

(No Model.)

C. PAUTHONIER.

MANUFACTURE OF INCANDESCENT ELECTRIC LAMPS.

No. 487,890.

Patented Dec. 13, 1892.

Fig. 1.

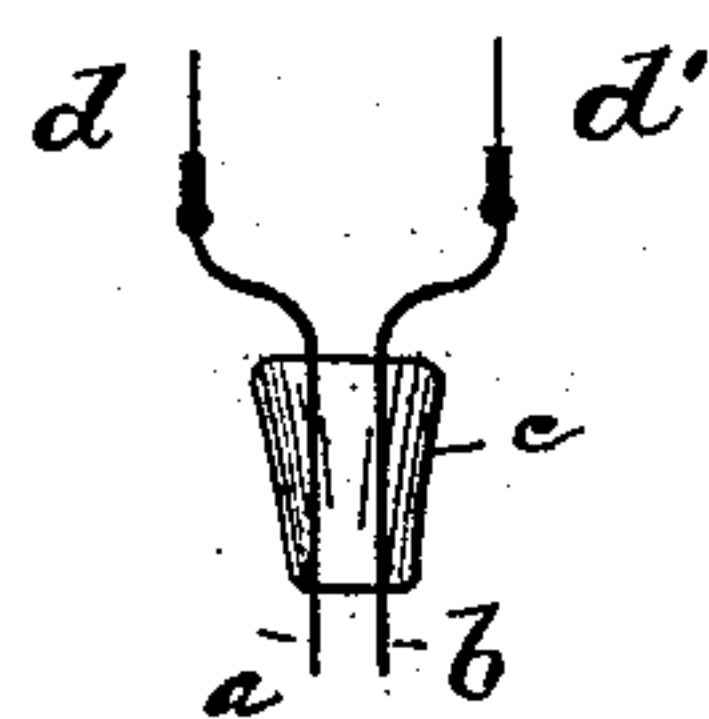


Fig. 2.

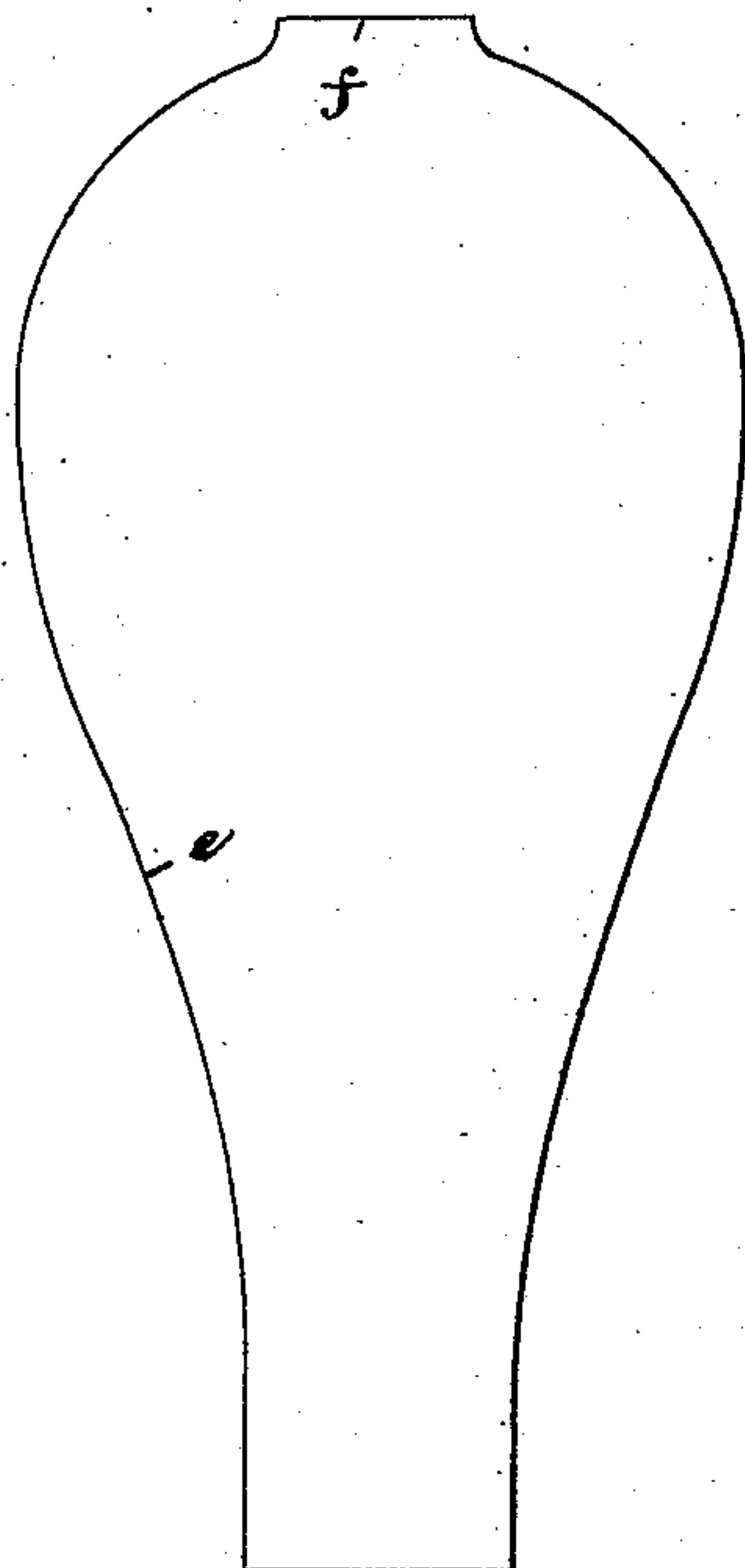


Fig. 3.

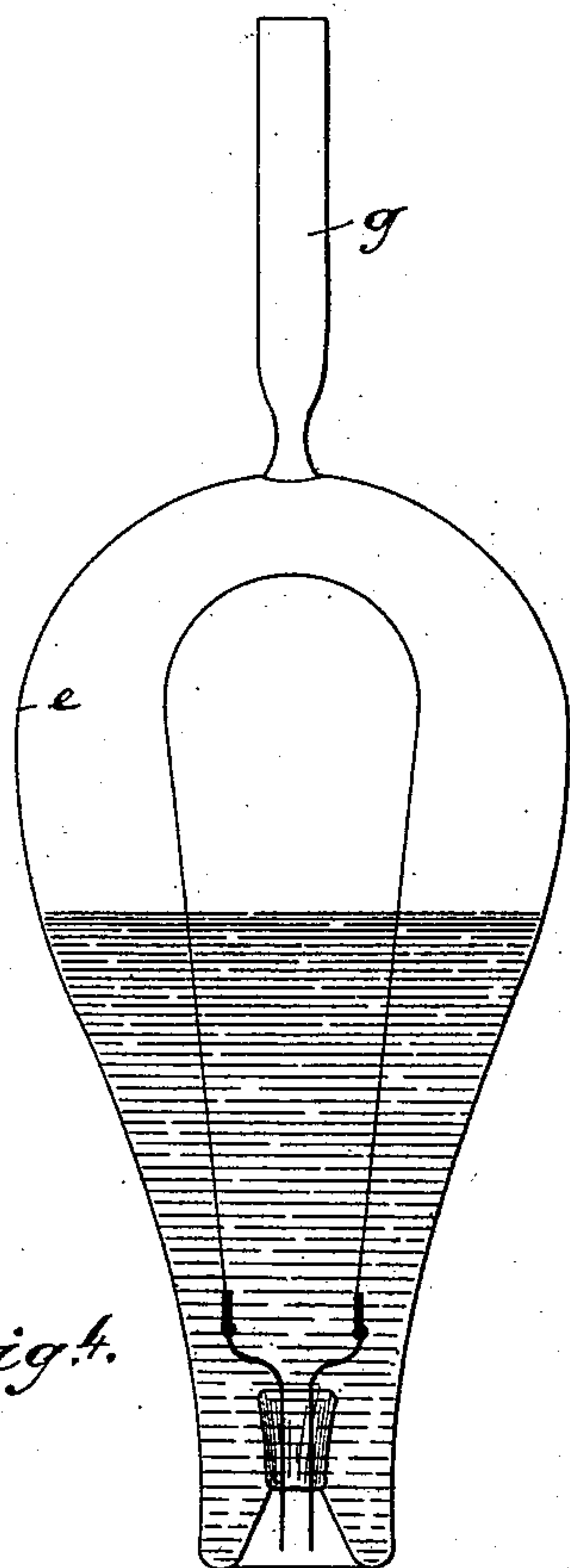
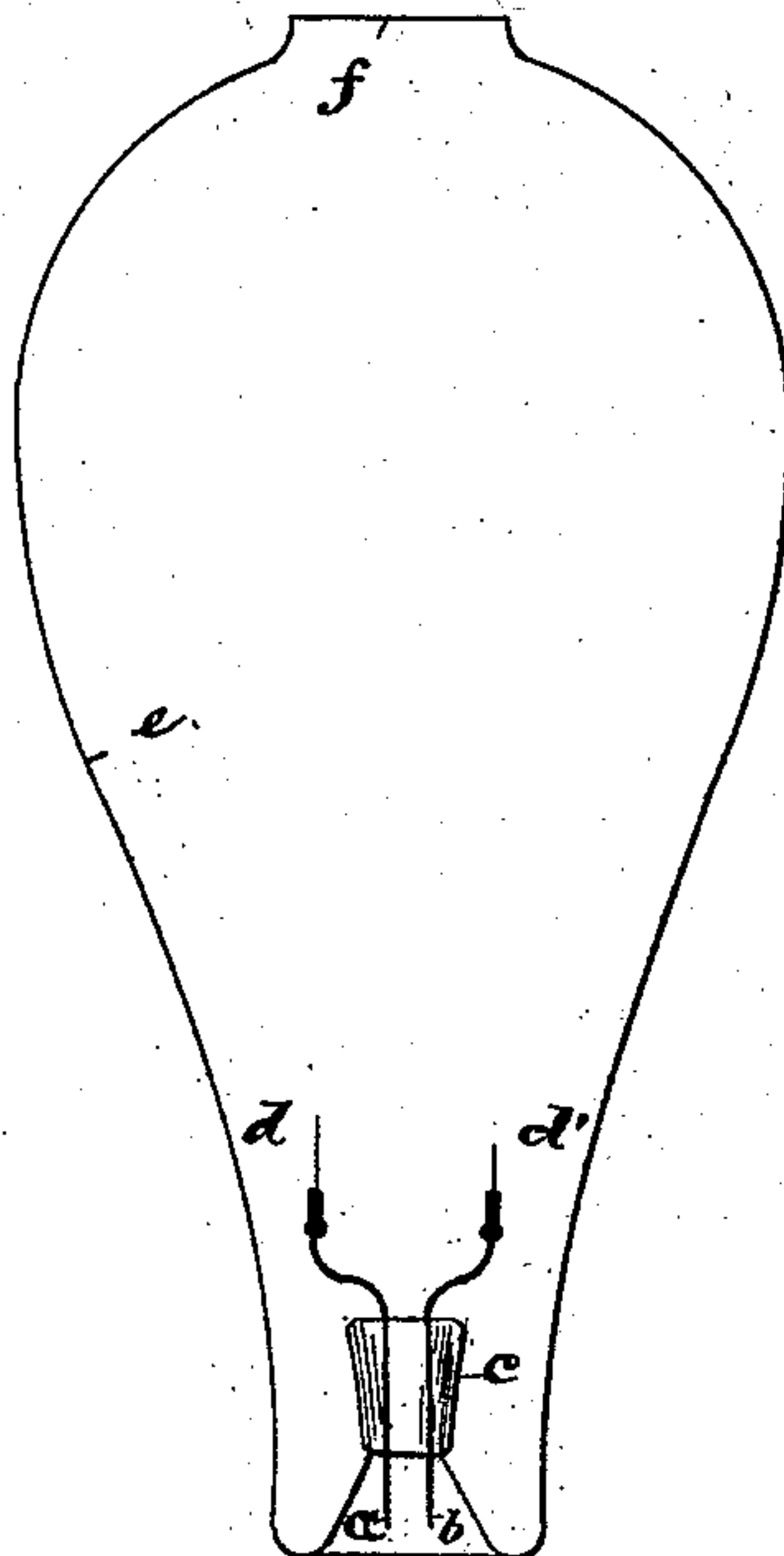
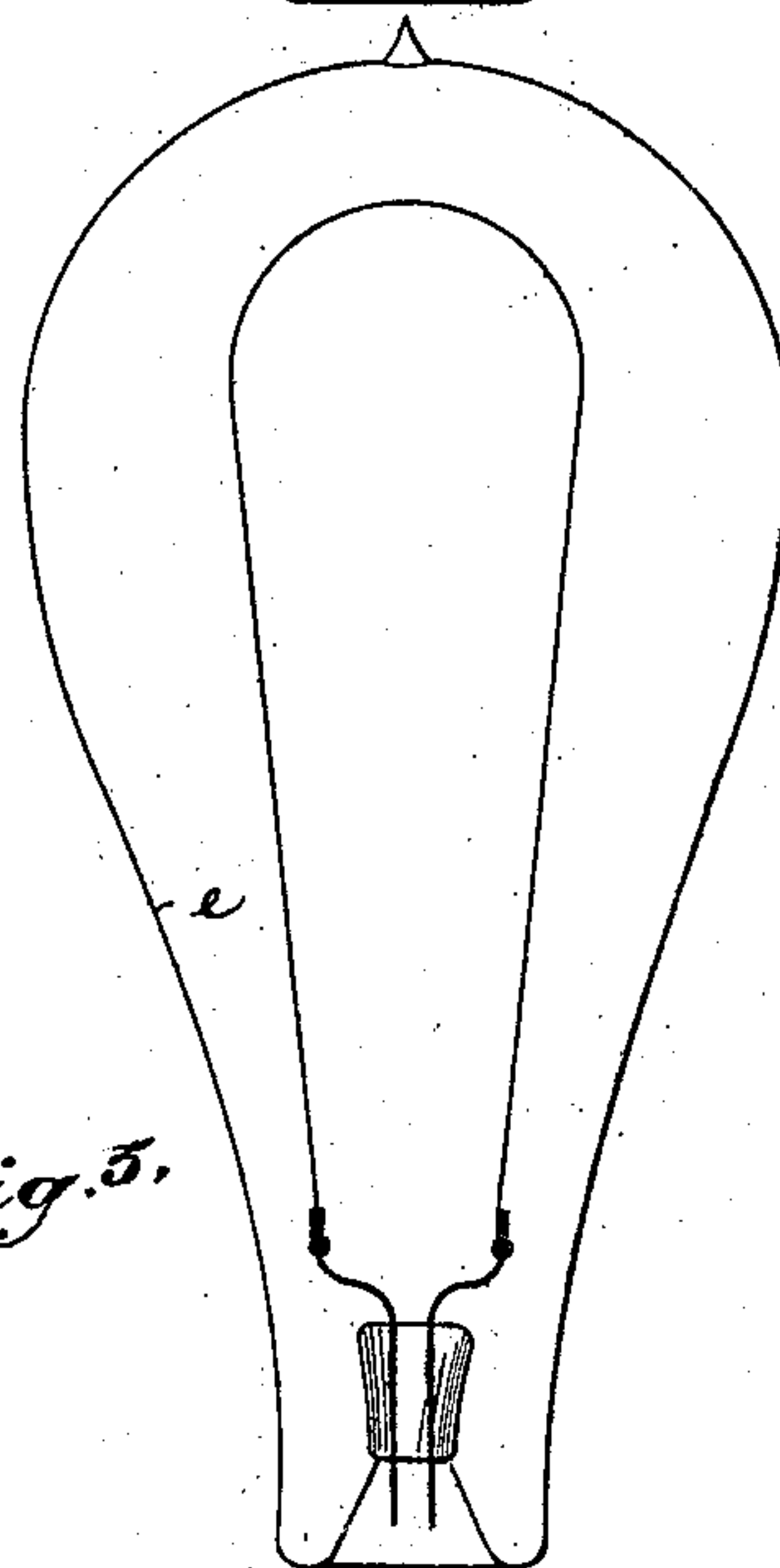


Fig. 5.



Attest;

*C. M. Benjamin
Esq.*

Inventor;

*Casimir Pauthonier
by Read & Price
his Attorneys.*

UNITED STATES PATENT OFFICE.

CASIMIR PAUTHONIER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO ADOLPH LADENBURG, OF NEW YORK, N. Y., AND R. T. McDONALD, OF FORT WAYNE, INDIANA.

MANUFACTURE OF INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 487,890, dated December 13, 1892.

Application filed April 20, 1892. Serial No. 429,838. (No model.)

To all whom it may concern:

Be it known that I, CASIMIR PAUTHONIER, a citizen of France, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Methods of Manufacturing Incandescent Electric Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to incandescent electric lamps, and involves a novel method of manufacturing the same by which they may be more quickly and cheaply made than under the processes heretofore in vogue. In all of the processes heretofore used the lamp-filament is mounted upon the leading-in conductors, which are fused into a small piece or button of glass, and the whole is then secured by fusion to the stem of the lamp-bulb. The handling of the mounted filament necessary before it is finally fixed in its bulb involves a considerable amount of breakage and a very high degree of skill in the workmen, so that the price of the lamp is increased to about four times the cost of the materials which enter into its construction. Leading-in wires of platinum are universally used by reason of the facility with which that metal may be fused into glass, its ratio of expansibility when heated being about the same as that of glass. The leading-in wires being fused into a piece of glass, the filament is fixed to the electrodes by a deposition of carbon resulting from the decomposition of a hydrocarbon, with which the joint is surrounded when a current is passed and the filament is brought to incandescence. In conducting this operation the workman secures the filament, the resistance of which has been accurately determined, in a small clamp on the electrodes and plunges it into a vessel containing the hydrocarbon. Current is then passed through the joint and the temperature raised, causing a decomposition of the hydrocarbon and a deposition of finely-divided carbon at the joint, forming a perfect contact. The filament is then built up to a uniform resistance by surrounding it with

a hydrocarbon gas and heating it by means of an electric current. The parts which are of greater resistance than others are raised to a higher degree of temperature by the current, and a greater deposition of carbon occurs at those points, so that after a certain period of treatment the filament is rendered uniform in resistance. In this condition the mounted filament must be transferred to the glass-blower, by whom it is sealed into the bulb of the lamp. Not only does considerable breakage result from the repeated handling of the mounted filament, but in spite of the high degree of skill of the workman it is almost impossible to mount the filament in a perfectly-erect position within the bulb. The filament itself interferes materially with a rapid and efficient mounting, as the slightest vibration causes a violent trembling, and great care and skill must be exercised to prevent breakage. In the mode of manufacture practiced by me these difficulties are entirely removed by first sealing the leading-in wires into the bulb and then presenting the filament to the electrodes after they have been fixed and attaching it by deposition of carbon.

In prior patents, No. 363,909, of May 31, 1887, and No. 439,178, of October 28, 1890, I described a method of repairing broken filaments, consisting in forming a deposition of carbon between the sundered parts or removing the old filament and attaching a new one by carbon deposition.

My present invention is applicable to new lamps, and is designed to effect increased economy in manufacture and superiority in the product. I preferably fix upon the electrodes before they are secured to the bulb a short piece or stub of carbon, with which the ends of the filaments may be brought into contact when the joint is being made, or in lieu of this the extremities of the leading-in wires may be coated with a conducting-paste which dries rapidly, such as a mixture of plumbago, sugar, and india-ink. Whether the paste be used or the short piece of carbon the desideratum is simply to provide a primer through which a firm union may be formed between the leading-in wire and the extremities of the filament. By this process

I avoid a considerable portion of the expense of the lamp, and the operation can be conducted by workmen of an ordinary degree of skill with great rapidity, so that whereas
 5 but one hundred to one hundred and twenty mountings have heretofore been made in a day of ten hours I am enabled to have three hundred or three hundred and fifty made by a lower-grade workman.

10 My invention therefore comprises a series of steps in the manufacture of a lamp involving first the sealing into the lamp of the leading-in wires and the subsequent introduction of the filament through an opening in the
 15 bulb and its attachment to the electrodes.

It also comprises other features of the process, the novelty of which will appear from the description hereinafter following, and will be definitely indicated in the claims appended to the specification.

20 In the accompanying drawings, which illustrate my invention, Figure 1 is a view illustrating the leading-in wires sealed into a button or stem of glass. Fig. 2 represents a
 25 glass bulb open at both ends as used in my process. Fig. 3 represents the leading-in wires sealed into the stem of the bulb. Fig. 4 represents the mode of securing the filament to the electrodes. Fig. 5 represents a
 30 filament completely mounted within its bulb.

The platinum leading-in wires *a b* are first sealed into a button *c* of glass in the usual manner, and have preferably mounted at their upper extremities a short piece of carbon *d*
 35 *d'* of about the same diameter as the filament. The whole is then introduced within the stem of a bulb *e* and sealed therein, as indicated in Fig. 3. The prepared filament is then introduced through the opening *f* in the
 40 top of the bulb and a hydrocarbon, either liquid or gaseous, is introduced. The filament is handled by a delicate pair of nippers supported upon a gallows for convenience of handling. One end of the filament is brought
 45 into contact with one of the electrodes and a current of electricity is led through the leading-in wire to the point at which the filament is held by the nippers. The stub of carbon and that portion of the filament adjacent thereto is thus heated and a deposition
 50 of carbon occurs, forming a firm joint. The other end of the filament is then similarly attached to the other electrode, when the filament will be found to have a firm support. By reason of the electrodes at the
 55 time of their attachment having no filament mounted thereon the workman can handle the parts without special care and can quickly and efficiently fuse together the glass button and the stem of the lamp. A tube *g* of
 60 glass is then attached to the open end of the bulb, and the filament may be built up to

uniform resistance by passing an electric current through it in the presence of a hydrocarbon. The stem is then connected with a
 65 Sprengel pump or other means of exhaustion and a vacuum produced, after which the tube is sealed at the point where it connects with the bulb and is removed, leaving the completed lamp, as illustrated in Fig. 5. The
 70 important incidents of this process as contradistinguished from those now in vogue are that all the filaments are uniformly mounted in an erect position, the operation is more quickly and cheaply effected, a less degree of
 75 skill is required to perform the operations, and a minimum amount of breakage of filaments results.

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

1. As a mode of manufacturing incandescent electric lamps, consisting in first sealing the leading-in wires into the bulb, then introducing the filament through an opening in
 85 the bulb and affixing it in conductive relation to the electrodes, then forming a vacuum within the bulb, and finally sealing the opening through which the filament was introduced.

2. The herein-described mode of manufacturing incandescent electric lamps, which consists in sealing the leading-in wires to the bulb, then introducing the filament through
 90 an opening in the bulb and fixing it upon the electrodes, then building up the filament to a uniform resistance, and finally exhausting and sealing the bulb.

3. The herein-described mode of manufacturing incandescent electric lamps, which
 100 consists in sealing the leading-in wires to the bulb, introducing the filament through an opening in the bulb, then affixing the terminals of the filament to the electrodes by depositing carbon from a suitable hydrocarbon,
 105 then forming a vacuum, and finally sealing the bulb.

4. The herein-described mode of manufacturing incandescent electric lamps, which
 110 consists in first sealing into the bulb the leading-in wires upon the electrodes of which is a primer of carbon, then introducing the filament through an opening in the bulb and forming a joint between its extremities and the electrodes by a deposition of carbon from
 115 a hydrocarbon, and finally forming a vacuum and sealing the bulb.

In testimony whereof I affix my signature in presence of two witnesses.

CASIMIR PAUTHONIER.

Witnesses:

MARY E. CONLEY,
 E. H. CRANDELL.