concern:

Be it known that I, PHILIP OSCAR JENKINS, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Incandescent Electric Lamps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to incandescent lamps, and has for its object to furnish a lamp of this class which will give forth a larger volume of light than heretofore, and which will be convenient and practical in use.

It consists in certain details of construction, arrangement, and combinations of parts and application of new materials, which I shall now proceed to fully describe, and the specific points of novelty in which will be particularly designated in the claims.

Referring to the accompanying drawings, Figure 1 is a perspective view of my invention complete. Fig. 2 is an enlarged sectional view of the same with the rubber tubing detached. Fig. 3 is a detail perspective of the inside plate, having the end of the soapstone cylinder inserted therein. Fig. 4 is a detail view of the soapstone cylinder. Fig. 5 is a detail view of one of the metallic tubes for conducting the gases into the rubber tubes. Figs. 6 and 7 are detail views of different forms of my carbon electrodes. Fig. 8 is a view in perspective of the manner of forming my mica casing. Fig. 9 is an end view of same, showing the projecting or overlapping ends of mica before it is secured down.

Like letters of reference mark the same parts in all the figures of the drawings.

Referring to the drawings by letter, A is the shell or casing of mica.

b b are the metallic caps, the average thickness of which is shown in section in Fig. 2.

C C are the electrode-wires piercing the ends of cap *b b*, and *d d* is the carbon electrode interposed between the wires C C, protected by an external insulated graphite shell, and having each end in contact with the wire electrodes, said ends of electrode *d* each projecting through a central perforation in each of the two disks *e'*, made of insulating substance interposed between the graphite and soapstone casings.

e is the casing, of graphite or other suitable substance, inclosing the carbon-insulated pencil *d*.

f f are the soapstone cylinders, having one of their ends respectively piercing the metallic plates *g g*, which serve to keep the plaster or other plastic material from rising up in the mica tube, and to press the material firmly against the inside of the rim and bottom of the metallic caps *b b*.

h h are the rubber tubes which receive and hold excess of carbon oxide or the gases conducted by the metallic tubes *i i* from within the mica casing. These tubes *i i* have one end, *i'*, larger than the other, *i''*, the object of which is to form a support for the ends of the rubber tubes. This rubber tube, the object of which has been partly explained, is of a very elastic nature, being capable of great distention, and consequently of an increase of capacity; and it may be attached to the lamp, as shown, or may be secured only at one end, having the other free and plugged up to prevent the ingress of air, thereby freeing the lamp from all danger of bursting by the expansion of heat.

D are modified forms of my carbon pencils, the advantages and uses of which will be hereinafter fully explained.

It is well known to those skilled in the art to which this invention appertains that the required resistance in an electrode for producing intensity of light cannot be obtained except in a small electrode or its equivalent in character or capacity, and that the maintenance of the light cannot be had unless in a vacuum or its equivalent; and, furthermore, it is known that this equivalent has not hitherto been discovered and utilized; and it will be obvious that a device that will accomplish this result is of great advantage and importance in incandescent lighting, and this is the object of my invention.

I find mica to be preferable to glass, it being sufficiently transparent, and is not so brittle as glass; but the former may be used when desired.

In constructing my invention, the mica be-

ing of a cleavable nature, I carefully separate its laminæ into very thin pieces, thereby obtaining the required elasticity, which enables me to properly roll it into form without breaking or injuring it. As shown in Figs. 8 and 9, it is formed by rolling tightly around a smooth unyielding cylinder of the size required with reference to the intended size of the lamps, then rolling it upon itself several times in a convoluted state. Rubber bands are then applied, or some suitable material is passed around its ends to sustain the cylindrical forms already gained. The unyielding cylinder upon which the mica has been wrapped is then withdrawn, leaving a hollow cylinder of mica of great firmness, one end of which is inserted into a metallic cup filled with some suitable plastic material. The electrode is then introduced and put into electrical contact with this cup by firmly touching its central surface or piercing it, as preferred, and the opposite end thereof is similarly treated.

Having proceeded thus far (premising that I have introduced a small hollow tube in one or both ends, which communicates with the space inside) I fasten a thin rubber tube, first pressing out the air therein and hermetically sealing it, its office being semi-vicarious, as hereinafter explained. The free edge of the mica left by wrapping is glued down upon the other layers of same, so that there may be no possible ingress of air.

The increase of the volume of light and the maintenance of the same for a correspondingly greater length of time is obtained by the employment of carbon pencils of from one-eighth to one-sixteenth of an inch in diameter, surrounded by a shell of the same or similar substance, (graphite being preferred,) which is provided with an aperture of somewhat greater diameter than the electrode inserted therein. Then this shell (when not of the refractory non-conducting oxides) is insulated both at its ends and upon its inside cylindrical surface. The former is done by interposing a solid substance of insulation similarly perforated, so that the small electrode within the shell may pass through it to the wires or poles, and the latter, by coating the small inclosed resisting-conductor with a coating or paste of the oxide of zirconium, aluminum, or any other insulating refractory substance suitable therefor. This arrangement prevents a loss of resistance in the inclosed pencil-conductor, allowing it its full power of conducting the heat generated by the electrical current at once to the shell, which shell becomes incandescent and gives forth from its larger surface a much greater volume of light than can be economically gained by the ordinary methods on a small electrode alone. When it is desired to increase the resistance on an electrode quite large, and at the same time to maintain its size, the diameter is reduced, as will be seen by the accompanying drawings.

The lamps are preferably made three and one-half inches in length, the mica being better adapted for this size than glass, and in addition, it may be said that a small lamp is more unyielding to pressure than a larger one.

To avoid the combustion of the electrode and the shell, I do not produce a vacuum by exhausting the air, but obtain an equivalent by reducing or converting the oxygen, which supports combustion, into carbonic oxide, in which form it is a non-supporter of combustion, and, together with the nitrogen present, has its only obstacle or disadvantage in the expansive property awakened by the heat within. This disadvantage is entirely overcome, as before explained.

To effect the equivalent of a vacuum in a lamp whose small amount of air is inadequate to more than supply a start toward the combustion-carbons within, it is only necessary to subject my construction of carbon electrode and shell to the action of the electrical current for a few moments, which will produce all combustion that can take place, and there remain only two gases—viz., carbonic-oxide and nitrogen, neither of which will produce or support combustion. This result is comparatively easy to obtain where the size of the carbons within the lamp is too large for the quantity of air; and this non-combustible condition will remain indefinitely, so long as there can be no ingress of air in the lamp, which contingency is carefully guarded against in the construction.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The method, substantially as described, of forming the cylindrical external mica casing, which consists in first separating the laminæ of the mica into thin elastic sheets or layers, which are then rolled or folded around an unyielding cylinder of suitable size and shape, then securing the said folds or layers together by gluing or otherwise, whereby a hollow transparent elastic mica cylinder or casing of suitable diameter and shape is formed for incandescent electric lamps, as set forth.

2. The combination, with suitable electrodes, of a carbon body projecting at each end through a central perforation in a disk, as shown, surrounding the casing of said electrodes, as set forth.

3. The combination, with suitable electrodes and an insulated body of carbon interposed between said electrodes, of an insulated graphite casing surrounding the said insulated carbon body, as set forth.

4. The combination, with suitable electrodes, of a carbon body projecting at each end through a central perforation in a disk surrounding the casing of the said electrodes, having its diameter centrally reduced, with the insulated graphite or other carbon casing, as set forth.

5. The combination of suitable electrodes, an insulated body of carbon interposed between said electrodes, having its diameter re-

duced between its extremities and insulated casing surrounding said body, and suitable soapstone or other cylinders surrounding the electrodes and supported at one end in the metallic plates at each end of the lamp, as set forth.

6. The combination, with suitable electrodes incased in the before-described cylinders, of a carbon body insulated by zirconium or other suitable substance and interposed between said electrodes and enveloping casing of graphite or other carbon body, and an insulating substance placed at the end of said carbon-enveloping body, as set forth.

7. The combination of a transparent inclosing mica shell, suitable electrodes inclosed therein, an insulated carbon body interposed between said electrodes, a casing for said body-insulating material at each end of the carbon body, and a suitable cylinder for incasing the electrodes, as described.

8. The combination of an incandescent lamp having transparent mica inclosing shell, suitable electrodes, an interposed carbon body between said electrodes enveloped with a graphite casing, and enveloping cylinders for said electrodes, with a glass reservoir consisting of rubber tubing impervious to air and communicating with the chamber of said lamp, as set forth.

9. The combination of the gas-reservoir consisting of rubber or other tubing impervious to air and communicating with the chamber of the lamps, with an incandescent lamp, as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

PHILIP OSCAR JENKINS.

Witnesses:

O. E. DUFFY,

M. P. CALLAN.